62RA,RB,RC,RD07-38
Dedicated Outdoor Air Rooftop Unit
Geothermal Water Source Heat Pump
with Optional Energy Conservation Wheel

Installation, Start-Up, and Maintenance Instructions

IMPORTANT: This installation instruction contains basic unit installation information including installation of field control devices. For information on unit start-up, service, and operation, refer to the unit Controls, Start-Up, Operation, Service, and Troubleshooting Instructions also enclosed in the unit literature packet.

CONTENTS

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform the basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING

Before performing recommended maintenance, be sure main power switch to unit is turned off and lockout tag is installed. Electrical shock could cause personal injury.

⚠ CAUTION

Puron® refrigerant (R-410A) systems operate at higher pressures than standard R-22 systems. Do not use R-22 service equipment or components on Puron refrigerant equipment. If service equipment is not rated for Puron refrigerant, equipment damage or personal injury may result.

⚠ WARNING

1. Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury, or loss of life. Refer to the User's Information Manual provided with this unit for more details.
2. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

What to do if you smell gas:

1. DO NOT try to light any appliance.
2. DO NOT touch any electrical switch, or use any phone in your building.
3. IMMEDIATELY call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.

If you cannot reach your gas supplier, call the fire department.

⚠ CAUTION

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations. DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed. Failure to follow these procedures may result in damage to equipment.

⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system.
e. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

INSTALLATION

Step 1 — Place Unit (Location and Clearance) — A 36-in. clearance must be allowed for access to the compressor and electrical panel. When installed at ground level, the unit should be mounted on a level concrete slab which should extend at least 2-in. beyond the unit on all sides. The top of the slab should be 2-in. above the ground level. The depth of the slab below the ground level and its structural design is governed by the type of soil and climatic conditions. The slab must not be in contact with any part of the building wall or foundation. The space between the slab and building wall prevents the possibility of transmitting vibrations to the building. The dimensions of the slab or roof mount should be checked and verified before the equipment arrives. Unit supports, roof opening, roof curb flashing, drain requirements, and electric locations are important to good installation. See Fig. 1-12 and Tables 1-3.

When installing the equipment on the top of a building, the following should be considered. Structural members supporting the unit must be sufficiently strong for the weight of the unit and mounting rails. Transmission of sound into the building is sometimes a problem when the structure is not strong enough.

Locate the unit as near as possible to the center of the area to be environmentally controlled. Sufficient clearance must be available for service, edge of roof, other units, or hazards. The condenser air inlet and discharge air must be unobstructed by overhang, walls, or other equipment. Avoid locations next to exhaust fans or flues.

Select a location where external water drainage cannot collect around the unit. Locate the unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level. Where snowfall is anticipated, mount the unit above the maximum snow depth for the area.

Step 2 — Install Curb — Proper installation for the 62R units requires that the roof mounting of the curb be firmly and permanently attached to the roof structure. Check for adequate fastening method prior to setting the rooftop onto the curb.

Inspect curb to ensure that none of the utility services (electric, gas, drain lines) routed through the curb protrude above the curb. Being a fully welded solid bottom curb, duct connections can be made before unit is set on the curb. Duct openings are to be sized and cut by the installing contractor in the solid curb. See Fig. 11 and 12.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a water tight seal. Improperly applied gasketing also can result in air leaks and poor unit performance.

Step 3 — Rig the Unit

⚠ WARNING

Be sure that the crane and lifting materials (bars, cable, chain or other lifting device) capacity is adequate for the unit weight. See Table 3 on page 17 for unit weights. The total unit weight calculated must include all appropriate options for your unit. Certain options can add significant weight to a unit.

Spreader bars keep the lift cables from damaging the cabinet once the unit has been lifted, these bars will be required in all instances. Keep the tension equal, improper lift tension can damage wiring, refrigeration lines, and the water tight integrity of the cabinet as well as sheet metal damage to the unit cabinet. See Fig. 1 for additional information.

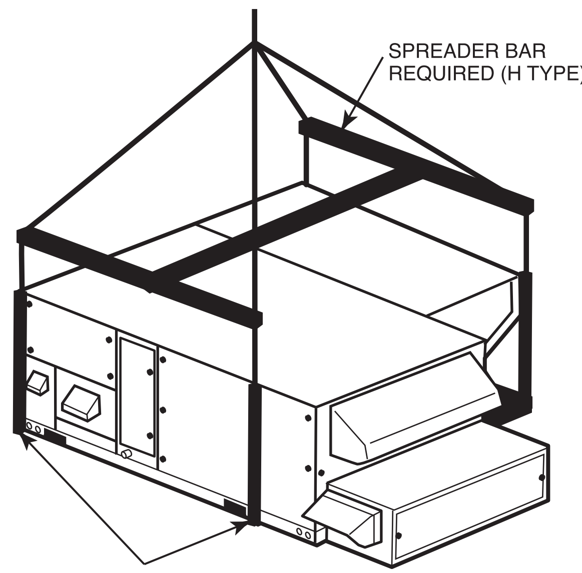


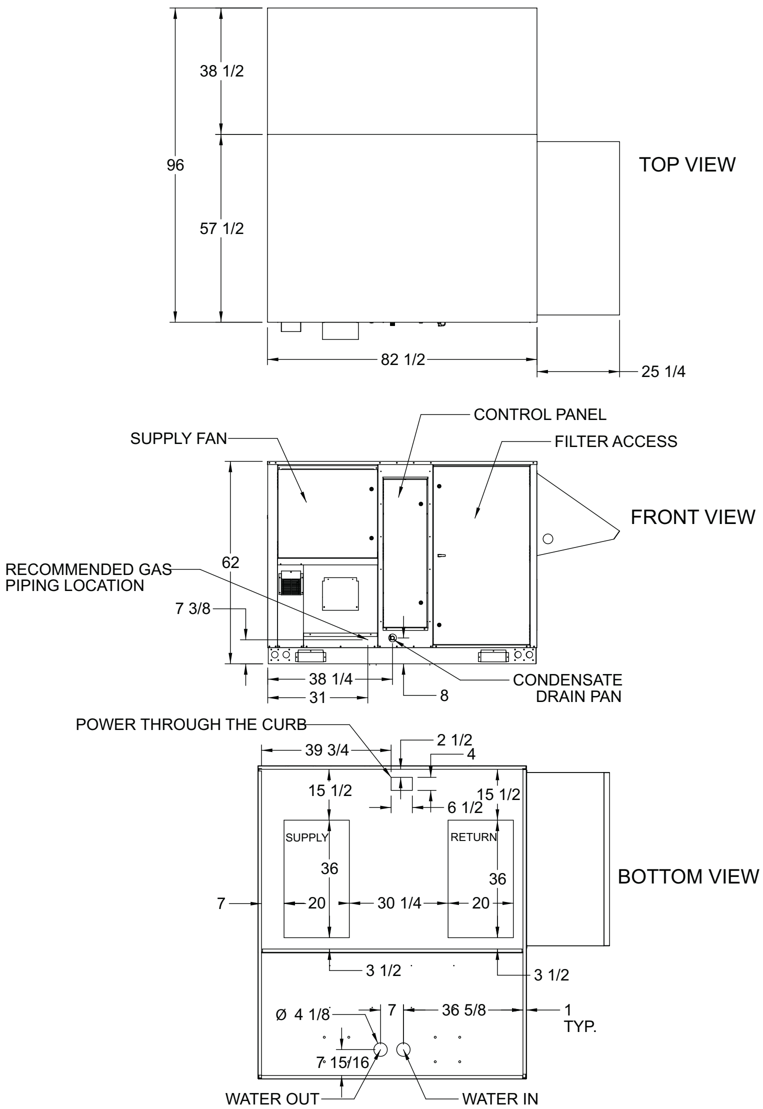
Fig. 1 — Unit Rigging

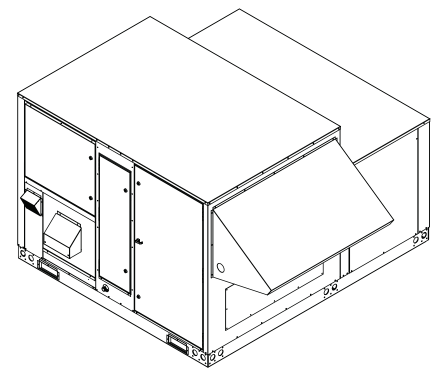
Lower unit carefully onto roof mounting curb or mounting rails or ground level slab. While rigging unit, center of gravity will cause condenser end to be lower than supply/return air end. Bring condenser end of unit into alignment with the curb. With condenser end of unit resting on the curb member and using the curb as a fulcrum, lower the front end of unit until entire unit is seated on curb.

RIGGING REMOVAL — Remove spreader bars, lifting cables, and other rigging equipment. Use caution not to dent, scratch or damage cabinet or intake and exhaust hoods.

⚠ CAUTION

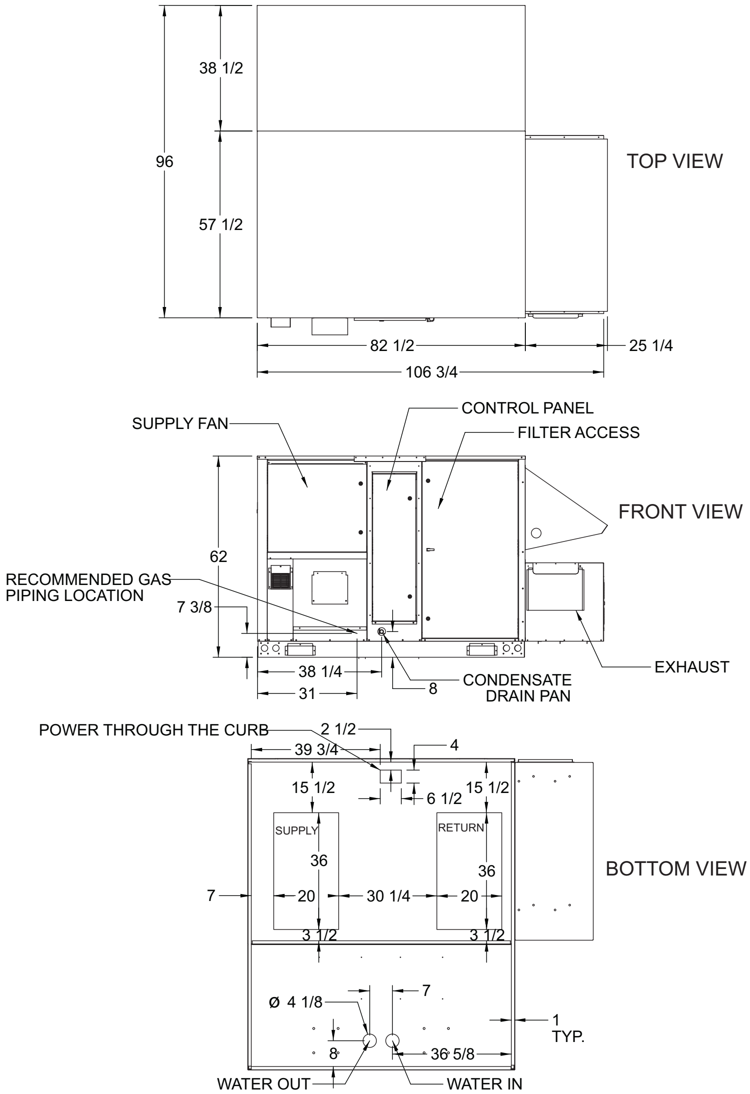
Do not allow crane hooks and separator bars to rest on roof of the unit. Damage to unit may result.

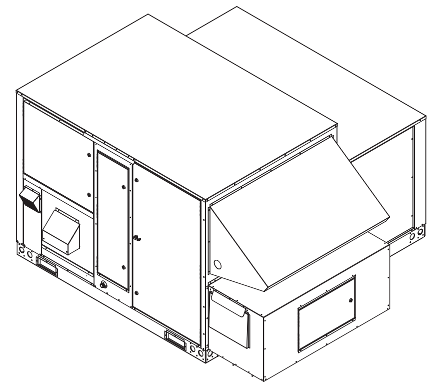




NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

Fig. 2 — Unit Dimensions — 62RA,RB07-09 Standard Units

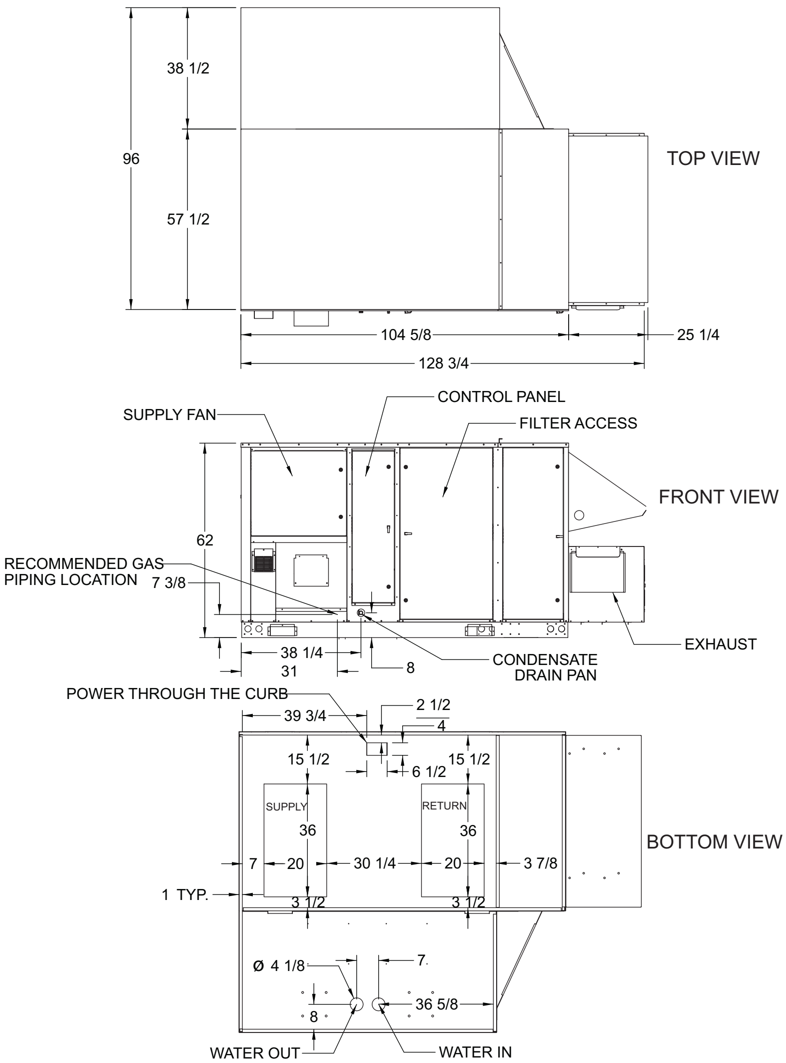


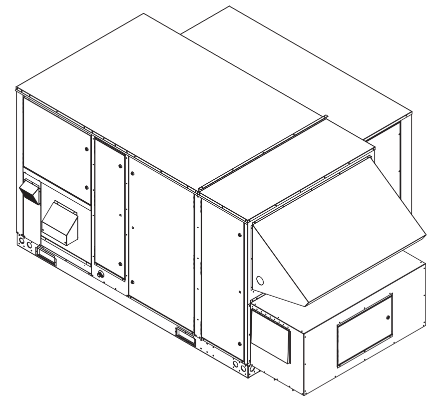


NOTES:

1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

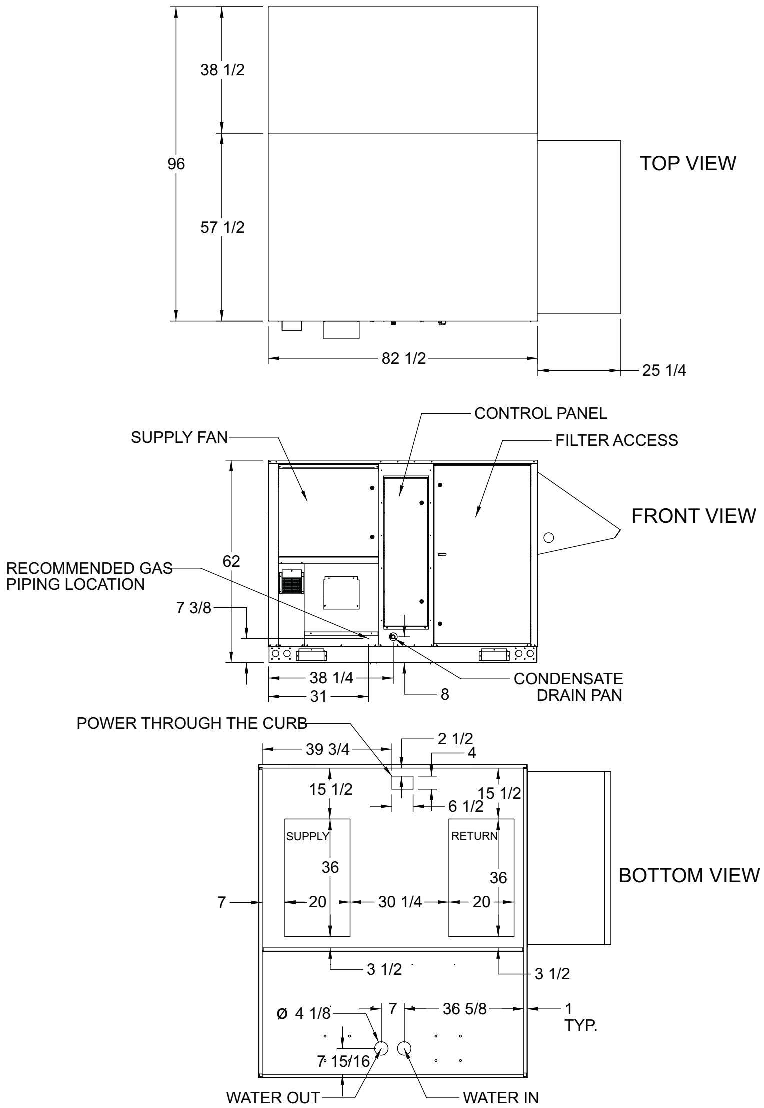
Fig. 3 — Unit Dimensions — 62RC,RD07-09 Units with Optional Exhaust

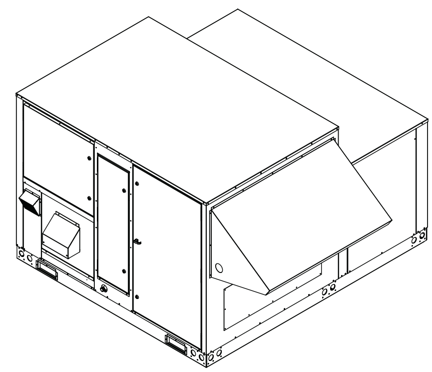




NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

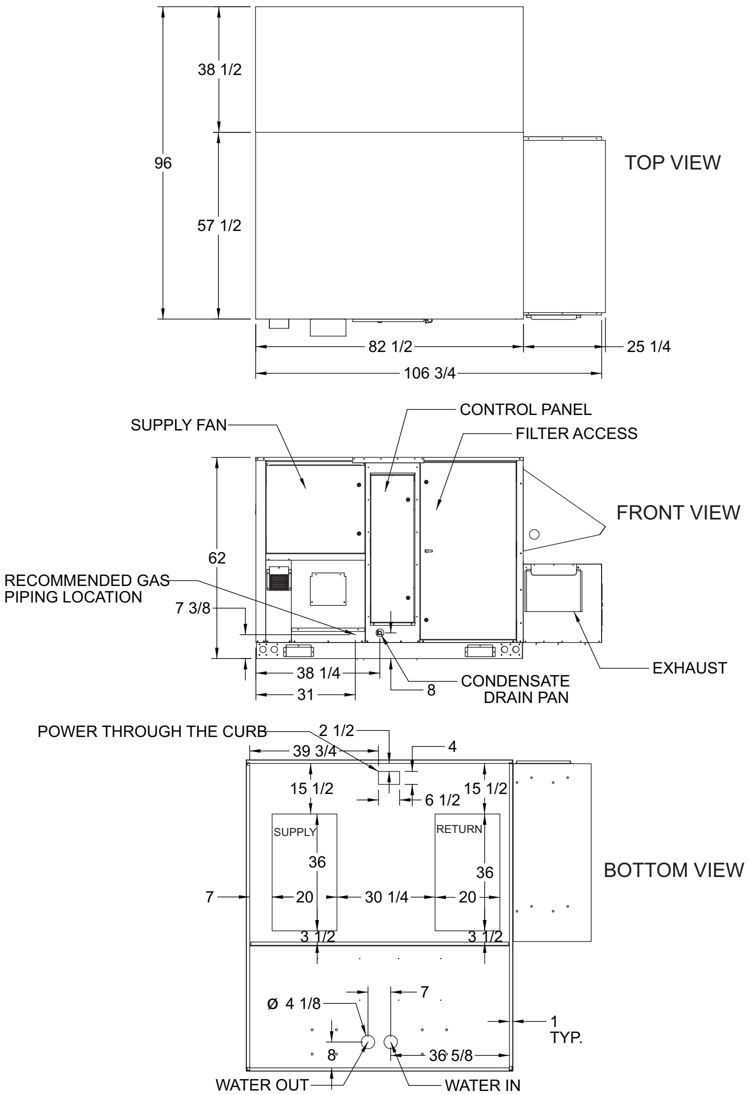
Fig. 4 — Unit Dimensions — 62RC,RD07-09 Units with Optional Energy Conservation Wheel

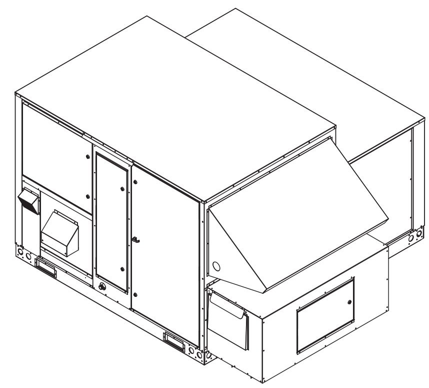




NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

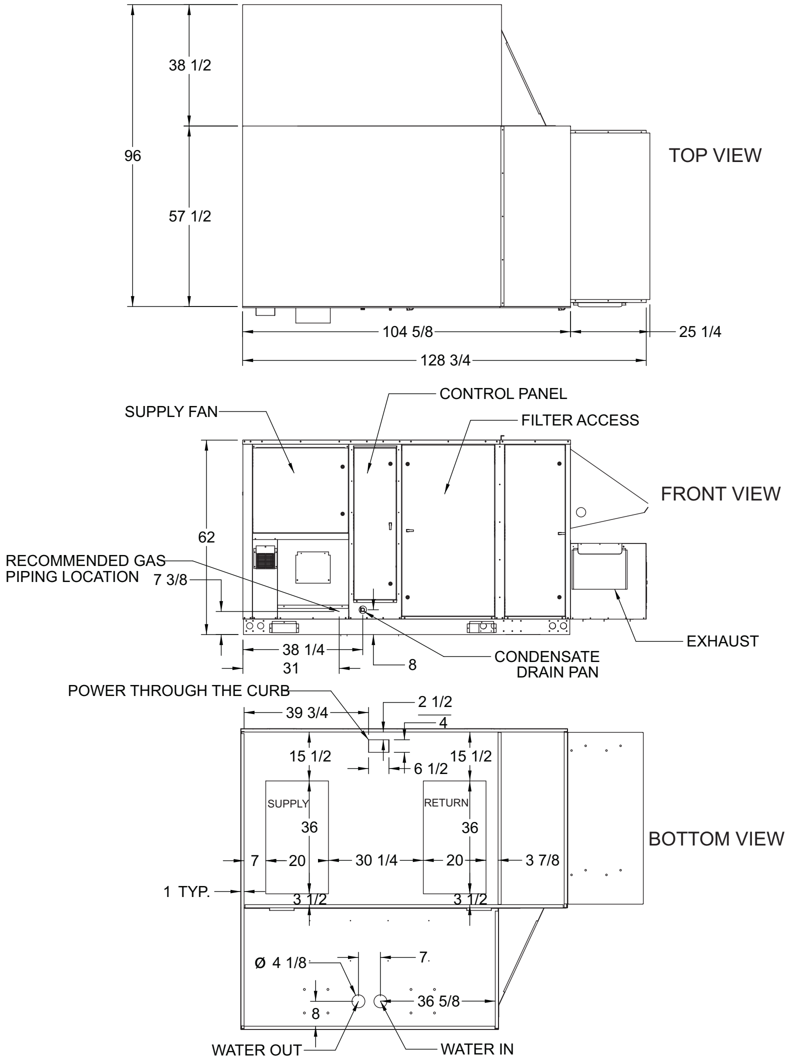
Fig. 5 — Unit Dimensions — 62RA,RB12-20 Standard Units

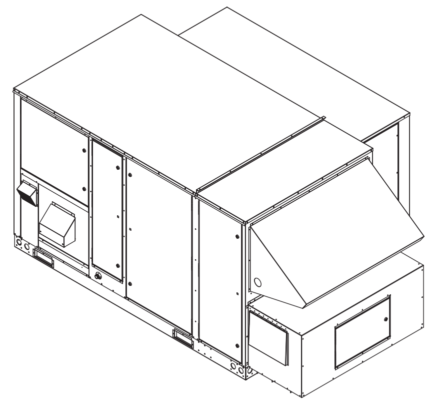




NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

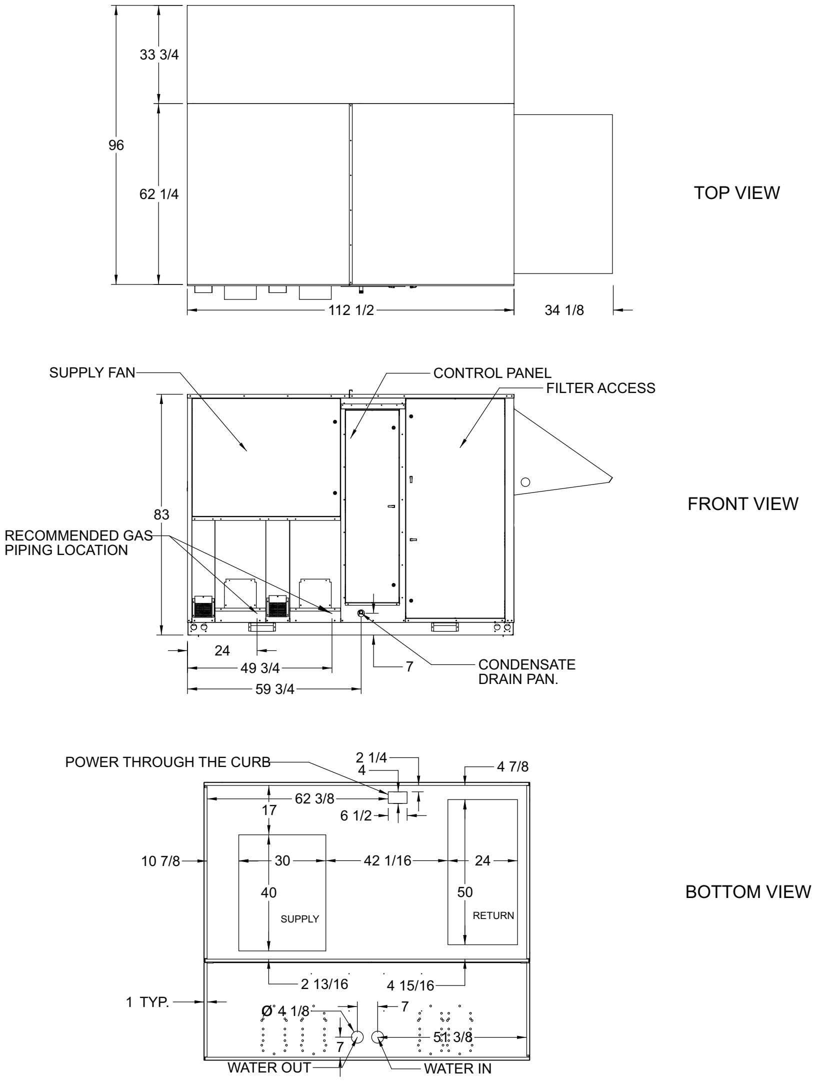
Fig. 6 — Unit Dimensions — 62RC,RD12-20 Units with Optional Exhaust

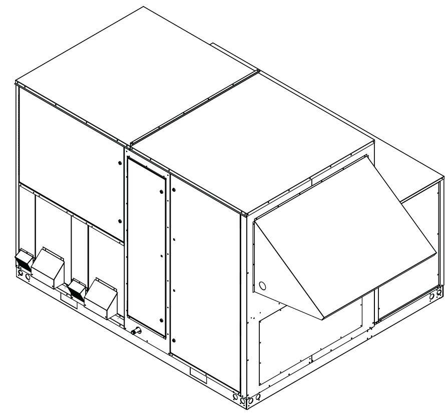




NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

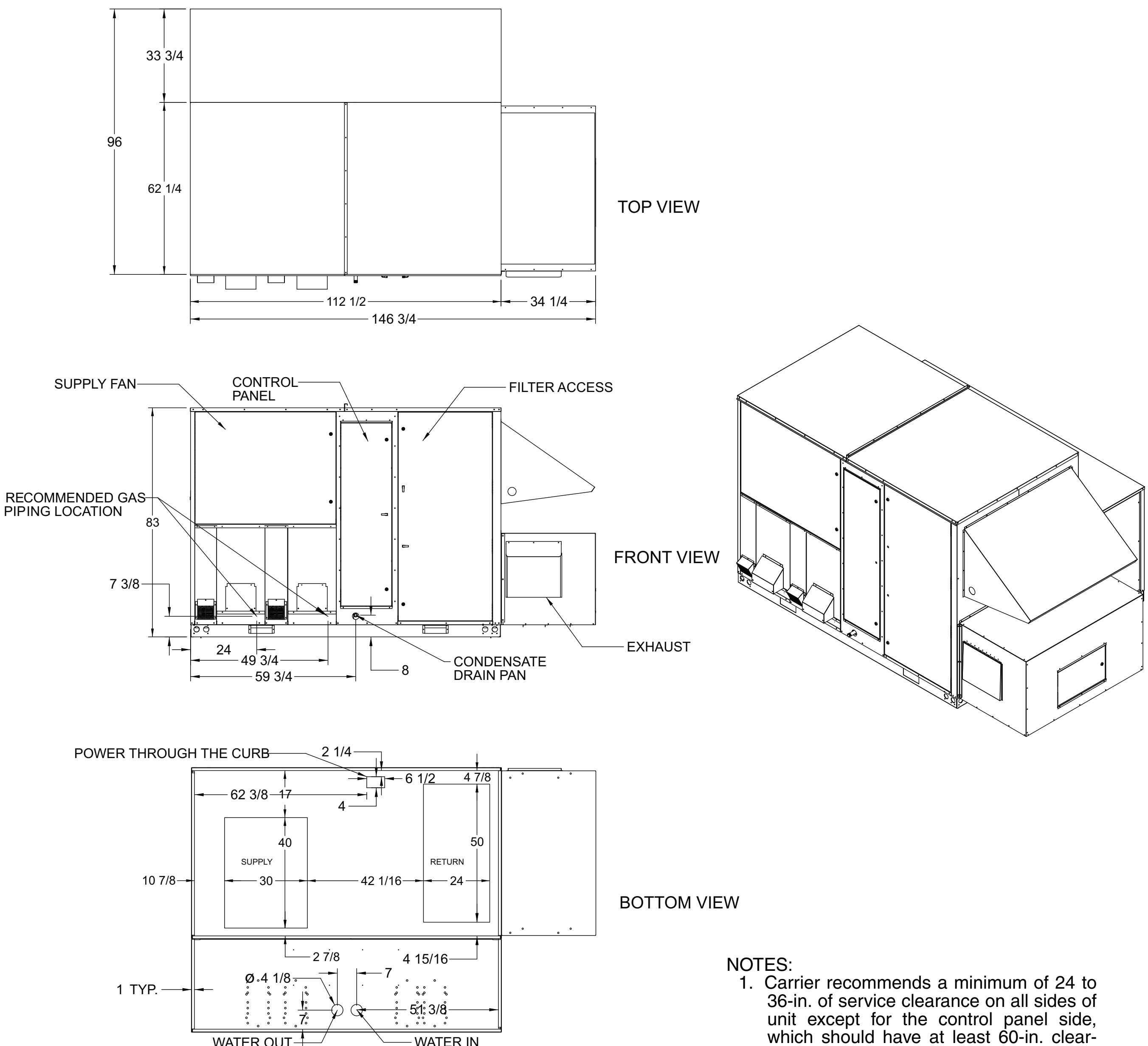
Fig. 7 — Unit Dimensions — 62RC,RD12-20 Units with Optional Energy Conservation Wheel





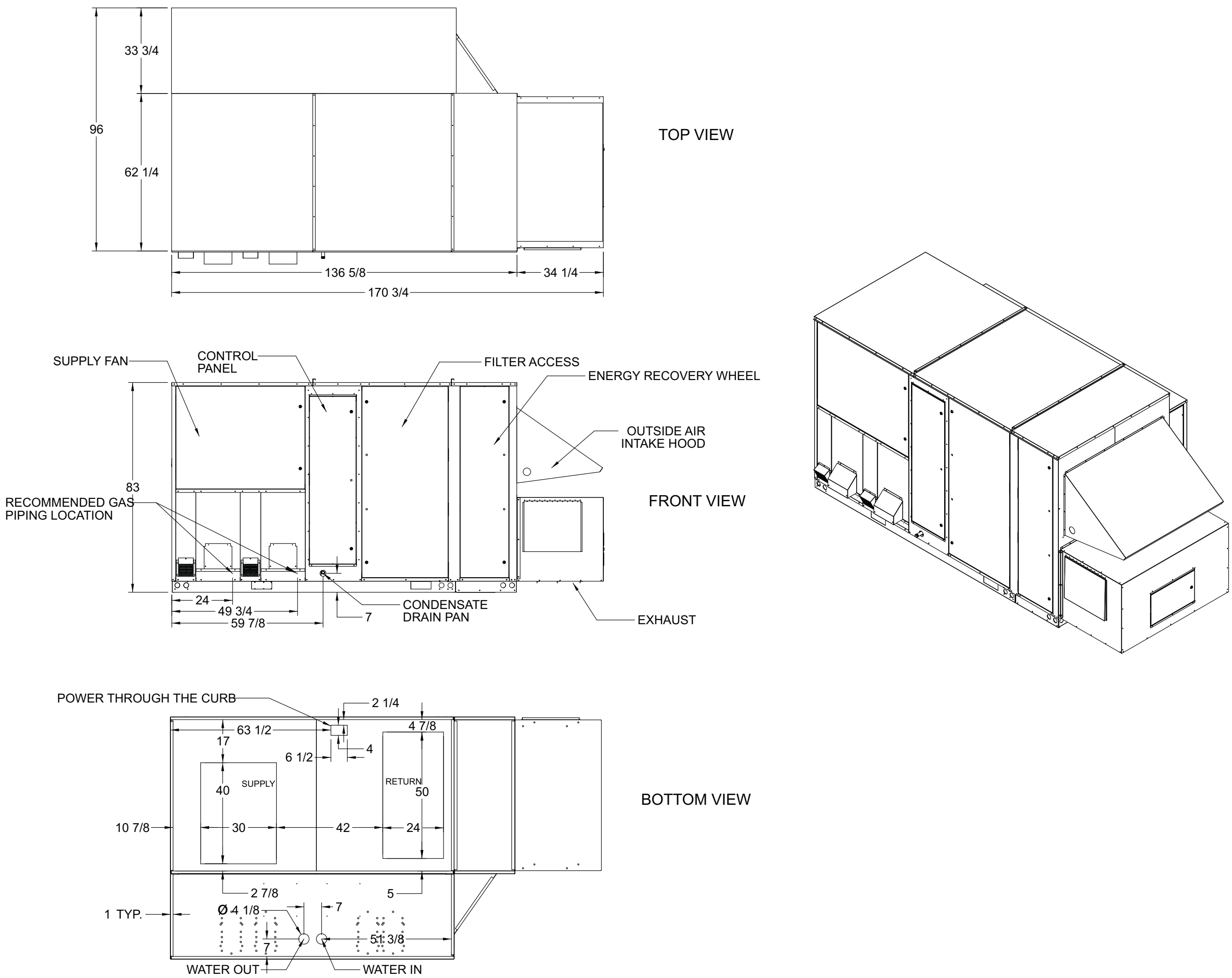
NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

Fig. 8 — Unit Dimensions — 62RA,RB22-38 Standard Units



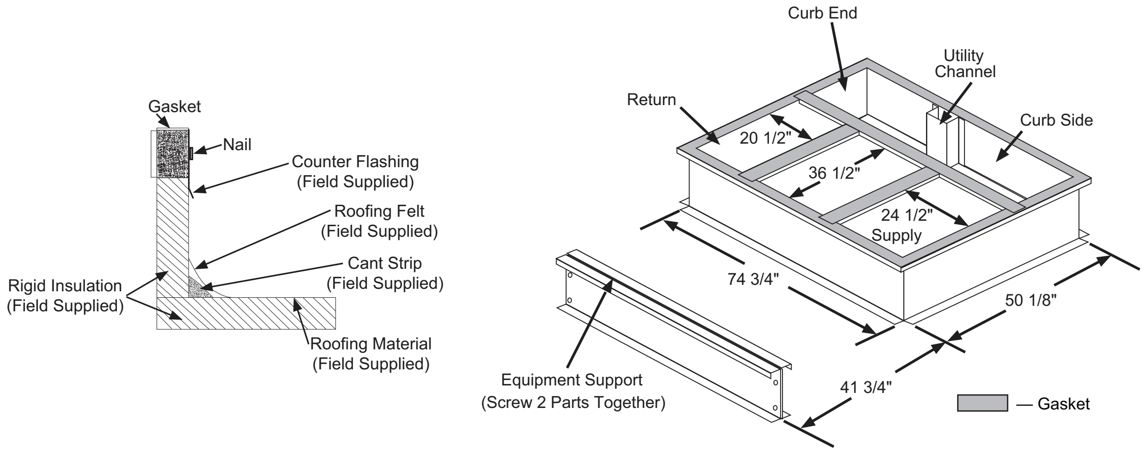
NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

Fig. 9 — Unit Dimensions — 62RC,RD22-38 Units with Optional Exhaust



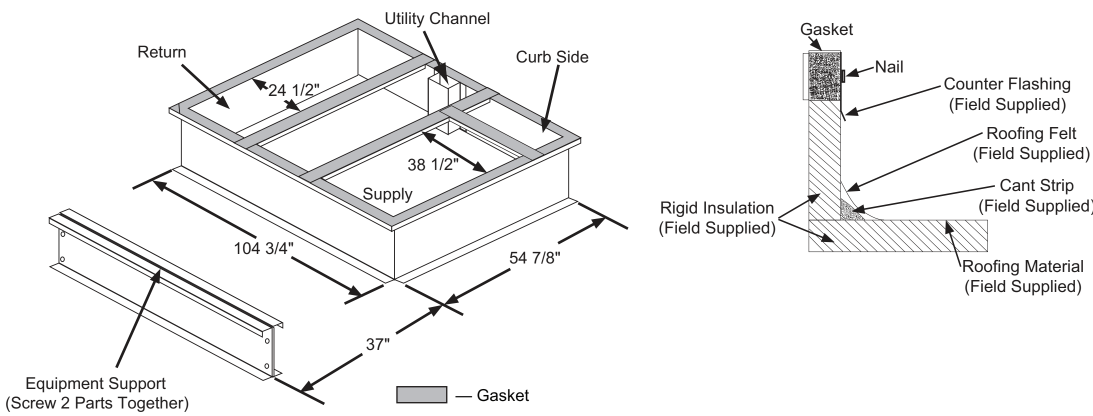
NOTES:
1. Carrier recommends a minimum of 24 to 36-in. of service clearance on all sides of unit except for the control panel side, which should have at least 60-in. clearance. Top should be unobstructed.
2. Dimensions are in inches.

Fig. 10 — Unit Dimensions — 62RC,RD22-38 Units with Optional Energy Conservation Wheel



NOTES:
1. Dimensions are in inches.
2. Field-assembled curbs are shown. Factory-assembled curbs are also available.
3. Curbs are available in 14-in. and 24-in. heights.

Fig. 11 — Accessory Dimensions — 62RA,RB,RC,RD07-20 Roof Curb



NOTES:
1. Dimensions are in inches.
2. Field-assembled curbs are shown. Factory-assembled curbs are also available.
3. Curbs are available in 14-in. and 24-in. heights.

Fig. 12 — Accessory Dimensions — 62RA,RB,RC,RD22-38 Roof Curb

Table 1 — Physical Data — 62RA, RB

UNIT 62RA,RB	07	08	09	12	14	15	16
NOMINAL CAPACITY (TONS)	6	7	8	10	12	14	15
COMPRESSOR							
Quantity/Unit … Model	1 … ZPD54	1 … ZPD61	1 … ZPD72	2 … ZPD42	2 … ZPD51	2 … ZPD67	2 … ZPD83
Number of Refrigerant Circuits	1			2			
Oil	Pre-Charged			Pre-Charged			
REFRIGERANT TYPE	R-410A			R-410A			
Operating Charge per circuit (lb-oz)	12-13	15-1	15-3	14-9	14-8	16-8	16-3
HIGH-PRESSURE SWITCH (psig)							
Cutout	640						
Reset (Manual)	595						
EVAPORATOR COIL							
Tube Size (in.)	3/8			3/8			
Rows … Fins/in.	6 ... 12			6 … 12			
Face Area (sq ft)	3.00	6.25		8.0		12.0	
SUPPLY FAN							
Backward Curved (mm)	180			N/A			
Forward Curved (in.)	12 x 9			N/A			
Airfoil (in.)	12 x 12			12 x 12			
Oversize Airfoil (in.)	N/A			15 x 15			
Backward Inclined (in.)	15			15			
Oversize Backward Inclined (in.)	18.5			18.5			
Nominal Cfm 100% OA	1000	1200	1400	1500	1900	2300	2800
Motor Hp Range	1/2 - 5			3/4 - 5		1 - 10	
OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL							
Face Area (sq ft)	3	6.25		8		12	
Tube Size (in.)	3/8						
LOW-PRESSURE SWITCH (psig)							
Cutout	99						
Reset (Auto)	135						
CONDENSATE DRAIN CONNECTION (NPT) (in.)	1 1/4						
OPTIONAL GAS HEAT FURNACE SECTION							
Gas Input Sizes (Btuh x 1000)	75, 100, 150, 200			150, 200, 250, 300			
Control Type							
Staged (no. of stages)	2			2			
Modulating (% range)	10 - 100			10 - 100			
Efficiency (Steady State) (%)	82			82			
Supply Line Pressure Range (in. wg)	5.0 min. - 13.0 max.			5.0 min. - 13.0 max.			
Rollout Switch Cutout Temp (F)	350			350			
Gas Valve Quantity	1 Std - 2 with Modulating Option			1 Std - 2 with Modulating Option			
Manifold Pressure (in. wg)							
Natural Gas Std	3.5			3.5			
LP Gas Special Order	10.0			10.0			
OPTIONAL ELECTRIC HEAT							
Size Range (kW)	10,15,20, 25,30,35,40			10,15,20, 25,30,35,40,50,60			
Control Type							
Staged (no. of stages)	2			2			
SCR (% range)	0 - 100			0 - 100			
OPTIONAL HOT WATER HEAT COIL	24 x 38 in., 2 Row, 10 FPI, with 1/2-in. Tube Size						
OPTIONAL STEAM HEAT COIL	24 x 38 in., 1 Row, 8 FPI, with 5/8-in. Tube Size						
OUTDOOR AIR FILTERS							
Quantity … Size (in.)							
Standard 2 in. MERV 8	4 ... 20x24			4 ... 20x24			
Optional 2 in. Metal Mesh	4 ... 20x24			4 ... 20x24			
Optional 4 in.							
MERV 8	4 ... 20x24			4 ... 20x24			
MERV 11	4 ... 20x24			4 ... 20x24			
MERV 14	4 ... 20x24			4 ... 20x24			

LEGEND

FPI — Fins per Inch
LP — Liquid Propane
OA — Outdoor Air
SCR — Silicon-Controlled Rectifier

Table 1 — Physical Data — 62RA, RB (cont)

UNIT 62RA,RB	20	22	24	30	34	38
NOMINAL CAPACITY (TONS)	18	19	20	27	30	35
COMPRESSOR						
Quantity/Unit … Model	2 … ZPD91	2 … ZPD91	2 … ZPD103	2 … ZPD137	2 … ZPD182	2 ...ZPDT21
Number of Refrigerant Circuits	2					
Oil	Pre-Charged					
REFRIGERANT TYPE	R-410A					
Operating Charge per circuit (lb-oz)	17-1	25-1	25-5	25-10	26-4	32-1
HIGH-PRESSURE SWITCH (psig)						
Cutout	640					
Reset (Manual)	595					
EVAPORATOR COIL						
Tube Size (in.)	3/8					
Rows … Fins/In.	6 … 12					
Face Area (sq ft)	12.0	15.3		23.0		
SUPPLY FAN						
Backward Curved (mm)	N/A					
Forward Curved (in.)	N/A					
Airfoil (in.)	12 x 12	15 x 15				
Oversize Airfoil (in.)	15 x 15	18 x 18				
Backward Inclined (in.)	15	24.5				
Oversize Backward Inclined (in.)	18.5	27				
Nominal Cfm 100% OA	3100	2900	3600	4600	5300	6200
Motor Hp Range	1 1/2 - 10	1 1/2 - 10	1 1/2 - 15			2 - 20
OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL						
Face Area (sq ft)	12	15.3		23		
Tube Size (in.)	3/8					
LOW-PRESSURE SWITCH (psig)						
Cutout	99					
Reset (Auto)	135					
CONDENSATE DRAIN CONNECTION (NPT) (in.)	1 1/4					
OPTIONAL GAS HEAT FURNACE SECTION						
Gas Input Sizes (Btuh x 1000)	150, 200, 250, 300	300, 400, 500, 600				
Control Type						
Staged (no. of stages)	2	2 (Low Heat) / 4 (High Heat)				
Modulating (% range)	10 - 100	10 - 100				
Efficiency (Steady State) (%)	82	82				
Supply Line Pressure Range (in.wg)	5.0 min. - 13.0 max.	5.0 min. - 13.0 max.				
Rollout Switch Cutout Temp (F)	350	350				
Gas Valve Quantity	1 Std - 2 with Modulating Option	1 Std - 2 with Modulating Option				
Manifold Pressure (in. wg)						
Natural Gas Std	3.5	3.5				
LP Gas Special Order	10.0	10.0				
OPTIONAL ELECTRIC HEAT						
Size Range (kW)	10,15,20,25,30, 35,40,50,60	10,15,20,30,40,50,60				
Control Type						
Staged (no. of stages)	2	2				
SCR (% range)	0 - 100	0 - 100				
OPTIONAL HOT WATER HEAT COIL	45 x 38 in., 2 Row, 10 FPI, with 5/8-in. Tube Size					
OPTIONAL STEAM HEAT COIL	45 x 38 in., 1 Row, 8 FPI, with 5/8-in. Tube Size					
OUTDOOR AIR FILTERS						
Quantity … Size (in.)						
Standard 2 in. MERV 8	4 ... 20x24	2 ... 20x24, 2 ... 24x24				
Optional 2 in. Metal Mesh	4 ... 20x24	2 ... 20x24, 2 ... 24x24				
Optional 4 in.						
MERV 8	4 ... 20x24	2 ... 20x24, 2 ... 24x24				
MERV 11	4 ... 20x24	2 ... 20x24, 2 ... 24x24				
MERV 14	4 ... 20x24	2 ... 20x24, 2 ... 24x24				

LEGEND

FPI — Fins per Inch
LP — Liquid Propane
OA — Outdoor Air
SCR — Silicon-Controlled Rectifier

Table 2 — Physical Data — 62RC, RD

UNIT 62RC,RD WITH ECW	07	08	09	12	14	15	16	20
NOMINAL CAPACITY (TONS)	6	7	8	10	12	14	15	18
COMPRESSOR								
Quantity/Unit … Model	1 … ZPD54	1 … ZPD61	1 … ZPD72	2 … ZPD42	2 … ZPD51	2 … ZPD67	2 … ZPD83	2 … ZPD91
Number of Refrigerant Circuits	1			2				
Oil	Pre-Charged			Pre-Charged				
REFRIGERANT TYPE	R-410A			R-410A				
Operating Charge per Circuit (lb-oz)	12-13	15-1	15-3	14-9	14-8	16-8	16-3	17-1
HIGH-PRESSURE SWITCH (psig)								
Cutout	640			640				
Reset (Manual)	595			595				
EVAPORATOR COIL*								
Tube Size (in.)	3/8			3/8		3/8		
Rows … Fins/in.	4 ... 12			4 … 12		6 … 12		
Face Area (sq ft)	4.0	7.5		12.0		12.0		
SUPPLY FAN								
Backward Curved (mm)	180			N/A				
Forward Curved (in.)	12 x 9			N/A				
Airfoil (in.)	12 x 12			12 x 12				
Oversize Airfoil (in.)	N/A			15 x 15				
Backward Inclined (in.)	15			15				
Oversize Backward Inclined (in.)	18.5			18.5				
Nominal Cfm 100% OA	1000	1200	1400	1500	1900	2300	2800	3100
Motor Hp Range	1/2 - 5			3/4 - 5		1 - 10		1 1/2 - 10
OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL								
Face Area (sq ft)	4	7.5		12				
Tube Size (in.)	3/8							
LOW-PRESSURE SWITCH (psig)								
Cutout	99							
Reset (Auto)	135							
CONDENSATE DRAIN CONNECTION (NPT) (in.)	1 1/4							
OPTIONAL GAS HEAT FURNACE SECTION								
Gas Input Sizes (Btuh x 1000)	75, 100, 150, 200			150, 200, 250, 300				
Control Type								
Staged (no. of stages)	2			2				
Modulating (% range)	10 - 100			10 - 100				
Efficiency (Steady State) (%)	82			82				
Supply Line Pressure Range (in. wg)	5.0 min. - 13.0 max.			5.0 min. - 13.0 max.				
Rollout Switch Cutout Temp (F)	350			350				
Gas Valve Quantity	1 Std - 2 with Modulating Option			1 Std - 2 with Modulating Option				
Manifold Pressure (in. wg)								
Natural Gas Std	3.5			3.5				
LP Gas Special Order	10.0			10.0				
OPTIONAL ELECTRIC HEAT								
Size Range (kW)	10,15,20,25,30,35,40			10,15,20,25,30,35,40,50,60				
Control Type								
Staged (no. of stages)	2			2				
SCR (% range)	0 - 100			0 - 100				
OPTIONAL HOT WATER HEAT COIL	24 x 38 in., 2 Row, 10 FPI, with 1/2-in. Tube Size							
OPTIONAL STEAM HEAT COIL	24 x 38 in., 1 Row, 8 FPI, with 5/8-in. Tube Size							
OUTDOOR AIR FILTERS								
Quantity … Size (in.)								
Standard 2 in. MERV 8	4 ... 20x24			4 ... 20x24				
Optional 2 in. Metal Mesh	4 ... 20x24			4 ... 20x24				
Optional 4 in.								
MERV 8	4 ... 20x24			4 ... 20x24				
MERV 11	4 ... 20x24			4 ... 20x24				
MERV 14	4 ... 20x24			4 ... 20x24				
OPTIONAL ECW								
Type	Molecular Sieve			Molecular Sieve				
Size (in.)	36			36 or 48				
OPTIONAL ECW FILTERS								
Quantity … Size (in.)								
with 36 in. ECW	2 ... 20x24, 2 ... 20x20			2 ... 20x24, 2 ... 20x20				
with 42 in. ECW	N/A			N/A				
with 48 in. ECW	N/A			4 ... 20x24, 2 ... 12x24				
with 54 in. ECW	N/A			N/A				
OPTIONAL EXHAUST FAN								
Backward Curved (mm)	180 mm			180 mm				
Forward Curved (in.)	9 x 7			N/A				
Oversize Forward Curved (in.)	12 x 9			N/A				
Airfoil (in.)	12 x 12			12 x 12				
Oversize Airfoil (in.)	N/A			N/A				
Motor Hp Range	1/2 - 5			1/2 - 10				

LEGEND

ECW — Energy Conservation Wheel
FPI — Fins per Inch
LP — Liquefied Petroleum
OA — Outdoor Air
SCR — Silicon-Controlled Rectifier

* 62RC,RD units without the ECW option use a 6-row evaporator coil.

Table 2 — Physical Data — 62RC, RD (cont)

UNIT 62RC,RD WITH ECW	22	24	30	34	38
NOMINAL CAPACITY (TONS)	19	20	27	30	35
COMPRESSOR					
Quantity/Unit … Model	2 … ZPD91	2 … ZPD103	2 … ZPD137	2 … ZPD182	2 ...ZPDT21
Number of Refrigerant Circuits			2		
Oil			Pre-Charged		
REFRIGERANT TYPE			R-410A		
Operating Charge per Circuit (lb-oz)	25-1	25-5	25-10	26-4	32-1
HIGH-PRESSURE SWITCH (psig)					
Cutout			640		
Reset (Manual)			595		
EVAPORATOR COIL*					
Tube Size (in.)			3/8		
Rows … Fins/in.			4 … 12		
Face Area (sq ft)			23.0		
SUPPLY FAN					
Backward Curved (mm)			N/A		
Forward Curved (in.)			N/A		
Airfoil (in.)			15 x 15		
Oversize Airfoil (in.)			18 x 18		
Backward Inclined (in.)			24.5		
Oversize Backward Inclined (in.)			27		
Nominal Cfm 100% OA	2900	3600	4600	5300	6200
Motor Hp Range	1 1/2 - 10	1 1/2 - 15		2 - 20	
OPTIONAL HOT GAS REHEAT AND LIQUID SUBCOOLING COIL					
Face Area (sq ft)	12	23			
Tube Size (in.)			3/8		
LOW-PRESSURE SWITCH (psig)					
Cutout			99		
Reset (Auto)			135		
CONDENSATE DRAIN CONNECTION (NPT) (in.)			1 1/4		
OPTIONAL GAS HEAT FURNACE SECTION					
Gas Input Sizes (MBtuh)			300, 400, 500, 600		
Control Type					
Staged (no. of stages)			2 (300 and 400) / 4 (500 and 600)		
Modulating (% range)			10 - 100		
Efficiency (Steady State) (%)			82		
Supply Line Pressure Range (in. wg)			5.0 min. - 13.0 max.		
Rollout Switch Cutout Temp (F)			350		
Gas Valve Quantity			1 Std - 2 with Modulating Option		
Manifold Pressure (in. wg)					
Natural Gas Std			3.5		
LP Gas Special Order			10.0		
OPTIONAL ELECTRIC HEAT					
Size Range (kW)			10,15,20,30,40,50,60		
Control Type					
Staged (no. of stages)			2		
SCR (% range)			0 - 100		
OPTIONAL HOT WATER HEAT COIL			45 x 38 in., 2 Row, 10 FPI, with 5/8-in. Tube Size		
OPTIONAL STEAM HEAT COIL			45 x 38 in., 1 Row, 8 FPI, with 5/8-in. Tube Size		
OUTDOOR AIR FILTERS					
Quantity … Size (in.)					
Standard 2 in. MERV 8			2 ... 20x24, 2 ... 24x24		
Optional 2 in. Metal Mesh			2 ... 20x24, 2 ... 24x24		
Optional 4 in.					
MERV 8			2 ... 20x24, 2 ... 24x24		
MERV 11			2 ... 20x24, 2 ... 24x24		
MERV 14			2 ... 20x24, 2 ... 24x24		
OPTIONAL ECW					
Type			Molecular Sieve		
Size (in.)			42, 48 or 54		
OPTIONAL ECW FILTERS					
Quantity … Size (in.)					
with 36 in. ECW			N/A		
with 42 in. ECW			4 ... 20x24, 2 ... 12x24		
with 48 in. ECW			6 ... 18x24		
with 54 in. ECW			6 ... 18x24		
OPTIONAL EXHAUST FAN					
Backward Curved (mm)			180		
Forward Curved (in.)			N/A		
Oversize Forward Curved (in.)			N/A		
Airfoil (in.)			15 x 15		
Oversize Airfoil (in.)			18 x 18		
Motor Hp Range			1/2 - 20		

LEGEND

ECW — Energy Conservation Wheel
FPI — Fins per Inch
LP — Liquefied Petroleum
OA — Outdoor Air
SCR — Silicon-Controlled Rectifier

* 62RC,RD units without the ECW option use a 6-row evaporator coil.

Table 3 — Unit and Component Weights (lb)

COMPONENT	62R UNIT SIZE												
	07	**08**	**09**	**12**	**14**	**15**	**16**	**20**	**22**	**24**	**30**	**34**	**38**
Base Unit	1650	1690	1710	1910	1960	2120	2060	2080	3375	3475	3575	3655	4075
Hot Gas Reheat	35	35	35	75	75	75	75	75	120	120	120	120	120
Liquid Subcooling Coil	25	25	25	55	55	55	55	55	100	100	100	100	100
Gas Furnace (Btuh)													
75,000	140	140	140	—	—	—	—	—	—	—	—	—	—
100,000	150	150	150	—	—	—	—	—	—	—	—	—	—
150,000	160	160	160	160	160	160	160	160	—	—	—	—	—
200,000	170	170	170	170	170	170	170	170	—	—	—	—	—
250,000	—	—	—	210	210	210	210	210	—	—	—	—	—
300,000	—	—	—	250	250	250	250	250	250	250	250	250	250
400,000	—	—	—	—	—	—	—	—	275	275	275	275	275
500,000	—	—	—	—	—	—	—	—	420	420	420	420	420
600,000	—	—	—	—	—	—	—	—	500	500	500	500	500
Electric Heater	75	75	75	75	75	75	75	75	100	100	100	100	100
Steam Coil	60	60	60	60	60	60	60	60	120	120	120	120	120
Hot Water Coil	75	75	75	75	75	75	75	75	150	150	150	150	150
Wheel Bypass Dampers	60	60	60	60	60	60	60	60	125	125	125	125	125
Energy Conservation Wheel	350	350	350	420	420	420	420	420	470	470	470	470	470
Power Exhaust	345	345	345	375	375	375	375	375	525	525	525	525	525
Curb 14-in.	275	275	275	275	275	275	275	275	305	305	305	305	305
Curb 24-in.	375	375	375	375	375	375	375	375	425	425	425	425	425

Step 4 — Complete Electrical Connections

WIRING CONNECTIONS — Power wiring should be connected to the main power terminal block located within the unit main control section. Power wiring connections on units with factory disconnects should be made at the line side of the disconnect switch. Low voltage wiring connections are made to the remote mounted controller or timeclock. Do NOT tamper with factory wiring. See Tables 4-7 for additional electrical information.

Contact your local representative or the factory if assistance is required. The internal power and control wiring of these units is factory installed and each unit is thoroughly tested prior to shipment. It is recommended that an independent 115 volt power source be brought to the vicinity of the rooftop unit for portable lights and tools used by the service mechanic.

MAIN POWER WIRING — The units are factory wired for the voltage shown on the nameplate. Main power wiring should be sized for the minimum wire ampacity shown on the nameplate.

An external weather tight disconnect switch properly sized for the unit total load is required for each unit. Disconnect must be installed in accordance with local and national electric codes.

Power wiring may enter the rooftop unit through the unit base and roof curbs on all models. Install conduit connectors at the entrance locations. External connectors must be weatherproof.

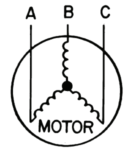
GROUNDING — All units must be properly grounded. The ground lug is provided for this purpose. Do NOT use the ground lug for connecting a neutral conductor. The unit must be electrically grounded in accordance with local codes, or in the absence of local codes, with the NEC (National Electrical Code) ANSI/NFPA (American National Standards Institute/National Fire Protection Association) 70.

Once it is established that supply voltage is within the utilization range, check and calculate if an unbalanced condition exists between phases. Calculate percent voltage unbalance as follows:

% Voltage imbalance

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: With voltage of 220, 215 and 210



AB = 220-v
BC = 215-v
AC = 210-v

$$\text{Average Voltage} = \frac{220 + 215 + 210}{3}$$

$$= \frac{645}{3}$$

$$= 215$$

Determine maximum deviation from average voltage.

220 - 215 = 5 v

Determine percent of voltage imbalance.

% Voltage Imbalance = 100 x (5/215)

= 500/215 = 2.3%

This amount of phase imbalance is unsatisfactory as it is below the maximum allowable 2%.

Contact power company if phase unbalance exceeds 2%.

CONTROL SYSTEM WIRING — For commercial equipment Table 4 lists the minimum size of 24 volt class 2 wire to be used.

Table 4 — Control System Wiring

WIRE SIZE	FT RUN FROM UNIT TO THERMOSTAT OR LONGEST RUN
18 AWG	Maximum run 50 feet
16 AWG	Maximum run 75 feet
14 AWG	Maximum run 100/125 feet
12 AWG	Maximum run 150/200 feet

LEGEND

AWG — American Wire Gage

NOTE: Consult the wiring diagram furnished with the unit. These units are custom designed for each application. The unit wiring diagram is located inside the control panel of each unit. See Fig. 13-27 for typical wiring diagrams.

Table 5 — Compressor Electrical Data

VOLTAGE		UNIT SIZE 62R												
		07	08	09	12	14	15	16	20	22	24	30	34	38
Number of Compressors		1	1	1	2	2	2	2	2	2	2	2	2	4
208-230/3/60	RLA (each)	16.0	19.0	23.2	13.7	16.0	22.4	25.0	29.5	29.5	30.1	48.1	55.8	29.5
	LRA	110.0	123.0	164.0	83.1	110.0	149.0	164.0	195.0	195.0	225.0	245.0	340.0	195.0
460/3/60	RLA (each)	7.8	9.7	11.2	6.2	7.8	10.6	12.2	14.8	14.8	16.7	18.6	26.9	14.8
	LRA	52.0	62.0	75.0	41.0	52.0	75.0	100.0	95.0	95.0	114.0	125.0	173.0	95.0

Table 6 — Supply and Exhaust Fan Motor Electrical Data

VOLTAGE		MOTOR HP									
		3/4	1	1 1/2	2	3	5	7 1/2	10	15	20
208/230-3-60	FLA	3.4	3.2	4.8	6.3	9.8	15.7	22.3	29.0	43.4	57.0
460-3-60	FLA	1.7	1.5	2.0	2.9	4.1	6.8	10.0	12.9	18.9	24.5

Table 7 — Energy Conservation Wheel Electrical Data

VOLTAGE		WHEEL SIZE (in.)			
		36	42	48	54
208/230-3-60	FLA	2.5	2.5	2.5	2.5
460-3-60	FLA	1.3	1.3	1.3	1.3

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
RLA — Rated Load Amps

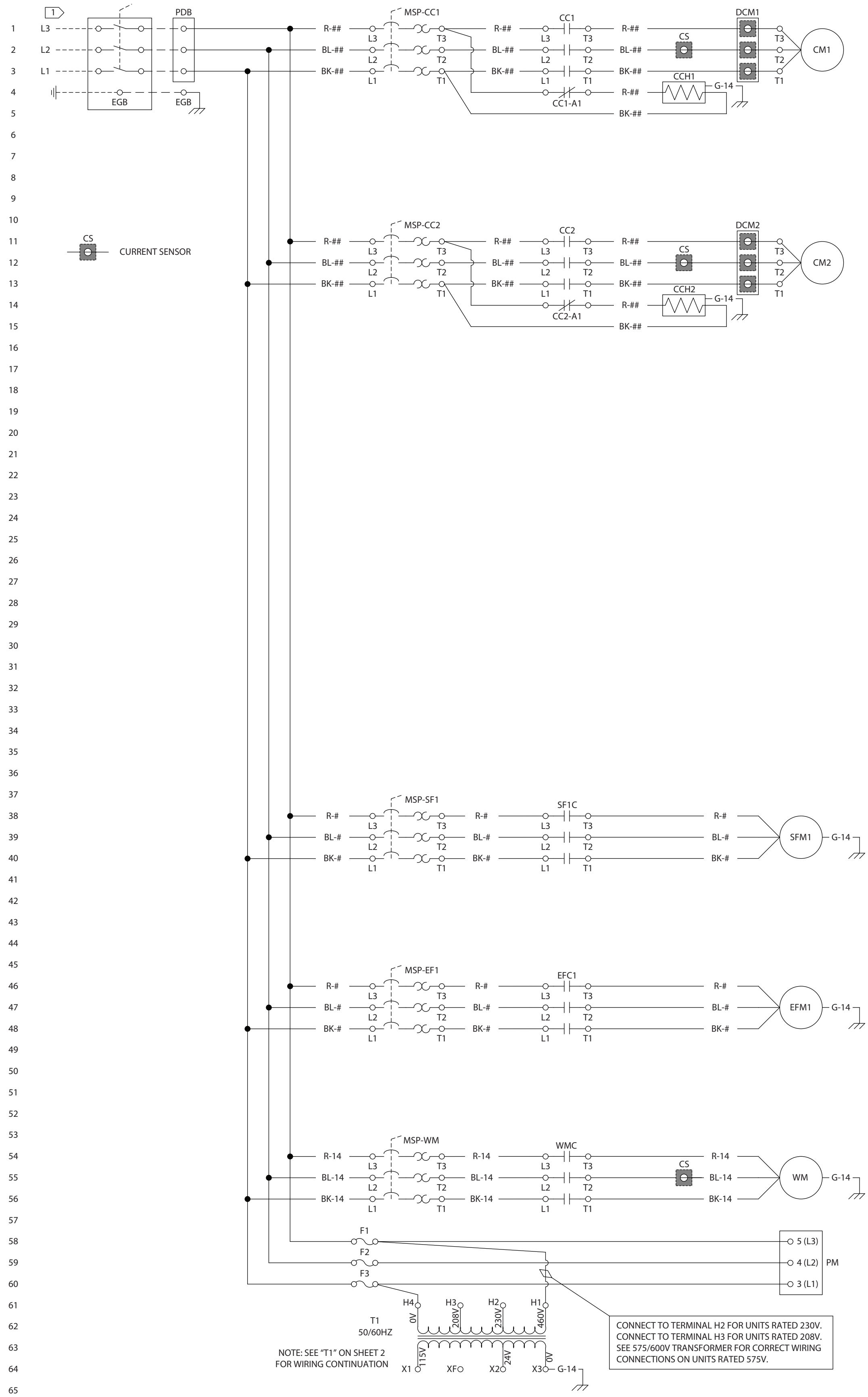


Fig. 13 — Typical Wiring Diagram — Motor Wiring for Dual Circuit Unit with ECW and Single Speed Fans

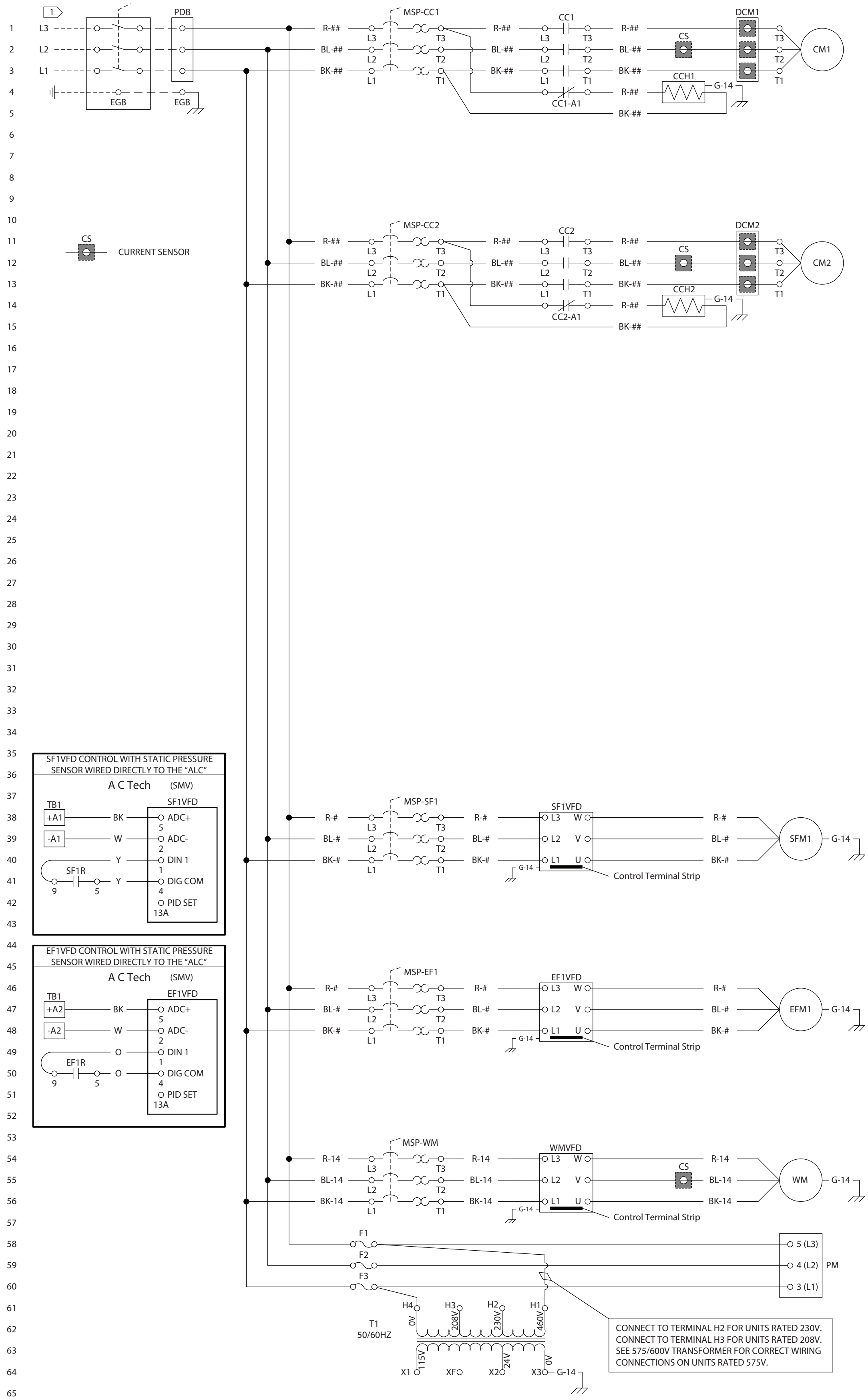


Fig. 14 — Typical Wiring Diagram — Motor Wiring for Dual Circuit Unit with ECW and Variable Speed Fans

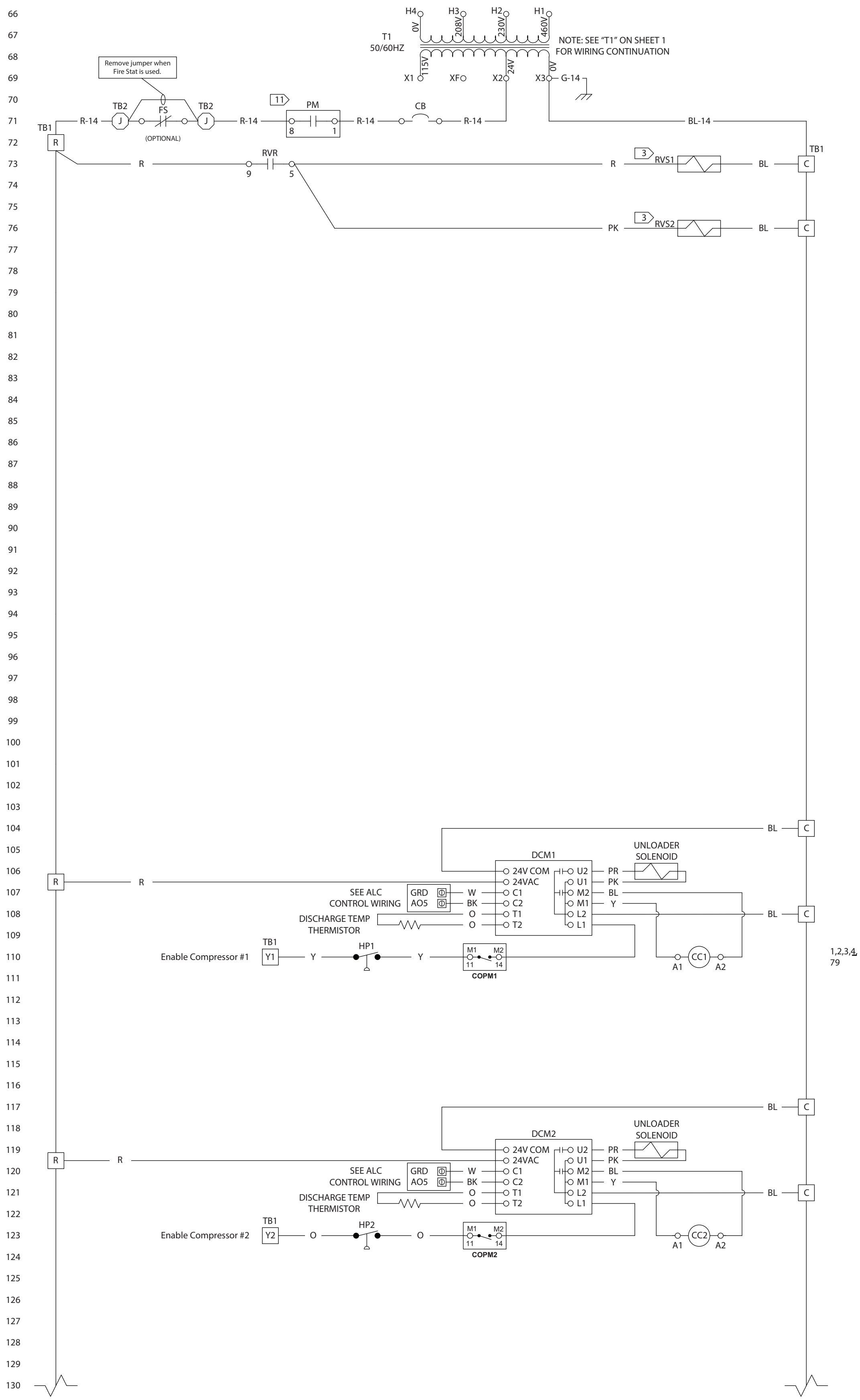


Fig. 15 — Typical Wiring Diagram — Digital Compressor Control Module Wiring for Dual Circuit Unit

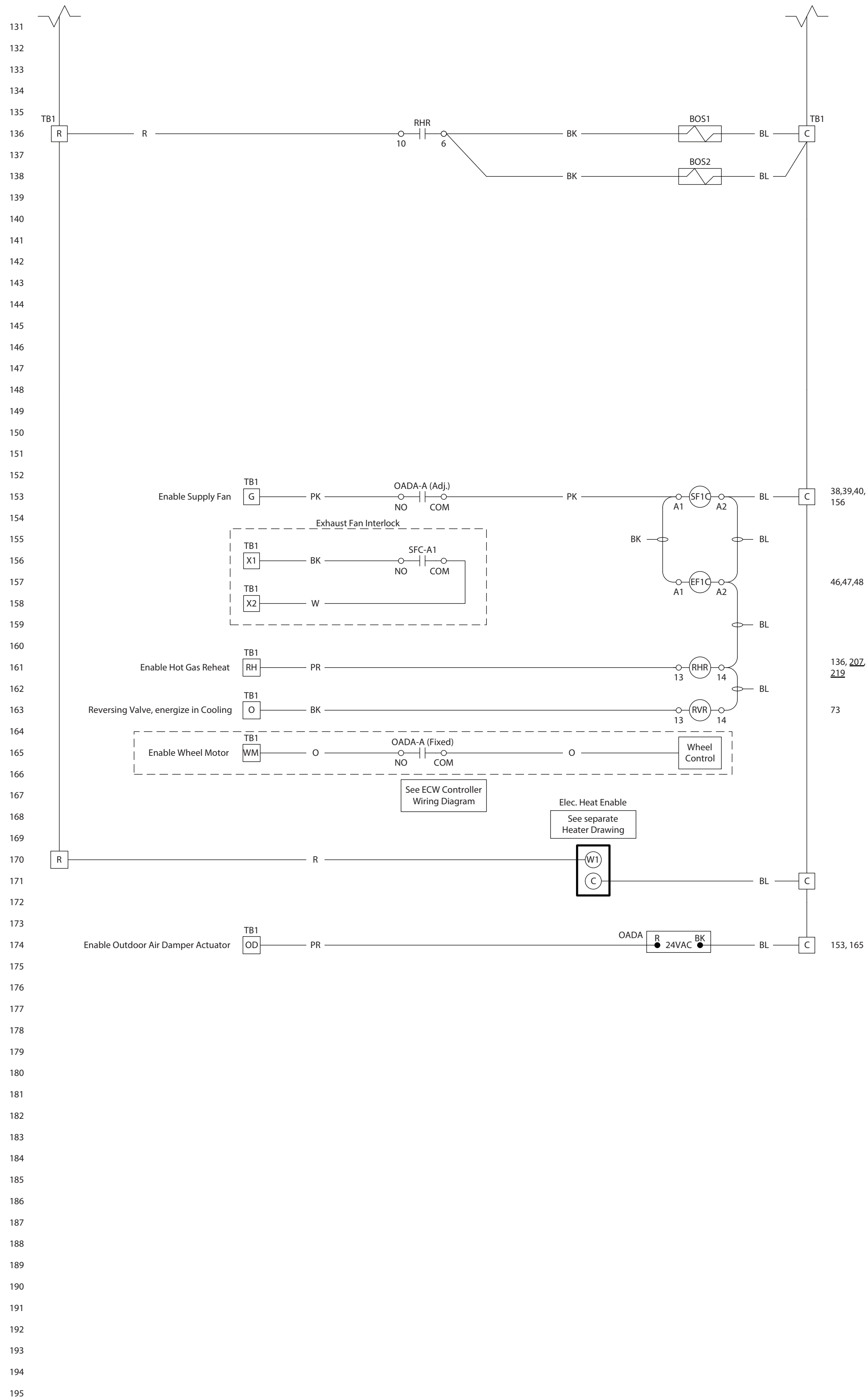


Fig. 16 — Typical Wiring Diagram — Component Wiring for Unit with HGRH and ECW

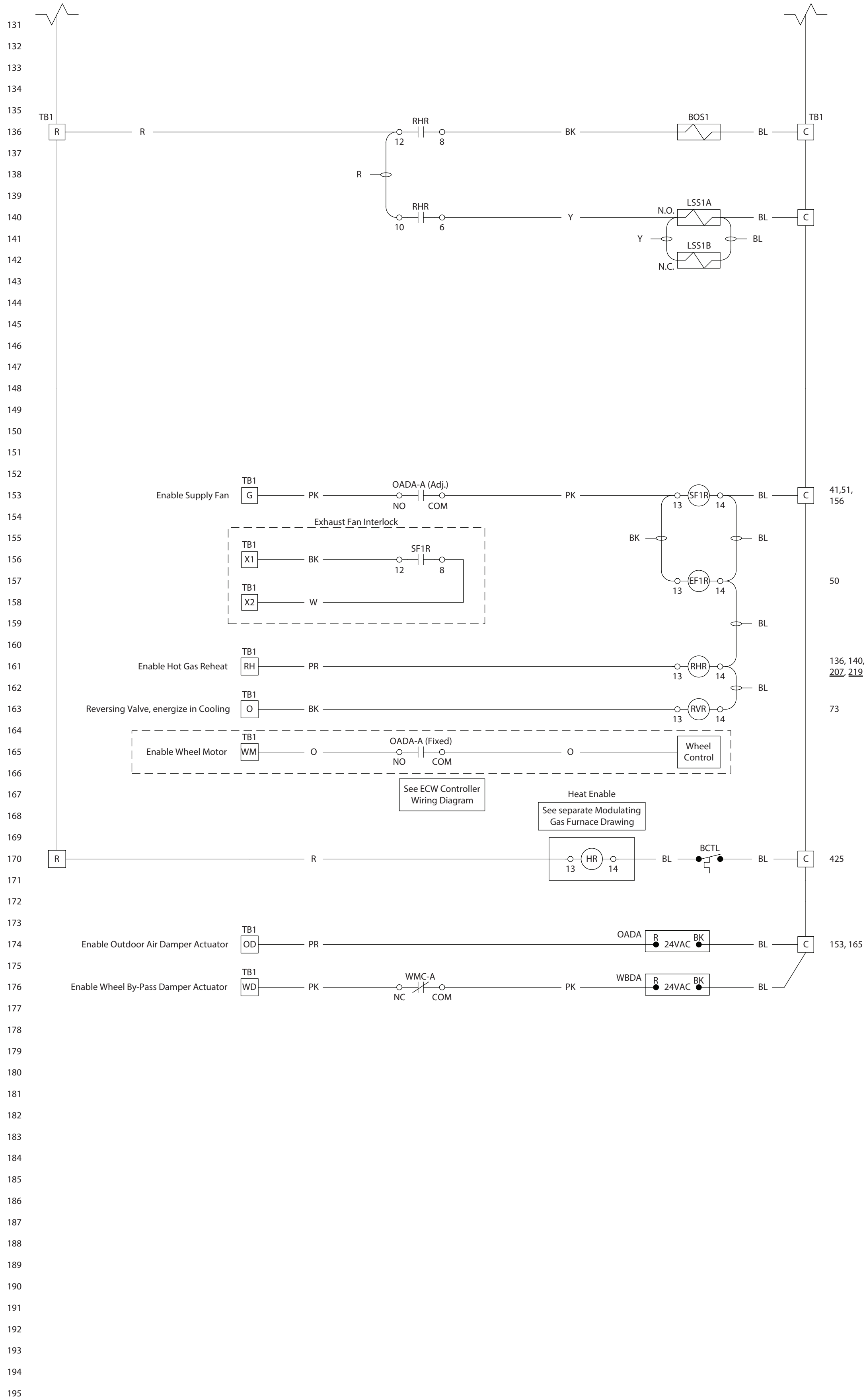


Fig. 17 — Typical Wiring Diagram — Component Wiring for Unit with HGRH and ECW with Bypass

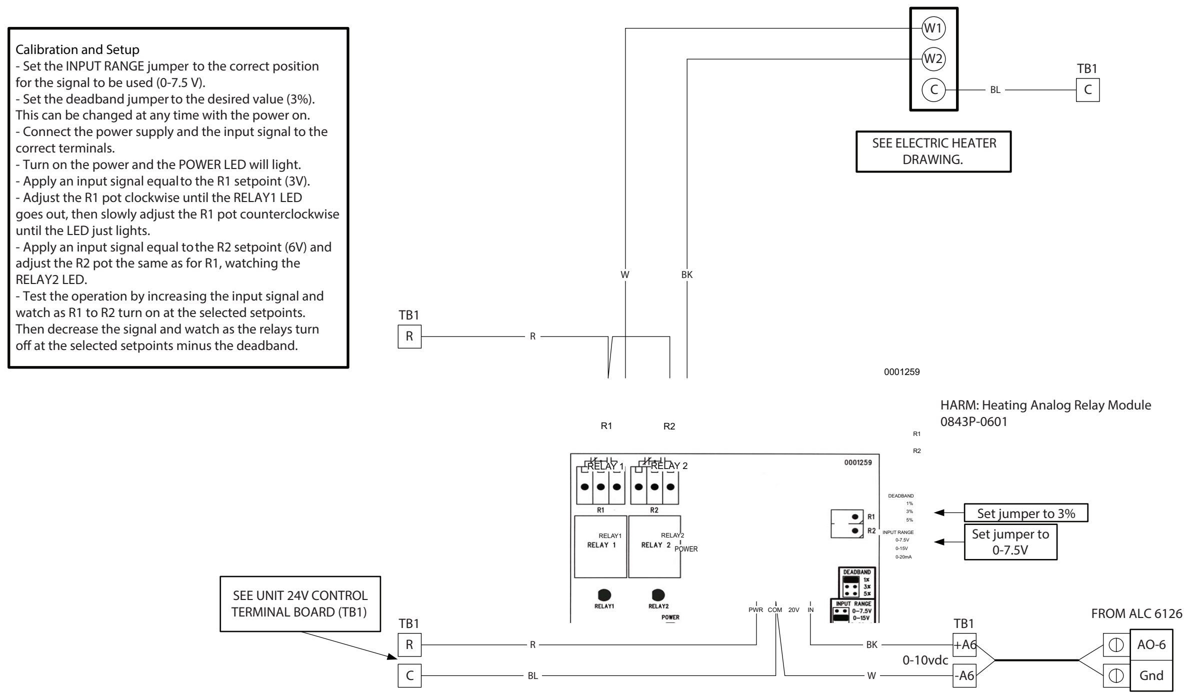


Fig. 18 — Typical Wiring Diagram — Control Wiring for Lead Circuit HGRH Control, Lead Circuit Discharge Control, and 2-Stage Electric Heat

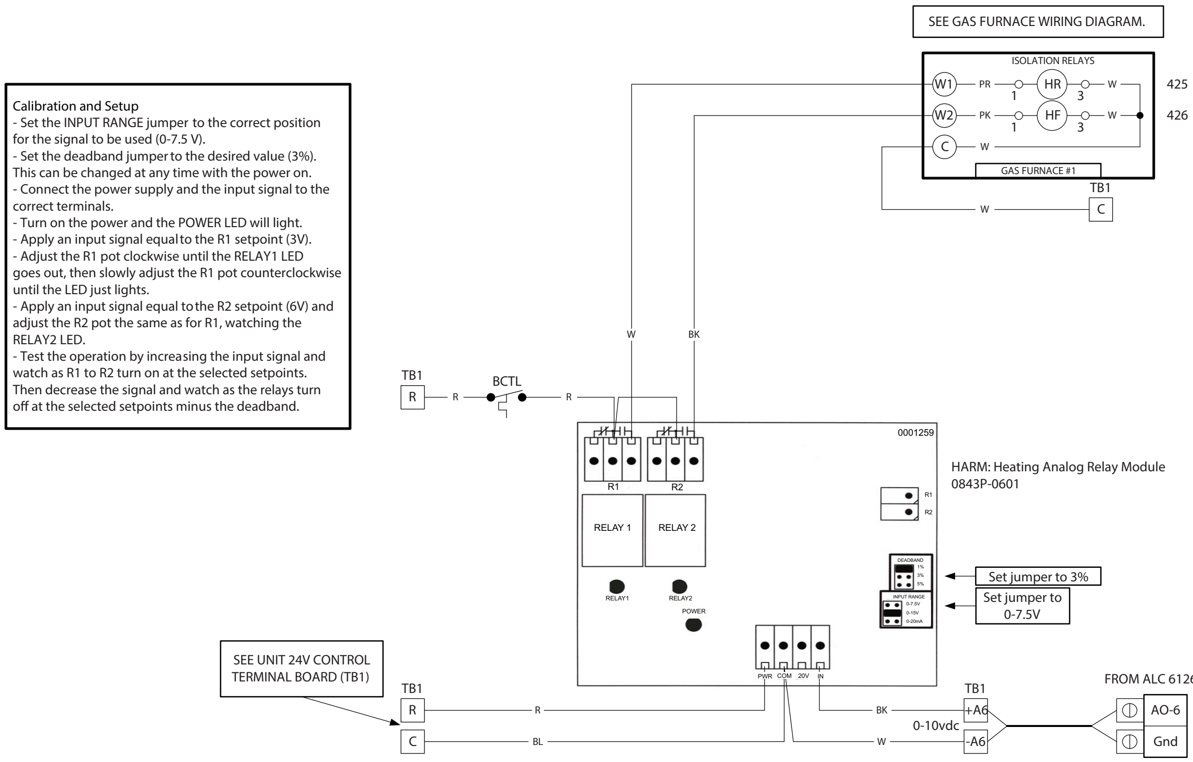


Fig. 19 — Control Wiring for 2-Stage Gas Furnace

Calibration and Setup
- Set the INPUT RANGE jumper to the correct position for the signal to be used (0-15 V).
- Set the deadband jumper to the desired value (3%). This can be changed at any time with the power on.
- Connect the power supply and the input signal to the correct terminals.
- Turn on the power and the POWER LED will light.
- Apply an input signal equal to the R1 setpoint (2.5V).
- Adjust the R1 pot clockwise until the RELAY1 LED goes out, then slowly adjust the R1 pot counterclockwise until the LED just lights.
- Apply an input signal equal to the R2 setpoint (5V) and adjust the R2 pot the same as for R1, watching the RELAY2 LED.
- Adjust R3 (7.5V) and R4 (9.5V) using the same method.
- Test the operation by increasing the input signal and watch as R1 to R4 turn on at the selected setpoints. Then decrease the signal and watch as the relays turn off at the selected setpoints minus the deadband.

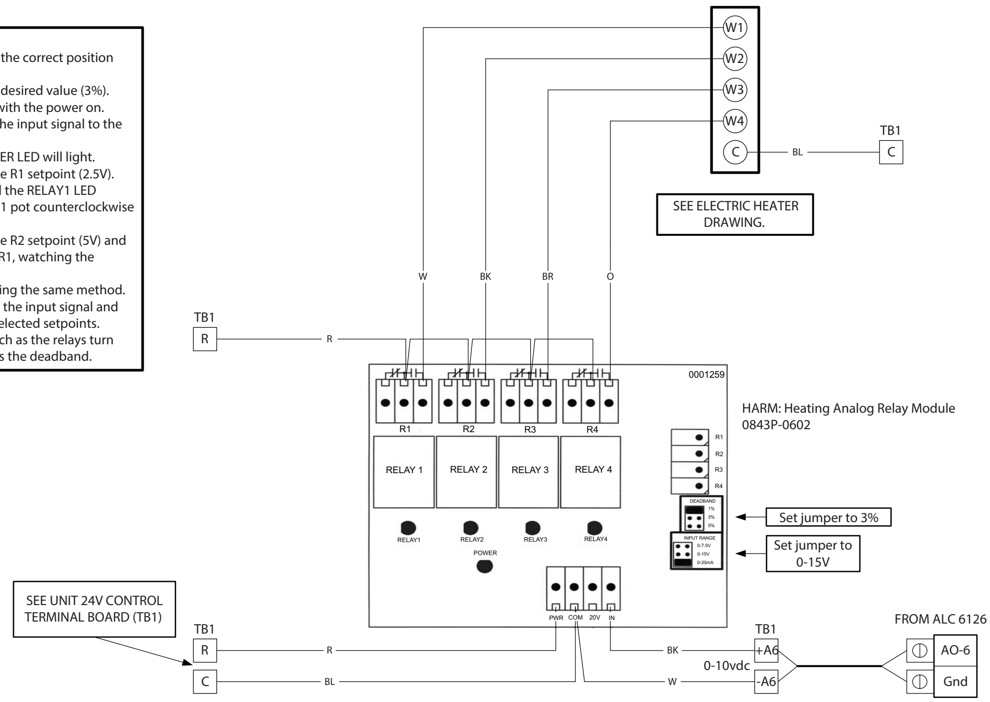


Fig. 20 — Control Wiring for 4-Stage Electric Heat

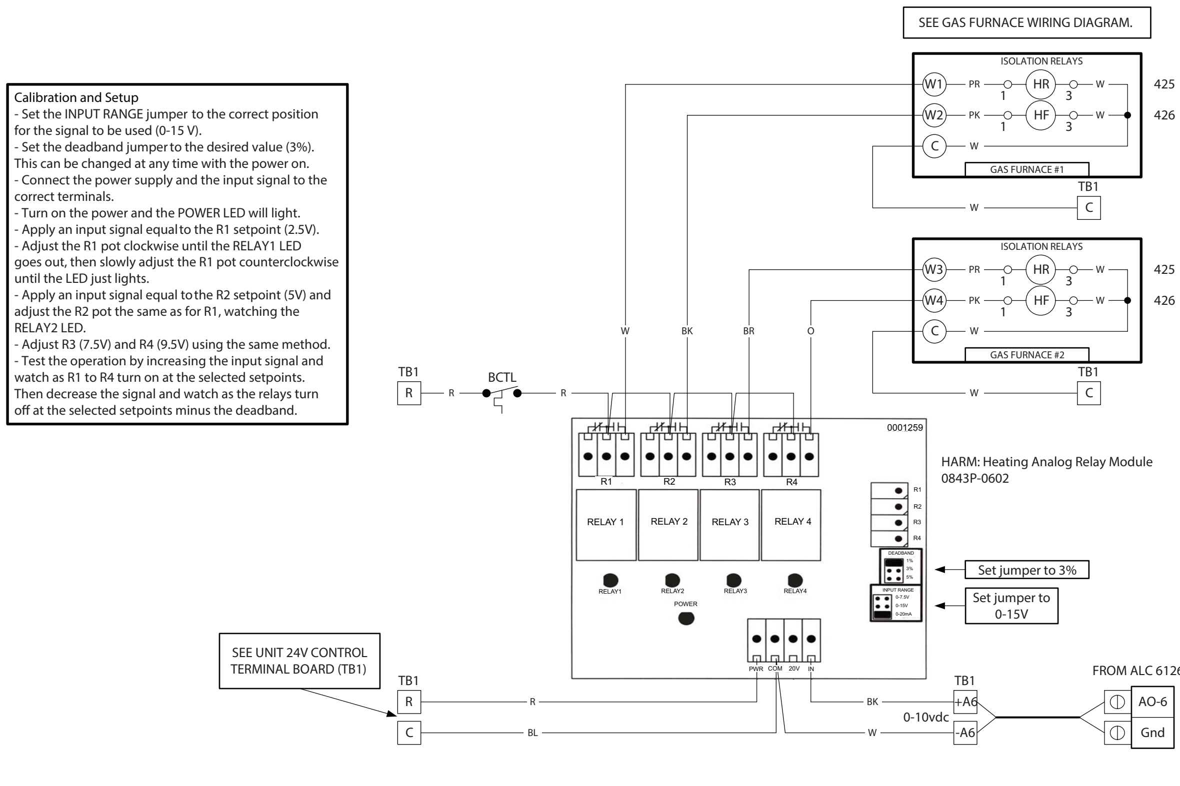


Fig. 21 — Control Wiring for 4-Stage Gas Furnace

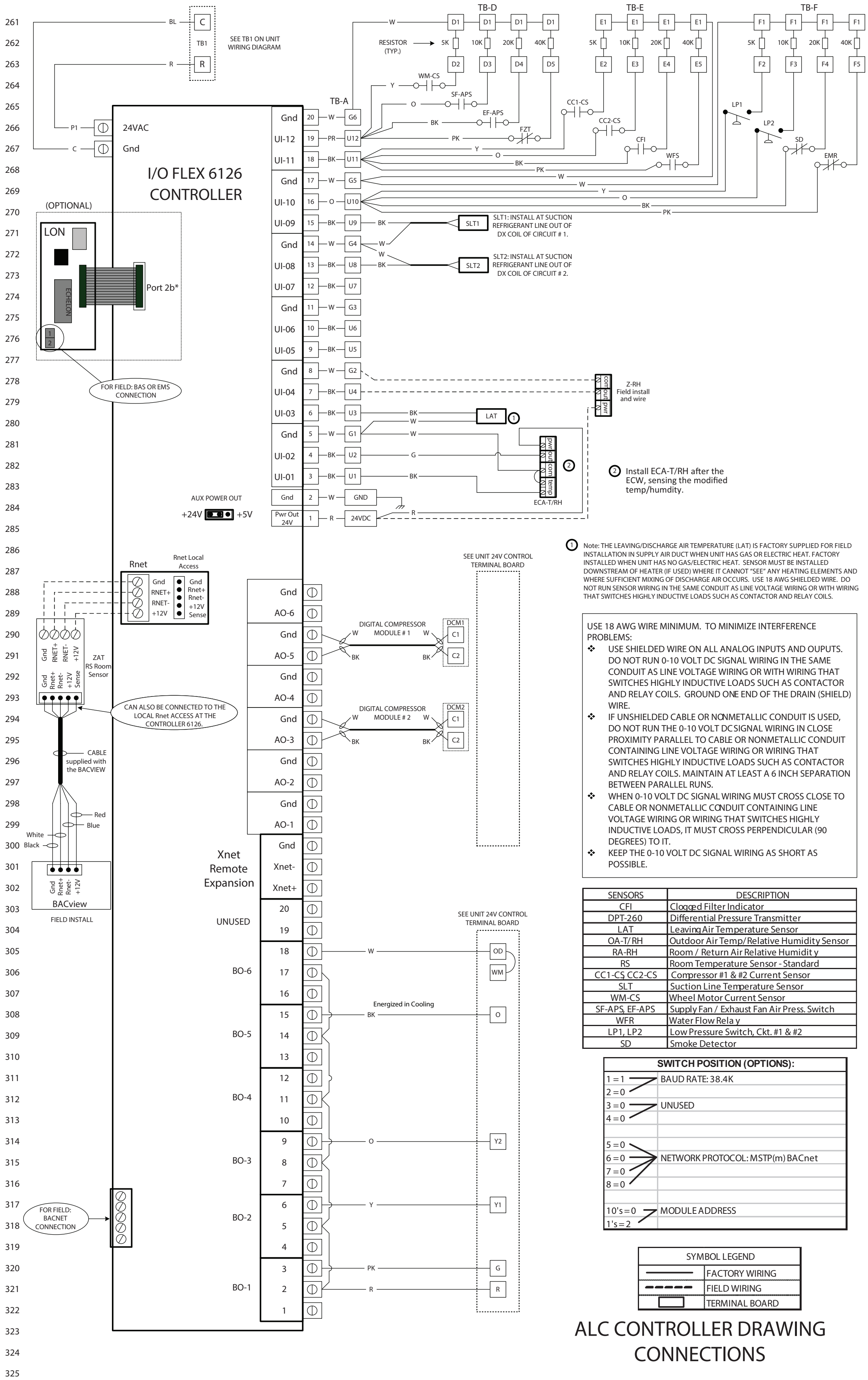
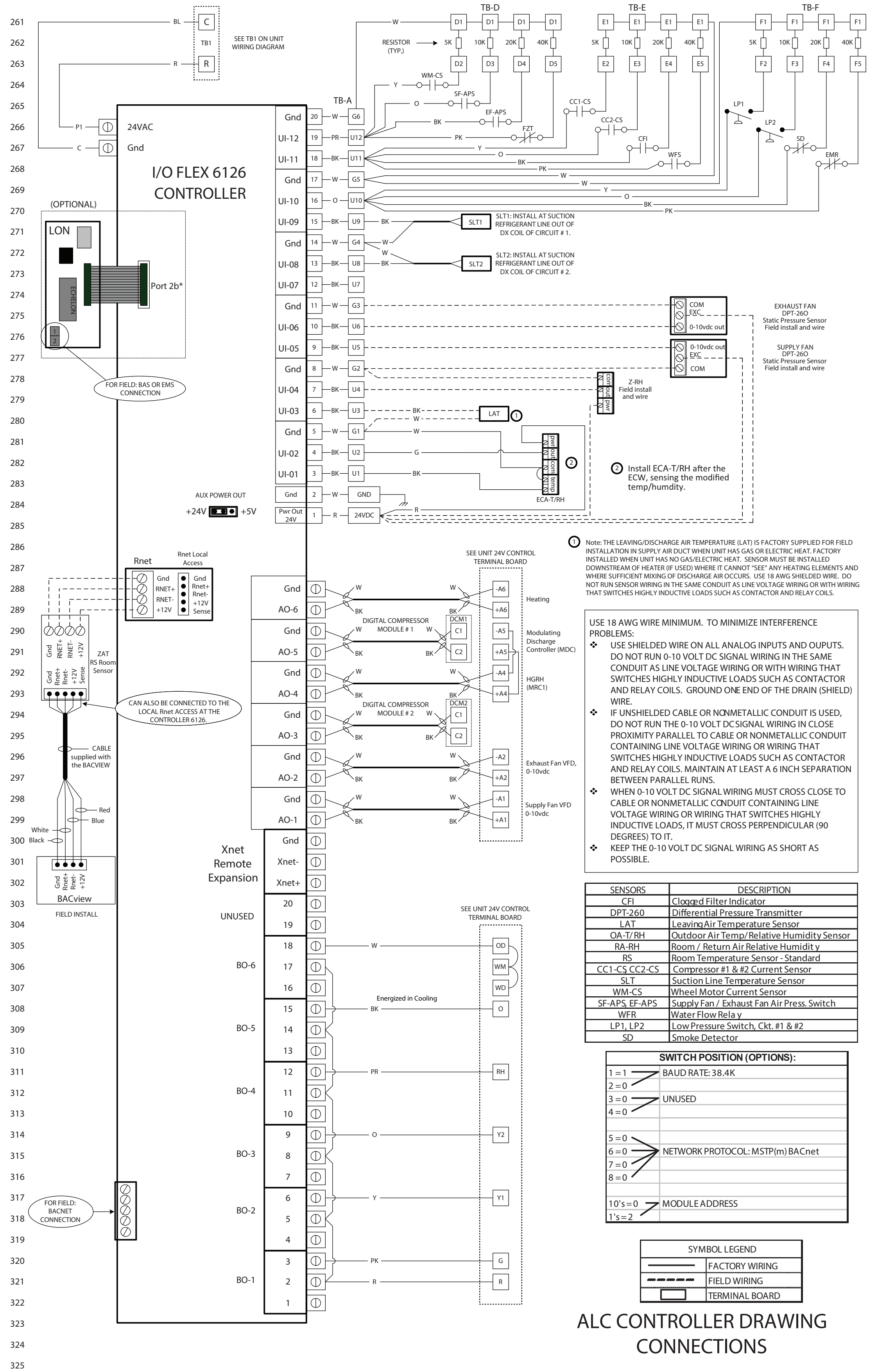


Fig. 22 — Controller Wiring for Dual Circuit Unit ECW and Single Speed Supply Fan



① Note: THE LEAVING/DISCHARGE AIR TEMPERATURE (LAT) IS FACTORY SUPPLIED FOR FIELD INSTALLATION IN SUPPLY AIR DUCT WHEN UNIT HAS GAS OR ELECTRIC HEAT. FACTORY INSTALLED WHEN UNIT HAS NO GAS/ELECTRIC HEAT. SENSOR MUST BE INSTALLED DOWNSTREAM OF HEATER (IF USED) WHERE IT CANNOT "SEE" ANY HEATING ELEMENTS AND WHERE SUFFICIENT MIXING OF DISCHARGE AIR OCCURS. USE 18 AWG SHIELDED WIRE. DO NOT RUN SENSOR WIRING IN THE SAME CONDUIT AS LINE VOLTAGE WIRING OR WITH WIRING THAT SWITCHES HIGHLY INDUCTIVE LOADS SUCH AS CONTACTOR AND RELAY COILS.

USE 18 AWG WIRE MINIMUM. TO MINIMIZE INTERFERENCE PROBLEMS:

- USE SHIELDED WIRE ON ALL ANALOG INPUTS AND OUPUTS. DO NOT RUN 0-10 VOLT DC SIGNAL WIRING IN THE SAME CONDUIT AS LINE VOLTAGE WIRING OR WITH WIRING THAT SWITCHES HIGHLY INDUCTIVE LOADS SUCH AS CONTACTOR AND RELAY COILS. GROUND ONE END OF THE DRAIN (SHIELD) WIRE.
- IF UNSHIELDED CABLE OR NONMETALLIC CONDUIT IS USED, DO NOT RUN THE 0-10 VOLT DC SIGNAL WIRING IN CLOSE PROXIMITY PARALLEL TO CABLE OR NONMETALLIC CONDUIT CONTAINING LINE VOLTAGE WIRING OR WIRING THAT SWITCHES HIGHLY INDUCTIVE LOADS SUCH AS CONTACTOR AND RELAY COILS. MAINTAIN AT LEAST A 6 INCH SEPARATION BETWEEN PARALLEL RUNS.
- WHEN 0-10 VOLT DC SIGNAL WIRING MUST CROSS CLOSE TO CABLE OR NONMETALLIC CONDUIT CONTAINING LINE VOLTAGE WIRING OR WIRING THAT SWITCHES HIGHLY INDUCTIVE LOADS, IT MUST CROSS PERPENDICULAR (90 DEGREES) TO IT.
- KEEP THE 0-10 VOLT DC SIGNAL WIRING AS SHORT AS POSSIBLE.

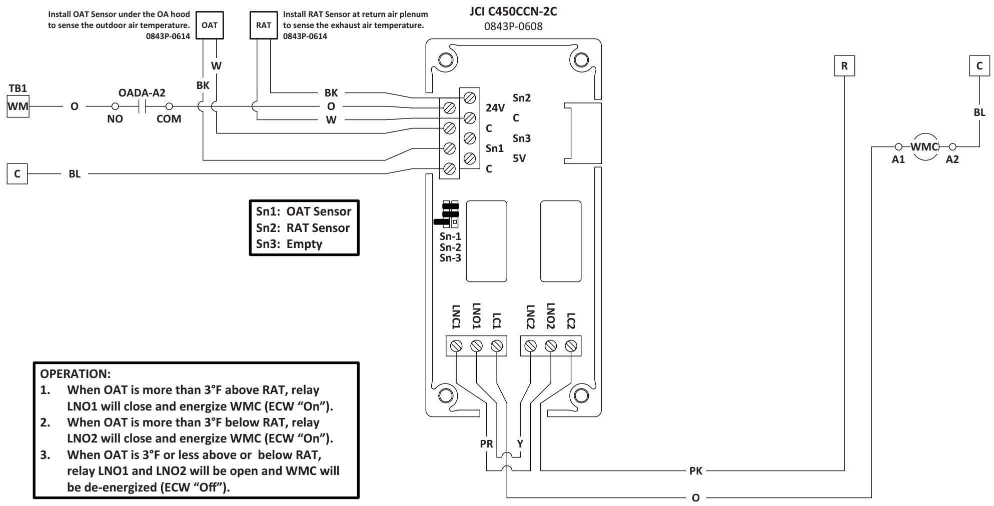
SENSORS	DESCRIPTION
CFI	Clogged Filter Indicator
DPT-260	Differential Pressure Transmitter
LAT	Leaving Air Temperature Sensor
OA-T/RH	Outdoor Air Temp/Relative Humidity Sensor
RA-RH	Room / Return Air Relative Humidity
RS	Room Temperature Sensor - Standard
CC1-CS, CC2-CS	Compressor #1 & #2 Current Sensor
SLT	Suction Line Temperature Sensor
WM-CS	Wheel Motor Current Sensor
SF-APS, EF-APS	Supply Fan / Exhaust Fan Air Press. Switch
WFR	Water Flow Relay
LP1, LP2	Low Pressure Switch, Ckt. #1 & #2
SD	Smoke Detector

SWITCH POSITION (OPTIONS):	
1 = 1, 2 = 0	BAUD RATE: 38.4K
3 = 0, 4 = 0	UNUSED
5 = 0, 6 = 0, 7 = 0, 8 = 0	NETWORK PROTOCOL: MSTP(m) BACnet
10's = 0, 1's = 2	MODULE ADDRESS

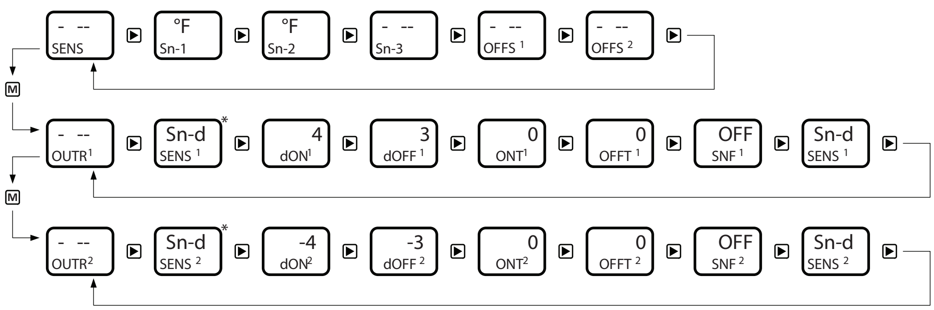
SYMBOL LEGEND	
(solid line)	FACTORY WIRING
(dashed line)	FIELD WIRING
(box)	TERMINAL BOARD

Fig. 23 — Controller Wiring for Dual Circuit Unit ECW and Bypass Variable Speed Fans, HGRH, and Auxiliary Heating (Gas or Electric)

Wiring Diagram for ECW with Standard Control



System 450 Set-Up for ECW with Standard Control



* - This screen will not show if sensor is already selected.

System 450 Controller Programming Instructions:

1. Jumper on both pins for **Sn-1** and **Sn-2**. Apply **24VAC** power.
2. Press and hold ▲ and ▼ simultaneously for **5** seconds to access "**SENS**" set-up screens.
3. Press ▶ for "**Sn-1**". Use ▲ or ▼ to select "**°F**" sensor. Press ▶ for "**Sn-2**". Use ▲ or ▼ to select "**°F**" sensor. Press ▶ then press M.
4. Press M to access "**OUTR^1^**" set-up.
5. Press ▶ for "**SENS^1^**". Press ▲ or ▼ to set value to "**Sn-d**".*
6. Press ▶ for "**dON^1^**". Press ▲ or ▼ to set value to "**4**".
7. Press ▶ for "**dOFF^1^**". Press ▲ or ▼ to set value to "**3**".
8. Press ▶ for "**ONT^1^**". Press ▲ or ▼ to set value to "**0**".
9. Press ▶ for "**OFFT^1^**". Press ▲ or ▼ to set value to "**0**".
10. Press ▶ for "**SNF^1^**". Press ▲ or ▼ to set value to "**OFF**".
11. Press ▶ for "**SENS^1^**". Press ▲ or ▼ to set value to "**Sn-d**".
12. Press M to return to "**OUTR^1^**" screen.
13. Press M to access "**OUTR^2^**" set-up.
14. Repeat steps **5** thru **11** for "**OUTR^2^**" settings except use "**-4**" for "**dON^2^**" and "**-3**" for "**dOFF^2^**".
15. Press M to return to "**OUTA^2^**" screen.
16. Press ▲ and ▼ simultaneously to return to the main screen.

The controller is now programmed and ready to use.

* - This screen will not show if sensor is already selected.

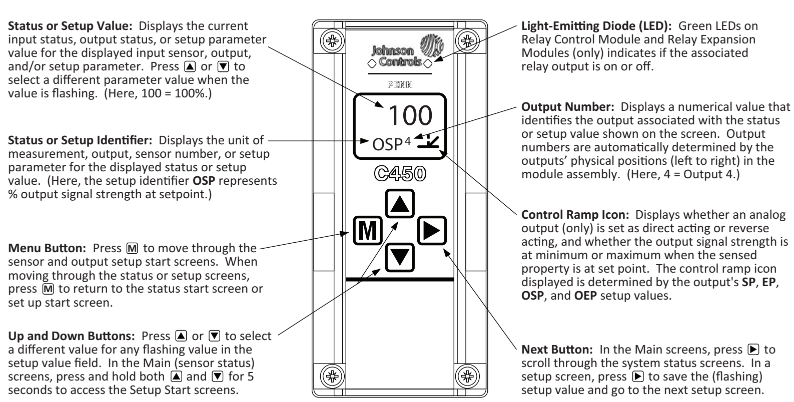
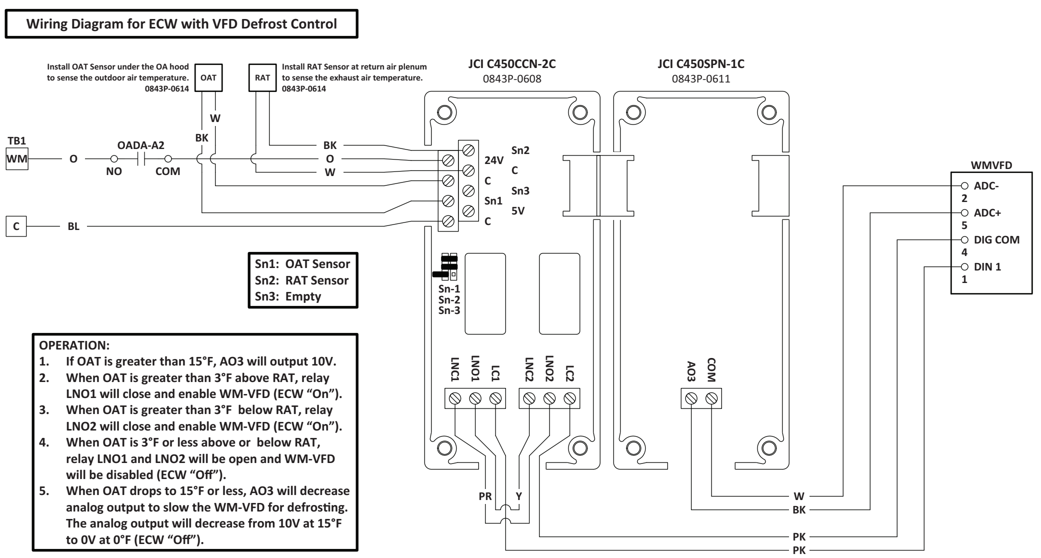
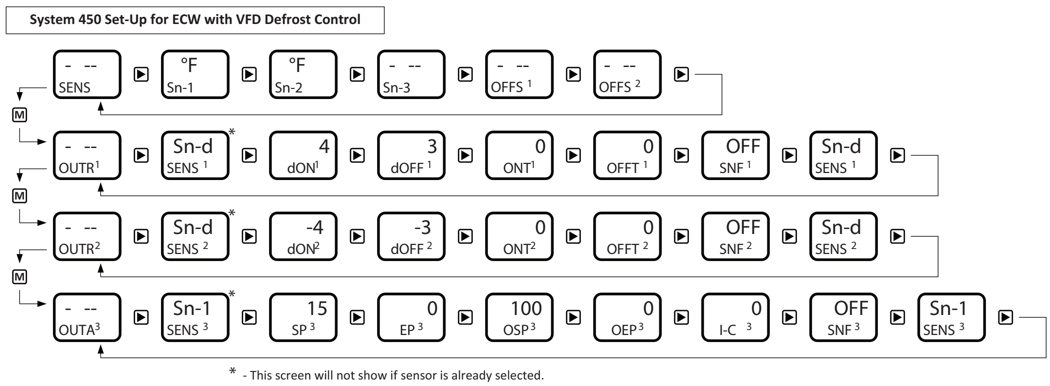


Fig. 24 — Controller Wiring for ECW with Cycling Defrost





System 450 Controller Programming Instructions:

1. Jumper on both pins for **Sn-1** and **Sn-2**. Apply **24VAC** power.
2. Press and hold ▲ and ▼ simultaneously for **5** seconds to access "**SENS**" set-up screens.
3. Press ▶ for "**Sn-1**". Use ▲ or ▼ to select "**°F** sensor.
   Press ▶ for "**Sn-2**". Use ▲ or ▼ to select "**°F** sensor.
   Press ▶ then press M. Press M to access "**OUTR**[1]" set-up.
4. Press ▶ for "**SENS**[1]". Press ▲ or ▼ to set value to "**Sn-d**".*
5. Press ▶ for "**dON**[1]". Press ▲ or ▼ to set value to "**4**".
6. Press ▶ for "**dOFF**[1]". Press ▲ or ▼ to set value to "**3**".
7. Press ▶ for "**ONT**[1]". Press ▲ or ▼ to set value to "**0**".
8. Press ▶ for "**OFFT**[1]". Press ▲ or ▼ to set value to "**0**".
9. Press ▶ for "**SNF**[1]". Press ▲ or ▼ to set value to "**OFF**".
10. Press ▶ for "**SENS**[1]". Press ▲ or ▼ to set value to "**Sn-d**".
11. Press M to return to "**OUTR**[1]" screen.
12. Press M to access "**OUTR**[2]" set-up.
13. Repeat steps **5** thru **11** for "**OUTR**[2]" settings except use "**-4**" for "**dON**[2]" and "**-3**" for "**dOFF**[2]".
14. Press M to return to "**OUTR**[2]" screen.
15. Press M to access "**OUTA**[3]" set-up.
16. Press ▶ for "**SENS**[3]". Press ▲ or ▼ to set value to "**Sn-1**".*
17. Press ▶ for "**SP**[3]". Press ▲ or ▼ to set value to "**15**".
18. Press ▶ for "**EP**[3]". Press ▲ or ▼ to set value to "**0**".
19. Press ▶ for "**OSP**[3]". Press ▲ or ▼ to set value to "**100**".
20. Press ▶ for "**OEP**[3]". Press ▲ or ▼ to set value to "**0**".
21. Press ▶ for "**I-C**[3]". Press ▲ or ▼ to set value to "**0**".
22. Press ▶ for "**SNF**[3]". Press ▲ or ▼ to set value to "**OFF**".
23. Press ▶ for "**SENS**[3]". Press ▲ or ▼ to set value to "**Sn-1**".
24. Press M to return to "**OUTA**[3]" screen.
25. Press ▲ and ▼ simultaneously to return to the main screen.

The controller is now programmed and ready to use.

* - This screen will not show if sensor is already selected.

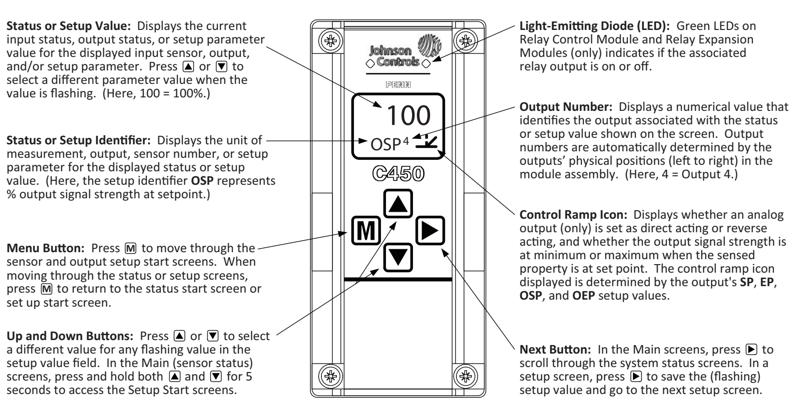
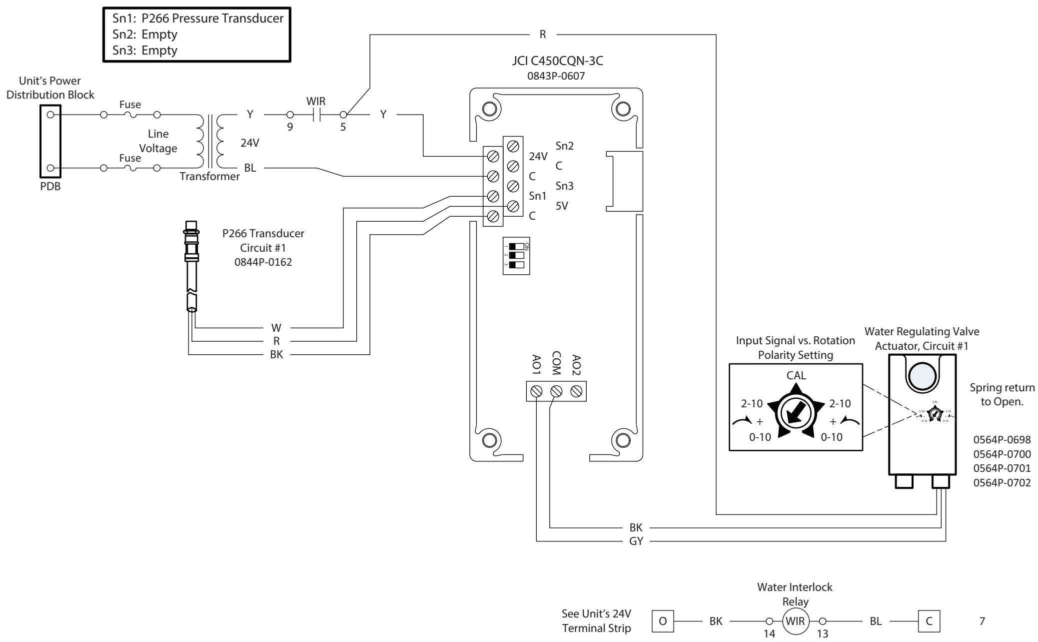
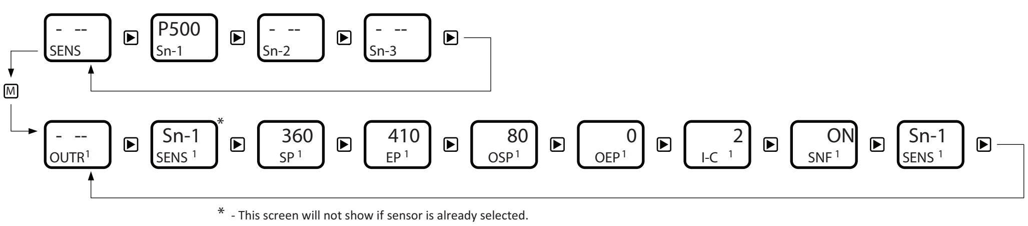


Fig. 25 — Controller Wiring for ECW with VFD Defrost

Wiring Diagram for Head Pressure Control of Water Regulating Valve Actuator – Single Circuit



System 450 Set-Up for Water Head Pressure – Single Circuit



System 450 Controller Programming Instructions:

1. Set all dip switches to "OFF" position. Apply 24VAC power.
2. Press and hold ▲ and ▼ simultaneously for 5 seconds to access "SENS" set-up screens.
3. Press ▶ for "Sn-1". Use ▲ or ▼ to select "P500" sensor. Press ▶ then press M.
4. Press M to access "OUTA[1]" set-up.
5. Press ▶ for "SENS[1]". Press ▲ or ▼ to set value to "Sn-1".*
6. Press ▶ for "SP[1]". Press ▲ or ▼ to set value to "360".
7. Press ▶ for "EP[1]". Press ▲ or ▼ to set value to "410".
8. Press ▶ for "OSP[1]". Press ▲ or ▼ to set value to "80".
9. Press ▶ for "OEP[1]". Press ▲ or ▼ to set value to "0".
10. Press ▶ for "I-C[1]". Press ▲ or ▼ to set value to "2".
11. Press ▶ for "SNF[1]". Press ▲ or ▼ to set value to "ON".
12. Press ▶ for "SENS[1]". Press ▲ or ▼ to set value to "Sn-1".
13. Press M to return to "OUTA[1]" screen.
14. Press ▲ and ▼ simultaneously to return to the main screen.

The controller is now programmed and ready to use.

* - This screen will not show if sensor is already selected.

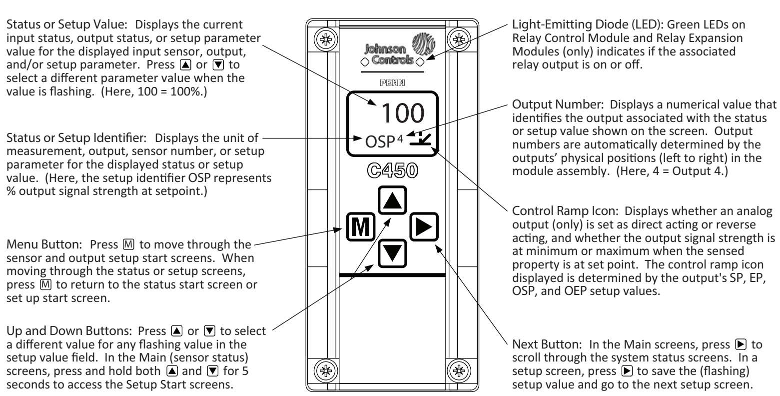
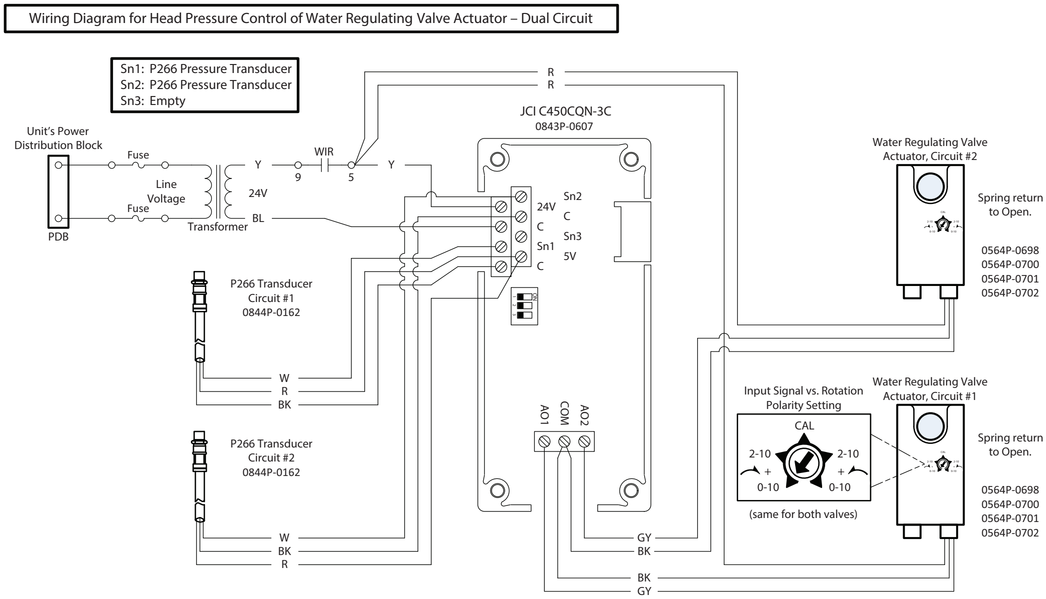
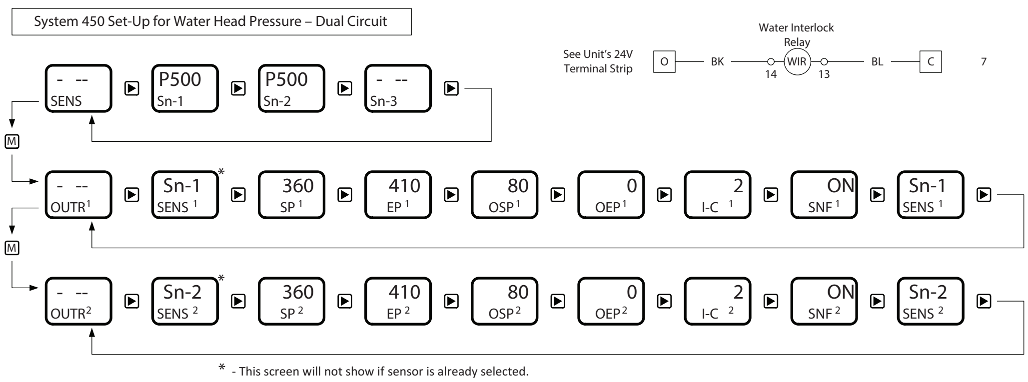


Fig. 26 — Controller Wiring for Water Regulating Valve for Single Circuit Unit





System 450 Controller Programming Instructions:

1. Set all dip switches to "OFF" position. Apply 24VAC power.
2. Press and hold ▲ and ▼ simultaneously for 5 seconds to access "SENS" set-up screens.
3. Press ▶ for "Sn-1". Use ▲ or ▼ to select "P500" sensor. Press ▶ for "Sn-2". Use ▲ or ▼ to select "P500" sensor. Press ▶ then press M.
4. Press M to access "OUTA1" set-up.
5. Press ▶ for "SENS1". Press ▲ or ▼ to set value to "Sn-1".*
6. Press ▶ for "SP1". Press ▲ or ▼ to set value to "360".
7. Press ▶ for "EP1". Press ▲ or ▼ to set value to "410".
8. Press ▶ for "OSP1". Press ▲ or ▼ to set value to "80".
9. Press ▶ for "OEP1". Press ▲ or ▼ to set value to "0".
10. Press ▶ for "I-C1". Press ▲ or ▼ to set value to "2".
11. Press ▶ for "SNF1". Press ▲ or ▼ to set value to "ON".
12. Press ▶ for "SENS1". Press ▲ or ▼ to set value to "Sn-1".
13. Press M to return to "OUTA1" screen.
14. Press M to access "OUTA2" set-up.
15. Press ▶ for "SENS2". Press ▲ or ▼ to set value to "Sn-2".
16. Repeat steps 6 thru 11 for the "OUTA2" settings.
17. Press ▶ for "SENS2". Press ▲ or ▼ to set value to "Sn-2".
18. Press M to return to "OUTA2" screen.
19. Press ▲ and ▼ simultaneously to return to the main screen.

The controller is now programmed and ready to use.

* - This screen will not show if sensor is already selected.

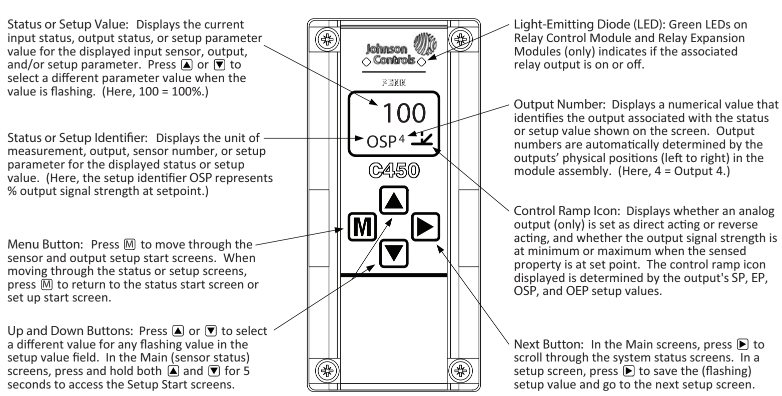


Fig. 27 — Controller Wiring for Water Regulating Valve for Dual Circuit Unit

Step 5 — Install Ductwork — Properly sized and installed ductwork is critical to reliable performance of the unit and system. All duct connections with the use of a curb are to be field sized and cut. All ductwork must be installed according to local codes, practices, and requirements.

Industry manuals should be used as a guide to sizing and designing the duct system. Ducts passing through unconditioned spaces must be well insulated with vapor barrier to prevent condensation.

An adequate straight length of ducting from the unit should be allowed before elbows are installed. Use 3 times the duct diameter as a minimum general rule.

Elbows should turn in the direction of fan rotation, if possible. Abrupt turns will generate air turbulence and excessive noise. Turning vanes should be used in all short radius bends. Ensure that ducting does not obstruct access to the unit for routine servicing.

Step 6 — Install Condensate Piping — A condensate trap must be provided by the customer. Drainage of condensation directly onto the roof is unacceptable if permitted by local codes. It is recommended that a small drip pad or either stone, tar, wood or metal be provided to prevent any possible damage to the roof. If condensate is to be piped into the building drainage system, the drain line must penetrate the roof external to the unit. Refer to local codes for additional requirements.

VENTING — Install a vent in the condensate line of any application that may allow dirt or air to collect in the line. Consider the following:

- Always install a vent where an application requires a long horizontal run.
- Always install a vent where large units are working against higher external static pressure and to allow proper drainage for multiple units connected to the same condensate main.
- Be sure to support the line where anticipated sagging from the condensate or when "double trapping" may occur.

If condensate pump is present on unit, be sure drain connections have a check valve to prevent back flow of condensate into other units.

IMPORTANT: Units with high internal and external static pressure drops will require a deeper trap. Use the graph and table in Fig. 28.

Step 7 — Install Gas Piping and Venting

⚠ WARNING

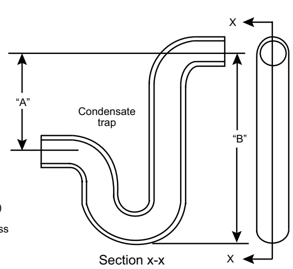
The 62R units with gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapors or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons, or in applications with airborne silicone substances. Improper installation, adjustment alteration, service, or maintenance can cause property damage, injury or death. Read the instructions, operation, and maintenance instructions thoroughly before installing or servicing this unit.

⚠ WARNING

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

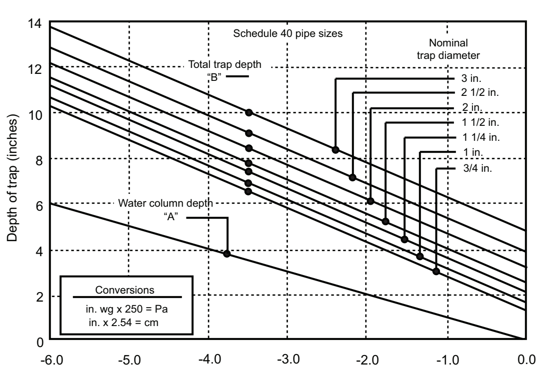
Dimensions of schedule 40 pipe (inches)

Size	Nominal Diameter Outside	Nominal Diameter Inside	Wall Thickness
3/4	1.050	0.624	0.113
1	1.315	1.049	0.133
1 1/4	1.660	1.380	0.140
1 1/2	1.900	1.610	0.145
2	2.375	2.067	0.154
2 1/2	2.875	2.467	0.203
3	3.500	3.066	0.216

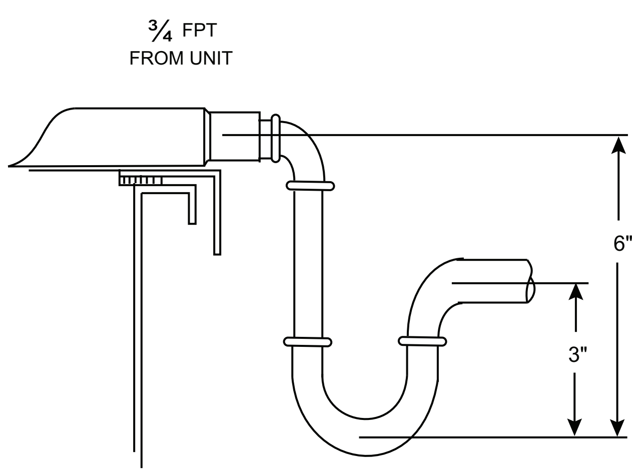


"A" - Pc (Condensate pan pressure)

"B" - (1.5 x Pc) + I.D. + wall thickness



THE TRAP MUST BE PRIMED BEFORE OPERATING UNIT.



DRAIN TRAP

Fig. 28 — Condensate Drain Piping Details

Step 8 — Check Service Clearances — Adequate clearance around the unit must be kept for safety, accessibility, service, and maintenance. A 48-in. clearance is required on the side (furnace and electrical) end of the unit. This clearance must be maintained for compressor removal and up to 64-in. in the case of a furnace or ECW (energy conservation wheel) unit.

All combustible materials must be kept out of the area. A 48-in. clearance is also required on the front (outside air) end of the unit for blower removal and for adequate outside air accessibility. The clearance of 6-in. on the filter access side of the unit is required for ECW wheel removal if installed. A clearance of 36-in. is required on the condenser side. See Fig. 29 and Table 8.

⚠ WARNING

No windows, doors, exhaust or intake air opening may be located in front of the gas furnace flue outlet. To do so exposes the building occupants to the danger of carbon monoxide poisoning. This could result in severe personal injury or death.

Step 9 — Install Water Connections — Water connections are inside the unit, in the compressor compartment. There are two pipe sleeves in the bottom pan of the unit, and the water lines must be brought up to the roof through the curb. Dimensions locating the sleeve center lines are shown on the dimensional drawings.

Where the two condensers are used, they are manifolded at the factory, so only two connections are required in the field. Follow all local plumbing codes in connecting water lines, and insulate against freezing.

Most of these units will be installed on closed loop systems. If well water is used, an adequate supply of good water must be available. If it is high in mineral content, it may need to be treated to prevent lime deposit accumulation in the heat exchanger. If high in sulfur content, an optional cupronickel condenser may need to be specified. Consult local water treatment companies for advice on the condition of the water you intend to use.

Depending on the application, there are 3 types of WSHP (water source heat pump) piping systems to choose from: water loop, ground-water and ground loop. Refer to Piping Section of Carrier System Design Manual for additional information.

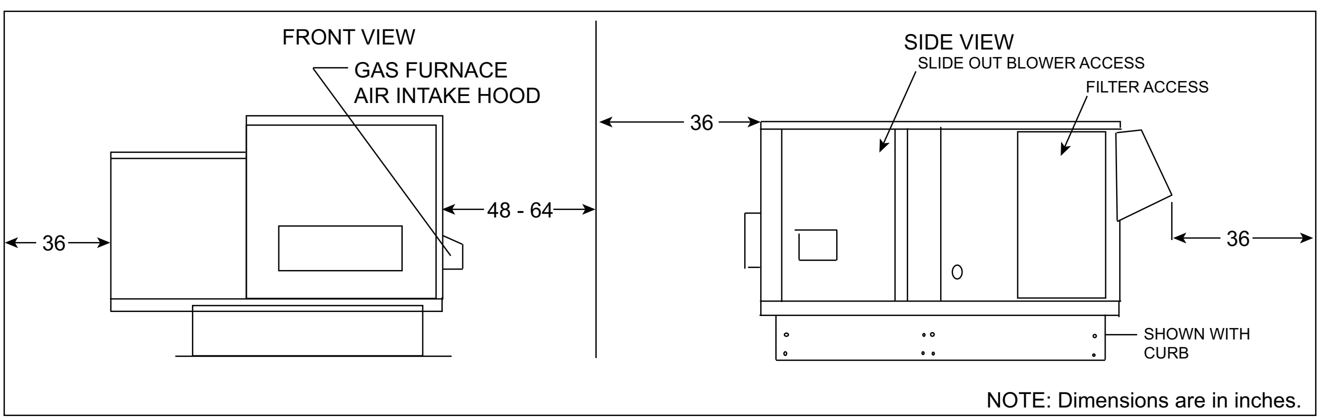
All WSHP units use low temperature soldered female pipe thread fittings for water connections to prevent annealing and out-of-round leak problems which are typically associated with high temperature brazed connections. Refer to Table 9 for connection sizes. When making piping connections, consider the following:

- Use a backup wrench when making screw connections to unit to prevent internal damage to piping.
- Insulation may be required on piping to avoid condensation in the case where fluid in loop piping operates at temperatures below dew point of adjacent air.
- Piping systems that contain steel pipes or fittings may be subject to galvanic corrosion. Dielectric fittings may be used to isolate the steel parts of the system to avoid galvanic corrosion.

Table 8 — Required Clearances

UNIT	TOP	SIDES*		BOTTOM	
		CONTROL	OPPOSITE	TO COMBUSTIBLES	TO NON-COMBUSTIBLES
62R SERIES	36-in.	Width of Furnace Plus 6-in.	0-in.	24-in.	0-in.

* Provide clearance as shown for safety, for combustion, and for service. However, for most closed loop applications, the recommended flow rate will vary according to inlet water temperature.



WARNING! IMPORTANT NOTE: No windows, doors, exhaust or intake air opening may be located in front of the gas furnace flue outlet. To do so exposes the building occupants to the DANGER of carbon monoxide poisoning! This could result in severe personal injury or death.

Fig. 29 — Accessibility, Service and Maintenance

Table 9 — Water Connection Sizes

62R UNIT SIZE	CONNECTION SIZE (in.)
07	1 1/8
08	1 1/8
09	1 3/8
12	1 3/8
14	1 3/8
15	1 3/8
16	1 5/8
20	1 5/8
22	2 1/8
24	2 1/8
30	2 1/8
34	2 1/8
38	2 1/8

WATER LOOP APPLICATIONS — Water loop applications usually include a number of units plumbed to a common piping system. Maintenance to any of these units can introduce air into the piping system. Therefore, air elimination equipment comprises a major portion of the mechanical room plumbing.

The flow rate is usually set between 2.25 and 3.5 gpm per ton of cooling capacity. For proper maintenance and servicing, pressure-temperature (P/T) ports are necessary for temperature and flow verification.

Cooling tower/boiler systems typically utilize a common loop maintained at 60 to 95 F. The use of a closed circuit evaporative cooling tower with a secondary heat exchange between the tower and the water loop is recommended. If an open type cooling tower is used continuously, chemical treatment and filtering will be necessary.

In addition to complying with any applicable codes, consider the following for system piping:

- Piping systems using water temperatures below 50 F require 1/2-in. closed cell insulation on all piping surfaces to eliminate condensation.
- Avoid all plastic to metal threaded fittings due to the potential to leak. Use a flange fitted substitute.
- Teflon tape thread sealant is recommended to minimize internal fouling of the heat exchanger.
- Use backup wrench. Do not overtighten connections.
- Route piping to avoid service access areas to unit.
- Flush the piping system prior to operation to remove dirt and foreign materials from the system.

GROUND-WATER APPLICATIONS — In addition to complying with any applicable codes, consider the following for system piping:

- Install shutoff valves for servicing.
- Install pressure-temperature plugs to measure flow and temperature.
- Connect boiler drains and other valves using a “T” connector to allow acid flushing for the heat exchanger.
- Do not overtighten connections.
- Route piping to avoid service access areas to unit.
- Use PVC SCH80 or copper piping material.

NOTE: PVC SCH40 should *not* be used due to system high pressure and temperature extremes.

Water Supply and Quantity — Check water supply. Water supply should be plentiful and of good quality. See Table 10 for water quality guidelines.

IMPORTANT: Failure to comply with the above required water quality and quantity limitations and the closed-system application design requirements may cause damage to the tube-in-tube heat exchanger. This damage is not the responsibility of the manufacturer.

In all applications, the quality of the water circulated through the heat exchanger must fall within the ranges listed in the Water Quality Guidelines table. Consult a local water treatment firm, independent testing facility, or local water authority for specific recommendations to maintain water quality within the published limits.

GROUND-LOOP APPLICATIONS — Temperatures between 25 and 110 F and a cooling capacity of 2.25 to 3 gpm of flow per ton is recommended. In addition to complying with any applicable codes, consider the following for system piping:

- Limit piping materials to only polyethylene fusion in the buried sections of the loop.
- Do not use galvanized or steel fittings at any time due to corrosion.
- Avoid all plastic to metal threaded fittings due to the potential to leak. Use a flange fitted substitute.
- Do not overtighten connections.
- Route piping to avoid service access areas to unit.
- Use pressure-temperature (P/T) plugs to measure flow of pressure drop.

To Measure Water Flow — Pressure taps are provided on each water connection, in order to measure water pressure at the inlet and outlet. This will allow the pressure drop across the unit to be determined, and the unit specification sheet will indicate water flow in gpm.

Rated flow in accordance with applicable AHRI (Air-Conditioning, Heating and Refrigerating Institute) standards is that rate which gives a 10° F water temperature rise on the cooling cycle, at rated cfm, 80 F dry bulb and 67 F wet bulb air across the evaporator coil (see unit specification sheet).

Table 10 — Water Quality Guidelines

CONDITION	HX MATERIAL*	CLOSED RECIRCULATING†	OPEN LOOP AND RECIRCULATING WELL**		
Scaling Potential — Primary Measurement Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below.					
pH/Calcium Hardness Method	All	N/A	**pH < 7.5 and Ca Hardness, <100 ppm**		
Index Limits for Probable Scaling Situations (Operation outside these limits is not recommended.)					
Scaling indexes should be calculated at 150 F for direct use and HWG applications, and at 90 F for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	N/A	**6.0 - 7.5** If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	N/A	**–0.5 to +0.5** If <–0.5 minimize steel pipe use. Based upon 150 F HWG and direct well, 85 F indirect well HX.		
Iron Fouling					
Iron Fe^{2+} (Ferrous) (Bacterial Iron Potential)	All	N/A	**<0.2 ppm (Ferrous)** If Fe^{2+} (ferrous) >0.2 ppm with pH 6 - 8, O_2<5 ppm check for iron bacteria.		
Iron Fouling	All	N/A	**<0.5 ppm of Oxygen** Above this level deposition will occur.		
Corrosion Prevention††					
pH	All	6 - 8.5 Monitor/treat as needed.	**6 - 8.5** Minimize steel pipe below 7 and no open tanks with pH <8.		
Hydrogen Sulfide (H_2S)	All	N/A	**<0.5 ppm** At H_2S>0.2 ppm, avoid use of copper and cupronickel piping or HXs. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are okay to <0.5 ppm.		
Ammonia Ion as Hydroxide, Chloride, Nitrate and Sulfate Compounds	All	N/A	**<0.5 ppm**		
Maximum Chloride Levels			Maximum allowable at maximum water temperature.		
			50 F (10 C)	75 F (24 C)	100 F (38 C)
	Copper	N/A	<20 ppm	NR	NR
	CuproNickel	N/A	<150 ppm	NR	NR
	304 SS	N/A	<400 ppm	<250 ppm	<150 ppm
	316 SS	N/A	<1000 ppm	<550 ppm	<375 ppm
	Titanium	N/A	>1000 ppm	>550 ppm	>375 ppm
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size.	<10 ppm (<1 ppm "sand free" for reinjection) of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components.		

LEGEND

HWG — Hot Water Generator
HX — Heat Exchanger
N/A — Design Limits Not Applicable Considering Recirculating Potable Water
NR — Application Not Recommended
SS — Stainless Steel

*Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.
†Closed recirculating system is identified by a closed pressurized piping system.
**Recirculating open wells should observe the open recirculating design considerations.

††If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.
Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity cause system problems, even when both values are within ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water contains a pH of 7.0.
NOTE: To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

Step 10 — Install Open Exhaust Damper (Units with Optional Exhaust or Energy Conservation Wheel Only) — The optional exhaust damper is secured to the exhaust assembly for shipping. Remove the two screws holding the damper to the panel. Damper should be free to swing open during operation. See Fig. 30.

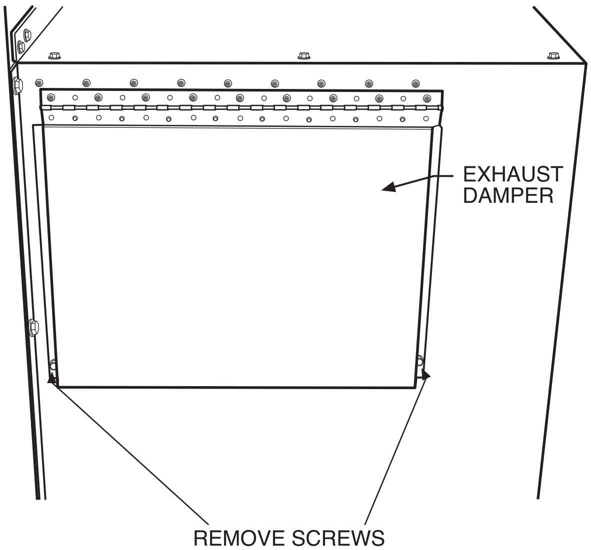


Fig. 30 — Optional Exhaust Damper

Step 11 — Configure Controls — The unit controller is pre-configured with default set points as detailed in the Controls, Start-Up, Operation, and Troubleshooting book. If changes to the set points are desired, this may be accomplished via BACview display or by using a computer equipped with Virtual BACview. See the Controls, Start-Up, Operation, and Troubleshooting book.

START-UP INSTRUCTIONS

The following steps are offered as a general guide to start-up:

1. With a voltmeter, check to see that the voltage to be applied to the unit is correct. If it is low by more than 10%, consult the power company before starting the unit. If it is high, watch carefully to see that it does not remain more than 10% high during full load running conditions.
2. All units are equipped with compressor crankcase heaters, which must be energized at least 12 hours prior to start-up.

   Before turning power on to the unit, see that the thermostat switch is in the OFF position. Then turn power on. Allow it to remain on at least 8 hours prior to starting the unit.
3. Feel the compressor crankcase. It should be warm, since the heaters have been on at least 12 hours. This will assure that no refrigerant liquid is present in the crankcase. If the crankcase is allowed to contain liquid refrigerant, compressor damage or failure can occur on start-up.
4. Install suction and discharge gauge set on compressor, to read suction and discharge pressure.
5. Allow unit to start up. The supply air blower should operate. Observe that airflow is present. Measure that airflow in order to determine if it is as specified for the particular application. Normal methods of measurement should be used, as with any commercial installation. Since blower motor is three-phase, check to be sure it is not running backwards. If it is, interchange any two of the three power leads to the unit, after first stopping the unit and opening the disconnect to remove power from the unit.
6. Be sure that water flow to the unit is correct. Water flow should be as specified for the job.
7. After being satisfied that airflow and water flow are correct, turn the temperature setting on the thermostat as high as it will go. Then turn the system switch to COOL. The unit compressor should not come on yet. Then, slowly turn the temperature setting down until the thermostat contacts make, calling for cooling. The compressor should now come on. Check to see that it is operating correctly. If compressor is equipped with an oil level sight glass, check for proper oil level.
8. With a voltmeter, check to see that the unit is receiving rated voltage while running. If it remains more than 10% low or high during full load running conditions, consult the power company.
9. With an ammeter, check to see that the unit is drawing approximately rated current in amps.
10. Check pressure readings on the suction and discharge gauges. While these will vary with start-up conditions, suction pressure will usually be from 65 to 80 psig, and the discharge pressure will usually be from 210 to 240 psig.
11. Check superheat at the suction line just before the compressor, it should be about 15 degrees during normal operation.
12. After checking the cooling operation, turn the thermostat to the OFF position, and listen for the unit reversing valve to shift. Then, turn the temperature setting as low as it will go. Switch to the HEAT position. Then, gradually raise the temperature setting until the compressor comes on. See that the unit is providing heat. The unit cannot be properly checked for pressures, etc., on the heating cycle until the heating season has started and room return conditions are in the normal range of 70 degrees dry bulb. However, since the unit was factory operated in both cooling and heating, if you have correct operation in cooling, the heating operation should be satisfactory. Do not run the unit too long in heating, with high summer-time return-air temperatures. Return at the beginning of the heating season to check the operation.
13. With room return air of 70 degrees dry bulb, on the heating cycle, compressor operating pressures should be: suction pressure from 60 to 70 psig, and discharge pressure from 250 to 325 psig.
14. Check to see that filters are properly positioned, and that they are clean.
15. Finally, check to see that all panels are on and correctly positioned, and that the unit seems to be operating normally, and that the owner's representative is instructed in unit operation and precautions.

MAINTENANCE PROCEDURES

Proper, regularly scheduled maintenance is important to ensure the most efficient operation and longest life for your equipment. The following points are to serve as a general guide. Always consult with your maintenance contractor with regard to the specific requirements of your own installation.

FILTERS — Check the air filters at least once each month. Wash or replace as required.

BEARINGS — Only sealed bearings are used in the evaporator blower motors. Therefore, bearing oiling is not required.

PAINT FINISH — Unit is primed and painted giving a durable finish. If paint lifting or peeling occurs, scrape and sand the affected area and touch up with paint obtained from the factory for this purpose.

WATER SYSTEM — The pump should be checked whenever filters are cleaned, to assure that it is operating normally. Clogged coils lead to high pressures and inefficient operation. Abnormal pressures may indicate liming or scaling. If so cleaning is necessary. Condenser coils should be checked yearly for liming or clogging.

REFRIGERANT PRESSURE — Check at any time unit does not seem to be performing at top efficiency. These should be checked only by a competent service contractor.

CONTACTOR POINTS — Check contactor points twice a year, to be sure they are not badly burned or pitted as a result of low voltage, lightning strikes, or other electrical difficulties.

CONDENSATE DRAINS — Always check to see that condensate is draining properly from the unit, whenever you check the filters.

EVAPORATOR FANS — Be alert for any noise that would indicate blower wheels loose, motors or bearing failing.

CONDENSATE DRAIN PAN — Each 6 months, clean and flush evaporator condensate drain pan.

BELTS AND PULLEYS — Check whenever filters are changed, to make sure belts are tight and pulleys are not loose. Check set screws on the bearings.

COOLING SYSTEM OPTIONS

Adjustable High and Low Pressure Switches — Standard cooling units are equipped with non-adjustable pressure switches. The low-pressure switch is set to open at 135 ± psig and is an automatic reset switch closing at 99 ± psig. The high-pressure switch is set to open at 640 ± psig and is a manual reset switch set to close at 595 ± psig.

Units can be equipped with adjustable high and low-pressure switches for those installations that require finer settings than the non-adjustable switches provide. Low-pressure switches have both set point and differential adjustments and are automatic reset. High-pressure switches must not be set above 640 psig and are manual reset. Set point and differential are adjustable.

MECHANICAL ADJUSTMENTS

Fan Rotation Check — Check that fan rotates clockwise when viewed from the drive side of unit and in accordance with rotation arrow shown on blower housing. See Fig. 31. If it does not, reverse two incoming power cables at TB terminal block.

Do not attempt to change load side wiring. Internal wiring assures all motors will rotate in correct direction once evaporator fan motor rotation check has been made.

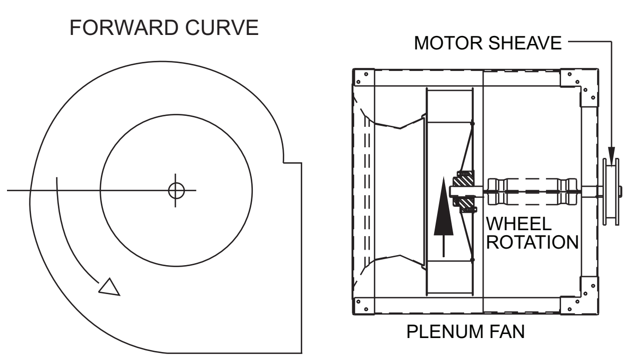


Fig. 31 — Blower Rotation

Drive Belt Tension and Alignment — For ease of service the 62R model unit is equipped with a slide-out fan assembly. Two screws must be removed and the wire harness wire tie must be cut to allow the fan to slide forward.

⚠ WARNING

The fan can slide completely out of the cabinet so use extreme care not to slide fan out to a point where the fan could fall out of the cabinet causing severe personal injury and/or equipment and roof damage. Leave at least 12 in. of the fan slide flanges engaged to the blower box rails to allow for proper support of the fan. Never apply additional weight or stand on the blower as a step.

Fan belt alignment and tension should be checked. Tension should be $^3/_4$-in. depression per foot of belt span between pulleys.

Personal injury hazard. Use extreme care during the following procedures and obey safety information. Failure to do so may result in personal injury.

The following safety rules MUST always be followed when working near belt drive.

⚠ WARNING

Always turn the power off. Turn the power to the unit OFF before you begin working on it.

⚠ WARNING

Always wear protective clothing. NEVER wear loose or bulky clothes, such as neckties, exposed shirttails, loose sleeves, or lab coats around belt drives. Wear gloves while inspecting sheaves to avoid nicks, burrs, or sharply worn pulley edges.

The blower speed is changed by adjusting the variable speed pulley mounted on the blower motor. If the blower speed needed is different than the speed of the blower as shipped, follow the steps below to change the blower speed. Before changing the blower speed, read the above safety rules first.

1. Turn electric power OFF.
2. Remove the side blower access panel. Loosen the four motor mounting bolts.
3. Turn the motor adjustment bolt counterclockwise until the belt is slack enough to come off easily.
4. Remove the belt. Do NOT pry off belt.
5. Loosen set screw(s) on the outer half of the adjustable pulley.
6. The unit has one of two different types of adjustable pulleys.
7. Remove key if unit has a keyway type pulley.
8. To set the blower for a desired cfm, first turn the outer half of the adjustable pulley clockwise until it meets the inner half of the pulley. See Fig. 32.

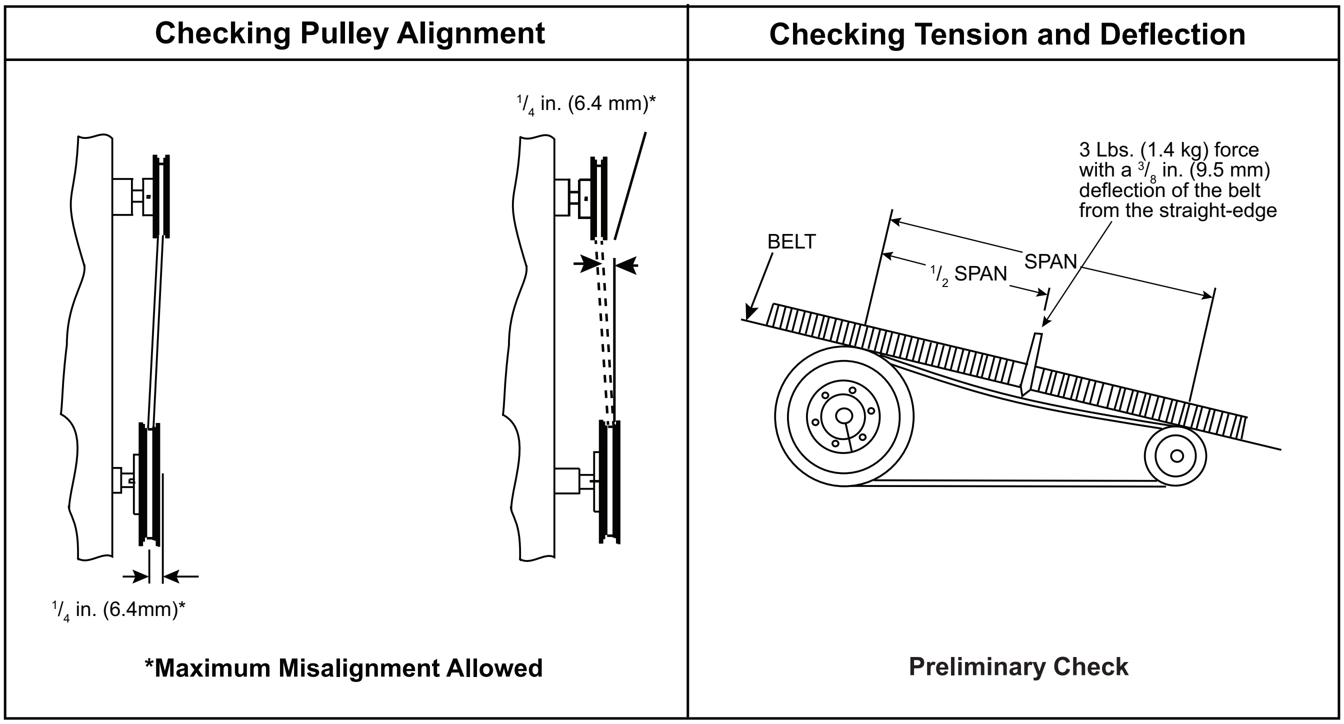


Fig. 32 — Check Pulley Alignment

9. Turn the outer half of the adjustable pulley counter clockwise the correct number of turns to obtain the desired cfm.

NOTE: To increase the blower speed, turn the outer half of the adjustable pulley clockwise. To decrease the blower speed, turn the outer half of the adjustable pulley counter clockwise.

10. Replace key if unit has keyway type pulley.
11. Tighten set screw(s).
12. Put on belt.
13. Turn motor adjustment bolt clockwise until the belt has enough tension at the proper deflection. Use one of the commercially available belt tension gauges to set the correct tension at the proper deflection.
14. Use a straight edge (angle iron, straight piece of board or anything with a straight surface or edge) to check the alignment of the blower pulley with blower motor pulley.
15. It may be necessary to back the tension off the belt temporarily and tighten one of the motor mount bolts before it is possible to adjust the angle of the blower motor.
16. Tighten all four blower motor mounting bolts.

ELECTRICAL SYSTEM OPTIONS

Airflow Switch — Switch is designed to prevent system operation unless there is proof of blower operation. A differential pressure switch measures the air pressures at the suction and discharge of the blower.

Clogged Filter Indicator — Dirty or clogged filters are indicated when the preset pressure differential across the filters is reached. The indicator is factory-installed and is manually reset. It includes contacts for remote indication.

Convenience Outlet (Field Wired) — A 115-v GFCI (ground fault current interrupt) receptacle mounted in a 2-in. x 4-in. enclosure and is furnished with a 15-amp circuit breaker. Separate 115-volt power source and ground is required.

Convenience Outlet (Factory Wired) — A 115-v GFCI receptacle mounted in a 2-in. x 4-in. enclosure may be furnished with a 15-amp circuit breaker, disconnect and 1500-Watt transformer. The transformer will be field connected to the line side of the unit disconnect switch.

Exhaust Fan Interlock — A relay installed in the unit control panel is energized when the blower is energized to interlock the unit with building exhaust fan(s).

Power Through the Curb — A chase is installed in the curb, directly under the electrical control section to bring power wiring inside the curb, preventing a separate roof penetration. The sleeve must be sealed after wiring is completed with suitable mastic to prevent water from entering the space.

Firestat — This control, mounted in the return air section, de-energizes the unit when return air reaches 135 F. The firestat is a manual reset control.

Phase Monitor — This control automatically stops the unit whenever a phase is lost, when phases are out of sequence, or when supply voltage drops too low. Restart is automatic with a 5-minute delay after proper power supply conditions are restored.

Unit Controller — A microprocessor controller is installed, in which complete unit operation is established through inputs of temperature, pressure, humidity sensors as well as other analog and digital inputs. The controller will provide a complete operating and monitoring system.

SEQUENCE OF OPERATION (HEATING)

Heating, Hydronic or Steam — Both hydronic and steam heat require a one or two row coil generally located downstream of the evaporator coil.

Controls for hydronic heat will involve a 3-way motorized mixing or blending valve, driven by a signal from a leaving air temperature thermostat.

Controls for low-pressure steam heat contain a motorized throttling valve driven by a signal from a leaving air temperature thermostat.

Heating, Electric Resistance

1. Three-phase power to the unit distribution block energizes 24-volt circuit in transformer T.
2. Indoor blower motor contactor is energized through normally closed contact of heat relay, stage 1, HR1, completing circuit from C to D.
3. A call for first stage heat closes circuit W1 and C, energizing HR1.
4. Heating contactor no. 1, HC1 is energized through closed air pressure differential switch APS, if used; closed high-limit switches AR1 and AR2 and closed HR1 contact.
5. A call for second-stage heat closes circuit W2 and C, energizing heat relay stage 2, HR2.
6. Closed HR2 contact energizes heating contactor no. 2, HC2.
7. Fusing and high limit switches protect the unit from malfunction.

Heating, Gas — See the Gas Furnace instructions for additional gas furnace data. Additional information can be found on the furnace access door such as the rating and serial label, wiring and lighting instruction label.

The furnace section is made from the control terminal across the normally closed contacts of the combustion pressure switch, energizing pilot ignition time delay relay heater. After delay of approximately 30 to 50 seconds the time delay relay's switch closes, energizing the furnace induced draft fan. As the induced draft fan motor operates, it causes the combustion pressure switch to open. The ignition control energizes a high-voltage electric spark, and the pilot valve solenoid in the combination gas valve. See Fig. 33.

The flame sensor proves the presence of the pilot flame generating a DC current of 0.2 micro-amp (or greater) to the ignition control. The ignition control's internal switch action then de-energizes the spark transformer and makes a circuit to the high fire solenoid of the combination gas valve.

When there is a call for gas furnace operation the discharge-air temperature causes a change in the resistance of a discharge air sensor thermistor. The Maxitrol solid-state control center measures the sensor's change in resistance and sends a varying DC current to the modulator-regulator valve to adjust the gas input as required.

GAS FURNACE

Installation Codes — The duct furnaces covered in this manual are design-certified by Intertek Testing Services (ETL) and are approved for use in the United States and Canada for use with natural or propane gas. See the "RATINGS AND SERIAL INFORMATION" label located on the inside of the vestibule access door for the type of gas, correct firing rate and electrical characteristics your furnace is equipped for.

In the United States, these furnaces must be installed in accordance with the standard of the National Fire Protection Association (NFPA) or the National Fuel Gas Code ANSI Z223.1a (latest edition). The National Fuel Gas Code is available from the American Gas Association, 1515 Wilson Boulevard, Arlington, VA. 22209. NFPA Publications are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

In Canada, installations must be in accordance with the CAN/CGA B149.1 and B149.2 Installation Code for Gas Burning Appliances and Equipment. Canadian Codes are available from the Standards Department, Canadian Gas Association, 55 Scarsdale Road, Don Mills, Ontario M3B-2R3.

Local authorities having jurisdiction should be consulted before installations are made to verify local codes and installation procedures.

⚠ WARNING

To ensure safety, follow the instructions provided on the "LIGHTING INSTRUCTIONS" label located on the inside of the vestibule access door and on page 43 of this instruction manual.

Read ALL instructions to prevent personal injury or death.

This manual is for use only by a qualified heating installer/service technician.

Do not block flow of supply, combustion or ventilation air to the furnace. Should overheating occur or gas supply fail to shut off, DO NOT TURN OFF OR DISCONNECT ELECTRICAL SUPPLY to inducer fan. Instead, SHUT OFF THE GAS SUPPLY at a location external to the appliance.

To avoid electric shock, disconnect all electrical supply before installing or performing maintenance.

If any of the original factory-installed wiring must be replaced, it must be replaced with copper wire of the same gauge and insulation rated for a minimum of 105 C.

⚠ CAUTION

To avoid potentially severe burns, allow furnace to cool before performing maintenance.

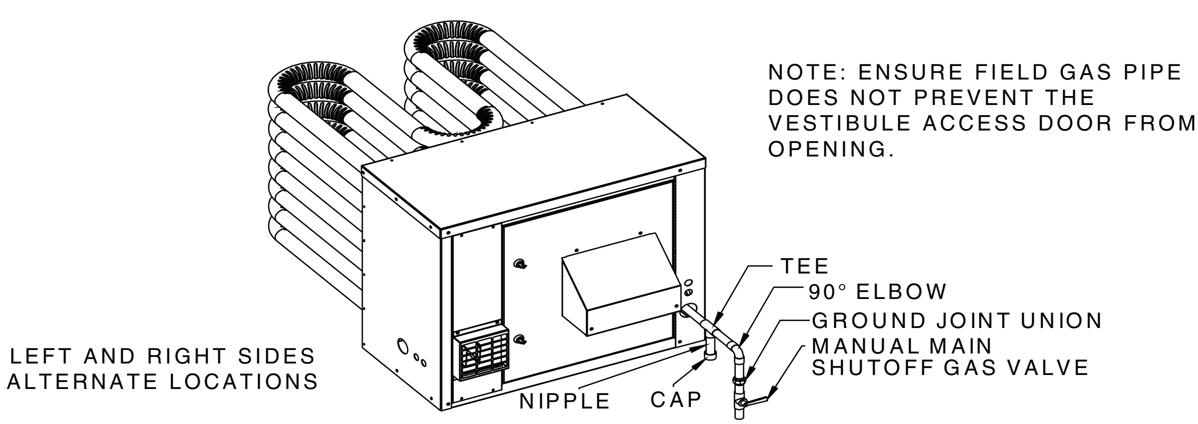


Fig. 33 — Gas Heat Section

Chlorines and Harsh Environments — The presence of chlorine vapors in the combustion air of gas-fired heating equipment presents a potential corrosion hazard. Chlorine will, when exposed to flame, precipitate from the compound, usually Freon or degreaser vapors, and go into solution with any condensation that is present in the heat exchanger or associated parts. The result is hydrochloric acid which readily attacks all metals including 409 and 439 stainless steels. Care should be taken to separate these vapors from the combustion process. This may be done by wise location of the furnace with regard to exhausters or prevailing wind direction. Remember, chlorine is heavier than air. This fact should be kept in mind when determining installation locations of heating equipment and building exhaust systems.

Gas Piping (Individual or Multiple Furnace Applications — All piping must be in accordance with the National Fuel Gas Code ANSI Z223.1a (latest edition), published by the American Gas Association or CAN/CGA-B149.1 and B149.2 (latest edition), published by the Canadian Gas Association. Always refer to local codes where required. Open the vestibule access door. Select the proper gas pipe clearance hole pre-installed in the furnace cabinet in three places depending on the best location for the field gas line. This may require moving the pipe grommet from its factory-installed position to the desired location as well as moving the cap to the old location of the pipe grommet to ensure rain water will not get inside the furnace vestibule. All model DF duct furnace use ¾-in. NPT gas connections to the gas valve. See Table 11 for proper pipe diameter for the length and Btu input.

Support piping with hangers, not by the furnace. Purge all air from the gas supply piping. Before placing the duct furnace into operation, check the furnace and its gas connections for leaks.

IMPORTANT: Close manual main shutoff valve during any pressure testing at less than 13 in. wg. The gas valve is equipped with two 1/8-in. NPT taps for gas pressure measurements. Disconnect furnace and gas valve from gas supply piping during any pressure testing greater than 13 in. wg. Installer must add a 1/8-in. minimum NPT fitting in this case.

⚠ WARNING

DO NOT CHECK FOR GAS LEAKS WITH AN OPEN FLAME. Use a bubble test. Failure to use a bubble test or check for leaks can cause severe personal injury, death or substantial property damage.

Use pipe sealing compound compatible with propane gases. Apply sparingly only to male threads of pipe joints so that pipe sealing compound does not block gas flow.

⚠ WARNING

Failure to apply pipe sealing compound as detailed above can result in severe personal injury, death or substantial property damage.

Natural Gas — Refer to Table 11 for pipe length and diameter. Base on maximum rated furnace input (divide by 1,000 to obtain cubic feet per hour). Table 11 is only for gas with specific gravity 0.60, with a pressure drop through the gas piping of 0.30 in. wg. For additional gas pipe sizing information, refer to ANSI Z223.1 for installations in the United States or for Canadian installations refer to CAN/CGA B149.1 or B149.2.

Natural gas required pressures:
- Maximum: 13 in. wg
- Minimum: 5 in. wg
- Manifold gas pressure: 3.5 in. wg

Propane Gas — Contact the gas supplier to size pipes, tanks and 100% lockup gas pressure regulator. Adjust propane regulator provided by the gas supplier for 13 in. wg maximum pressure.

Propane Gas Required Pressures:
- Maximum: 13 in. wg
- Minimum: 11 in. wg
- Manifold gas pressure: 10 in. wg

Table 11 — Pipe Capacities

GAS PIPE LENGTH (FT)	PIPE CAPACITY OF NATURAL GAS Specific Gravity = 0.06 in.					PIPE CAPACITY OF PROPANE GAS Specific Gravity = 1.60 in. (Multiply all values in propane table by 2.550)				
	3/4-in.	1-in.	1 1/4-in.	1 1/2-in.	2-in.	3/4-in.	1-in.	1 1/4-in.	1 1/2-in.	2-in.
10	278	520	1050	1600	2700	122	228	465	687	1304
20	190	350	730	1100	2100	116	214	445	671	1281
30	152	285	590	890	1650	93	174	360	543	1007
40	130	245	500	760	1450	79	149	305	464	885
50	115	215	440	670	1270	70	131	268	409	775
60	105	195	400	610	1105	64	119	244	372	674
70	96	180	370	560	1050	59	110	226	342	641
90	84	160	320	490	930	51	98	195	299	567
100	79	150	305	460	870	48	92	186	281	531
125	72	130	275	410	780	44	79	168	250	476
150	64	120	250	380	710	39	73	153	232	433
175	59	110	225	350	650	36	67	137	214	397
200	55	100	210	320	610	34	61	128	195	372

Lighting Instructions

> ⚠ **WARNING**
>
> To ensure safety, follow the instructions provided on the "LIGHTING INSTRUCTIONS" label located inside of the vestibule access door and in Fig. 34.

1. Read Lighting Instructions. See Fig. 34.
2. Raise space thermostat to call for heat.
3. Inducer motor energizes. After pressure switch proves proper airflow, control module initiates a 30-second purge.
4. Control module sparks the direct spark igniter and opens main gas valve.
   a. If main burners do not light within 4 seconds, the main gas valve is closed and the spark igniter turned off. The ignition control initiates a 30-second post-purge, then starts a new cycle.
   a. If main burner does light and control module senses flame current, spark igniter is turned off and burners stay on until space temperature satisfies the thermostat.
5. During main burner operation:
   a. The ignition control monitors main burner flame current. If signal is lost, the spark igniter is energized and sequence returns to Step 4.
   a. If power is interrupted, control system shuts off main gas valve and restarts at Step 2 when power is restored.
6. In the event the supply air limit control shuts down the furnace during operation, the control module closes the main gas valve, but keep the inducer energized for 30 seconds post-purge.
7. Lower space thermostat setting to stop call for heat. Thermostat is satisfied: main gas valve is closed and inducer is turned off.
8. Furnace is now in the off cycle.
9. Repeat Steps 1 through 7 several times to verify correct furnace operation. See Table 12 for LED codes.
10. Return the space thermostat to normal setting.
11. If so equipped, set thermostat heat anticipator setting to 0.4 amp, adjusted for gas valve and control current.

Table 12 — LED Codes

LED STATUS	CODE DESCRIPTION
Steady On	Good Control, Normal Operation
1 Flash	Open Position Pressure Switch
2 Flashes	Stuck Closed Position Pressure Switch
3 Flashes	Failed Ignition
4 Flashes	Too Many Flame Losses
5 Flashes	Internal Ignition Control Fault
6 Flashes	Too Many Pressure Switch Losses

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the pilot by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

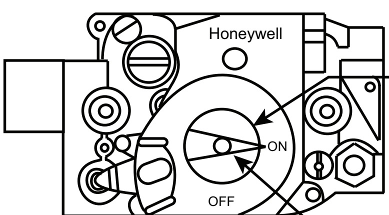
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, do not try to repair it, call a qualified service technician. Force or attempt repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

LIGHTING INSTRUCTION

1. STOP! Read the safety information above on this label.
2. Set the thermostat to the lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.



5. Open the control access door.
6. Turn the gas control knob clockwise ↻ to "OFF".
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas go to the next step.
8. Turn gas control knob counterclockwise ↺ on "ON".
9. Close the control access door.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Open the control access door.
4. Push in gas control knob slightly and turn clockwise ↻ to "OFF". Do not force.
5. Close the control access door..

0527P-1394

Fig. 34 — Lighting Instructions Label

STAGED GAS FURNACE SEQUENCE OF OPERATION

When system is powered up 24 vac will be applied to the ignition control (IC) terminals 24 VAC/R and to the timer relay control (TR1). The ignition control will reset, perform a self check routine, initiate full time flame sensing, flash the diagnostic LED for up to four seconds and enter the thermostat scan standby state. The amber light on the TR1 will be lit indicating it is in the ready position.

Call For Heat

1. Thermostat (controller) (first stage or first and second stage) closes on call for heat.
2. 24 vac is supplied to IC terminal TH, provided limit switch is in closed position.
3. The control will check that pressure switch contacts are open (IC terminal PSW is not powered).
4. Combustion blower is then energized at high speed.
5. When the air switch (APS1) closes, a 15-second pre-purge period begins.
6. At end of pre-purge period, the spark commences and the first and second stage gas valves are energized for the trial for ignition period.
7. Burners ignite and cross light, operating at maximum input rate (manifold pressure 3.5 in. wg).
8. TR1 is powered (terminal 7) simultaneously (SR LED lit) and begins timing a 90-second warm-up period while maintaining the combustion blower at high speed (FR LED lit). The TR1 will maintain this mode of operation, regardless of status of thermostat second stage.
9. When flame is detected by flame sensor, the spark is shut-off immediately and gas valves and combustion blower remain energized.
10. When the initial timer in TR1 times out, it defaults the gas valve to low fire and the combustion blower to low speed and returns control of the operating mode to the temperature controller. The SR LED turns off and the MR LED is lit.
11. If the controller is calling for second-stage heat TR1 terminal 6 is powered. After a short time delay (approximately 15 seconds), the system switches the combustion blower to high speed (FR LED lit) and the second stage gas valve at 3.5-in. wg manifold pressure (CR LED lit), provided the high air pressure switch (APS2) is proved.
12. During heating operation, the thermostat, pressure switch and main burner flame are constantly monitored by the IC to assure proper system operation.
13. Operation continues on high fire until the second-stage thermostat is satisfied, opening the second-stage contact and de-energizes terminal 6 on the TR1, turning off the second-stage gas valve and returning the combustion blower to low speed.
14. When the thermostat (controller) is satisfied and the demand for heat ends, the first-stage valve is de-energized immediately, the control senses loss of flame and a 30-second post-purge occurs (at high speed) before de-energizing the combustion blower.

Ignition and Operational Failures During a Call for Heat Result in “Lockout” of the Ignition Control

1. If flame is lost during an operational cycle, the control will respond within 0.8 second. The spark will be energized for a trial for ignition period to attempt to relight burners and prove flame sensor. If flame is re-established, normal operation resumes.
2. If the burners fail to light or carryover during a trial for ignition, the control will attempt two additional ignition trials. If no flame is present at the flame sensor within 10 seconds, the spark and gas valve will be de-energized. A 15-second inter-purge period begins and the combustion blower continues to run. After the inter-purge period another ignition trial will take place.
3. If the burner fails to light or prove the flame sensor following the two additional trials the control will go into lockout. The valve relay in the IC will be de-energized shutting off the gas valve immediately and the combustion blower following a 30-second post-purge period.

Recovery from Lockout

1. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.
2. The ignition control may also be manually reset, by turning the thermostat (controller) down and back up to previous temperature setting or removing power (24V) to IC terminal 24 VAC. See Table 13 for fault condition and LED key.

Table 13 — Fault Conditions and LED Key

LED STATUS	CODE DESCRIPTION
Steady On	Internal Control Fault
1 Flash	Combustion Air Flow Fault
2 Flashes	Flame with No Call for Heat
3 Flashes	Ignition Lockout

NOTE: LED flashes on for 0.25 second, and off for 0.25 second during fault condition. Pause between fault codes is 3 seconds.

3. If during the initial call for heat the air switch contacts are closed for 30 seconds without an output to the combustion blower, an airflow fault occurs (one LED flash) and control will remain in this mode.
4. If the airflow switch remains open (or a rollout switch is open) for more than 30 seconds after the combustion blower output (IND) is energized, an airflow fault occurs (one LED flash), and control will stay in this mode with combustion blower on, waiting for air flow switch (or rollout) to close.
5. If the airflow signal is lost during operation, the control immediately de-energizes the gas valve and maintains blower operation. If the call for heat remains and proper airflow is not detected, and airflow fault occurs (one LED flash). If proper airflow is detected at any time, the normal sequence will begin with pre-purge.
6. If the main valve fails to close properly at the end of a heating cycle and a flame is maintained, the combustion blower will continue in operation. If the valve does close completely later removing the flame signal, the blower will run for the post purge period and shut-off.

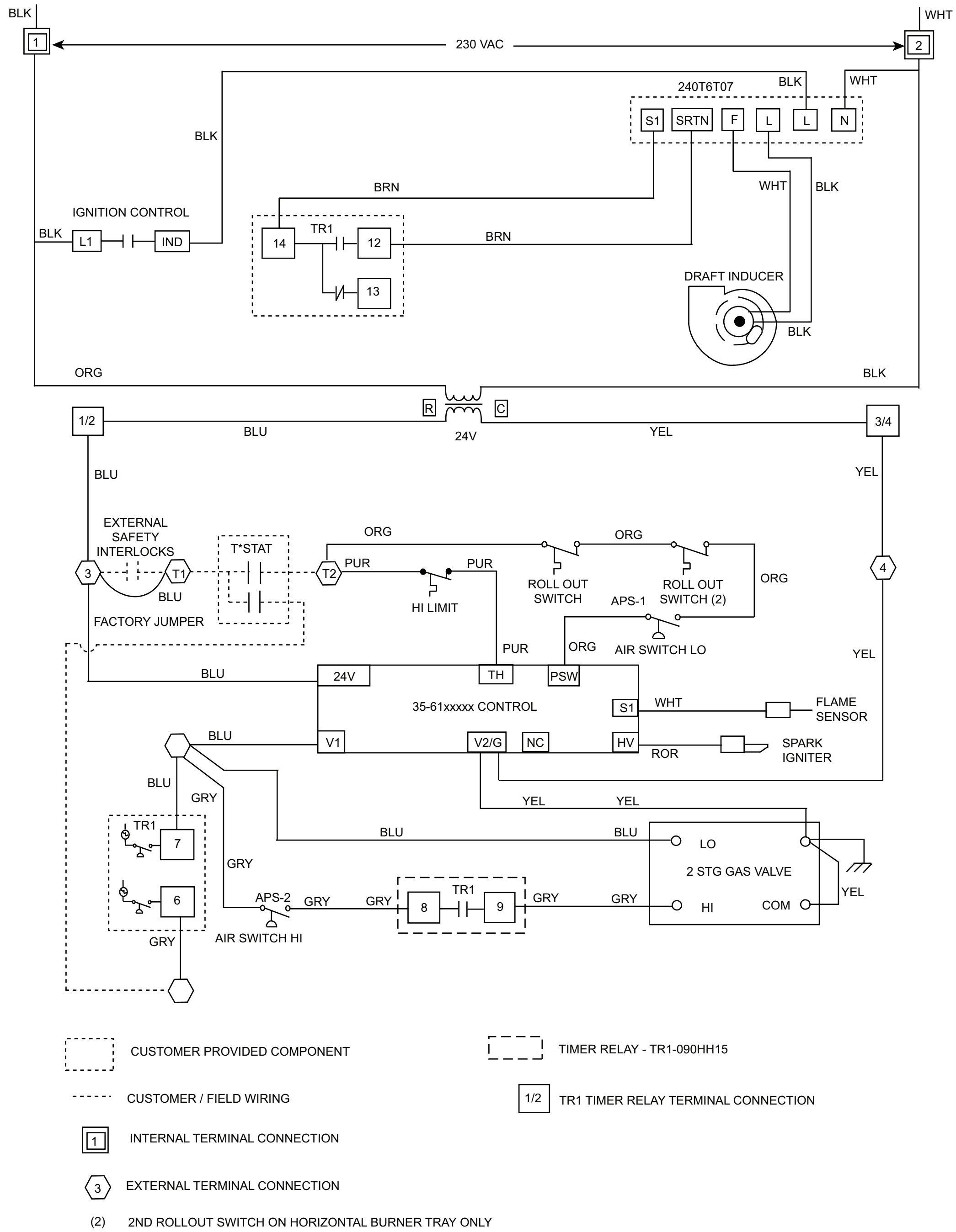


Fig. 35 — Typical 2-Stage Gas Furnace Control Wiring Diagram

MODULATING GAS FURNACE SEQUENCE OF OPERATION

When system is powered up 24 vac will be applied to the ignition control (IC) terminals 24 VAC/R and to the timer relay control (TR1). The ignition control will reset, perform a self check routine, initiate full time flame sensing, flash the diagnostic LED for up to four seconds and enter the thermostat scan standby state. The amber light on the TR1 will be lit indicating it is in the ready position. See Fig. 36.

Call For Heat

1. Thermostat (heat enable) closes on call for heat.
2. 24 vac is supplied to IC terminal TH, provided limit switch is in closed position.
3. The control will check that pressure switch contacts are open (IC terminal PSW is not powered).
4. Combustion blower is then energized at high speed.
5. When the air switch (APS1) closes, a 15-second prepurge period begins.
6. At end of pre-purge period, the spark commences and the first stage gas valve is energized for the trial for ignition period.
7. TR1 is powered (terminal 7) simultaneously (SR LED lit) and begins timing a 90-second warm-up period while maintaining the combustion blower at high speed (FR LED lit) and powers the SC30. The SC30 will output 12 to 13 vdc to the modulating control valve during the timing duration (90 seconds) of TR1, regardless of the analog input signal to SC30 terminals 7 and 8.
8. Burners ignite and cross light, operating at the adjusted mid-fire input rate (manifold pressure set at 1.2 to 1.5-in. wg).
9. When flame is detected by flame sensor, the spark is shutoff immediately and gas valve(s) and combustion blower remains energized.
10. When the initial timer in TR1 times out, it defaults the gas valve to low fire and the combustion blower to low speed and returns control of the operating mode to the building temperature controller. The SR LED turns off and the MR LED is lit.
11. If the controller is providing an analog signal between 0.5 and 5.3 vdc to the SC30 control, the system will continue to run at low speed combustion blower and with only the first-stage valve open. The modulating valve will be powered proportional to the input voltage signal from the controller, and will open or close changing the gas manifold pressure. Manifold pressure will vary from 0.3 to 1.2 in. wg operating in this mode.
12. If the signal increases above 5.3 vdc, the SC30 relay closes powering terminal 6 on the TR1, and starts a second time delay of 15 seconds. At the end of this time delay the fan switches to high speed (FR LED lit) and the second-stage gas valve opens (CR LED lit) through the TR1 (terminal 9) provided the high air switch contacts are closed. The manifold pressure will vary from 1.4 to 3.5 in. wg in this mode.
13. During heating operation, the thermostat, pressure switch and main burner flame are constantly monitored by the IC to assure proper system operation.
14. Operation continues in the high fire mode until the controller input signal to the SC30 control drops to 4.7 vdc. At this point the SC30 relay circuit opens (SC30 terminal 5 has no output) de-energizing the second-stage valve and the TR1 switches the combustion blower to low speed operation. Low fire modulation will continue as in Step 11.
15. When the thermostat (temperature controller) is satisfied and the demand for heat ends, the heat enable contact opens and the first stage valve is de-energized immediately, the control senses loss of flame and a 30-second post-purge occurs (at high speed) before de-energizing the combustion blower.

Ignition and Operational Failures During a Call for Heat Result in “Lockout” of the Ignition Control

1. If flame is lost during an operational cycle, the control will respond within 0.8 second. The spark will be energized for a trial for ignition period to attempt to relight burners and prove flame sensor. If flame is re-established, normal operation resumes.
2. If the burners fail to light or carryover during a trial for ignition, the control will attempt two additional ignition trials. If no flame is present at the flame sensor within 10 seconds, the spark and gas valve will be de-energized. A 15-second inter-purge period begins and the combustion blower continues to run. After the inter-purge period another ignition trial will take place.
3. If the burner fails to light or prove the flame sensor following the two additional trials the control will go into lockout. The valve relay in the IC will be de-energized shutting off the gas valve immediately and the combustion blower following a 30-second post-purge period.

Recovery from Lockout

1. If the thermostat (controller) is still calling for heat one hour after a lockout occurs, the control will automatically reset and initiate a call for heat sequence.
2. The ignition control may also be manually reset, by turning the thermostat (controller) down and back up to previous temperature setting or removing power (24V) to IC terminal 24 VAC. See Table 14 for fault conditions and LED key.

Table 14 — Fault Conditions and LED Key

LED STATUS	CODE DESCRIPTION
Steady On	Internal Control Fault
1 Flash	Combustion Air Flow Fault
2 Flashes	Flame with No Call for Heat
3 Flashes	Ignition Lockout

NOTE: LED flashes on for 0.25 second, and off for 0.25 second during fault condition. Pause between fault codes is 3 seconds.

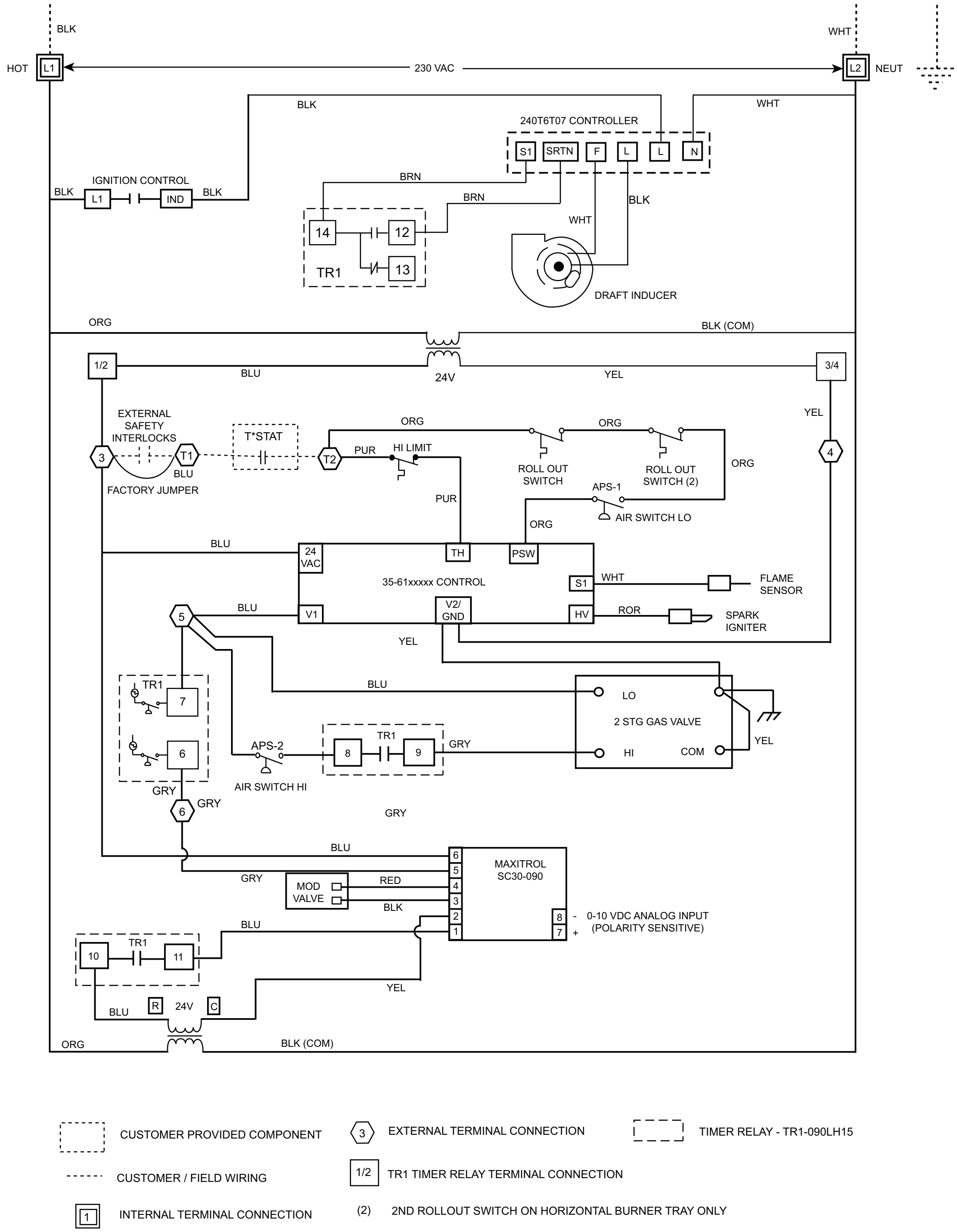


Fig. 36 — Typical Modulating Gas Furnace Wiring Diagram

TROUBLESHOOTING

Table 15 — Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSES
Compressor will not run, no hum	Disconnect switch open. Blown fuse(s). Thermostat not calling. Open control contacts – defective control. High or low pressure control open or defective. Oil pressure control open or defective (larger units with semi-hermetic compressors). Overload protector tripped or defective. Defective wiring.
Compressor will not start – hums but cycles on overload	Low voltage. Wiring incorrect or loose connections. Blown fuse. Compressor motor defective. Bearings or pistons tight – low oil charge. Defective compressor motor controller.
Compressor starts and runs but cycles on overload protector	Low voltage. Defective overload protector. Defective high pressure control or lock-out circuit. Compressor motor partially grounded. Bearings or pistons tight – low oil pressure. Improper refrigerant charge.
Head pressure too high	Refrigerant overcharge. Air or other non-condensable gases in system. Dirty or clogged condenser (cool cycle). Defective fan motor (heat cycle). Restriction in strainer or drier. Restriction in discharge or liquid line. Clogged air filter in unit (heat cycle). Insufficient water flow (cool cycle). Loose blowers, pulleys or belts (heat cycle). Restricted airflow (heat cycle). Defective expansion valve. Indoor blower(s) running backwards (heat cycle).
Head pressure too low	Insufficient refrigerant charge. Refrigerant leak in system. Defective compressor. Insufficient water flow (heat cycle). Dirty or clogged water coil (heat cycle). Leaking check valves. Clogged air filter in unit (cool cycle). Defective or improperly adjusted expansion valve. Defective reversing valve.
Suction pressure too high	Refrigerant overcharge. Defective compressor discharge valves. Leaking check valve. Defective expansion valve. Expansion valve bulb not secured to suction line. System overload – too much air or excessive temperatures (cool cycle) – too much water or excessive temperatures (heat cycle). Defective reversing valve.
Suction pressure too low	Refrigerant undercharge. Restriction in suction or liquid line. Defective or improperly adjusted expansion valve. Check valve not fully opening. System underload – too little air or low entering temperature (cool cycle) – too little water or low entering temperature (heat cycle). Clogged air filter in unit (cool cycle). Loose blower(s), pulley(s) or belts (cool cycle). Blower(s) running backwards (cool cycle).
Compressor short cycles	Room thermostat malfunction or improper location. Improper heat anticipator setting. Refrigerant undercharge or overcharge and defective high or low pressure control or lockout circuit. Cycling on overload protector due to tight bearings, stuck piston, high head pressure, or leaking discharge valves. Defective expansion valve. Insufficient water flow (both cycles). Defective reversing valve. Poor air distribution causing short circuiting.
Running cycle too long or unit operates continuously	Refrigerant undercharge – possible leak. Dirty or restricted air coil (cool cycle) Scaled or otherwise clogged water coil (heat cycle). Control contacts stuck. Air or other non-condensable gasses in system. Restriction in suction or liquid line. Unit too small for application. Defective compressor. Insufficient water flow (heat cycle) or insufficient airflow (cool cycle). Room thermostat malfunction or improper location. Incorrect heat anticipator setting.
Supply air temperature too low	Shortage of refrigerant or leak in system (cool cycle). Restriction in strainer or drier (cool cycle). Coil plugged with ice or dirt. Defective compressor. Restricted airflow (heat cycle). Restricted water flow (cool cycle). Maladjusted or defective expansion valve causing high suction superheat and low suction pressure (cool cycle). Defective reversing valve (cool cycle). Compressor not running (heat cycle). Refrigerant undercharge (heat cycle). Insufficient water flow or temperature (heat cycle). Malfunctioning or defective expansion valve (heat cycle). Defective (or stuck) reversing valve (heat cycle). Insufficient airflow (cool cycle). Dirty air filters (cool cycle). Return air temperature too low.
Noisy unit	Defective compressor. Blower(s) out of balance. Fan motor bearings worn. Tubing rattle. Loose parts (belts, pulleys, etc.) Air velocity too high.
Liquid line too hot	Refrigerant undercharge or leak in system. Excessive head pressure.
Liquid line frosted	Restriction upstream of point of frosting.
Suction line frosted	Malfunctioning or defective expansion valve. Refrigerant undercharge. Restriction in suction or liquid line. Insufficient evaporator air flow or temperature (cool cycle). Insufficient water flow or temperature (heat cycle).
Blower motor not running	Improper wiring. Defective motor or controller. Defective thermostat or control circuit. Motor off on overload protective device.