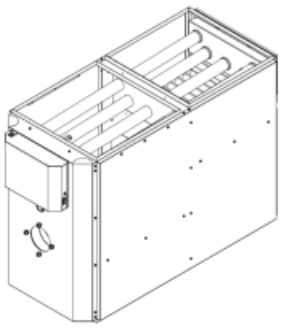
GRANBY
HEATING PRODUCTS

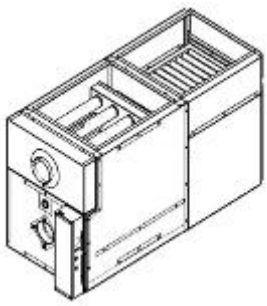
Installation, Operation and Service Manual

OIL FIRED LOBOY FURNACE - 85% + EFFICIENCY

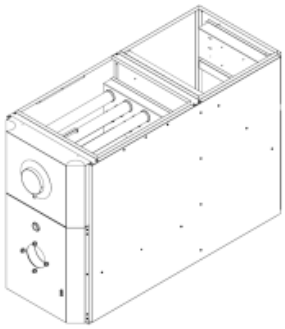
KLR-100
KLR-200
KLF-100
KLF-200



KLR-100 & 200



KLF-100



KLF-200

INSTALLATIONS MUST MEET ALL LOCAL AND FEDERAL CODES THAT MAY DIFFER FROM THIS MANUAL

Please read the manual in its entirety before beginning installation. This manual must be kept with the boiler for future reference. For maintenance or question, please refer to your installer – contractor directly.

15-08-2017 **G2017-E2 Rev.J**

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1.0 IMPORTANT SAFETY ADVICE

Please read and understand this manual before installing, operating or servicing the furnace. To ensure you have a clear understanding of the operating procedures of the unit please take the time to read the **IMPORTANT SAFETY ADVICE section** of this manual.

WARNINGS

NEVER burn garbage or paper in the unit.
NEVER store combustible material around it.
DO NOT attempt to start burner when excess oil has accumulated, when unit is full of vapour or when heat exchanger is very hot.
DO NOT use gasoline, crankcase draining's or any oil containing gasoline.

CAUTION

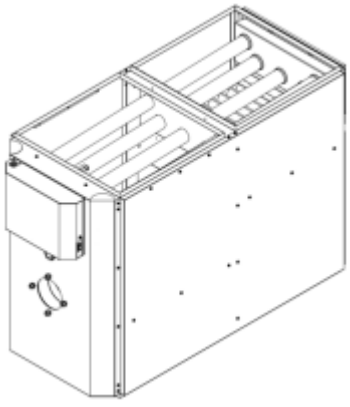
DO NOT TAMPER WITH THE FURNACE OR CONTROLS, CALL A QUALIFIED BURNER TECHNICIAN.

DANGER

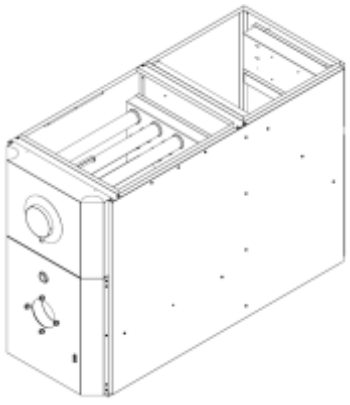
Do not use this furnace as a construction heater. Use of this furnace as a construction heater exposes it to abnormal conditions, contaminated combustion air and lack of air filtering. Failure to follow this warning can lead to premature furnace failure which could result in a fire hazard and/or bodily harm and/or material damage.

IMPORTANT

This manual contains instructional and operational information for the KLR / KLF OIL-FIRED FURNACE. Read the instructions thoroughly before installing furnace or starting the burner. Consult local authorities about your local FIRE SAFETY REGULATIONS. All installations must be in accordance with local state or provincial codes. Improper installation will result in voiding of warranty.



KLR



KLF

2.0 PRODUCT INFORMATION

CLEARANCE (minimum) TO COMBUSTIBLES

Top of Supply Plenum	1”	(25 mm)
Front (Maintenance)	24”	(610 mm)
Rear (Maintenance)	24”	(610 mm)
Side – Non-Access	1”	(25 mm)
Side – Access maintenance	24”	(610 mm)
Flue Pipe	9”	(229 mm)

Floor (Can be installed directly on combustible or non-combustible)

DRAFT PRESSURE

Breech draft pressure	-0.01” WC minimum

BURNER TUBE INSERTION

Riello and Beckett	2-1/2”	(63 mm)

AIR/BLOWER DATA

Maximum external static pressure	0.50” WC
Maximum cooling unit capacity	KLR-100, up to 3.0 tons. KLR-200, up to 5.0 tons. KLF-100, up to 3.0 tons KLF-200, up to 5.0 tons.
Maximum air temperature rise	85°F
High Limit temperature	185℉

MOTOR/BLOWER

KLR-100: 1/2 hp 4 Speed PSC / G10-8 DD or 1/2 hp 5 speed ECM / G10-8 DD
KLR-200: 3/4 hp 4 Speed PSC / GT12-10 DD or 3/4 hp ECM 5 speed / GT12-10 DD
KLF-100: 1/2 hp 4 Speed PSC / G10-8 DD or 1/2 hp ECM 5 speed / G10-8 DD
KLF-200: 3/4 hp 4 Speed PSC / GT12-10 DD or 3/4 hp ECM 5 speed / GT12-10 DD

FAN/HIGH LIMIT CONTROL

Honeywell ST9103A1028 Fan Center & Thermo-Disk (7” stem)

FLUE-PIPE CONNECTION

5” breech

CLEANOUTS

Rear breech cover & burner opening (KLR) or Front breech & burner opening (KLF)

THERMOSTAT

Any wall thermostat
Thermostat adjustment as per thermostat manufacturer installation.

FUEL
Not heavier than No. 2 furnace oil.

ELECTRICAL – 120 Volts, 1PH-60 Hz, 15 amps. circuit protection, USA circuit protection 20 amps.

AIR FILTERS

KLR-100	20” x 20” x 2” non-pleated UL approved
KLR-200	15” x 20” x 2” & 20” x 20” x 2” non-pleated UL approved
KLF-100	20” x 20” x 2” non-pleated UL approved
KLF-200	15” x 20” x 2” (2X) non-pleated UL approved

PLENUM DIMENSIONS (KLR-100)

Cold air return	(A)	20” x 20”	(508 x 508 mm)
Hot air supply	(B)	20” x 20”	(508 x 508 mm)
Plenum spacing	(C)	2”	(51 mm)

PLENUM DIMENSIONS (KLR-200)

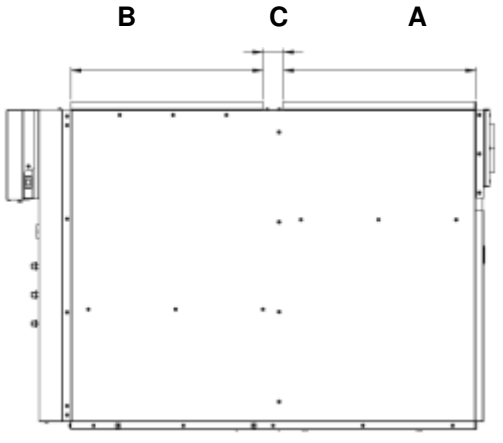
Cold air return	(A)	20” x 22”	(508 x 559 mm)
Hot air supply	(B)	20” x 24”	(508 x 610 mm)
Plenum spacing	(C)	2”	(51 mm)

PLENUM DIMENSIONS (KLF-100)

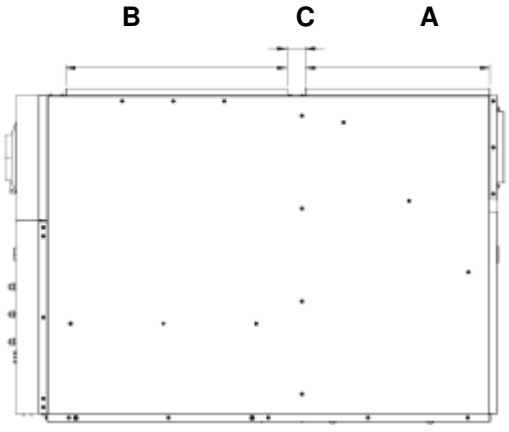
Cold air return	(A)	18” x 20-3/4”	(457 x 527 mm)
Hot air supply	(B)	18” x 21-3/4”	(457 x 552 mm)
Plenum spacing	(C)	2-1/8”	(54 mm)

PLENUM DIMENSIONS (KLF-200)

Cold air return	(A)	20” x 20”	(508 x 508 mm)
Hot air supply	(B)	20” x 24”	(508 x 610 mm)
Plenum spacing	(C)	2”	(51 mm)



KLR



KLF

KLR **KLF**

DIMENSIONS (KLR-100)

Depth	49-1/8”	(1248 mm)
Height	33”	(838 mm)
Width	21-1/2”	(546 mm)

DIMENSIONS (KLR-200)

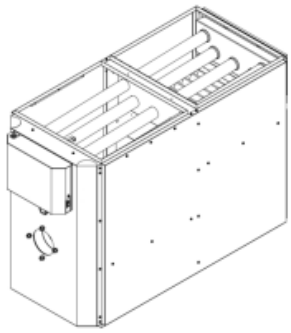
Depth	55-1/8”	(1400 mm)
Height	33”	(838 mm)
Width	21-1/2”	(546 mm)

DIMENSIONS (KLF-100))

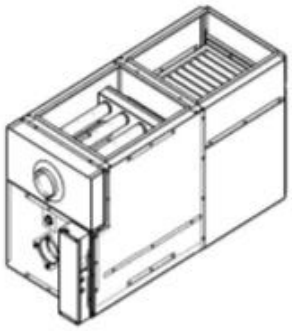
Depth	53-1/2”	(1,359 mm)
Height	29-3/8”	(746 mm)
Width	21-1/2”	(546 mm)

DIMENSIONS (KLF-200)

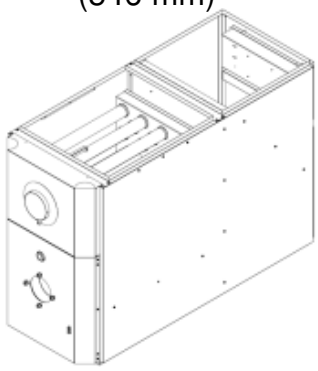
Depth	52-5/8”	(1337 mm)
Height	35-1/8”	(892 mm)
Width	21-1/2”	(546 mm)



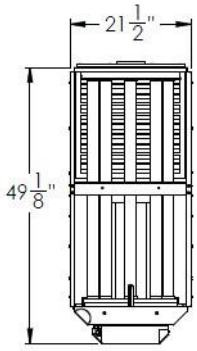
KLR

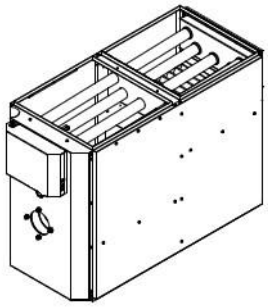


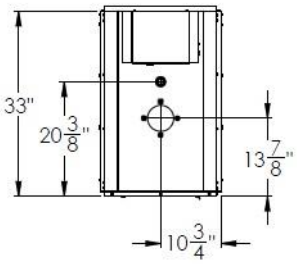
KLF-100

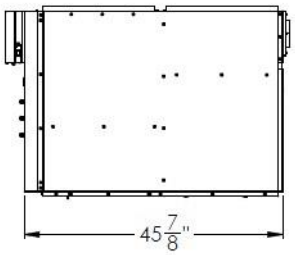


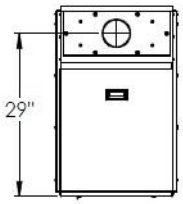
KLF-200





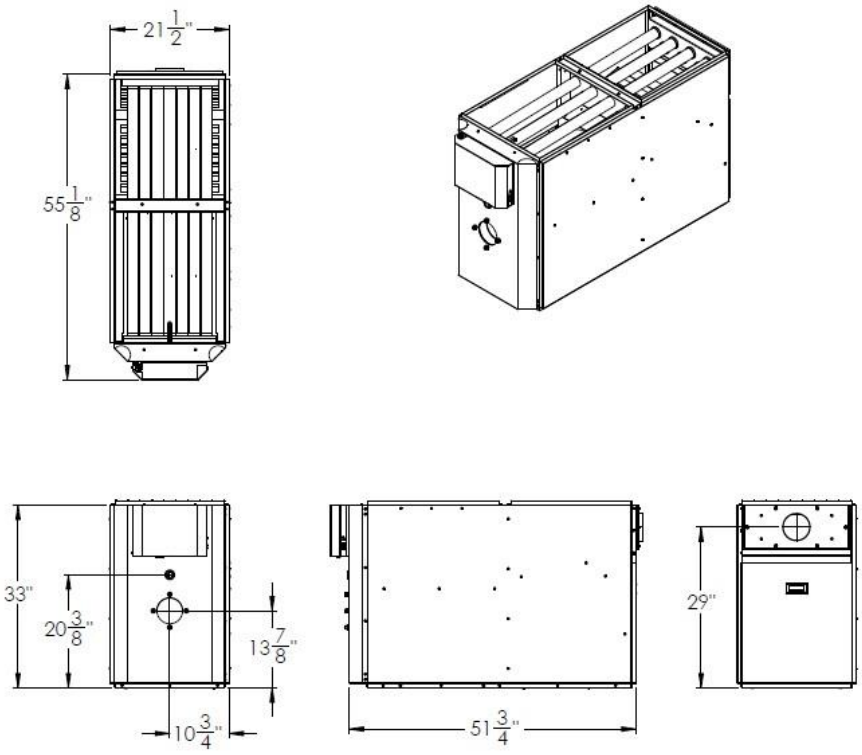






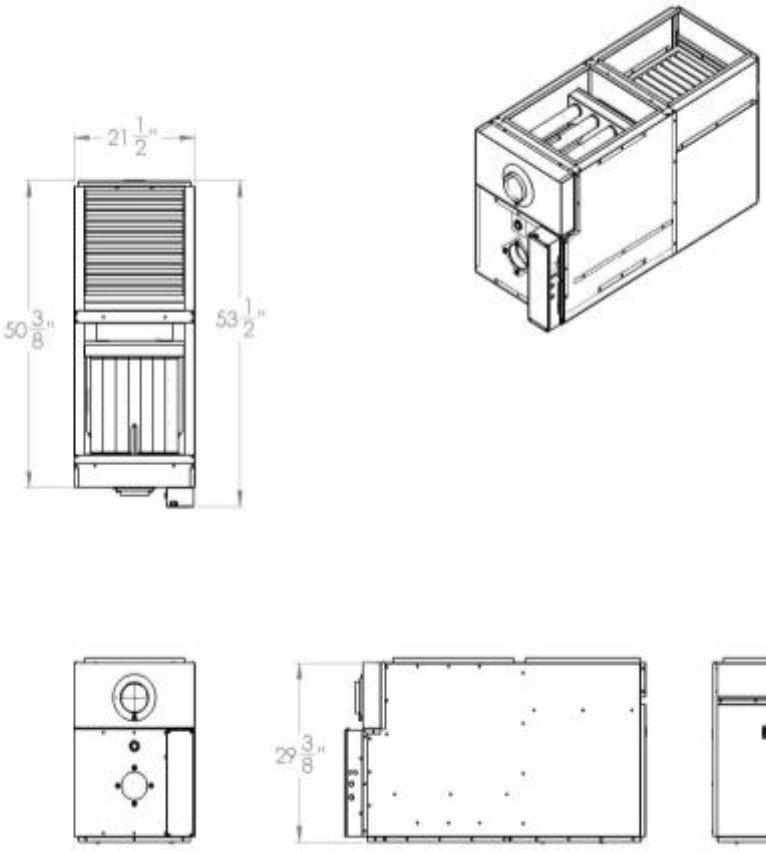
KLR-100 - DIMENSIONS

Dimensions are in inches



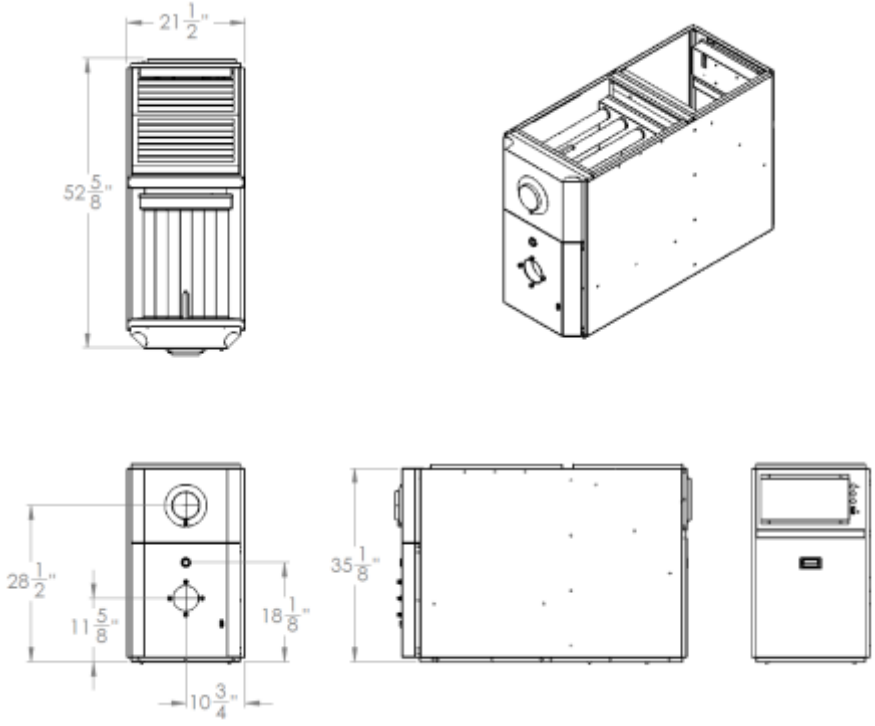
KLR-200 – DIMENSIONS

Dimensions are in inches



KLF-100 - DIMENSIONS

Dimensions are in inches



KLF-200 – DIMENSIONS
Dimensions are in inches

3.0 FURNACE INSTALLATION

OIL TANK & PIPING

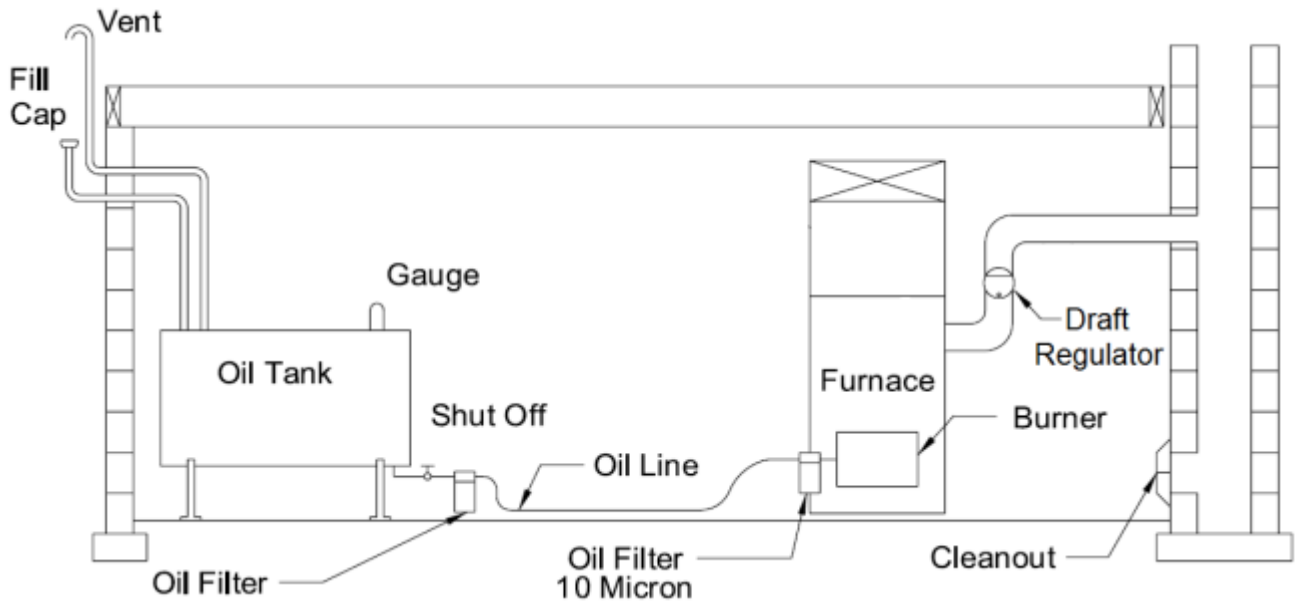
Tank installation must conform to local requirements.

Install according to the applicable code such as CAN/CSA B139 and NFPA 31 in the USA. Minimize number of connections in suction line and make all connections air tight. Use a pipe joint compound suitable for oil on all pipe threads. To reduce possibility of air leaks, tighten stem packing gland nut on any valves installed in the suction line. Also, be sure the oil filter is tight, as filter gaskets often shrink. Check for kinks in the oil lines as well as for possible air pockets and for loose connections. Two filters as shown below are recommended. Optional tank gauge protectors and outlet protectors are available at your local dealer.

ONE PIPE SYSTEM Where the tank outlet is above the burner and when the oil flows by gravity to the oil pump, a single-stage fuel unit with a single oil line to the pump may be used.

TWO PIPE SYSTEM When a single line is not suitable, use two-line system. Install by-pass plug on burner fuel pump as specified in the burner manual.

REAR FLUE FURNACE ILLUSTRATION



Oil Tank and Piping

PLACEMENT & VENTING

Furnace installation shall conform to the required installation code for oil-fired equipment (USA: NFPA 31, Canada: CAN/CSA B139).

FLOOR SUPPORT COMBUSTIBLE – If required, support furnace on five (5) concrete blocks. Make sure the center of the furnace base is supported. For a furnace installed on a combustible floor, consult the applicable code and authorities having jurisdiction on this application. The floor must support the weight.

CHIMNEY/VENT Connect the furnace to a chimney/vent system of size and material required by the NFPA 31 (USA) or CAN/CSA B139 (Canada) code. Furnace is approved for factory built chimney type "L" vents. Breech is certified for 5" vent pipe. Keep vent/flue pipe as short as possible with min. 1/4" per foot upward slope. This furnace is approved for installation with Granby DVS direct vent system. Vent/flue pipes MUST NOT pass through a ceiling. Maximum flue gas temperature is 575℉.

PRESENCE OF CONDENSATION IN THE CHIMNEY OR FLUE PIPE

Presence of condensation in your chimney or flue pipe is not normal, all necessary precautions should be taken to prevent condensation build-up in the flue pipe and inside the chimney. Make sure that the chimney size is according to the tables in CAN/CSA B139 / NFPA 31.

The base temperature of the chimney can be increased by insulating the flue-pipe between the furnace and the chimney base. If this is not sufficient,

consider cutting evenly the flue baffles in the furnace. **BE AWARE THAT MODIFYING OR REMOVING BAFFLES REDUCES THE UNIT'S EFFICIENCY AND A MODIFIED UNIT IS NO LONGER ENERGY STAR® CERTIFIED.**

*Note: See **Base temperature** definition inside NFPA-31 and CAN/CSA B139 codes.*

The base temperature of the chimney shall be measured after the unit has been in operation for a minimum of 5 minutes or long enough for the flue gas temperatures to have reached equilibrium. Install a thermometer in the vent pipe as close as possible to the entry point of the vent pipe into the chimney, at the base "T", the barometric damper must be completely shut and the flue gas temperature reading is stable. The base temperature must be within the values indicated in table 1 or 2 of the CAN/CSA B139 code for Canadian installations or values indicated in the NFP-31 code for US A installations.

ELECTRICAL Wire according to the National Electrical Code (Canadian Electrical Code in Canada) or local codes. Use a separately fused #12 electrical line directly from the service panel to the furnace junction box. Install a manual shut-off switch at the door or stairway to furnace room so furnace can be shut off remotely.

COMBUSTION & VENTILATION AIR Oil combustion appliances must be installed only when sufficient combustion air is available to ensure appropriate combustion and circulating air temperatures as per NFPA-31 code in the USA and CAN/CSA B139 code in Canada. If the construction of the building cannot allow for enough air infiltration through natural infiltration of the building to satisfy combustion air requirements and circulating air requirements outside air must be brought inside the space surrounding the oil combustion appliance.

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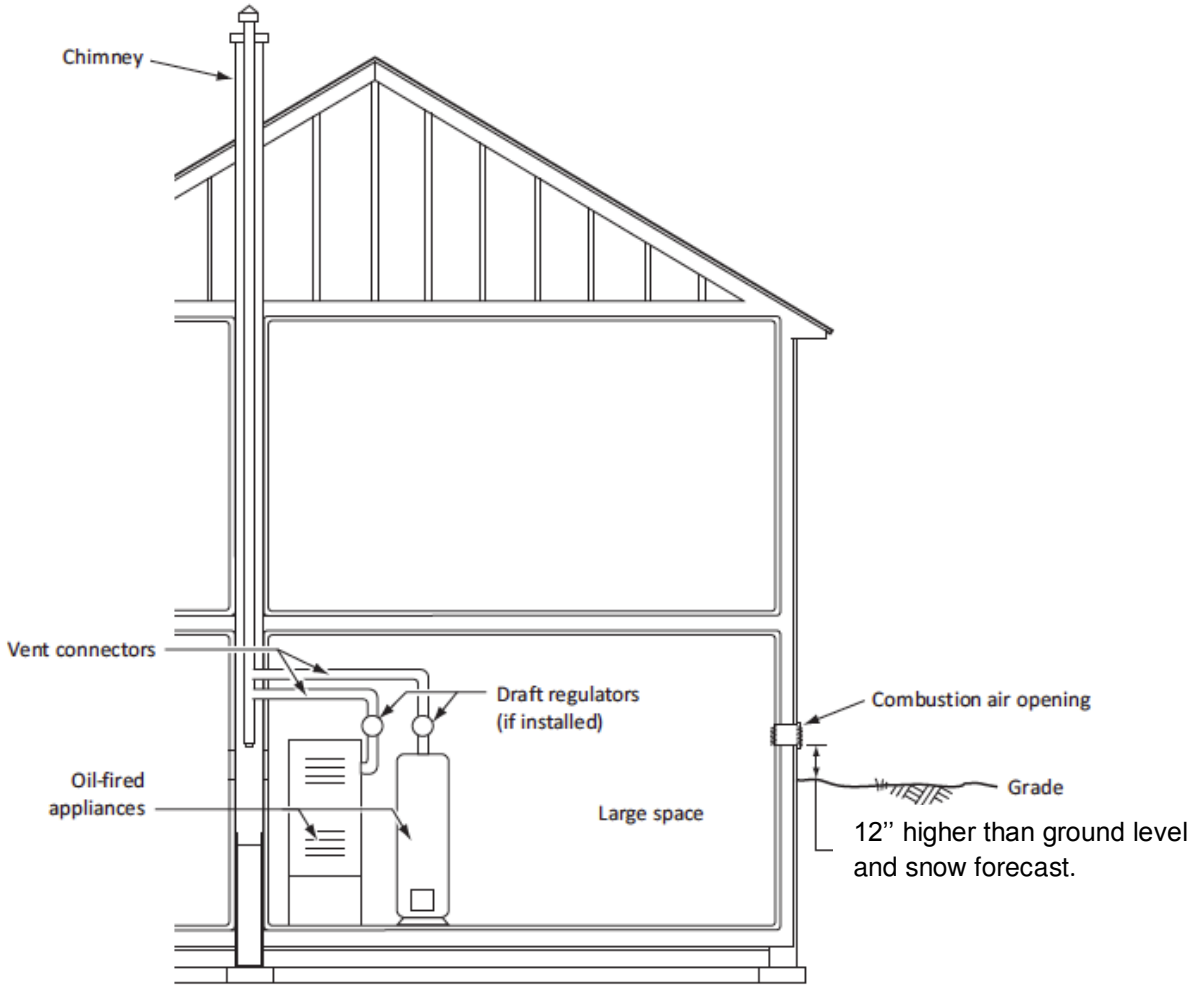
Appliance(s) located in a large space

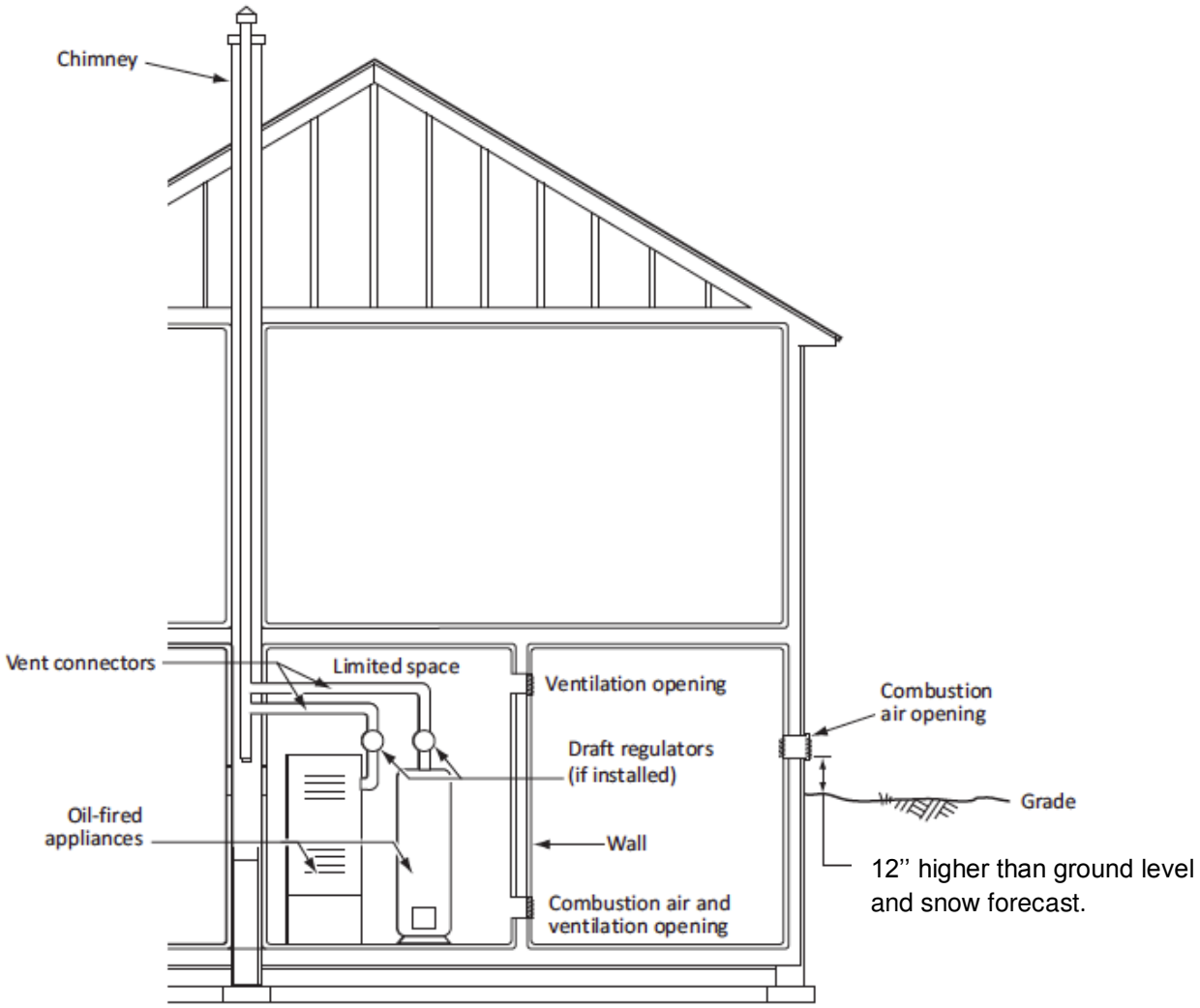
Combustion air and additional ventilation from outdoor



The opening shall have a total free-flow area of not less than 4,4 cm^2/kW (1 po^2/5000 BTU/h) of the total input rating for the appliance(s) located in a large space.

Appliance(s) located in a limited space

Combustion air from outdoors by infiltration and ventilation from inside the building



The opening shall have a total free-flow area of not less than 4,4 cm^2/kW (1 po^2/5000 BTU/h) of the total input rating for the appliance(s) located in a limited space.

Each ventilation opening through the inside wall (venting opening of the combustion air and ventilation opening) shall have a free-flow area of not less than 22 cm2/kW (1 po2/1000 BTU/h) of the input rating of the appliance(s) located in the limited space.

4.0 ACCESSORIES INSTALLATION

BLOCKED VENT SWITCH (BVSO)
(FOR CANADIAN INSTALLATION ONLY)

Oil-fired appliances installed in Canada require a blocked vent shut off switch (BVSO) system when installed on a chimney. A BVSO **Field Controls Model: WMO-1 (Manual Reset)** is included with the furnace to perform this function. It is the installer's responsibility to install the BVSO in accordance with the instructions provided. Not applicable for direct vent systems.

Switch Operation
Blocked vent switches are flue gas temperatures safety devices for detecting spillage of flue gases due to a blocked flue or inadequate draft. After detecting a problem, the switch de-energizes the system's burner control. **NEVER reset the switch unless the cause of the blockage has been corrected.**

Installation

1) Drill a 5/8" hole in to the flue vent pipe near the appliance breech connection.
2) This hole must be before the draft regulator, vertically or horizontally.
3) Remove one of the securing nuts from the threaded tube of the safety switch.
4) Tighten the other securing nut onto the pipe as far as possible (Figure 1).
5) Insert the threaded tube end into the pierced hole of the flue vent pipe.
6) Install the securing nut on the safety switch tube, which protrudes into the flue vent pipe. Tighten the nut securely (Figure 1).

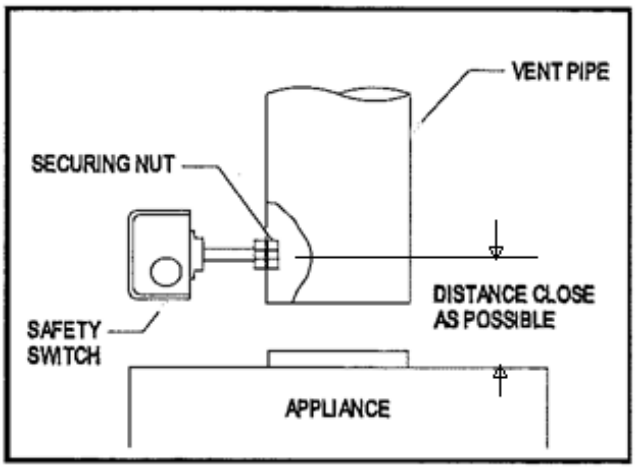


Figure 1 - Illustration from Field Controls

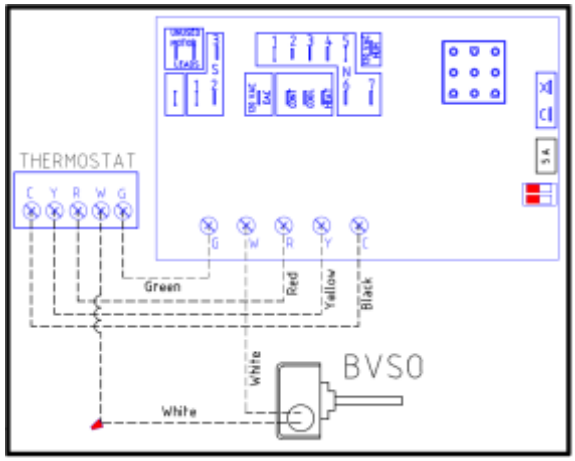


Figure 2 - BVSO wiring diagram

Wiring Instructions (BVSO)

Caution: Disconnect the electrical power when wiring the unit.

Wire the blocked vent switch in accordance with The National Electrical Code and applicable local codes. Wire the BVSO in series with the thermostat and furnace operating control (Figure 2).

System Test Procedure (BVSO)

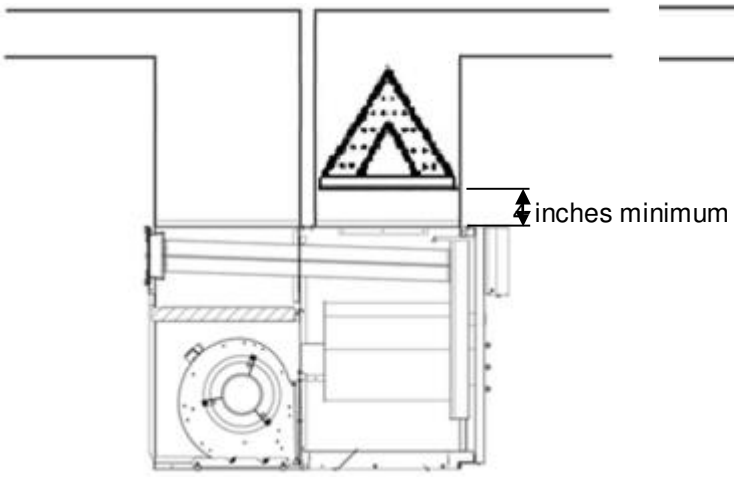
1. 1) With the power re-established, block the chimney or vent pipe downstream of the switch.
2. 2) Adjust the thermostat to call for heat.
3. 3) Once the heating system has started the blocked vent switch should shut down the burner within 10 minutes or sooner.
4. 4) Once the system has cooled, the blocked vent switch can manually be reset.
5. 5) This procedure should be tested a second time.
6. 6) After testing the blocked vent switch the chimney should be cleared of obstruction and the heating system should be tested over a long run cycle.

If the block vent switch shuts down the system, check to ensure there is enough draft in the chimney and venting pipes.

AIR CONDITIONING

An air conditioning coil may be installed on the supply plenum **only**. Coils installed on the return plenum will cause condensation on the heat exchanger; this will shorten the heat exchanger life and may cause products of combustion to enter the house. Wire as per wiring label and diagram. **Height of the coil above the unit shall be at least 4" (102 mm).**

See A/C coil Manufacturers Requirements.
To check the AC coil total air flow resistance, see procedure at page 39



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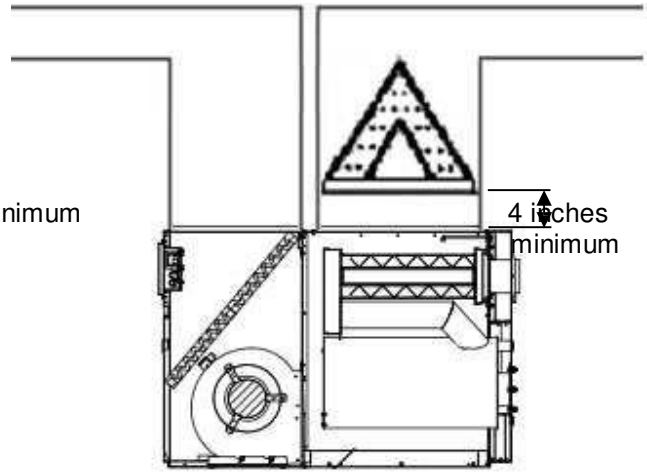


KLF

HUMIDIFIER

If a humidifier is installed ensure that no water can drip or run from it into the furnace. This would cause deterioration and void the furnace warranty.

5.0 BURNER INSTALLATION AND SPECIFICATIONS

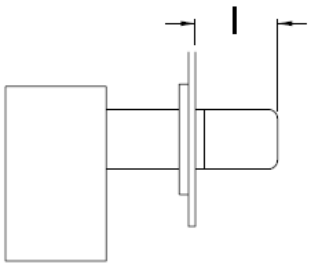
5.1 ASSEMBLY & INSTALLATION OF BURNER

ASSEMBLY Check that the burner model is correct for furnace rating required. Assemble as per burner manufacturer's instructions.

SELECT NOZZLE Select oil input, nozzle and burner configuration as shown on furnace operating decal.

INSTALL NOZZLE Install selected nozzle, check for clean seating and tighten in nozzle adaptor.

ELECTRODES See burner manufacturer's instructions for correct setting



BURNER INSERTION (I)

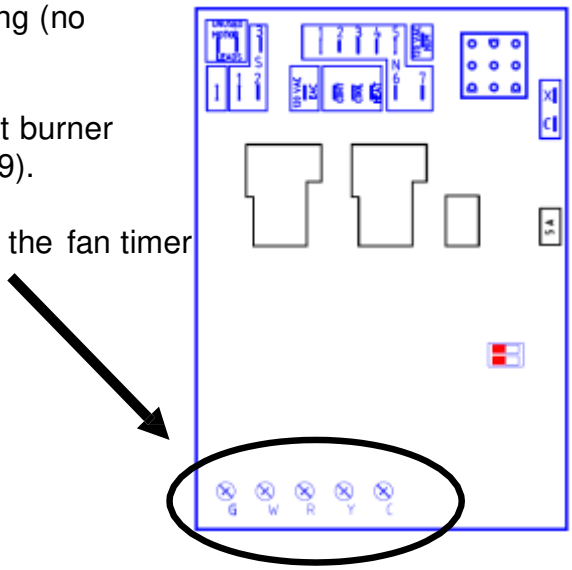
	in	mm
RIELLO	2 1/2	63
BECKETT	2 1/2	63

INSERTION MOUNT BURNER Tighten top nut first so burner tips down slightly. The burner is always installed in an upright position by four (4) nuts.

PUMP BY-PASS PLUG For two-pipe system, factory setting (no bypass plug).

WIRING Refer to wiring diagram for correct burner connections (see pages 28 and 29).

THERMOSTAT Connect the thermostat wires to the fan timer control board (ST9103).



5.2 SET BURNER FOR EFFICIENT OPERATION

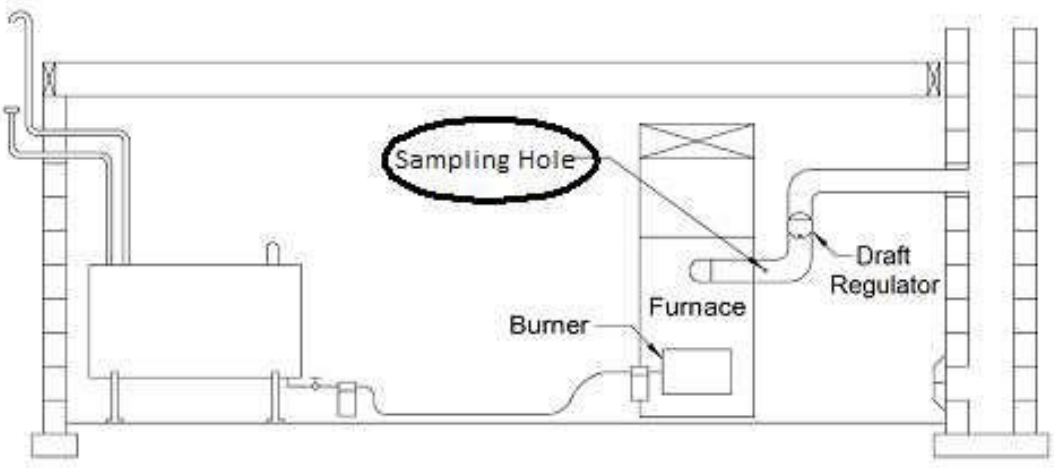
BURNER SETTING Use burner settings in the table on page 18 (KLR) and 19 (KLF) or operating decal as a starting guide to set the burner, particularly for nozzle changes. **Those settings are only starting points for the adjustments and are not meant as final settings.**
On Beckett AFG burner, make sure the correct retention head and static disk are installed on the burner for the desired firing rate. The head is held in place by two screws at the end of the burner blast tube. From the burner technical information table on page 18 (KLR) and 19 (KLF), the head model is always after the AFG designation and the static disk size after the head model information. For example, the AFG LII 3-3/8'' means an AFG chassis burner with a LII head and a static disk of 3-3/8''.

PUMP PRESSURE Refer to the table on pages 18 (KLR) and 19 (KLF) or operating decal.

AIR SETTING Use air settings on pages 18 (KLR) and 19 (KLF) as a guide to set air adjustment. **Those settings are only starting points for the adjustments and are not meant as final settings.**

DRAFT REGULATOR The draft regulator should be installed at least 3 flue pipe diameters from the breech of the furnace.

SAMPLING HOLE On smoke/vent pipe, drill a 3/8" round sampling hole. The sampling hole should be at least 1 flue pipe diameters away from the draft regulator, between the breech and the draft regulator of the furnace.



FRONT FLUE FURNACE ILLUSTRATION

COMBUSTION TEST

All your tests must be done with the burner cover on

ADJUSTMENTS After 10 minutes of normal operation, adjust the breech draft with the barometric control to obtain a value of -0.01'' WC, after proceed to take a smoke test and adjust the burner in order to obtain a reading of '1' on the smoke scale, once achieved take a CO2 reading and note the result.

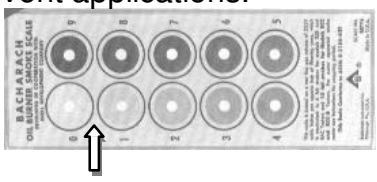
To reach the optimal smoke test reading, a 10, full slow steady pump action is required

- **Lower the CO^2 reading noted before by the value of 1% by opening the air gate of the burner.**

CO^2 test can be done **mechanically**, activate 18 full slow steady pump action.

OR by using an electronic CO^2 analyser.

- Once your CO2 is reduced by 1% take another smoke test
- You should now have a small "slight trace" of smoke**.**
- A 'slight' trace of smoke (between 0 and 1) is recommended for chimney vent applications.



Relation between % of CO^2 and O^2

CO^2 (%)	O^2 (%)	Excess Air (%)
13.5	2.6	15.0
13.0	3.3	20.0
12.5	4.0	25.0
12.0	4.6	30.0
11.5	5.3	35.0
11.0	6.0	40.0

5.3 KLR TECHNICAL INFORMATION / BURNER AND BLOWER

KLR Series	KLR-100			KLR-200		
Riello Burner	F3			F5		
Unit Model	KLR-E1-*067-03	KLR-E1-*079-03	KLR-E1-*091-03	KLR-E3-*109-05	KLR-E3-*127-05	KLR-E3-*139-05
Firing Rate (USGPH)	0.55	0.65	0.75	0.90	1.05	1.15
Input (BTU/H)	77,000	91,000	105,000	126,000	147,000	161,000
Output (BTU/h)	67,000	79,000	91,000	109,000	126,000	139,000
Nozzle	0.40 - 70A	0.60 - 70W	0.65 - 70W	0.75 - 80W	0.85 - 70W	1.00 - 70W
Pump Pr. 2 pipes sys. (psi)	190	145	145	145	165	145
Pump Pr. 1 pipe sys. (psi)	190	165	165	165	175	165
Turbulator Setting	0	0	0	0	1	2
Air Gate Adjustment	1.75	2	2.35	2	2.25	2.25
Energy Star Approved	YES	YES	YES	YES	YES	YES
AFUE (%)	86.80	87.00	86.20	88.00	87.40	86.80

Beckett Burner	AFG LII (3-3/8 Static disc)			AFG F3 (2-3/4 Static disc)		
Unit model	KLR-G2-*066-03	KLR-G2-*078-03	KLR-G2-*090-03	KLR-G2-*102-05	KLR-G2-*119-05	KLR-G2-*132-05
Firing Rate (USGPH)	0.55	0.65	0.75	0.85	1.00	1.10
Input (BTU/h)	77,000	91,000	105,000	119,000	140,000	154,000
Output (BTU/h)	66,000	78,000	90,000	102,000	119,000	132,000
Nozzle	0.50 - 60W	0.60 - 60W	0.65 - 60W	0.75 - 70B	0.85 - 70B	1.00 - 70B
Low Firing Rate Baffle	NO	NO	NO	YES	YES	YES
Pump Pressure (psi)	145	145	145	145	145	145
Air Band (Gross)	N/A	N/A	N/A	1	2	2
Air Shutter (Fine)	4	5,5	7	7	6	10
Energy Star Approved	YES	YES	YES	YES	YES	YES
AFUE (%)	87.00	87.10	86.30	87.50	87.20	86.50
CO2 (%)	**12.5**	**13.5**	**13.5**	**12.5**	**13.5**	**13.5**

PSC motor info

Temperature Rise (℉)	55 – 85	55 – 85	55 – 85	55 – 85	55 – 85	55 – 85
Blower Speed (0.2" WC)	M-LOW	M-HIGH	M-HIGH	M-LOW	M-HIGH	M-HIGH
Blower Speed (0.5" WC)	M-HIGH	M-HIGH	HIGH	M-HIGH	HIGH	HIGH

ECM motor (0.2'' WC to 0.5'' WC static pressure)

Temperature Rise(°F)	40-70	45-75	55-85	55-85	55-85	60-85
Blower Speed	M-LOW	M-LOW	M-LOW	M-LOW	MEDIUM	M-HIGH

Static Pressure at 0.2" WC / 0.5" WC

Blower Speed	PSC 1/2 hp		PSC 3/4 hp	
	0.2" WC	0.5" WC	0.2" WC	0.5" WC
HIGH	1375	1275	2120	2030
M-HIGH	1250	1170	1940	1875
MEDIUM	---	---	---	---
M-LOW	1100	1075	1710	1650
LOW	875	850	1150	1050

Blower Speed	ECM 1/2 hp		ECM 3/4 hp	
	0.2" WC	0.5" WC	0.2" WC	0.5" WC
HIGH	1300	1230	2000	1910
M-HIGH	1225	1160	1900	1835
MEDIUM	1140	1050	1690	1660
M-LOW	1025	980	1610	1575
LOW	775	750	1060	1010

(*) For administration only.

5.4 KLF TECHNICAL INFORMATION / BLOWER AND BURNER

KLF Series	KLF-100			KLF-200		
Riello Burner	F3			F5		
Unit Model	KLF-E1-*067-03	KLF-E1-*079-03	KLF-E1-*091-03	KLF-E3-*102-05	KLF-E3-*119-05	KLF-E3-*132-05
Firing Rate (USGPH)	0.55	0.65	0.75	0.85	1.00	1.10
Input (BTU/H)	77,000	91,000	105,000	119,000	140,000	154,000
Output (BTU/h)	67,000	79,000	91,000	102,000	119,000	132,000
Nozzle	0.40 - 70A	0.60 - 70W	0.65 - 70W	0.75 - 70W	0.85 - 70W	1.00 - 70W
Pump Pr. 2 pipes sys. (psi)	190	145	145	145	165	145
Pump Pr. 1 pipe sys. (psi)	190	165	165	165	175	165
Turbulator Setting	0	0	0	0	1	2
Air Gate	1.75	2	2.35	2	2.25	2.25
Energy Star® Certified	YES	YES	YES	YES	YES	YES
AFUE (%)	86.80	86.80	86.30	87.50	87.30	86.50

Beckett Burner	AFG LII (3-3/8 Static disc)			AFG F3 (2-3/4 Static disc)		
Unit Model	KLF-G2-*066-03	KLF-G2-*078-03	KLF-G2-*090-03	KLF-G2-*102-03	KLF-G2-*119-03	KLF-G2-*132-05
Firing Rate (USGPH)	0.55	0.65	0.75	0.85	1.00	1.10
Input (BTU/h)	77,000	91,000	105,000	119,000	140,000	154,000
Output (BTU/h)	66,000	78,000	90,000	102,000	119,000	132,000
Nozzle	0.50 - 60W	0.60 - 60W	0.65 - 60W	0.75 - 70B	0.85 - 70B	1.00 - 70B
Low Firing Rate Baffle	NO	NO	NO	YES	YES	YES
Pump Pressure (psi)	145	145	145	145	145	145
Air Band (Gross)	N/A	N/A	N/A	1	2	2
Air Shutter (Fine)	4	5,5	7	7	6	10
Energy Star® Certified	YES	YES	YES	YES	YES	YES
AFUE (%)	86.80	86.60	86.00	86.60	86.30	86.30
CO2 (%)	**12.5**	**13.5**	**13.7**	**13.5**	**13.5**	**12.5**

PSC motor info

Temperature Rise (°F)	40 - 70	40 - 70	50 - 80	55 – 85	55 – 85	55 – 85
Blower Speed (0.2'' WC)	M-LOW	M-HIGH	M-HIGH	M-LOW	HIGH	HIGH
Blower Speed (0.5" WC)	M-HIGH	M-HIGH	HIGH	M-HIGH	M-HIGH	HIGH

ECM Motor (0.2'' WC. to 0.5''WC static pressure)

Temperature Rise(°F)	40 - 70	40 - 70	50- 80	52-80	55-85	55-85
Blower Speed	M-LOW	M-HIGH	HIGH	M-LOW	MEDIUM	M-HIGH

Static Pressure at 0.2" WC / 0.5"WC

Blower Speed	PSC 1/2 hp		PSC 3/4 hp	
	0.2" WC	0.5" WC	0.2" WC	0.5" WC
HIGH	1400	1250	2120	2030
M-HIGH	1300	1200	1940	1875
MEDIUM	---	---	---	---
M-LOW	1200	1150	1710	1650
LOW	875	850	1150	1050

Blower Speed	ECM 1/2 hp		ECM 3/4 hp	
	0.2" WC	0.5" WC	0.2" WC	0.5" WC
HIGH	1400	1250	2000	1910
M-HIGH	1325	1225	1900	1835
MEDIUM	1275	1200	1690	1660
M-LOW	1200	1125	1610	1575
LOW	775	750	1060	1010

(*) For administration only.

6.0 FURNACE OPERATION AND SETTINGS

SHUTTING FURNACE DOWN

POWER OFF Turn off main power breaker or disconnect.

FUEL OFF Shut off manual fuel supply valve.

Always keep manual fuel supply valve shut off if the burner is shut down for an extended period.

RESTARTING FURNACE

Follow this procedure before restarting a unit that has been shut down for an extended period.

INSPECTION Have the furnace/system serviced and inspected by a **qualified technician**.

FUEL Turn on fuel supply and check that there are no leaks.

POWER Turn on power and check that the furnace starts and operates as usual.

OPERATION If the furnace/system fails to operate or operates in an unusual manner, call your service technician. If the burner fails to operate at any time, call a qualified burner technician.

6.1 BLOWER SETTING

Ensure power is off when adjusting blower setting. For heating, use the blower speeds shown on the furnace specifications to give a temperature rise according to the technical information tables on page 18 (KLR) and 19 (KLF). The 'Low' blower speed can be used for air re-circulation when heating or cooling are not required. Set blower speeds to match the installation requirements.

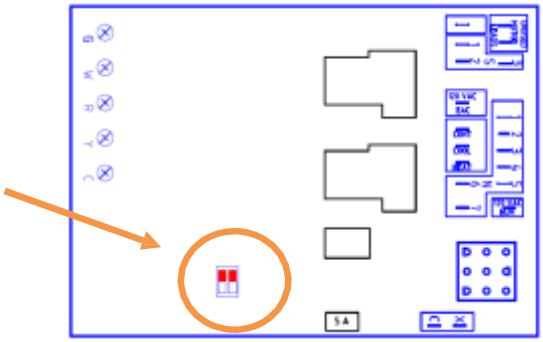
FAN & LIMIT CONTROL

Limit	185℉ – Factory set
Fan On	45 seconds after the burner starts
Fan Off	Adjustable on ST9103 board (see page 18)

6.2 FAN TIMER CONTROL BOARD (ST9103A1028)

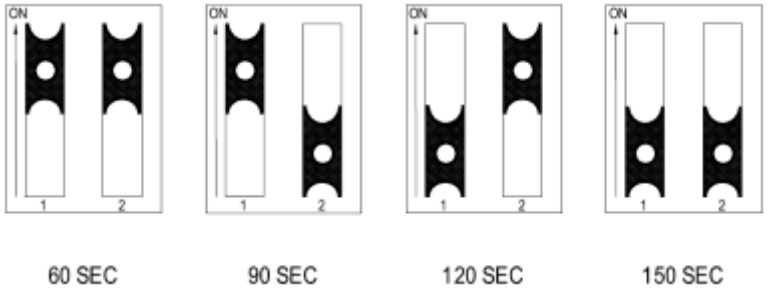
"FAN OFF Timer" Dip Switches adjustment

Dip Switches



COMFORT ADJUSTMENTS

- Outlet air consistently too warm or too cold - change the blower motor speed to give the specified air temperature rise.
- Outlet air gets too warm and burner shuts down on high limit - increase air circulation by changing the blower motor speed to give the specified temperature rise.
- Outlet air is too cold or too warm at the end of the heating cycle after the burner has turned off - adjust the “FAN OFF” dip switch on fan timer control board. Refer to the next figure.



“FAN OFF” Dip Switch

Dip Switch adjustment (90 seconds) on all unit input
Except for Beckett burner 0.55 nozzle (60 seconds)

OFF CYCLE AIR CIRCULATION (Factory settings)

LOW SPEED FAN All KLR / KLF models have a Low speed switch for optional constant air re-circulation during the furnace off cycle.

FAN ON When “FAN ON” is selected on the thermostat, the blower will run constantly at the blower speed selected on the heating terminal on the ST9103 board. This is the equivalent of jumping terminals R and G on the ST9103 board.

6.3 ST9103A1028 CONTROL BOARD

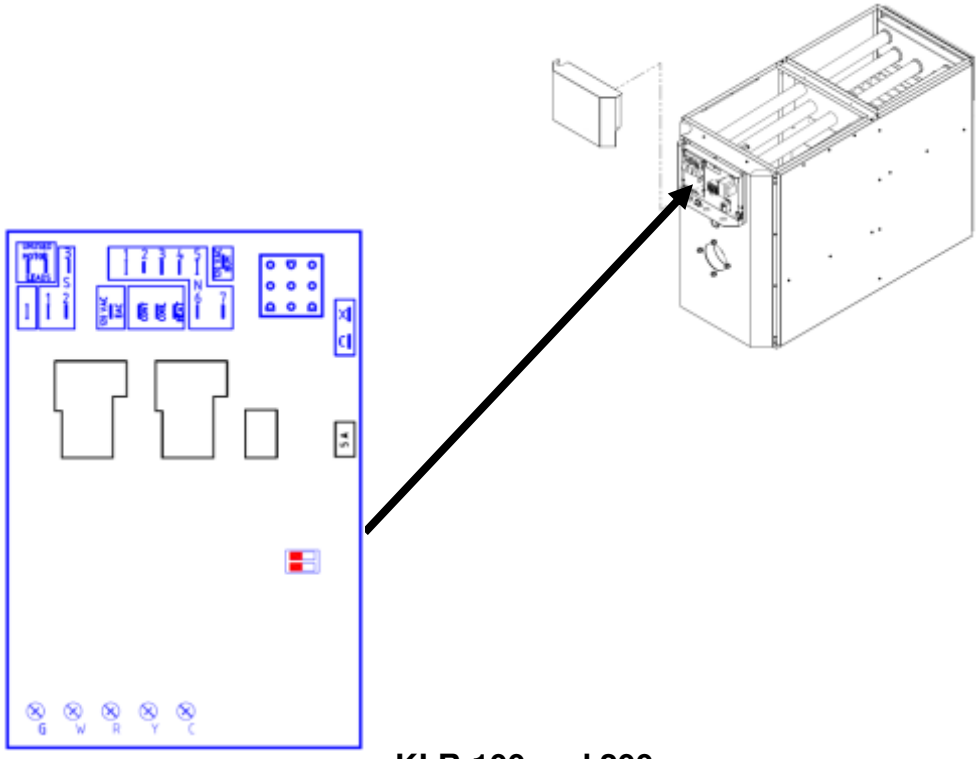
ST9103 Heating Sequence

1) Thermostat calls for Heat.
2) Burner starts
3) Blower starts after **45** seconds
4) Burner shuts down after call for heat is satisfied
5) Blower stops according to adjusted (FAN OFF) Dip switch selection

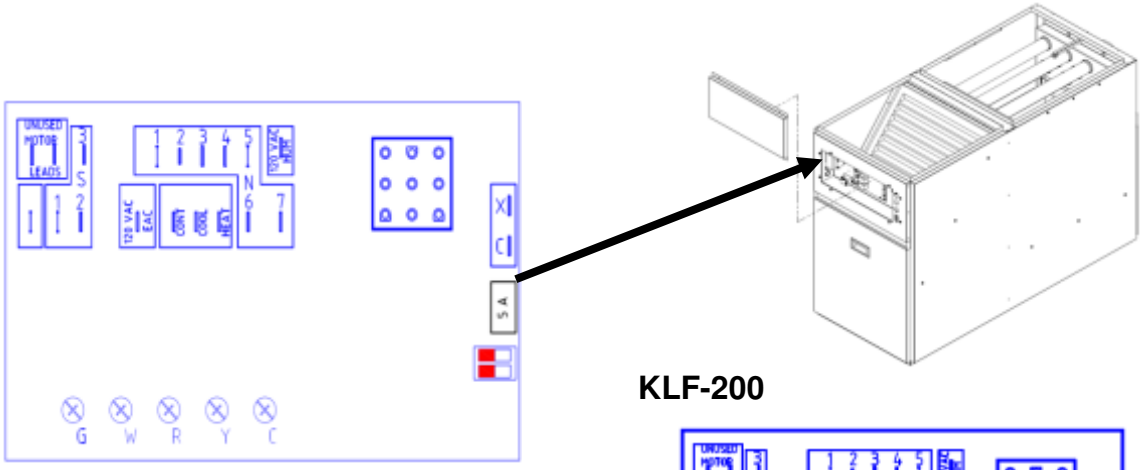
ST9103A1028 Cooling Sequence

1) Thermostat calls for cooling
2) Blower starts immediately
3) Cooling unit starts
4) Blower stops immediately after cooling demand is satisfied
5) Cooling unit stops

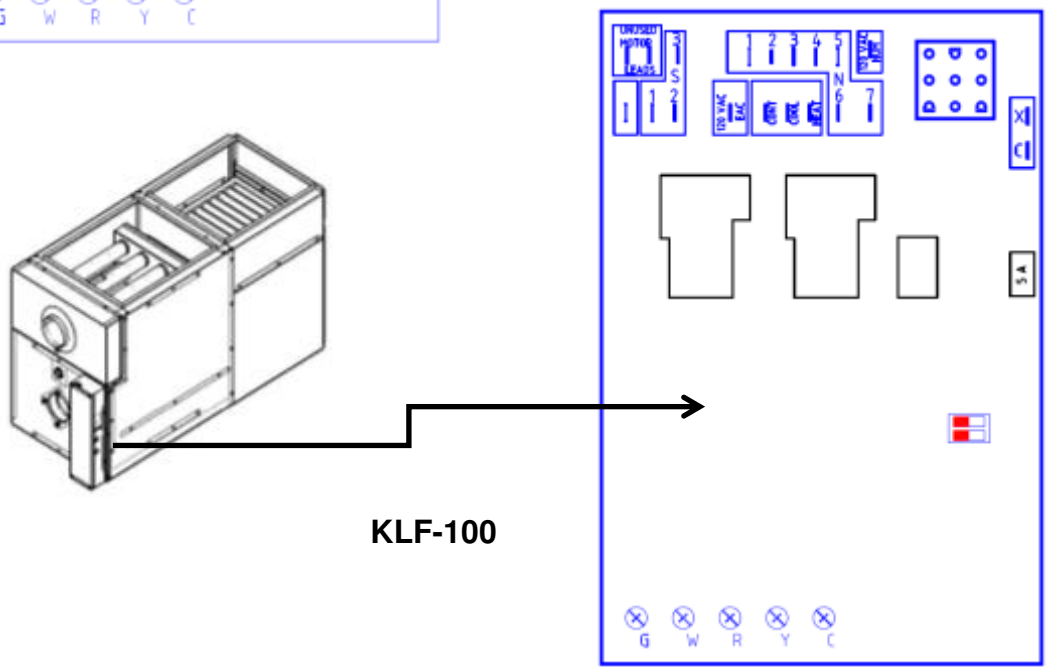
Location of the ST9103A1028 Electronic Board



KLR-100 and 200



KLF-200



KLF-100

6.4 SERVICING - FAN TIMER ST9103A1028

Before trouble shooting the board,
check for the 5 Amp. fuse

For accurate trouble shooting,
follow **step by step** the below Trouble Shooting Chart.

Step	Possible Cause	Check-out procedure	Corrective action
No Heat			
1	Incoming supply	Check for 120 Volts between terminal S2 and 3 on electronic fan control	**Yes - Move to next step** No - Check breaker main power switch
2	Transformer	Check for 120 Volts between terminal S3 and 4 on electronic fan control. Check for 24 Volts between terminal X and C on electronic fan control	**Yes - Move to next step** No - Check for bad connection **Yes - Move to next step** No - Change Transformer
3	Electronic Fan control	Check for 24 Volts between R and C Check for 24 Volts between terminal W and C	**Yes - Move to next step** No - Change the electronic board **Yes - Move to next step** No - Check thermostat and wiring
4	**Warning: Make sure the quick connect cable is fully inserted on the board**		
	Limit Control	Check for 120 Volts on each terminal of the high limit Check for 120 Volts coming from the main plug-in of the electronic fan control to the limit control	**Yes - Move to step # 5** No - Move to next step **Yes - Move to next step** No - Change the electronic fan control
		Check for 120 Volts coming out of the limit control	**Yes - Move to step # 5** No - Failure on the limit control circuit . Temperature too high . Bad limit control

Step	Possible Cause	Check-out procedure	Corrective action
No Heat			
5	**Riello burner**	Check for 120 Volts on the black wire, contact (COM) on the burner activation relay	**Yes - Move to next step** No - Back to step # 4 or check for bad connection
		Check if oil primary control is on reset	**Yes - Press reset button** No - Move to the next step
		Check for continuity between the two wires yellow and violet on the burner activation relay	**Yes - Move to next step** No - Change the electronic fan control
		Check for 120 Volts on the contact (No) of the burner activation relay	**Yes - Move to next step** No - Change the burner activation relay
		Check for 120 volts on the orange wire coming to the burner (L)	**Yes - Failure on the burner** No - Change the electronic fan control
	Beckett Burner	Check for 120 Volts on terminal strip (COM) of the burner activation relay	**Yes - Move to next step** No - Back to step # 4 or check bad connection
		Check if oil primary control is on Reset and by-pass on (TT)	**Yes - Press reset button, check by- pass on (TT)** No - Move to the next step
		Check for continuity between the two wires yellow and violet on the burner activation relay	**Yes - Move to next step** No - Change the electronic fan control
		Check for 120 Volts on the contact (NO) on the burner activation relay	**Yes - Move to next step** No - Change the burner activation relay
		Check for 120 Volts on the orange wire coming to the burner	**Yes - Failure on the burner** No - Change the primary control

Step	Possible Cause	Check-out procedure	Corrective action
6	Blower . Low speed Check if the constant low speed switch is **ON**	Check for 120 Volts at the "CONT" terminal on the electronic fan control Check for 120 Volts on both side of the constant low speed switch	**Yes - Move to next step** No - Change the electronic fan control **Yes - Check "LOW" speed on the blower motor** No - Change the switch

No Cooling			
7	Blower . High speed	Check for 24 Volts between G and C on electronic fan control	**Yes - Move to next step** No - Check thermostat and wiring; if it's OK, then change the electronic fan control
	Cooling Speed	Check for 120 Volts at the "COOL" terminal of the electronic fan control	**Yes - Check "COOL" speed on the blower motor** No - Change the electronic fan control
No Cooling			
8	Condensing unit	Check for 24 volts between terminal Y and C on the electronic fan control	**Yes - Compressor ON** No - Check thermostat and wiring
Electronic air filter and Humidifier			
9	Electronic air filter	Check for 120 Volts on terminal "EAC" of the electronic fan control (thermostat must call a Heat, Cool or Fan ON demand	**Yes - Electronic filter failure** No - Change the electronic fan control
10	Humidifier	Check for 120 Volts on terminal "HUM" of the electronic fan control (burner must be energized)	**Yes - Humidifier failure** No - Change the electronic fan control

7.0 SERVICE / MAINTENANCE

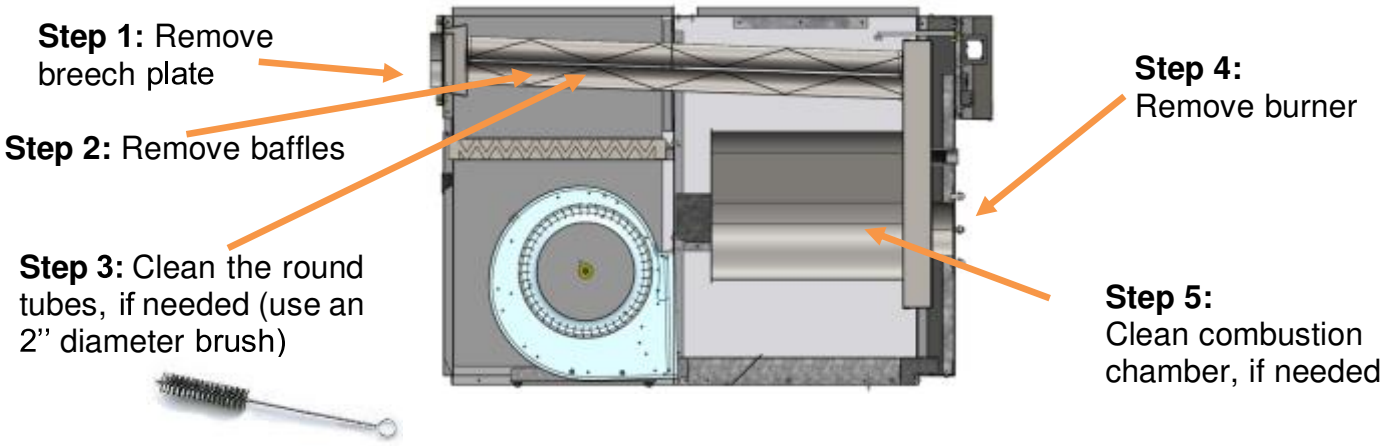
REGULAR MAINTENANCE

Check complete operation **at least once a year**. In Canada see CAN/B139, (Maintenance), in United States refer to NFPA 31, for recommended servicing procedure. Clean flue pipes on a regular basis. Replace flue pipes if there is any sign of corrosion or other problems. Gaskets should be checked and may have to be replace.

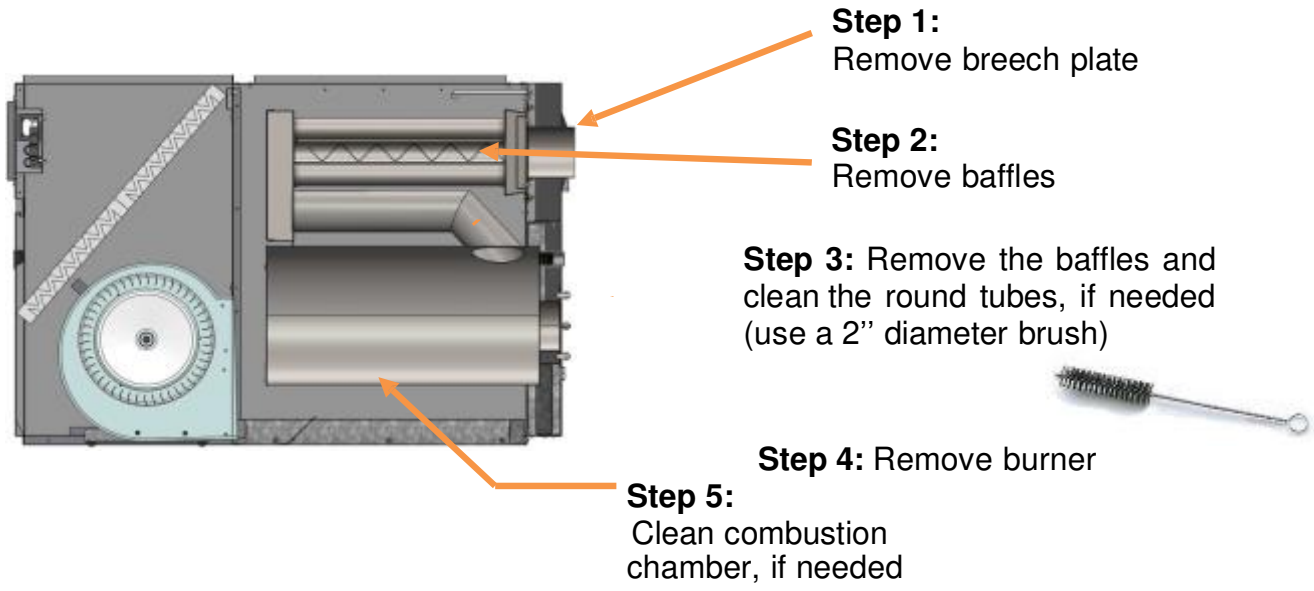
BLOWER REMOVAL

This furnace has a blower sealing system, which is designed to be tight and rattle free. Refer to the instructions and pictures below.

KLR HEAT EXCHANGER



KLF HEAT EXCHANGER

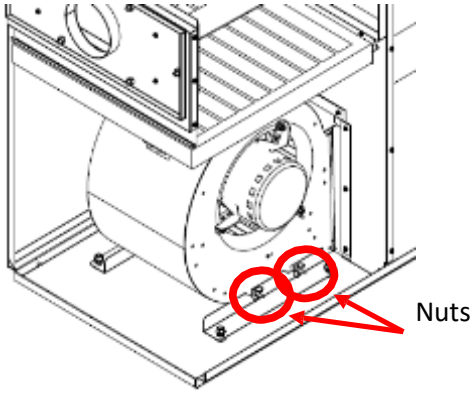


CHANGING NOZZLE

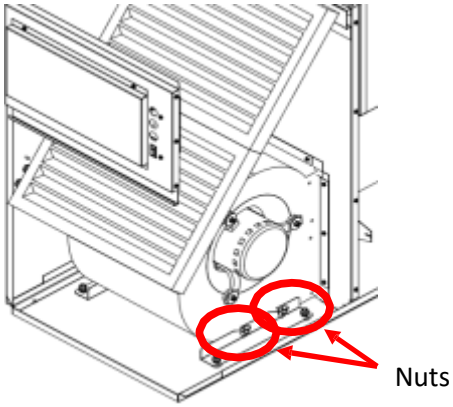
It is recommended that the nozzle be replaced at least once annually. If a new nozzle of a different size is installed, change the blower speed according to section **BURNER INSTALLATION AND SPECIFICATIONS** or operating decal as required. Verify smoke trace and CO^2 reading every time the nozzle is replaced.

AIR FILTERS

To maintain furnace performance and safety, replace dirty filters at least once every heating season or as required. Use new approved disposable filters of the same size and type. Dirty, clogged or wrong sized filters will impair the furnace performance and may cause the furnace to shut down or overheat.

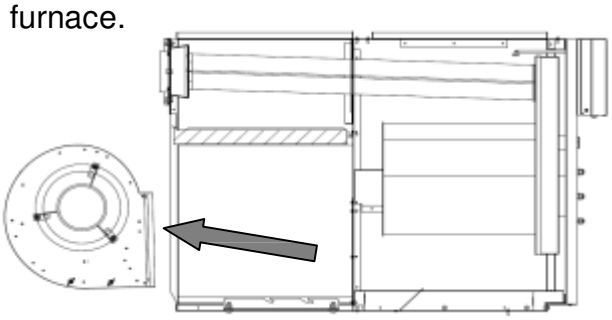


KLR

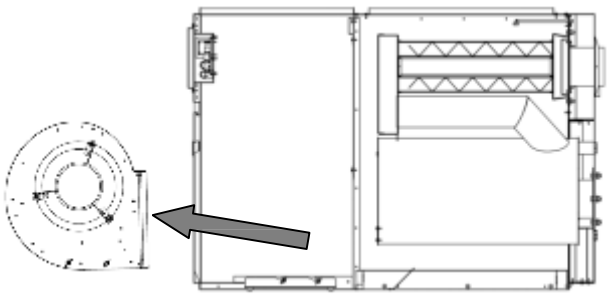


KLF

6) Slide the blower toward you and then lift the blower straight up. Shift the blower out of the furnace.



KLR

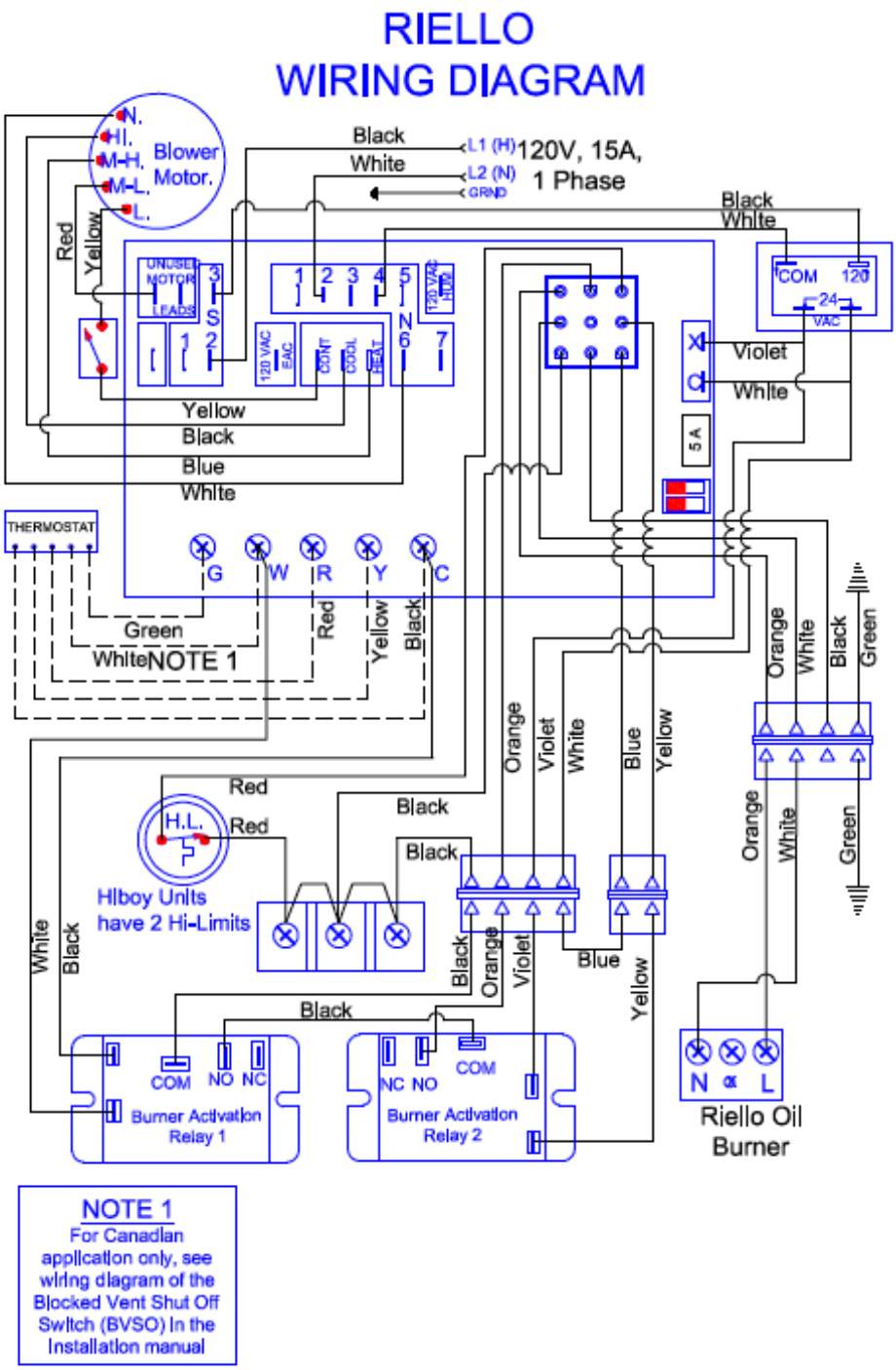


KLF

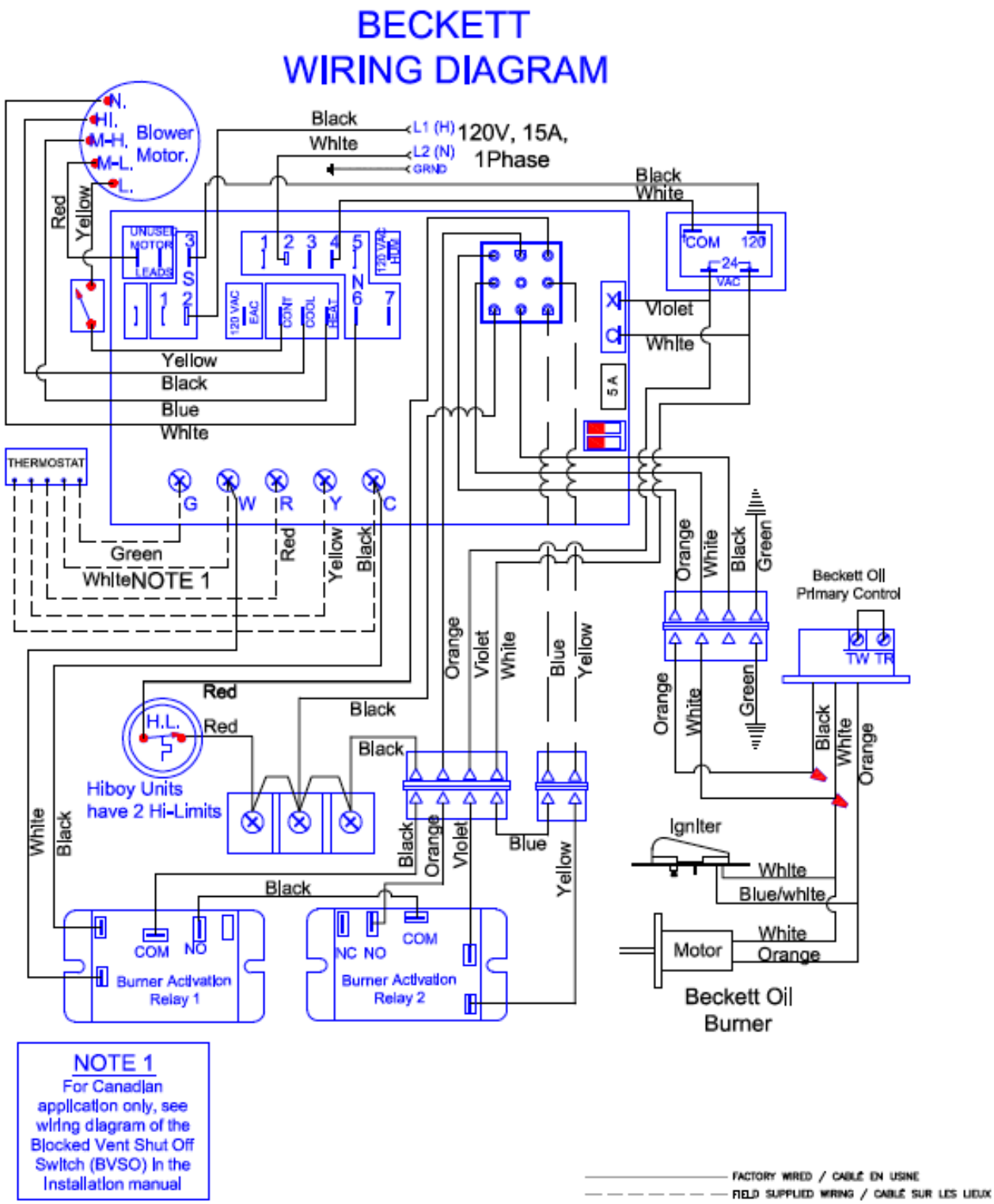
Put back the blower assembly using the reverse procedure. Ensure wiring and ground wires are correctly reconnected.

8.0 ELECTRICAL WIRING DIAGRAMS

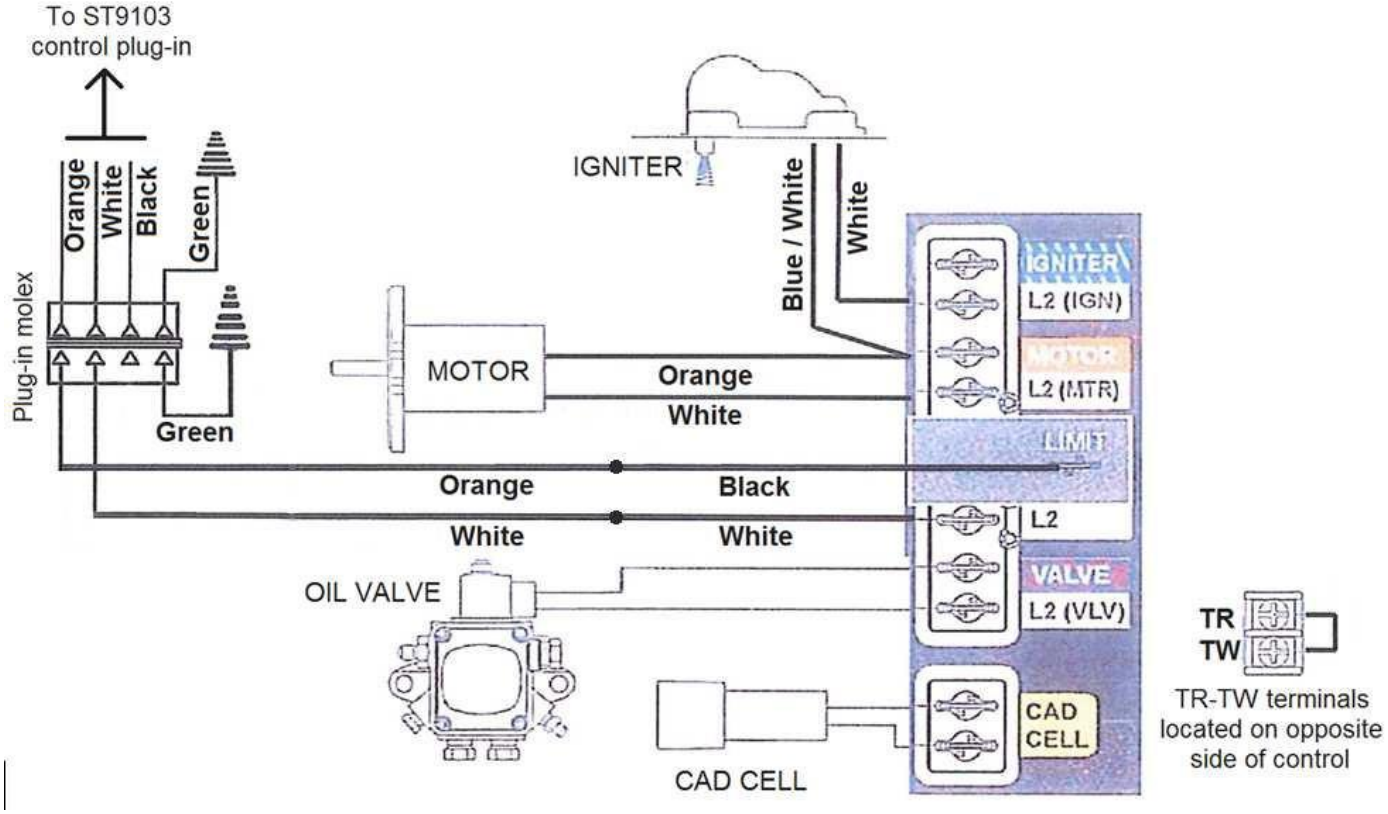
HEATING & COOLING



HEATING & COOLING

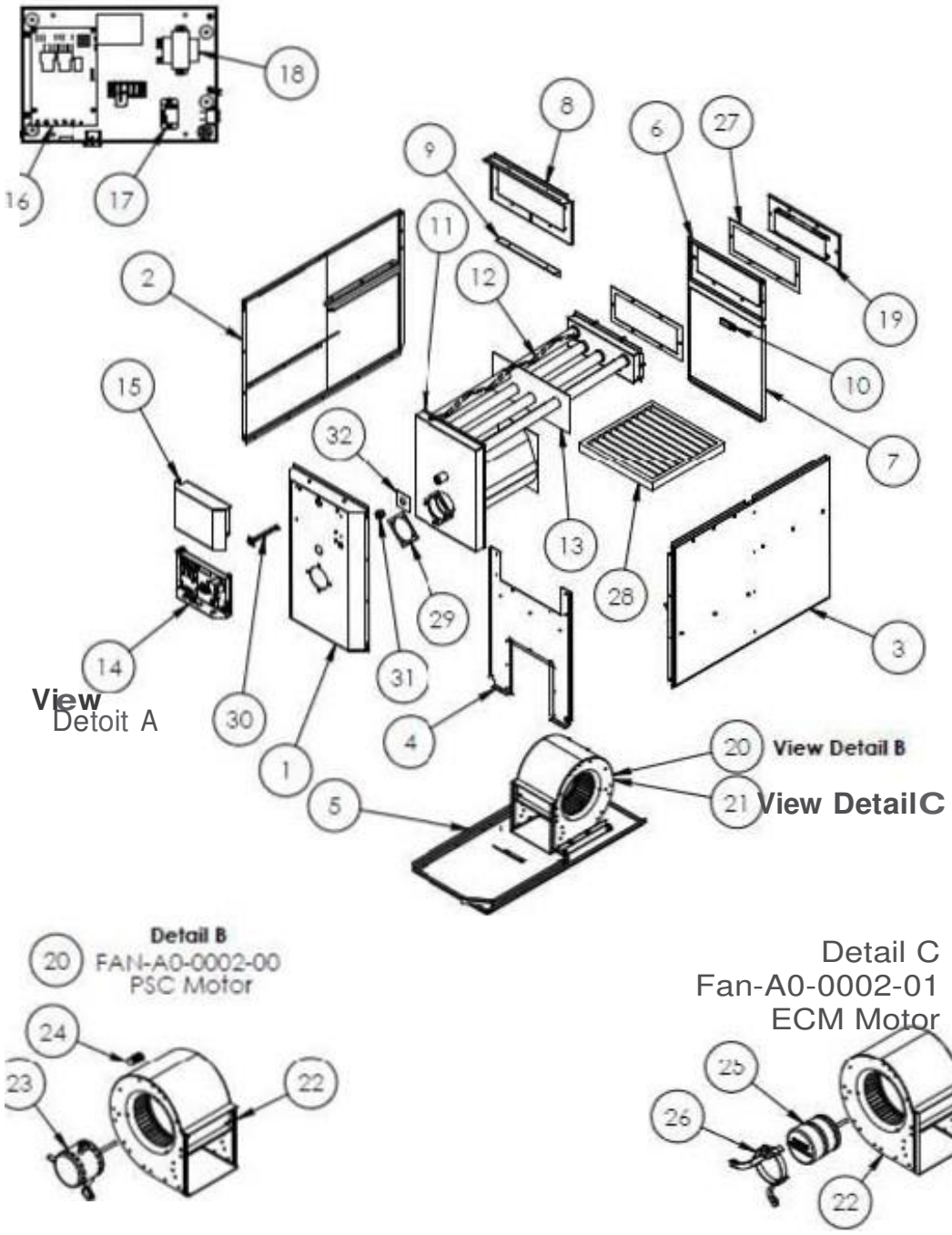


GeniSys control schematic with the ST9103 Board



9.0 EXPLODED PARTS VIEW

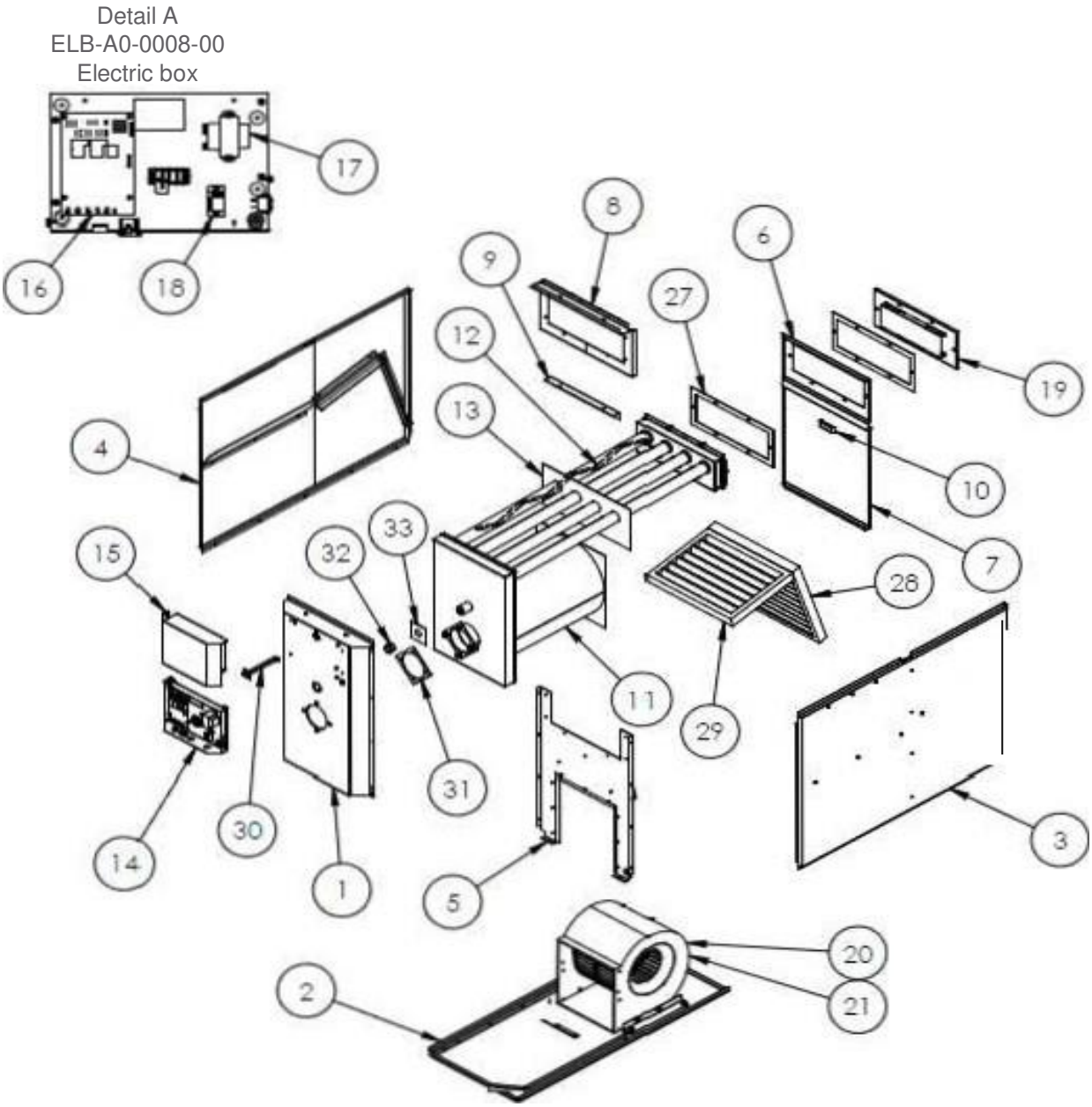
KLR-100 – EXPLODED PARTS VIEW

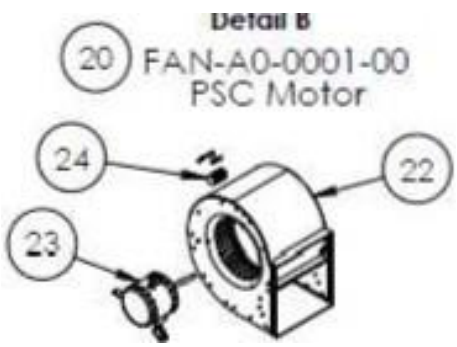


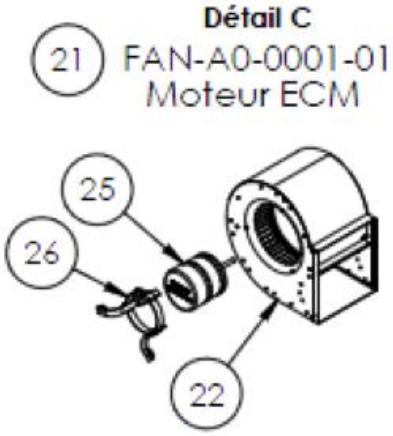
KLR-100 – Part List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	CAB-A0-0007-00	Front Panel Assembly	1
2	CAB-A0-0005-00	Right Panel Assembly	1
3	CAB-A0-0004-00	Left Panel Assembly	1
4	CAB-A0-0006-00	Divider Panel Assembly	1
5	CAB-A0-0011-00	Base Panel Assembly	1
6	CAB-P0-0080-00	Top Rear Panel	1
7	CAB-P0-0013-00	Blower Door Panel	1
8	CAB-P0-0014-00	Upper Divider	1
9	CAB-P0-0015-00	Divider's Filler Gasket Bracket	1
10	3HN-00-PULL-00	Handle Flush Pocket Pull	1
11	HEX-A0-0001-00	Heat Exchanger Assembly	1
12	HEX-P0-0053-00	Pipe Baffle Low-Boy	5
13	INS-P0-0001-00	Divider Filler Gasket - 5 Holes	1
14	ELB-A0-0008-00	Electrical Assembly - Low-Boy Model	1
15	ELB-P0-0018-00	Cover Electrical Box - Low-Boy Model	1
16	4CB-00-FAN0-00	ST9103A1028 Electronic Board	1
17	4TF-00-40VA-00	Transformer HTC-01A0BB01 40VA	1
18	4RY-00-24V0-00	Relay AE04001 24VAC Form C SPDT 24V	1
19	HEX-A0-0012-00	Rear Collector Assembly	1
20	FAN-A0-0002-00	Fan Motor Assembly KLR-100 PSC Motor	1
21	FAN-A0-0002-01	Fan Motor Assembly KLR-100 ECM Motor	1
22	3BU-10-08DD-00	Blower 10" x 8" Direct Drive (G10-8DD)	1
23	3BM-50-4SDD-01	Motor Blower 1/2 HP Direct Drive 4SP EMERSON	1
24	4CA-00-705M-00	Capacitor 7.5 µF 370VAC 70C 60 Hz	1
25	3BM-50-ECM0-02	Motor Blower 1/2 HP ECM Ecotech EMERSON	1
26	1SB-00-BUMR-00	Bracket Motor Mounting Direct Drive Blower	1
27	INS-P0-0015-00	Low-Boy Rear Insulation	2
28	3AF-02-2020-01	Filter Air 20" x 20" x 2" Non-Pleated (Strata Type)	1
29	INS-P0-0017-00	Burner's Flange Insulation	1
30	4SD-00-0185-00	Control Limit Snap Disc (185°) Au to Reset (L185-	1
31	3SG-0P-1030-5A	Glass Sight Clear 1" NPT Hex with THD Seal	1
32	INS-P0-0018-00	Sight Glass Insulation	1

KLR-200 – EXPLODED PARTS VIEW



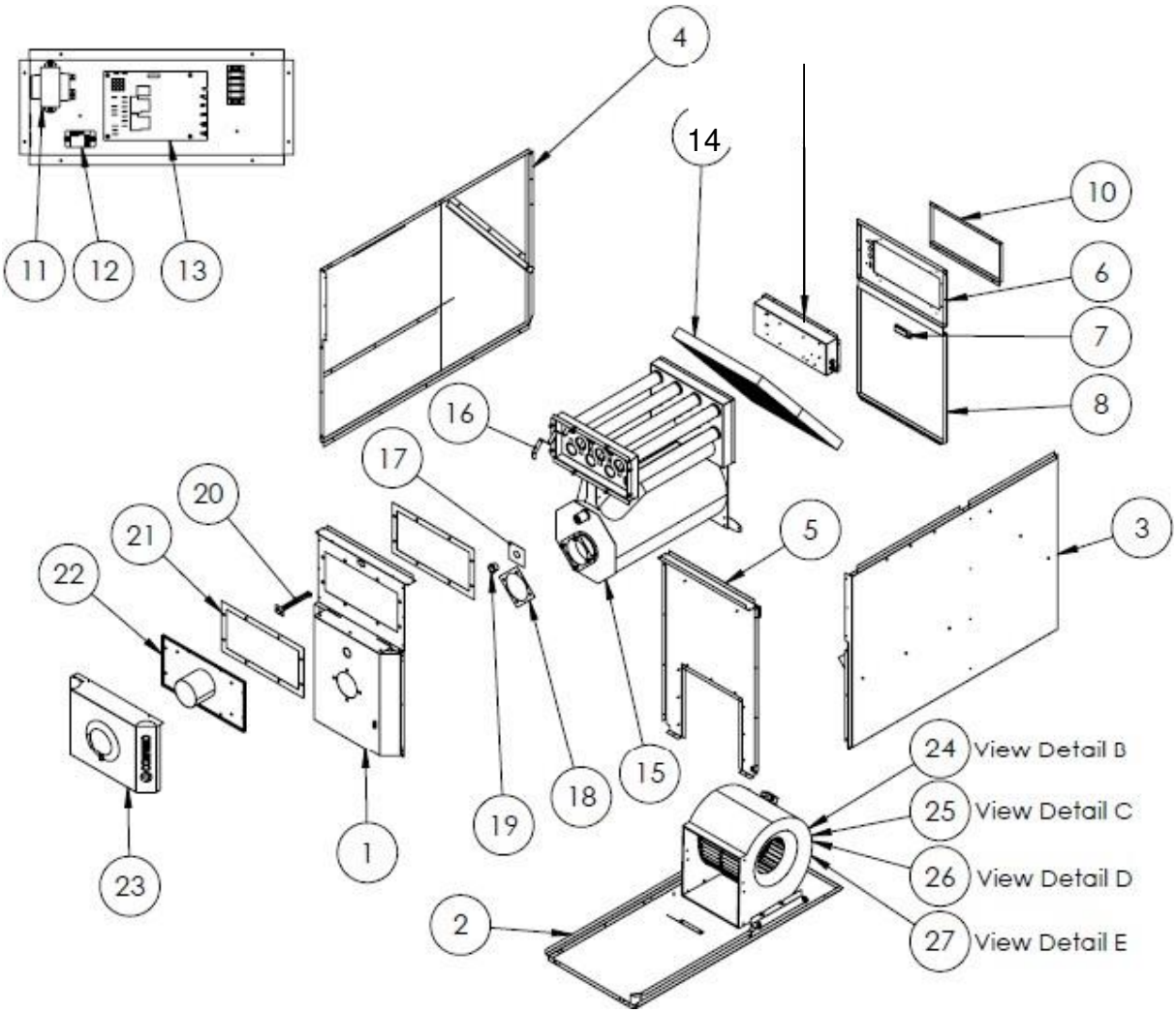




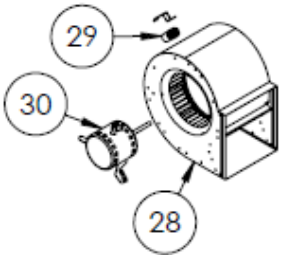
KLR-200 – Part List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	CAB-A0-0007-	Front Panel Assembly	1
2	CAB-A0-0012-	Base Panel Assembly	1
3	CAB-A0-0009-	Right Panel Assembly	1
4	CAB-A0-0008-	Left Panel Assembly	1
5	CAB-A0-0010-	Divider Panel Assembly	1
6	CAB-P0-0080-	Top Rear Panel	1
7	CAB-P0-0013-	Blower Door Panel	1
8	CAB-P0-0014-	Upper Divider	1
9	CAB-P0-0015-	Divider's Filler Gasket Bracket	1
10	3HN-00-PULL-	Handle Flush Pocket Pull	1
11	HEX-A0-0003-	Heat Exchanger Assembly	1
12	HEX-P0-0053-	Pipe Baffle Low-Boy	7
13	INS-P0-0008-00	Divider Filler Gasket - 7 Holes	1
14	ELB-A0-0008-	Electrical Assembly - Low-Boy Model	1
15	ELB-P0-0018-	Cover Electrical Box - Low-Boy Model	1
16	4CB-00-FAN0-	ST9103A1028 Electronic Board	1
17	4TF-00-40VA-	Transformer HTC-01A0BB01 40VA	1
18	4RY-00-24V0-	Relay AE04001 24VAC Form C SPDT 24V	1
19	HEX-A0-0012-	Rear Collector Assembly	1
20	FAN-A0-0001-	Fan Motor Assembly KLR-200 PSC Motor	1
21	FAN-A0-0001-	Fan Motor Assembly KLR-200 ECM Motor	1
22	3BU-12-00DD-	Blower 12" Direct Drive (GT12-10DD)	1
23	3BM-75-4SDD-	Motor Blower 3/4 HP Direct Drive 4SP EMERSON	1
24	4CA-00-156M-	Capacitor 15 µF 370VAC 70C 60 Hz	1
25	3BM-75-4SDD-	Motor Blower 3/4 HP ECM Ecotech EMERSON	1
26	1SB-00-BUMR-	Bracket Motor Mounting Direct Drive Blower	1
27	INS-P0-0015-00	Low-Boy Rear Insulation	2
28	3AF-02-2020-01	Filter Air 20" x 20" x 2" Non-Pleated (Strata Type)	1
29	3AF-02-1520-01	Filter Air 15" x 20" x 2" Non-Pleated (Strata Type)	1
30	4SD-00-0185-00	Control Limit Snap Disc (185°) Au to Reset (L185-	1
31	INS-P0-0017-00	Burner's Flange Insulation	1
32	3SG-0P-1030-	Glass Sight Clear 1" NPT Hex With THD Seal	1
33	INS-P0-0018-00	Sight Glass Insulation	1

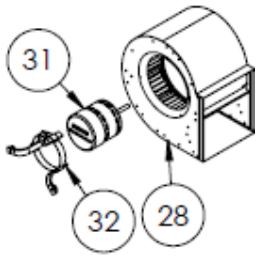
KLF-200- Exploded Parts View



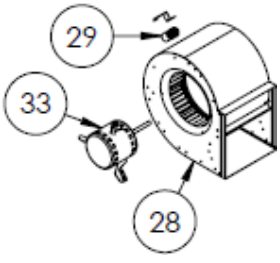
Detail B
FAN-A0-0001-00
Motor PSC 3⁄4 HP



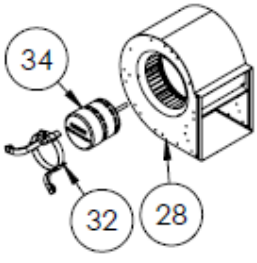
Detail C
FAN-A0-0001-01
Motor ECM 3⁄4 HP



Detail D
FAN-A0-0006-00
Motor PSC 1⁄2 HP



Detail E
FAN-A0-0006-01
Motor ECM 1⁄2 HP



KLF-200 – Part List

ITEM	PART NUMBER	DESCRIPTION	QTY
1	CAB-A0-0049-	Front Panel Assembly	1
2	CAB-A0-0052-	Base Panel Assembly	1
3	CAB-A0-0051-	Right Panel Assembly	1
4	CAB-A0-0050-	Left Panel Assembly	1
5	CAB-A0-0053-	Divider Panel Assembly	1
6	CAB-P0-0164-	Top Rear Panel	1
7	3HN-00-PULL-	Handle Flush Pocket Pull	1
8	CAB-P0-0013-	Blower Door Panel	1
9	ELB-A0-0018-	Electrical Box Assembly	1
10	CAB-P0-0128-	Cover Electrical Box	1
11	4TF-00-40VA-	Transformer HTC-01A0BB01 40VA	1
12	4RY-00-24V0-	Relay AE04001 24VAC Form C SPDT 24V	1
13	4CB-00-FAN0-	ST9103A1028 Electronic Board	1
14	3AF-02-1520-01	Filter Air 15" x 20" x 2" Non-Pleated (Strata Type)	2
15	HEX-A0-0011-	Heat Exchanger Assembly	1
16	HEX-P0-0064-	Pipe Baffle Hi-Boy	11
17	INS-P0-0018-00	Sight Glass Insulation	1
18	INS-P0-0017-00	Burner's Flange Insulation	1
19	3SG-0P-1030-	Glass Sight Clear 1" NPT Hex With THD Seal	1
20	4SD-00-0185-00	Control Limit Snap Disc (185º) Au to Reset (L185-	1
21	INS-P0-0020-00	Hi-Boy Front Insulation	2
22	HEX-A0-0010-	Front Collector Assembly	1
23	CAB-P0-0156-	Front Door Panel	1
24	FAN-A0-0001-	Fan Motor Assembly KLR-200 PSC Motor	1
25	FAN-A0-0001-	Fan Motor Assembly KLR-200 ECM Motor	1
26	FAN-A0-0006-	Fan Motor Assembly KLF-200 PSC Motor	1
27	FAN-A0-0006-	Fan Motor Assembly KLF-200 ECM Motor	1
28	3BU-12-00DD-	Blower 12" Direct Drive (GT12-10DD)	1
29	4CA-00-156M-	Capacitor 15 µF 370VAC 70C 60 Hz	1
30	3BM-75-4SDD-	Motor Blower 3/4 HP Direct Drive 4SP EMERSON	1
31	3BM-75-4SDD-	Motor Blower 3/4 HP ECM Ecotech EMERSON	1
32	1SB-00-BUMR-	Bracket Motor Mounting Direct Drive Blower	1
33	3BM-50-4SDD-	Motor Blower 1/2 HP Direct Drive 4SP EMERSON	1
34	3BM-50-ECM0-	Motor Blower 1/2 HP ECM Ecotech EMERSON	1

10. START-UP TEST RESULTS

Model**:** _____Serial Number: _____

Lowboy KLR_____ Lowboy KLF_____

Date of installation: _____

Installer (name & address): _____

_____

_____

START-UP TEST RESULTS

Size of unit (Btu/h): _____

Nozzle: _____Oil Pressure (psi): _____

Chimney_____
Direct vent system (DVS) _____

Burner adjustments:

RIELLO **F3**/ BF3____*RIELLO **F5**/* **BF5**____ BECKETT **AFG-LII** ____ Beckett **F3** ____
Turbulator: _____ Air Gate: _____
Air band: _____ Air shutter: _____

Smoke result: #0 _____TRACE _____#1 _____

Combustion Results: _____CO_2 %

Chimney draft: _____" W.C.

Ambient temperature: _____℉

Gross flue temperature: _____℉

Temperature rise: _____℉ (see page 39)

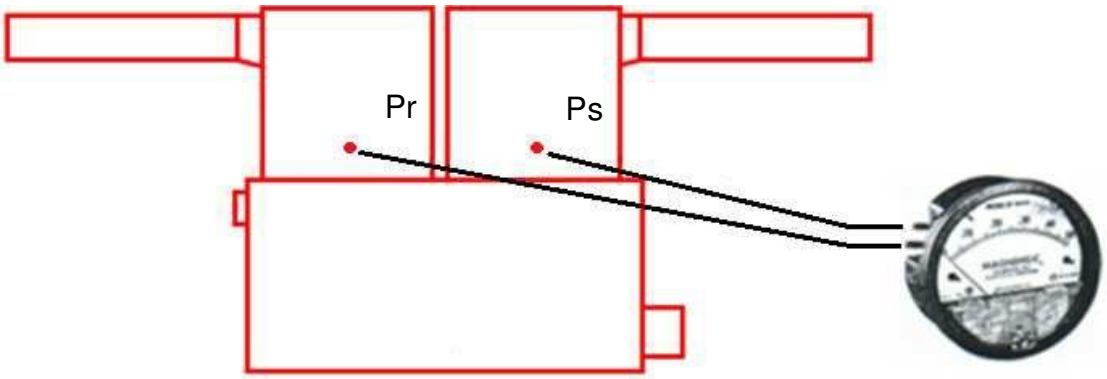
External total static pressure: _____" W.C. (see page 39)

A/C Coil total resistance: (see page 39)

TEST PROCEDURES

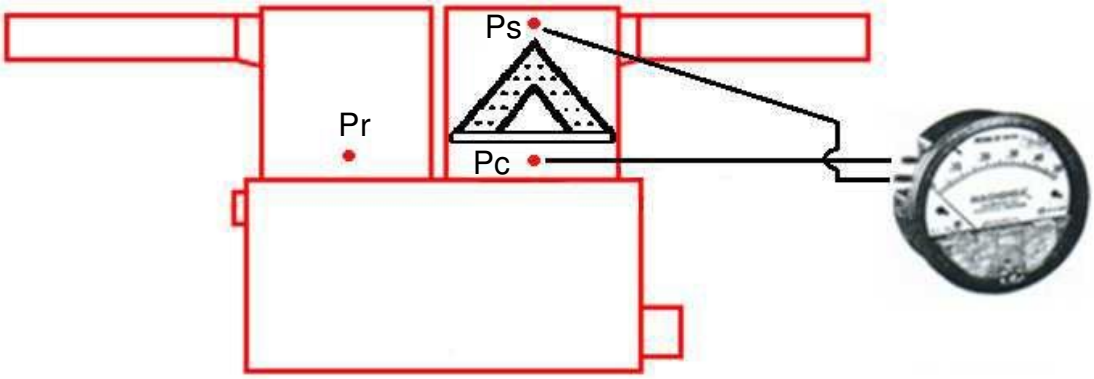
External Total Static Pressure Reading

Total Static Pressure = Supply Pressure (Ps) + Return Pressure (Pr)



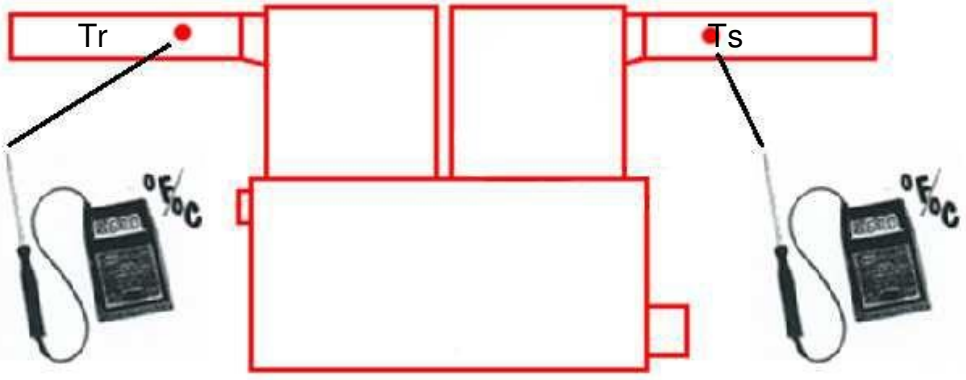
A/C Coil Total Resistance Reading

A/C coil total resistance = Coil Pressure (Pc) - Supply Pressure (Ps)



Temperature Rise Reading ***

Temperature rise = Supply Temp. (Ts) - Return Temp. (Tr)



*** Probe must not be in direct sight of heat exchanger.

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Thank you for choosing Granby