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REV. 1/10

**UC1 VERSION
X.06**



MODEL UCRT (UC1 with speed control) INSTALLATION INSTRUCTIONS

**THE UCRT CONTROL IS ONLY SUITABLE FOR USE WITH
TJERNLUND RT SERIES ROOFTOP DRAFT INDUCERS**



Recognize this symbol as an indication of important Safety Information!

OWNER INSTRUCTIONS, DO NOT DESTROY

WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED, LICENSED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS PRODUCT. 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, OR PERSONAL INJURY OR PROPERTY DAMAGE.

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

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DESCRIPTION

The UCRT combines Tjernlund's UC1 burner interlock control with an Inducer speed control. It is designed for use **ONLY** with Tjernlund RT-Series Rooftop Inducers. Follow these instructions through page 11 for information, options and wiring for the UC1. Follow PSA-1 proving switch adjustment procedures on page 11 or within the RT-Series Rooftop Inducer Installation Instructions. The UC1 interlock control can be interlocked with virtually any burner control circuit. Features include: adjustable pre & post purge, LED status / diagnostic indicators, 10 second prover switch delay to avoid burner start up and wind induced short cycling. Interlocks with any 24-115 VAC burner control circuit and also includes "dry" contact actuation option. After each burner cycle the UC1 will continue to operate in post-purge mode to allow the Inducer 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 and Prover Status Check Dip Switch Settings" on page 3.

GENERAL INFORMATION

Each UC1 is electrically factory line tested before shipment.

After opening carton, inspect thoroughly for hidden damage. If any damage is found notify freight carrier and your distributor immediately and file a concealed damage claim.

INSTALLATION RESTRICTIONS

1. The Pre-Cycle Prover Status Check is deactivated from the factory on the UCRT. Natural chimney draft may be sufficient to close the PSA-1 Fan Prover contacts prior to a call for heat which may cause nuisance lockouts. The Pre-Cycle Prover Status dip switch #9 should be up or "ON" so that it is deactivated. See page 4 for details.
2. An Inducer post-purge on the UC1 has been factory set at 2 minutes. Confirm that dip switch #5 is in the up or "on" position. Oil fired equipment requires that the post-purge be long enough to eliminate post cycle nozzle drip odor. 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 gas installations. See "Pre / Post Purge Dip Switch Settings" on page 3 for details.
3. The UCRT is intended for indoor installation only. Do not mount the UCRT on a heat source that exceeds 140°F (60°C). 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 (60°C).

CAUTIONS

WARNING

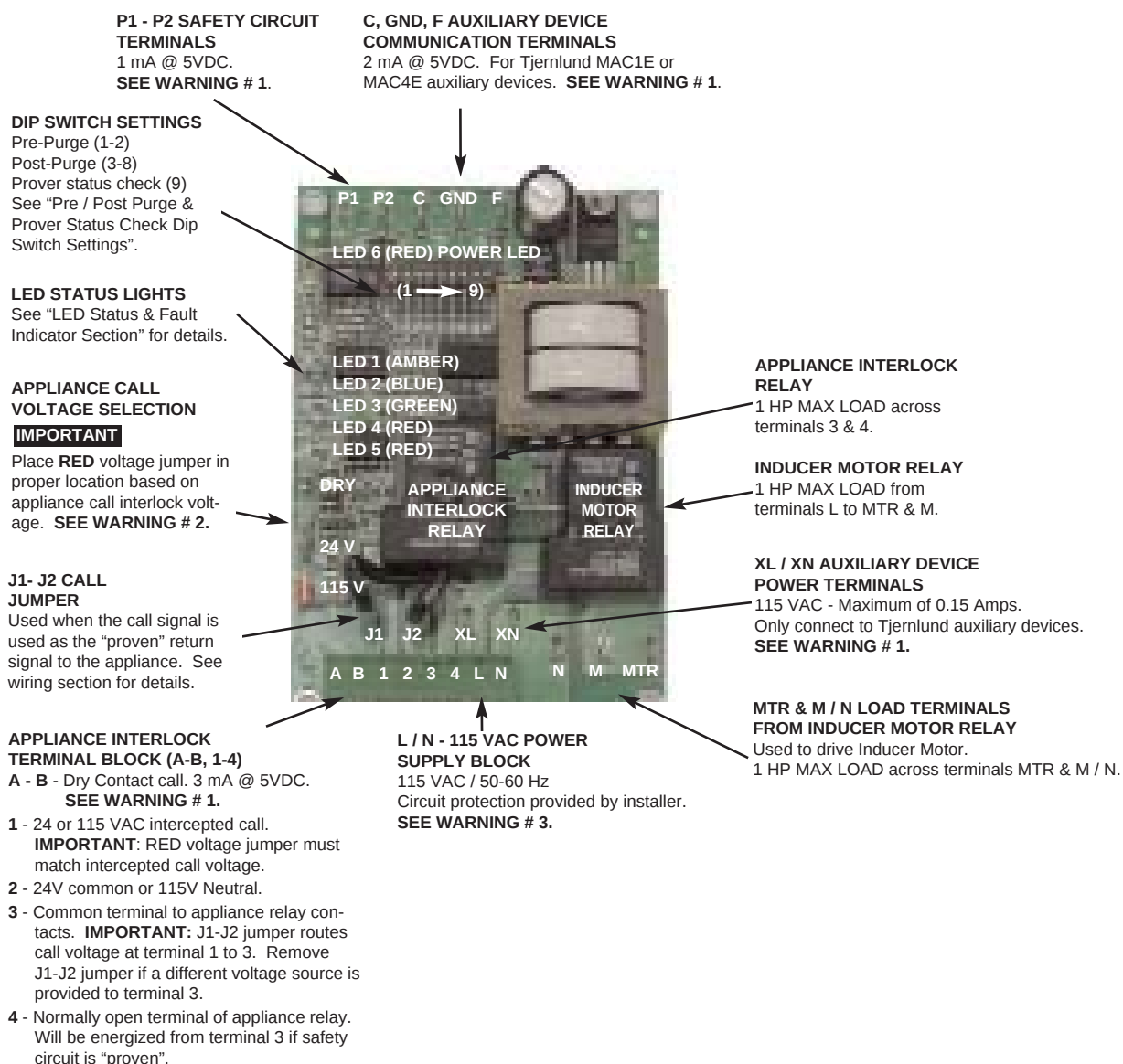
The UC1 must be installed by a qualified installer (an individual properly licensed and/or trained) in accordance with all local codes or, in their absence, in accordance with the appropriate National Fire Protection Association #31, #54, #211 and the National Electrical Code.

Failure to install, maintain and/or operate the UC1 in accordance with manufacturer's instructions may result in conditions which can produce bodily injury and property damage.

1. The installer must verify that the BTU/hr. input of the appliance does not exceed the recommended input of the any Inducer being controlled by the UC1. Refer to the Rooftop Inducer installation instructions for capacities.
2. Disconnect power supply from the UC1 and heating equipment when making wiring connections and servicing the UC1. Failure to do so may result in personal injury and/or equipment damage. LED #6 (RED) should be off with power removed.

3. All installation restrictions and instructions in the Inducer installation instructions must be adhered to when using the UC1.
4. Make certain power source is adequate for the UC1 and Venter requirements. Do not add equipment to a circuit when the total electrical load is unknown.

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 (Blue) Safety circuit through P1 & P2 (Inducer Fan Prover and/or Limit). Indicates Inducer prover is closed during run cycle. Burner circuit is energized with Interlock Relay contact closure from terminal 3 to 4.
- LED #3 (Green) Power switched to Inducer motor from L to MTR & M.
- LED #4 (Red) Status / Fault indicator.
- LED #5 (Red) Used as a status indicator.
- LED #6 (Red) 115 VAC power supplied to board.

LED STATUS INDICATORS

LED #4 & #5 (Red) Flashing Alternately = Inducer in Pre-purge. (Pre-Purge options 0, 5, 20, 35 seconds)

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

LED #4 Flashes Continuously* = Fan Prover opened for more than 10 seconds during burner cycle.
(Inducer will run for 10 minutes, attempting to make Fan Prover)

LED #5 (Red) Flashing Intermittently = With no call for heat, flashes 3 seconds on / 3 seconds off if microcontroller is working properly.

LED FAULT INDICATORS

Fault conditions are indicated by counting the number of times LED #4 (Red) flashes.

LED #4 Flashes 2 Times Fan Prover was in electrically closed position prior to venter operation.

LED #4 Flashes 3 Times* Fan Prover does not close within 60 seconds after call for heat.

LED #4 Flashes 4 Times* Fan Prover did not re-close after 10 minutes of Inducer operation.

LED #4 Flashes 5 Times* Fan Prover opened for more than 10 seconds during burner cycle but closed within 10 minutes.

* Investigate cause of Fan Prover short cycling such as; firing burner at capacities or temperatures exceeding Inducer limits, excessive vent pipe runs, high winds, plugged / kinked Fan Prover sensing tube or a faulty Fan Prover switch.

IMPORTANT: Fault codes will automatically be displayed after a fault condition occurs. If the call for heat interlock signal or 115 VAC power is removed, the UC1 board will reset and the fault will be stored in memory instead of displayed. Any new fault will replace any previous fault.

CHECKING MEMORY FOR LAST FAULT CODE

IMPORTANT: Prior to accessing the fault code memory, note the settings of the dip switches so that they can be returned to their original Pre / Post-Purge positions. When power is supplied to the UC1 use caution when moving dip switches.

The last fault code can be retrieved at any time by setting all dip switches 1-8 to the up, or "on" position. The last fault code, or lack thereof, will be indicated by counting the number of times LED 4 flashes. By moving any of the dip switches back to their original position, the fault code will be cleared. **NOTE:** The UC1 board must have its 115 VAC power supply present when any of the (1-8) dip switches are moved back to their original position for the fault code to clear.

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 #6 (RED) should not be on if 115 VAC supply power is removed from the control.

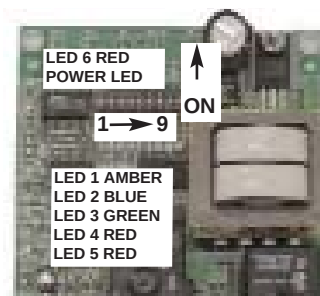
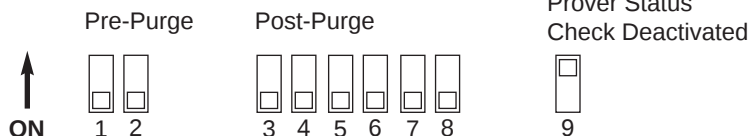
Pre-purge

Used for longer vent runs to get draft fully established throughout the vent system prior to burner ignition. Also beneficial for negative pressure prone environments. **IMPORTANT:** Nuisance equipment lockouts may occur if Inducer pre-purge is running in conjunction with and is longer than any equipment timing circuit. Pre-purge settings must be shorter than burner control lockout time unless wired prior to burner control timing circuit (i.e. aquastat / thermostat).

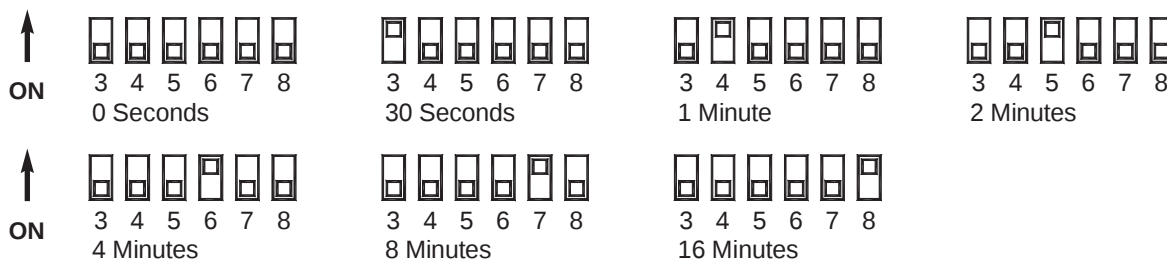
Post-purge

An Inducer post-purge has been factory set at 2 minutes. Confirm that dip switch #5 is in the up or "on" position. Oil fired equipment requires that the post-purge be long enough to eliminate post cycle nozzle drip odor. 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 gas installations.

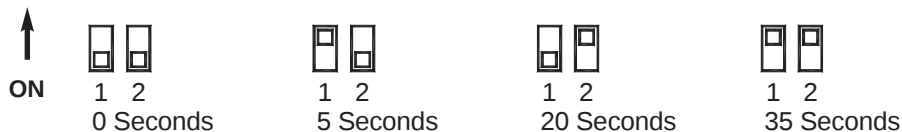
DIP SWITCH NUMBERING



POST-PURGE SETTINGS (SEE "POST-PURGE" ABOVE PRIOR TO SETTING)



PRE-PURGE SETTINGS (SEE "PRE-PURGE" ON PAGE 3 PRIOR TO SETTING)



P1 & P2 PRE-CYCLE FAN PROVER STATUS CHECK

Pre-Cycle
Prover Status
Check Deactivated



The Pre-Cycle Prover Status Check is deactivated from the factory on the UCRT. Natural chimney draft may be sufficient to close the PSA-1 Fan Prover contacts prior to a call for heat which may cause nuisance lockouts. The Pre-Cycle Prover Status dip switch should be up or "ON" so that it is deactivated.

UCRT INSTALLATION

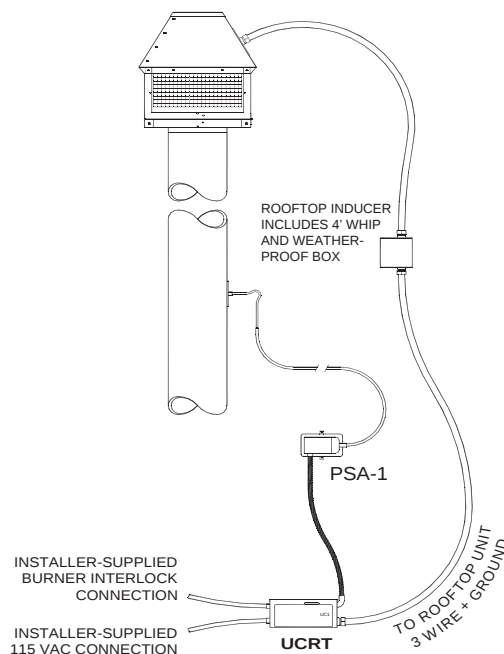
Do not mount the UCRT junction box on a heat source that exceeds 140°F (60°C). Examples of improper mounting surfaces include vent pipe, top of heater casing or any place where radiant or convective heat would cause the junction box temperature to exceed 140°F. The UCRT is intended for indoor installation only.

Using the key hole slots on the back of the UCRT 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 Rooftop Inducer includes a 4' whip and weatherproof junction box.

The PSA-1 must be mounted with the diaphragm in a vertical position. See Rooftop Inducer instructions for complete installation details.

TYPICAL UCRT, PSA-1 FAN PROVER & ROOFTOP INDUCER INSTALLATION



ELECTRICAL WIRING

ELECTRICAL 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.
SPEED CONTROL	RED LEAD TO INDUCER	6 AMPS MAXIMUM @ 120 VAC 50/60 HZ.

⚠ WARNING

All wiring from the UC1 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, Type MC Cable, or be otherwise suitably protected from physical damage.

IMPORTANT: MORE THAN ONE INTERLOCK METHOD MAY BE APPLICABLE

In many cases it is easier to interlock with the thermostat/aquastat portion of the heater control circuit vs. the ignition module / primary control portion of the heater control circuit. Review all of the wiring diagram options prior to choosing the best method.

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

Control signal from thermostat, aquastat, primary control 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 Inducer 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.

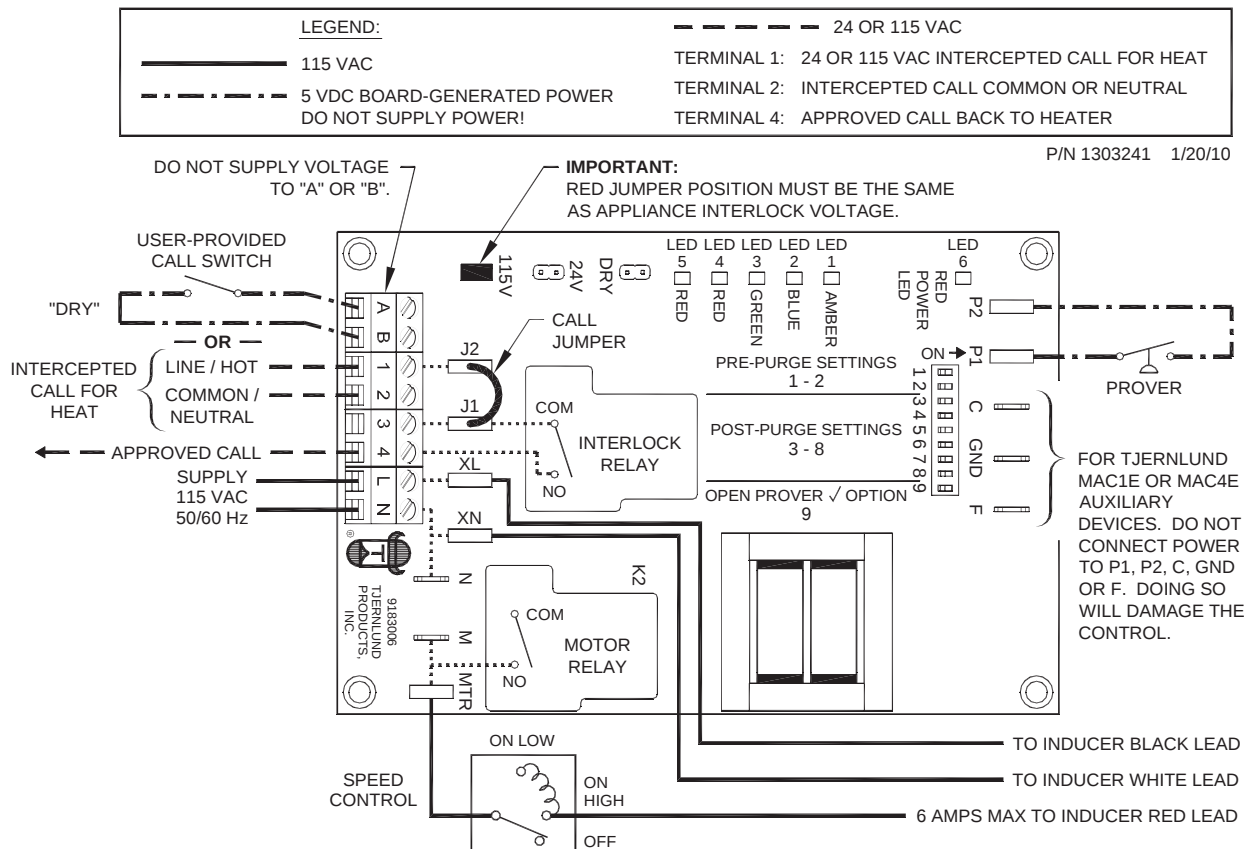
NOTE: If an Inducer pre-purge is selected, the burner will not fire until the pre-purge time is finished. The Inducer will continue to run after the burner has finished firing for the set post-purge time cycle. The UC1 is set for a 2 minute post-purge time period from the factory. See "Pre / Post-Purge Settings" on page 3 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 24V or 115V. 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. **IMPORTANT:** Only one interlock method (i.e. 24V, 115V or "Dry") can be used with the UC1. Multiple appliance interlocks require the use of our MAC-Series multiple appliance controls.

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: If the call for heat interlock signal or 115 VAC power is removed, the UC1 board will reset and any fault, if present, will be stored in memory instead of displayed. See page 3, "Checking Memory for Last Fault Code".

UCRT UNIVERSAL CONTROL WIRING SCHEMATIC (UC1 WITH SPEED CONTROL)



WARNING: Disconnect power supply from the UC1 and heating equipment when making wiring connections and servicing the Inducer. Failure to do so may result in personal injury and/or equipment damage. LED #6 (RED) should be off with power removed.

INDUCER GROUND, MOTOR AND PROVER SAFETY CIRCUIT CONNECTIONS

ROOFTOP INDUCER PSA-1 FAN PROVER CONNECTIONS

The Blue and Yellow leads from UC1 (P1 and P2) safety circuit must be connected to the PSA-1 Fan Prover switch. Leads are not polarity sensitive. When venting **only** millivolt appliances, the PSA-1 Fan Prover is not needed. See WHKE instructions or consult factory.

ROOFTOP INDUCER MOTOR AND COOLING FAN CONNECTIONS

Connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weatherproof junction box.

UCRT / ROOFTOP INDUCER GROUND CONNECTIONS

Connect the two Green ground leads within the UCRT to the ground of the power supply service panel. Connect the Green/Yellow stripe lead to the Green ground screw within the Rooftop Inducer whip 4x4 weatherproof junction box.

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. Consult factory for installations with more than 5 heaters.

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

MILLIVOLT HEATER INSTALLATIONS

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

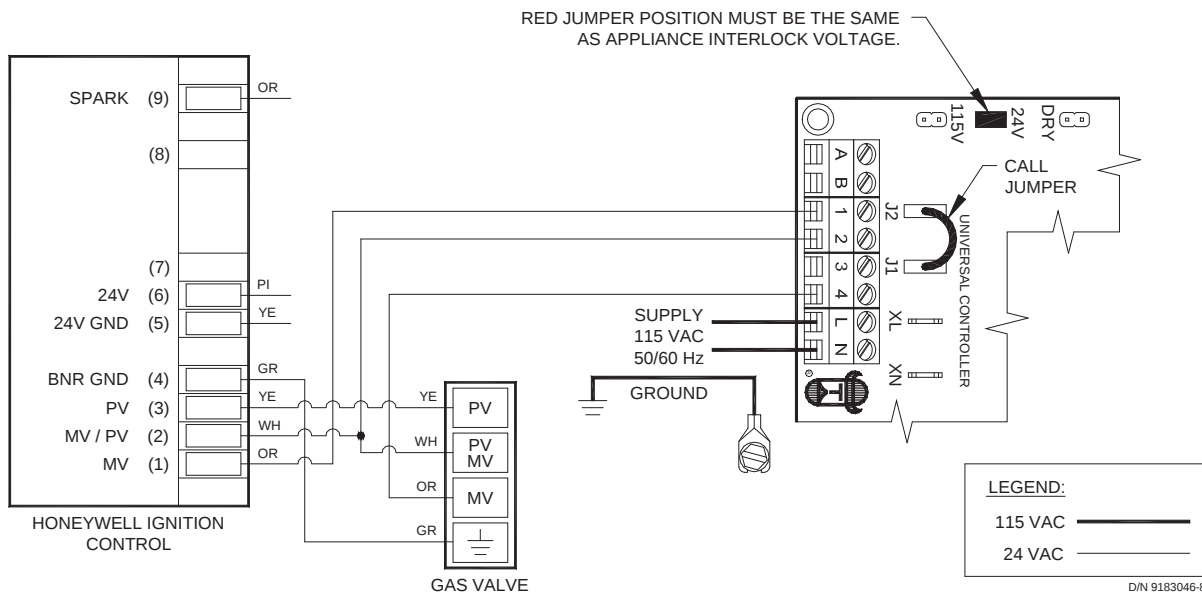
IMPORTANT: Each millivolt appliance interlocked with the UC1 must have its own Linear Limit spill switch.

MULTIPLE MILLIVOLT HEATER INSTALLATIONS

Multiple millivolt heaters can be installed by using the A-B dry contact terminals of the UC1, MAC1E or MAC4E. Wire each WHKE gas pressure switch in parallel across A-B terminals of UC1, MAC1E or MAC4E. Wire Linear Limit safety switch into each individual millivolt heater. For further information consult factory or WHKE instructions.

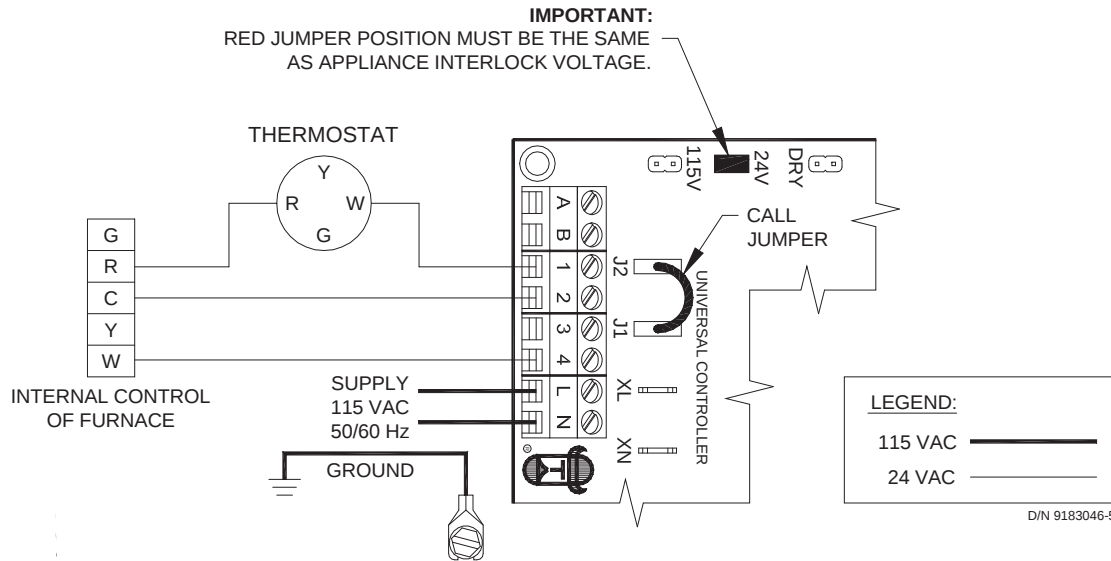
UC1 BURNER INTERLOCK WIRING DIAGRAMS

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. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
6. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weatherproof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

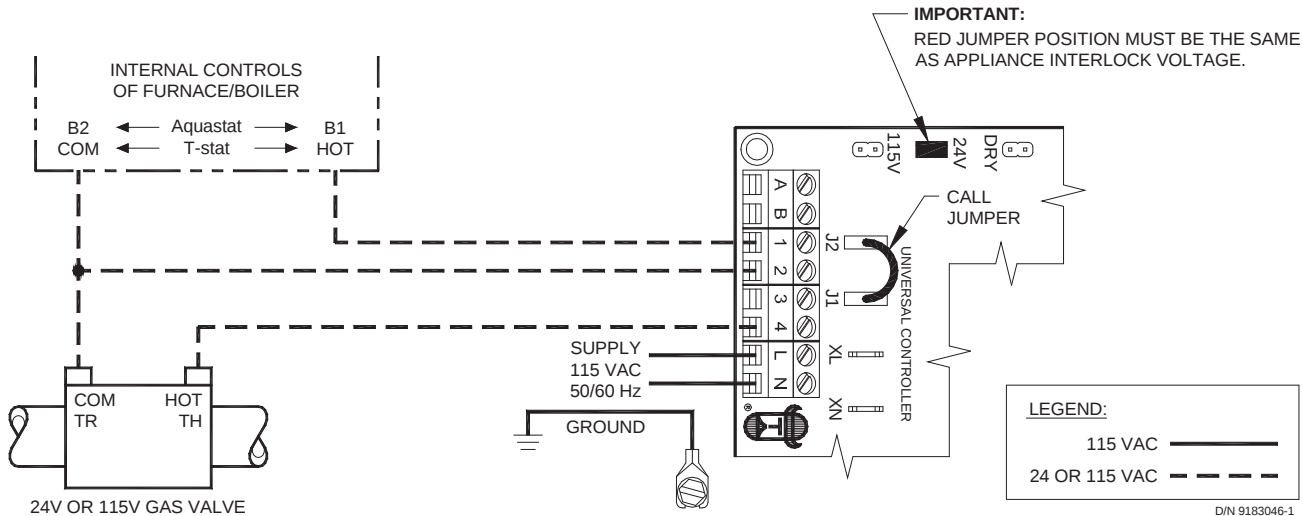
UC1 UNIVERSAL CONTROL CONNECTED WITH A SINGLE ZONE 24 VAC THERMOSTAT



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. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
6. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather-proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

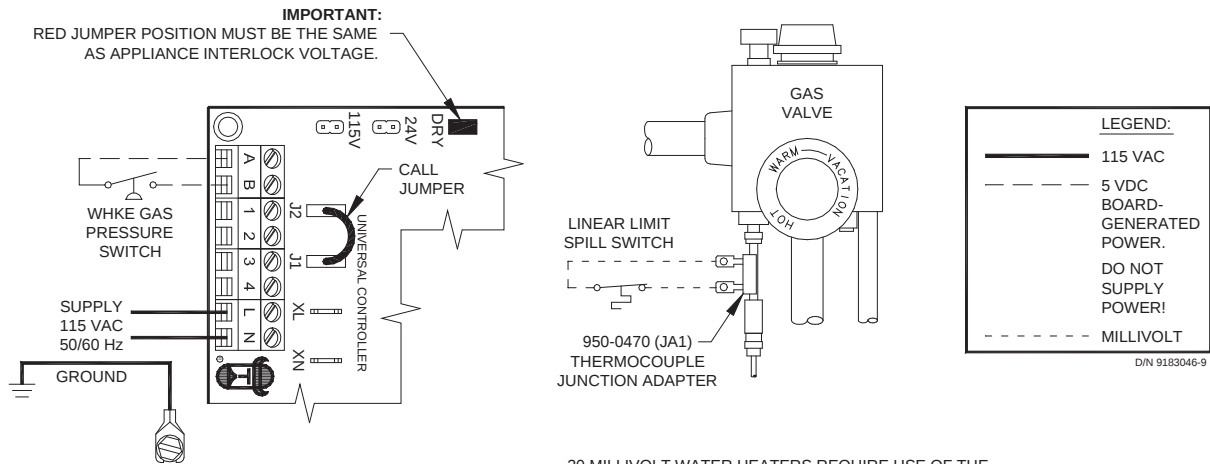
NOTE: If burner safety control goes out on lockout, the Inducer will continue to run as long as a call for heat is present.

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. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
6. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather-proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

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



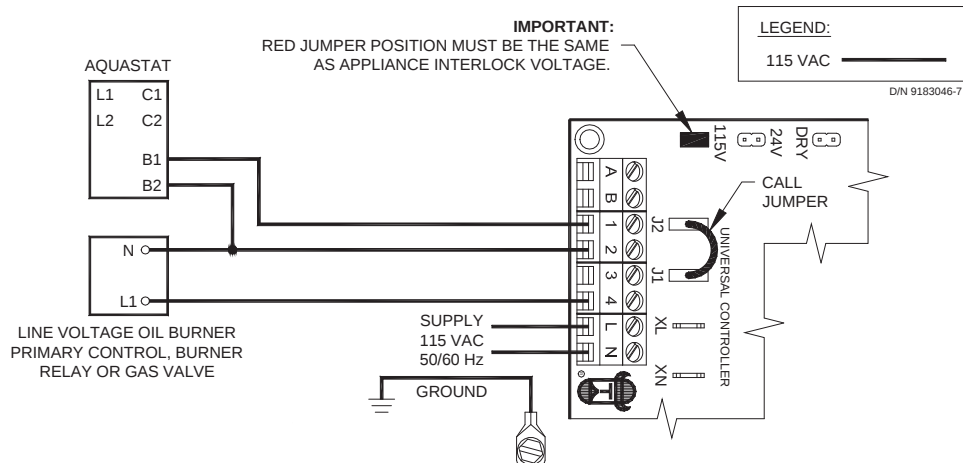
Each millivolt appliance interlocked with the UC1 must have its own WHKE kit installed. The WHKE Gas Pressure Switch actuates the Inducer through the A - B Dry contacts. The Linear Limit switch disables the heater in the event of a venting malfunction.

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. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
5. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weatherproof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

If using **only** venting millivolt appliances the PSA-1 Fan Proving Switch is not necessary, see WHKE instructions for details.

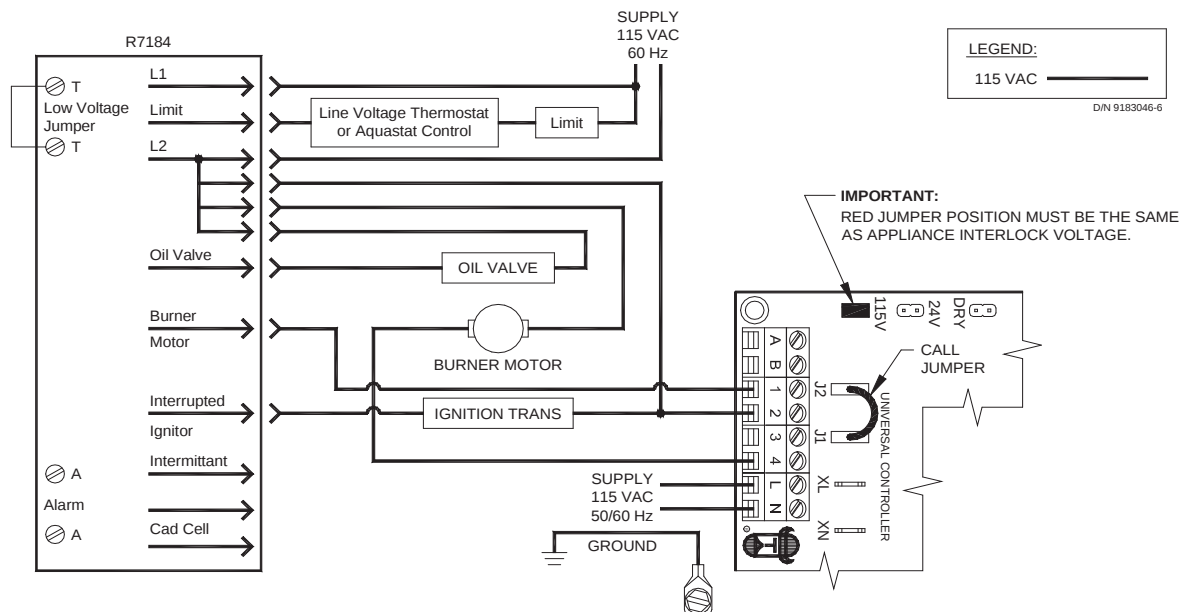
UC1 UNIVERSAL CONTROL CONNECTED TO A GAS OR OIL BURNER WITH AN AQUASTAT



1. Disconnect B1 from L1 of oil burner primary control, 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 oil burner primary control, 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. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
6. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weatherproof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

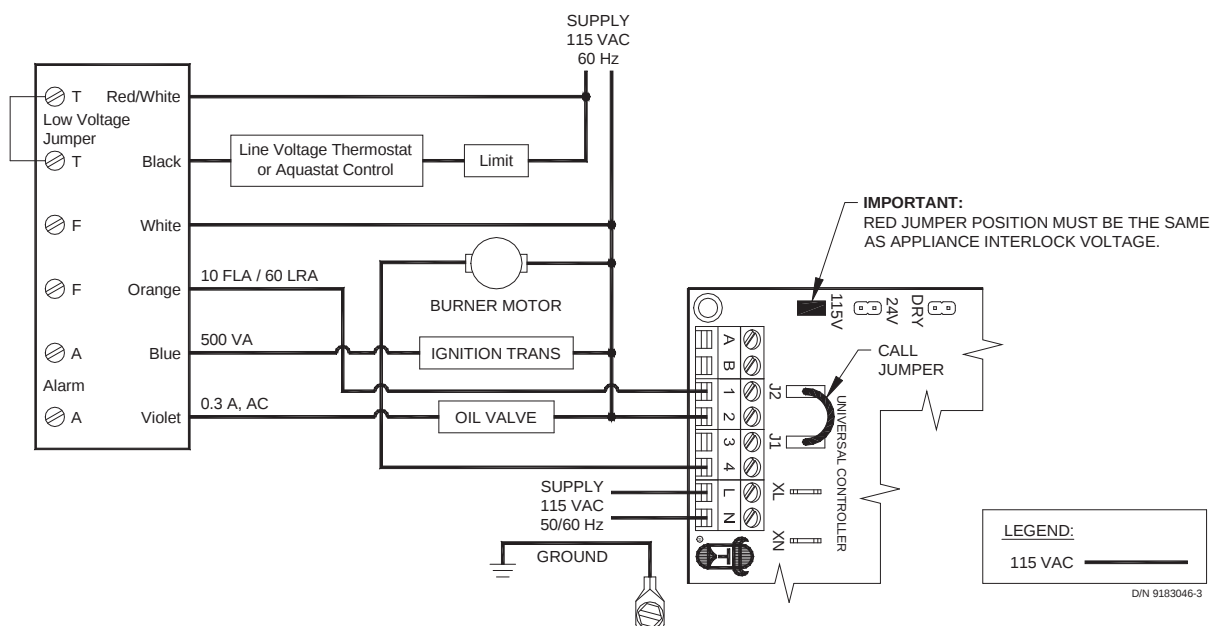
NOTE: If burner safety control goes out on lockout, the Inducer will continue to run as long as a call for heat is present.

UC1 UNIVERSAL CONTROL CONNECTED TO A HONEYWELL R7184 SERIES OR EQUIVALENT PRIMARY CONTROL WITH A LINE VOLTAGE THERMOSTAT OR AQUASTAT



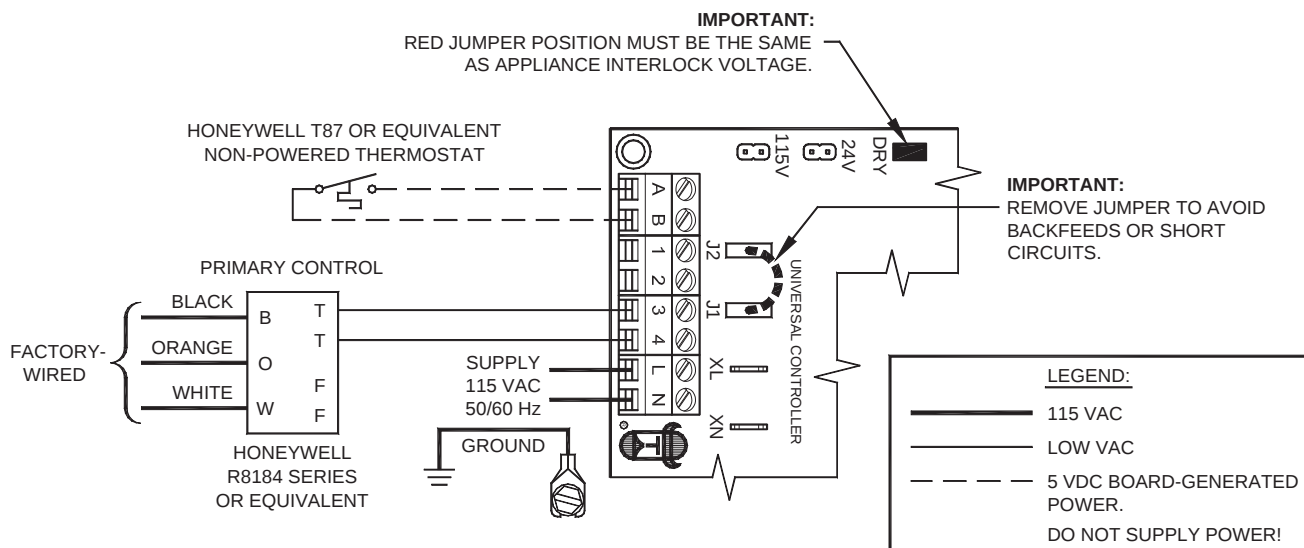
1. Disconnect burner motor wire off the R7184 and connect burner motor terminal of R7184 to #1 on UC1 terminal block.
2. Connect #2 on UC1 terminal block to L2 or N.
3. Connect #4 on UC1 terminal block to burner motor wire removed from R7184.
4. Make sure RED voltage jumper on UC1 is on 115V.
5. Connect 115 VAC supply voltage to L & N terminals on UC1. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
6. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather-proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

UC1 UNIVERSAL CONTROL CONNECTED WITH A CARLIN 40200, 42230, 48245, 50200, 60200 SERIES OR EQUIVALENT AND A LINE VOLTAGE THERMOSTAT OR AQUASTAT



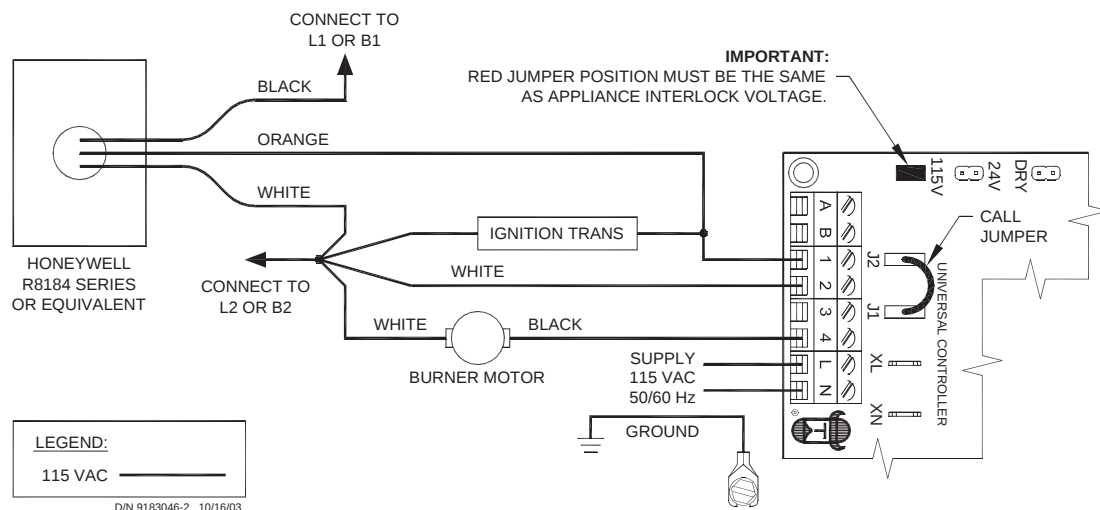
1. Disconnect burner motor wire off the Orange on Carlin and connect burner motor terminal Orange of Carlin to #1 on UC1 terminal block.
2. Connect #2 on UC1 terminal block to L2 or N
3. Connect #4 on UC1 terminal block to burner motor wire removed from Orange of Carlin.
4. Make sure RED voltage jumper on UC1 is on 115V.
5. Connect 115 VAC supply voltage to L & N terminals on UC1. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
6. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather-proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

UC1 UNIVERSAL CONTROL CONNECTED TO AN OIL-FIRED FURNACE WITH A HONEYWELL T87 OR EQUIVALENT NON-POWERED THERMOSTAT



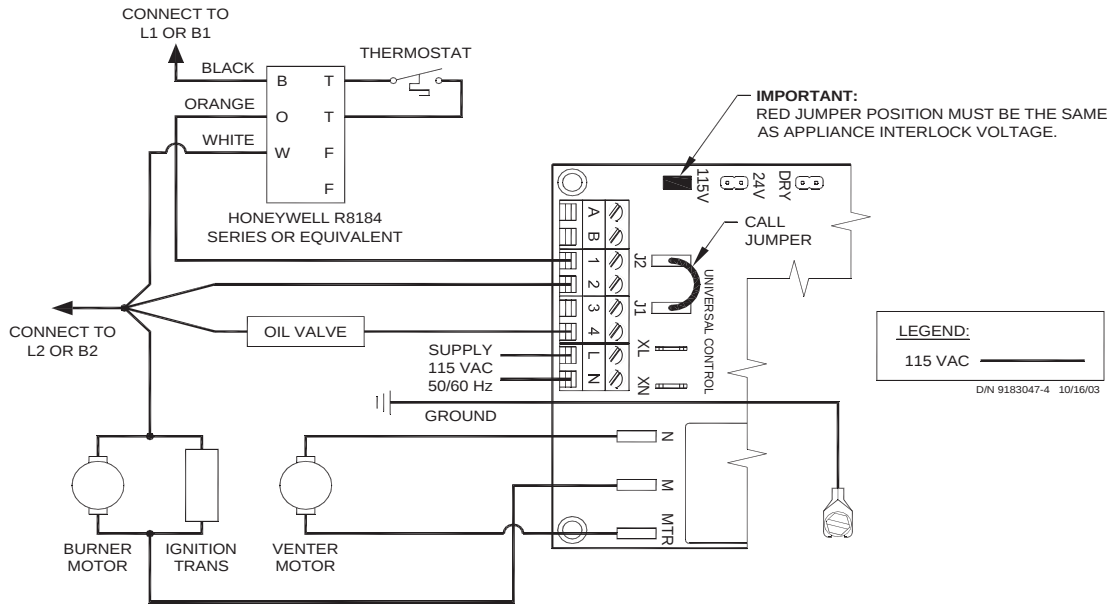
1. **IMPORTANT:** Remove J1 & J2 Call Jumper on UC1 to avoid backfeeds or short circuits.
 2. Connect T87 or Equivalent non-powered thermostat to A and B terminals on UC1.
 3. Remove T T Jumper from R8184 or equivalent Primary Control.
 4. Connect #3 on UC1 terminal block to T terminal of Primary Control.
 5. Connect #4 on UC1 terminal block to remaining T terminal of Primary Control.
 6. Make sure RED voltage jumper on UC1 is on DRY.
 7. Connect 115 VAC supply voltage to L & N terminals on UC1. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
 8. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather-proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.
- NOTE:** If burner safety control goes out on lockout, the Inducer will continue to run as long as a call for heat is present.

UC1 UNIVERSAL CONTROL CONNECTED TO A HONEYWELL R8184 SERIES OR EQUIVALENT PRIMARY CONTROL



1. Separate the Black burner motor wire from the Orange wire of R8184 Primary Control.
NOTE: Do not separate the ignition transformer wire from the Orange.
2. Connect Orange wire of R8184 to #1 on UC1 terminal block.
3. Connect #2 on UC1 terminal block to White on R8184 and L2 or B2.
4. Connect Black of burner motor to #4 on UC1 terminal block.
5. Make sure RED voltage jumper on UC1 is on 115V.
6. Connect 115 VAC supply voltage to L & N terminals on UC1. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
7. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather-proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

UC1 UNIVERSAL CONTROL CONNECTED WITH A HONEYWELL R8184 SERIES OR EQUIVALENT PRIMARY CONTROL AND A BURNER MOTOR POST-PURGE



1. Separate the burner motor wire and ignition transformer from the Orange wire of R8184.
2. Connect the Orange of R8184 to #1 on UC1 terminal block.
3. Connect #2 on UC1 terminal block to White on R8184 and L2 or B2.
4. Connect the HOT wire of oil solenoid valve to #4 on UC1 terminal block and neutral wire to White or N.
5. Connect burner motor and ignition transformer HOT wires to M terminal on UC1 and neutrals to White or N.
6. Make sure RED voltage jumper on UC1 is on 115V.
7. Connect 115 VAC supply voltage to L & N terminals on UC1. Connect the 2 green ground wires in UCRT to supply ground.
Important: Installer must supply overload and disconnect protection.
8. If not previously completed, connect Black, White and Red leads from UCRT to like colors in Rooftop Inducer whip 4x4 weather proof junction box. Connect the Green/Yellow ground lead in UCRT to the ground screw in the Rooftop Inducer whip 4x4 weatherproof box. Connect Blue and Yellow leads from UCRT to PSA-1 Fan Prover switch. Prover Leads are not polarity sensitive.

PSA-1 FAN PROVING SWITCH ADJUSTMENT

NOTE: This section is also repeated in the Rooftop Inducer instruction manual.

1. Drill an appliance draft sampling hole in the vent riser after each draft diverter or between the flue outlet and the draft hood / barometric draft control of each appliance. For most oil burners sample over-fire draft. Connect draft gauge to sampling hole, (See Diagram A).
2. For installations with a barometric draft control: Adjust weight on draft control to minimum or most responsive position (Less Draft).
3. **WARNING: This step requires that the wires connected to the PSA-1 Fan Prover terminals be temporarily removed and jumpered together. Disconnect power before proceeding.**

Remove power source and connect leads attached to the C (common) and N/O (normally open) terminals of the PSA-1 together. Attach a continuity tester to the C and N/O terminals of the PSA-1 Switch. Turn the PSA-1 adjustment screw counter clockwise until it seats against the stop. **The PSA-1 must be reconnected to the interlocked heaters(s) per the appropriate wiring diagram after completing these procedures. Failure to do so may result in a hazardous condition such as an explosion, fire or carbon monoxide poisoning resulting in property damage, personal injury or death.** The UC1 interlock control number 9 dip switch should be up or "ON" so the Pre-Cycle Prover Status check is deactivated.

Close all access doors and openings to the mechanical room that would typically be closed during heating equipment operation. Fire all other heating equipment not connected to this vent system and operate exhaust fans or air consuming devices within the facility that could affect the air pressure of the mechanical room.

4. Activate Rooftop Inducer and adjust balancing baffle(s) or speed control so that (-0.08" W.C. or -20 Pa) is read at the appliance draft sampling position(s) referenced in Step 1. The PSA-1 switch contacts should close. If switch contacts do not close move pressure sampling probe closer to the Inducer. **Do not** move sampling probe between manual damper and Inducer inlet.

DIAGRAM A

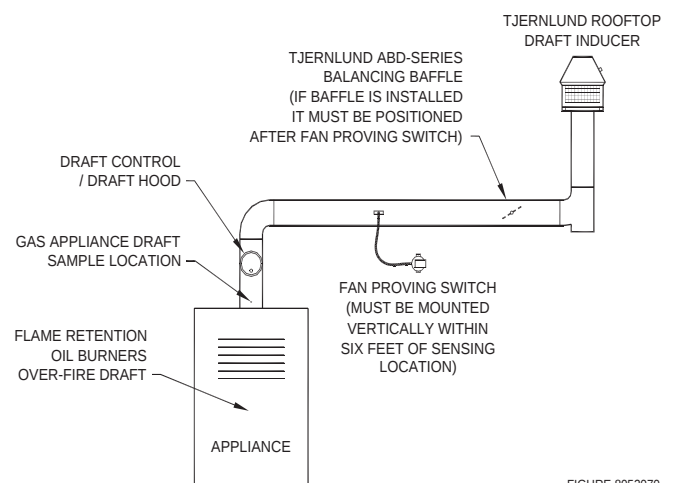


FIGURE 8052070

5. Activate burner(s) at full capacity. Gradually adjust balancing baffle(s) or speed control to maintain a slight negative draft (-0.02" to -0.05" W.C. or -5 to -12.5 Pa) at the heater's draft sampling location(s). Allow vent temperatures to reach steady state by referencing breaching flue gas temperatures.
6. Once flue gas temperatures have stabilized, verify that balancing baffle(s) or speed control are adjusted so that a slight negative draft (-0.02" to -0.05" W.C or -5 to -12.5 PA) is measured at draft sampling location(s). Individual appliance vent connections may require balancing baffles to evenly regulate draft.
7. Adjust balancing baffle(s) or speed control so that a slight positive draft (neutral to +0.01" W.C. or +2.5 Pa) is measured at the appliance draft sampling location. Flue gases should just start to spill from the draft hood/draft diverter or barometric draft control.
8. Turn the PSA-1 Fan Prover Switch adjustment screw clockwise in 1/6-turn increments, waiting 2-3 seconds after each adjustment until the pressure switch opens and no continuity is read. Shut off heater for 5 minutes while continuing to allow Inducer to operate.
9. Fire heater and readjust the balancing baffle(s) or speed control so that a negative draft (-0.02 to -0.05" W.C. or -5 to -12.5 Pa) is once again measured at the appliance draft sampling location. This readjustment must be enough to cause the PSA-1 Fan Prover Switch to close. The PSA-1 may take a few moments to close after each adjustment.
10. Confirm Fan Prover Switch set point by adjusting balancing baffle(s) or speed control so that a slight positive draft (neutral to +0.01" W.C. or +2.5 Pa) is measured at the appliance draft sampling location. Flue gases should just start to spill from the draft hood/draft diverter or barometric draft control and the Fan Prover Switch should open. Readjust the balancing baffle(s) or speed control so that a negative draft (-0.02 to -0.05" W.C. or -5 to -12.5 Pa) is once again measured at the appliance draft sampling location. Verify that the PSA-1 Fan Prover Switch closes.
11. **IMPORTANT:** Reconnect PSA-1 Fan Prover leads to switch that were jumpered together in Step # 3. Run entire heating/vent system through 3 cycles to verify proper burner light off and operation. Verify that each appliance lights off properly with all other appliances not firing. If barometric draft control(s) are excessively open, adjust weight so the draft control damper opens less and repeat process starting with Step # 3.
12. Use a permanent marker or sticker to make a mark on speed control faceplate where final adjustment was, (See Diagram B).
13. Sign and date these instructions to verify that the PSA-1 Fan Prover interlock was completed.

DIAGRAM B



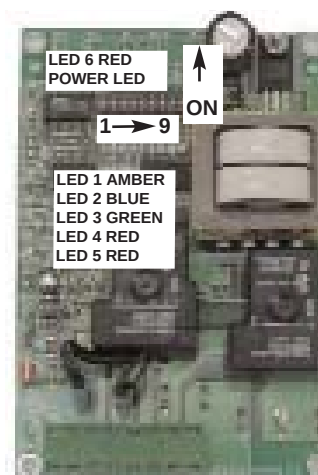
These instructions must remain on site. SIGN: _____ DATE : _____

COMBUSTION AIR

Adequate combustion air is vital for proper combustion and for safe venting. Likewise, for proper Inducer performance, adequate combustion air must be available to the appliance. Many installers assume adequate combustion air is present, especially in older structures. In some cases this is a false assumption, because many structures have been made "tight" due to weatherization. Size the combustion air opening(s) into the equipment room as outlined in NFPA 31, 54 & 211. Tjernlund's IN-FORCER™ combustion air intake systems provide a convenient, automated way to supply combustion air to the equipment room. When installing the Rooftop Inducer it is not necessary to supply any more combustion air than normally required when conventional venting.

UC1 UNIVERSAL CONTROL OPERATIONAL CHECK

1. Confirm power is supplied to the Control. LED #6 (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 Inducer motor. LED #3 (GREEN) should be on.
4. If the safety circuit across P1 & P2 (Inducer Prover) is closed, indicating an approved condition, the appliance interlock relay will close making terminal #3 closed to terminal #4 & LED #2 (BLUE). Appliance burner should fire.
5. Remove power to the UC1 and any interlocked appliances. The LED #6 (RED) or any LED's should not be on. Test the safety circuit by removing the Blue or Yellow Lead from PSA-1 Fan Proving Switch. Do not let the opened Lead touch a ground or damage may occur to the control when power is Reestablished. Reestablish power to the UC1 and interlocked appliances and initiate a call for heat. After 60 seconds a Prover Start Up fault should arise with LED #4 flashing 3 times.
6. Remove appliance call for heat and power to the UC1 and any interlocked appliances. The LED #6 (RED) or any LED's should not be on. Reconnect Blue or Yellow Fan Prover lead to PSA-1 Fan Proving 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.



RESETTING FAULT CODE CREATED BY STEP 5 OF OPERATIONAL CHECK

IMPORTANT: Prior to accessing the fault code memory, note the settings of the dip switches so that they can be returned to their original Pre / Post-Purge positions. When power is supplied to the UC1 use caution when moving dip switches.

The last fault code can be retrieved at any time by setting all dip switches 1-8 to the up, or "on" position. The last fault code, or lack thereof, will be indicated by counting the number of times LED 4 flashes. By moving any of the dip switches back to their original position, the fault code will be cleared. **NOTE:** The UC1 board must have its 115 VAC power supply present when any of the (1-8) dip switches are moved back to their original position for the fault code to clear.

⚠ WARNING

The following guide is intended to be used if a problem occurs during the use of the Inducer 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: If the call for heat interlock signal or 115 VAC power is removed, the UC1 board will reset and any fault, if present, will be stored in memory instead of displayed. See page 3, "Checking Memory for Last Fault Code".

LED STATUS & FAULT INDICATORS**LED INDICATOR LIGHTS**

LED #1 (Amber)	Appliance call for heat.
LED #2 (Blue)	Safety circuit through P1 & P2 (Inducer Fan Prover and/or Limit). Indicates Inducer prover is closed during run cycle. Burner circuit is energized with Interlock Relay contact closure from terminal 3 to 4.
LED #3 (Green)	Power switched to Inducer motor from L to MTR & M.
LED #4 (Red)	Status / Fault indicator.
LED #5 (Red)	Used as a status indicator.
LED #6 (Red)	115 VAC power supplied to board.

LED STATUS INDICATORS

LED #4 & #5 (Red) Flashing Alternately	= Inducer in Pre-purge. (Pre-Purge options 0, 5, 20, 35 seconds)
LED #4 & #5 (Red) Flashing in Unison	= Inducer in Post-Purge. (Post-Purge options 0, 30 seconds or 1, 2, 4, 8, 16 minutes)
LED #4 Flashes Continuously*	= Fan Prover opened for more than 10 seconds during burner cycle. (Inducer will run for 10 minutes, attempting to make Fan Prover)
LED #5 (Red) Flashing Intermittently	= With no call for heat, flashes 3 seconds on / 3 seconds off if microcontroller is working properly.

LED FAULT INDICATORS

Fault conditions are indicated by counting the number of times LED #4 (Red) flashes.

LED #4 Flashes 2 Times	Fan Prover was in electrically closed position prior to Inducer operation.
LED #4 Flashes 3 Times*	Fan Prover does not close within 60 seconds after call for heat.
LED #4 Flashes 4 Times*	Fan Prover did not re-close after 10 minutes of Inducer operation.
LED #4 Flashes 5 Times*	Fan Prover opened for more than 10 seconds during burner cycle but closed within 10 minutes.

* Investigate cause of Fan Prover short cycling such as; Firing burner at capacities or temperatures exceeding Inducer limits, excessive vent pipe runs, high winds, plugged / kinked Fan Prover sensing tube or a faulty Fan Prover switch.

IMPORTANT: Fault codes will automatically be displayed after a fault condition occurs. If the call for heat interlock signal or 115 VAC power is removed, the UC1 board will reset and the fault will be stored in memory instead of displayed. Any new fault will replace any previous fault.

SYMPTOM 1: INDUCER OPERATES CONTINUOUSLY

Verify that Inducer 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 & #5 (Red) will flash in unison during post-purge. An Inducer pre-purge could also be set for up to 35 seconds. LED #4 & #5 (Red) will flash alternately during pre-purge. See "Pre / Post-Purge Settings" on page 3.

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

Yes, LED #1 (Amber) is lit: Check interlock wiring. Confirm burner control(s) are functioning properly. UC1 control is receiving constant call for heat signal.

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

SYMPTOM 2: INDUCER MOTOR DOES NOT OPERATE

Verify that UC1 control has power, LED #6 (Red) should be lit. Verify that LED# 4 (Red) is not flashing. See "LED Status & Fault Indicators" above if flashing. Verify RED voltage selection jumper corresponds with interlock voltage (i.e 24V, 115V or "Dry").

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

Yes, LED #6 (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 motor speed control is switched ON and check for voltage in UCRT across Red from speed control and White or Neutral.

No voltage present from speed control: Replace UCRT Speed Control part number 950-8601.

Voltage present from speed control: Confirm voltage is present across Red & White lead in Rooftop Inducer 4x4 weatherproof junction box.

Voltage present: Inducer capacitor or motor may be defective.

SYMPTOM 3: INDUCER OPERATES, BUT BURNER DOES NOT

For any newly established call for heat the Inducer will run for 60 seconds to try to close the fan prover circuit (P1 to P2). If circuit can not be made within 60 seconds LED #4 (Red) will flash 3 times, indicating a prover check circuit fault on UC1 start up. **NOTE:** The UC1 safety circuit and LED #4 (Red) will be reset if the call for heat interlock signal or 115 VAC power is removed. If the fan prover makes on start up, but breaks for more than 10 seconds during the burner cycle, LED #4 will flash continuously indicating a prover circuit fault. The Inducer will continue to run for 10 minutes to try to make the prover circuit as long as a call for heat exists. If Prover does not make within 10 minutes, the UC1 will shut down and LED #4 (Red) will flash 4 times indicating a prover circuit fault. Remove the call for heat and then reestablish to reset the UC1 prover safety circuit (P1 to P2) & LED #4 (Red).

Verify that LED #2 (Blue) is lit.

Yes, LED #2 (Blue) is lit: Verify that "call jumper" is connected from J1 to J2 on UC1 circuit board if using typical wiring where supply voltage from terminal 1 is routed to terminal 3 through "call jumper" then to 4 when appliance interlock relay makes. 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 or confirm burner control(s) are functioning properly. **NOTE:** If a different voltage source is provided to terminal 3 which is switched to terminal 4 or when using the A-B dry contacts, voltage measurements may not apply. For millivolt installations make sure system Limits are reset and relight pilot.

No, LED #2 (Blue) is not lit: Remove power from UC1 and push dip switch #9 up or "on" to deactivate Fan Prover status check which should always be deactivated with a Rooftop Inducer. Remove P1 and P2 prover leads off of Fan Prover switch and jumper together. Reestablish power and call for heat. After Inducer pre-purge, if set (up to 35 seconds), LED #2 (Blue) should light.

No, LED #2 (Blue) does not light: Replace UC1 circuit board, part number 950-8804.

Yes, LED #2 (Blue) lights up: The fan proving switch may not be closing, wiring connections are incorrect/broken or burner control(s) are not functioning properly. With Inducer running, verify that Inducer performance is sufficient to close Fan Prover contacts by checking for continuity across switch. Adjust speed control to a higher speed if necessary. Replace Fan Prover leads from P1 and P2 back on Fan Proving switch.

No, continuity is not present: Confirm that burner is not firing at capacities or temperatures exceeding Inducer limits. Check for excessive vent pipe runs, high winds, plugged / kinked Fan Prover sensing tube or a faulty Fan Prover switch. If everything checks out okay, perform "PSA-1 Fan Proving Switch Adjustment" procedure again on page 11 or replace Fan Prover.

Yes, continuity present: Recheck wiring and burner control(s).

HOW TO OBTAIN SERVICE ASSISTANCE

1. If you have any questions about your UCRT Universal Control or if it 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 with the following information.
 1. Model of the Inducer that UCRT is interlocked with as shown on the label attached to Inducer.
 2. Name and address of installer and any service agency who performed work on UCRT or Inducer.
 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 UCRT for one 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 UCRT if it is operative, except for the defective part.

Tjernlund Products, Inc. will issue credit or provide a free part to replace one that becomes defective during the one year warranty period. Proof of date of the installation in the form of the contractor sales/installation receipt is necessary to prove the unit has been in service for under one year. All receipts should include the date code of the UCRT to ensure that the defective component corresponds with the complete unit. This will help preclude possible credit refusal.

- 1.) Follow troubleshooting guide to determine defective component. If unable to determine faulty component, contact your Tjernlund distributor or Tjernlund Technical Customer Service 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 UCRT 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 part has been returned prepaid to Tjernlund and verified defective.

WHAT IS NOT COVERED

Product installed contrary to our installation instructions, altered, neglected or misused
Product that has been wired incorrectly
Product that has been damaged by a malfunctioning or maladjusted 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

Component

Universal Control Circuit Board
UCRT Speed Control

Part Number

950-8804
950-8601

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.