



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

**Request for
 Quotation**

RFQ NUMBER
DNR209084

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
**FRANK WHITTAKER
 304-558-2316**

RFQ COPY
 TYPE NAME/ADDRESS HERE

VENDOR

SHIP TO

DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
12/16/2008				

BID OPENING DATE: **02/04/2009** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	LS		031-06		
<p>AIR CONDITIONING AND HEATING, CENTRAL UNITS</p> <p>THE WEST VIRGINIA/ THE WEST VIRGINIA/ SOLICITING BIDS F CONDITIONING (HVA LOST RIVER STATE ATTACHED SPECIFIC</p> <p>A MANDAYORY PRE-BI 10:00 AM AT THE PAI</p> <p>THE TECHNICAL QUESTIONS MUST BE SUBMITTED IN WRITING TO FRANK WHITTAKER IN THE WEST VIRGINIA PURCHASING DIVISION VIA FAX AT 304-558-4115 OR VIA EMAIL AT FRANK.M.WHITTAKER@WV.GOV. DEADLIND FOR ALL TECNICAL QUESTIONS IS 01/16/09 AT 3:00 PM. ALL TECHNICAL QUESTIONS RECEIVED, IF ANY WILL BE ANSWERED BY ADDENDUM AFTER THE DEADLINE.</p> <p>EXHIBIT 5</p> <p>WEST VIRGINIA CODE 21-1D-5 PROVIDES THAT: ANY SOLICITA TION FOR A PUBLIC IMPROVEMENT CONSTRUCTION CONTRACT REQUIRES EACH VENDOR THAT SUBMITS A BID FOR THE WORK TO SUBMIT AT THE SAME TIME AN AFFIDAVIT OF COMPLIANCE WITH THE BID. THE ENCLOSED PURCHASING AFFIDAVIT MUST BE SIGNED AND SUBMITTED WITH THE BID AS EVIDENCE OF THE VENDOR'S COMPLIANCE WITH THE PROVISIONS OF ARTICLE 1D,</p>						

RECEIVED
 2009 FEB 10 A 8:13
 PURCHASING DIVISION
 STATE OF WV

INCY,
 IS

... 13/09 AT

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE TELEPHONE **304 765 5833** DATE **2/3/09**

TITLE **Friskhal** FEIN **550653057** ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. All quotations are governed by the *West Virginia Code* and the *Legislative Rules* of the Purchasing Division.
4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125 fee.
5. All services performed or goods delivered under State Purchase Order/Contracts are to be continued for the term of the Purchase Order/Contracts, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.
6. Payment may only be made after the delivery and acceptance of goods or services.
7. Interest may be paid for late payment in accordance with the *West Virginia Code*.
8. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
11. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.
12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this Contract may be deemed null and void, and terminated without further order.
14. **HIPAA BUSINESS ASSOCIATE ADDENDUM:** The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site (<http://www.state.wv.us/admin/purchase/vrc/hipaa.htm>) is hereby made part of the agreement. Provided that, the Agency meets the definition of a Cover Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.
15. **WEST VIRGINIA ALCOHOL & DRUG-FREE WORKPLACE ACT:** If this Contract constitutes a public improvement construction contract as set forth in Article 1D, Chapter 21 of the West Virginia Code ("The West Virginia Alcohol and Drug-Free Workplace Act"), then the following language shall hereby become part of this Contract: "The contractor and its subcontractors shall implement and maintain a written drug-free workplace policy in compliance with the West Virginia Alcohol and Drug-Free Workplace Act, as set forth in Article 1D, Chapter 21 of the West Virginia Code. The contractor and its subcontractors shall provide a sworn statement in writing, under the penalties of perjury, that they maintain a valid drug-free work place policy in compliance with the West Virginia and Drug-Free Workplace Act. It is understood and agreed that this Contract shall be cancelled by the awarding authority if the Contractor: 1) Fails to implement its drug-free workplace policy; 2) Fails to provide information regarding implementation of the contractor's drug-free workplace policy at the request of the public authority; or 3) Provides to the public authority false information regarding the contractor's drug-free workplace policy."

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division.
2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Complete all sections of the quotation form.
4. Unit prices shall prevail in case of discrepancy.
5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications: Department of Administration, Purchasing Division, 2019 Washington Street East, P.O. Box 50130, Charleston, WV 25305-0130



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNR209084

PAGE
2

ADDRESS CORRESPONDENCE TO ATTENTION OF:
FRANK WHITTAKER
304-558-2316

RFQ COPY
 TYPE NAME/ADDRESS HERE

DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372

DATE PRINTED 12/16/2008	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
BID OPENING DATE: 02/04/2009		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>CHAPTER 21 OF THE WEST VIRGINIA CODE. FAILURE TO SUBMIT THE SIGNED PURCHASING AFFIDAVIT WITH THE BID SHALL RESULT IN DISQUALIFICATION OF SUCH BID.</p> <p>NOTICE TO PROCEED: THIS CONTRACT IS TO BE PERFORMED WITHIN 45 CALENDAR DAYS AFTER THE NOTICE TO PROCEED IS RECEIVED. NOTICE TO PROCEED WILL BE ISSUED BY THE AGENCY IN WRITING.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE MATERIALS OR WORKMANSHIP SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM WITH THE SPECIFICATIONS OF THE BID AND CONTRACT HERE IN.</p> <p>WAGE RATES: THE CONTRACTOR OR SUBCONTRACTOR SHALL PAY THE HIGHER OF THE U.S. DEPARTMENT OF LABOR MINIMUM WAG RATES AS ESTABLISHED FOR HARDY COUNTY, PURSUANT TO WEST VIRGINIA CODE 21-5A, ET, SEQ. (PREVAILING WAGE RATES APPLY TO THIS PROJECT)</p> <p>ARBITRATION: ANY REFERENCES MADE TO ARBITRATION OR INTEREST FOR PAYMENTS DUE (EXCEPT FOR ANY INTEREST REQUIRED BY STATE LAW) CONTAINED IN THIS CONTRACT OR IN ANY AMERICAN INSTITUTE OF ARCHITECTS DOCUMENTS PERTAINING TO THIS CONTRACT ARE HEREBY DELETED.</p> <p>WORKERS' COMPENSATION: VENDOR IS REQUIRED TO PROVIDE A CERTIFICATE FROM WORKERS' COMPENSATION IF SUCCESSFUL</p> <p>ALL OF THE ITEMS CHECKED BELOW WILL BE A REQUIREMENT OF THIS CONTRACT:</p> <p>(XX) INSURANCE: SUCCESSFUL VENDOR SHALL FURNISH PROOF OF COMMERCIAL GENERAL LIABILITY INSURANCE PRIOR TO</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNR209084

PAGE
3

ADDRESS CORRESPONDENCE TO ATTENTION OF
**FRANK WHITTAKER
 304-558-2316**

RFQ COPY

TYPE NAME/ADDRESS HERE

SHIP TO

**DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372**

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
12/16/2008				

BID OPENING DATE: **02/04/2009** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>ISSUANCE OF CONTRACT. UNLESS OTHERWISE SPECIFIED IN THE BID DOCUMENTS, THE MINIMUM AMOUNT OF INSURANCE COVERAGE REQUIRED IS \$250,000.</p> <p>() BUILDERS RISK INSURANCE: SUCCESSFUL VENDOR SHALL FURNISH PROOF OF BUILDERS RISK - ALL RISK INSURANCE IN AN AMOUNT EQUAL TO 100% OF THE AMOUNT OF THE CONTRACT.</p> <p>(XX) BONDS: FIVE PERCENT (5%) OF THE TOTAL AMOUNT OF THE BID PAYABLE TO THE STATE OF WEST VIRGINIA, SHALL BE SUBMITTED WITH EACH BID AS A BID BOND. THE SUCCESSFUL BIDDER SHALL ALSO FURNISH A PERFORMANCE BOND AND LABOR MATERIAL BOND FOR 100% OF THE AMOUNT OF THE CONTRACT. BONDS MAY BE PROVIDED IN THE FORM OF A CERTIFIED CHECK, IRREVOCABLE LETTER OF CREDIT, OR BOND FURNISHED BY A SOLVENT SURETY COMPANY AUTHORIZED TO DO BUSINESS IN THE STATE OF WEST VIRGINIA. A LETTER OF CREDIT SUBMITTED IN LIEU OF A BOND WILL ONLY BE ALLOWED FOR PROJECTS UNDER \$100,000. PERSONAL OR BUSINESS CHECKS ARE NOT ACCEPCTABLE IN LIEU OF THE 5% BID BOND, PERFORMANCE BOND, OR LABOR AND MATERIAL BOND.</p> <p>() MAINTENANCE BOND: A TWO (2) YEAR MAINTENANCE BOND COVERING THE ROOFING SYSTEM WILL BE A REQUIREMENT OF THE SUCCESSFUL VENDOR.</p> <p>REV. 11/00</p> <p>EXHIBIT 7</p> <p>DOMESTIC ALUMINUM, GLASS & STEEL IN PUBLIC WORKS PROJECTS</p> <p>IN ACCORDANCE WITH WEST VIRGINIA CODE 5-19-1 ET., SEQ., EVERY CONTRACT FOR CONSTRUCTION, RECONSTRUCTION,</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNR209084

PAGE
4

ADDRESS CORRESPONDENCE TO ATTENTION OF
**FRANK WHITTAKER
 304-558-2316**

RFQ COPY
 TYPE NAME/ADDRESS HERE

DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
12/16/2008				

BID OPENING DATE: **02/04/2009** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
				<p>ALTERATION, REPAIR, IMPROVEMENT OR MAINTENANCE OF PUBLIC WORKS, WHERE THE COST IS MORE THAN \$50,000 AND, IN THE CASE OF STEEL ONLY, WHERE THE COST OF STEEL IS MORE THAN \$50,000 OR WHERE MORE THAN 10,000 POUNDS OF STEEL ARE REQUIRED, THE STATE WILL ACCEPT ONLY ALUMINUM GLASS, OR STEEL PRODUCTS PRODUCED IN THE UNITED STATES IN ADDITION, ITEMS OF MACHINERY OR EQUIPMENT PURCHASED FOR USE AT THE SITE OF PUBLIC WORKS SHALL BE MADE OF DOMESTIC ALUMINUM, GLASS OR STEEL, UNLESS THE COST OF THE PRODUCT IS LESS THAN \$50,000 OR LESS THAN 10,000 POUNDS OF STEEL ARE USED IN PUBLIC WORKS PROJECTS.</p> <p>FOREIGN MADE ALUMINUM, GLASS OR STEEL PRODUCTS MAY BE ACCEPTED ONLY IF THE COST OF DOMESTIC PRODUCTS IS FOUND TO BE UNREASONABLE. SUCH COST IS UNREASONABLE IF IT IS 20% OR MORE HIGHER THAN THE BID PRICE FOR FOREIGN MADE PRODUCTS. IF THE DOMESTIC ALUMINUM, GLASS OR STEEL PRODUCTS TO BE SUPPLIED OR PRODUCED IN A "SUBSTANTIAL LABOR SURPLUS AREA", AS DEFINED BY THE UNITED STATES DEPARTMENT OF LABOR, FOREIGN PRODUCTS MAY BE SUPPLIED ONLY IF DOMESTIC PRODUCTS ARE 30% OR MORE HIGHER IN PRICE THAN THE FOREIGN MADE PRODUCTS.</p> <p>IF, PRIOR TO THE AWARD OF A CONTRACT UNDER THE ABOVE PROVISIONS, THE SPENDING OFFICER OF THE SPENDING UNIT DETERMINES THAT THERE EXISTS A BID FOR LIKE FOREIGN ALUMINUM, GLASS OR STEEL THAT IS REASONABLE AND LOWER THAN THE LOWEST BID DOMESTIC PRODUCTS, THE SPENDING OFFICE MAY REQUEST, IN WRITING, A REEVALUATION AND REDUCTION IN THE LOWEST BID FOR SUCH DOMESTIC PRODUCTS ALL VENDORS MUST INDICATE IN THEIR BID IF THEY ARE SUPPLYING FOREIGN ALUMINUM, GLASS OR STEEL.</p> <p>REV. 3/88</p>		

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNR209084

PAGE
5

ADDRESS CORRESPONDENCE TO ATTENTION OF
**FRANK WHITTAKER
 304-558-2316**

RFQ COPY
 TYPE NAME/ADDRESS HERE

**DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372**

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
12/16/2008				

BID OPENING DATE: **02/04/2009** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>EXHIBIT 9</p> <p>NOTICE FOR ISSUANCE & ACKNOWLEDGEMENT OF CONSTRUCTION PROJECT ADDENDA</p> <p>THE ARCHITECT/ENGINEER AND/OR AGENCY SHALL BE REQUIRED TO ABIDE BY THE FOLLOWING SCHEDULE IN ISSUING CONSTRUCTION PROJECT ADDENDA FOR STATE AGENCIES:</p> <p>(1) THE ARCHITECT/ENGINEER SHALL PREPARE THE ADDENDUM AND A LIST OF ALL PARTIES THAT HAVE PROCURED DRAWINGS AND SPECIFICATIONS FOR THE PROJECT. THE ADDENDUM AND LIST SHALL BE FORWARDED TO THE BUYER IN THE STATE PURCHASING DIVISION. THE ARCHITECT/ENGINEER SHALL ALSO SEND A COPY OF THE ADDENDUM TO THE STATE AGENCY FOR WHICH THE CONTRACT IS ISSUED.</p> <p>(2) THE BUYER SHALL SEND THE ADDENDUM TO ALL INTERESTED PARTIES AND, IF NECESSARY, EXTEND THE BID OPENING DATE. ANY ADDENDUM SHOULD BE RECEIVED BY THE BUYER WITHIN FOURTEEN (14) DAYS PRIOR TO THE BID OPENING DATE.</p> <p>(3) ALL ADDENDA SHOULD BE FORMALLY ACKNOWLEDGED BY ALL BIDDERS AND SUBMITTED TO THE STATE PURCHASING DIVISION. THE SAME RULES AND REGULATIONS THAT APPLY TO THE ORIGINAL BIDDING DOCUMENT SHALL ALSO APPLY TO AN ADDENDUM DOCUMENT. THE ONLY EXCEPTION MAY BE FOR AN ADDENDUM THAT IS ISSUED FOR THE SOLE PURPOSE OF CHANGING A BID OPENING TIME AND/OR DATE.</p> <p>REV. 11/96</p> <p>EXHIBIT 10</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFO NUMBER
DNR209084

PAGE
6

ADDRESS CORRESPONDENCE TO ATTENTION OF:
**FRANK WHITTAKER
 304-558-2316**

RFQ COPY
 TYPE NAME/ADDRESS HERE

DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372

DATE PRINTED 12/16/2008	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
BID OPENING DATE: 02/04/2009		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>ADDENDUM ACKNOWLEDGEMENT</p> <p>I HEREBY ACKNOWLEDGE RECEIPT OF THE FOLLOWING CHECKED ADDENDUM(S) AND HAVE MADE THE NECESSARY REVISIONS TO MY PROPOSAL, PLANS AND/OR SPECIFICATION, ETC.</p> <p>ADDENDUM NOS.:</p> <p>NO. 1 .. 2/2/09</p> <p>NO. 2</p> <p>NO. 3</p> <p>NO. 4</p> <p>NO. 5</p> <p>I UNDERSTAND THAT FAILURE TO CONFIRM THE RECEIPT OF THE ADDENDUM(S) MAY BE CAUSE FOR REJECTION OF THE BIDS.</p> <p>VENDOR MUST CLEARLY UNDERSTAND THAT ANY VERBAL REPRESENTATION MADE OR ASSUMED TO BE MADE DURING ANY ORAL DISCUSSION HELD BETWEEN VENDOR'S REPRESENTATIVES AND ANY STATE PERSONNEL IS NOT BINDING. ONLY THE INFORMATION ISSUED IN WRITING AND ADDED TO THE SPECIFICATIONS BY AN OFFICIAL ADDENDUM IS BINDING.</p> <p>..... SIGNATURE</p> <p>Krebs Frueh Generation Inc COMPANY</p> <p>2/3/09 DATE</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS			
SIGNATURE 	TELEPHONE 304 765 5853	DATE 2/3/09	
TITLE President	FEIN 550653057	ADDRESS CHANGES TO BE NOTED ABOVE	

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNR209084

PAGE
8

ADDRESS CORRESPONDENCE TO ATTENTION OF
**FRANK WHITTAKER
 304-558-2316**

VENDOR

**RFQ COPY
 TYPE NAME/ADDRESS HERE**

SHIP TO

**DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372**

DATE PRINTED 12/16/2008	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
BID OPENING DATE: 02/04/2009		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
<p>ANY INFORMATION PROVIDED IN SPECIFICATION MANUALS, OR ANY OTHER SOURCE, VERBAL OR WRITTEN, WHICH CONTRADICTS OR ALTERS THE INFORMATION PROVIDED FROM THE SOURCES AS DESCRIBED IN THE ABOVE PARAGRAPH IS VOID AND OF NO EFFECT.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.</p> <p>REV. 1/2005</p> <p style="text-align: center;">NOTICE</p> <p>A SIGNED BID MUST BE SUBMITTED TO:</p> <p style="text-align: center;">DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED:</p> <p>SEALED BID</p> <p>BUYER: 44</p> <p>REQ. NO.: DNR209084</p> <p>BID OPENING DATE: 02/04/09</p>						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE	TELEPHONE	DATE
TITLE	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
DNR209084

PAGE
9

ADDRESS CORRESPONDENCE TO ATTENTION OF
**FRANK WHITTAKER
 304-558-2316**

RFQ COPY
 TYPE NAME/ADDRESS HERE

POSTER

SHIP TO

**DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372**

DATE PRINTED 12/16/2008	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
-----------------------------------	---------------	----------	--------	---------------

BID OPENING DATE: **02/04/2009** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UQP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
BID OPENING TIME:				1:30 PM		
PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID:						
				304 765 2063		
PLEASE PRINT OR TYPE NAME OF PERSON TO CONTACT CONCERNING THIS QUOTE:						
				Shane Orey		
***** THIS IS THE END OF RFQ DNR209084 ***** TOTAL:						90,230.13

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE 	TELEPHONE 304 765 5833	DATE 2/3/09
TITLE President	FERN 550653057	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

PURCHASING CONTINUATION SHEET

BUYER:	PAGE	Req. or PO#
		DNR209084

VENDOR

Richs Refrigeration, Inc.

Spending Unit:

DNR -

Item No:	Quantity	Description	Unit Price	Amount
1	7	Replacement of existing oil furnace units with new oil furnace units in cabin numbers 15, 16, 17, 18, 20, 22, and 23. The following equipment is to be installed in each cabin: Lennox Elite Series 023, 7400 BTU, 83% AFUE oil furnace or equal. Unit must have a lifetime warranty on heat exchanger with a minimum five (5) year warranty on remaining covered components.	6,564. ⁸⁹	45,954. ²³
2	9	Installation of air conditioning units in cabin numbers 14, 15, 16, 17, 18, 20, 22, 23 and 25. The following equipment is to be installed in each cabin: Lennox Merit Series 14ACX, 1 5 ton, 14 SEER air conditioner or equal. Unit must have a five(5) year warranty on compressor with a five (5) year warranty on remaining covered components.	3,022. ⁶²	27,203. ⁵⁸
3	9	Lennox Model C33 coil or equal	475. ⁹⁸	4,283. ⁸²
4	2	Installation of air conditioning units in cabin numbers 7 and 26 The following equipment is to be installed in each cabin: Lennox Merit Series 14ACX 2 5 ton unit or equal Unit must have a five(5) year warranty on compressor with a five (5) year warranty on remaining covered components.	3,659. ⁹³	7,319. ⁸⁶
5	2	Lennox Model C33 coil or equal.	475. ⁹⁸	951. ⁹⁶
6	11	Installation of thermostats in cabins 7, 14, 15, 16, 17, 18, 20, 22, 23, 25, and 26. The following equipment is to be installed in each cabin: Lennox ComfortSense 3000 Series non-programmable or equal	315. ⁸⁸	3,474. ⁶⁸
7	8	Cabins # 15,16,17,18,20,22,23,26 Installation of air filter racks	72. ⁵⁰	580. ⁰⁰
8	1	Cabin #25 Relocation of existing furnace to allow proper clearances for A/C and install air filter rack	482. ⁰⁰	482. ⁰⁰
		The scope of work includes the complete removal and disposal of all existing oil furnace units; installation and testing of new oil heat furnace units and air conditioning units; modifications to existing ductwork to achieve proper air flow, all grills/diffusers to have dampers West Virginia Building prevailing wage rates must be paid for Hardy County, West Virginia (http://www.wvsos.com/adlaw/wagerates/building/building08/hardy.pdf)		

ALL WORK MUST BE SCHEDULED THROUGH THE LOST RIVER STATE PARK MAIN OFFICE (304-897-5372) TO ACCOMMODATE CABIN RENTALS.

TOTAL THIS PAGE 90,250¹³

STATE OF WEST VIRGINIA
Purchasing Division**PURCHASING AFFIDAVIT****VENDOR OWING A DEBT TO THE STATE:**

West Virginia Code §5A-3-10a provides that: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

PUBLIC IMPROVEMENT CONTRACTS & DRUG-FREE WORKPLACE ACT:

West Virginia Code §21-1D-5 provides that: Any solicitation for a public improvement construction contract shall require each vendor that submits a bid for the work to submit at the same time an affidavit that the vendor has a written plan for a drug-free workplace policy in compliance with Article 1D, Chapter 21 of the West Virginia Code. A public improvement construction contract may not be awarded to a vendor who does not have a written plan for a drug-free workplace policy in compliance with Article 1D, Chapter 21 of the West Virginia Code and who has not submitted that plan to the appropriate contracting authority in timely fashion. For a vendor who is a subcontractor, compliance with Section 5, Article 1D, Chapter 21 of the West Virginia Code may take place before their work on the public improvement is begun.

ANTITRUST:

In submitting a bid to any agency for the state of West Virginia, the bidder offers and agrees that if the bid is accepted the bidder will convey, sell, assign or transfer to the state of West Virginia all rights, title and interest in and to all causes of action it may now or hereafter acquire under the antitrust laws of the United States and the state of West Virginia for price fixing and/or unreasonable restraints of trade relating to the particular commodities or services purchased or acquired by the state of West Virginia. Such assignment shall be made and become effective at the time the purchasing agency tenders the initial payment to the bidder.

I certify that this bid is made without prior understanding, agreement, or connection with any corporation, firm, limited liability company, partnership or person or entity submitting a bid for the same materials, supplies, equipment or services and is in all respects fair and without collusion or fraud. I further certify that I am authorized to sign the certification on behalf of the bidder or this bid.

LICENSING:

Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agencies or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

CONFIDENTIALITY:

The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures and rules. Vendors should visit www.state.wv.us/admin/purchase/privacy for the Notice of Agency Confidentiality Policies.

Under penalty of law for false swearing (West Virginia Code §61-5-3), it is hereby certified that the vendor acknowledges the information in this said affidavit and is in compliance with the requirements as stated.

Vendor's Name: Rich's Refrigeration IncAuthorized Signature: Date: 2/3/09

BID BOND PREPARATION INSTRUCTIONS

AGENCY _____ (A)
 RFQ/RFP# _____ (B)

Bid Bond

- (A) WV State Agency
(Stated on Page 1 "Spending Unit")
Request for Quotation Number (upper right corner of page #1)
- (C) Your Company Name
- (D) City, Location of your Company
- (E) State, Location of your Company
- (F) Surety Corporate Name
- (G) City, Location of Surety
- (H) State, Location of Surety
- (I) State of Surety Incorporation
- (J) City of Surety Incorporation
- (K) Minimum amount of acceptable bid bond is 5% of total bid. You may state "5% of bid" or a specific amount on this line in words.
- (L) Amount of bond in figures
- (M) Brief Description of scope of work
- (N) Day of the month
- (O) Month
- (P) Year
- (Q) Name of Corporation
- (R) Raised Corporate Seal of Principal
- (S) Signature of President or Vice President
- (T) Title of person signing
- (U) Raised Corporate Seal of Surety
- (V) Corporate Name of Surety
- (W) Signature of Attorney in Fact of the Surety

NOTE: Dated, Power of Attorney with Raised Surety Seal must accompany this bid bond.

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, _____ (C) of _____ (D), _____ (E) as Principal, and _____ (F) of _____ (G), _____ (H), a corporation organized and existing under the laws of the State of _____ (I) with its principal office in the City of _____ (J), as Surety, are held and firmly bound unto The State of West Virginia, as Obligee, in the penal sum of _____ (K) (\$ _____ (L)) for the payment of which, well and truly to be made, we jointly and severally bind ourselves, our heirs, administrators, executors, successors and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the Purchasing Section of the Department of Administration a certain bid or proposal, attached hereto and made a part hereof to enter into a contract in writing for _____ (M)

NOW THEREFORE.

(a) If said bid shall be rejected, or
 (b) If said bid shall be accepted and the Principal shall enter into a contract in accordance with the bid or proposal attached hereto and shall furnish any other bonds and insurance required by the bid or proposal, and shall in all other respects perform the agreement created by the acceptance of said bid then this obligation shall be null and void, otherwise this obligation shall remain in full force and effect. It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated

The Surety for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of time within which the Obligee may accept such bid: and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, Principal and Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be affixed hereto and these presents to be signed by their proper officers, this _____ (N) day of _____ (O), 20 _____ (P).

Principal Corporate Seal

(R)

 (Name of Principal)
 By _____
 (Must be President or Vice President)

 Title

Surety Corporate Seal

(U)

 (Name of Surety)

 Attorney-in-Fact

IMPORTANT – Surety executing bonds must be licensed in West Virginia to transact surety insurance. Raised Corporate Seals must be affixed and a Power of Attorney must be attached.

BID BOND

KNOW ALL MEN BY THESE PRESENTS, That we, the undersigned, _____
of _____, _____, as Principal, and _____
of _____, _____, a corporation organized and existing under the laws of the State of _____
with its principal office in the City of _____, as Surety, are held and firmly bound unto the State
of West Virginia, as Obligee, in the penal sum of _____ (\$ _____) for the payment of which,
well and truly to be made, we jointly and severally bind ourselves, our heirs, administrators, executors, successors and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the Purchasing Section of the
Department of Administration a certain bid or proposal, attached hereto and made a part hereof, to enter into a contract in writing for

NOW THEREFORE,

- (a) If said bid shall be rejected, or
- (b) If said bid shall be accepted and the Principal shall enter into a contract in accordance with the bid or proposal attached
hereto and shall furnish any other bonds and insurance required by the bid or proposal, and shall in all other respects perform the
agreement created by the acceptance of said bid, then this obligation shall be null and void, otherwise this obligation shall remain in full
force and effect. It is expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event,
exceed the penal amount of this obligation as herein stated.

The Surety, for the value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no
way impaired or affected by any extension of the time within which the Obligee may accept such bid, and said Surety does hereby
waive notice of any such extension.

IN WITNESS WHEREOF, Principal and Surety have hereunto set their hands and seals, and such of them as are corporations
have caused their corporate seals to be affixed hereunto and these presents to be signed by their proper officers, this
_____ day of _____, 20_____.

Principal Corporate Seal

(Name of Principal)

By _____

(Must be President or
Vice President)

(Title)

Surety Corporate Seal

(Name of Surety)

Attorney-in-Fact

**IMPORTANT -- Surety executing bonds must be licensed in West Virginia to transact surety insurance. Raised corporate seals
must be affixed, a power of attorney must be attached.**

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310

Bid Bond

KNOW ALL MEN BY THESE PRESENTS, that we

Rich's Refrigeration, Heating, Plumbing and Welding Services, Inc.
(Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and

(Here insert full name and address or legal title of Surety)

RLI Insurance Company

a corporation duly organized under the laws of the State of

Illinois

as Surety, hereinafter called the Surety, are held and firmly bound unto

(Here insert full name and address or legal title of Owner)

West Virginia Division of Natural Resources

as Obligee, hereinafter called the Obligee, in the sum of

5% of the Amount Bid

Dollars (\$ 5% of the Amount Bid)

for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for

(Here insert full name, address and description of project)

Lost Run State Park
Install 11 Air Conditioners and 7 Furnaces

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this 4th day of February 2009

[Signature]
(Witness)

[Signature]
(Witness)

Rich's Refrigeration, Heating, Plumbing and Welding Services, Inc.

(Principal)

(Seal)

[Signature]
(Title) President

RLI Insurance Company

(Surety)

(Seal)

[Signature]

DAVID A. SAMS ATTORNEY-IN-FACT



RLI Surety
 P.O. Box 3967 | Peoria, IL 61612-3967
 Phone: (800)645-2402 | Fax: (309)689-2036
 www.rlicorp.com

POWER OF ATTORNEY

RLI Insurance Company

Know All Men by These Presents:

That this Power of Attorney is not valid or in effect unless attached to the bond which it authorizes executed, but may be detached by the approving officer if desired.

That **RLI Insurance Company**, an Illinois corporation, does hereby make, constitute and appoint:

David A. Sams

in the City of Cincinnati, State of Ohio its true and lawful Agent and Attorney in Fact, with full power and authority hereby conferred, to sign, execute, acknowledge and deliver for and on its behalf as Surety, the following described bond.

Any and all bonds, undertakings, and recognizances in an amount not to exceed Ten Million Dollars (\$10,000,000) for any single obligation.

The acknowledgment and execution of such bond by the said Attorney in Fact shall be as binding upon this Company as if such bond had been executed and acknowledged by the regularly elected officers of this Company.

The **RLI Insurance Company** further certifies that the following is a true and exact copy of the Resolution adopted by the Board of Directors of **RLI Insurance Company**, and now in force to-wit:

"All bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, any Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or Agents who shall have authority to issue bonds, policies or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile."

IN WITNESS WHEREOF, the **RLI Insurance Company** has caused these presents to be executed by its Vice President with its corporate seal affixed this 13th day of August, 2008.

State of Illinois }
 County of Peoria } SS



RLI Insurance Company

By: [Signature]
 Roy C. Die Vice President

CERTIFICATE

On this 13th day of August, 2008, before me, a Notary Public, personally appeared Roy C. Die, who being by me duly sworn, acknowledged that he signed the above Power of Attorney as the aforesaid officer of the **RLI Insurance Company** and acknowledged said instrument to be the voluntary act and deed of said corporation.

I, the undersigned officer of **RLI Insurance Company**, a stock corporation of the State of Illinois, do hereby certify that the attached Power of Attorney is in full force and effect and is irrevocable; and furthermore, that the Resolution of the Company as set forth in the Power of Attorney, is now in force. In testimony whereof, I have hereunto set my hand and the seal of the **RLI Insurance Company** this 4th day of February, 2009.

By: [Signature]
 Jacqueline M. Bockler Notary Public

RLI Insurance Company

By: [Signature]
 Roy C. Die Vice President





State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 DNR209084

PAGE
 1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
 FRANK WHITTAKER
 304-558-2316

RFQ COPY

TYPE NAME/ADDRESS HERE

SHIP TO

DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
01/30/2009				

BID OPENING DATE: 02/10/2009 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
***** ADDENDUM NO. 1 *****						
THIS ADDENDUM IS ISSUED TO:						
1. REPLACE THE ORIGINAL SPECIFICATIONS WITH THE ATTACHED REVISED SPECIFICATIONS.						
2. TO PROVIDE PRE-BID SIGN SHEET, QUESTIONS & ANSWERS RESULTING FROM THE PRE-BID MEETING HELD ON 01/13/09						
3. PROVIDE THE WEST VIRGINIA DRUG FREE WORKPLACE CONFORMANCE AFFIDAVIT. THIS AFFIDAVIT MUST BE SUBMITTED WITH THE BID. FAILURE TO SUBMIT THE AFFIDAVIT WITH THE BID SHALL RESULT IN DISQUALIFICATION OF THE BID.						
4. TO CHANGE THE BID OPENING DATE AND TIME TO: BID OPENING DATE: 02/10/09 BID OPENING TIME: 1:30 PM						
0001	1	LS		031-06		
AIR CONDITIONING AND HEATING, CENTRAL UNITS						

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE: TELEPHONE: 304 765 5833 DATE: 2/3/09
 TITLE: President FEIN: 530633057 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
 DNR209084

PAGE
 2

ADDRESS CORRESPONDENCE TO ATTENTION OF:
 FRANK WHITTAKER
 804-558-2316

RFQ COPY
 TYPE NAME/ADDRESS HERE

V
E
N
D
O
R

S
H
I
P
T
O


DIVISION OF NATURAL RESOURCES
 LOST RIVER STATE PARK
 ATTN: PARK SUPERINTENDENT
 ROUTE 2, BOX 24
 MATHIAS, WV
 26812 897-5372

DATE PRINTED	TERMS OF SALE	SHIP VIA	FOB	FREIGHT TERMS
01/30/2009				

BID OPENING DATE: 02/10/2009 BID OPENING TIME 01:30PM

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
***** THIS IS THE END OF RFQ DNR209084 ***** TOTAL:						90,250. ¹³

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE  TELEPHONE 304 765 5833 DATE 2/3/09
 TITLE President FEIN 550653057 ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

Page 1 of 1
Date: Jan 13 2009

SIGN IN SHEET
PLEASE PRINT

Request for Proposal No.

* PLEASE BE SURE TO PRINT LEGIBLY - IF POSSIBLE, LEAVE A BUSINESS CARD

FIRM & REPRESENTATIVE NAME	MAILING ADDRESS	TELEPHONE & FAX NUMBERS
Company: <u>PERSON TECHNICAL SERVICES</u>	<u>302 Spruce St -</u>	PHONE <u>304-722-1870</u>
Rep: <u>Lewis Angus</u>	<u>SAINT ALBANS</u>	TOLL FREE
Email Address: <u>Lewis.Angus@PTSWV.COM</u>	<u>WV 25177</u>	FAX <u>304-722-1846</u>
Company: <u>MAR-AIR HEATING A/C & REFRIGERATION</u>	<u>HC 32 Box 4</u>	PHONE <u>304 358-2284</u>
Rep: <u>ROBERT MOLFORD</u>	<u>UPPER TOWER WAY 26866</u>	TOLL FREE
Email Address: <u>MOLFORD@WILDBLUE.NET</u>		FAX <u>304 358-2284</u>
Company: <u>L. Scott Ltd. Co.</u>	<u>HC 33 Box 922</u>	PHONE <u>304-257-7112</u>
Rep: <u>Larry Scott</u>	<u>Petersburg, WV</u>	TOLL FREE
Email Address: <u>Lscott154@CITILINK.NET</u>	<u>26847</u>	FAX <u>304-257-1324</u>
Company: <u>Rich's Ref.</u>	<u>1151 Airport Rd</u>	PHONE <u>304-765-5833</u>
Rep: <u>Shane Oney</u>	<u>Sutton WV. 26601</u>	TOLL FREE
Email Address: <u>ONEY@RICH'S.AC.COM</u>		FAX <u>304-765-2063</u>
Company: <u>BWA Heating & Cooling LLC</u>	<u>Box 500</u>	PHONE <u>304-454-9714</u>
Rep: <u>Bob AYERSMURD</u>	<u>Rawlinsburg w.v. 26425</u>	TOLL FREE
Email Address: <u>BWA Heating@yahoo.com</u>		FAX <u>304-454-9716</u>
		Cell <u>304-890-2895</u>

PURCHASING CONTINUATION SHEET

VENDOR

Rich's Refrigeration, Inc.

BUYER:	PAGE	Req. or PO#
		DNR209084
Spending Unit:		
DNR -		

Item No:	Quantity	Description	Unit Price	Amount
1	7	Replacement of existing oil furnace units with new oil furnace units in cabin numbers 15, 16, 17, 18, 20, 22, and 23. The following equipment is to be installed in each cabin: Lennox Elite Series 023, 7400 BTU, 83% AFUE oil furnace or equal. Unit must have a lifetime warranty on heat exchanger with a minimum five (5) year warranty on remaining covered components	6,564. ⁸⁹	45,954. ²³
2	9	Installation of air conditioning units in cabin numbers 14, 15, 16, 17, 18, 20, 22, 23 and 25. The following equipment is to be installed in each cabin: Lennox Merit Series 14ACX, 1 5 ton, 14 SEER air conditioner or equal. Unit must have a five(5) year warranty on compressor with a five (5) year warranty on remaining covered components.	3,022. ⁶²	27,203. ⁵⁸
3	9	Lennox Model C33 coil or equal	475. ⁹⁸	4,283. ⁸²
4	2	Installation of air conditioning units in cabin numbers 7 and 26. The following equipment is to be installed in each cabin: Lennox Merit Series 14ACX 2 5 ton unit or equal. Unit must have a five(5) year warranty on compressor with a five (5) year warranty on remaining covered components.	3,659. ⁹³	7,319. ⁸⁶
5	2	Lennox Model C33 coil or equal.	475. ⁹⁸	951. ⁹⁶
6	11	Installation of thermostats in cabins 7, 14, 15, 16, 17, 18, 20, 22, 23, 25, and 26. The following equipment is to be installed in each cabin: Lennox ComfortSense 3000 Series non-programmable or equal	315. ⁸⁸	3,474. ⁶⁸
7	8	Cabins # 15,16,17,18,20,22,23,26 Installation of air filter racks	72.50	580. ⁰⁰
8	1	Cabin #25 Relocation of existing furnace to allow proper clearances for A/C and install air filter rack	487. ⁰⁰	482. ⁰⁰
		The scope of work includes the complete removal and disposal of all existing oil furnace units; installation and testing of new oil heat furnace units and air conditioning units; modifications to existing ductwork to achieve proper air flow, all grills/diffusers to have dampers. West Virginia Building prevailing wage rates must be paid for Hardy County, West Virginia (http://www.wvsos.com/adlaw/wagerates/building/building08/hardy.pdf).		

ALL WORK MUST BE SCHEDULED THROUGH THE LOST
RIVER STATE PARK MAIN OFFICE (304-897-5372) TO
ACCOMMODATE CABIN RENTALS.

TOTAL THIS PAGE 90,250¹³

**Pre-bid Meeting Minutes For Installation Of New Furnaces And Air Conditioning
In Modern Cabins At Lost River State Park
January 13, 2009 10:00 a.m.**

-At 10:00 A.M. the meeting began. Five vendors were present. Also present was Dee Taylor, Mike Foster, and Russ Fritz. The vendors signed in on the sign in sheet. Larry Scott, one of the vendors, signed in then departed after reviewing the bid package stating cordially that he didn't do air conditioning. Questions and answers were as follows:

1. What length of flex duct work do you want to use? 6ft maximum
2. Do you want to keep your old diffusers (vent covers)? All vent covers must be the same in each cabin. If old are good then reuse. No rusty or broken ones to be reused. We don't want white diffusers. We want the clay colored ones.
3. Do we have to get rid of all of the current furnaces, etc.? Yes. The contractor is responsible for all clean up and disposal of trash. Trash is not to be put in LRSP dumpster.
4. Russ requested an airflow test for each style of cabin following installation to meet manufacture standards.
5. What about the scheduling of cabins verses the time and when can we work on them? Dee said that we will work with you the best that we can.
6. Are gas furnace units coming out? No. Existing gas units will remain.
7. Are your #2 heating oil tanks safe? Yes
8. Which cabins need complete duct work replacement? Cabins #7, 14, 15, 16, 17, 18, 20, 22, and 23. Cabins #25 and 26 need changes at the furnace only to accept HVAC modification.
9. How will payments to the vendor be made? Lump sum? Call Frank Whittaker. Russ read payment may possibly lump sum. Dee explained that in the past equipment would be paid for and then later services were paid for.
10. Will we have storage? No. We recommend that the contractor supply a trailer or a truck.
11. May we bring a storage trailer? Yes. It would need to be stored away from the cabins on the weekends.

This concludes the pre-bid meeting minutes.

After the meeting the vendors were escorted to cabin #7. The following questions were asked.

1. Will we replace the vents? We want all vents the same in each cabin. Refer to item # 2 above.
2. Russ stated that cabins 7 and 26 require 2.5 ton units. One vendor suggested a 2 ton unit for cabin #7. The agency will require that a 2.5 ton unit be used.
3. Russ stated that the vendors are responsible for any electrical work needed during the alterations.
4. Do we have access under the cabins? Yes, there is a crawl space.
5. Can we use a central return? Yes. Return lines can be added if needed.
6. Are crawl spaces too tight? No. Most are not less than 2 ft.
7. Can we have floor returns? We don't want them in the middle of the floor but yes.
8. Do we patch the wall in places that vents are removed, etc? No. Leave abandoned vents in place but seal duct work up.
9. Do we use metal duct or flex hose under the cabins? Metal duct

The vendors were then escorted to cabin #15 and explained that cabins # 14, 16, 17, 18, 20, 22, and 23 are set up the same and offered to take them to these other cabins. They said viewing the one alike cabin was fine.

1. Will you put on new roof vents? No.
2. It was stated that LRSP will provide concrete blocks for the air units to rest on and the contractor would provide the plastic pad for the unit to rest on.

We then drove to cabin #25 and #26. Asked if there are any other questions.



State of West Virginia
DRUG FREE WORKPLACE CONFORMANCE AFFIDAVIT
West Virginia Code §21-1D-5

STATE OF WEST VIRGINIA,

COUNTY OF Brayton, TO-WIT:

I, Shane Oray, after being first duly sworn, depose and state as follows:

- 1. I am an employee of Rich's Refrigeration Inc; and,
(Company Name)
- 2. I do hereby attest that Rich's Refrigeration, Inc.
(Company Name)

maintains a valid written drug free workplace policy and that such policy is in compliance with **West Virginia Code §21-1D-5**.

The above statements are sworn to under the penalty of perjury.

Rich's Refrigeration, Inc
(Company Name)

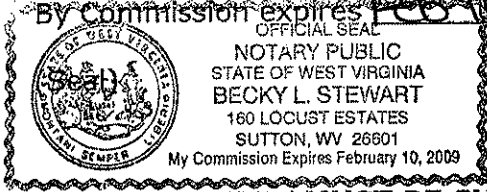
By: [Signature]

Title: President

Date: 2/3/09

Taken, subscribed and sworn to before me this 3rd day of February 2009

By Commission expires Feb 10, 2009



[Signature]
(Notary Public)

THIS AFFIDAVIT MUST BE SUBMITTED WITH THE BID IN ORDER TO COMPLY WITH WV CODE PROVISIONS. FAILURE TO INCLUDE THE AFFIDAVIT WITH THE BID SHALL RESULT IN DISQUALIFICATION OF THE BID.

CONTRACTOR LICENSE

Authorized by the
West Virginia Contractor Licensing Board

Number: WV001629

Classification:

ELECTRICAL
HEATING, VENTILATING & COOLING
PIPING
PLUMBING

RICHS REFRIGERATION A/C HEAT PLUMBI
1151 AIRPORT RD
SUTTON, WV 26601-9744

Date Issued

Expiration Date

AUGUST 07, 2008

AUGUST 07, 2009



Authorized Company Signature

Michael A. Carl
Chair, West Virginia Contractor
Licensing Board



**WEST VIRGINIA
CONTRACTOR
LICENSING
BOARD**

This license, or a copy thereof, must be posted in a conspicuous place at every construction site where work is being performed. This license number must appear in all advertisements, on all bid submissions and on all fully executed and binding contracts. This license cannot be assigned or transferred by licensee. Issued under provisions of West Virginia Code, Chapter 21, Article 11.

2008

**WEST VIRGINIA
STATE TAX DEPARTMENT**

2010

**BUSINESS REGISTRATION
CERTIFICATE**

ISSUED TO:

**RICHS REFRIGERATION AIR CONDITIONING HEATING PLUMBING &
WELDING SERVICE
1151 AIRPORT RD
SUTTON, WV 26601**

BUSINESS REGISTRATION ACCOUNT NUMBER: 1039-0801

This certificate is issued for the registration period beginning: **July 1, 2008**

This certificate is valid until: **June 30, 2010**

*This business registration certificate is issued by
the West Virginia State Tax Commissioner
in accordance with Chapter 11, Article 12 of the West Virginia Code.*

*The person or organization identified on this certificate is registered
to conduct business in the State of West Virginia at the location above.*

This certificate is not transferrable and must be displayed at the location for which issued.

**ENGAGING IN BUSINESS WITHOUT CONSPICUOUSLY POSTING A WEST VIRGINIA BUSINESS
REGISTRATION CERTIFICATE IN THE PLACE OF BUSINESS IS A CRIME AND MAY SUBJECT YOU
TO FINES PER W. VA. CODE § 11-9.**

**TRAVELING/STREET VENDORS: Must carry a copy of this certificate in every vehicle operated by them.
CONTRACTORS, DRILLING OPERATORS, TIMBER/LOGGING OPERATIONS: Must have a copy of
this certificate displayed at every job site within West Virginia.**

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)
03/17/2008

PRODUCER (304)925-6789 FAX (304)925-0149
 Ramsey Insurance Agency Inc.
 4301 MacCorkle Ave SE
 PO Box 4025
 Charleston, WV 25364

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE	NAIC #
INSURER A: Hartford Casualty Insurance Co	29424
INSURER B: Hartford Underwriters Ins Co	30104
INSURER C: Brickstreet Insurance	
INSURER D:	
INSURER E:	

INSURED RICH'S REFRIGERATION A/C, HEAT
 1150 AIRPORT RD
 1151 Airport Road
 SUTTON, WV 26601

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR ADD'L LTR	INSRC	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS
A		GENERAL LIABILITY	40SBAVQ3612	03/01/2008	03/01/2009	EACH OCCURRENCE \$ 1,000,000
		<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC				DAMAGE TO RENTED PREMISES (Per occurrence) \$ 300,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 1,000,000 GENERAL AGGREGATE \$ 2,000,000 PRODUCTS - COMP/OP AGG \$ 2,000,000
B		AUTOMOBILE LIABILITY	40UECTR5263	03/01/2008	03/01/2009	COMBINED SINGLE LIMIT (Per accident) \$ 1,000,000
		<input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
		GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT \$ OTHER THAN EA ACC \$ AUTO ONLY: AGG \$
		EXCESS/UMBRELLA LIABILITY				<input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE DEDUCTIBLE \$ RETENTION \$
C		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	WC10000699-05	07/16/2008	07/16/2009	<input checked="" type="checkbox"/> WC STATUS-TORY LIMITS <input type="checkbox"/> OTHER
		ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below OTHER				E.L. EACH ACCIDENT \$ 100,000 E.L. DISEASE - EA EMPLOYEE \$ 100,000 E.L. DISEASE - POLICY LIMIT \$ 500,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS
 Certificate holder shall also be added as Additional Insured for General Liability

CERTIFICATE HOLDER

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

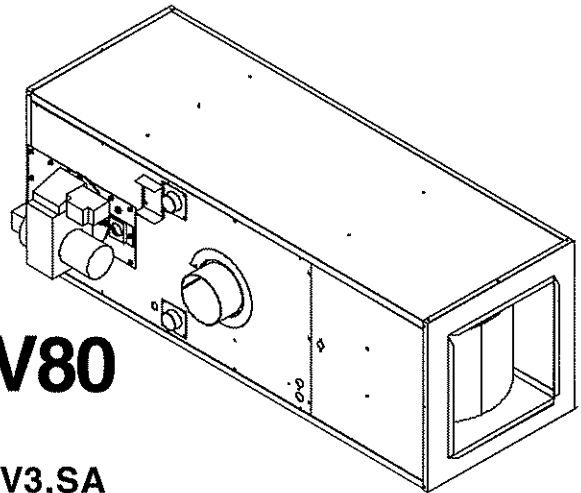
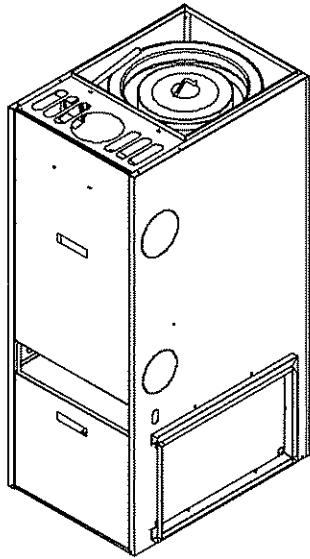
AUTHORIZED REPRESENTATIVE

June Goff/MKP

June Goff



Vertical Highboy, Lowboy Front Flue, Lowboy Rear Flue, Downflow/Horizontal Oil-Fired Furnace



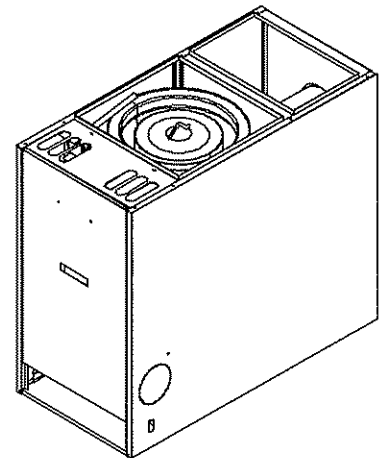
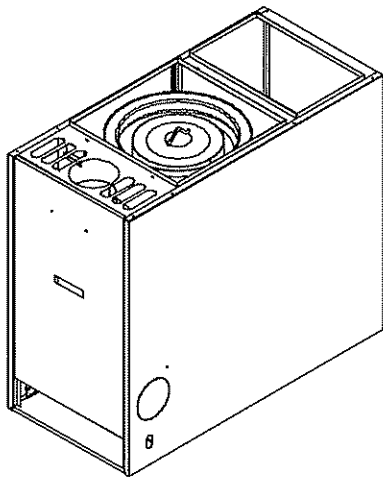
XP80 / XV80

Highboy Vertical
THV1M087A936,V3,SA
THV1M087A948,V5,SA

Downflow/Horizontal
Front Flue
TDF1M087A936,V3,SA
TDF1M087A948,V5,SA

Lowboy Front Flue
TLF1M087A936,V3,SA
TLF1M087A948,V5,SA

Lowboy Rear Flue
TLR1M087A936,V3,SA
TLR1M087A948,V5,SA





General Features

Oil Furnace Models

Central heating oil furnace models are designed to meet U.L. standards and are certified by ETL. Limit setting and rating data were established and approved under standard rating conditions using U.L.

Safe Operation

Oil furnace models ship with Beckett Burners that utilize cad cells for flame sensing and a safety lockout feature to prevent excess oil buildup in the combustion chamber if ignition fails. The burner also includes a valve delay on cycle and clean cut solenoid valve for smooth ignition.

Quick Heating

Durable, cycle tested, hot rolled, 13 gauge steel heat exchanger quickly transfers heat to provide warm conditioned air to the structure.

Burner

Model AF Beckett Burner with valve delay on & "clean-cut" oil pump for safety and efficient combustion.

Controls

Proven fan limit control for reliable operation is adjustable to avoid cold drafts. The oil furnace fan center is rated at 40VA for use with a cooling system and accessories.

Air Delivery

Multispeed, direct drive blower motor, has sufficient airflow for most heating and cooling requirements, will switch from heating to cooling speeds on demand from room Comfort Control. Variable speed models tailor air flow for varied cooling capacities.

Styling

Heavy gauge, steel cabinet construction with powder paint for attractive appearance and durability. The heat exchanger section of the cabinet is completely lined with foil faced fiberglass insulation and the blower compartment includes a sound reduction insulation. This results in quiet and efficient operation due to the excellent acoustical and insulating qualities of fiberglass. A bottom pan is built into the blower compartment with alternate back, left side or right side return air connection provision.



Contents

Feature Summary	2
Features and Benefits	4
Standard Equipment	
Optional Equipment	
General Data	6
THV1M087A936SA	6
THV1M087A948SA	6
TLF1M087A936SA	6
TLF1M087A948SA	6
TLR1M087A936SA	6
TLR1M087A948SA	6
TDF1M087A936SA	6
TDF1M087A948SA	6
THV1M087A9V3SA	7
THV1M087A9V5SA	7
TLF1M087A9V3SA	7
TLF1M087A9V5SA	7
TLR1M087A9V3SA	7
TLR1M087A9V5SA	7
TDF1M087A9V3SA	7
TDF1M087A9V5SA	7
Performance Data	9
Electrical Data	17
Field Wiring	21
Dimensions	24



Features and Benefits

XP 80 / XV80 STANDARD EQUIPMENT

- Up to 85.0% Annual Fuel Utilization Efficiency (AFUE)
- 13 gauge hot rolled steel wrap around heat exchanger for durability
- Beckett Flame Retention Burner operates cleanly and quietly
- Burner features include primary control with interrupted ignition for reliability, pre-purge and clean cutoff solenoid valve for smooth ignition
- Burner and controls factory wired
- Dual clean out ports for quick access and easy cleaning
- Direct drive, permanently lubricated, 4 speed blower motor on XP models
- Variable speed blower motors on XV models
- Insulated blower compartment
- Slide out blower assembly for quick cleaning and service accessibility
- Filter rack with cleanable filter (Highboy & Lowboy Models only)
- 5 year parts limited warranty and lifetime heat exchanger warranty
- Preformed ceramic fiber combustion chamber for higher efficiencies and more complete combustion
- 40 VA control transformer for add on cooling
- Heavy gauge, painted steel cabinet
- Recessed door handles for easy removal of Highboy & Lowboy Furnace doors
- Lowboy models available with front or rear flue
- Highboy models with top or right side venting
- Downflow/Horizontal model field convertible from downflow to right or left horizontal
- 6" Left and Right side fresh air knockouts (Highboy & Lowboy Models only)
- Barometric draft regulator included
- Heat exchanger cabinet section lined with foil faced insulation



Features and Benefits

OPTIONAL EQUIPMENT

Downflow Subbase - TDF1M087A936, 948SA	BAYSUB10ABASEA []
Trim Kit - Horizontal Right Vent - Top Cover and Vent Trim Ring - THV1M087A936, 948SA	BAYTRM10AVENTA []
Comfort Control, Prog., 7Day, 1-Stage Htg. / Clg.	TCONT800AS11AA []
Comfort Control, Prog., 7Day, 3 Htg. / 2 Clg.	TCONT802AS32DA []
Comfort Control, Prog., 7Day, 3 Htg. / 2 Clg w/dehumidification.	TCONT803AS32DA []
Comfort Control, Prog., 5/1/5 Day, 1-Stage Htg. / Clg.	TCONT600AF11MA []
Comfort Control, Prog., 5/1/5 Day, 2 Htg. / 2 Clg.	TCONT602AF22MA []
Comfort Control, Mechanical 1-Stage Htg. / Clg. ①	BAY28X182 []
Comfort Control, Mechanical 2-Stage Htg. / Clg ①	BAY28X183 []
Subbase Auto / Manual Changeover - BAY28X183	BAY28X184 []
Subbase Auto Changeover - BAY28X182, 183	BAY28X187 []
Add-on Heat Pump Kit	TAYPLUS103A []
Bonnet Comfort Control-(required with TAYPLUS103A)	THT1248 []

① Requires subbase with isolated RC & RH terminals.



General Data

Oil Fired Furnace Specifications												
Model	THV1M087A936 & 948SA				TLF1M087A936 & 948SA TLR1M087A936 & 948SA				TDF1M087A936 & 948SA			
Type	Upflow - Highboy				Upflow - Lowboy				Downflow - Horizontal			
Heat input Rate (BTUH):	140,000	119,000	105,000	84,000	140,000	119,000	105,000	84,000	140,000	119,000	105,000	84,000
Nominal Thermal Efficiency (%):	83.6				84.2				83.8			
Heating Capacity (BTUH):	114,000	98,000	87,000	70,000	114,000	98,000	87,000	70,000	114,000	98,000	87,000	70,000
Nominal Temperature Rise (deg. F):	85				85				85			
Minimum AFUE (I.C.S.) Rating (%):	THV1M087A936SA - 82.9% THV1M087A948SA - 82.6%				TLF1M087A936SA - 82.9% TLF1M087A948SA - 82.7% TLR1M087A936SA - 85.0% TLR1M087A948SA - 82.4%				TDF1M087A936SA - 84.8% TDF1M087A948SA - 82.6%			
Burner Specifications:	R.W. Beckett Pressure Atomizing Type, Model AF				R.W. Beckett Pressure Atomizing Type, Model AF				R.W. Beckett Pressure Atomizing Type, Model AF			
Air Tube Length (in.):	5.875, Effective				5.875, Effective				5.875, Effective			
Burner Head Type:	Fixed, Flame Retention				Fixed, Flame Retention				Fixed, Flame Retention			
Fuel Type:	# 2 Distillate (Domestic Heating Oil)				# 2 Distillate (Domestic Heating Oil)				# 2 Distillate (Domestic Heating Oil)			
Nozzle Rating For Beckett AF (GPH):	1.00	0.85	0.75	0.60	1.00	0.85	0.75	0.60	1.00	0.85	0.75	0.60
Spray Angle (deg.):	80				80				80			
Spray Pattern:	Hollow				Hollow				Hollow			
Oil Pump Pressure (PSIG):	130				130				130			
Ignition Control Type:	Interrupted, Direct Spark				Interrupted, Direct Spark				Interrupted, Direct Spark			
Pre / Post Purge Feature(s):	Yes / no				Yes / no				Yes / no			
Automatic Oil Solenoid Valve:	Yes				Yes				Yes			
Blower Drive:	Direct				Direct				Direct			
	THV1M087A936SA	THV1M087A948SA	TLF1M087A936SA	TLF1M087A948SA	TLR1M087A936SA	TLR1M087A948SA	TDF1M087A936SA	TDF1M087A948SA				
Diameter x Width (in.):	10 x 9	11 x 11	10 x 9	10 x 9	10 x 9	10 x 9	10 x 9	11 x 9				
No. Used:	1	1	1	1	1	1	1	1				
Speeds (no.):	4	4	4	4	4	4	4	4				
CFM vs in. w.g.:	See Fan Performance Table				See Fan Performance Table				See Fan Performance Table			
Motor HP:	1/2	3/4	1/2	3/4	1/2	3/4	1/2	3/4				
R.P.M.:	1075	1130	1075	1130	1075	1130	1075	1130				
Volts / Ph. / Hz.:	120 / 60 / 1				120 / 60 / 1				120 / 60 / 1			
Filter Furnished?:	Yes				Yes				No			
Type Recommended:	Throwaway				Throwaway				Throwaway			
No. - Size x Thick:	1 - 16 x 25 x 1				2 - 10 x 20 x 1				Not Supplied			
Vent - Size (in.):	6				6				6			
Gross Heat Exchanger Area (sq. ft.):	27.8				27.8 (Front Flue) / 30.0 (Rear Flue)				27.8			
Supply / Return Size (in. x in.):	See Outline Drawing				See Outline Drawing				See Outline Drawing			
Combustion Chamber Type:	Preformed, Refractory (Ceramic Fiber Matrix Material)				Preformed, Refractory (Ceramic Fiber Matrix Material)				Preformed, Refractory (Ceramic Fiber Matrix Material)			
Total Current (amps.):	12.1	19.8	12.1	19.8	12.1	19.8	12.1	19.8				
Max. Fuse Size (amps.):	15	30	15	30	15	30	15	30				
Dimensions uncrated (in.):	H X W X D 58 X 22.25 X 31				H X W X D 41.5 X 22.25 X 47				H X W X D 22.25 X 61.25 X 22.25			
Weight Shipping (lbs.) / Net (lbs.):	260 / 250				300 / 290				280 / 270			



General Data

Oil Fired Furnace Specifications												
Model	THV1M087A9V3 & 9V5SA				TLF1M087A9V3 & 9V5SA TLR1M087A9V3 & 9V5SA				TDF1M087A9V3 & 9V5SA			
Type	Upflow - Highboy				Upflow - Lowboy				Downflow - Horizontal			
Heat Input Rate (BTUH):	140,000	119,000	105,000	84,000	140,000	119,000	105,000	84,000	140,000	119,000	105,000	84,000
Nominal Thermal Efficiency (%):	83.6				84.2				83.8			
Heating Capacity (BTUH):	114,000	98,000	87,000	70,000	114,000	98,000	87,000	70,000	114,000	98,000	87,000	70,000
Nominal Temperature Rise (deg. F):	85				85				85			
Minimum AFUE (I.C.S.) Rating (%):	THV1M087A9V3SA - 82.9% THV1M087A9V5SA - 82.6%				TLF1M087A9V3SA - 82.9% TLF1M087A9V5SA - 82.7% TLR1M087A9V3SA - 85.0% TLR1M087A9V5SA - 82.4%				TDF1M087A9V3SA - 84.8% TDF1M087A9V5SA - 82.6%			
Burner Specifications:	R.W. Beckett Pressure Atomizing Type, Model AF				R.W. Beckett Pressure Atomizing Type, Model AF				R.W. Beckett Pressure Atomizing Type, Model AF			
Air Tube Length (in.):	5.875, Effective				5.875, Effective				5.875, Effective			
Burner Head Type:	Fixed, Flame Retention				Fixed, Flame Retention				Fixed, Flame Retention			
Fuel Type:	# 2 Distillate (Domestic Heating Oil)				# 2 Distillate (Domestic Heating Oil)				# 2 Distillate (Domestic Heating Oil)			
Nozzle Rating For Beckett AF (GPH):	1.00	0.85	0.75	0.60	1.00	0.85	0.75	0.60	1.00	0.85	0.75	0.60
Spray Angle (deg.):	80				80				80			
Spray Pattern:	Hollow				Hollow				Hollow			
Oil Pump Pressure (PSIG):	130				130				130			
Ignition Control Type:	Interrupted, Direct Spark				Interrupted, Direct Spark				Interrupted, Direct Spark			
Delay valve on / Post Purge Feature:	Yes / no				Yes / no				Yes / no			
Automatic Oil Solenoid Valve:	Yes				Yes				Yes			
Blower Drive:	Direct				Direct				Direct			
	THV1M087A9V3SA	THV1M087A9V5SA	TLF1M087A9V3SA TLR1M087A9V3SA	TLF1M087A9V5SA TLR1M087A9V5SA	TDF1M087A9V3SA	TDF1M087A9V5SA						
Diameter x Width (in.):	10 x 9		12 x 9		10 x 9		11 x 9		10 x 9		12 x 9	
No. Used:	1		1		1		1		1		1	
Speeds (no.):	Variable		Variable		Variable		Variable		Variable		Variable	
CFM vs in. w.g.:	See Fan Performance Table						See Fan Performance Table					
Motor HP:	1/2		1		1/2		1		1/2		1	
Volts / Ph. / Hz.:	120 / 60 / 1				120 / 60 / 1				120 / 60 / 1			
Filter Furnished?:	Yes				Yes				No			
Type Recommended:	Hi Velocity				Hi Velocity				Hi Velocity			
No. - Size x Thick:	1 - 16 x 25 x 1				2 - 10 x 20 x 1				Not Supplied			
Vent - Size (in.):	6				6				6			
Gross Heat Exchanger Area (sq. ft.):	27.8				27.8 (Front Flue) / 30.0 (Rear Flue)				27.8			
Supply / Return Size (in. x in.):	See Outline Drawing						See Outline Drawing					
Combustion Chamber Type:	Preformed, Refractory (Ceramic Fiber Matrix Material)				Preformed, Refractory (Ceramic Fiber Matrix Material)				Preformed, Refractory (Ceramic Fiber Matrix Material)			
Total Current (amps.):	13.5		18.8		13.5		18.8		13.5		18.8	
Max. Fuse Size (amps.):	15		30		15		30		15		30	
Dimensions uncrated (in.):	H X W X D 58 X 22.25 X 31				H X W X D 41.5 X 22.25 X 47				H X W X D 22.25 X 61.25 X 22.25			
Weight Shipping (lbs.) / Net (lbs.)	260 / 250				300 / 290				280 / 270			



General Data

Furnace Model:	All
Burner Model:	R.W. Beckett, AF
Standard Nozzle:	Delavan, 0.75 GPH / 80 deg. angle / hollow cone
Oil Pump Pressure (PSIG):	130
Burner Head Type:	F3
Head / Turbulator Setting:	"Z" = 1.125 in.
Air Band Setting:	Fully-closed
Air Shutter / Damper Setting:	5
Overfire Draft (in. W.G.):	0.02
Smoke Spot, Maximum (Bacharach Scale):	# 1
Carbon Dioxide, CO ₂ , Maximum (%):	13
Carbon Dioxide, CO ₂ , Minimum (%):	12*
Carbon Monoxide, CO (PPM)	0
Oil Solenoid Valve Equipped:	YES
Delay valve on Time (sec):	15 sec.
Postpurge Time (sec):	None
Ignition Type:	Interrupted

Oil Burner Application and Specifications

* When operating these furnaces at the lowest input rate (84,000 BTUH), the carbon dioxide (CO₂) value may not be able to be adjusted above 12%. This is normal and does not necessarily indicate a problem.

High Limit Comfort Control Setting (deg. F.):	230 (highboy / lowboy models) 190 (horizontal / downflow model)
Fan "On" Setting (deg. F.):	130
Fan "Off" Setting (deg. F.):	100
Standard Fan Speed as shipped	Low, Orange Wire to "L" Terminal

Standard Furnace Fan / Limit Control and Speed Settings



Performance Data

Furnace Airflow (CFM) vs. External Static Pressure (in. WC)								
Model	Speed Tap	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Highboy THV1M087A936SA	High	1508	1468	1407	1345	1278	1202	1120
	Med-High	1420	1361	1310	1242	1176	1096	1019
	Med-Low	1308	1263	1220	1174	1103	1031	953
	Low	1189	1150	1113	1072	1009	936	870
Highboy THV1M087A948SA	High	1974	1913	1854	1766	1695	1621	1547
	Med-High	1694	1643	1589	1534	1477	1406	1339
	Med-Low	1413	1384	1348	1315	1280	1235	1184
	Low	1166	1144	1127	1105	1076	1027	983
Lowboy Front Flue TLF1M087A936SA	High	1688	1648	1595	1522	1447	1373	1309
	Med-High	1372	1331	1290	1246	1200	1146	1079
	Med-Low	1173	1156	1134	1108	1082	1043	989
	Low	999	993	975	956	931	888	807
Lowboy Front Flue TLF1M087A948SA	High	1920	1822	1730	1649	1564	1483	1397
	Med-High	1620	1572	1511	1443	1376	1311	1224
	Med-Low	1358	1339	1309	1264	1216	1167	1098
	Low	1103	1106	1080	1056	1023	981	858
Lowboy Rear Flue TLR1M087A936SA	High	1669	1599	1541	1475	1409	1329	1231
	Med-High	1410	1345	1299	1246	1184	1127	1171
	Med-Low	1196	1184	1149	1111	1066	1023	938
	Low	1007	1004	985	963	915	845	749
Lowboy Rear Flue TLR1M087A948SA	High	1844	1771	1694	1612	1538	1451	1355
	Med-High	1622	1545	1484	1419	1356	1274	1172
	Med-Low	1366	1330	1303	1247	1187	1124	1046
	Low	1110	1107	1091	1068	1031	973	887
Downflow/Horizontal TDF1M087A936SA	High	1616	1550	1482	1406	1347	1231	1144
	Med-High	1447	1397	1343	1284	1209	1127	1043
	Med-Low	1320	1274	1228	1176	1111	1043	950
	Low	1166	1139	1107	1064	1017	955	871
Downflow/Horizontal TDF1M087A948SA	High	1901	1837	1790	1714	1648	1584	1496
	Med-High	1615	1572	1521	1468	1412	1355	1308
	Med-Low	1355	1342	1311	1273	1230	1183	1133
	Low	1116	1105	1084	1058	1038	1001	955





Performance Data

TLR/F1M087A9V3SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

COOLING	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE										
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9						
								CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS			
	3.5	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1093	1120	1120	1113	1091	WATTS	183	267	340	413	471
		Normal (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1254	1296	1296	1284	1244	WATTS	262	382	467	552	608
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1259	1300	1306	1298	1250	WATTS	271	375	472	557	609
	3**	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	940	919	900	881	862	WATTS	154	207	254	310	371
		Normal** (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1057	1060	1049	1037	1015	WATTS	213	291	352	409	468
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1217	1211	1196	1179	1151	WATTS	300	387	461	525	582
	2.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	788	775	761	714	674	WATTS	104	152	197	239	284
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	904	880	868	840	818	WATTS	145	194	240	290	348
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1007	1001	987	978	962	WATTS	181	248	302	357	417
	2	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	634	607	585	542	493	WATTS	67	99	142	181	218
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	541	682	808	929	1030	WATTS	85	127	173	218	260
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	817	805	792	748	710	WATTS	113	162	206	249	300

HEATING	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE										
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9						
					CFM	WATTS	CFM	WATTS	CFM	WATTS	CFM	WATTS			
	LOW (920 CFM)	ON	ON	CFM	804	791	792	780	761	WATTS	100	146	198	256	307
	MEDIUM LOW (1145 CFM)	OFF	ON	CFM	985	991	988	987	964	WATTS	146	221	283	346	393
	MEDIUM HIGH** (1290 CFM)	ON	OFF	CFM	1107	1111	1127	1129	1122	WATTS	192	272	355	428	498
	HIGH (1500 CFM)	OFF	OFF	CFM	1293	1330	1332	1324	1319	WATTS	291	407	495	582	661

NOTES:

1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.



Performance Data

TLR/F1M087A9V5SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

COOLING	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
	5**	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1539	1548	1533	1527	1525
			WATTS	438	573	674	761	866				
		Normal ** (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1756	1759	1766	1740	1722
		WATTS	635	790	970	1055	1180					
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1948	1958	1927	1852	1780
		WATTS	870	1063	1215	1240	1255					
	4	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	1198	1216	1223	1223	1221
			WATTS	237	322	403	493	565				
		Normal (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1396	1434	1425	1401	1406
		WATTS	339	464	565	631	741					
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1572	1577	1570	1574	1575
		WATTS	467	588	708	816	922					
3.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	1056	1053	1047	1048	1046	
		WATTS	172	251	304	375	445					
	Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	1200	1216	1237	1231	1226	
	WATTS	232	326	425	494	575						
	High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1363	1407	1405	1388	1381	
	WATTS	317	449	552	625	712						
2.5	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	774	754	741	728	705	
		WATTS	95	138	183	233	289					
	Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	863	875	861	859	826	
	WATTS	111	177	228	284	334						
	High (450 CFM/TON)	ON	ON	ON	OFF	CFM	962	971	969	951	935	
	WATTS	140	208	270	320	383						

HEATING	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
	LOW (920 CFM)	ON	ON	CFM	804	791	792	780	761
				WATTS	100	146	198	256	307
	MEDIUM LOW (1145 CFM)	OFF	ON	CFM	985	991	988	987	964
				WATTS	146	221	283	346	393
	MEDIUM HIGH ** (1290 CFM)	ON	OFF	CFM	1107	1111	1127	1129	1122
				WATTS	192	272	355	428	498
	HIGH (1500 CFM)	OFF	OFF	CFM	1293	1330	1332	1324	1319
				WATTS	291	407	495	582	661

NOTES:

1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.



Performance Data

THV1M087A9V3SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

COOLING	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
	3.5	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1127	1147	1148	1138	1117
							WATTS	229	295	356	413	470
		Normal (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1278	1293	1297	1293	1272
							WATTS	321	398	469	536	597
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1301	1320	1323	1315	1287
							WATTS	336	419	493	558	611
	3**	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	969	993	1004	997	968
							WATTS	152	213	272	329	377
		Normal ** (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1132	1145	1147	1136	1106
							WATTS	225	289	350	405	460
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1264	1253	1270	1260	1241
							WATTS	308	369	441	502	562
2.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	802	836	829	802	789	
						WATTS	98	150	199	238	280	
	Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	910	942	949	941	918	
						WATTS	132	189	244	300	346	
	High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1048	1077	1083	1072	1041	
						WATTS	185	251	311	368	419	
2	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	669	677	669	663	642	
						WATTS	67	107	146	184	220	
	Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	749	781	772	751	731	
						WATTS	85	134	179	217	254	
	High (450 CFM/TON)	ON	ON	ON	OFF	CFM	837	868	862	841	829	
						WATTS	111	162	211	255	300	

HEATING	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
	LOW	ON	ON	CFM	857	882	883	858	843
				WATTS	115	167	219	263	307
	MEDIUM LOW	OFF	ON	CFM	1061	1086	1092	1080	1051
				WATTS	196	261	321	378	430
	MEDIUM HIGH **	ON	OFF	CFM	1198	1205	1197	1193	1172
				WATTS	272	337	395	458	517
	HIGH	OFF	OFF	CFM	1280	1295	1297	1287	1265
				WATTS	330	407	476	538	596

NOTES:

1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.



Performance Data

THV1M087A9V5SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

COOLING	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
	5**	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM WATTS	1609 543	1616 642	1620 737	1623 836	1632 936
		Normal ** (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM WATTS	1841 818	1835 925	1820 1020	1807 1110	1779 1181
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM WATTS	2040 1142	1978 1161	1915 1178	1864 1204.08	1810 1215.44
	4	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM WATTS	1277 287	1296 370	1301 446	1314 531	1311 604
		Normal (400 CFM/TON)	ON	OFF	OFF	OFF	CFM WATTS	1494 440	1501 530	1504 615	1492 690	1493 776
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM WATTS	1661 595	1659 689	1657 782	1665 890	1657 979
	3.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM WATTS	1094 195	1103 258	1122 332	1125 402	1124 473
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM WATTS	1277 288	1304 374	1305 449	1317 532	1312 606
		High (450 CFM/TON)	OFF	ON	ON	OFF	CFM WATTS	1477 428	1470 504	1470 586	1472 673	1461 745
	3	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM WATTS	866 115	893 172	893 228	886 287	879 346
		Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM WATTS	1081 189	1096 255	1106 322	1104 387	1101 458
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM WATTS	1213 253	1244 340	1269 425	1275 500	1266 573

HEATING	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
	LOW	ON	ON	CFM WATTS	864 111	895 169	899 224	899 239	879 334
		OFF	ON	CFM WATTS	1052 174	1064 238	1059 296	1057 359	1061 431
	MEDIUM HIGH **	ON	OFF	CFM WATTS	1162 226	1185 302	1202 378	1205 450	1211 526
		OFF	OFF	CFM WATTS	1377 353	1397 445	1396 520	1399 604	1401 688

NOTES:

1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.



Performance Data

TDF1M087A9V3SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

COOLING	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
	3.5	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1215	1243	1235	1227	1211
			WATTS	232	303	371	442	507				
		Normal (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1375	1389	1414	1417	1364
		WATTS	290	378	492	571	600					
		High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	1375	1389	1414	1417	1364
		WATTS	290	378	492	571	600					
	3**	Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	992	1048	1065	1068	1044
			WATTS	141	218	277	348	406				
		Normal ** (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1173	1229	1235	1226	1206
		WATTS	189	288	358	438	498					
		High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1358	1361	1375	1374	1340
		WATTS	295	353	452	548	607					
2.5	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	836	879	872	863	839	
		WATTS	81	148	197	254	313					
	Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	938	1000	1006	1014	992	
	WATTS	114	187	250	321	384						
	High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1085	1135	1145	1148	1115	
	WATTS	156	234	312	386	433						
2	Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	690	705	699	677	649	
		WATTS	65	107	155	198	235					
	Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	782	813	818	801	760	
	WATTS	79	134	184	231	279						
	High (450 CFM/TON)	ON	ON	ON	OFF	CFM	853	920	911	901	885	
	WATTS	88	163	216	278	327						

HEATING	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
	LOW	ON	ON	CFM	864	913	919	910	892
			WATTS	94	161	220	281	337	
	MEDIUM LOW	OFF	ON	CFM	1103	1148	1159	1151	1117
			WATTS	175	253	324	404	462	
	MEDIUM HIGH **	ON	OFF	CFM	1267	1292	1298	1301	1289
			WATTS	245	329	417	489	553	
	HIGH	OFF	OFF	CFM	1375	1389	1414	1417	1364
			WATTS	290	378	492	571	600	

NOTES:

1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.



Performance Data

TDF1M087A9V5SA OIL FURNACE COOLING AND HEATING AIRFLOW AND POWER VS. EXTERNAL STATIC PRESSURE WITH FILTER

COOLING	OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE					
			SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9	
								CFM	WATTS	CFM	WATTS	CFM	WATTS
	5**	Low (350 CFM/TON)	OFF	OFF	OFF	ON	CFM	1665	1665	1684	1665	1675	
			WATTS	522	621	747	830	939					
		Normal ** (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM	1884	1895	1905	1895	1863	
		4	High (450 CFM/TON)	OFF	OFF	ON	OFF	CFM	2147	2087	2025	1960	1880
				WATTS	1170	1190	1220	1230	1250				
			Low (350 CFM/TON)	ON	OFF	OFF	ON	CFM	1274	1289	1334	1348	1348
		3.5	Normal (400 CFM/TON)	ON	OFF	OFF	OFF	CFM	1490	1516	1533	1541	1549
				WATTS	377	495	600	672	796				
			High (450 CFM/TON)	ON	OFF	ON	OFF	CFM	1715	1715	1715	1724	1715
	3	Low (350 CFM/TON)	OFF	ON	OFF	ON	CFM	1132	1168	1186	1186	1186	
			WATTS	192	266	350	424	495					
		Normal (400 CFM/TON)	OFF	ON	OFF	OFF	CFM	1291	1302	1332	1372	1372	
	3	High (450 CFM/TON)	OFF	ON	ON	OFF	CFM	1486	1518	1542	1565	1565	
			WATTS	388	503	609	711	809					
		Low (350 CFM/TON)	ON	ON	OFF	ON	CFM	972	1005	1021	1015	999	
	3	Normal (400 CFM/TON)	ON	ON	OFF	OFF	CFM	1110	1142	1148	1154	1154	
			WATTS	180	260	329	404	488					
		High (450 CFM/TON)	ON	ON	ON	OFF	CFM	1254	1268	1290	1318	1318	
						WATTS	238	318	405	528	607		

HEATING	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 7	SW 8		0.1	0.3	0.5	0.7	0.9
					CFM	WATTS	CFM	WATTS	CFM
	LOW	ON	ON	CFM	871	876	894	890	871
				WATTS	104	155	221	282	336
	MEDIUM LOW	OFF	ON	CFM	1051	1081	1104	1104	1087
				WATTS	160	229	306	380	445
	MEDIUM HIGH **	ON	OFF	CFM	1178	1213	1247	1247	1260
				WATTS	219	285	389	466	550
	HIGH	OFF	OFF	CFM	1389	1421	1442	1473	1483
				WATTS	311	415	519	627	715

NOTES:

1. **FACTORY SETTING.
2. CONTINUOUS FAN SETTING: HEATING OR COOLING AIRFLOW IS APPROXIMATELY 50% OF SELECTED COOLING VALUE.
3. FOR VARIABLE SPEED: LOW SPEED AIRFLOWS ARE APPROXIMATELY 30% OF LISTED VALUES.
4. LOW 350 CFM/TON IS RECOMMENDED FOR VARIABLE SPEED APPLICATION FOR COMFORT & HUMID CLIMATE SETTING: NORMAL IS 400 CFM/TON: HIGH 450 CFM/TON IS FOR DRY CLIMATE SETTING.



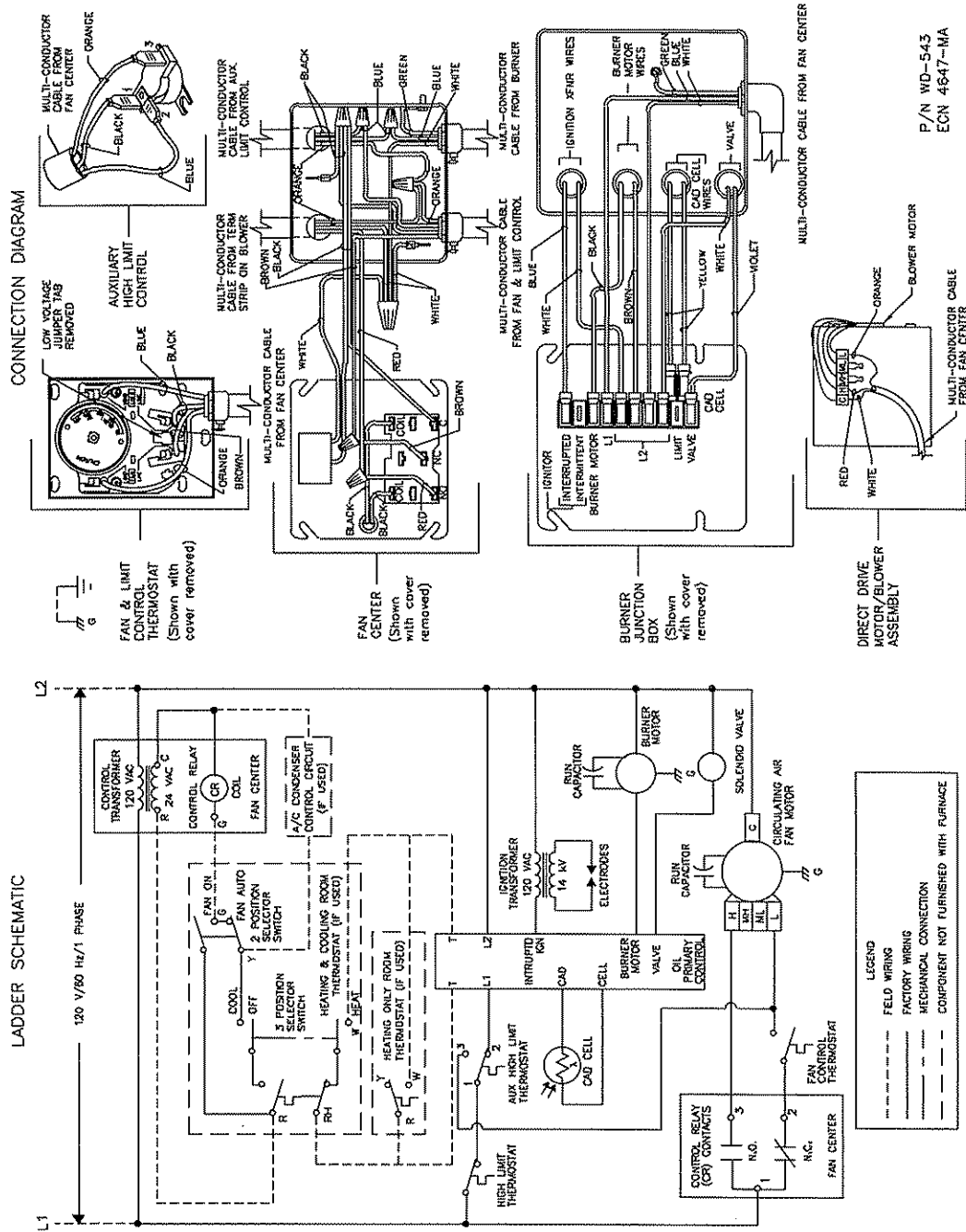
Performance Data

CFM vs. Temperature Rise														
Model	Heating Capacity													
		800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Highboy THV1M087A936SA THV1M087A9V3SA	70,000		72	65	59	54	50	46	43					
	87,000		90	81	73	67	62	58	54					
	98,000		101	91	82	76	70	65	60					
	114,000		117	106	96	88	81	75	70					
Highboy THV1M087A948SA THV1M087A9V5SA	70,000			65	59	54	50	46	43	41	38	36	34	32
	87,000			81	73	67	62	58	54	50	47	45	42	40
	98,000			91	82	76	70	65	60	57	53	50	48	45
	114,000			106	96	88	81	75	70	66	62	59	56	53
Lowboy Front Flue TLF1M087A936SA TLF1M087A9V3SA	70,000		72	65	59	54	50	46	43	41				
	87,000		90	81	73	67	62	58	54	50				
	98,000		101	91	82	76	70	65	60	57				
	114,000		117	106	96	88	81	75	70	66				
Lowboy Front Flue TLF1M087A948SA TLF1M087A9V5SA	70,000		72	65	59	54	50	46	43	41	38	36	34	
	87,000		90	81	73	67	62	58	54	50	47	45	42	
	98,000		101	91	82	76	70	65	60	57	53	50	48	
	114,000		117	106	96	88	81	75	70	66	62	59	56	
Lowboy Rear Flue TLR1M087A936SA TLR1M087A9V3SA	70,000	81	72	65	59	54	50	46	43	41	38			
	87,000	101	90	81	73	67	62	58	54	50	47			
	98,000	113	101	91	82	76	70	65	60	57	53			
	114,000	Not allowed	117	106	96	88	81	75	70	66	62			
Lowboy Rear Flue TLR1M087A948SA TLR1M087A9V5SA	70,000		72	65	59	54	50	46	43	41	38	36		
	87,000		90	81	73	67	62	58	54	50	47	45		
	98,000		101	91	82	76	70	65	60	57	53	50		
	114,000		117	106	96	88	81	75	70	66	62	59		
Downflow/Horizontal TDF1M087A936SA TDF1M087A9V3SA	70,000		72	65	59	54	50	46	43	41				
	87,000		90	81	73	67	62	58	54	50				
	98,000		101	91	82	76	70	65	60	57				
	114,000		117	106	96	88	81	75	70	66				
Downflow/Horizontal TDF1M087A948SA TDF1M087A9V5SA	70,000			65	59	54	50	46	43	41	38	36	34	
	87,000			81	73	67	62	58	54	50	47	45	42	
	98,000			91	82	76	70	65	60	57	53	50	48	
	114,000			106	96	88	81	75	70	66	62	59	56	

The unshaded area is the recommended operating range for HEATING comfort

Electrical Data

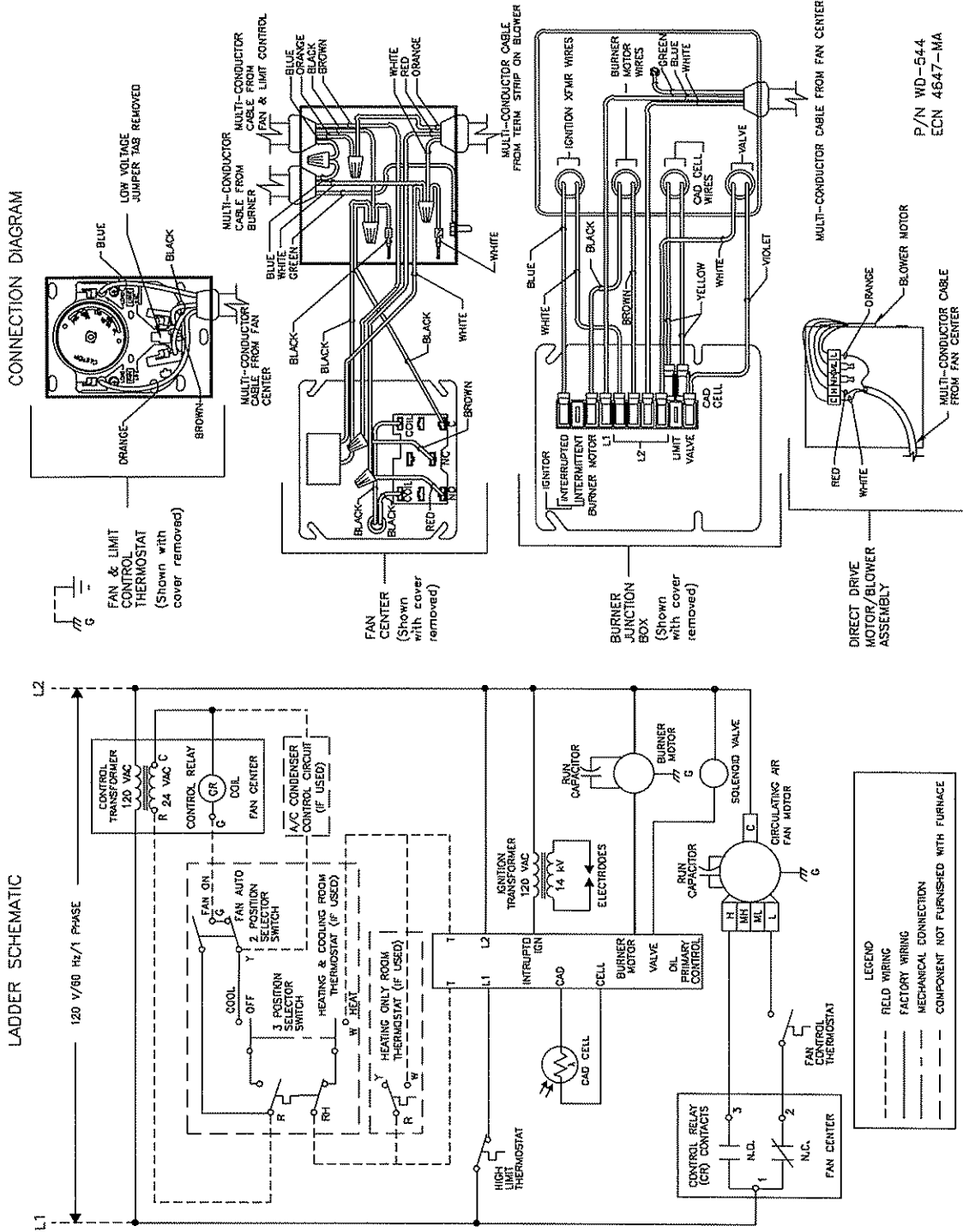
ELECTRICAL DIAGRAMS FOR PSC 4 SPEED BLOWER DOWNFLOW / HORIZONTAL FURNACES





Electrical Data

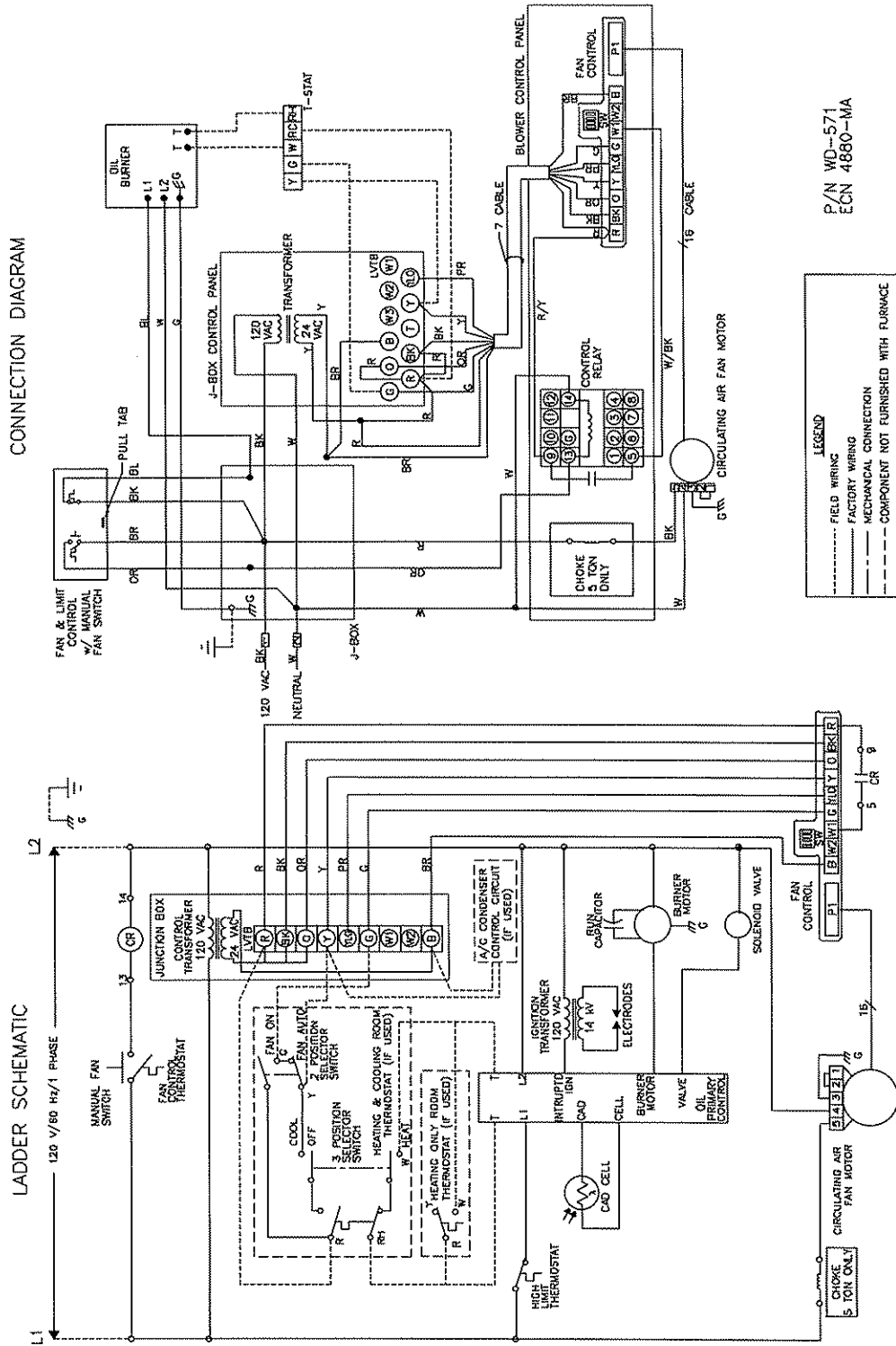
ELECTRICAL DIAGRAMS FOR PSC 4 SPEED BLOWER HIGHBOY & LOWBOY FURNACES



P/N WD-544
ECN 4647-MA

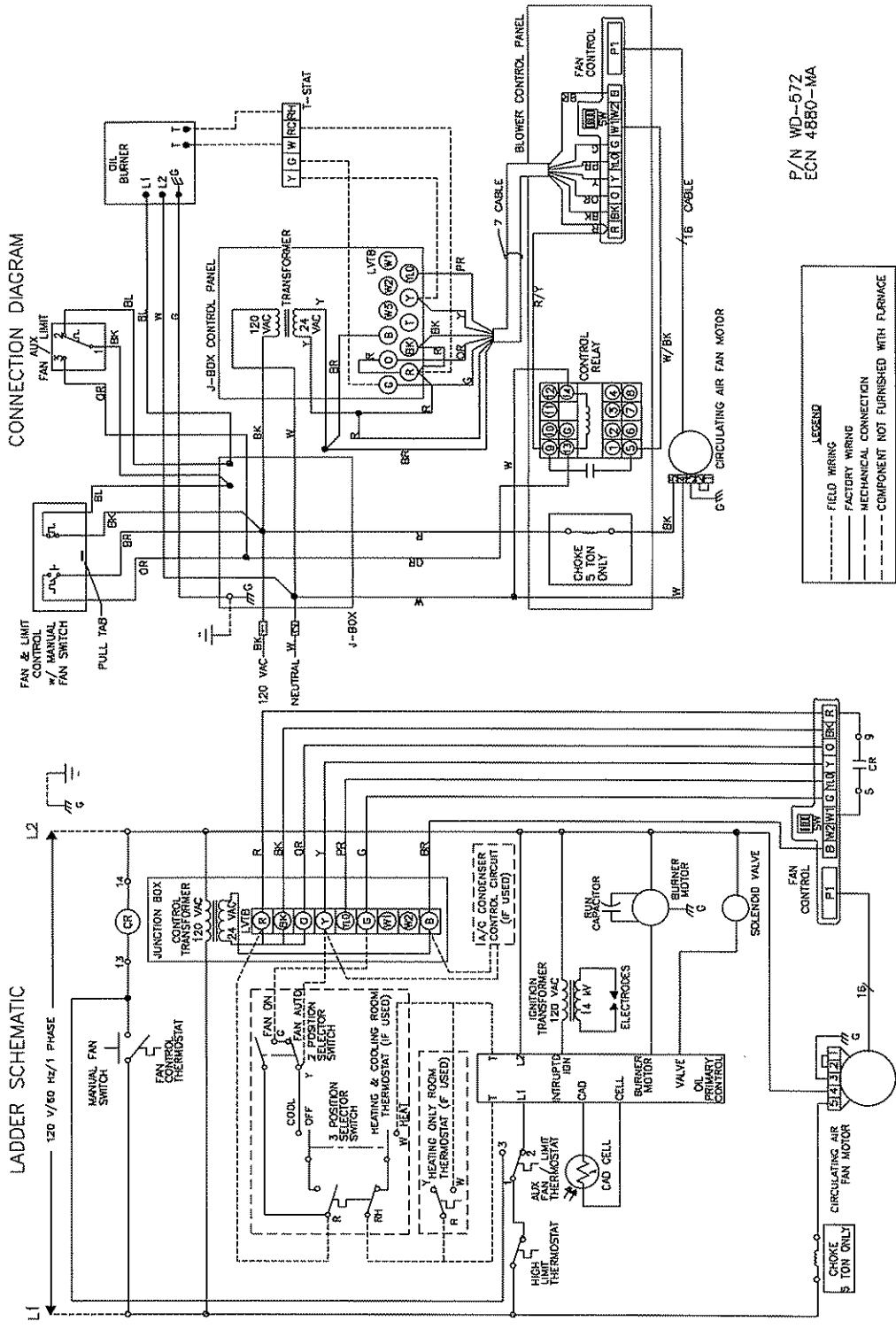
Electrical Data

ELECTRICAL DIAGRAMS & OPERATING INSTRUCTIONS FOR HIGHBOY & LOWBOY FURNACES



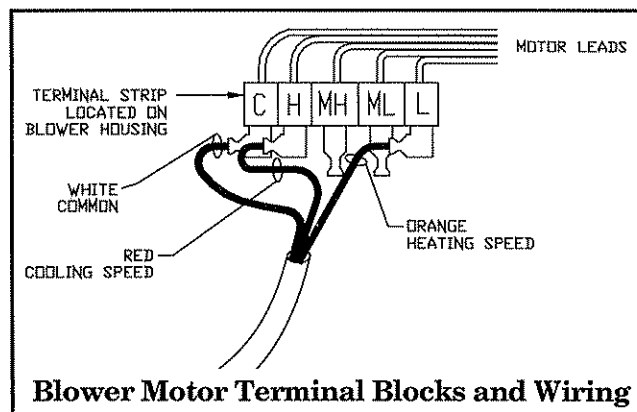
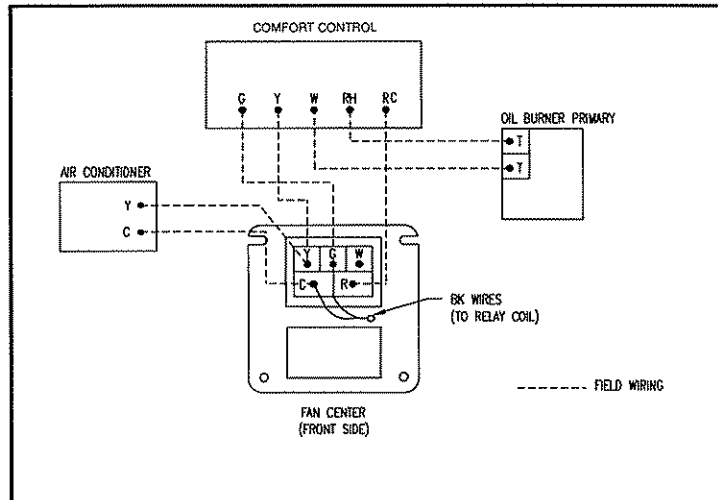
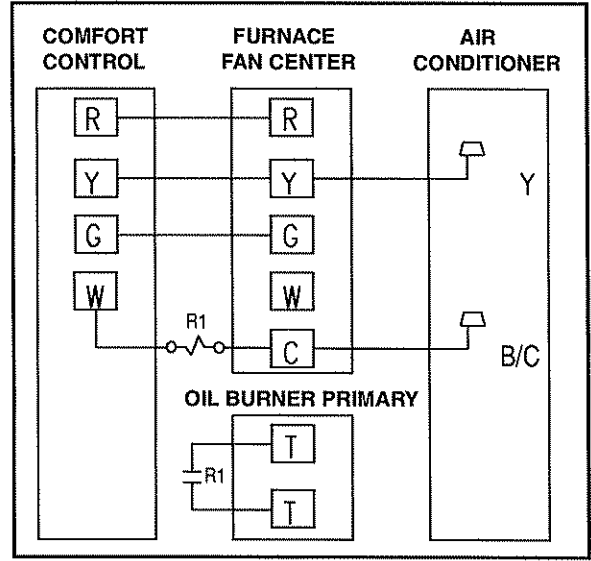
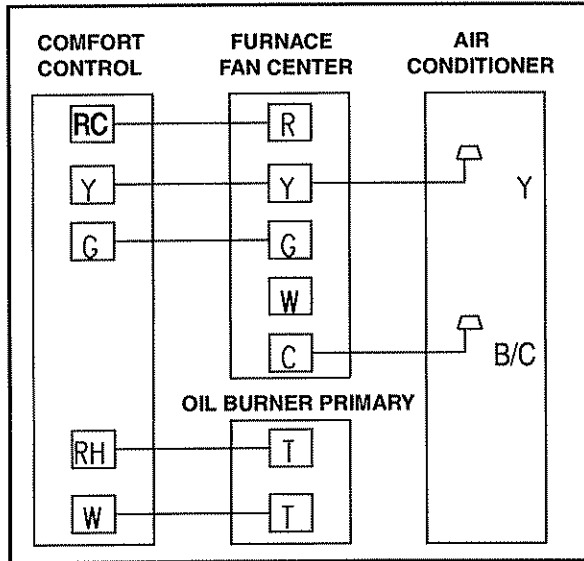
Electrical Data

ELECTRICAL DIAGRAMS & OPERATING INSTRUCTIONS FOR HORIZONTAL / DOWNFLOW FURNACE



Field Wiring

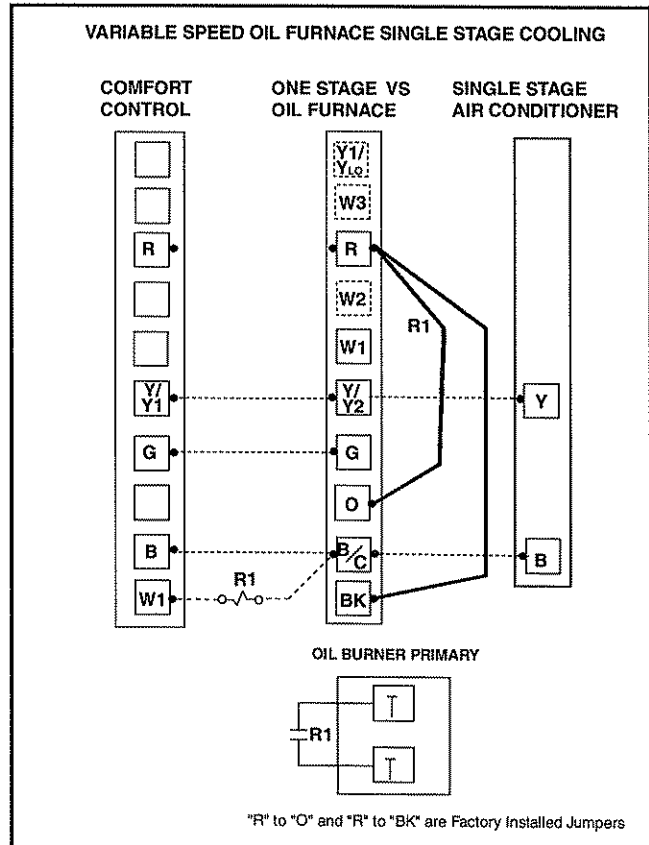
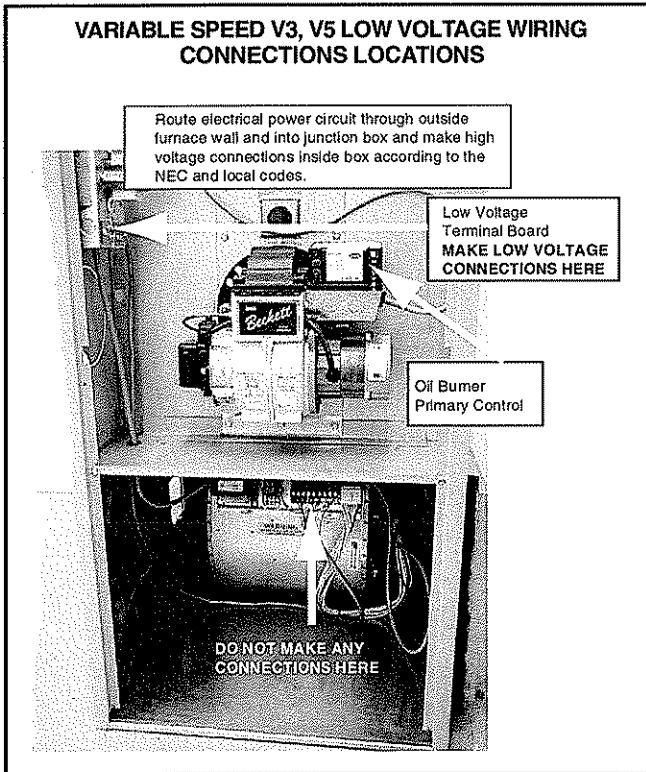
LOW VOLTAGE HOOK UP DIAGRAMS FOR OIL FURNACE & SINGLE STAGE COOLING PSC 4 SPEED MOTORS





Field Wiring

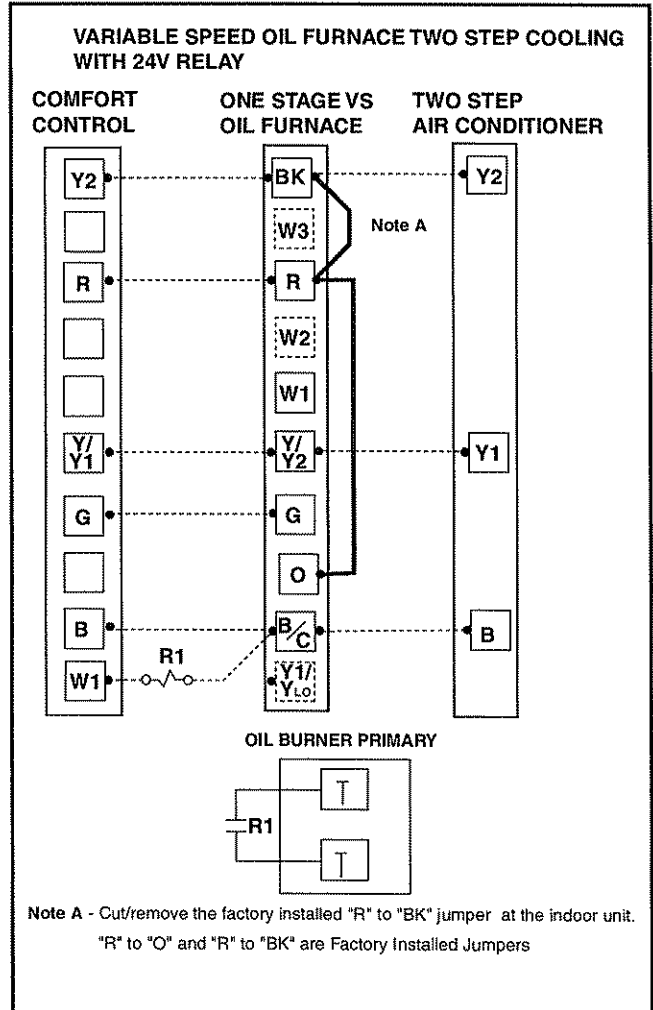
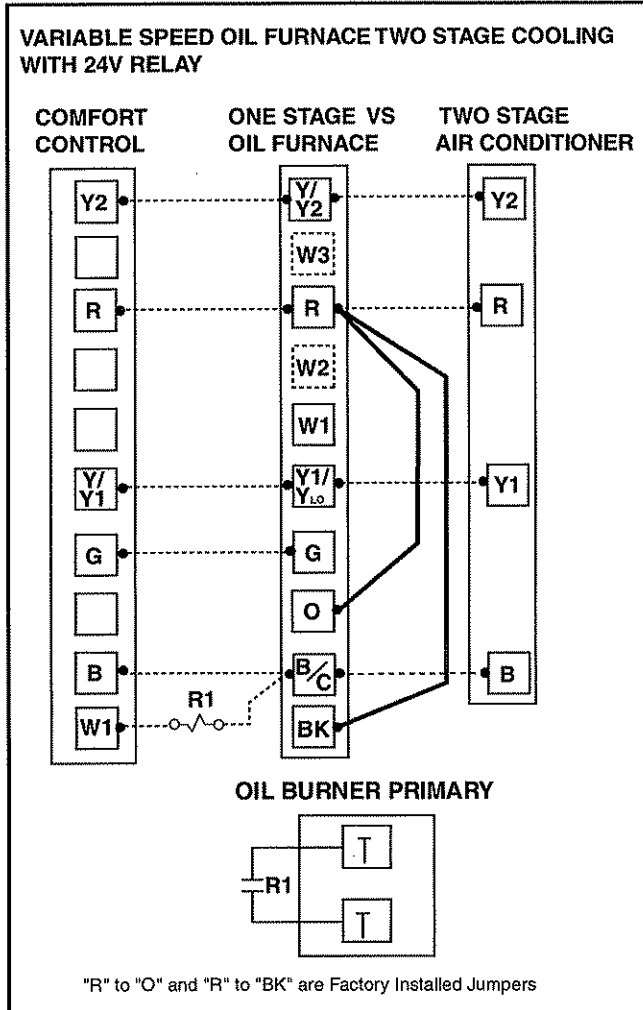
VARIABLE SPEED LOW VOLTAGE HOOK UP DIAGRAMS FOR OIL FURNACE AND SINGLE STAGE COOLING





Field Wiring

VARIABLE SPEED LOW VOLTAGE HOOK UP DIAGRAMS FOR OIL FURNACE AND TWO STAGE / STEP COOLING

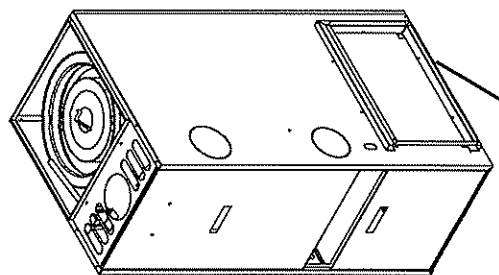
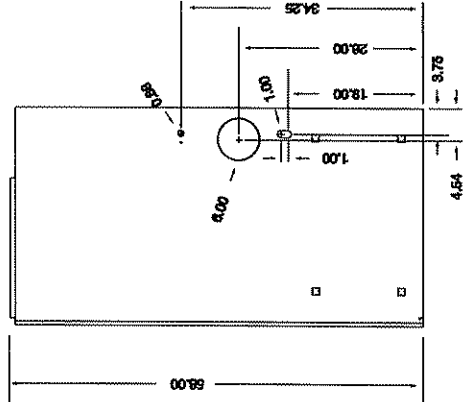
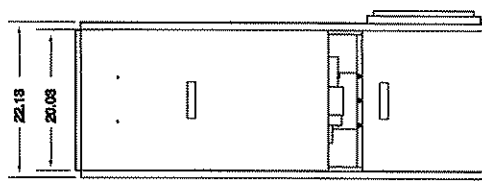
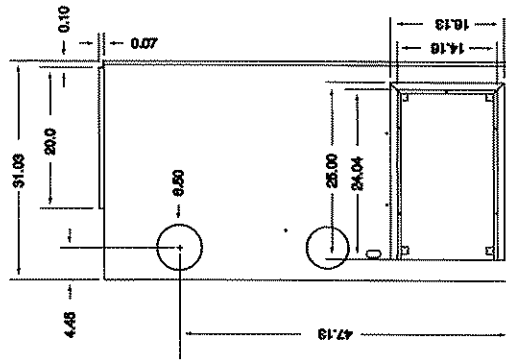
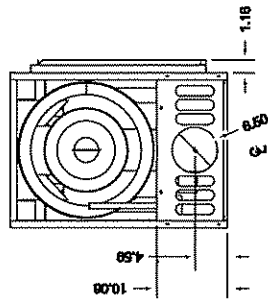




Dimensions

THV1M087A936, 48, V3, V5SA OUTLINE DRAWING (ALL DIMENSIONS ARE IN INCHES)

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS	
Furnace casing sides and rear	3"
Front furnace casing to closet door	8"
Furnace flue pipe / vent connector	9"
Furnace casing top	3"
Supply air plenum (any side)	3"
Supply air ducts within 6 feet of the furnace.	3"



* NOTE: Filter Frame
Shipped unassembled
& packed in blower
compartment

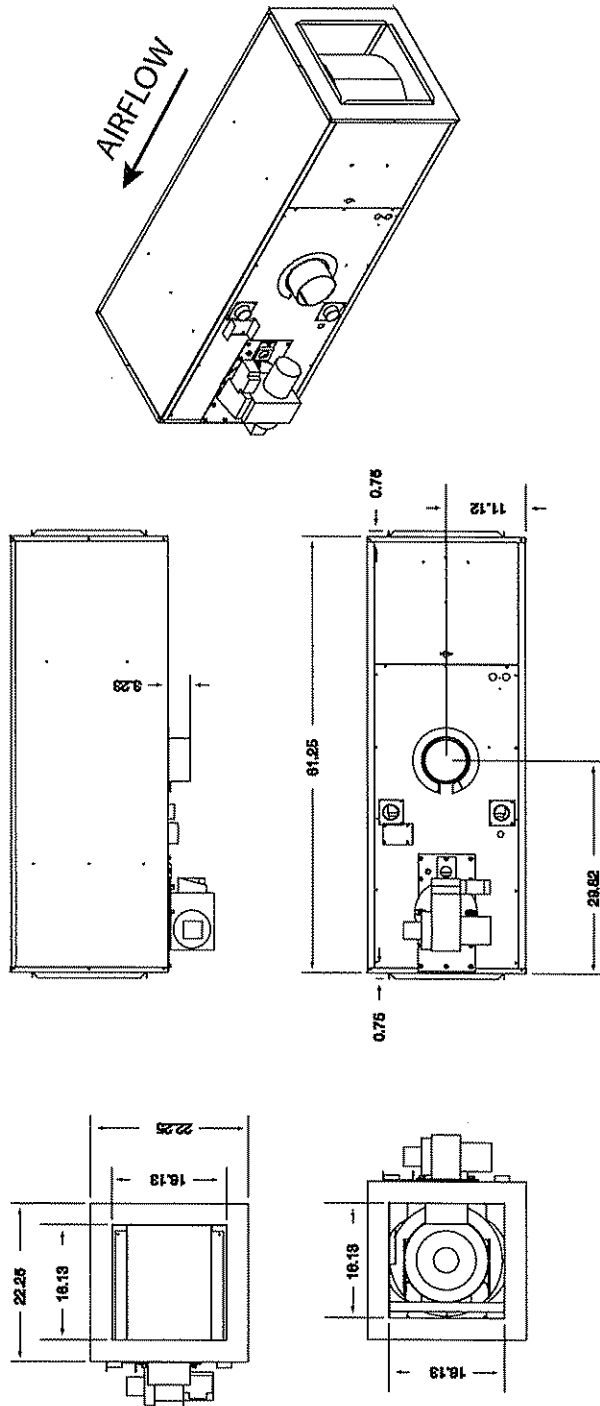
Highboy Vertical

Dimensions

TDF1M087A936, 48, V3, V5SA OUTLINE DRAWING (ALL DIMENSIONS ARE IN INCHES)

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS	
Furnace casing sides and rear	3"
Front furnace casing to closet door ¹	8"
Furnace flue pipe / vent connector	9"
Furnace casing top	3"
Supply air plenum (any side)	3"
Supply air ducts within 6 feet of the furnace.	3"

Notes:
 1 The Horizontal / Downflow model requires 22" from the front casing of the furnace to the closet door.
 2 Adequate clearance from the supply end surface of the furnace casing to combustible materials are provided by the design of the accessory mounting base when used with the Horizontal / Downflow furnace model applied in the Downflow configuration.



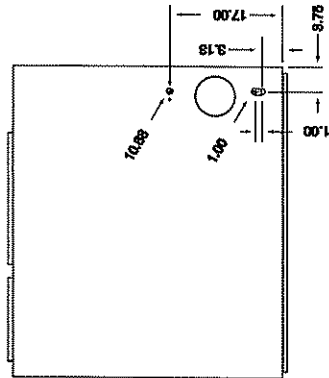
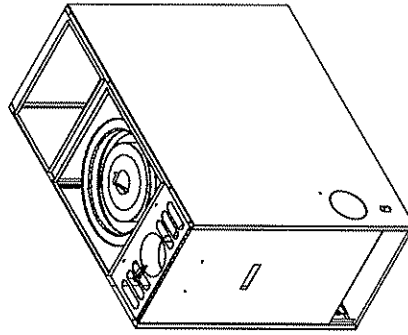
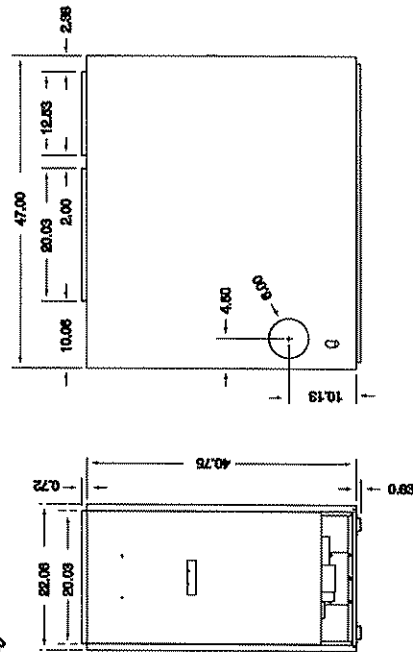
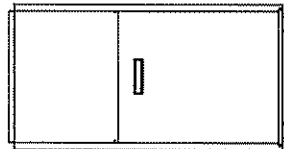
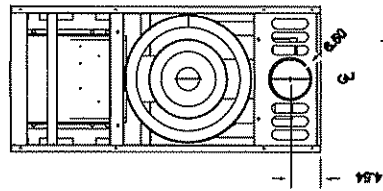
Downflow / Horizontal - Front Flue



Dimensions

TLF1M087A936, 48, V3, V5SA OUTLINE DRAWING (ALL DIMENSIONS ARE IN INCHES)

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS	
Furnace casing sides and rear	3"
Front furnace casing to closet door ¹	8"
Furnace flue pipe / vent connector	9"
Furnace casing top	3"
Supply air plenum (any side)	3"
Supply air ducts within 6 feet of the furnace.	3"



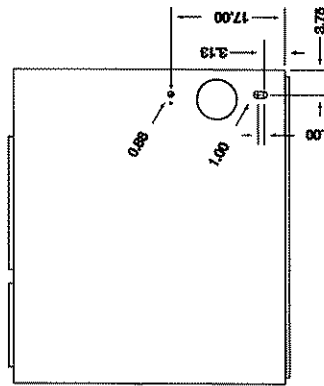
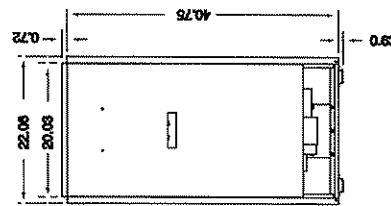
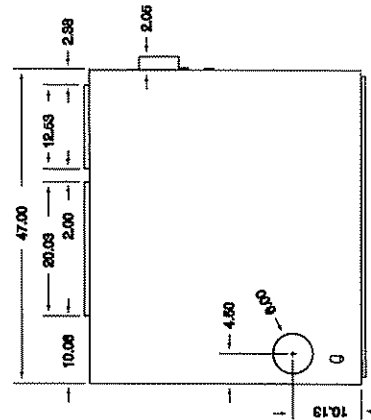
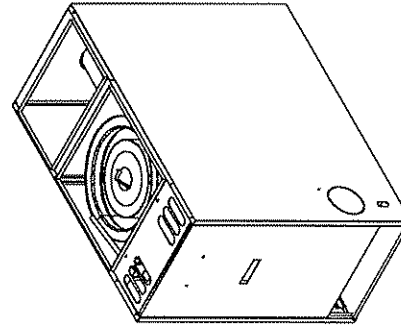
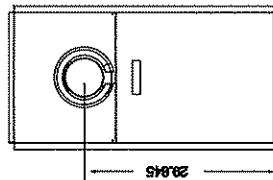
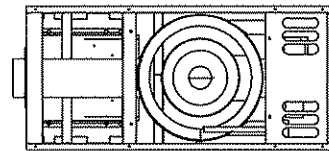
Lowboy - Front Flue

Dimensions

TLR1M087A936, 48, V3, V5SA OUTLINE DRAWING (ALL DIMENSIONS ARE IN INCHES)

MINIMUM CLEARANCE TO COMBUSTIBLE MATERIALS	
Furnace casing sides and rear	3"
Front furnace casing to closet door†	8"
Furnace flue pipe / vent connector	9"
Furnace casing top	3"
Supply air plenum (any side)	3"
Supply air ducts within 6 feet of the furnace.	3"

Notes:
† Lowboy Rear Flue model requires 3" from the furnace front casing to the closet door.



Lowboy Rear Flue



2TTX4018-SQ-100.01

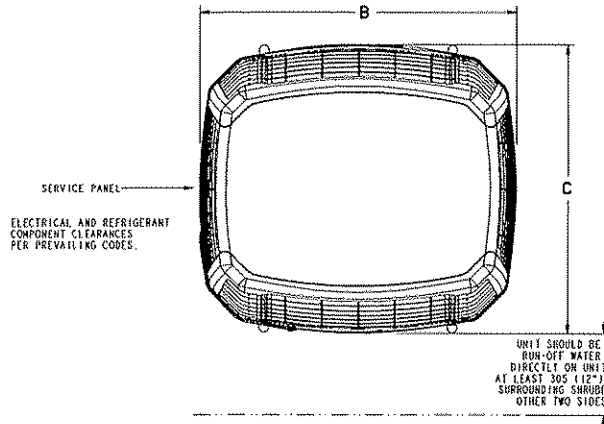
TAG: _____

SUBMITTAL

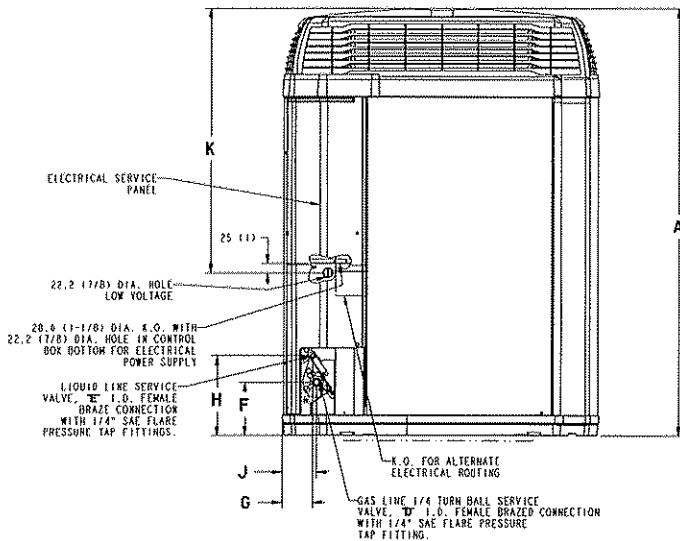
NOTE: All dimensions are in mm/inches.

1 1/2 Ton Split System Cooling — 1 Phase 2TTX4018B

OUTDOOR UNIT ①② 2TTX4018B1000A



UNIT SHOULD BE PLACED SO ROOF RUN-OFF WATER DOES NOT POUR DIRECTLY ON UNIT, AND SHOULD BE AT LEAST 305 (12") FROM WALL AND ALL SURROUNDING SHRUBBERY ON TWO SIDES. OTHER TWO SIDES UNRESTRICTED.



General Data

Model No.(1)	2TTX4018B1000AA
Electrical Data V/Ph/Hz(2)	200/230/1/60
Min Cir Ampacity	10
Max Fuse Size (Amps)	15
Compressor	CLIMATUFF - (R)
RL Amps - LR Amps	7.2 - 42
Outdoor Fan FL Amps	0.6
Fan HP	1/15
Fan Dia (inches)	23
Coil	Spine Fin TM
Refrigerant R-22	5/03-LB/OZ
Line Size-(in.) O.D. Gas (3)	5/8
Line Size-(in.) O.D. Liquid (3)	1/4
Dimensions HxWxD (Crated)	43.6 X 30.1 X 33
Weight-Shipping	229
Weight-Net	195
Start Components	YES
Sound Enclosure	YES
Compressor Sump Heat	YES

① Certified in accordance with the Unitary Air-Conditioner equipment certification program which is based on ARI Standard 210/240.
 ② Calculated in accordance with N.E.C. Use only HACR circuit breakers or fuses.
 ③ Standard line lengths - 60'. Standard lift - 60' Suction and Liquid line.
 For Greater lengths and lifts refer to refrigerant piping software Pub# 32-3312-01. (*denotes latest revision)



MODELS	BASE	FIG.	A	B	C	D	E	F	G	H	J	K
2TTX4018B	3	1	1016 (40)	829 (32-5/8)	756 (29-3/4)	5/8	1/4	143 (5-5/8)	92 (3-5/8)	210 (8-1/4)	79 (3-1/8)	692 (27-1/4)

From Dwg. 21D152635 Rev. 11

A-weighted Sound Power Level [dB(A)]

MODEL	SOUND POWER LEVEL [dB(A)]	A-WEIGHTED FULL OCTAVE SOUND POWER LEVEL dB - [dB(A)]							
		63	125	250	500	1000	2000	4000	8000
2TTX4018B1	73	50.6	56.2	59.7	65.5	65.3	66.6	57.5	56.7

Mechanical Specification Options

General

The 2TTX4 shall be fully charged from the factory for matched indoor section and up to 15 feet of piping. This unit must be designed to operate at outdoor ambient temperatures as high as 115°F. Cooling capacities shall be matched with a wide selection of air handlers and furnace coils that are ARI certified. The unit shall be UL listed. Exterior must be designed for outdoor application.

Casing

Unit casing is constructed of heavy gauge, galvanized steel and painted with a weather-resistant powder paint. Corrosion and weatherproof CMBP-G30 DuraTuff™ base.

Refrigerant Controls

Refrigeration system controls include condenser fan and compressor contactor. High and low pressure controls are inherent to the compressor. Another standard feature is the liquid line dryer.

Compressor

The Climatuff® compressor features internal over temperature and pressure protector and total dipped hermetic motor. Other features include: roto lock suction and discharge refrigeration connections, centrifugal oil pump, and low vibration and noise. The Climatuff® compressor is standard with a 10 year limited warranty.

Condenser Coil

The Spine Fin™ coil shall be continuously wrapped, corrosion resistant all aluminum with minimum brazed joints. This coil is seamless aluminum glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels and has a 10 year limited warranty.

Low Ambient Cooling

As manufactured, this unit has a cooling capability to 55°F. The addition of an evaporator defrost control permits operation to 40°F. The addition of an evaporator defrost control with TXV permits low ambient cooling to 30°F.

Accessories

Thermostats — Heating/Cooling (manual and automatic changeover). Sub-base to match thermostat and locking thermostat cover.

Evaporator Defrost Control — See Low Ambient Cooling.

Outdoor Thermostat — Supplemental heat outdoor ambient lockout from 46 to -10°F.



TRANE®

Trane
A business of
American Standard Companies
www.trane.com

Trane has a policy of continuous product and product data improvement and it reserves the right to change design and specifications without notice.



2TTX4030-SQ-102.01

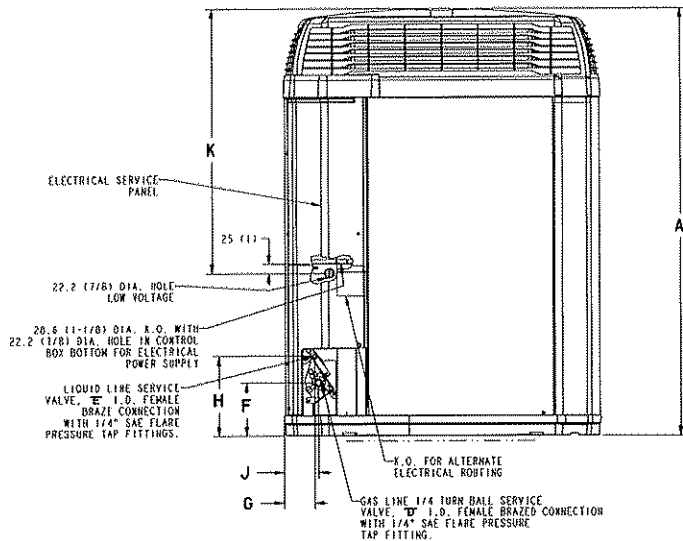
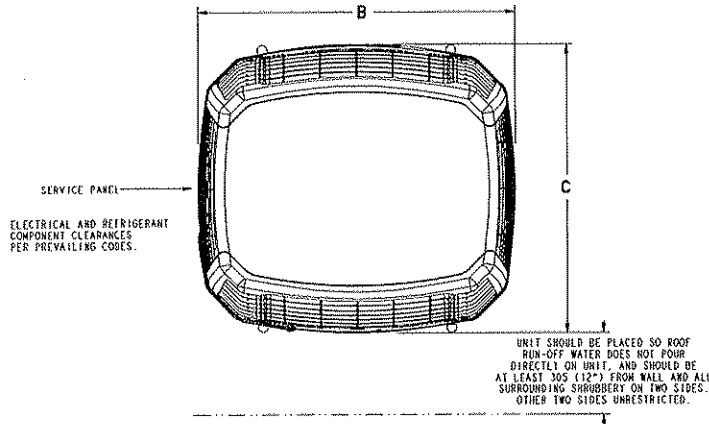
TAG: _____

SUBMITTAL

NOTE: All dimensions are in mm/inches.

2 1/2 Ton Split System Cooling — 1 Phase 2TTX4030B

OUTDOOR UNIT ①② 2TTX4030B1000A



General Data

Model No.(1)	2TTX4030B1000AA
Electrical Data V/Ph/Hz(2)	208/230/1/60
Min Cir Ampacity	18
Max Fuse Size (Amps)	30
Compressor	CLIMATUFF - (R) - SCROLL
RL Amps - LR Amps	13.5 - 73
Outdoor Fan FL Amps	1.4
Fan HP	1/6
Fan Dia (inches)	23
Coil	Spine Fin TM
Refrigerant R-22	6/09-LB/OZ
Line Size-(in.) O.D. Gas (3)	3/4
Line Size-(in.) O.D. Liquid (3)	5/16
Dimensions HxWxD (Crated)	47.6 X 30.1 X 33
Weight-Shipping	245
Weight-Net	210
Start Components	NO
Sound Enclosure	YES
Compressor Sump Heat	NO

- ① Certified in accordance with the Unitary Air-Conditioner equipment certification program which is based on ARI Standard 210/240.
- ② Calculated in accordance with N.E.C. Use only HACR circuit breakers or fuses.
- ③ Standard line lengths - 60'. Standard lift - 60' Suction and Liquid line.
For Greater lengths and lifts refer to refrigerant piping software Pub# 32-3312-0'. (*denotes latest revision)



MODELS	BASE	FIG.	A	B	C	D	E	F	G	H	J	K
2TTX4030B	3	1	1118 (44)	829 (32-5/8)	756 (29-3/4)	3/4	5/16	143 (5-5/8)	92 (3-5/8)	210 (8-1/4)	79 (3-1/8)	692 (27-1/4)

From Dwg. 21D152635 Rev. 11

A-weighted Sound Power Level [dB(A)]

MODEL	SOUND POWER LEVEL [dB(A)]	A-WEIGHTED FULL OCTAVE SOUND POWER LEVEL dB - [dB(A)]							
		63	125	250	500	1000	2000	4000	8000
2TTX4030B1	74	49.1	56.8	59.1	64.9	68.7	62.5	54.5	47.6

Mechanical Specification Options

General

The 2TTX4 shall be fully charged from the factory for matched indoor section and up to 15 feet of piping. This unit must be designed to operate at outdoor ambient temperatures as high as 115°F. Cooling capacities shall be matched with a wide selection of air handlers and furnace coils that are ARI certified. The unit shall be UL listed. Exterior must be designed for outdoor application.

Casing

Unit casing is constructed of heavy gauge, galvanized steel and painted with a weather-resistant powder paint. Corrosion and weatherproof CMBP-G30 DuraTuff™ base.

Refrigerant Controls

Refrigeration system controls include condenser fan and compressor contactor. High and low pressure controls are inherent to the compressor. Another standard feature is the liquid line dryer.

Compressor

The Climatuff® compressor features internal over temperature and pressure protector and total dipped hermetic motor. Other features include: roto lock suction and discharge refrigeration connections, centrifugal oil pump, and low vibration and noise. The Climatuff® compressor is standard with a 10 year limited warranty.

Condenser Coil

The Spine Fin™ coil shall be continuously wrapped, corrosion resistant all aluminum with minimum brazed joints. This coil is seamless aluminum glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on all four sides by louvered panels and has a 10 year limited warranty.

Low Ambient Cooling

As manufactured, this unit has a cooling capability to 55°F. The addition of an evaporator defrost control permits operation to 40°F. The addition of an evaporator defrost control with TXV permits low ambient cooling to 30°F.

Accessories

Thermostats — Heating/Cooling (manual and automatic changeover). Sub-base to match thermostat and locking thermostat cover.

Evaporator Defrost Control — See Low Ambient Cooling.

Outdoor Thermostat — Supplemental heat outdoor ambient lockout from 46 to -10°F.

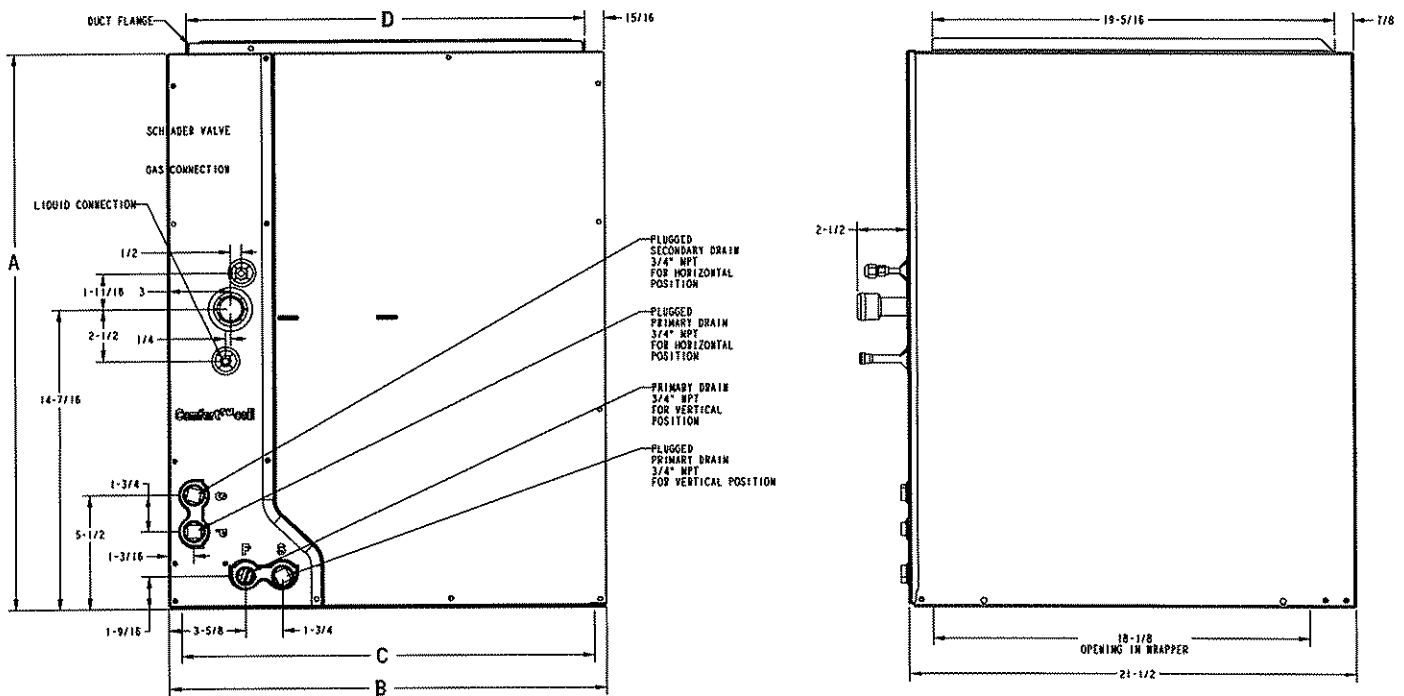




TAG: _____

SUBMITTAL

1-1/2 - 5 ton Comfort Coils™, Split System Aluminum Heat Pump / Cooling Coils Cased Upflow/Downflow Horizontal 2/4TXC Series Coils



MODEL	2TXCA018BC3HCA 4TXCA016BC3HCA 2TXCA024BC3HCA 4TXCA024BC3HCA	2TXCB025BC3HCA 4TXCB025BC3HCA 2TXCB031BC3HCA 4TXCB031BC3HCA	4TXCB032BC3HCA 2TXCB036BC3HCA 4TXCB036BC3HCA 2TXCB042BC3HCA 4TXCB042BC3HCA	2TXCC037BC3HCA 4TXCC037BC3HCA 2TXCC043BC3HCA 4TXCC043BC3HCA	2TXCB048BC3HCA 4TXCB048BC3HCA	4TXCC044BC3HCA 2TXCC049BC3HCA 4TXCC049BC3HCA	2TXCC060BC3HCA 4TXCC060BC3HCA
WEIGHT (LBS.)	34	38	45	48	49	51	65
REFRIGERANT CONTROL	TXV (NON-BLEED)						
HEIGHT "A" (IN)	22-5/8	17-5/8	22-5/8	22-5/8	26-7/8	26-7/8	30-1/16
OVERALL WIDTH "B" (IN)	14-1/2	17-1/2	21	17-1/2	21	21	21
OPENING WIDTH "C" (IN)	13-1/2	16-1/2	20	16-1/2	20	20	20
TOP OPENING "D"	12-3/4	15-3/4	19-1/4	15-3/4	19-1/4	19-1/4	19-1/4
GAS CONNECTION	3/4 BRAZE		7/8 BRAZE		1-1/8 BRAZE		
R410-A GAS REDUCER	5/8" X 3/4"	5/8" X 3/4" (025 ONLY)	3/4" X 7/8"		7/8" X 1-1/8"		
LIQUID CONNECTION	5/16 BRAZE		3/8 BRAZE				
MATCHED FURNACE WIDTH (NO ADAPTER REQUIRED)	14-1/2	17-1/2	21	17-1/2	21	21	21
DRAIN PAN	PLASTIC						

* Reducer supplied with R-410A models

Mechanical Specifications

General

Upflow, Downflow, or Horizontal coils shall be designed for cooling and heat pump applications. The coil shall be 3/8" seamless aluminum tubing mechanically bonded to aluminum plate fin.

Refrigerant for the TXC coils shall be controlled with factory installed Non-Bleed TXV refrigerant control. Refrigerant connections are brazed fittings with an additional Schrader Valve for system service.

The coil cabinet shall have a removable front and interior access panel for evaporator coil entering air surface cleaning.

The coil includes a drain pan with drain connections for vertical or horizontal operation and a horizontal auxiliary drain pan.

These coils are A.R.I. certified with Trane's matching condensing units.

Accessories

Evaporator Defrost Control installed on coil for lower ambient operating conditions.

Non-Bleed Expansion Valve Kits for use with R410A refrigerant systems.

PRODUCT SPECIFICATIONS --- SPLIT SYSTEM HEAT PUMP / COOLING COMFORT™ COILS CASED UPFLOW / DOWNFLOW / HORIZONTAL

	2/4TXCA018BC3HCA		2/4TXCA024BC3HCA		2/4TXCB025BC3HCA		2/4TXCB031BC3HCA		4TXCB032BC3HCA	
INDOOR COIL -- Type	PLATE FIN		PLATE FIN		PLATE FIN		PLATE FIN		PLATE FIN	
Rows / F.P.I.	2 / 18		2 / 18		3 / 14		3 / 14		3 / 14	
Face Area (sq.ft.)	3.50		4.00		3.50		3.50		5.00	
Tube Size	3/8		3/8		3/8		3/8		3/8	
Refrigerant Control (No internal check valve)	Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV	
Drain Conn. Size (in.)	3/4 NPT		3/4 NPT		3/4 NPT		3/4 NPT		3/4 NPT	
Duct Connections			-See Outline Drawings-							
REFRIGERANT CONNECTIONS	R-22	R-410A	R-22	R-410A	R-22	R-410A	R-22	R-410A	R-22	R-410A
	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED
Line Size -- Gas (in.)	5/8	1/2*	3/4	5/8*	3/4	5/8*	3/4	3/4	7/8	3/4*
Line Size -- Liquid (in.)	1/4	1/4	5/16	5/16	5/16	5/16	5/16	5/16	3/8	3/8
DIMENSIONS (in.)	H X W X D		H X W X D		H X W X D		H X W X D		H X W X D	
Crated (H x W x D)	15-1/2x17-1/2x26-1/2		18-1/2x17-1/2x26-1/2		16-1/2x20-1/2x26-1/2		16-1/2x20-1/2x26-1/2		22-3/4x20-1/2x26-1/2	
Uncrated			-See Outline Drawings-							
WEIGHT (lbs)										
Shipping -- Net	36 / 34		36 / 34		40 / 38		40 / 38		48 / 45	

* Reducer supplied with R-410A models

[1] These indoor coils are A.R.I. certified with various split system air conditioners and heat pumps (A.R.I. Standard 210/240).

Refer to the split system product data guides for performance data.

**PRODUCT SPECIFICATIONS --- SPLIT SYSTEM HEAT PUMP / COOLING COMFORT™ COILS
CASED UPFLOW / DOWNFLOW / HORIZONTAL**

	2/4TXCB036BC3HCA		2/4TXCC037BC3HCA		2/4TXCB042BC3HCA		2/4TXCC043BC3HCA		4TXCC044BC3HCA	
INDOOR COIL -- Type	PLATE FIN		PLATE FIN		PLATE FIN		PLATE FIN		PLATE FIN	
Rows / F.P.I.	3 / 14		3 / 14		3 / 14		3 / 14		3 / 14	
Face Area (sq.ft.)	5.00		5.00		5.00		5.00		6.00	
Tube Size	3/8		3/8		3/8		3/8		3/8	
Refrigerant Control (No internal check valve)	Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV	
Drain Conn. Size (in.)	3/4 NPT		3/4 NPT		3/4 NPT		3/4 NPT		3/4 NPT	
Duct Connections					-See Outline Drawings-					
REFRIGERANT CONNECTIONS	R-22	R-410A	R-22	R-410A	R-22	R-410A	R-22	R-410A	R-22	R-410A
	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED
Line Size -- Gas (in.)	7/8	3/4*	7/8	3/4*	7/8	3/4*	7/8	3/4*	1-1/8	7/8*
Line Size -- Liquid (in.)	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8
DIMENSIONS (in.)	H X W X D		H X W X D		H X W X D		H X W X D		H X W X D	
Crated (H x W x D)	22-3/4x20-1/2x26-1/2		22-3/4x24x26-1/2		22-3/4x20-1/2x26-1/2		22-3/4x24x26-1/2		28-1/4x24x26-1/2	
Uncrated					-See Outline Drawings-					
WEIGHT (lbs)										
Shipping -- Net	48 / 45		51 / 48		48 / 45		51 / 48		55 / 51	

	2/4TXCB048BC3HCA		2/4TXCC049BC3HCA		2/4TXCC060BC3HCA	
INDOOR COIL -- Type	PLATE FIN		PLATE FIN		PLATE FIN	
Rows / F.P.I.	3 / 14		3 / 14		3 / 14	
Face Area (sq.ft.)	6.00		6.00		7.00	
Tube Size	3/8		3/8		3/8	
Refrigerant Control (No internal check valve)	Non-Bleed TXV		Non-Bleed TXV		Non-Bleed TXV	
Drain Conn. Size (in.)	3/4 NPT		3/4 NPT		3/4 NPT	
Duct Connections					-See Outline Drawings-	
REFRIGERANT CONNECTIONS	R-22	R-410A	R-22	R-410A	R-22	R-410A
	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED	BRAZED
Line Size -- Gas (in.)	1-1/8	7/8*	1-1/8	7/8*	1-1/8	7/8*
Line Size -- Liquid (in.)	3/8	3/8	3/8	3/8	3/8	3/8
DIMENSIONS (in.)	H X W X D		H X W X D		H X W X D	
Crated (H x W x D)	28-1/4x20-1/2x26-1/2		28-1/4x24x26-1/2		31-1/2x24x26-1/2	
Uncrated					-See Outline Drawings-	
WEIGHT (lbs)						
Shipping -- Net	51 / 49		55 / 51		69 / 65	

* Reducer supplied with R-410A models

[1] These indoor coils are A.R.I. certified with various split system air conditioners and heat pumps (A.R.I. Standard 210/240). Refer to the split system product data guides for performance data.

PRESSURE DROP CHARACTERISTICS FOR COOLING AND HEAT PUMP COILS
AIRFLOW (CFM) VS. PRESSURE DROP ACROSS WET COIL

PRESSURE DROP (INCHES OF WATER COLUMN)

MODEL	.05	0.1	0.15	0.2	0.25	0.3	0.35	0.4
2/4TXCA018BC3HCA	360	545	690	820	930	1040	1135	1230
2/4TXCA024BC3HCA	360	545	690	820	930	1040	1135	1230
2/4TXCB025BC3HCA 2/4TXCB031BC3HCA	310	515	700	865	1020	1170	1310	1450
4TXCB032BC3HCA 2/4TXCB036BC3HCA 2/4TXCB042BC3HCA	480	690	860	1005	1130	1250	1360	1460
2/4TXCB048BC3HCA	470	680	840	980	1110	1220	1330	1425
2/4TXCC037BC3HCA 2/4TXCC043BC3HCA	630	900	1105	1280	1440	1520	1710	1830
4TXCC044BC3HCA 2/4TXCC049BC3HCA	675	970	1200	1390	1560	1715	1860	2000
2/4TXCC060BC3HCA	680	965	1190	1375	1540	1685	1820	1950
2/4TXCD050BC3HCA	810	1140	1390	1600	1790	1950	2110	2250
2/4TXCD061BC3HCA	820	1155	1410	1620	1810	1980	2130	2280
4TXCD064BC3HCA	670	1000	1250	1470	1670	1850	2020	2180

Since the Trane Company has a policy of continuous product and product data improvement, it reserves the right to change specifications and design without notice.

Technical Literature - Printed in U.S.A.

The Trane Company
a business of American Standard Inc.
6200 Troup Highway
Tyler, TX 75707

Library _____
Product Section _____
Product _____
Model _____
Literature Type _____
Sequence _____
Date _____
File No. _____
Supersedes _____



Installer's Guide XB200 Comfort Control

TCONT200AN11AA 1 Heat (Gas, Oil* or Elec) / 1 Cool Electronic Non-Programmable, 4 Wire Hookup

ALL phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES

Note: Read the entire instruction manual before starting the installation.


Contents	
Introduction	1
Application	1
Product Specifications	1
Installation	2
Mounting and Wiring	2
SETUP	4
Checkout	4
Troubleshooting	6
Features	7

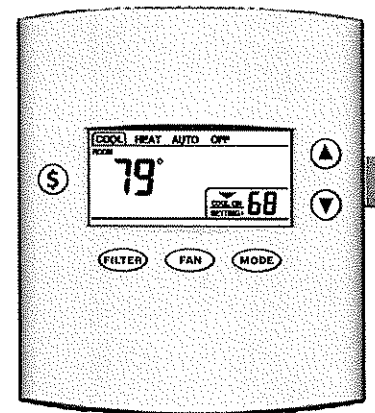
CAUTION
To prevent shortening its service life, the control should not be installed until construction is completed.

Introduction

TCONT200AN11AA is a digital non-programmable 1Heat/1 Cool wall mounted low voltage (24Vac) Comfort Control with backlit LCD and keypad. It maintains room temperature by controlling the operation of heating and cooling systems. The XB Comfort Control is easily configured for Heating Only (gas or electric) or Cooling Only applications via the user friendly Installer Setup menu. The XB Comfort Control features separate heating and cooling setpoints, selectable Auto or Manual Changeover, adjustable Energy Saving mode, adjustable filter reminder and LitePort technology for extended system diagnostics and fault notification. Setup selections and diagnostics are stored indefinitely in the XB Comfort Controls nonvolatile memory eliminating the need for battery backup.

Safety Considerations

Read the following manufacturer instructions carefully. Follow all local codes during installation. All wiring must conform to local and national electrical codes. Improper wiring or installation may damage comfort control. Recognize safety information. This is the safety alert symbol . When you see this symbol on the equipment and in the instruction manual, be alert to the potential for personal injury. Understand the signal words DANGER, WARNING and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies a hazard which could result in personal injury or death. CAUTION is used to identify unsafe practices which could result in minor personal injury or product and property damage.



Application Hook-up diagrams FIG

- 1 Heat / 1 Cool (Gas or Electric) Fig. 3, 4, & 5
- 1 Heat / 0 Cool (Gas or Electric) Fig. 6
- 0 Heat / 1 Cool Fig. 5
- 1 Heat / 1 Cool (Oil Furnace) Fig. 7
- 1 Heat / 0 Cool (Oil Furnace) Fig. 8

SYSTEM MODE: HEAT, COOL, AUTO and OFF

FAN MODE: AUTO or ON

* Requires external relay for Oil furnace applications.

Product Specifications

- Power Source: 20V-30VAC, 50/60Hz, Load Powered through W and Y.
- Cooling setpoint temperature range: 65F - 90F, 18.0C - 33.0C, 1F and 0.5C resolution.
- Heating setpoint temperature range: 40F- 85F, 5.0C - 30.0C, 1F and 0.5C resolution.
- Default set points: 68F, 20.0C Heat, 78F, 25.5C Cool
- Storage Range: -40F to 140F, 5% - 90% RH non-condensing.
- Operating Temperature range: 32F - 110F, 5 - 90% RH non-condensing.
- Minimum Cycle Off Time Delay: Cooling - 5 minutes, Heating - 1 minute.
- Use minimum 18 gauge NEC approved control wiring.

Installation

Location

The XB Comfort Control should be mounted approximately 60" (1.5m) off the floor on an interior partition wall. Never install the XB Home Comfort Control on an outside wall.

For proper temperature sensing, avoid mounting the XB Comfort Control where it will be exposed to heat radiated from lamps, sun light, fireplaces or any other radiant heat sources.

Avoid locations close to windows, behind doors or alcoves with poor air circulation, adjoining outside walls, or doors that lead to the outside.

Select a location that prevents the XB Comfort Control from being directly exposed to air currents from supply registers or return grills.

Mount the XB Comfort Control on a section of interior wall that does not contain hot and cold water pipes or ductwork.

Mounting and Wiring

1. Turn OFF all power to heating and cooling equipment.
2. If an existing thermostat is being replaced:
 - a. Remove existing thermostat from wall.
 - b. Disconnect wires from existing thermostat, one at a time. Be careful not to allow wires to fall back into the wall.
 - c. As each wire is disconnected, record wire color and terminal marking.
 - d. Discard or recycle old thermostat.



Mercury is a hazardous waste and MUST be managed properly. If the XB Comfort Control is replacing a thermostat that contains mercury in a sealed tube, do not place your old thermostat in the trash. Contact your local waste management authority for instructions regarding recycling and the proper disposal of an old thermostat.

3. Separate the control from the mounting base to expose mounting holes by pressing the release button A on the bottom of the control and lift out and up. See Figure 1.

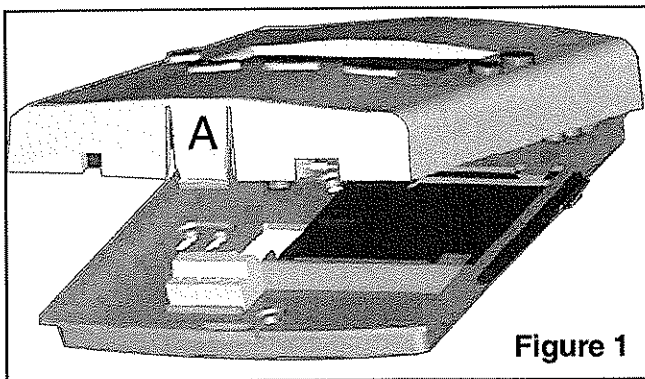


Figure 1

4. Slide the mounting base drawer out to expose all the mounting holes.
Route control wires through the large hole in mounting base. Level mounting base against wall (for aesthetic value only) and mark wall through 2 mounting holes. See Figure 2.
5. Drill two mounting holes in wall where marked.

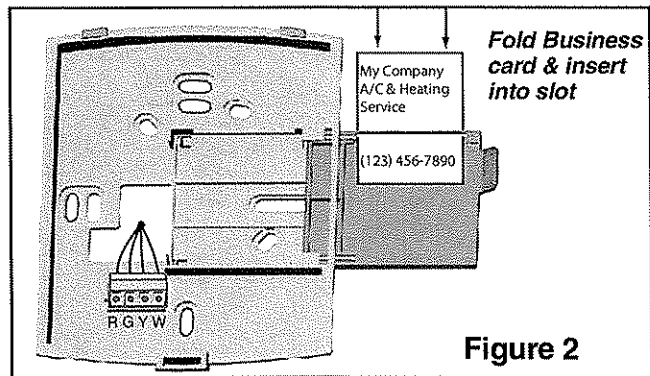


Figure 2

6. Secure mounting base to wall with 2 screws (use anchors provided if needed). Additional mounting holes are available for more secure mounting if needed. Make sure all wires extend through hole in mounting base.
7. Adjust length and routing of each wire to reach proper terminal on the connector block on mounting base. Strip only 1/4-in. of insulation from each wire to prevent adjacent wires from shorting together when connected.
8. Match and connect control wires to proper terminals on the connector block. See Figures 3-8.

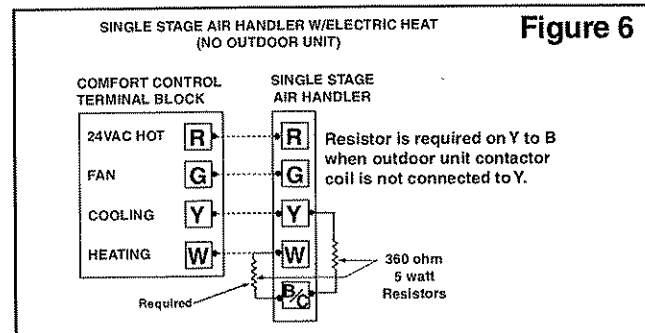
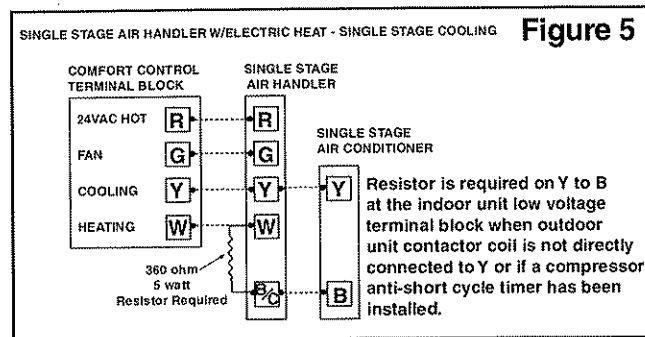
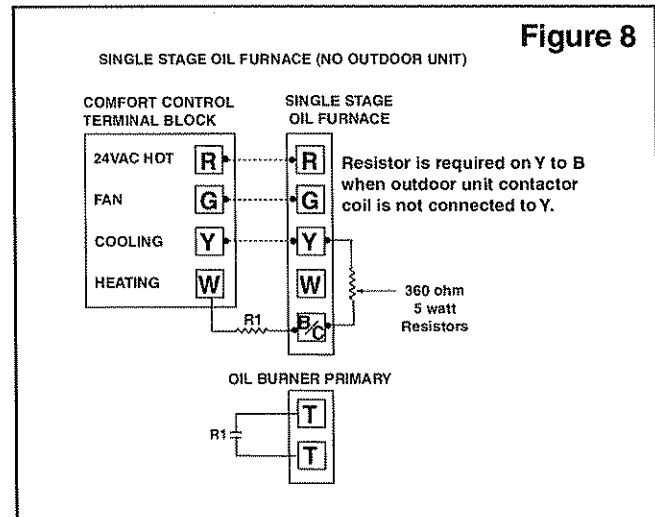
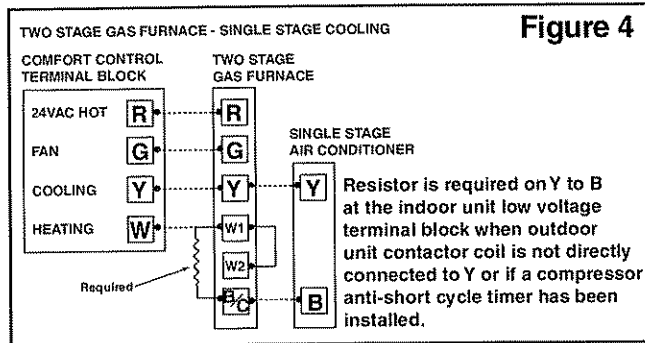
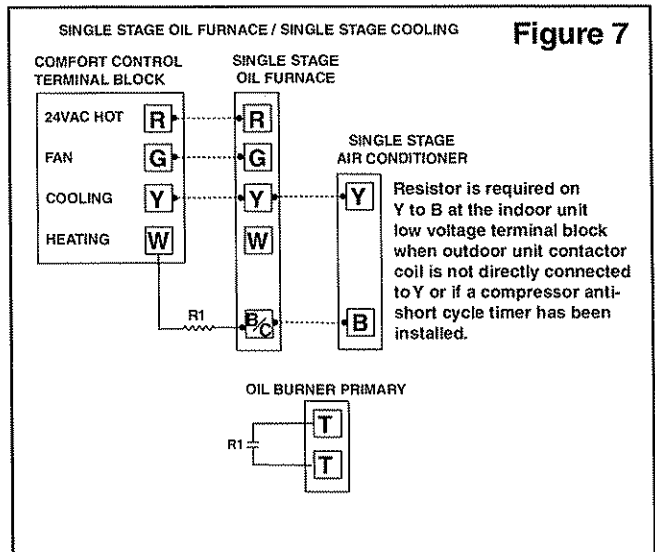
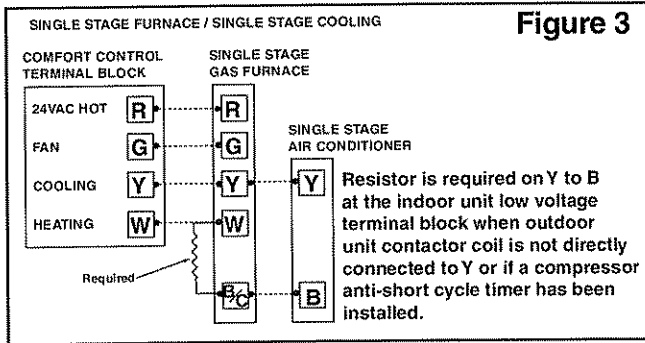
Two 360 ohm resistors (5 watts) are included with this control. One of them must be installed between the "W" and "B/C" terminal of the indoor unit low voltage terminal block regardless of the application.

The XB control is powered through the loads connected to it. The second resistor is required between "Y" and "B/C" at the indoor unit low voltage terminal block if no outdoor unit is installed or the outdoor unit has a compressor anti-short cycle timer installed. See Figures 3-8.

9. Push any excess wire back into the wall and seal the hole to prevent air leaks.

Note: Air leaks in the wall behind the control can cause improper operation.

10. Check the operation of the mounting base drawer. Verify that it slides in and out without binding.
11. Reinstall the control on its mounting base by aligning the control at the top of the mounting base. Swing the control downward and gently press the bottom of control into position until latch button A engages. See Figure 1.
12. Turn ON power to the heating and cooling equipment.



SETUP

Enter INSTALLER Setup:

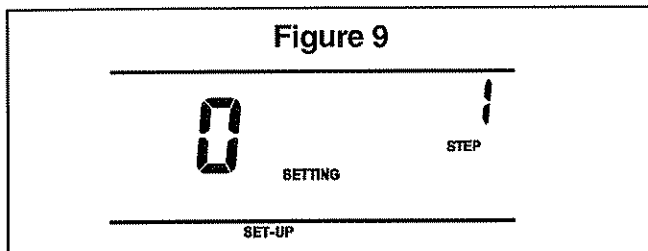
(See Table 2, steps 1-50 for option details)

- 1.) Set System Mode to OFF
- 2.) Set Fan to AUTO
- 3.) Press and hold Mode and Up Arrow at the same time.
- 4.) SET-UP will appear on display. See Figure 9.

Enter USER Setup:

(See Table 2, steps 40-49 for option details)

Press and hold Mode and Fan at the same time.



Note: Allow a minimum of 5 seconds after saving selections (Step 99 - SA) for the control to write selections to memory. If power is lost or removed prior to the 5 second elapsed time, the selections may be lost and must be reentered. If the SERVICE icon is flashing on the control LCD, press any key and check / reenter setup choices.

Keypad Navigation:

Use the Mode and Fan buttons to navigate forward and backward through the configuration and Manual Test Mode steps.

Press Mode to advance forward to the next step.

Press Fan to return to the previous step.

Use the Up and Down arrow buttons to select or change setup options.

Lock - Unlock Keypad:

Press and hold Up Arrow and Down Arrow at the same time. ("Keypad Locked" icon will display on LCD screen)

Defeat Equipment Time Delay:

(Current Cycle only) Press Mode and Down Arrow at the same time.

Checkout

There are two methods of verifying that the XB Comfort Control operates the system as intended.

Method 1: Normal Mode

This can be accomplished by pressing the appropriate keypad button(s) to cycle the system through each of the available modes and increasing or decreasing the setpoint to activate and deactivate the cycle.

The minimum on and off cycle time delays, selected during the setup, will be enforced. Press the appropriate keypad button for the filter timer and energy savings features to verify they are set to the end user's desired preference.

Method 2: Manual Test Mode

The XB Comfort Control's load outputs can be verified using the manual test mode. See Table 1 for navigating through the manual test mode steps.

To Enter The Manual Test Mode:

- 1.) Set System Mode to OFF
- 2.) Set Fan to AUTO
- 3.) Press and hold Mode and Down Arrow at the same time.

Menu Item (Press MODE or FAN)	Default	Setting (Choices) (Press Up or Down arrow)	Step (Press MODE or FAN)
G - Fan Relay "G"	Off	On/Off	70
Y - Compressor Contactor (G - must be ON) "Y"	Off	On/Off	72
W - Heating relay "W"	Off	On/Off	75
LCD "SC"	---	All icons On (See Fig. 8) All icons Off	78
Factory Use Only	Press and hold MODE to advance to step 80 and press "\$" Energy Savings key to exit.		79-82

The manual test mode allows the installer to energize the G fan relay, Table 1, Step 70, and then advance to Step 72 to energize the Y compressor output with the fan still operating. It is recommended that this method be used to prevent damage to the compressor.

The Manual test mode will time out and return to normal operation after 1 minute from the last key press.

XB Control Setup

Table 2 INSTALLER SETUP (ISU)				USER SETUP (USU)			
1. Set System MODE to OFF 2. Set FAN to AUTO 3. Press and hold MODE and UP arrow at the same time.				1. Press and hold MODE and FAN at the same time.			
Menu Item	Factory Setting	Setting (Choices) (Press UP or DOWN arrow)	Step (Press MODE or FAN)	Menu Item	Default	Setting (Choices) (Press UP or DOWN arrow)	Step (Press MODE or FAN)
Error Count	0	None	1	Temperature Display	0	0 = Fahrenheit 1 = Celsius	40
Software Version		None	2	Auto or Manual Changeover	1	0 = Manual 1 = Auto	41
Configuration Signature - LoByte		None	3	Setpoint Deadband	3	2 - 10 Degrees Fahrenheit 1.5 - 5.0 Degrees Celsius	42
Configuration Signature - HiByte		None	4	Waiting Icon	0	0 = Disable 1 = Enable	43
Compressor Stages	1	0 = None 1 = Single Stage AC	6	Cooling Droop	1	0 = Off 1 = 1 Degree 2 = 2 Degrees	44
Indoor Heater Type	1	1 = Gas, Oil 2 = Electric	7	Energy Savings - Cooling Setpoint Offset	5	0 - 25 Degrees Fahrenheit 0 - 15 Degrees Celsius	45
Indoor Heater Stages	1	0 = None 1 = Single Stage Heater	8	Energy Savings - Heating Setpoint Offset	5	0 - 45 Degrees Fahrenheit 0 - 25 Degrees Celsius	46
Cooling Cycle Fan ON Delay	0	0 - 30 Seconds	15	Indoor Filter Timer Method	0	0 = Calendar Days 1 = Fan Run Time Days	47
Cooling Cycle Fan OFF Delay	0	0 - 90 Seconds	16	Indoor Filter Reminder - Days	30	1 - 180 Days 0 = Disable	48
Compressor Cooling Cycles Per Hour	3	2 - 6 Cycles per Hour	19	Calibrate Indoor Temperature	0	Calibrated Room Temperature +/- 5 Degrees (1/2 degree increments)	49
Compressor Cooling Cycle Minimum On Time - Minutes	3	2 - 4 CPH: 1 - 15 Minutes	20	Exit User Setup	SA	SAve = Save selections USer = Default user settings CAncel = Cancel	99 (Exit)
Heater Cycles Per Hour	3	2 - 6 Cycles per Hour	27	Note: Pressing the Energy Savings Key (\$) anytime during setup will advance to step 99.			
Heater Minimum On Time - Minutes	3	Gas Heat: 3 - 15 Minutes Electric Heat: 1 - 15 Minutes	28	Step 99 - Make setting selection then press MODE to exit.			
Control Response Rate	0	0 = Normal 1 = Fast	33	SAve = Save selections USer = Default user settings FActory = Factory default settings (Installer Setup only). Clears history from EEprom and returns to step 1 in menu list. CAncel = Cancel selections for current session and return to previous session selections.			
Press MODE to advance to User Setup choices steps 40 - 49 or Press the Energy Savings key (\$) to advance to step 99.							
Exit Setup (Press MODE)	SA	SAve = Save selections USer = Default user settings FActory = Factory default settings (Installer Setup only). Clears history from EEprom and returns to step 1 in menu list. CAncel = Cancel	99 (Exit)				

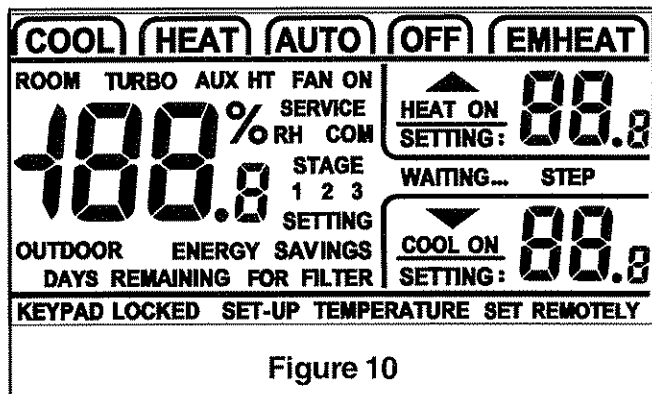


Figure 10

Troubleshooting

Symptom	Possible Cause	Action
Display will not come on.	<ol style="list-style-type: none"> 1. Blown fuse or tripped circuit breaker. 2. Furnace power switch OFF 3. Furnace blower compartment door or panel loose or not properly installed. 4. 360 ohm resistor not installed. 	<ol style="list-style-type: none"> 1. Replace fuse or reset breaker. 2. Turn switch to ON. 3. Replace door panel in proper position to engage safety interlock or door switch. 4. Install 360 ohm - 5 watt resistor (see figures 3-6 for details).
Display comes on and goes off.	360 ohm resistor not installed.	Install 360 ohm - 5 watt resistor (see figures 3-6 for details).
Temperature display is incorrect.	Temperature display needs calibration.	Calibrate Sensor - User Setup Step 49.
Cannot set Heating setpoint above 80 degrees	Deadband between Heating and Cooling set to high	Decrease Deadband setting - User Setup Step 42.
Service indicator Flashing on and off.	Control EEPROM write error.	Press any key and Check / Re-enter Setup Choices.
Service indicator solid on and "--" in temperature display.	Indoor temperature sensor open or shorted	Replace Control
Temperature setting will not change. (Example: Cannot set heating higher or cooling lower).	<ol style="list-style-type: none"> 1. Upper and/or lower temperature limits were reached. 2. "Keypad locked" is displayed on LCD. 	<ol style="list-style-type: none"> 1. Check the temperature setpoints: Heating limits are 40 - 85F. Cooling limits are 65 - 90F. 2. Unlock keypad - press Up+Down arrow together until icon disappears.
Room temperature overshoots when Energy Savings Key (\$) is used or the Heat/Cool settings is changed more than 2 degrees.	Oversized heating or cooling equipment. Control can not respond fast enough to prevent overshooting.	Set Control Response rate to "Fast" - Step 33.
Heating will not come on.	<ol style="list-style-type: none"> 1. System Mode not set to Heat. 2. Minimum off time delay being enforced. 3. Loose connection to control or system. 4. Heating system requires service or control requires replacement. 	<ol style="list-style-type: none"> 1. Set Mode to heat and raise the setpoint above room temperature. 2. If heating does not come on within 5 minutes, Check Heating. 3. Check / Repair connections. 4. Repair system / Replace control.
Cooling will not come on.	<ol style="list-style-type: none"> 1. System Mode not set to Cool. 2. Minimum off time delay being enforced 3. Loose connection to control or system. 4. Cooling system requires service or control requires replacement. 	<ol style="list-style-type: none"> 1. Set Mode to cool and lower the setpoint below room temperature. 2. If cooling does not come on within 15 minutes, contact servicer. 3. Repair connections. 4. Repair system / Replace control.
Cool ON or Heat ON is displayed, but no warm or cool air is coming from the registers.	<ol style="list-style-type: none"> 1. The heating equipment turns on the fan when the furnace has warmed up to a setpoint. 2. Heating or cooling equipment is not operating. 	<ol style="list-style-type: none"> 1. Wait one minute after Heat ON is displayed and then check the registers. 2. Check Heating and Cooling system.
Control does not respond to keypad presses.	<ol style="list-style-type: none"> 1. "Keypad locked" is displayed on LCD. 2. Keypad failure. 	<ol style="list-style-type: none"> 1. Unlock keypad - press Up+Down arrow together until "Keypad locked" appears. 2. Replace Control.
Fan does not operate properly in heat or cool mode.	<ol style="list-style-type: none"> 1. Incorrect wiring. 2. Heating or cooling equipment inoperative. 	<ol style="list-style-type: none"> 1. Correct wiring. 2. Repair system.
Fan runs all the time.	<ol style="list-style-type: none"> 1. Fan mode set to ON. 2. Shorted control wiring. 	<ol style="list-style-type: none"> 1. Set fan mode to AUTO. 2. Check / Repair wiring.
Cooling cycle too fast or too slow. (Narrow or wide temperature swing).	The location of the control and/or the size of the cooling system may be influencing the cycle rate.	Verify cycle rate adjustment Step 19.
Heating cycle too fast or too slow. (Narrow or wide temperature swing).	The location of the control and/or the size of the heating system may be influencing the cycle rate.	Verify cycle rate adjustment Step 27.

Features

Cycle Rate

The selected number of system cycles per hour. If the cycle rate were set to 3, each cycle would be 20 minutes long. The total ON and/or OFF times depends on actual indoor space load. A shorter cycle rate (more cycles per hour) may be desired for Heating in order to maintain a tighter control on indoor setpoint. A longer cycle rate may be desirable for Cooling so the system has the opportunity to remove moisture from the air and improve indoor comfort.

Auto Changeover

When the system mode is set to AUTO, the control automatically switches between heating and cooling modes to maintain the desired comfort level.

Setpoint Deadband

The number of degrees separating Heating and Cooling setpoints. The amount of separation between mode setpoints is user defined between 2 and 10 degrees. When the control is set to Auto, and the cooling setpoint is changed to a cooler setting, the heating setpoint also changes to maintain the selected degrees separation. The same action occurs when the heating setpoint is changed to a warmer temperature.

Backlit Display & Keys

The liquid crystal display and the keypad will illuminate whenever a keypad button is pressed to improve control visibility. The back light stays on for 10 seconds after the last key press.

Cooling Droop

Cooling Droop is an automatic function that cycles the compressor on to improve indoor comfort by removing moisture from the air. The Droop cycle is activated when temperature is at or below the cooling temperature setpoint. When this function is active, the control will control temperature at 1 or 2 degrees below cooling setpoint. The Droop cycle is deactivated when the temperature rises above the cooling setpoint.

Energy Savings

The Energy Savings mode provides instant energy savings by offsetting the indoor setpoint to a cooler temperature setting for heating and a warmer temperature setting for cooling.

The Energy Savings mode is activated by pressing the Energy Savings key "\$" on the controls keypad. Pressing the Energy Savings key "\$" again deactivates the Energy Savings mode. Pressing and holding the Energy Savings key "\$" provides quick access to the setpoint offset for both heating and cooling.

Filter Reminder

"FILTER" will automatically flash to remind the homeowner that its time to change the filter once the preset time has expired. Pressing the "Filter" keypad button automatically resets the internal clock timer. Once the timer has been reset, the number of days remaining till the next filter change can easily be determined by simply pressing the "Filter" keypad button. Pressing and holding the "Filter" keypad button provides quick access to the filter timer value.

Keypad Lock

Locking the control's keypad can help prevent unwanted tampering or changing the thermostat settings by pressing the controls UP and DOWN arrow keypad buttons at the same time and holding for 2 seconds. "Keypad Locked" will be displayed on the LCD. Repeating this combination unlocks the keypad and the "Keypad Locked" will disappear.

Business Card Drawer

The drawer attached to the mounting base of the control is designed to provide a convenient location for the home owner to locate their local servicer. A standard business card can be folded and inserted into the slot on the drawer to remind the User whom to call when service is required.

LitePort

LitePort is a patented feature that allows the servicer access to extended real-time and history data events stored in the thermostat's memory.

Manual Test Mode

The built-in Manual Test Mode allows the servicer to quickly and easily test the control's individual control outputs and makes diagnostic procedures a snap. Set the Mode to OFF, set the Fan to AUTO, and press the MODE and DOWN arrow keypad buttons at the same time and hold for 2 seconds. See Table 1, steps 70-78 for details.

Default Factory Settings

The thermostat is shipped with a set of factory default settings. The factory default settings can be restored at any time using the control configuration menu. See Table 2, step 99.

Service Indicator

The "SERVICE" indicator automatically flashes when an internal fault or error has been detected by the thermostat.

Minimum Off Time Delay Override

Minimum Off time delays can be overridden for the current cycle by pressing the Mode and Down arrow keys at the same time for approximately 2 seconds. It may be necessary to lower the indoor setpoint for cooling or increase the setpoint for heating to activate the system. Minimum off time delays will be enforced on the next cycle.

Wait Indicator

"Waiting" will illuminate when the indoor setpoint is moved in the direction of calling for additional system capacity. "Waiting" indicates system time delays are being enforced and that the control is adjusting to the new settings.

Calibrate Indoor Temperature

This option allows calibration (or deliberate miscalibration) of the room temperature sensor. The selected number is number of degrees, plus or minus, which will be added to actual temperature. The number can range between + 5 and - 5 degrees in 1/2 degree increments. Factory default is 0. This adjusted value will be used as actual temperature for both display and control action. For example, if 2 is selected, 72 degrees actual will read 74 degrees.

Control Response Rate

A set of higher gain Proportional-Integral control constants can be chosen to increase the responsiveness of the temperature control performance.

