Carlin®
Combustion Technology, Inc.

EZ-Gas Burner with 9-slot diffuser

WARNING: Installer/servicer — Except where specifically stated otherwise, this Supplement must be used only by a qualified service technician. Follow all guidelines in the Burner Manual and Boiler Manual. Failure to comply with this or other requirements in this manual could result in severe personal injury.

Preliminary Set up tables for:

EZ Gas with 9 slot diffuser

Gas and Oil btu equivalents - Note 1 important!

		Nat gas orifice sizes		Air Band settings		Propane orifice sizes	
		Letter and		See note 2		Letter and	
Oil	Gas	Number	Fractional	one slot	two slot	Number	Fractional
.50 gph	70,000	#16 (.177)	11/64" (.172)	10%		#30 (.129)	1/8" (.125)
.65 gph	90,000	#12 (.189)	3/16" (.187)	20%		#22 (.157)	5/32" (.156)
.75 gph	105,000	#4 (.209)	7/32" (.219)	30%		#17 (.173)	11/64" (.172)
.85 gph	120,000	Let C (.242)	15/64" (.234)	35%		#13 (.185)	3/16" (.187)
1.00 gph	140,000	Let E (.250)	1/4" (.250)	42%		#6 (.204)	13/64" (.203)
1.10 gph	150,000	Let F (.257)	17/64" (.266)	65%		#3 (.213)	7/32" (.219)
1.25 gph	175,000	Let L (.290)	9/32" (.281)		40%	Let C (.242)	15/64" (.234)
1.35 gph	189,000	Let N (.302)	19/64" (.297)		48%	Let E (.250)	1/4" (.250)
1.50 gph	210,000	0.328	21/64" (.328)		60%	Let I (.272)	17/64" (.266)
1.65 gph	230,000	0.359	23/64" (.359)		75%	Let L (.290)	9/32" (.281)

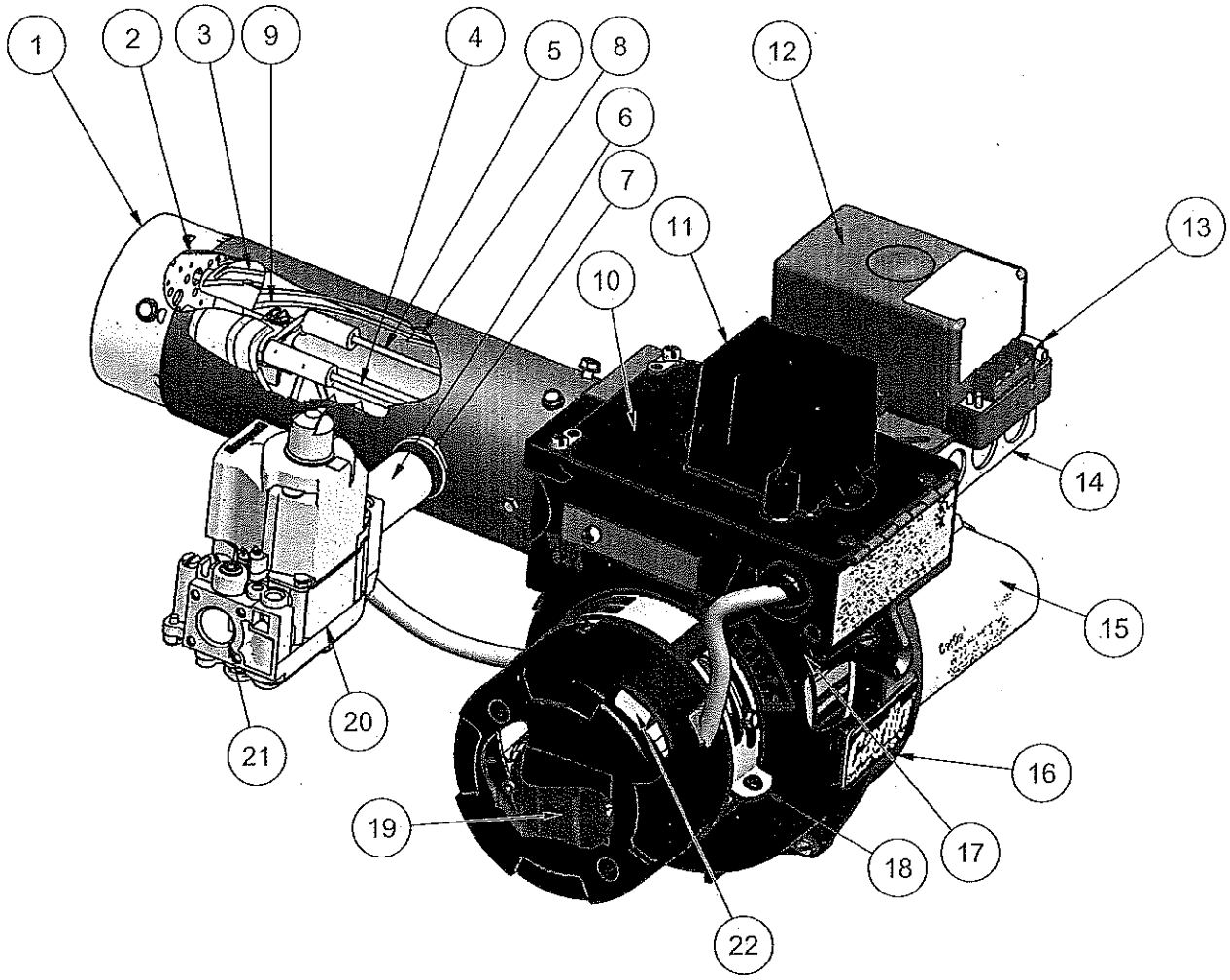
Note 1: When selecting a firing rate, consult the appliance data plate. Don't base the gas firing rate on the existing oil nozzle (pump pressures change flow rate).

Note 2: Air band settings and orifices will vary based on heat exchanger design and draft conditions. Chart is based on a neutral overfire pressure.

Note 3: This supplement is meant to be used along with the EZ Gas Instructions and provide helpful information for the 9 slot diffuser and orifice set ups.

P/N MNEZGAS2 Rev 02/11/13

EZGas Pro burner at-a-glance



1 Air tube (flange omitted for clarity), with powder coat paint finish

2 Diffuser plate (interchangeable hole or slot pattern)

3 Gas manifold (concentric cylinders swaged at ends) — Gas manifold delivers gas to gas openings on inner wall of manifold near the diffuser plate.

4 Ignitor electrode

5 Flame rod

6 Gas orifice nipple — see pages 7 and 8 for orifice sizing requirements

7 Gas inlet connection (gas entrance to gas manifold)

8 Gas manifold outer wall

9 Gas manifold inner wall

10 Hinged cover plate (for access to blower wheel & electrodes)

11 Ignitor — Carlin Model 41800 solid state electronic ignitor — 9,000 volts, interrupted duty rated)

12 Primary control (Carlin Model 60200FR microprocessor-based interrupted ignition flame supervisory control, for use with flame rod flame rectification)

13 Flame current test jack

14 Burner junction box

15 Motor (Carlin PSC motor, with permanently-lubricated bearings and automatic thermal overload protection)

16 Blower housing (cast aluminum), with powder coat paint finish

17 Blower wheel

18 Air band with indicator — Only a single adjustment required for setting combustion air; see page 7 for starting setting based on appliance model and input)

19 Airflow proving switch — Prevents burner from firing if air is not moving

20 Combination gas valve (with integral gas pressure regulation — set for 3½" w.c. outlet pressure) - 24V

21 Gas supply entrance — ¾" NPT; 5" w.c. min; 14" w.c. max

22 24V Transformer

2.3 Exhaust Pipe System

The DVF System must be installed where provisions do not exist for the ducting of combustion products to the outside. **The direct vent connector shall not pass through any floor or ceiling.** The burner exhaust must be ducted directly to the vent hood through listed exhaust pipes provided. The exhaust pipe throughout it's entire length must be readily accessible for inspection, cleaning and replacement.

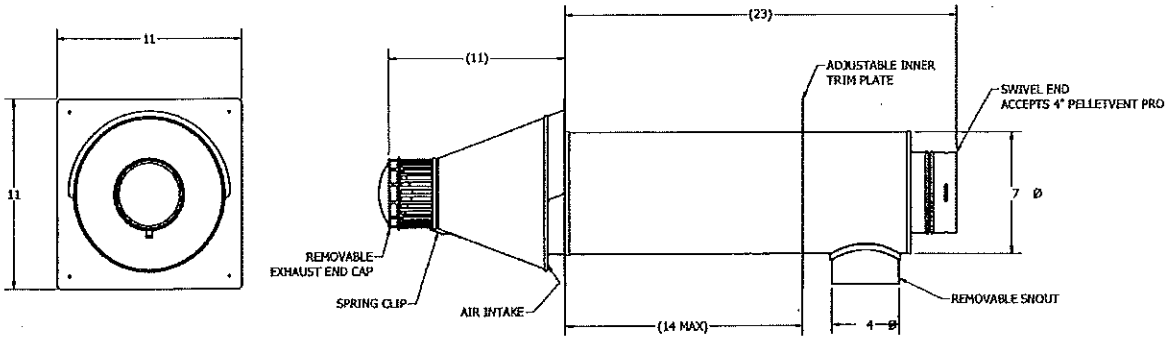
The venting system should be installed and supported in accordance with the National Fuel Gas Code, ANSI Z223.1, CAN/CGA B149 or in accordance with any local codes.

The Exhaust Kit consists of:

DVF System	
1 - 6" to 4" Boiler Adapter	1 - 4" x 36" vent pipe
2 - 4" 90 degree elbows	1 - 4" x 18" vent pipe adjustable extension
1 - 4" x 24" vent pipe	1 - 5" Concentric exhaust

Installation of DVF Exhaust:

1. Begin by locating a suitable location for the exhaust to breech the wall. This location should be at least 12" above ground level or the expected snow level, and on the leeward side of the house. Consult page 6 for required distances from windows, doors, etc.. **The hood location must also allow for a upward slope of a 1/4" per foot for the exhaust piping.**
2. Once the hood location has been determined, cut a 8" hole for a non combustible wall, or a 9" hole for a combustible wall. Using 2" X 2", Frame a box around the hole on the outside of the house so the flange is mounted away from the siding. Attach the hood to the outside of the house using appropriate screws to support the hood. Use one screw through each of the predrilled holes on the trim plate of the hood. Do not drill or screw through the hood at all.
3. Once the hood is secure, mock up the rest of the vent kit. Start by fitting the boiler adapter onto the



boiler and securing it in place with the locking band on the adapter. Install the rest of the vent sections that are required to complete your job. Connect the next piece of pipe by pushing the female end of the pipe over the male end of the boiler adapter. Once the pipe is fully seated, twist the female end clockwise until the locking mechanism is engaged. Do not screw into the pipe or add sealant to the pipe as this could compromise the factory seal. Continue in this way until the entire kit is complete from the boiler to the vent hood. It is allowable to add extra sections of pipe to the vent kit up to 20'. Each 90 degree elbow is 3 equivalent feet and each 45 degree elbow is 1.5 equivalent feet.

4. Once you are satisfied with the fit of the exhaust, make sure that the vent pipe is properly supported every three feet with a upward slope to the hood of 1/4" every foot.

2.4 Installation of Make-up Combustion Air

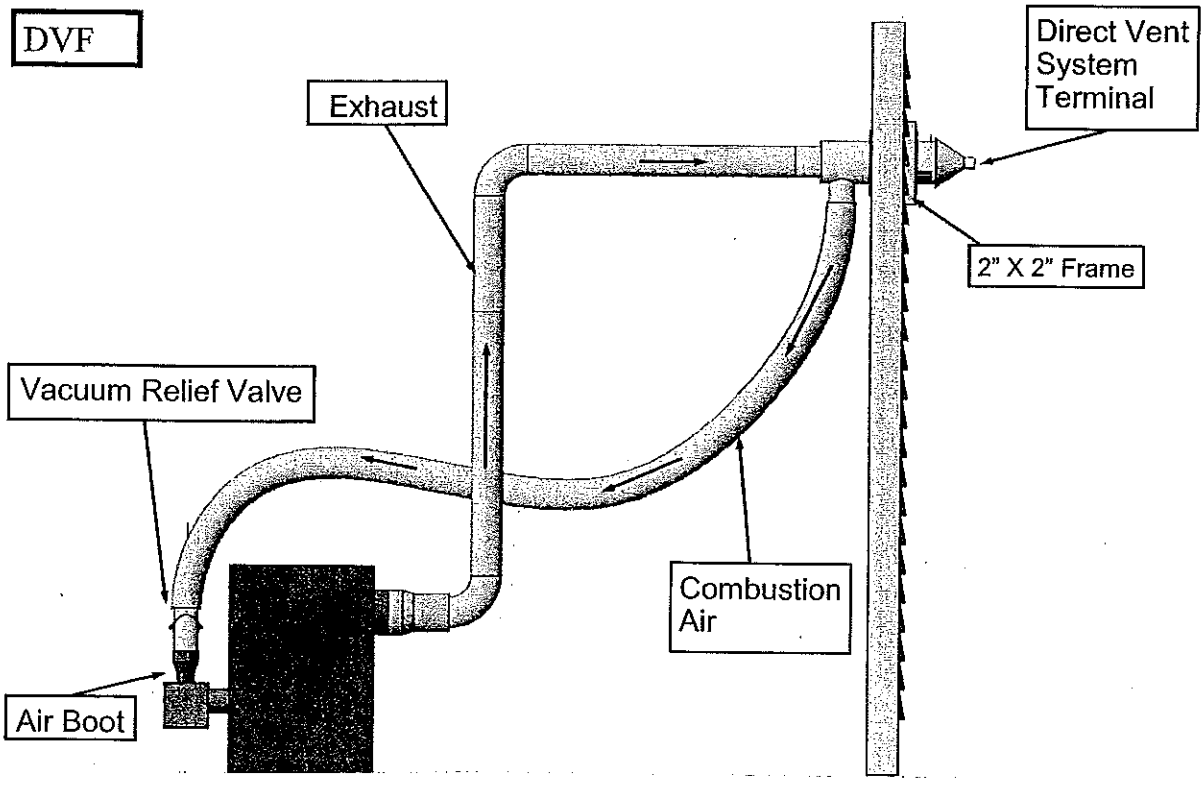
NOTICE

Do not operate the burner with air intake disconnected.

For DVF kits:

4. Use 4 inch diameter flex pipe that is provided in the kit or a comparable single wall metal pipe. The maximum allowable length of intake pipe is twenty feet not including elbows.
5. Begin installing the 4" tee to the burner (Riello requires the supplied 3" to 4" increaser to be installed first). Secure all joints on the intake with three screws each.
6. Install the supplied vacuum relief damper in the branch of the tee making sure that it is mounted with all labeling right side up and perfectly horizontal.
7. In the last run leg of the tee install the aluminum flex pipe.
8. Finally attach the other end of the flex pipe to the intake port on the concentric hood.
9. Inspect the intake system and make sure all connections are secure and then seal each joint with silicone or aluminum tape.

2.3 Vent System Diagram



3. Burner Setup Guidelines

In all boilers, regardless of fuel being burnt or configuration, a 10" X 10" Cerafiber pad should be installed under the flame. This pad is not for acoustic purposes, it is to keep the area under the nozzle warm to prevent flame out.

Good, reliable operation with a minimum of service, starts with attention to the small details:

Oil:

1. Setting the nozzle position and electrodes "by the book" using the manufacturer's guide lines.
2. Installing a quality micron filter before the burner
3. Making careful/tight flare connections, without couplings, on oil suction line.
4. Checking fuel pump pressure is set to specs on following page.
5. Setting the air band properly with well maintained instruments. A good target is 11% to 12.5% of (CO_2) or 6.5% to 3.8% of (O_2) with a zero smoke.

To ensure proper burner setup, gauges should be used to check things such as the pump pressure, CO_2 levels, etc...

Gas:

1. Checking the electrode, orifice size, and flame rod settings against manufacturer's specs to insure proper operation.
2. Installing properly sized gas piping according to BTU input required and length of gas line run.
3. **Making sure there is proper manifold pressure before and after the gas valve using a calibrated manometer.**
4. Setting the air band properly with well maintained instruments. A good target is 9.0% to 9.5% of (CO_2) or 5% to 3.5% of (O_2) for natural gas, or 10.0% to 11.0% of (CO_2) or 5% to 3.5% of (O_2) for LP gas. CO readings should always be less than 100 ppm.

3.1 B-10 Oil Burner Setup

BURNER MANUFACTURER Beckett NX (NEC 1101, 1102, 1103)				
Boiler Model	B10 - 3*	B10 - 4*	B10 - 5*	B10 - 6*
Burner Model	NEC - 1102	NEC - 1101	NEC - 1101	NEC - 1103
Firing Rate	0.55	0.90	1.00	1.20
Insertion Depth	3.5"	6.0"	6.0"	6.0"
Nozzle	.40 X 60°	.65 X 60°	.75 X 60°	.90 X 60°
Spray Pattern	hollow	solid	solid	W
Pump Pressure	180 psi	180 psi	180 psi	180 psi
Head Type	6 slot	9 slot	9 slot	9 slot
Head Position	1.25	3	4	4.25
Air Setting	N/A	N/A	N/A	N/A

BURNER MANUFACTURER Riello BF3 and BF5				
Boiler Model	B10-3	B10-4	B10-5	B10-6
Burner Model	BF-3	BF-3	BF-5	BF-5
Firing Rate	0.55	0.80	1.00	1.25
Insertion Depth	3.5"	3.5"	3.0"	3.0"
Nozzle	.5 X 80	.65 X 80	.85 X 60	1.00 X 60
Spray Pattern	W	W	W	W
Pump Pressure	145 psi	145 psi	145 psi	145 psi
Turbulator	2	3	2	3
Air Gate	3.2	4.7	3.4	5

*** - These burners are not approved for use in Canada on Biasi equipment**

3.2 SG Oil Burner Setup

BURNER MANUFACTURER Beckett NX (NEC 1201, 1202)			
Boiler Model	SG-2*	SG-3*	SG-4*
Burner Model	NEC - 1201	NEC - 1202	NEC - 1202
Firing Rate	0.65	1.00	1.30
Insertion Depth	3.5"	6.0"	6.0"
Nozzle	.50 X 60°	.75 X 60°	1.00 X 60°
Spray Pattern	hollow	solid	solid
Pump Pressure	180 psi	180 psi	180 psi
Head Type	6 slot	9 slot	9 slot
Head Position	1.50	3.50	4.25

BURNER MANUFACTURER Riello BF3 and BF5			
Boiler Model	SG-2	SG-3	SG-4
Burner Model	BF-3	BF-5	BF-5
Firing Rate	0.65	1.00	1.30
Insertion Depth	5.0"	5.0"	5.0"
Nozzle	.55 X 70	.85 X 60	1.10 X 80
Spray Pattern	solid	solid	solid
Pump Pressure	145 psi	145 psi	145 psi
Turbulator	0.5	1.0	2
Air Gate	4.5	4.0	5.6

* - These burners are not approved for use in Canada on Biasi equipment

3.3 B10 Gas Burner Setup

Carlin			Natural Gas		
Boiler Model	Burner Model	Input (MBH)	Man. Pres. (W.C.)	Orifice	Air Gate
B-3	EZ-GAS-WC	80	3.50"	#11 (.191")	30%
B-4	EZ-GAS-WC	110	3.50"	#1 (.228")	40%
B-5	EZ-GAS-WC	140	3.50"	Let F (.257")	20%
B-6	EZ-GAS-WC	175	3.50"	5/16" (.312")	36%

Carlin			Propane		
Boiler Model	Burner Model	Input (MBH)	Man. Pres. (W.C.)	Orifice	Air Gate
B-3	EZ-GAS-WC	80	3.50"	#25 (.150")	30%
B-4	EZ-GAS-WC	110	3.50"	#15 (.180")	48%
B-5	EZ-GAS-WC	140	3.50"	#5 (.206")	20%
B-6	EZ-GAS-WC	175	3.50"	1/4" (.250")	41%

To determine how much gas is coming into the burner, or to set the gas meter correctly, the following formula can be used.

$Ft^3/hr = [3600/(sec.\ Per\ rev.)]*(Size\ of\ gas\ meter)$

The chart to the right can be used to determine the flow rate depending upon the time per revolution and the size of the gas meter dial.

Seconds per Revolution	Size of Gas Meter Dial (Cubic Foot)		
	0.5	1	2
20	90	180	360
25	72	144	288
30	60	120	240
35	51	103	206
40	45	90	180
45	40	80	160
50	36	72	144
55	33	65	131
60	30	60	120