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FIELD CONTROLS

Since 1927, our focus has been the control and movement of air. We lead the industry in the fields of venting, combustion, and draft control. This is your guide for product information, specifications, installation, wiring, and replacement parts. For specific installation manuals and more information, visit www.fieldcontrols.com.

Thank you for specifying Field Controls.

Vent Dampers
for Oil & Gas
Heating Appliances

Power Venters
for Oil & Gas
Heating Appliances

Draft Controls
for Gas, Oil and Coal
Heating Appliances

Venting

Combustion

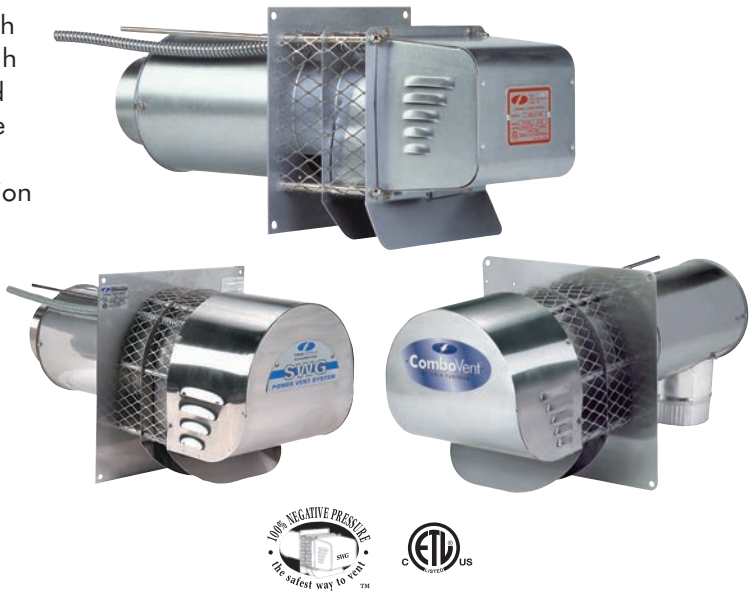
Draft

More

SWG/CV Power Venter

Outdoor Mounted Power Venters for Oil & Gas

Gas and oil heating appliances generate heat through the combustion of fuel. The heat is transferred through the heat exchanger and distributed to the conditioned space. The products of combustion, however, must be vented safely out of the structure. In a conventional chimney, venting is achieved by the natural lifting action of the hot combustion gas. New, efficient systems absorb more of the heat in the heat exchanger and produce lower temperature vent gas. Lower temperature gas does not rise as quickly or as reliably as in older, less efficient systems. Power venting or sidewall venting is more economical and safer than chimney venting. A power venter uses a motorized blower to vent the products of combustion. A power venter is interlocked with the appliance to ensure that proper draft is achieved before the appliance burner is activated.



The SWG or ComboVent™ Power Venter is the safest, most efficient power venter available today.

Patented SWG or ComboVent Power Venters are ETL and cETL listed for all LP gas, natural gas, or oil-fired heating equipment. The SWG or ComboVent combines the motor, blower, and vent hood in one complete, easy to install unit. The SWG mounts on the outside of the building and pulls the combustion gases from the appliance through the outside wall utilizing 100% negative pressure.

Benefits of the SWG or ComboVent Power Venter include:

- 100% negative pressure in the vent pipe for maximum safety.
- Standard galvanized pipe can be used instead of expensive stainless steel.
- No need to seal vent pipe joints, saving time and money.
- Significantly longer vent lengths than positive pressure, direct vent systems.
- The SWG or ComboVent is recommended by major heating appliance manufacturers.

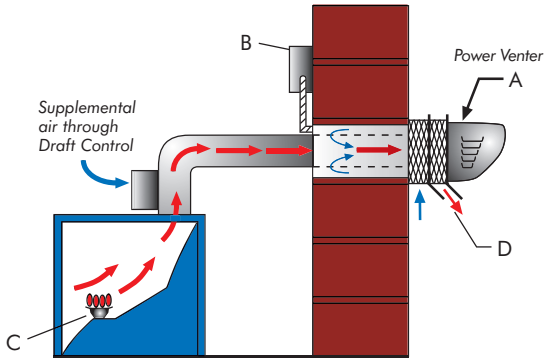
The SWG or ComboVent must be sized to match the appliance or appliances' input firing rate. Most firing rates are published in the manufacturer's installation manual. The SWG and ComboVent must be installed with a CK Control Kit to ensure proper listing and safe, efficient venting.

Note: ComboVent and SWG-4HD, 5 & 6 Motor Kits include a stainless steel blower wheel for better performance and extended life.

Replacement Motor Kit and Stainless Steel Blowerwheel shown.

How the SWG/CV Works

1. *The thermostat calls for heat, energizing the Power Venter (A).*
2. *A negative pressure is created, closing the pressure switch on the control kit (B).*
3. *The burner (C) is activated and combustion gases are exhausted (D).*
4. *After the thermostat is satisfied, the burner shuts down and the venter continues to post purge, exhausting residual flue gases.*
5. *When the timer or temperature control is satisfied, the venter is deactivated.*



The Power Venter pulls combustion gases to the outside, creating 100% negative pressure in the vent pipe.

Easier to Install. Easier to Service. A total system for combustion air and venting.

Features

A
- Telescoping stainless steel body
- Accommodates walls up to 14" thick

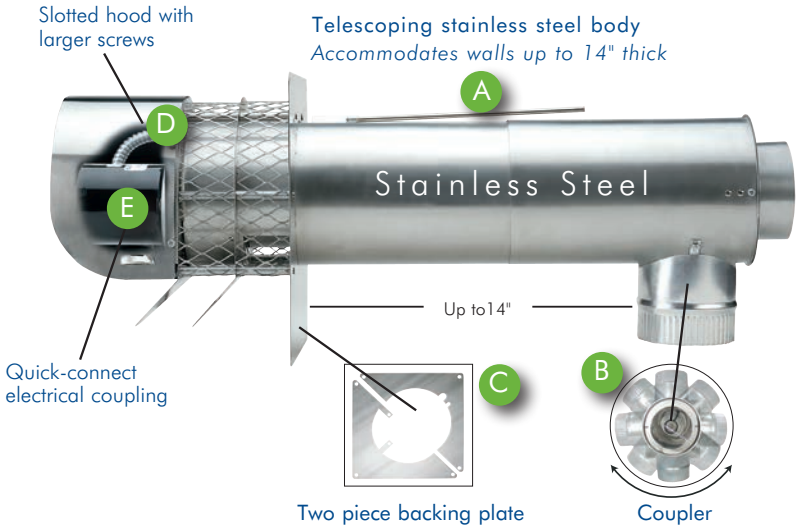
B
- Combustion air connection included
- Provides fresh air directly to burner
- Coupler rotates 360° for easy installation with CAS boot

C
- Two piece backing plate
- Can be mounted at any point during installation

Easier to Service

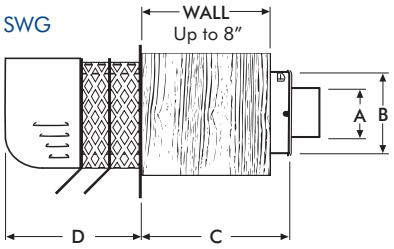
D
- Slotted hood with larger screws
- Saves time during annual service

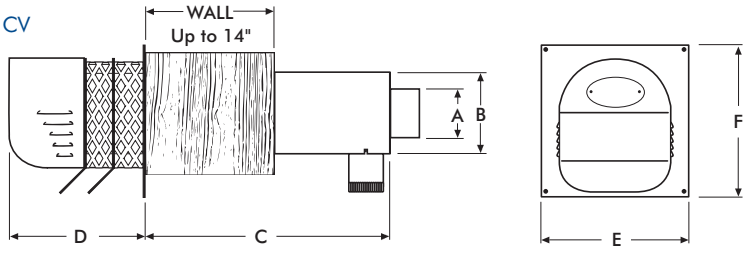
E
- Quick-connect electrical coupling
- Allows for easy motor access



When to use the SWG/CV Power Venter:

- Use with gas or oil furnaces, boilers, and water heaters.
- New construction.
- When converting from electric to gas or oil.
- To avoid relining a chimney.
- When installing an additional heating appliance.
- When co-venting with water heater or additional appliance, can be used as a gas/oil combo single unit.





Power Venter Specifications and Dimensions

Model	Volts	Hz	Amps	Watts	RPM	Thermal Protection	UL Listed	CSA Listed	Dimensions					
									A	B	C	D	E	F
SWG-3	115	60	0.6	40	3000	✓	✓		3"	5"	9 1/16"	8 1/2"	7 5/8"	9 3/16"
SWG-4HD	115	60	1.7	138	3000	✓	✓		4"	6"	9 1/4"	9 1/2"	9"	9"
SWG-4HDs	115	60	1.7	138	3000	✓	✓	✓	4"	6"	9 1/4"	9 1/2"	11"	11 1/2"
SWG-5	115	60	1.3	144	3100	✓	✓		5"	7"	9 7/32"	10 3/4"	12"	12 1/4"
SWG-5s	115	60	1.3	144	3100	✓	✓	✓	5"	7"	9 7/32"	10 1/2"	12"	12 1/2"
SWG-6	115	60	2.1	228	3100	✓	✓		6"	8"	9 7/32"	10 3/4"	12"	12 1/4"
SWG-6s	115	60	2.1	228	3100	✓	✓	✓	6"	8"	9 7/32"	10 1/2"	12"	12 1/2"
SWG-8	115	60	4.37	478	3100	✓	✓		8"	10"	9 7/32"	11 7/8"	13"	14 1/4"
SWG-10	115/230	60	11.4/5.7	1311	1725	✓	✓	✓	10"	14"	19 1/2"	24"	20"	21"
SWG-12	115/230	60	13.6/6.8	1564	1725	✓	✓	✓	12"	16"	19 1/2"	25"	22"	23"
CV-4	115	60	1.7	138	3000	✓	✓	✓	4"	6"	11 3/4"-17 3/4"	9 1/2"	9"	9"
CV-5	115	60	1.3	144	3100	✓	✓	✓	5"	7"	11 3/4"-17 3/4"	10 3/4"	12"	12 1/4"

"s" Designates stainless steel model.

SWG/CV Power Venter

Sizing The Venter

Size the SWG or ComboVent venter based on the input firing rate of the appliance. If the power venter is being used to vent multiple appliances, add the input firing rates for each appliance and use that total to size the venter. Knowing the total input BTU/hr. for gas, or GPH for oil, the venter can be sized from Table 1. Select the venter rated closest to the total input BTU or GPH for installation. If the input of the appliance is higher than the maximum allowable for that size SWG or CV, move to the next larger size SWG or CV.

Do not select a venter with a maximum BTU/hr. or GPH lower than the appliance. The equivalent feet of vent pipe for the installation must be calculated. Based on the vent pipe diameter to be used, compare the calculated equivalent feet of vent pipe with the maximum equivalent feet allowable for the venter (See Table 1). If the calculated equivalent feet is greater than that allowed for the venter, increase the diameter of the vent pipe to be used and refer to the table or use the next larger size SWG or CV venter.

Note: In Table 1, the maximum equivalent footage allowable for the vent pipe is given for two points, the maximum BTU/hr. venting capacity and at 60% of the maximum. This allows for estimating values between the two given points.

Table 1

Sizing The Venter (Use Maximum BTU or GPH Input)

MODEL	MAX* OIL GPH INPUT 100psi	MAX* OIL GPH INPUT 140psi	MAX** GAS BTU/hr. INPUT	Maximum Equivalent Feet of Vent Pipe		VENT PIPE SIZE
				AT MAX BTU/hr. INPUT	AT 60% OF MAX BTU/hr. INPUT	
SWG-3	N/A	N/A	70,000	21	80	3"
				50	100	4"
SWG-4HD, 4HDs, CV-4	1.10	.90	170,000	35	100	4"
				65	100	5"
				100	100	6"
				100	100	7"
SWG-5, 5s, CV-5	1.85	1.55	290,000	16	44	4"
				51	100	5"
				95	100	6"
				100	100	7"
SWG-6, 6s	2.65	2.25	416,000	28	78	5"
				68	100	6"
				100	100	7"
SWG-8	4.75	4.0	740,000	26	72	7"
				51	100	8"
				70	100	9"
SWG-10	9	7.5	1,300,000	10	100	8"
				30	100	10"
				75	100	12"
SWG-12	13.5	11.5	1,900,000	16	100	10"
				40	100	12"
				86	100	14"

NOTE: Control Kits are required for operation of the SWG. Stainless steel recommended for oil applications.

** Oil: Select venter according to the actual rated maximum GPH input. SWG GPH ratings at 100 psi. Do not exceed maximum oil GPH input.*

*** Gas: Do not exceed maximum BTU/hr. input rating. For multiple venting system applications add the input for each appliance. Category I gas-fired draft induced systems require an SWG-4HD or larger. Category III gas-fired draft induced systems require an SWG-5 or larger. Unit sizing may vary depending on specific application. Consult your dealer or factory representative for the proper sizing for your particular application.*

Calculating Equivalent Feet of a Vent System

How to determine total equivalent feet

1. Determine the total equivalent feet for each type of fitting used in the venting system from Tables 2 and 3.
2. Calculate the total feet for the straight lengths of pipe.
3. Add the equivalent feet of the fittings to the total amount of feet of straight length pipe. This will approximate the total equivalent feet of the vent system.
4. Find your total equivalent feet in Table 1 to determine the proper model for your installation.

   Example: System Pipe Size= 6"
   Step 1 2-90° Elbows (6")= 22 Ft.
   Step 2 10-2 Ft. Lengths of 6" Pipe= 20 Ft.
   Step 3 6" to 4" reducer= 4 Ft.
   Step 4 Total Equivalent Feet= 22 Ft. + 20 Ft. + 4 Ft.= 46 Ft.

Table 2

Equivalent Feet for Vent Pipe Fitting

Vent Pipe Fittings	Vent Pipe Diameter									
	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"
Tee	19	25	31	38	44	50	56	63	75	89
Y-Connection	10	13	16	20	23	26	29	32	39	45
90° Elbow	5	7	9	11	12	14	16	18	21	25
45° Elbow	3	4	4	5	6	7	8	9	10	13

Table 3

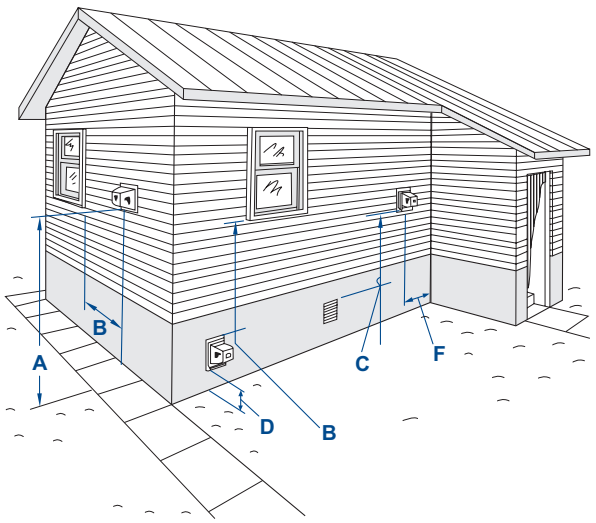
Equivalent Feet for a Reducer/Increaser

Large Pipe Size \ Small Pipe Size	3"	4"	5"	6"	7"	8"	9"	10"	12"	14"
3"	0									
4"	2	0								
5"	4	2	0							
6"	5	4	2	0						
7"	6	5	4	1	0					
8"	7	7	6	3	2	0				
9"	7	8	7	5	4	2	0			
10"	8	8	8	6	6	4	2	0		
12"	8	10	10	8	9	8	6	4	0	
14"	9	10	12	10	12	11	9	8	3	0
16"	9	11	12	11	14	13	13	11	8	3
18"	9	11	13	12	15	15	15	14	11	7
20"	9	12	14	13	16	17	17	17	15	11

To estimate the equivalent feet length of the Reducer/Increaser chart, find the figure at the intersection of the small pipe size and the large pipe size.

Terminal Locations of a Vent System

Location of the termination of the venting system should comply with the National Fuel Gas Code, ANSI Z223.1, manufacturer's recommendations, and/or applicable local codes. See diagram for typical terminal locations.



A. The exit termination of a mechanical draft system must not be less than 7' above grade when located adjacent to a public walkway.*

B. The venting systems, with the exception of direct vent appliances, must terminate at least 4' below, 4' horizontally, or 1' above any door, window or gravity air inlet into the building.

C. A venting system must terminate at least 3' above any forced air inlet located within 10'.

D. The bottom of the vent terminal must be located at least 1' above finished grade.**

E. The vent termination should not be mounted directly above or within 3' horizontally from an oil tank vent or gas meter (not shown in diagram).

F. The vent termination point must not be installed closer than 3' from an inside corner of an L-shaped structure.

G. For basement installations where a window well must be used or in installations where the vent terminal cannot be mounted to maintain the minimum 12" clearance above grade, use a Field Vent Riser™. The Vent Riser ensures the vent termination is above grade or the snow line and is in compliance with local codes (not shown in diagram).

**10" or larger should be 10' minimum above public walkway.*
***10" or larger should be 4' above finished grade.*

SWG/CV Power Venter

Clearance to Combustibles

If mounting the venting system near combustible materials, refer to Diagram A for allowable installation clearances. Clearances are based on an installation using single wall galvanized steel vent pipe. If manufactured double wall vent pipe is required or used for the installation, clearance should be based on the vent pipe's rated clearance. Always check local code requirements for code restrictions.

Routing of the vent system and clearances for the vent pipe may be planned once the termination location is determined. Route the vent pipe from the appliance to the venter using as few elbows as possible. The horizontal section of the vent pipe should have a slight upward slope from the appliance to the venter. The vent pipe size (diameter) can be smaller than a typical chimney vented system and still overcome the higher pressure losses because the power venter mechanically creates the required draft or air flow to vent the system.

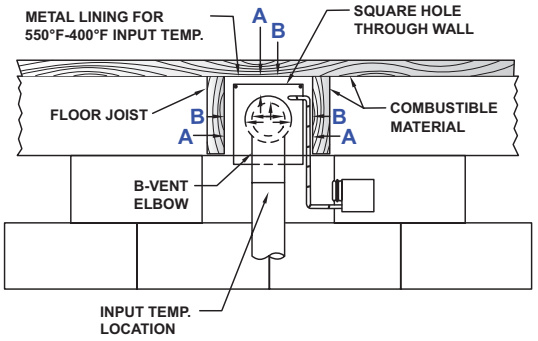
For estimating the minimum vent pipe diameter for a gas system, divide the BTU/hr. input of the heating equipment by 12,600 BTU/sq. in. For oil systems, multiply GPH by 140,000 BTU/GAL, then divide by 12,600 BTU/sq. in. This will give the minimum cross sectional area required. (See Table 4 for area to diameter conversion.) For multiple equipment venting systems, divide the total BTU/hr. input for all appliances by 9,300 BTU/sq. in. This will give you the minimum vent pipe diameter needed for the common breach of the vent system.

As a rule of thumb, size the vent pipe to the outlet diameter of the heating equipment for a single appliance venting system. For multiple appliance venting systems, use the outlet diameter of the largest unit and add 50%.

Diagram A

Single Pipe System		Double Pipe System	
Allowable Inlet Temperature	Clearance (B)	Allowable Inlet Temperature	Clearance (A)
400°F or Less	3" min.	400°F or Less	.5" min.
550°F or Less	4" min.	550°F or Less	1" min.
550°F or Less	3" min.*	550°F or Less	.5" min.*

** With galvanized sheet metal liner or equivalent*



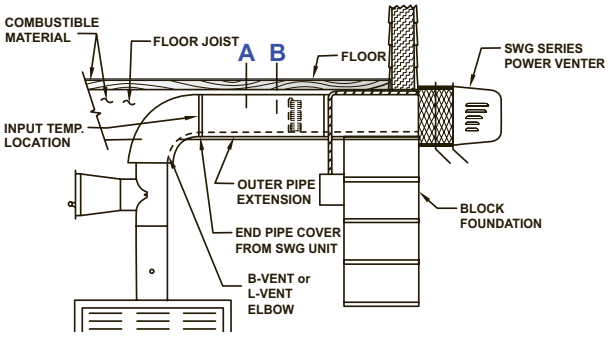


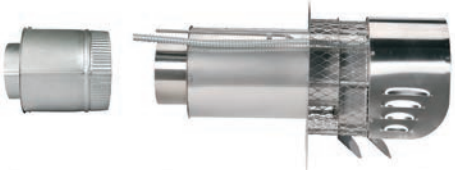
Table 4

Pipe Size	Nominal Cross-Sectional Area Sq. Inches
3"	7
4"	13
5"	20
6"	28
7"	38
8"	50
9"	64
10"	79
12"	113
14"	154

Extension Kits

The standard SWG Power Venter is designed for walls up to 8" thick. PEK extension kits allow the SWG to be installed in walls up to 16" thick.* The PEK kit includes the inner/outer pipe extension, air flow damper, and one foot of ¼" aluminum tubing. It is available for models SWG-4HD through SWG-8.

** PEK-4 allows the SWG to be installed in walls up to 12" thick.*



Power Venter Model	Extension Kit Model	Maximum Wall Thickness
SWG-4HD	PEK-4	12"
SWG-4HDS	PEK-4	12"
SWG-5	PEK-5	16"
SWG-5S	PEK-5	16"
SWG-6	PEK-6	16"
SWG-6S	PEK-6	16"
SWG-8	PEK-8	16"

Control Kit*

Control Kits (CK) control the operation of SWG/CV Power Venters. See the chart below to select the proper kit for your application. Control Kits can also control the operation of Field Draft Inducers.

Selecting the proper Control Kit for your application

		Model	Applications	Draft Proving Switch	Gas Pressure Switch	Secondary Safety Switch	Thermal Post Purge	Adjustable Electronic Post Purge	Fixed Post Purge	Draft Control	RJR-6
Oil		CK-61	All oil-fired systems. Has adjustable electronic post purge.	✓		✓		✓			✓
		CK-62	All oil-fired systems. Has thermally activated post purge.	✓		✓	✓				✓
		CK-63	All oil-fired systems. (May require optional delay oil valve for simultaneous burner operation.)	✓		✓		✓			
Gas	30 mv	CK-20FV	30 millivolt gas-fired water heaters and gas-fired pool or spa heaters with a manual or internally mounted thermostat.		✓	✓			✓		
		CK-21	Gas-fired instantaneous water heaters with pressure tap port in the burner manifold.		✓	✓					
	24 v	CK-41F CK-41P**	Furnaces, boilers, unit heaters and water heaters operating with a 24 VAC gas valve without factory mounted spillage switches.	✓		✓			✓		
		CK-43	Draft induced 24 VAC gas valve systems. Includes a 4" MG-1 draft control and post purge.	✓				✓		✓	
		CK-43F		✓					✓	✓	
	750 mv	CK-81***	750 millivolt operated boilers, furnaces, water heaters, pool or spa heaters and gas-fired fireplaces when operated with a remote mounted thermostat or on/off switch. Operated off a 24 VAC circuit.	✓					✓		
		CK-21	750 millivolt operated gas-fired appliances with pressure tap port in the burner manifold.		✓	✓					
	Co-venting Multiple Appliances	CK-91FV	Gas-fired draft induced 24 VAC gas valve systems and a 30 millivolt operated water heater. Includes a 4" MG-1 draft control and post purge.	✓	✓	✓			✓	✓	
		CK-92FV CK-92FVP**	Gas-fired furnace or boiler and a 30 millivolt operated water heater. Includes post purge.	✓	✓	✓			✓		

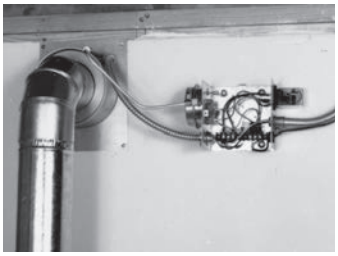
** Control Kits are ETL approved accessories when used in conjunction with the SWG Power Venter.*

*** Plugs into 24v electric damper*

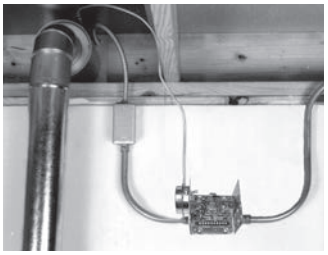
**** A secondary safety switch should be used with a CK-81*

F = Fixed Post Purge FV= right hand threaded TCA Safety Switch

Control Kit Installation



CK-62 mounted at venter. For use with a 24 VAC, gas-fired system (shown with cover off).



CK-63 remote mounted. For use with 120V or 24V oil or gas systems. Electronic post purge is included (shown with cover off).

NOTE: CK kits can be mounted up to 100 feet from venter.

SYSTEM SETUP:

Figure 1 shows a typical oil-fired appliance and the expected ranges of several readings taken at various locations in the system. Note: If a vent pipe reducer is required, use a smooth walled gradual reducer. Place it at the venter inlet as shown in Figure 1.

1. Set the choke plate in the power venter, or extension kit, to its full open position. Set the draft control adjustment weight to its midpoint position.

2. Adjust the thermostat so that the unit will run continuously. Allow the unit to operate for 5 to 10 minutes to ensure stack temperature stabilization.

3. Find out the manufacturer's recommended over-fire or breach draft. Close the choke plate on the SWG until the draft above the draft control reads approximately 0.04" w.c. greater than the recommended breach draft. Example: If the appliance manufacturer recommends a 0.02" breach draft, adjust the choke plate to get an approximate 0.06" draft above the draft control.

4. Adjust the barometric draft control to obtain the manufacturer's recommended draft over-fire or at the breach. The draft control gate should be open approximately half its full swing during normal operation. This allows the gate to swing open or closed depending on changes in atmospheric pressure or operating conditions.

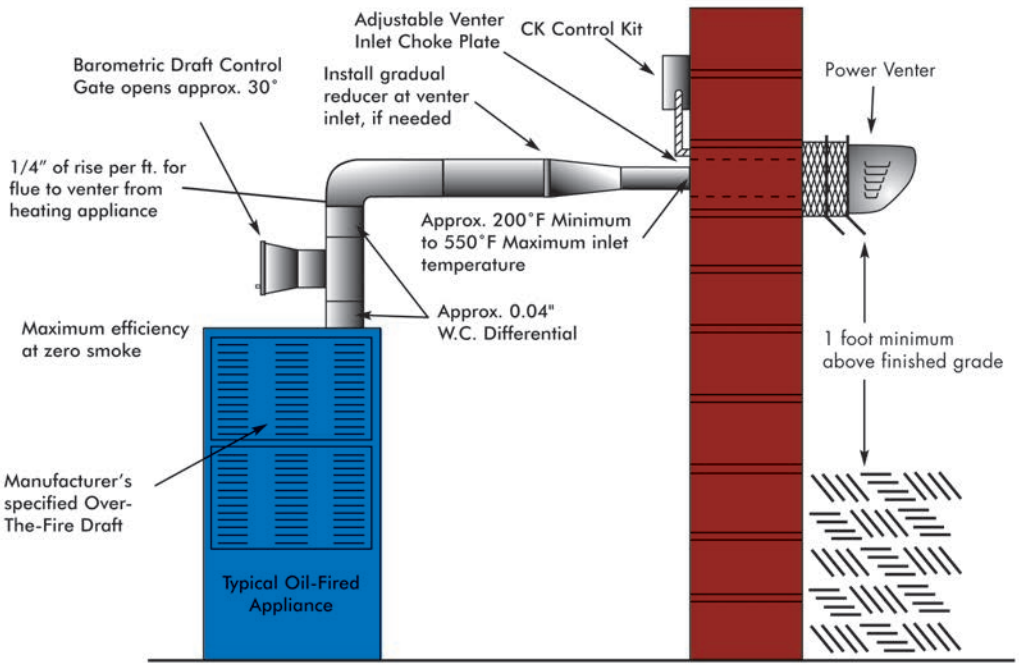
5. If the proper draft cannot be obtained at the breech or if the gate does not open as described, then adjust the choke plate in the SWG to reduce or increase the airflow. Re-adjust the draft control to obtain the required draft, since moving the choke plate will change the system draft.

Procedure for adjusting the pressure switch

- Turn pressure switch adjustment clockwise until the burner quits.
- Turn counterclockwise slowly until the burner starts.
- Turn an additional ¼ to ½ turn counterclockwise.

Note: Every installation will require unique pressure switch adjustment.

Figure 1



6. Once proper draft is achieved, measure CO_2 and smoke level. If necessary, adjust the intake airflow at the burner to obtain the highest possible CO_2 reading with a zero smoke reading. As the intake airflow is increased or decreased, the draft may change. Repeat steps 3 through 6 to re-adjust the draft control and choke plate before attempting any other adjustments.

7. Measure combustion efficiency and exhaust gas temperature at the venter inlet. Combustion efficiency should be adjusted to maximum attainable at zero smoke. Exhaust gas temperature at the venter inlet should range between 200°F and 550°F.

8. If maximum efficiency and zero smoke yields a temperature below 200°F at the inlet to the venter, the following suggestions must be considered.
   A. Use a larger oil nozzle or higher oil pump pressure to raise the firing rate of the burner. Repeat steps 3 through 7 until all combustion parameters are within the specified ranges.
   B. Reduce the length of the duct from the appliance to the venter which will increase the venter inlet temperature.
   C. Insulate the vent pipe to minimize heat loss.
   D. Seal the vent pipe joints to reduce uncontrolled dilution air.

TESTING:

1. The thermostat (wall thermostat, or aquastat) calls for heat, starting venter motor.

2. After the venter motor has come up to speed, the pressure switch closes. This closes the circuit to the burner and allows the burner to operate. This occurs in approximately 1 to 2 seconds.

3. After the heating requirement is satisfied, the thermostat circuit opens and deactivates the burner and power venter circuit.

4. Oil venting systems require a post purge device. During the post purge cycle, the venter operates for a period after the burner has shut off. This is to purge the remaining flue gases and to cool the combustion chamber. Typical post purge times are 3 to 5 minutes. Longer purge times may be required depending on system installation.

ANNUAL MAINTENANCE:

1. Motor: Inspect the motor once a year; it should rotate freely. To prolong the life of the motor, lubricate with six drops of SWG Super Lube, Part #46226200, annually. Use of any other type of lubricant may cause premature motor failure. ***Note:*** *Permanently-lubricated electric motors with sealed, lubricated bearings should not be oiled. Doing so may damage the motor.*

SWG Super Lube

- Oil motor and fan shaft with SWG Super Lube annually
- Works in conditions of -40° to 300° (F)
- Synthetic lubricant which maintains specified viscosity
- Use of any other lubricant may cause premature failure

2. Wheel: Inspect the venter wheel annually to clear any soot, ash, or coating which inhibits either rotation or air flow. Remove all foreign materials before operating.

3. Vent System: Inspect all vent connections annually for looseness, for evidence of corrosion, and for flue gas leakage. Replace, seal or tighten pipe connections if necessary. Check the venter choke plate to ensure it is secured in place. Check the barometric draft control to ensure the gate swings freely.

4. System Safety Devices: With the heating system operating, disconnect the pressure sensing tube from the pressure switch on the CK Kit. This should stop the burner operation. Re-connecting the tube should relight the burner.