



TJERNLUND PRODUCTS, INC.

1601 Ninth Street • White Bear Lake, MN 55110-6794
 PHONE (800) 255-4208 • (651) 426-2993 • FAX (651) 426-9547
 Visit our web site • www.tjernlund.com

side wall vent ~~systems~~

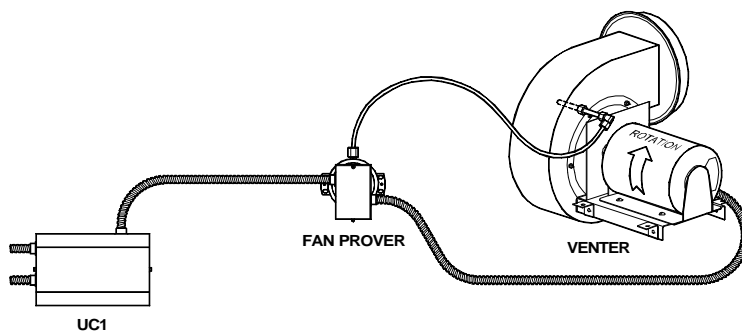
FOR NATURAL GAS OR LP

MODELS

HS3

HS4

HS5



**INCLUDES NEW UC1
UNIVERSAL CONTROL**

OWNER INSTRUCTIONS, DO NOT DESTROY

▲ Recognize this symbol as an indication of important Safety Information!

NOTE: FLUE GAS TEMPERATURES MUST NOT EXCEED
600°F AT VENT SYSTEM INLET.

▲ WARNING

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

**DO NOT DESTROY. PLEASE READ CAREFULLY AND KEEP
IN A SAFE PLACE ON JOB SITE FOR FUTURE REFERENCE.**

Address all correspondence to:

Customer Service • Tjernlund Products, Inc. • 1601 Ninth Street • White Bear Lake, MN 55110-6794

Call us toll free at 800-255-4208, visit our web site @ www.tjernlund.com or email us at fanmail@tjfans.com.

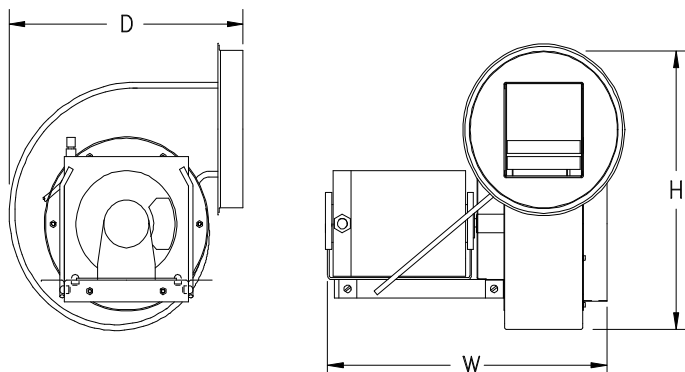
TABLE OF CONTENTS

	PAGE(S)
HS3,4,5 DESCRIPTION	1
HS3,4,5 SIZING, MODEL SELECTION & SPECIFICATIONS	1-2
INSTALLATION RESTRICTIONS.....	3
INSTALLER CAUTIONS	3
UC1 UNIVERSAL CONTROL BOARD FEATURES	4
LED STATUS & FAULT INDICATORS	4
PRE / POST-PURGE & PROVER STATUS CHECK SETTINGS.....	5
VENT HOOD LOCATION	6
POWER VENTER MOUNTING	6
VENT PIPE INSTALLATION	7
UC1 AND FAN PROVING SWITCH INSTALLATION	7-8
WIRING	8
WARNINGS, SEQUENCE OF OPERATION & INTERNAL SCHEMATIC	8-9
WIRING CONNECTIONS FROM UC1 TO FAN PROVER AND MOTOR	9
MULTIPLE OR MILLIVOLT APPLIANCE INTERLOCKS	9
WIRING DIAGRAMS WITH A SINGLE GAS APPLIANCE	10-12
UC1 OPERATION CHECK, DRAFT ADJUSTMENT AND COMBUSTION AIR.....	12-13
MAINTENANCE	14
TROUBLESHOOTING	14-15
WARRANTY & REPLACEMENT PARTS	15

DESCRIPTION

The Tjernlund Power Venter models HS3, HS4 and HS5 are designed to Side Wall or Vertically vent Natural and LP Gas appliances. After each burner cycle the Venter will continue to operate in post-purge mode to purge the heater and vent of residual flue gases. A factory post-purge time is set at 2 minutes and is adjustable up to 16 minutes, see "Pre / Post-purge Settings" on page 5. The Venter features a safety system consisting of the integral UC1 Universal Control and a Fan Proving Switch. These devices monitor the Venter's performance and will interrupt the main burner if a venting malfunction is detected.

VENTER SPECIFICATIONS



UNIT DIMENSIONS (IN)				
MODEL	(H) HEIGHT	(W) WIDTH	(D) DEPTH	INLET/OUTLET
HS3	12 1/2"	13 1/4"	11"	8"
HS4	14 3/4"	15 1/4"	13"	8"
HS5	18"	16 1/2"	16 1/2"	10"

VENTER SIZING

The installer must verify that the Power Venter is sized properly using the selection table on page 2. The installer may reduce the vent pipe diameter to the size shown in the selection table immediately after the draft hood, draft diverter or barometric draft control. The vent pipe length shown includes all vent pipe before and after the Power Venter. To calculate the equivalent vent pipe length, add the straight vent pipe plus 10 feet for every 90 degree elbow and 5 feet for every 45 degree elbow.

If venting multiple appliances with one Power Venter, the total combined BTU/hr. input of all appliances must be added together to size the Power Venter.

IMPORTANT: Elbows placed directly after discharge on Power Venter may cause erratic operation of Fan Prover. If elbows are necessary on discharge, allow for a straight section of pipe 3 times the vent diameter being used before installing an elbow.

MODEL SELECTION TABLE AND MOTOR SPECIFICATIONS

MODEL NUMBERS	VENT PIPE DIA.	BTU/HR INPUT	MAXIMUM PIPE LENGTH (FT) AT STACK TEMP			
			100% DILUTION, 300°F	25% DILUTION, 400°F		
			GAS FIRED ATMOSPHERIC WITH DRAFT HOOD OR DRAFT DIVERTER	GAS FIRED POWER BURNER WITH BAROMETRIC DRAFT CONTROL		
HS3 115 VAC 1/4 HP 2.7 AMP	8"	450,000 500,000 600,000 700,000	100' 100' 100' 7'	100' 100' 100' 100'		
	10"	450,000 500,000 600,000 700,000	100' 100' 100' 21'	100' 100' 100' 100'		
HS4 115 VAC 1/3 HP 5.8 AMP	8"	700,000 800,000 900,000 1,000,000 1,100,000 1,200,000	100' 100' 100' 70' 32' 5'	100' 100' 100' 100' 100' 100'		
		10"	700,000 800,000 900,000 1,000,000 1,100,000 1,200,000	100' 100' 100' 100' 97' 14'	100' 100' 100' 100' 100' 100'	
			12"	700,000 800,000 900,000 1,000,000 1,100,000 1,200,000	100' 100' 100' 100' 100' 34'	100' 100' 100' 100' 100' 100'
				10"	1,200,000 1,400,000 1,600,000 1,825,000	100' 100' 100' 29'
	12"				1,200,000 1,400,000 1,600,000 1,825,000	100' 100' 100' 72'
		14"			1,200,000 1,400,000 1,600,000 1,825,000	100' 100' 100' 100'

UC1 UNIVERSAL CONTROL SPECIFICATIONS

POWER REQUIREMENTS	T-BLOCK L / N	120 VAC ±10 %, 50/60 Hz CIRCUIT PROTECTION PROVIDED BY INSTALLER
ADD VENTER MOTOR LOAD PLUS 1/2 AMP FOR UC1 LOAD	XL / XN	150 mA MAX @ 120 VAC, 50/60 Hz CAN ONLY BE CONNECTED TO TJERNLUND-SPECIFIED AUXILIARY DEVICE
	UC1 CONTROL	DURING OPERATION THE CONTROL USES 50 mA MAX @ 120 VAC
	M & MTR (RELAY K2)	MOTOR - 1 H.P. MAX. @ 120 VAC, 50/60 Hz GENERAL PURPOSE - 15A @ 120 VAC, 50/60 Hz
EXTERNAL POWER SWITCHING CAPACITY	T-BLOCK 3 TO 4 (RELAY K1)	MOTOR - 1 H.P. MAX. @ 120 VAC, 50/60 Hz GENERAL PURPOSE - 15A @ 120 VAC, 50/60 Hz RESISTIVE - 10A @ 28 VDC PILOT DUTY - 470 VA
EXTERNAL CALL TRIGGER METHODS	T-BLOCK A / B	USER-PROVIDED CONTACT CLOSURE FROM A TO B. SIZE CONTACT CLOSURE TO HANDLE 3 mA @ 5 VDC. MOVE RED VOLTAGE JUMPER TO "DRY" LOCATION. DO NOT SUPPLY POWER.
	OR 24V 1 / 2	USER-PROVIDED 24 VAC AT TERMINALS 1 & 2. 1 = CALL HOT, 2 = COMMON. CONTROL REQUIRES 5 mA @ 24 VAC TO TRIGGER. MOVE RED VOLTAGE JUMPER TO "24V" LOCATION.
	OR 115V 1 / 2	USER-PROVIDED 115 VAC AT TERMINALS 1 & 2. 1 = CALL LINE, 2 = NEUTRAL. CONTROL REQUIRES 1 mA @ 115 VAC TO TRIGGER. MOVE RED VOLTAGE JUMPER TO "115V" LOCATION.
J1 / J2 JUMPER	J1 / J2	USED TO JUMP CALL HOT (24 VAC) OR CALL LINE (115 VAC) FROM TERMINAL 1 TO TERMINAL 3. REMOVE J1-J2 JUMPER IF A DIFFERENT VOLTAGE SOURCE IS PROVIDED TO TERMINAL 3.
SAFETY CIRCUIT	P1 / P2	CONNECTED TO FAN PROVER. 1 mA @ 5 VDC. DO NOT SUPPLY POWER HERE.

INSTALLATION RESTRICTIONS

1. The Power Venter may only be installed on Natural Gas or LP Gas appliances.
2. The Power Venter may not be installed on incinerators, incinerating toilets, condensing-type appliances or solid-fuel burning appliances.
3. The Power Venter shall not be installed on an appliance with an automatic valve having a manual opener unless the manual opener has been rendered inoperative or the automatic valve has been replaced with a valve not equipped with a manual opener.
4. The Power Venter may only be installed on an appliance equipped with a draft hood, draft diverter or barometric draft control.
5. The Power Venter shall not be installed where the flue gas temperature exceeds 600^o F. at the Power Venter inlet. Flue gas temperature verification:
 - A) Consult appliance manufacturer for flue gas temperature after dilution by the draft hood, draft diverter or barometric draft control.
 - B) Measure flue gas temperature at the Power Venter inlet after installation. Temperature should be measured after appliance and Power Venter have operated for at least 15 minutes, allowing the flue gas temperature to stabilize.
6. The Power Venter must be mounted so that the shaft of the motor remains horizontal to prevent motor bearing wear.
7. Fan Proving Switch must be mounted with diaphragm in a vertical position. Do not mount the Fan Proving Switch on a heat source that exceeds 140^oF. Examples of improper mounting surfaces include vent pipe, venter, top of heater casing or any place where radiant or convective heat would exceed 140^oF.
8. Ambient temperature surrounding Power Venter must not exceed 104^o F.
9. The UC1 is intended for indoor installation only. Do not mount the UC1 junction box on a heat source that exceeds 140^oF. Examples of improper mounting surfaces include vent pipe, top of heater casing or any place where radiant or convective heat would cause the junction box temperature to exceed 140^oF.

INSTALLER CAUTIONS

WARNING

The Power Venter must be installed by a qualified installer in accordance with these instructions and all local codes or in their absence in accordance with the latest edition of The National Fuel Gas Code (NFPA #54), The latest edition of the National Electrical Code (NFPA#70) and the Occupational Safety and Health Act (OSHA) when applicable. Improper installation can create a hazardous condition such as an explosion, fire, electrical shock or carbon monoxide poisoning resulting in property damage, personal injury or death.

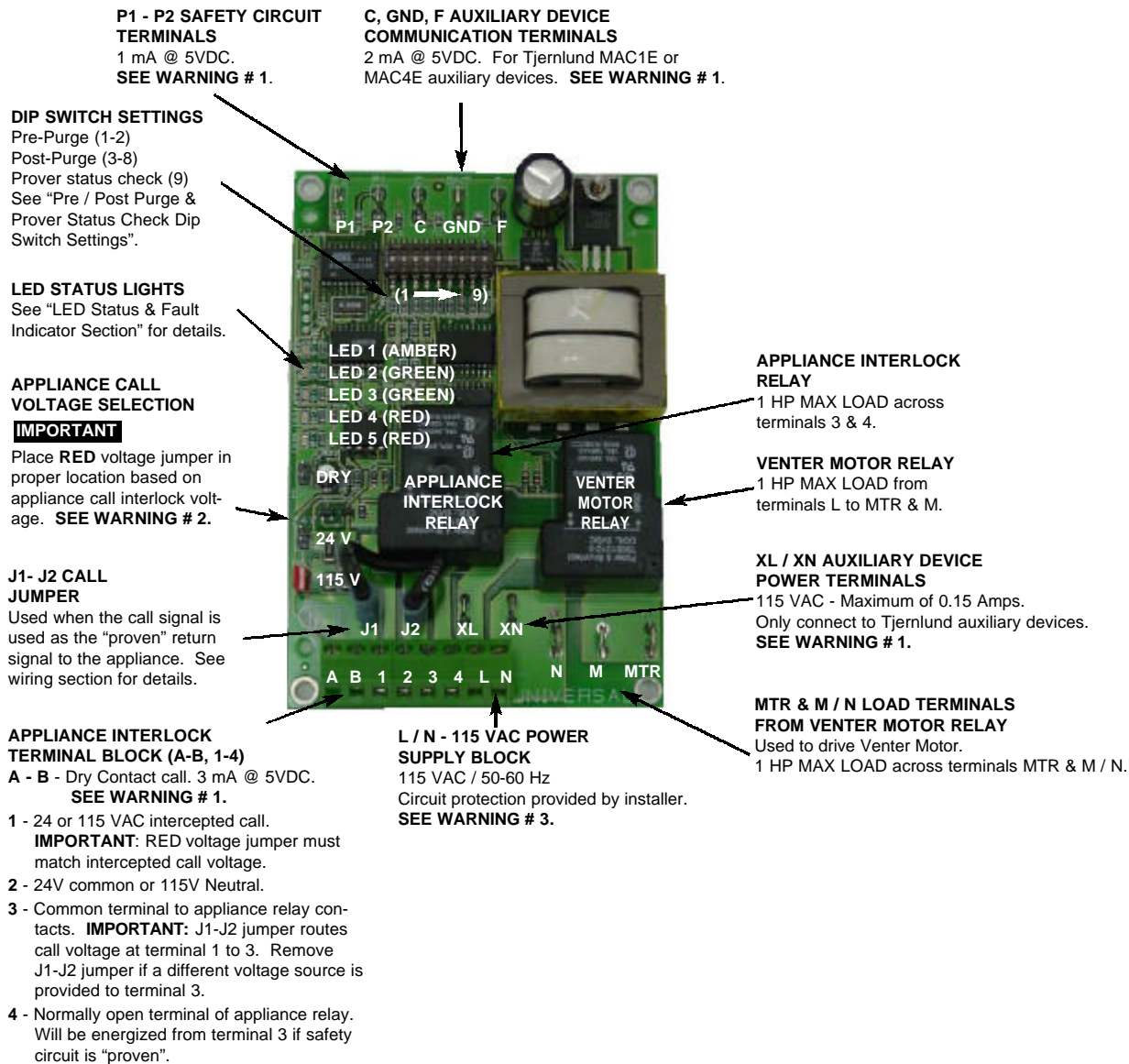
Failure to install, maintain and/or operate the Power Venter in accordance with manufacturer's instructions may result in conditions which can produce bodily injury and property damage.

WARNING

Disconnect the power supply from UC1 and heating equipment when making wiring connections or when working around the fan wheel and motor. Failure to do so can result in electrical shock, personal injury, death or property damage.

1. The Fan Prover must be wired with the appliance so as to prevent the main burner(s) from firing if the Power Venter malfunctions or the flue is blocked. It is not safe to use the Power Venter as is on millivolt appliances, such as water heaters which employ a combination gas valve/temperature controller, since the Fan Prover can not be wired as described in this manual. Millivolt appliances require additional interlock controls such as our WHKE kit. See millivolt wiring diagram in this manual for more details.
2. Plan the vent system so that the code required clearances are maintained from plumbing and wiring.
3. To prevent personal injury and equipment damage, disconnect power supply when working on Power Venter.
4. Make certain the power supply is adequate for Power Venter motor requirements. Do not add the Power Venter to a circuit where the total load is unknown.
5. The installer must verify that the appliance on which the Power Venter will be installed is in a safe operating condition. Consult appliance manufacturer's Instructions for details.
6. Plan the vent system layout so that the Power Venter is as close to the point of termination as possible. Vent pipe between the Power Venter and Vent Hood is acceptable. However, all vent pipe connections after the Power Venter discharge will be under positive pressure during operation and must be sealed with high-temperature caulk or aluminum vent pipe tape to prevent flue gas leakage into the structure.

UC1 UNIVERSAL CONTROL BOARD FEATURES



WARNING

- # 1. Power supplied by board. Do not supply power to this area or control damage may result.
- # 2. Do not supply power to the appliance interlock block with the call selector in the "DRY" position. Control damage may result if power is supplied.
- # 3. Circuit protection must be provided by the installer. 16 Amps is the maximum current allowed for this device at terminal L. A 15 Amp circuit breaker is recommended.

LED STATUS & FAULT INDICATORS

LED INDICATOR LIGHTS

- LED #1 (Amber) Appliance call for heat.
- LED #2 (Green) Safety circuit through P1 & P2 (Venter Fan Prover) is verified "Open" upon start-up. Burner circuit is energized with contact closure from terminal 3 to 4. Also verifies Venter prover is closed during run cycle.
- LED #3 (Green) Power switched to Venter motor from L to MTR & M.
- LED #4 (Red) Status indicator.
- LED #5 (Red) 115 VAC power supplied to board. Also used as status indicator.

LED INDICATOR LIGHT STATUS & FAULTS

- LED #4 & #5 Flashing Alternately = Prover start up fault. Venter Prover contacts "Closed" across P1 & P2 upon appliance call before Venter is turned on. Prover status check **must** be activated, see page 5.
- LED #4 & #5 Flashing in Unison = Fan Prover circuit is "Open" longer than 60 seconds on start-up or 10 seconds during run cycle. Venter Prover contacts are not staying "Closed" across P1 & P2 safety circuit.
- LED #4 Flashing & #5 on Continuous = System in Pre-Purge. (Pre-Purge options 0, 15, 30, 60 seconds)
- LED #5 Flashing & #4 on Continuous = System in Post-Purge. (Post-Purge options 0, 30 seconds or 1, 2, 4, 8, 16 minutes)
- IMPORTANT:** To reset faults, verify fault by checking the LEDs and then remove call for heat.

PRE / POST PURGE AND PROVER STATUS CHECK DIP SWITCH SETTINGS

⚠ WARNING

Remove power to UC1 and heating equipment when installing, servicing or changing dip switch settings. Failure to do so may result in personal injury and/or equipment damage. LED #5 (RED) should not be on if 115 VAC supply power is removed from the control.

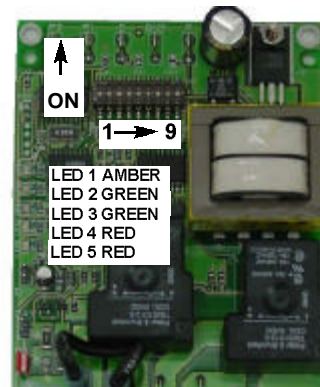
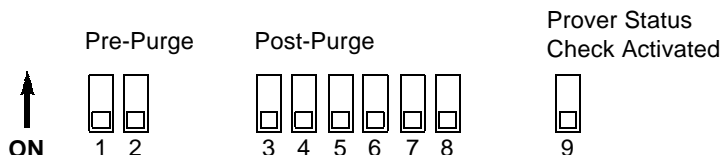
Pre-purge

Used for a Venter with longer vent runs to get draft fully established throughout the vent system prior to burner ignition. Also beneficial for negative pressure prone environments. **IMPORTANT:** Pre-purge settings must be shorter than flame sensor lockout time unless wired prior to flame sensor (i.e. aquastat / thermostat).

Post-purge

A Venter post-purge has been factory set at 2 minutes. Confirm that dip switch #5 is in the up or "on" position. A longer post-purge may be necessary for longer vent runs or high heat retention, refractory lined combustion chambers. A shorter post-purge may be desired for shorter vent runs or when using the UC1 to control a combustion air In-Forcer.

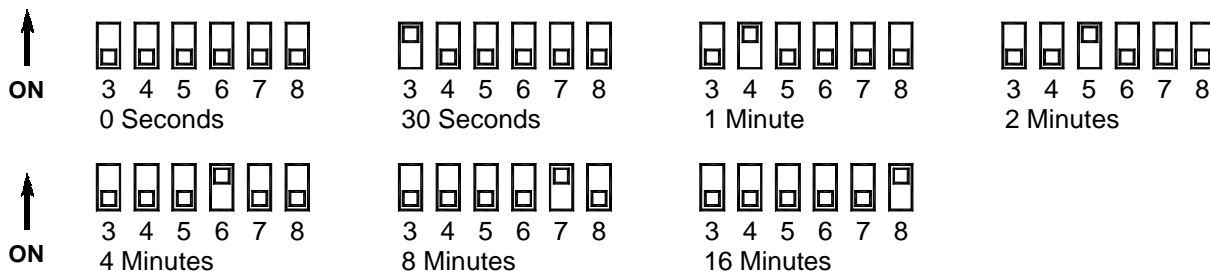
DIP SWITCH NUMBERING



PRE-PURGE SETTINGS



POST-PURGE SETTINGS



P1 & P2 FAN PROVER SAFETY CIRCUIT "OPEN" UPON APPLIANCE CALL

Prover Status Check Activated The Prover Status Check is activated from the factory. When activated the UC1 Universal Control checks across P1 & P2 safety circuit (Venter Fan Prover) to verify that the Fan Prover switch is "Open" upon a call for heat and not stuck "Closed". **IMPORTANT: This must always be in the down "Activated" position when side wall venting.**

VENT HOOD LOCATION

This section only applies if using a Power Venter to Sidewall vent. If using Power Venter to exhaust the flue gases vertically, skip to the section titled "POWER VENTER MOUNTING" below.

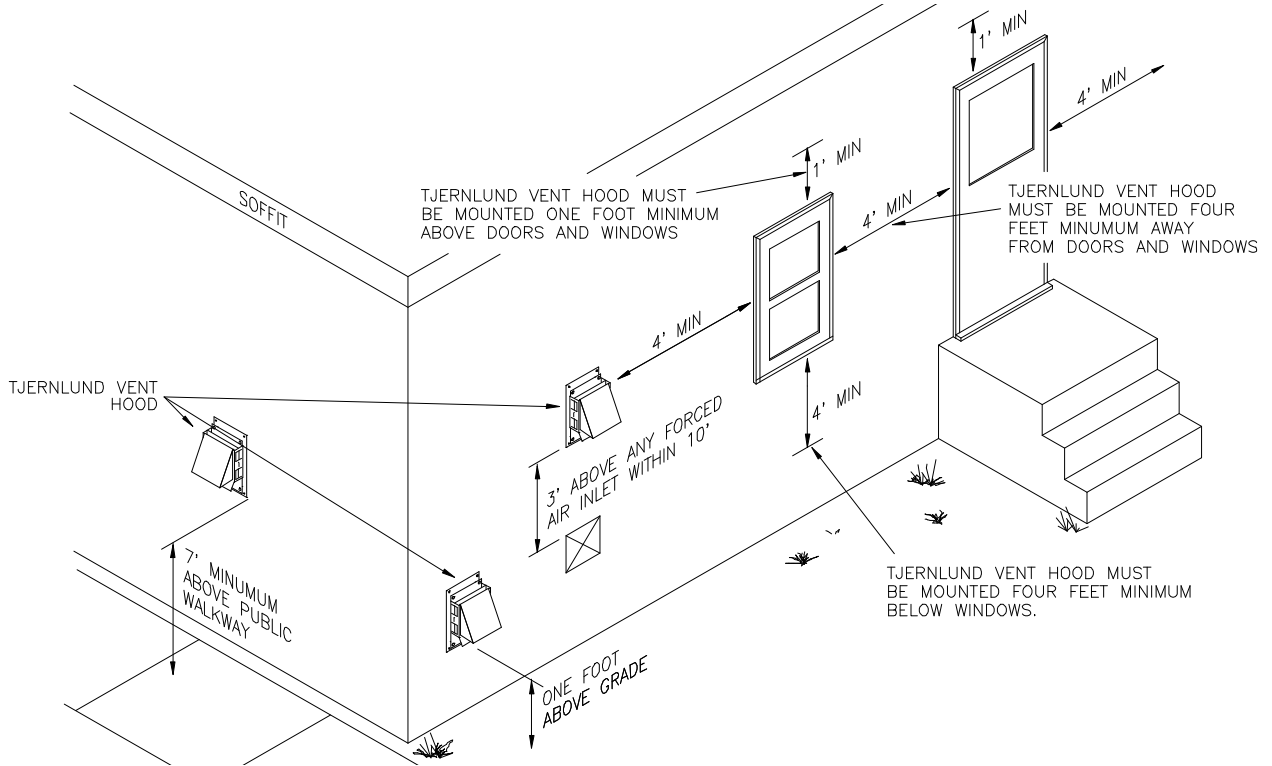
If possible, locate the Vent Hood on a wall that does not face the direction of prevailing winds. This will diminish the possibility of appliance interruption during periods of extreme winds.

If possible, locate the Vent Hood no closer than 3 feet from an inside corner of an L-shaped structure.

CODE REQUIREMENTS

Terminate the vent system so that proper minimum clearances are maintained as cited in the latest edition of the National Fuel Gas Code (NFPA # 54) and the latest edition of Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances, (NFPA #211), or as follows:

- Not be less than 7 feet above grade when located adjacent to public walk ways.
- At least 3 feet above any forced air inlet located within 10 feet.
- At least 4 feet below, 4 feet horizontally from or 1 foot above any door, window or gravity air inlet into any building.
- At least 1 foot above grade.
- So that the flue gases are not directed so as to jeopardize people, overheat combustible structures or enter buildings, and
- Not less than 2 feet from an adjacent building.

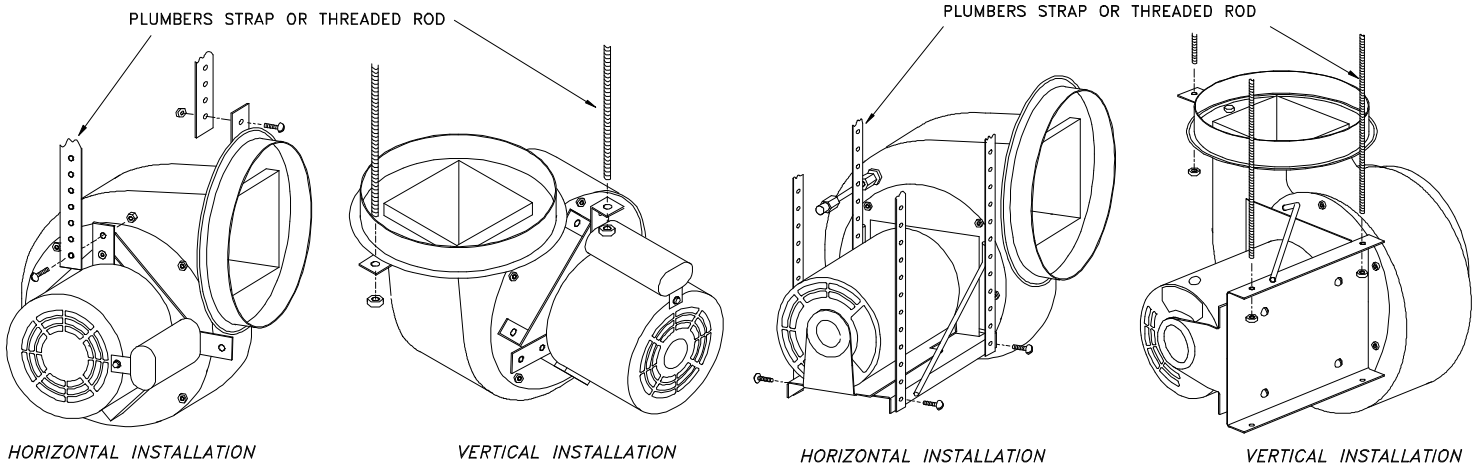


POWER VENTER MOUNTING

The installer must supply plumber's strap or 1/4" threaded rod with nuts and washers for mounting. The Power Venter may be mounted in any position as long as the shaft of the motor remains horizontal. The Power Venter housing is single wall, 6 inches must be maintained from all combustible materials. It is recommended that the Power Venter be mounted as close as possible to the point of termination.

HS3

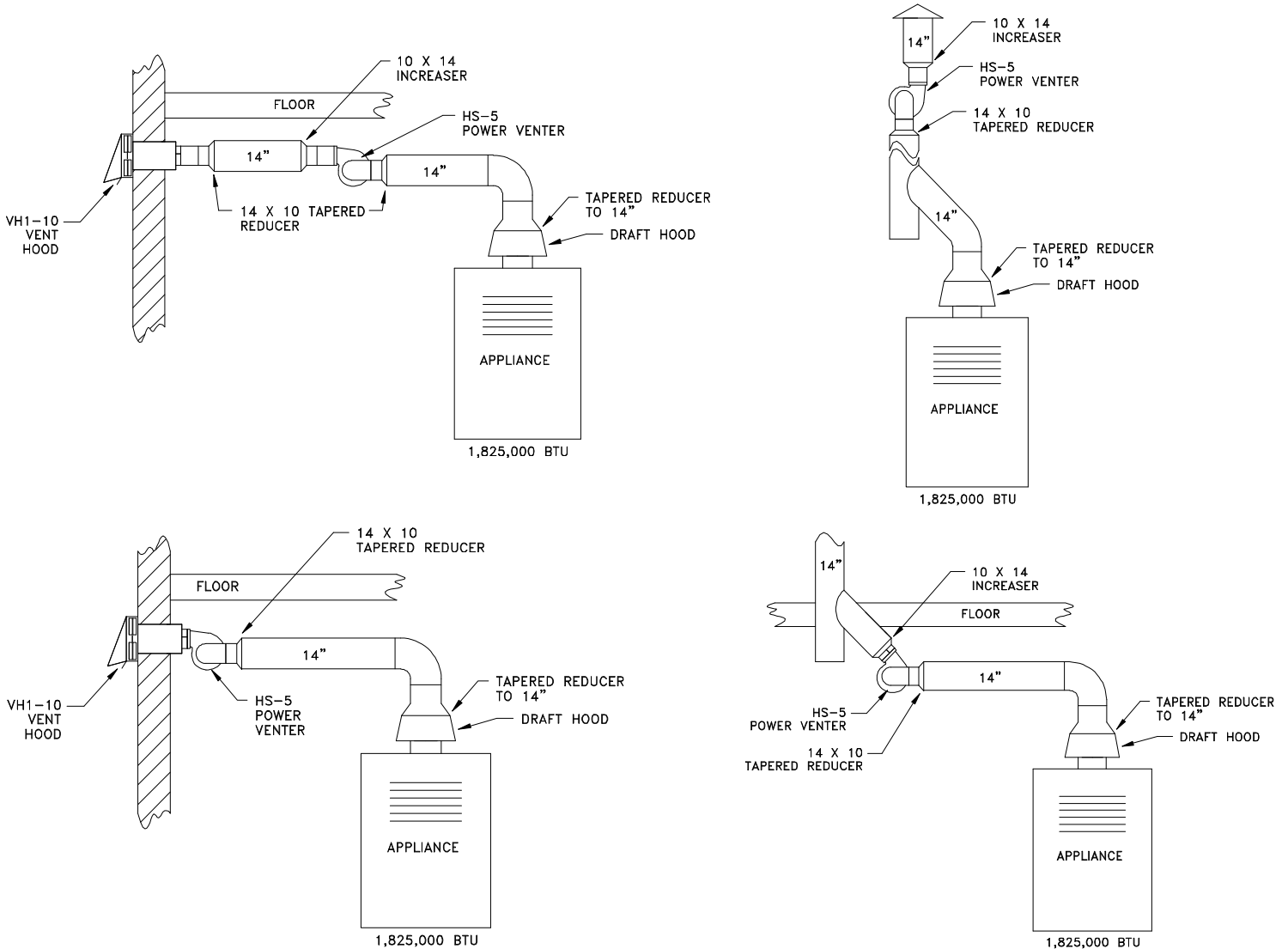
HS4, HS5



VENT PIPE INSTALLATION

If installing the Power Venter on an appliance not equipped with a draft hood or draft diverter (e.g. Power Burners, Induced Draft), a barometric draft control must be added. The barometric draft control must be the same size as the flue outlet and installed as close as possible to the appliance. After the draft hood, draft diverter or barometric draft control, a tapered reducer should be installed to reduce the flue to the size shown in the selection table on page 2 of these instructions. After the tapered reducer, install the appropriate type of vent pipe to the inlet of the Power Venter. The vent pipe chosen must be in compliance with local codes. The Power Venter inlet and outlet are designed to accept single wall vent pipe. If using vent pipe other than single wall, the installer must supply adapters to connect to the Power Venter. While it is recommended that the Power Venter be mounted at the point of termination, it is acceptable to install vent pipe between the outlet of the Power Venter and the point of termination. The Installer must seal all vent pipe connections after the Power Venter with high-temperature caulk or aluminum vent pipe tape to prevent flue gas leakage during operation. The size of the vent pipe between the Power Venter and point of termination should be the same size shown on the selection table. Support the vent pipe as recommended by its manufacturer. Examples of proper vent pipe installation are shown below.

IMPORTANT: Elbows placed directly after discharge on Power Venter may cause erratic operation of Fan Prover. If elbows are necessary on discharge, allow for a straight section of pipe 3 times the vent diameter being used before installing an elbow.



UC1 AND FAN PROVER SWITCH INSTALLATION

Do not mount the UC1 junction box on a heat source that exceeds 140°F. Examples of improper mounting surfaces include vent pipe, top of heater casing or any place where radiant or convective heat would cause the junction box temperature to exceed 140°F.

The UC1 is intended for indoor installation only.

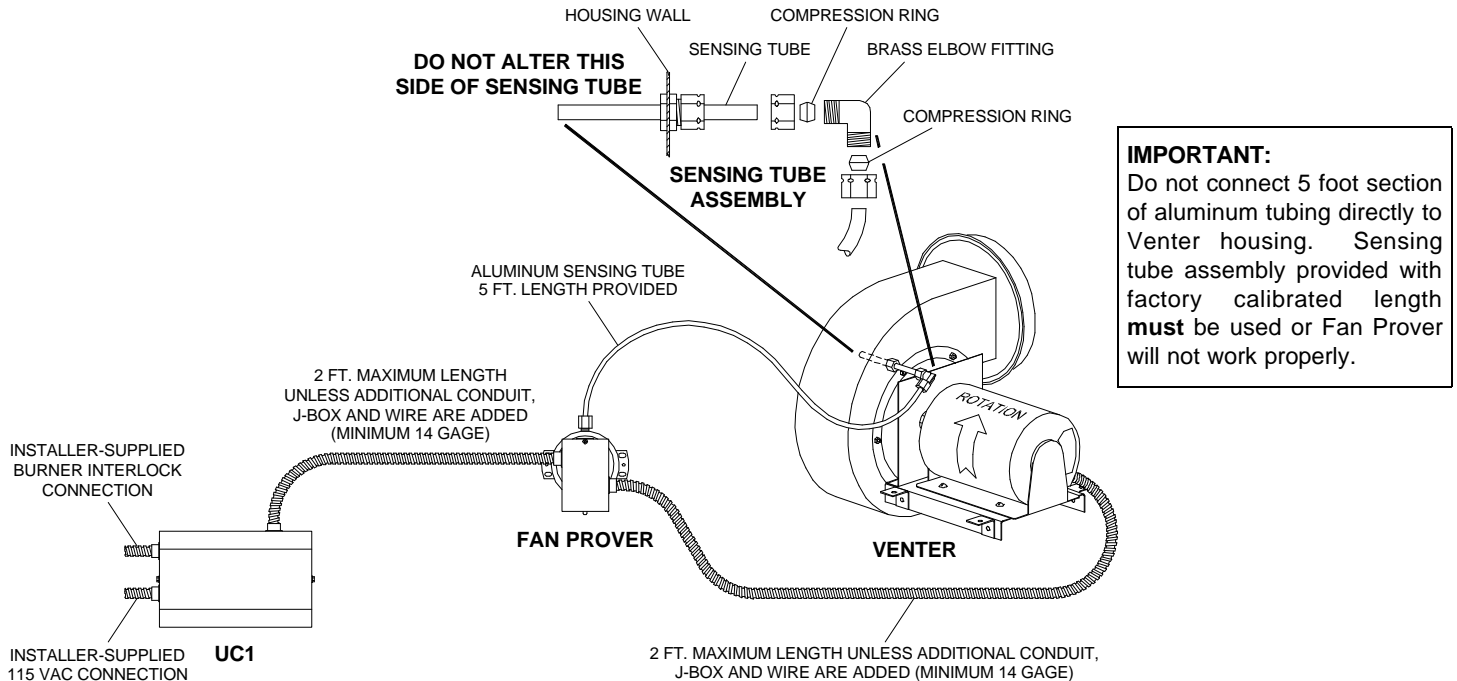
Using the key hole slots on the back of the UC1 junction box as a template, mark 4 holes on the mounting surface, drill pilot holes if necessary, and secure junction box using provided screws.

The UC1 has a 2 foot whip that contains a ground lead and the leads to power the Venter motor and connect to the Fan Prover. If it is desirable to mount the UC1 more than 2 feet from the Fan Proving Switch an additional electrical junction box and appropriate length of conduit will be necessary. Any added wire should be 14 gage and a pig tail should be added to each ground wire connection so that each electrical junction box is grounded. See diagram on page 8 for a typical UC1, Fan Prover and Venter installation.

IMPORTANT: The Fan Proving Switch must be mounted so the diaphragm is in a vertical position.

1. Mount Fan Prover in a vertical position within 4 feet of the Power Venter so 5 foot sensing tube can be trimmed if necessary. Do not mount the Fan Proving Switch on a heat source that exceeds 140°F. Examples of improper mounting surfaces include vent pipe, venter, top of heater casing or any place where radiant or convective heat would exceed 140°F.
2. Connect the 1/4" aluminum tubing from the Fan Proving Switch to the Power Venter housing using supplied fittings. The factory calibrated sensing tube length and compression fittings are critical for proper operation of the Fan Proving Switch. If it is necessary to alter the sensing tube length, **ONLY** trim sensing tube portion that is on the exterior of the housing. **IMPORTANT: DO NOT** trim the sensing tube portion that will be mounted in the interior of the housing because Fan Prover will not sense the proper pressure. **Sensing tube assembly with factory calibrated length must be used for Fan Prover to work properly!**

TYPICAL UC1, FAN PROVER AND VENTER INSTALLATION



IMPORTANT: As viewed from the opposite end of the shaft (rear of motor), the motor should rotate clockwise.

WIRING

WARNING

All wiring from the Power Venter to the appliance must be in compliance with the local codes or in their absence, the National Electric Code (NFPA #70).

All wiring from the Power Venter to the appliance must be appropriate class 1 wiring as follows: Installed in rigid metal conduit, intermediate metal conduit, rigid non-metallic conduit, electrical metallic tubing, Type MI Cable or be otherwise suitably protected from physical damage.

SEQUENCE OF OPERATION WITH UC1 UNIVERSAL CONTROL AND 24 VAC OR 115 VAC HEATER CONTROL CIRCUIT:

Control signal from thermostat, aquastat, power burner or gas valve is intercepted and routed to terminal "1" on UC1 terminal strip. When terminal "1" is energized with either 24 VAC or 115 VAC, the Venter motor is energized. After draft is established, the Fan Proving Switch closes within 5 to 10 seconds energizing terminal "4", which completes the circuit allowing burner to fire. **NOTE:** If a Venter pre-purge is selected, the burner will not fire until the pre-purge time is finished. The Venter will continue to run after the burner has finished firing for the set post-purge time cycle. The UC1 is set for a 2 minute post-purge time period from the factory. See "Pre / Post-Purge Settings" on page 5 for details.

The "1" input terminal on the UC1 can accept either a 24 VAC or 115 VAC control signal. IMPORTANT: The RED voltage jumper must be positioned based on appliance interlock voltage. For most furnace applications it may be easier to interlock with the 24 VAC thermostat circuit. For most boiler applications it may be easiest to interlock with the 115 VAC aquastat or burner motor circuit. Choose the interlock method that best fits your application. If using the "DRY" contact activation method, use terminals A & B on UC1 control and position the RED voltage jumper tab in the "DRY" position. See millivolt appliance interlock diagram for further information.

The steps listed under each diagram are intended as a supplement to the diagram. Wiring colors or designations may vary by manufacturer. If you are unable to wire the UC1 as outlined in these instructions, call Tjernlund's Customer Service Department toll free at 1-800-255-4208 for assistance.

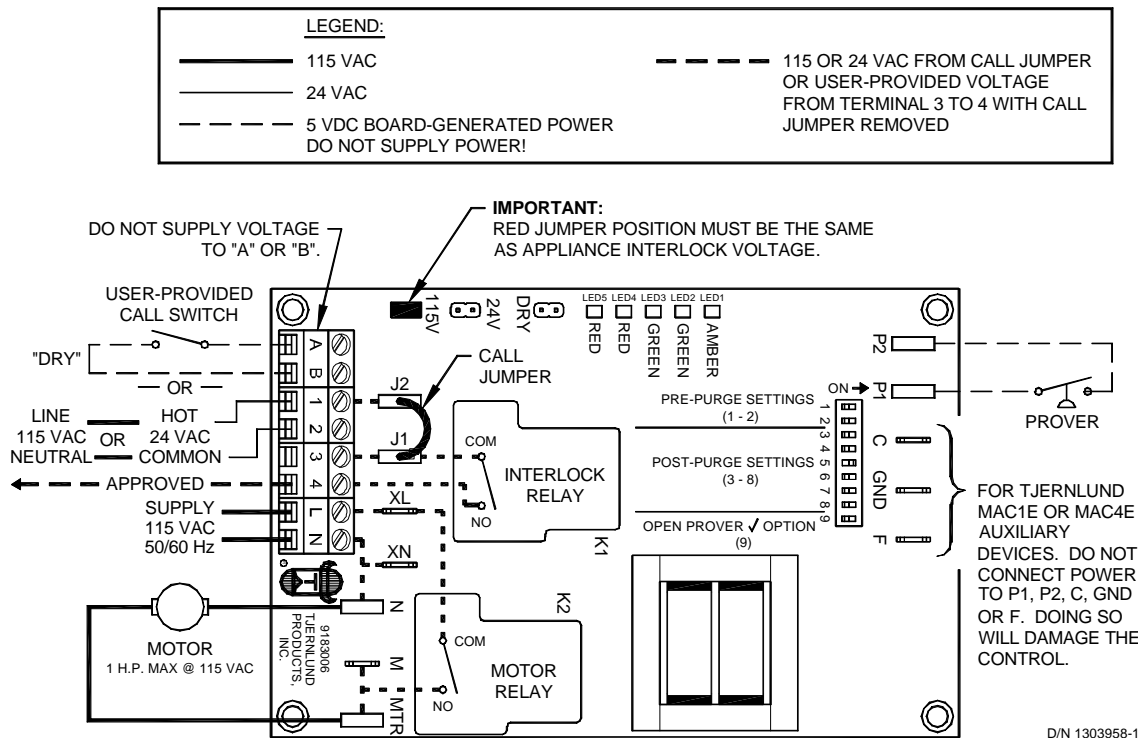
IMPORTANT: To reset faults, verify fault by checking the LEDs and then remove call for heat.

WIRING CONNECTIONS FROM UC1 UNIVERSAL CONTROL AND MOTOR MADE IN FAN PROVER JUNCTION BOX

The UC1 has a 2 foot whip that contains a ground lead and the leads to power the Venter motor and connect to the Fan Prover. If it is desirable to mount the UC1 more than 2 feet from the Fan Proving Switch an additional electrical junction box and appropriate length of conduit will be necessary. Any added wire should be 14 gage and a pig tail should be added to each ground wire connection so that each electrical junction box is grounded. See diagram on page 8 for a typical UC1, Fan Prover and Venter installation.

UC1 UNIVERSAL CONTROL WIRING SCHEMATIC

The Ground lead, Venter motor and Fan Prover leads are factory connected to the UC1 circuit board. Venter Ground, motor and Fan Prover wiring connections are made at the free end of the 2 foot whip. Motor should be factory wired for proper rotation. As viewed from the opposite end of the shaft (rear of motor), the motor should rotate clockwise. See motor nameplate for proper rotation.



WARNING: Disconnect power supply from the UC1 and heating equipment when making wiring connections and servicing the Venter. Failure to do so may result in personal injury and/or equipment damage. LED #5 (RED) should be off with power removed.

WIIRING CONNECTIONS FROM UC1 TO FAN PROVER AND VENTER MOTOR

MODELS HS4 & HS5 (ONLY)

Connect Black and White motor ring terminal leads to ring terminal studs on motor. Connect Ground Lead to ground screw on motor.

IMPORTANT: Motor should be factory wired for proper rotation. As viewed from the opposite end of the shaft (rear of motor), the motor should rotate clockwise. See motor nameplate for proper rotation.

ALL MODELS (See diagram on page 8 for typical installation)

1. Connect ground wire from UC1 whip and Venter motor ground wire to ground screw in Fan Prover junction box.
2. Connect Black and White motor leads from UC1 whip to Venter motor leads in Fan Prover junction box.
3. Connect Blue and Yellow leads from UC1 whip to Fan Prover switch terminals. Leads are not polarity sensitive.

MULTIPLE APPLIANCE INTERLOCKS

To interlock with one additional 24/115 VAC heater add the MAC1E. It is a stripped down auxiliary board version of the UC1 and is powered by and communicates with the UC1 through a factory wired whip.

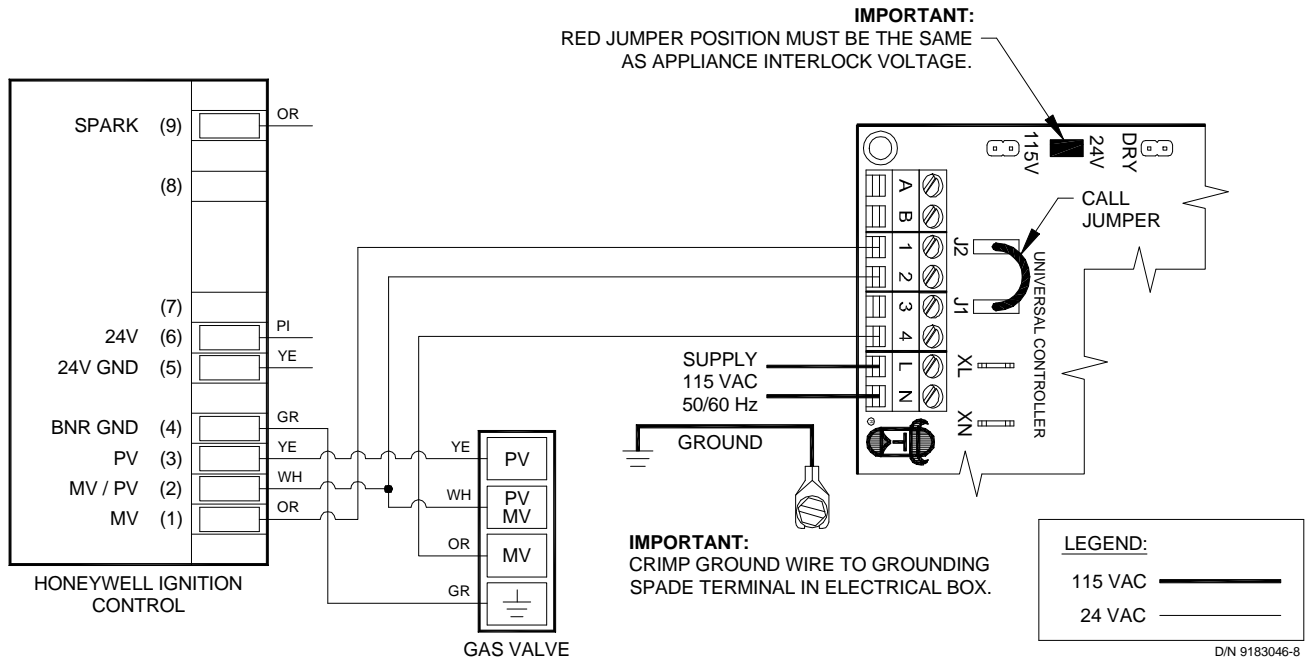
To interlock more than two 24/115 VAC heaters, add the MAC4E for a total of up to 5 heaters. It is powered by and communicates with the UC1 through a factory wired whip.

To interlock a millivolt water heater and a 24/115 VAC furnace or boiler, add the WHKE and MAC1E.

MILLIVOLT INSTALLATIONS

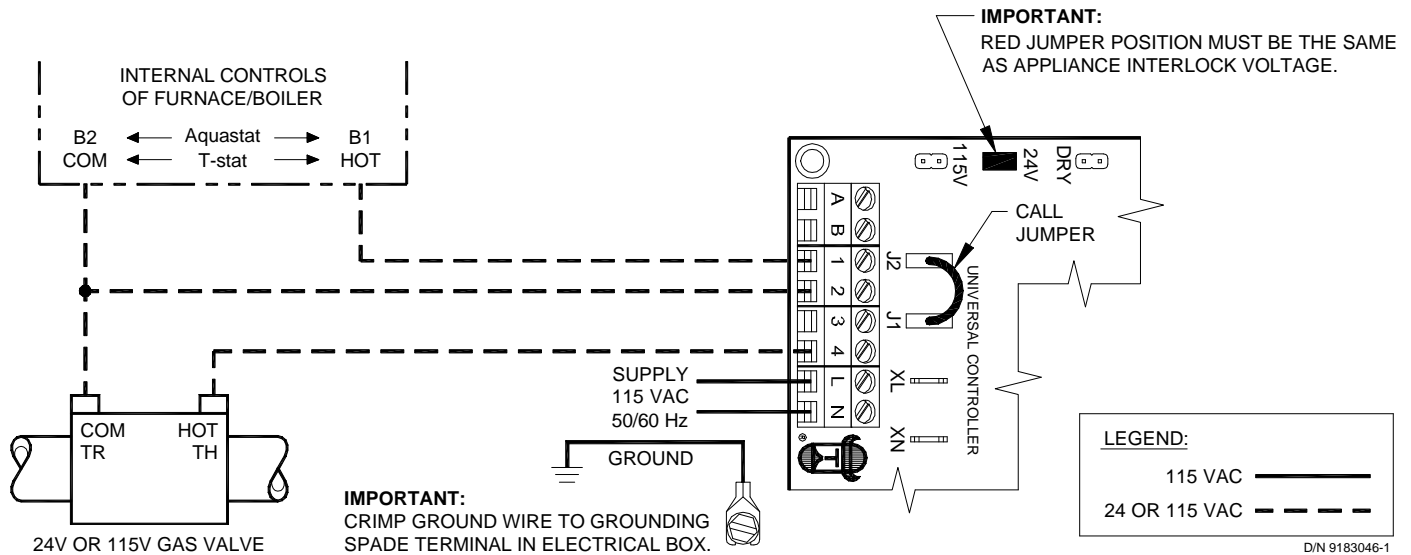
Each millivolt appliance interlocked with the UC1 must have its own WHKE kit installed. The WHKE Gas Pressure Switch actuates the Venter through the A - B Dry contacts. The Linear Limit switch disables the heater in the event of a venting malfunction. **IMPORTANT:** Each millivolt appliance interlocked with the UC1 must have its own Linear Limit spill switch.

UC1 UNIVERSAL CONTROL CONNECTED WITH A 24 VAC ELECTRONIC IGNITION MODULE



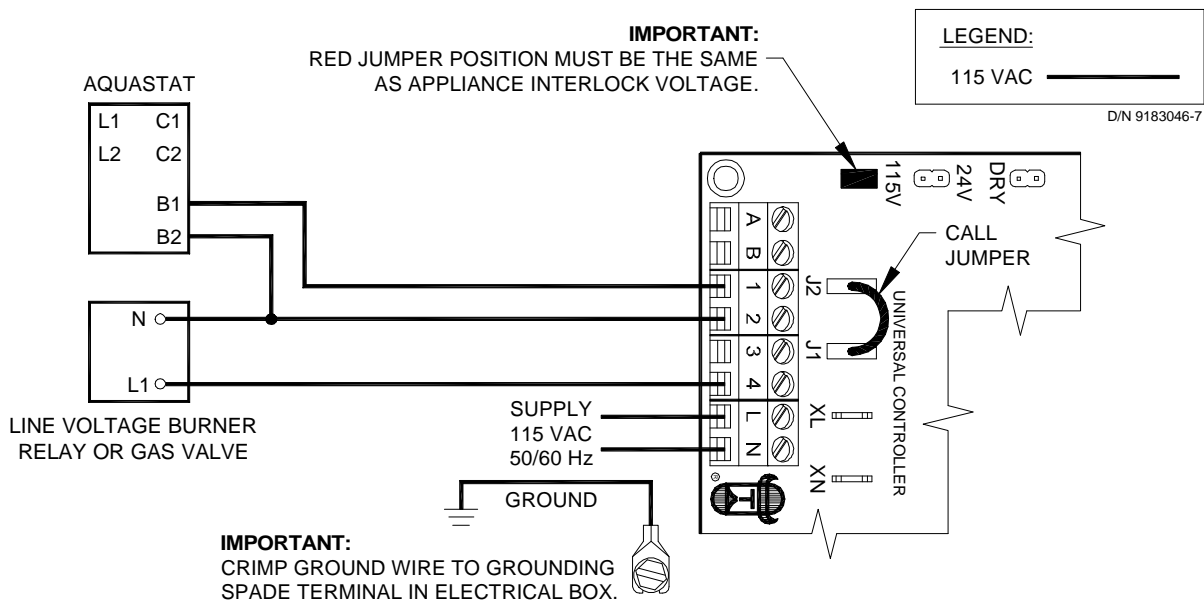
1. Remove the wire on MV at gas valve and connect it on #1 on UC1 terminal block.
2. Connect #2 on UC1 terminal block to MV/PV.
3. Connect #4 on UC1 terminal block to MV on gas valve.
4. Make sure RED voltage jumper on UC1 is on 24V.
5. Connect 115 VAC supply voltage to L & N terminals on UC1. Crimp Ground wire to grounding spade terminal in UC1.
Important: Installer must supply overload and disconnect protection.
6. If not completed, connect ground from UC1 whip to Venter ground in Fan Prover j-box. Connect Black & White leads from UC1 whip to Venter motor leads. Connect Blue and Yellow leads from UC1 whip to Fan Prover switch. Prover Leads are not polarity sensitive.

UC1 UNIVERSAL CONTROL CONNECTED WITH A 24 OR 115 VAC STANDING PILOT



1. Remove the wire on TH or HOT of gas valve and connect it on #1 on UC1 terminal block.
2. Connect #2 on UC1 terminal block to TR or Common.
3. Connect #4 on UC1 terminal block to TH or HOT on gas valve.
4. Make sure RED voltage jumper on UC1 is on 24V or 115V depending on control voltage.
5. Connect 115 VAC supply voltage to L & N terminals on UC1. Crimp Ground wire to grounding spade terminal in UC1.
Important: Installer must supply overload and disconnect protection.
6. If not completed, connect ground from UC1 whip to Venter ground in Fan Prover j-box. Connect Black & White leads from UC1 whip to Venter motor leads. Connect Blue and Yellow leads from UC1 whip to Fan Prover switch. Prover Leads are not polarity sensitive.

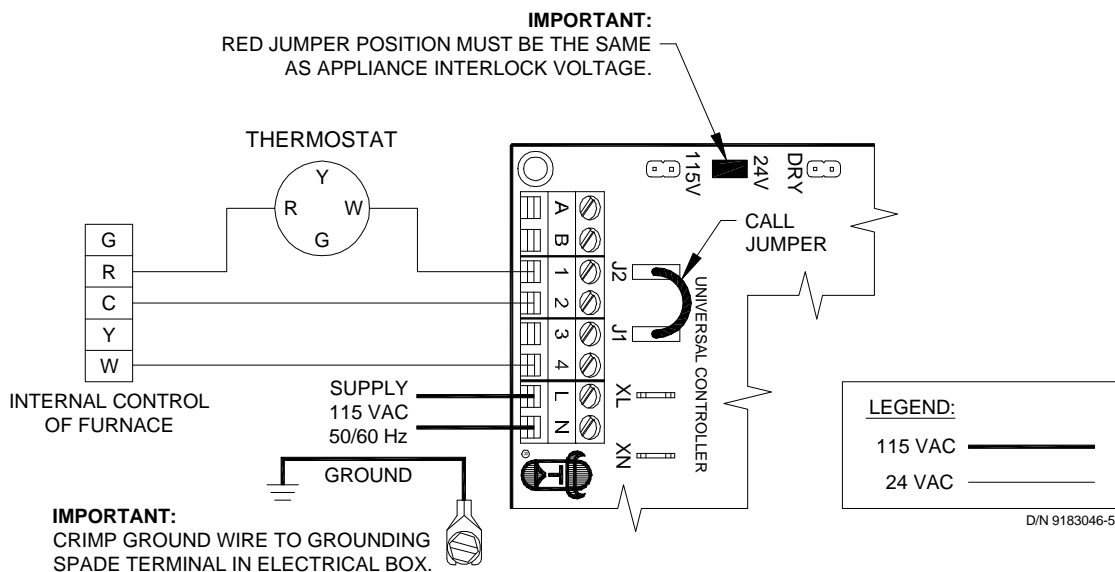
UC1 UNIVERSAL CONTROL CONNECTED WITH AN AQUASTAT



1. Disconnect B1 from L1 of burner relay or hot of gas valve and reconnect to #1 on UC1 terminal block.
2. Connect #2 on UC1 terminal block to B2 or N.
3. Connect #4 on UC1 terminal block to the L1 on line voltage burner relay or gas valve.
4. Make sure RED voltage jumper on UC1 is on 115V.
5. Connect 115 VAC supply voltage to L & N terminals on UC1. Crimp Ground wire to grounding spade terminal in UC1.
Important: Installer must supply overload and disconnect protection.
6. If not completed, connect ground from UC1 whip to Venter ground in Fan Prover j-box. Connect Black & White leads from UC1 whip to Venter motor leads. Connect Blue and Yellow leads from UC1 whip to Fan Prover switch. Prover Leads are not polarity sensitive.

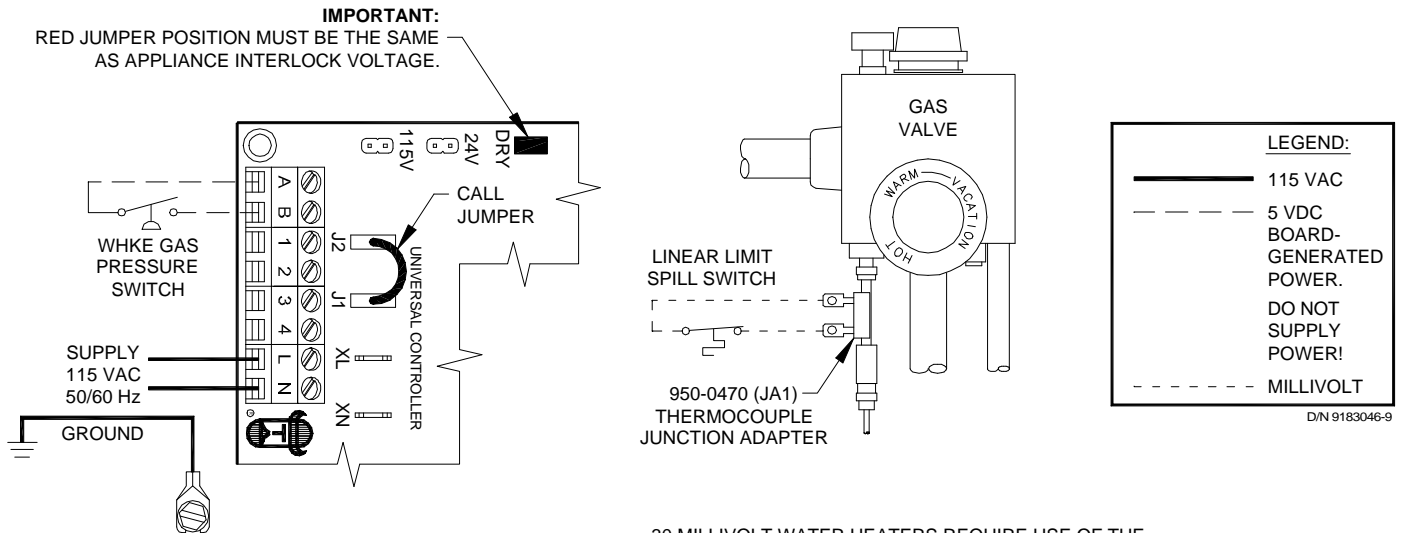
NOTE: If burner control goes out on lockout, the Venter will continue to run as long as a call for heat is present.

UC1 UNIVERSAL CONTROL CONNECTED WITH A SINGLE ZONE 24 VAC THERMOSTAT



1. Connect W from t-stat to #1 on terminal block of UC1.
2. Connect #2 on UC1 terminal block to C on internal control terminal strip of furnace/boiler.
3. Connect #4 on UC1 terminal block to W on internal control terminal strip of furnace/boiler.
4. Make sure RED voltage jumper on UC1 is on 24V.
5. Connect 115 VAC supply voltage to L & N terminals on UC1. Crimp Ground wire to grounding spade terminal in UC1.
Important: Installer must supply overload and disconnect protection.
6. If not completed, connect ground from UC1 whip to Venter ground in Fan Prover j-box. Connect Black & White leads from UC1 whip to Venter motor leads. Connect Blue and Yellow leads from UC1 whip to Fan Prover switch. Prover Leads are not polarity sensitive.

UC1 UNIVERSAL CONTROL AND WHKE INTERLOCK KIT CONNECTED WITH A MILLIVOLT APPLIANCE

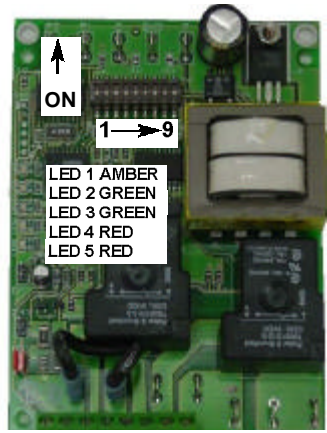


Each millivolt appliance interlocked with the UC1 must have its own WHKE kit installed. The WHKE Gas Pressure Switch actuates the Venter through the A - B Dry contacts. The Linear Limit switch disables the heater in the event of a venting malfunction. **IMPORTANT:** Each millivolt appliance interlocked with the UC1 must have its own Linear Limit spill switch.

1. Wire WHKE Gas Pressure Switch in series with A and B terminal on UC1. Do not supply voltage to A and B terminals.
2. Wire WHKE Linear Limit in series with thermocouple junction adapter or high limit ECO of water heater.
3. Make sure RED voltage jumper on UC1 is in the DRY position.
4. Connect 115 VAC supply voltage to L & N terminals on UC1. Crimp Ground wire to grounding spade terminal in UC1. Important: Installer must supply overload and disconnect protection.
5. If not completed, connect ground from UC1 whip to Venter ground in Fan Prover j-box. Connect Black & White leads from UC1 whip to Venter motor leads. Connect Blue and Yellow leads from UC1 whip to Fan Prover switch. Prover Leads are not polarity sensitive.

UC1 UNIVERSAL CONTROL OPERATIONAL CHECK

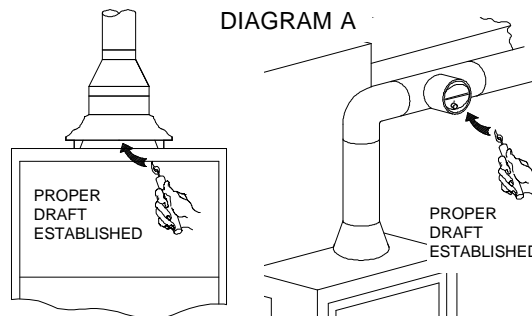
1. Confirm power is supplied to the Control. LED #5 (RED) should be on.
2. Activate the UC1 by initiating an appliance call for heat. LED #1 (AMBER) should be on.
3. The motor relay will close and activate the Venter motor. LED #3 (GREEN) should be on and Venter motor should be running.
4. If the safety circuit across P1 & P2 (Venter Prover) is closed, indicating an approved condition, the appliance interlock relay will close making terminal #3 closed to terminal #4 & LED #2 (GREEN). Appliance burner should fire.
5. Remove power to the UC1 and any interlocked appliances. The LED #5 (RED) or any LED's should not be on. Test the safety circuit by removing the Blue or Yellow lead from Fan Proving switch. Do not let the opened LEAD touch a ground or damage may occur to the control when power is Re-established. Reestablish power to the UC1 and interlocked appliances and initiate an appliance call for heat. After 60 seconds a Prover Start Up fault should arise with LED #4 (RED) and LED #5 (RED) flashing in unison.
6. Remove appliance call for heat and power to the UC1 and any interlocked appliances. The LED #5 (RED) or any LED's should not be on. Reconnect Blue or Yellow Fan Prover lead to Fan Prover Switch terminal removed from in step 5.
7. Reestablish power to UC1 and interlocked appliances and initiate a call for heat to confirm proper operation of UC1 and appliance.



⚠ WARNING

The Power Venter Fan Proving Switch is designed to disable the appliance gas valve or burner motor upon Power Venter failure only! It is not designed and cannot replace, regular vent system inspection, appliance servicing and combustion testing.

1. Close all doors and windows of the building. If the appliance is installed in a utility room or closet, close the entrance door to this room.
2. Turn on all exhaust and ventilation fans to maximum speeds. Do not operate a fan used strictly for Summer exhausting.
3. Following the appliance manufacturer's instructions, place the appliance in operation, set thermostat for continuous operation.
4. Verify that Power Venter operates first, prior to burner ignition. Watch to make sure burner lights off properly.



GAS

After allowing appliance(s) to operate for 15 minutes, follow the appliance manufacturers instructions to verify that the recommended draft is present. In general, most gas appliances will operate safely with flue outlet draft levels from -0.02 to -0.05" W.C.. If the draft is excessive, make necessary adjustments to the barometric control and/or follow the, "Power Venter Air Flow Damper Adjustment" procedure outlined below. As a cross check, a candle or match can be held adjacent to the draft hood or barometric control to verify flame/smoke is being drawn into, and not rolling out of edge of the relief opening, (See Diagram A). If exhaust gases are escaping from the relief opening of the draft hood or barometric control, the equipment should not be operated until proper adjustments or repairs are made to provide adequate draft levels.

5. Next, turn on all other fuel-burning appliances within the same room so they will operate at their full input. Repeat Step 3 above, checking the draft on each appliance.

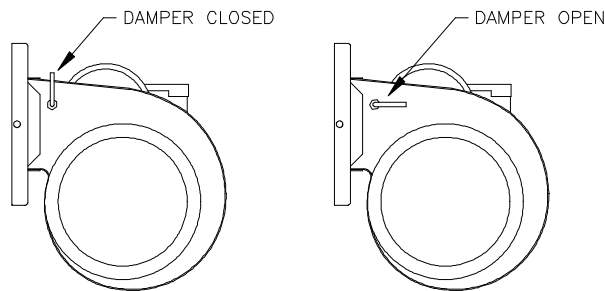
POWER VENTER AIR FLOW DAMPER ADJUSTMENT

The Air Flow Damper Adjustment on the Power Venter is factory set for maximum air flow. Operating a properly sized Power Venter at its maximum setting will assure that combustion gases are safely removed to the outside. If the Power Venter has excess venting capacity than what is required for this application, operating the Power Venter with the air-flow adjustment at the maximum setting may draw more dilution air than necessary.

The Air Flow Damper Adjustment may be set by use of a combustion analyzer, inclined manometer or draft gauge. Alternatively, the damper adjustment can be set using a smoke candle or taper, as follows:

1. With all exhaust fans operating, air inlets closed and all appliances firing (as instructed above), hold a lighted match or taper around the edge of the relief opening of the draft hood(s) or barometric draft control, (See Diagram A).
2. Set Air Flow Adjustment by loosening locknut and turning damper rod handle. CAUTION: HANDLE MAY BE HOT, use pliers to move handle. Position of rod handle indicates the position of Air Flow Adjustment inside housing, (See Diagram B).
3. Using pliers, move handle towards minimum draft setting until spillage is detected at draft hood relief opening, then re-open Air Flow Adjustment just enough to eliminate spillage.
4. Lock Air Flow Adjustment at desired setting by tightening locknut.
5. Return doors, windows, exhaust fans, fireplace dampers and appliances to their previous conditions of use.

DIAGRAM B



COMBUSTION AIR

Adequate combustion air is vital for proper combustion and for safe venting. Likewise, for proper Power Venter performance, adequate combustion air must be available to the appliance. Many installers assume adequate combustion air is present, especially in older buildings. In some cases this is a false assumption, because many older buildings have been made "tight" due to weatherization. Size the combustion air opening(s) into the appliance room as outlined local or national codes. Tjernlund's IN-FORCER™ Combustion Air Intake Systems provide a convenient interlocked way to provide combustion air to the equipment room. When installing a Power Venter it is not necessary to supply any more combustion air than normally required when conventional venting. Common symptoms of inadequate combustion air include: Fan Proving Switch short cycling, odor present at end of burner cycle, outside air enters the structure through the Power Venter during appliance off cycle.

MAINTENANCE

1. Oil every six months with 2 drops of S.A.E #20. The oil ports are located at both ends of the motor.
2. The end-user must semiannually inspect the Vent Hood and vent pipe for blockage, corrosion and leaks.
3. A vent system inspection must be performed annually by a qualified service agency. The inspection should include the operation circuit check, safety interlock test, combustion air test and a visual inspection of the complete vent system for corrosion, blockage or leaks. Any corrosion, blockage or leaks detected must be repaired or replaced immediately.

TROUBLESHOOTING

WARNING

The following guide is intended to be used if a problem occurs during the use of the Venter and UC1. It may be necessary to measure voltage during troubleshooting. **Extreme caution must be exercised to prevent injury.** If you are unable to determine the defective part with the use of this guide, call your Tjernlund distributor or Tjernlund Products direct at 1-800-255-4208 for further assistance.

IMPORTANT: To reset faults, verify fault by checking the LEDs and then remove call for heat.

LED STATUS & FAULT INDICATORS

LED INDICATOR LIGHTS

LED #1 (Amber) Appliance call for heat.

LED #2 (Green) Safety circuit through P1 & P2 (Venter Fan Prover) is verified "Open" upon start-up. Burner circuit is energized with contact closure from terminal 3 to 4. Also verifies Venter prover is closed during run cycle.

LED #3 (Green) Power switched to Venter motor from L to MTR & M.

LED #4 (Red) Status indicator.

LED #5 (Red) 115 VAC power supplied to board. Also used as status indicator.

LED INDICATOR LIGHT STATUS & FAULTS

LED #4 & #5 Flashing Alternately = Prover start up fault. Venter Prover contacts "Closed" across P1 & P2 upon appliance call before Venter is turned on. Prover status check **must** be activated, see page 5.

LED #4 & #5 Flashing in Unison = Fan Prover circuit is "Open" longer than 60 seconds on start-up or 10 seconds during run cycle. Venter Prover contacts are not staying "Closed" across P1 & P2 safety circuit.

LED #4 Flashing & #5 on Continuous = System in Pre-Purge. (Pre-Purge options 0, 15, 30, 60 seconds)

LED #5 Flashing & #4 on Continuous = System in Post-Purge. (Post-Purge options 0, 30 seconds or 1, 2, 4, 8, 16 minutes)

SYMPTOM 1: VENTER OPERATES CONTINUOUSLY

Verify that Venter is not in post-purge mode which could last up to 16 minutes. A factory post-purge has been set for 2 minutes.

LED #4 (Red) will be on continuously and LED #5 will be flashing during post-purge. A Venter pre-purge could also be set for up to 1 minute. LED #4 (Red) will be flashing and LED #5 will be on continuously during a Venter pre-purge. See "Pre / Post-Purge Settings" on page 5.

Verify that LED #1 (Amber) is not lit.

Yes, LED #1 (Amber) is lit: Check interlock wiring. UC1 control is receiving constant call for heat signal.

LED #1 (Amber) is not lit: Replace UC1 circuit board part number (HS3 & HS4 950-8801) (HS5 950-8804).

SYMPTOM 2: VENTER MOTOR DOES NOT OPERATE

Verify that UC1 control has power, LED #5 (Red) should be lit. Verify that LED# 4 (Red) or LED# 5 (Red) are not flashing. See "LED Status & Fault Indicators", above. Make sure RED voltage selection jumper is positioned according to appliance interlock voltage.

No: Check circuit breaker, disconnect switches and wiring. Confirm that motor leads are connected to N & MTR terminals.

Yes, LED #5 (Red) is lit: Verify that the interlocked burner is calling for heat, LED #1 (Amber) should be lit.

No, LED #1 (Amber) is not lit: Verify interlock wiring and that thermostat/aquastat is adjusted to call for heat. Verify that the RED voltage selection jumper is installed so that it matches the voltage of the interlocked burner.

Yes, LED #1 (Amber) is lit: Verify Prover safety circuit fault does not exist. See, "LED Status & Fault Indicators", above.

If faults exist check Prover P1 & P2 safety circuit.

If no faults exist, check for 115 VAC across terminals N and MTR.

Voltage present: Confirm Black and White leads from UC1 whip are securely fastened to motor leads in Fan Prover electrical box. If so, replace Venter motor.

No voltage present: Replace UC1 circuit board part number (HS3 & HS4 950-8801) (HS5 950-8804).

SYMPTOM 3: VENTER OPERATES, BUT BURNER DOES NOT

NOTE: Prover status check **must** be activated when side wall venting, see page 5. Venter may be in Pre-purge mode for up to 1 minute before burner fires, See "Pre / Post-purge settings". **IMPORTANT:** Venter pre-purge time, if selected, must be shorter than flame sensor lockout time. For any newly established call for heat the UC1 will run for 60 seconds to try to close the fan prover circuit (P1 to P2). If circuit can not be made after 60 seconds LED's 4 & 5 (Red) will flash in unison, indicating a prover check circuit fault on UC1 start up. The UC1 will shut down and LED's 4 & 5 (Red) will flash in unison, indicating a prover check circuit fault on UC1 start up. NOTE: If flame sensor of burner locks out during the 1 minute period the UC1 safety circuit and LED's 4 & 5 will be reset. If the fan prover makes on start up, but breaks for more than 10 seconds during the burner cycle, LED's 4 & 5 (Red) will flash in unison indicating a prover circuit fault. The UC1 will continue to run for 10 minutes to try to make the prover circuit as long as a call for heat exists. After 10 minutes the UC1 will shut down and LED's 4 & 5 (Red) will flash in unison indicating a prover circuit fault. Remove the call for heat and then reestablish to reset the UC1 prover safety circuit (P1 to P2) & LED's.

Verify that LED #2 (Green) is lit.

Yes, LED #2 (Green) is lit: Verify that "call jumper" is connected from J1 to J2 on UC1 circuit board. With call for heat established, verify that wiring is correct by measuring voltage between terminals 1 & 2 and 2 & 4 of UC1 terminal strip. Voltage should be the same in both cases, if not rewire per appropriate diagram. NOTE: If using the "Dry Contact" interlock method, make sure that the RED voltage selection jumper is installed on the dry contact tabs and High Limit has not tripped.

No, LED #2 (Green) is not lit: Remove call for heat and reestablish a call for heat to reset control. Within 1 minute of call for heat, carefully jump a wire between P1 & P2 on UC1 control. LED #2 (Green) should light.

No, LED #2 (Green) does not light: Replace UC1 circuit board, part number 950-8801.

Yes, LED #2 (Green) lights up: Remove supply power to UC1. Remove Jumper from P1 & P2. The fan proving switch is not closing or wiring connections are incorrect/broken. Disrupt call for heat. Remove leads from Fan Prover and initiate a call for heat. With Venter running, verify that Venter performance is sufficient to close Fan Prover contacts by checking for continuity across switch.

No, continuity is not present: Visually inspect system for blockages. Confirm that maximum Venter BTU/hr. input and vent pipe lengths are not exceeded or elbows are not installed directly on Venter discharge. **IMPORTANT:** Do not connect 5 foot section of aluminum tubing directly to Venter housing. Sensing tube assembly provided with factory calibrated length must be used or Fan Prover will not work properly. If everything checks out okay, replace fan prover.

Yes, continuity present: Recheck wiring.

HOW TO OBTAIN SERVICE ASSISTANCE

1. If the Venter requires adjustment or repair, we suggest that you contact your installer, contractor or service agency.
2. If you require technical information contact Tjernlund Products, Inc. at 1-800-255-4208.

When contacting Tjernlund Products, Inc., please have the following information available:

1. Model of the Venter the UC1 is interlocked with as shown on the label attached to Venter.
2. Name and address of installer and any service agency who performed work on Venter.
3. Date of original installation and dates any service work was performed.
4. Details of the problem as you can best describe them.

LIMITED PARTS WARRANTY AND CLAIM PROCEDURE

Tjernlund Products, Inc. warrants the components of the Venter and UC1 for 1 year from date of installation. This warranty covers defects in material and workmanship. This warranty does not cover normal maintenance, transportation or installation charges for replacement parts or any other service calls or repairs. This warranty DOES NOT cover the complete Venter if it is operative, except for the defective part.

- 1.) Follow troubleshooting guide to determine defective component. If unable to determine faulty component, contact your Tjernlund distributor or Tjernlund Products Technical Customer Service Department at 1-800-255-4208 for troubleshooting assistance.
- 2.) After the faulty component is determined, return it to your Tjernlund distributor for replacement. Please include Venter date code component was taken from. The date code is located on the Electrical Box coverplate. If the date code is older than 1 year, you will need to provide a copy of the original installation receipt to your distributor. Credit or replacement will only be issued to a Tjernlund distributor after the defective part has been returned prepaid to Tjernlund.

WHAT IS NOT COVERED

Product installed contrary to our installation instructions
Product that has been altered, neglected or misused
Product that has been wired incorrectly
Product that has been damaged by a malfunctioning or mistuned burner
Any freight charges related to the return of the defective part
Any labor charges related to evaluating and replacing the defective part

REPLACEMENT PARTS

MODEL HS3		MODEL HS4		MODEL HS5	
MOTOR KIT	950-1022	MOTOR KIT*	950-0131	MOTOR KIT	950-1017
WHEEL KIT	950-1013	SHAFT EXTENSION	950-0010	WHEEL KIT	950-1015
FAN PROVER KIT	950-1032	WHEEL KIT	950-1013	FAN PROVER KIT	950-1007
HOUSING	950-1014	FAN PROVER KIT	950-1007	HOUSING	950-1018
UNIVERSAL CONTROL	950-8801	HOUSING	950-1008	UNIVERSAL CONTROL	950-8804
CIRCUIT BOARD		UNIVERSAL CONTROL	950-8801	CIRCUIT BOARD (HS5)	

CIRCUIT BOARD
*May need shaft extension kit if old shaft extension can not be removed.

TJERNLUND LIMITED ONE YEAR WARRANTY

Tjernlund Products, Inc. warrants to the original purchaser of this product that the product will be free from defects due to faulty material or workmanship for a period of (1) year from the date of original purchase or delivery to the original purchaser, whichever is earlier. Remedies under this warranty are limited to repairing or replacing, at our option, any product which shall, within the above stated warranty period, be returned to Tjernlund Products, Inc. at the address listed below, postage prepaid. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF, AND TJERNLUND PRODUCTS, INC. EXPRESSLY DISCLAIMS LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OF THIS PRODUCT. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND NO AGENT IS AUTHORIZED TO ASSUME FOR US ANY LIABILITY ADDITIONAL TO THOSE SET FORTH IN THIS LIMITED WARRANTY. IMPLIED WARRANTIES ARE LIMITED TO THE STATED DURATION OF THIS LIMITED WARRANTY. Some states do not allow limitation on how long an implied warranty lasts, so that limitation may not apply to you. In addition, some states do not allow the exclusion or limitation of incidental or consequential damages, so that above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which may vary from State to State. Send all inquiries regarding warranty work to Tjernlund Products, Inc. 1601 9th Street, White Bear Lake, MN 55110-6794. Phone (651) 426-2993 • (800) 255-4208 • Fax (651) 426-9547 • Email: fanmail@tjfans.com