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HTDM 80+ OMEGA Series

Installation , Operation, Maintenance Manual

Models: 200,400,600,1000**,**1500,2000,2500,3000

ATTENTION:

Read this manual, unit submittal sheets and all labels attached to the unit carefully before attempting to install, operate or service these units! Check unit data plates for type of gas, model number and serial numbers. Retain this document for future reference.

INSTALLERS RESPONSIBILITY

Installer please note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. It is the installer's responsibility to inspect and correct any problems that may be found.

Installer/Service Contractor Information

Name: _____

Company: _____

Telephone: _____

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TABLE OF ILLUSTRATIONS

IMPORTANT!

Read Before Proceeding!

This equipment is a relatively complicated apparatus. During installation, operation, maintenance or service, individuals may be exposed to certain components or conditions including but not limited to: oils, and materials under pressure, rotating components and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death.
It is the obligation and responsibilities of the operating/service personnel to identify and recognize these inherent hazards to protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property, in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized operating/service personnel. It is expected that this individual possesses independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood this document and any referenced materials. This individual shall also be familiar with and comply with all applicable governmental standards and regulations pertaining to the task in question.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical and mechanical hazards.

- Before installing/servicing this unit, technicians must put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guideline for proper PPE.

- If there is a risk of arc or flash, technicians MUST put on all necessary Personal Protective Equipment (PPE) in accordance with NFPA70E or CSAZ462 for arc/flash protection PRIOR to servicing the unit.

Failure to fellow safety warnings exactly could result in serious injury, death or property damage.

- Be sure to read and understand the installation operation and service instructions in the manual.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Improper installation, adjustment alteration, service or maintenance can cause serious injury, death or property damages.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF SMALL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a phone remote from the building. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the Fire department.

- Installation and service must be performed by a qualified installer, service agency or gas supplier.

⚠WARNING

Proper Field Wiring and Grounding Required!

Proper Field Wiring and Grounding Required!

All filed wring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards.

RECEIVING AND WAREHOUSING

Inspect the unit upon arrival for any shipping damage. If any part is missing or damaged, Mark bill of lading as to damage and notify the carrier at once.

If the unit cannot be installed immediately, store it and its accessories in:

- A clean and dry area
- An area where the unit will not be damaged
- An area where surface water does not accumulate

GENERAL HANDLING INSTRUCTIONS

- A qualified and experienced crane operator must do all rigging. General rigging methods should be followed in all cases:
- Spreader bars must be used when lifting equipment.

- Equipment must be lifted simultaneously by all “eye” bolts or channel slots provided on each section at the same time to distribute the loading properly. Damage or injury may result if all provisions for lifting are not utilized at time of lift. When multiple lifting eyes are furnished they are to share the weight of the lift evenly via spreader bar(s).

- Lifting eyes and channel slots are designed to be lifted vertically. The **MAXIMUM** angle from a vertical lift, which is permitted, is 30 degrees. Single sections only are to be lifted at one time and stacked from the lowest section upward. Sections are designed to be self-supporting in compression only. Do not attempt to hang multiple sections from any structure. The total perimeter base and all frame structure must be supported, and leveled, on high-density concrete or sufficient I-beam steel.

- For some models the heating and blower sections may be shipped separately. Assemble the sections by aligning the base frames and/or the pre-drilled flanges and secure the assembly with the fasteners provided. Use gasketing material to prevent infiltration at the joints.

WARNING

FAILURE TO COMPLY WITH THE GENERAL REQUIREMENTS MAY RESULT IN EXTENSIVE PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

GENERAL INSTALLATION NOTES

- Installation shall conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 / NFPA 54, or the National Gas and Propane Installation Code, CSA B149.1.

- No alterations are to be made on this equipment.

- Install indoor units in such a way that the gas ignition control system is not directly exposed to water spray, water mist, or dripping water.

- The furnace and operating equipment of the furnace, must not be operated in the prescence of chlorine vapours, When such vapors mix with products of combustion, highly corrosive conpounds will result. These compounds can be the cause of pre-mature equipment failure, and serious equipment damage. In such an event, equipment factory warranty is void.

WARNING

FAILURE TO COMPLY WITH THE GENERAL REQUIREMENTS MAY RESULT IN EXTENSIVE PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

MOUNTING & PLACEMENT

Units must be mounted on a stable leveled surface to ensure there won't be any operational damages, water being trapped in the drain pans, or decreased indoor air quality.

Make sure there is sufficient amount of clearance for doors to open and components to be taken out without any obstructions.

Ducts connected to the furnace shall have removable access panels on both the upstream and downstream sides of the furnace. These openings shall be accessible when the furnace is installed and shall be sized to allow the observation of smoke or reflected light inside the casing to indicate the presence of leaks in the heat exchanger. The covers for the openings shall be attached in such manner as to prevent leaks.

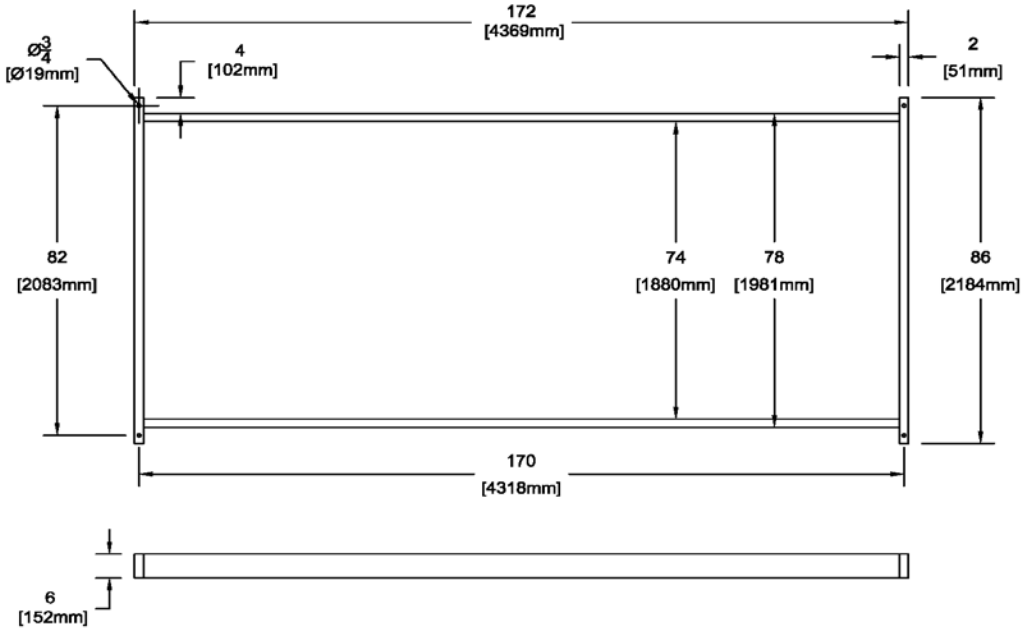
CLEARANCE TO COMBUSTIBLE MATERIALS in inches (mm)

MODEL	TOP	FRONT	BACK	FLOOR	SIDES	FLUE
HTDM 200	0 (0)	0 (0)	0 (0)	3(76)	0 (0)	18(457)
HTDM 400	6(152)	6(152)	4(102)	3(76)	4(102)	18(457)
HTDM 600	6(152)	6(152)	4(102)	3(76)	4(102)	18(457)
HTDM 1000	6(152)	6(152)	6(152)	3(76)	6(152)	18(457)
HTDM 1500	6(152)	6(152)	6(152)	3(76)	6(152)	18(457)
HTDM 2000	6(152)	6(152)	6(152)	3(76)	6(152)	18(457)
HTDM 2500	6(152)	6(152)	6(152)	3(76)	6(152)	18(457)
HTDM 3000	6(152)	6(152)	6(152)	3(76)	6(152)	18(457)

All units installed on the floor has a minimum clearance of 3" (76mm) provided by the base frames of each individual unit. Refer to (Figure 1) for an example base frame.

For service it is advisable to maintain a sufficient area to open all hinges doors fully, refer to (Figure 2). If this unit is to be operated within a confined space or within a building of unusually tight construction, air for combustion and ventilation must be obtained from outdoors or other spaces freely communicating with the outdoors. Refer to current United States and Canadian Fuel Codes.

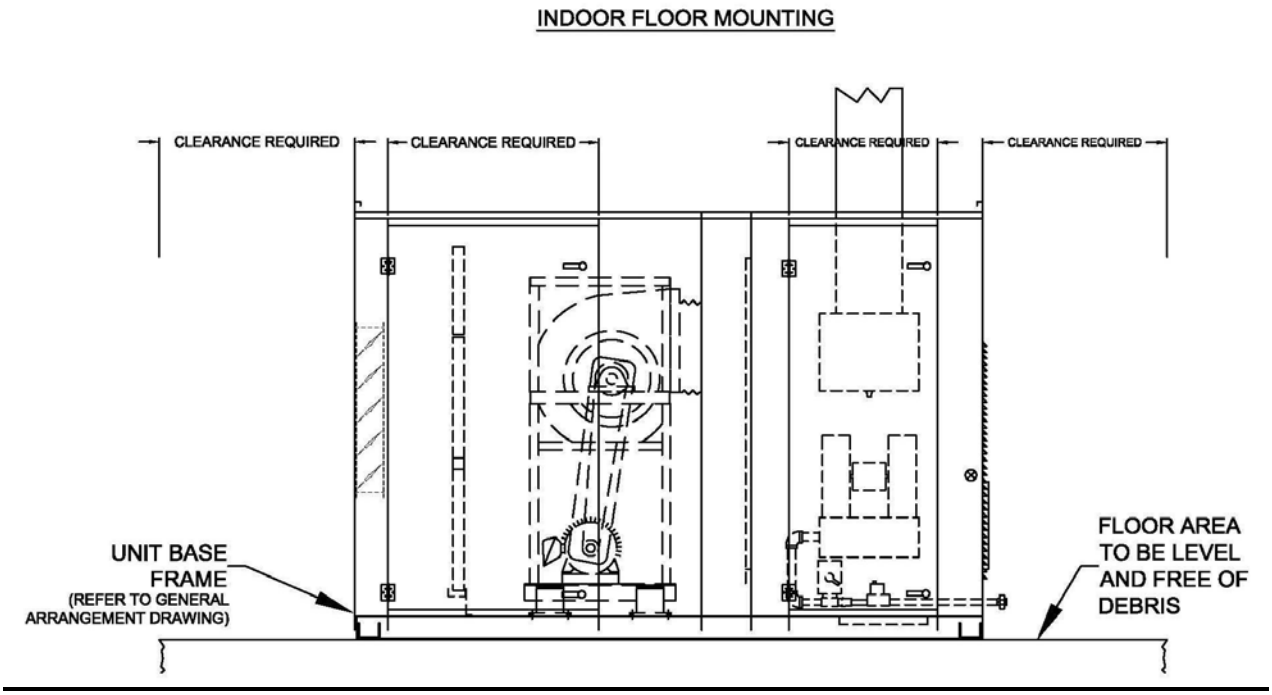
Figure 1 Indoor Floor Mounting



INDOOR FLOOR MOUNTING

Please refer to (Figure 2) for reference if you are going to mount the unit inside of a building.

Figure 2 Indoor Pad Mounting



OUTDOOR PAD MOUNTING

Please refer to (Figure 3) and (Figure 4) for reference if you are going to mount the unit on a pad on the exterior side of a building. Also refer to (Figure 5) before you put the unit into place.

Figure 3 Outdoor Pad Mounting Side View

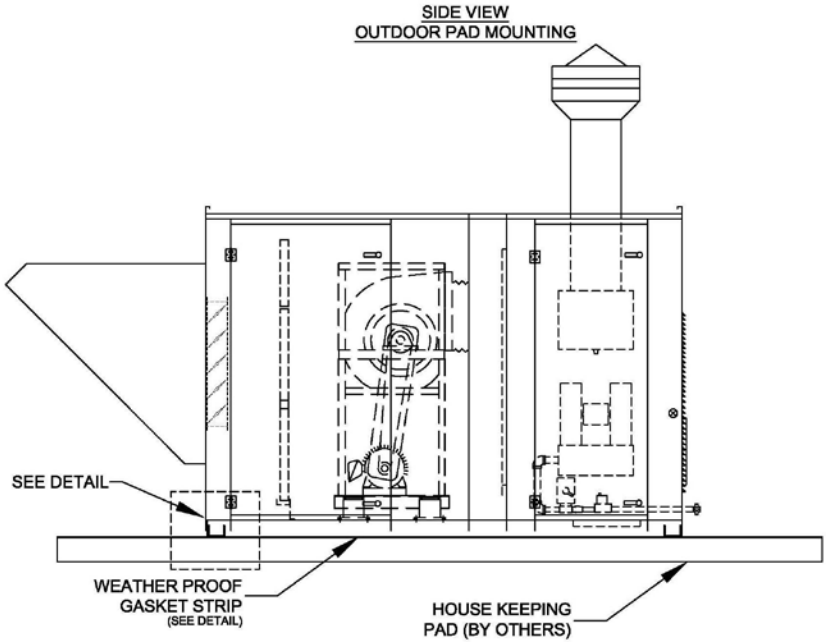
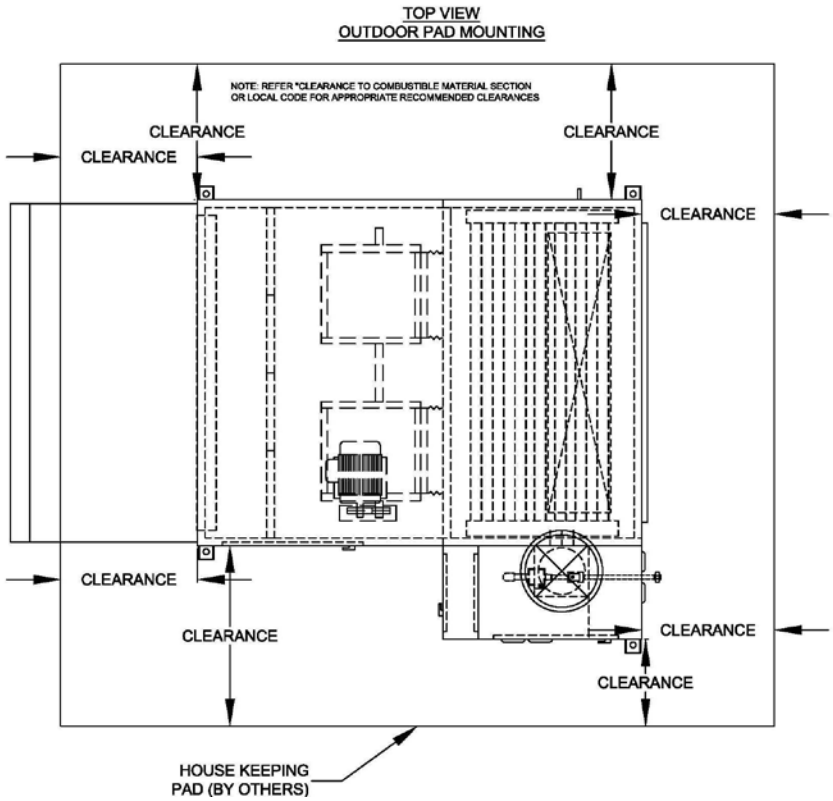


Figure 4 Outdoor Pad Mounting Top View



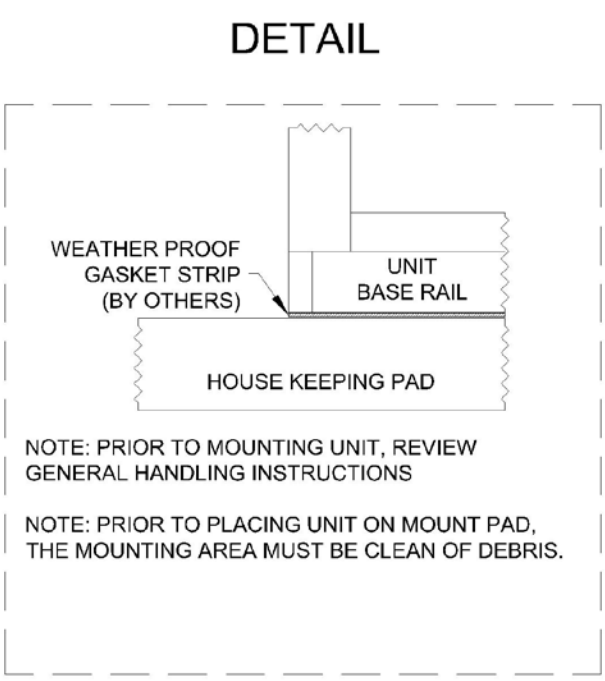


Figure 5 Detail

EXTERIOR ROOF TOP MOUNTED

Roof curb should be fully assembled and properly installed onto the roof structure, using best practice techniques. (Note: Roof-Curb Detail Drawings in Section 3 of Unit Manual which you can also refer to (Figure 1) for example.)

Please Note Following Assembly Recommendation (Figure 6).

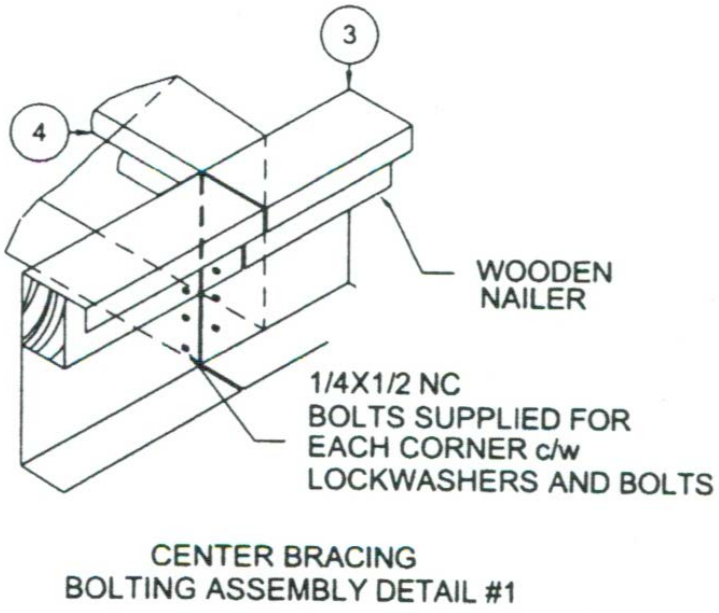
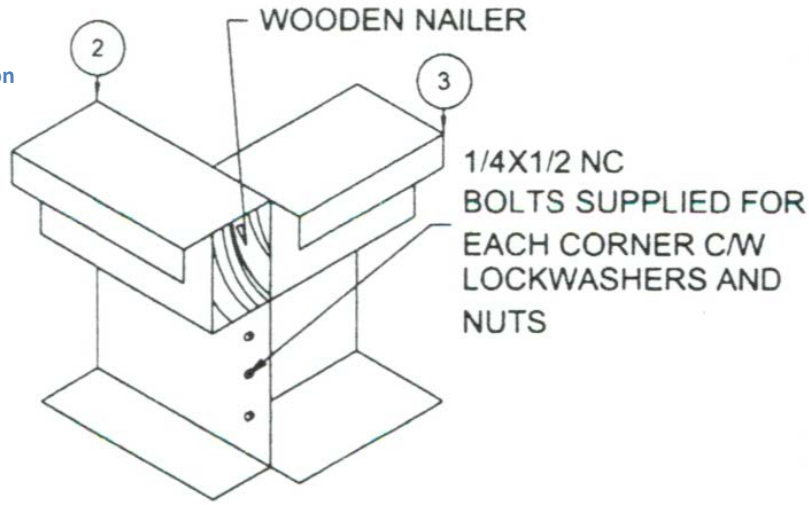


Figure 6 Assembly Recommendation

Please Note Following Assembly Secondary Recommendation (Figure 7).

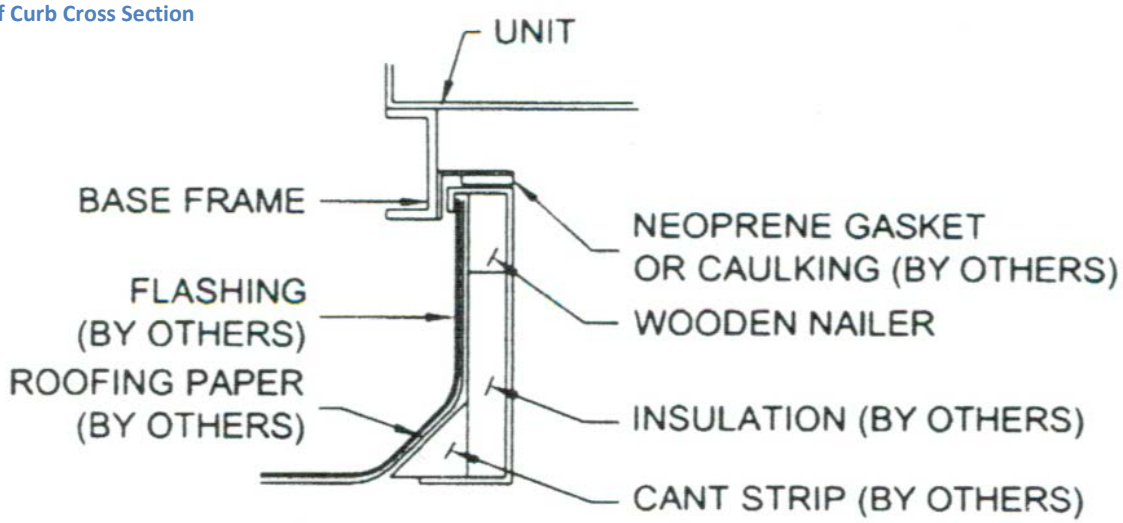
Figure 7 Secondary Recommendation



CORNER BOLTING ASSEMBLY DETAIL #2

Please Note Following Assembly Detail (Figure 8).

Figure 8 Roof Curb Cross Section



ROOF CURB CROSS SECTION DETAIL AA

WARNING

LIFT RIGGING OF UNIT SHALL ONLY BE PERFORMED BY A QUILFIED CRANE RIGGING OPERATOR, OR CONTRATOR. FAILURE TO DO SO MAY RESULT IN: SERIOUS INJURY OR DEATH.

VERTICAL FLUE GAS VENT INSTALLATION NOTES

- Use UL listed category I (1) or category III (3) for venting pipe.
- Follow pipe Manufacturers sizing guide to ensure accurate selection of venting pipe.
- Horizontal pipe runs MUST have at least ¼ inch (6mm) rise per 12 inch (305mm) of vent pipe run to ensure proper operation of equipment.
- Use category I (1) chart for sizing diameter for category I (1) & III (3). Refer to (Table 1).
- Where horizontal vent pipe run intersects the vertical vent pipe run, a vent connection tee must be installed. The lowest end of the vent tee must be equipped with a condensate drain connection nipple.
- Installer should design the vent pipe runs in such a fashion as to minimize the amount of pipe elbows. (Note: each elbow is equivalent to five (5) feet of straight vent pipe run.) Refer to (Figure 9) Contractor is expected to use most current and best installation practices.
- Where venting is run through unheated indoor spaces, vent pipe shall be insulated with approved Insulation wrap to prevent flue gas condensation inside the vent pipe run. Insulation shall be a minimum of ½" (12mm) thick, 1-1/2 lb density foil faced fibre glass type.
- Dampers MUST NOT be used in the flue vent run. Spillage, leakage, of flue vent gasses can result in serious injury, death, or equipment damage.

Figure 9 Vertical Venting

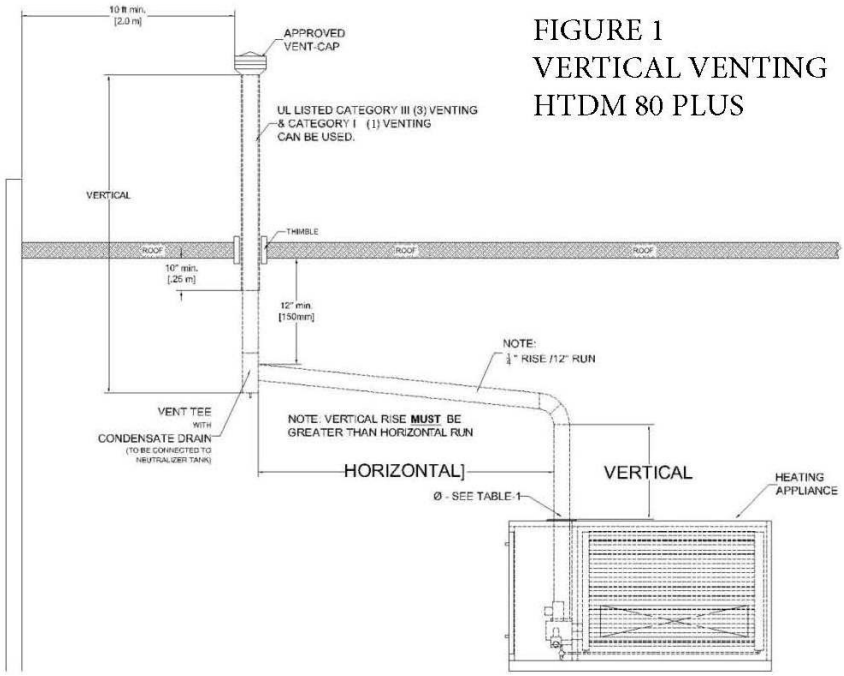


Table 1 Flue Vent Ø Sizes

FLUE VENT Ø SIZES

TABLE - 1

MODEL	FLUE VENT Ø
HTDM 200-80 PLUS	Ø 4"
HTDM 400-80 PLUS	Ø 4"
HTDM 600-80 PLUS	Ø 6"
HTDM 1000-80 PLUS	Ø 6"
HTDM 1500-80 PLUS	Ø 8"
HTDM 2000-80 PLUS	Ø 10"
HTDM 2500-80 PLUS	Ø 10"
HTDM 3000-80 PLUS	Ø 12"

NOTE: USE CATEGORY 1 CHIMENY SIZING CHARTS TO DETERMINE CHIMENY Ø SIZE

- Through the wall, vents shall not terminate over public walkways, or over an area where condensate or vapor could create a nuisance or hazard. Provide vent termination clearances to building or structure features as follows.

Structure	Minimum clearance
Door, Window or gravity inlet	4ft below
	4 ft horizontally
	1 ft above
Forced air inlet within 10 ft	3 ft above
Adjoining building or parapet	6 ft
Adjacent public walkway	7 ft above grade

CONNECTING THE FLUE (VENTING)

When making flue connection to the unit, observe the following recommendations.

The HTDM series of units requires UL listed category I (1 or category III(3) for venting pipe and/or vent connector. All connections must conform to the requirements of current United States and Canadian codes (Gas Fires Units), and be in accordance with local authorities, which include, but are not limited to:

- The flue must be securely attached to the unit with tight joints.

- The flue must be sized to have a cross-sectional area not less than that of the flue collar at the unit, unless the category I (1) chimney chart shows a reduction in diameter being suitable because of the vertical rise.

- Other appliances must not be connected so as to vent through the flue vent run of this unit, refer to category I (1) venting charts for multiple appliances, if multiple appliances of being vented to a common chimney.

- Do not support the weight of the stack on the flue connection of the heating section.

- Minimize connecting pipe length and the number of bends by locating the unit as close to the flue pipe as possible.

- Maintain clearances between the flue pipe and combustible material that are acceptable to the local authorities having jurisdiction.

PROCEDURE FOR USING THE INDIVIDUAL VENT TABLE

To determine the proper size for an individual vent, apply the table as follows:

- Determine total vent height and length of lateral, based on appliance and vent location and height to top of vent, as indicated in (Table II). If gas appliances, such as a furnace, have not been chosen or installed, estimate height beginning at 6' above the floor.

- Read down the height column to a height equal to or less than the estimated total height (Table II).

- Select the horizontal row for the appropriate lateral (L) length. (Table II)

Table 2 Individual Vents

INDIVIDUAL VENTS - TABLE II

Type B Gas Vent Diameter (Inches)

Appliance Input Rating In Thousands of Btu Per Hour

Height H (ft)	Lateral L (ft)	3" FAN Min	3" FAN Max	3" NAT Max	4" FAN Min	4" FAN Max	4" NAT Max	5" FAN Min	5" FAN Max	5" NAT Max	6" FAN Min	6" FAN Max	6" NAT Max	7" FAN Min	7" FAN Max	7" NAT Max	8" FAN Min	8" FAN Max	8" NAT Max	10" FAN Min	10" FAN Max	10" NAT Max
6	0	0	78	46	0	152	86	0	251	141	0	375	205	0	524	285	0	698	370	0	1121	570
	2	13	51	36	18	97	67	27	157	105	32	232	157	44	321	217	53	425	285	75	675	455
	4	21	49	34	30	94	64	39	153	103	50	227	153	66	316	211	79	419	279	110	668	445
	6	25	46	32	36	91	61	47	149	100	59	223	149	78	310	205	93	413	273	128	661	435
8	0	0	84	50	0	165	94	0	276	155	0	415	235	0	583	320	0	780	415	0	1261	660
	2	12	57	40	16	109	75	25	178	120	28	263	180	42	365	247	50	483	322	71	770	515
	5	23	53	38	32	103	71	42	171	115	53	255	173	70	356	237	83	473	313	115	758	503
	8	28	49	35	39	98	66	51	164	109	64	247	165	84	347	227	99	463	303	137	746	490
10	0	0	88	53	0	175	100	0	295	166	0	447	255	0	631	345	0	847	450	0	1377	720
	2	12	61	42	17	118	81	23	194	129	26	289	195	40	402	273	48	533	355	68	852	560
	5	23	57	40	32	113	77	41	187	124	52	280	188	68	392	263	81	522	346	112	839	547
	10	30	51	36	41	104	70	54	176	115	67	267	175	88	376	245	204	504	330	142	817	525
15	0	0	94	58	0	191	112	0	327	187	0	502	285	0	716	390	0	970	525	0	1596	840
	2	11	69	48	15	136	93	20	226	150	22	339	225	38	475	316	45	633	414	63	1019	675
	5	22	65	45	30	130	87	39	219	142	49	330	217	64	463	300	76	620	403	105	1003	660
	10	29	59	41	40	121	82	51	206	135	64	315	208	84	445	288	99	600	386	135	977	635
	15	35	53	37	48	112	76	61	195	128	76	301	198	98	429	275	115	580	373	155	953	610
20	0	0	97	61	0	202	119	0	349	202	0	540	307	0	776	430	0	1057	575	0	1756	930
	2	10	75	51	14	149	100	18	250	166	20	377	249	33	531	346	41	711	470	59	1150	755
	5	21	71	48	29	143	96	38	242	160	47	367	241	62	519	337	73	697	460	101	1133	738
	10	28	64	44	38	133	89	50	229	150	62	351	228	81	499	321	95	675	443	130	1105	710
	15	34	58	40	46	124	84	59	217	142	73	337	217	94	481	308	111	654	427	150	1078	688
	20	48	52	35	55	116	78	69	206	134	84	322	206	107	464	295	125	634	410	167	1052	665
30	0	0	100	64	0	213	128	0	374	220	0	587	336	0	853	475	0	1173	650	0	1977	1060
	2	9	81	56	13	166	112	14	283	185	18	432	280	27	613	394	33	826	535	54	1351	865
	5	21	77	54	28	160	108	36	275	176	45	421	273	58	600	385	69	811	524	96	1332	851
	10	27	70	50	37	150	102	48	262	171	59	405	261	77	580	371	91	788	507	125	1301	829
	15	33	64	NR	44	141	96	57	249	163	70	389	249	90	560	357	105	765	490	143	1272	807
	20	56	58	NR	53	132	90	66	237	154	80	374	237	102	542	343	119	743	473	160	1243	784
	30	NR	NR	NR	73	113	NR	88	214	NR	104	346	219	131	507	321	149	702	444	195	1189	745
50	0	0	101	67	0	216	134	0	397	232	0	633	363	0	932	518	0	1297	708	0	2231	1195
	2	8	86	61	11	183	122	14	320	206	18	497	314	22	715	445	29	975	645	41	1620	1010
	5	20	82	NR	27	177	119	35	312	200	43	487	308	55	702	438	65	960	605	90	1600	996
	10	26	76	NR	35	168	114	45	299	190	56	471	298	73	681	426	86	935	589	118	1567	972
	15	59	70	NR	42	158	NR	54	287	180	66	455	288	85	662	413	100	911	572	136	1536	948
	20	NR	NR	NR	50	149	NR	63	275	169	76	440	279	97	642	401	113	888	556	151	1505	924
	30	NR	NR	NR	69	131	NR	84	250	NR	99	410	259	123	605	376	141	844	522	183	1446	876
100	0	NR	NR	NR	0	218	NR	0	407	NR	0	665	400	0	997	560	0	1411	770	0	1310	2491
	2	NR	NR	NR	10	194	NR	12	354	NR	13	566	375	18	831	510	21	1155	700	360	1975	1170
	5	NR	NR	NR	29	189	NR	33	347	NR	40	557	369	52	820	504	60	1141	692	82	1955	1159
	10	NR	NR	NR	33	182	NR	43	335	NR	53	542	361	68	801	493	80	1118	679	108	1923	1142
	15	NR	NR	NR	40	174	NR	50	321	NR	62	528	353	80	782	482	93	1095	666	126	1892	1124
	20	NR	NR	NR	47	166	NR	59	311	NR	71	513	344	90	763	471	105	1073	653	141	1861	1107
	30	NR	NR	NR	NR	NR	NR	78	290	NR	92	483	NR	115	726	449	131	1029	627	170	1802	1071
	50	NR	NR	NR	NR	NR	NR	NR	NR	NR	147	428	NR	180	651	405	197	944	575	241	1688	1000

NOTES:

1) Regardless of altitude or derating, always design the vent for sea level nameplate input.
2) "0" lateral applies to vertical vent attached to a top outlet flue collar (see definitions). Any vertical vent starting with a 90 degree elbow at a side outlet must use the 2-foot lateral capacity.
3) These capacities apply to all-Selkirk vents (no single wall connector material).

INDIVIDUAL VENTS - TABLE II

Type B Gas Vent Diameter (Inches)

Appliance Input Rating In Thousands of Btu Per Hour

Height	Lateral	12"			14"			16"			18"			20"			22"			24"		
		FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT	FAN		NAT
H (ft)	L (ft)	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max	Min	Max	Max
6	0	0	1645	850	0	2267	1170	0	2983	1530	0	3802	1960	0	4721	2430	0	5737	2950	0	6853	3520
	2	103	982	650	138	1346	890	178	1769	1170	225	2250	1480	296	2782	1850	360	3377	2220	426	4030	2670
	4	147	975	640	191	1338	880	242	1761	1160	300	2242	1475	390	2774	1835	469	3370	2215	555	4023	2660
	6	171	967	630	219	1330	870	276	1753	1150	341	2235	1470	437	2767	1820	523	3363	2210	618	4017	2650
8	0	0	1858	970	0	2571	1320	0	3399	1740	0	4333	2220	0	5387	2750	0	6555	3360	0	7838	4010
	2	98	1124	745	130	1543	1020	168	2030	1340	212	2584	1700	278	3196	2110	336	3882	2560	401	4634	3050
	5	154	1110	733	199	1528	1010	251	2013	1330	311	2563	1685	398	3180	2090	476	3863	2545	562	4612	3040
	8	180	1097	720	231	1514	1000	289	2000	1320	354	2552	1670	450	3163	2070	537	3850	2530	630	4602	3030
10	0	0	2036	1060	0	2825	1450	0	3742	1925	0	4782	2450	0	5955	3050	0	7254	3710	0	8682	4450
	2	93	1244	850	124	1713	1130	161	2256	1480	202	2868	1890	264	3556	2340	319	4322	2840	378	5153	3390
	5	149	1229	829	192	1696	1105	243	2238	1461	300	2849	1871	382	3536	2318	458	4301	2818	540	5132	3371
	10	187	1204	795	238	1669	1040	298	2209	1430	364	2818	1840	459	3504	2280	546	4268	2780	641	5099	3340
15	0	0	2380	1240	0	3323	1720	0	4423	2270	0	5678	2900	0	7099	3620	0	8665	4410	0	10393	5300
	2	86	1495	985	114	2062	1350	147	2719	1770	186	3467	2260	239	4304	2800	290	5232	3410	346	6251	4080
	5	140	1476	967	182	2041	1327	229	2696	1748	283	3442	2235	355	4278	2777	426	5204	3385	501	6222	4057
	10	177	1446	936	227	2009	1289	283	2659	1712	346	3402	2193	432	4234	2739	510	5159	3343	599	6175	4019
	15	202	1418	905	257	1976	1250	318	2623	1675	385	3363	2150	479	4192	2700	564	5115	3300	665	6129	3980
20	0	0	2637	1350	0	3701	1900	0	4948	2520	0	6376	3250	0	7988	4060	0	9785	4980	0	11753	6000
	2	81	1694	1100	107	2343	1520	139	3097	2000	175	3955	2570	220	4916	3200	269	5983	3910	321	7154	4700
	5	135	1674	1079	174	2320	1498	219	3071	1978	270	3926	2544	337	4885	3174	403	5950	3880	475	7119	4662
	10	172	1641	1045	220	2282	1460	273	3029	1940	334	3880	2500	413	4835	3130	489	5896	3830	573	7063	4600
	15	195	1609	1018	248	2245	1425	306	2988	1910	372	3835	2465	459	4786	3090	541	5844	3795	631	7007	4575
	20	217	1578	990	273	2210	1390	335	2948	1880	404	3791	2430	495	4737	3050	585	5792	3760	689	6953	4550
30	0	0	3004	1550	0	4252	2170	0	5725	2920	0	7420	3770	0	9341	4750	0	11483	5850	0	13848	7060
	2	74	2004	1310	98	2786	1800	127	3696	2380	159	4734	3050	199	5900	3810	241	7194	4650	285	8617	5600
	5	127	1981	1289	164	2759	1775	206	3666	2350	252	4701	3020	312	5863	3783	373	7155	4622	439	8574	5552
	10	164	1944	1254	209	2716	1733	259	3617	2300	316	4647	2970	386	5803	3739	456	7090	4574	535	8505	5471
	15	187	1908	1220	237	2674	1692	292	3570	2250	354	4594	2920	431	5744	3696	507	7026	4527	590	8437	5391
	20	207	1873	1185	260	2633	1650	319	3523	2200	384	4542	2870	467	5686	3650	548	6964	4480	639	8370	5310
	30	246	1807	1130	305	2555	1585	369	3433	2130	440	4442	2785	540	5574	3565	635	6842	4375	739	8239	5225
50	0	0	3441	1825	0	4934	2550	0	6711	3440	0	8774	4460	0	11129	3635	0	13767	6940	0	16694	8430
	2	66	2431	1513	86	3409	2125	113	4554	2840	141	5864	3670	171	7339	4630	209	8980	5695	251	10788	6860
	5	118	2406	1495	151	3380	2102	191	4520	2813	234	5826	3639	283	7295	4597	336	8933	5654	394	10737	6818
	10	154	2366	1466	196	3332	2064	243	4464	2767	295	5763	3585	355	7224	4542	419	8855	5585	491	10652	6749
	15	177	2327	1437	222	3285	2026	274	4409	2721	330	5701	3534	396	7155	4511	465	8779	5546	542	10570	6710
	20	195	2288	1408	244	3239	1987	300	4356	2675	361	5641	3481	433	7086	4479	506	8704	5506	586	10488	6670
	30	232	2214	1349	287	3150	1910	347	4253	2631	412	5523	3431	494	6953	4421	577	8557	5444	672	10328	6603
100	0	0	3925	2050	0	5729	2950	0	7914	4050	0	10485	5300	0	13454	6700	0	16817	8600	0	20578	10300
	2	44	3027	1820	72	4313	2550	95	5834	3500	120	7591	4600	138	9577	5800	169	11803	7200	204	14264	8800
	5	107	3002	1803	136	4282	2531	172	5797	3475	206	7548	4566	245	9528	5769	293	11748	7162	341	14204	8756
	10	142	2961	1775	180	4231	2500	223	5737	3434	268	7478	4509	318	9447	5717	374	11658	7100	436	14105	8683
	15	163	2920	1747	206	4182	2469	252	5678	3392	304	7409	4451	358	9367	5665	418	11569	7037	487	14007	8610
	20	181	2880	1719	226	4133	2438	277	5619	3351	330	7341	4394	387	9289	5613	452	11482	6975	523	13910	8537
	30	215	2803	1663	265	4037	2375	319	5505	3267	378	7209	4279	446	9136	5509	514	11310	6850	592	13720	8391
	50	282	2657	1550	350	3856	2250	415	5289	3100	486	6956	4050	572	8841	5300	659	10979	6600	752	13354	8100

NOTES:

1) Regardless of altitude or derating, always design the vent for sea level nameplate input.
2) "0" lateral applies to vertical vent attached to a top outlet flue collar (see definitions). Any vertical vent starting with a 90 degree elbow at a side outlet must use the 2-foot lateral capacity.
3) These capacities apply to all-Selkirk vents (no single wall connector material).

CONNECTING THE FLUE (COMBUSTION)

OUTDOOR INSTALLATIONS

AIR FOR COMBUSTION

Openings for combustion air must be provided in a panel (door) with direct access to the vestibule area where the burners and draft inducer are located. This air opening must be of sufficient size to provide a suitable supply of air for combustion to the burner compartment, but not less than one (1) square inch free area per every 800 Btu per hour of the specified maximum input rate. The minimum dimension of any air opening should not be less than 3 inches. Heating appliance must be installed so that air access to inlet opening is unobstructed.

VENTING

The vent termination must be located in accordance with the National Fuel Codes (ANSI Z223.2) in the US or CAN/CGA-B149 Installation code in Canada.
The venting system for outdoor units is a Category 1, with vent products at positive pressure and up to 500 F. The cross-section area of the vent duct or pipe must be at least equal to the discharge area of the draft inducer.

The discharge opening must always be located in the same pressure zone as the combustion air inlet.

- For horizontal discharge, the outlet should be located on the same side of the unit as the combustion air inlet. Never locate the vent outlet on the opposite side from the combustion air inlet opening.
- For horizontal discharge where the flue gases need to be vented vertically, the preferred flue gas discharge should terminate in an exterior flue riser that extends at least to the top of the cabinet and is open at the top and bottom. The riser must be located on the same side of the appliances as the combustion air opening.

INDOOR INSTALLATIONS

AIR FOR COMBUSTION

The furnace must be installed in a location with adequate clearances to provide for an adequate combustion air space, service and inspection, and proper clearance for combustible construction. The furnace shall be located in such a manor that it does not interfere with the circulation of air in the heated space.

All fuel burning equipment must be supplied with air that enters into combustion process and is then vented outdoors. Sufficient air must enter the appliances location to replace the air exhausted through the vent system. Do not install appliances in a confirmed space without providing wall opening to and from this space, if building construction is such that the normal infiltration does not provide sufficient air for combustion and venting, outside air must be introduced in accordance with ANSI Z223.1 (Sect 1.3.4.2 and 1.3.4.3).Install air openings that provide a total free area in accordance with the following.

1. Air from inside the building- Opening of a 1 square inch (sq.in) per 1000 Btuh of input, but never less than 100 sq.in.

2. Air from outside (ducted) – Opening of 1 sq.in. per 2000 Btuh

3. Air from inside (Direct opening) – Opening of 1 sq.in.per 4000 Btuh.

SEPARATE COMBUSTION SYSTEMS

MTI duct furnace modules may be applied to appliances for operation in separated combustion systems. The module must be mounted with the burner section in a reasonably airtight vestibule compartment, as these systems provide combustion air from outside the heated space and vent products of combustion outdoors. No air openings are to be provided in the vestibule access door or panel and sealing grommets or gaskets should be provided for gas and electrical entry points into the vestibule to provide a reasonably airtight seal.

1. A suitable airtight gasket on the vestibule door or access door.
2. An observation window in the door to permit observation of ignition and main burner flame during operation and servicing.
3. A door or panel interlock switch to insure that door or panel is closed or in place during operation.
4. Openings in the vestibule space for attachments of inlet air supply pipe and vent pipe, sized for the Btuh input rating.
5. Approved vent terminal on both the supply air inlet and flue gas exhaust. NOTE: The inlet and outlet terminals must be located in the same pressure zone to provide safe appliance operation.

Proper installation of air inlet, and flue gas exhaust piping are essential to the proper operation of the furnace. (See Figure 3 and Figure 4 in appendix C)

ELECTRICAL CONNECTIONS

- When installed, the appliance must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA, and/or the Canadian Electrical Code, CSA C22.1, if an external source is utilized.

- Control voltage is as indicted on the rating plate.

- Follow the wiring diagram supplied with the unit, (NOTE: when submittal wiring diagrams are provided, the submittal diagrams shall only be used for equipment wiring reference.)

- If a space thermostat is used with the furnace, locate the thermostat so the cold drafts and hot discharge air streams do not affect the performance of the unit. Do no mount the thermostat on the casing of the unit, as it will be affected by radiated and conducted heat. Refer to the instruction furnished with the thermostat for further details.

- If any of the original wires as supplied with the unit must be replaced, it must be replaced with type TEW 105 degrees or its equivalent except where noted.

- Temperature controllers, limit controllers, remote selector switches, door switches or any other auxiliary electrical items must be connected to the terminals provided as shown on the wiring diagram.

- For units shipped in multiple sections, electrical connections between sections are to be made by the installer in the field.

- Field wiring to be done by the installer is denoted by dotted lines on the wiring diagram. Solid lines on the wiring diagram indicate factory wiring by the manufacturer.

- The unit must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, and/or the CSA.C22.1 Canadian Electrical code.

NOTE: *Due to the nature of transport, installer shall check all contacts and termination points for tightness, and or loose wires.*

Figure 10 Standard Wiring Diagram-1

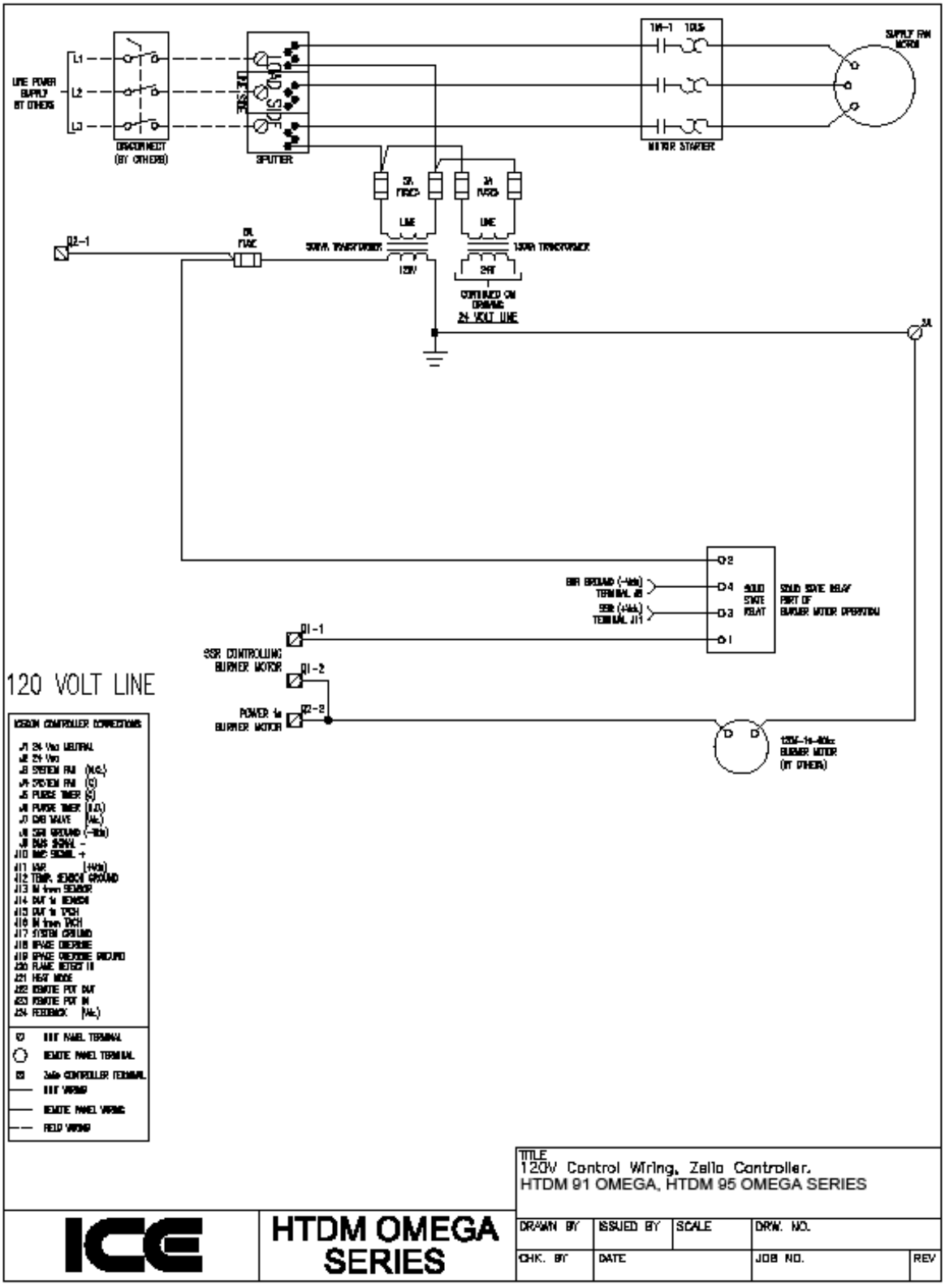


Figure 11 Standard Wiring Diagram-2

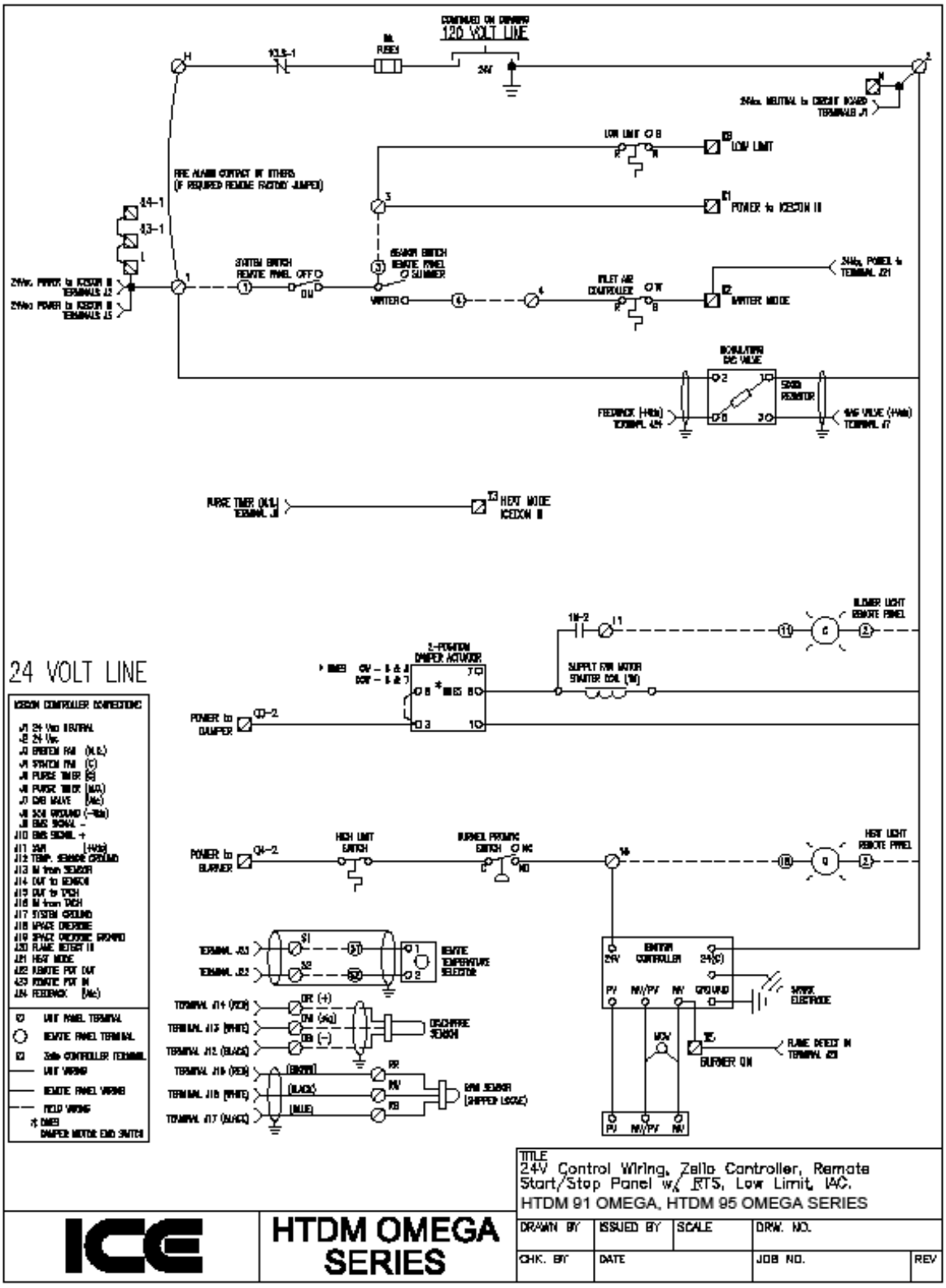
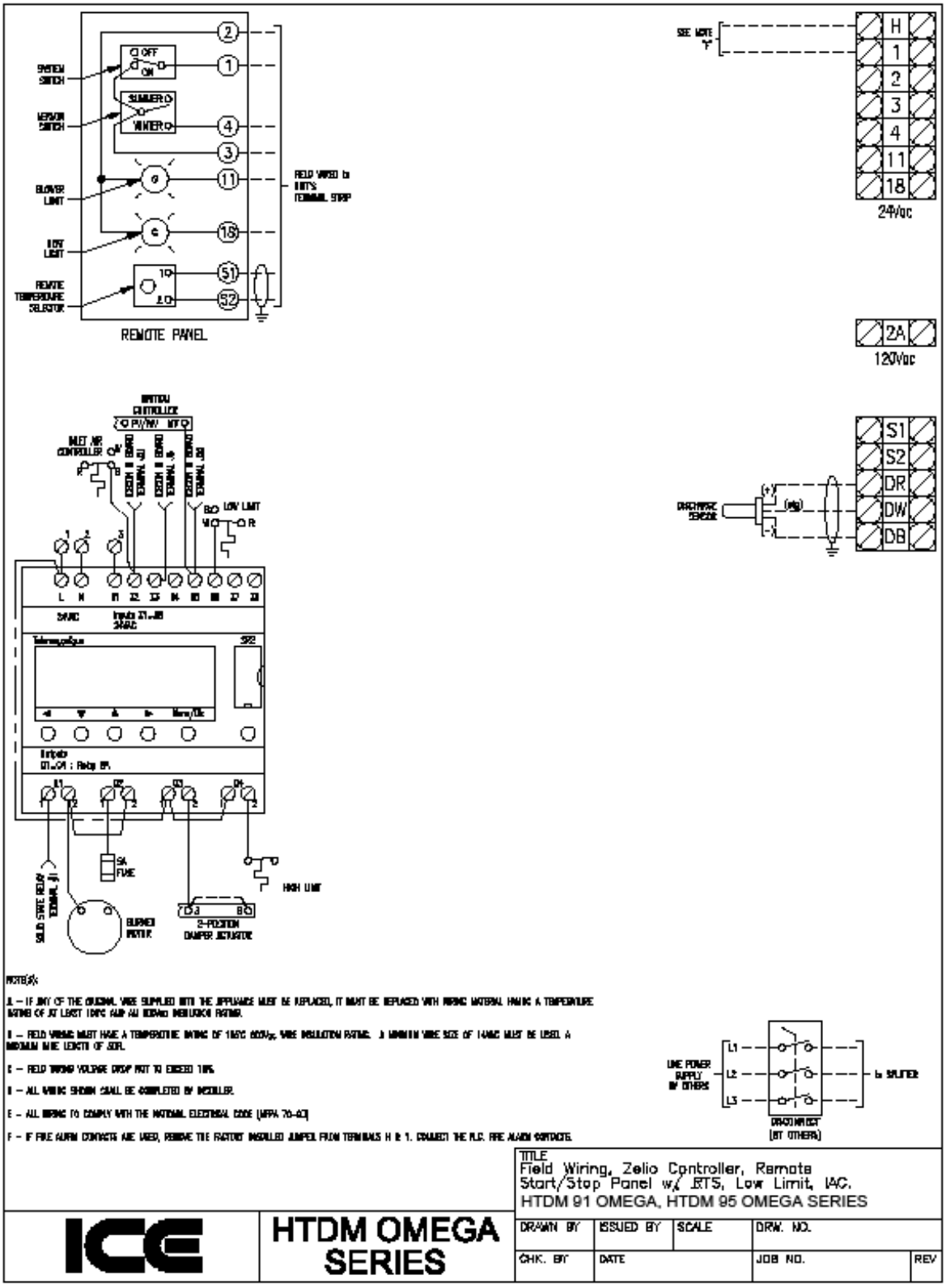


Figure 12 Standard Wiring Diagram-3



GAS PIPING

- All gas piping should be in accordance with NFPA, National Gas Code, and CAN 1- B149 with the regulation of local authorities having jurisdiction. An emergency manual shut down valve shall be provided upstream of the piping to unit and should be labeled for quick identification. Color coding of gas piping is also recommended.

- The appliance and the appliances individual shut off valve MUST be disconnected from supply gas piping system during any pressure testing of the supply gas line system when pressures are in excess of ½" p.s.i. [3.5 kPa]. The appliance must be isolated from gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at pressures less than or equal to ½" p.s.i. [3.5 kPa].

- Carefully check the unit rating plate for fuel type and supply pressure.

- If required, locate the high-pressure regulator at least five feet from the unit.

- Gas lines must not be located in such a way as to hinder access to the unit.

- A minimum 1/8" NPT tapping plug, accessible for testing gauge connection, must be installed immediately upstream of the gas supply connection to the appliance.

- Check for gas leaks with soap and water solution. Never use open flame to check for gas leaks.

- The appliance and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures of ½ psi (3.5 kPa). The appliance must be isolated from the gas supply system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than ½ psi (3.5 kPa)

GAS PIPING/REGULATOR VENTING

High gas pressure regulator (if required), low pressure regulator, pilot pressure regulator, gas pressure switch (if supplied), and normally open vent valve (if supplied) must be vented outside of building for an indoor unit (check with authorities having jurisdiction).

NATURAL GAS AND PROPANE INSTALLATION:

- Installation must be made in accordance with the requirements of the authorities having jurisdiction in the area.
- Check the unit rating plate and confirm fuel type, supply pressure, input rating, and temperature rise.
- Refer to the heater rating plate for determining the minimum gas supply pressure for obtaining the maximum gas capacity for which this heater is specified
- Gas supply pressure higher than the unit rating plate requires an additional field supplied gas regulator.
- Install an approved shutoff valve on the gas supply in accordance with the requirements of the authorities having jurisdiction. Manufactures specification states a minimum of 3ft from the gas connection (union).
- Gas lines shall not interfere with unit access. The gas line connection at the heater shall have an approved drip leg with screwed cap.
- A minimum 1/8 inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the unit.
- On indoor units any control device (regulator, diaphragm valve, high and low pressure switch, etc.) that requires a bleed or vent line, must be vented in accordance with applicable codes.
- To obtain specific temperature rise settings, Temperature rise is directly affected by the air flow across the heat exchanger. The unit shall be air balanced (by an approved air balancing contractor) as to provide specified air flow. (see Figures 16 through 20)

TEMPERATURE RISE – AIR FLOW TABLES

Table 3 HTDM 200 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 200 80 plus	200/160	7-10.5	11-13	1380	110
		7-10.5	11-13	1518	100
		7-10.5	11-13	1687	90
		7-10.5	11-13	1898	80
		7-10.5	11-13	2169	70
		7-10.5	11-13	2531	60
		7-10.5	11-13	3037	50
		7-10.5	11-13	3796	40
		7-10.5	11-13	5062	30
		7-10.5	11-13	7592	20

Table 4 HTDM 400 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 400 80 plus	. 00/320	7-10.5	11-13	2761	110
		7-10.5	11-13	3037	100
		7-10.5	11-13	3374	90
		7-10.5	11-13	3796	80
		7-10.5	11-13	4338	70
		7-10.5	11-13	5062	60
		7-10.5	11-13	6074	50
		7-10.5	11-13	7592	40
		7-10.5	11-13	10123	30
		7-10.5	11-13	15185	20

Table 5 HTDM 600 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 600 80 plus	600/480	7-10.5	11-13	4141	110
		7-10.5	11-13	4555	100
		7-10.5	11-13	5062	90
		7-10.5	11-13	5694	80
		7-10.5	11-13	6508	70
		7-10.5	11-13	7592	60
		7-10.5	11-13	9111	50
		7-10.5	11-13	11388	40
		7-10.5	11-13	15185	30
		7-10.5	11-13	22777	20

Table 6 HTDM 1000 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 1000 80 plus	1000/800	7-10.5	11-13	6902	110
		7-10.5	11-13	7592	100
		7-10.5	11-13	8436	90
		7-10.5	11-13	9490	80
		7-10.5	11-13	10846	70
		7-10.5	11-13	12654	60
		7-10.5	11-13	15185	50
		7-10.5	11-13	18981	40
		7-10.5	11-13	25308	30
		7-10.5	11-13	37961	20

Table 7 HTDM 1500 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 1500 80 plus	1500/1200	7-10.5	11-13	10353	110
		7-10.5	11-13	11389	100
		7-10.5	11-13	12654	90
		7-10.5	11-13	14236	80
		7-10.5	11-13	16270	70
		7-10.5	11-13	18981	60
		7-10.5	11-13	22778	50
		7-10.5	11-13	28472	40
		7-10.5	11-13	37963	30
		7-10.5	11-13	56944	20

Table 8 HTDM 2000 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 2000 80 plus	2000/1600	7-10.5	11-13	13804	110
		7-10.5	11-13	15185	100
		7-10.5	11-13	16872	90
		7-10.5	11-13	18981	80
		7-10.5	11-13	21692	70
		7-10.5	11-13	25308	60
		7-10.5	11-13	30369	50
		7-10.5	11-13	37961	40
		7-10.5	11-13	50615	30
		7-10.5	11-13	70923	20

Table 9 HTDM 2500 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 2500 80 plus	2500/2000	7-10.5	11-13	17255	110
		7-10.5	11-13	18981	100
		7-10.5	11-13	21090	90
		7-10.5	11-13	23726	80
		7-10.5	11-13	27115	70
		7-10.5	11-13	31635	60
		7-10.5	11-13	37961	50
		7-10.5	11-13	47452	40
		7-10.5	11-13	63269	30
		7-10.5	11-13	94904	20

Table 10 HTDM 3000 Air Flow

MODEL	INPUT/OUTPUT MBH	Inlet Pressure Natural Gas WC	Inlet Pressure Propane WC	AIR CAPACITY CFM	TEMPERATURE RISE (Deg-F)
HTDM 3000 80 plus	3000/2400	7-10.5	11-13	20706	110
		7-10.5	11-13	22777	100
		7-10.5	11-13	25308	90
		7-10.5	11-13	28471	80
		7-10.5	11-13	32538	70
		7-10.5	11-13	37961	60
		7-10.5	11-13	45554	50
		7-10.5	11-13	56942	40
		7-10.5	11-13	75923	30
		7-10.5	11-13	113884	20

NOTE: AIR-FLOW REQUIEMENTS MAY DIFFER FROM ABOVE BASE CHARTS. FOR SPECIFIC AIR FLOW AND TEMPERATURE RISE REFER TO EQUIPMENT SUBMITTAL PACKAGE, OR CONSULT FACTORY.

HEAT TRANSFER FLUIDS

The coil(s) (when provided) have been selected for use with a specific heat transfer fluid as shown on the Submittal Record. Use of other fluids will result in different performance and can damage the coil(s).

It is imperative to properly select and apply heat transfer fluids used in heating and cooling systems. Untreated, improperly treated or improper use of fluids or use of fluids not approved for use in commercial heating and cooling systems can damage coils and system components. For selection and application of heat transfer fluids, always follow the manufacturers' recommendations including treatment, mixing and filling. Warranty will be void if coil damage results from misapplication or improper treatment of the heat transfer fluid.

Some systems may use CPVC piping. Do not use propylene glycol with CPVC.

COOLING COILS

Cooling coils (when provided) are installed in the air stream, condensation will form on coil surface and provisions must be made to properly dispose of condensate liquid. Condensate drains are located on the exterior of the unit (See Submittal Package for Details). The condensate should be disposed of according to local or national plumbing codes.

GENERAL OPERATING INSTRUCTION

1) Refer to the rating plate for fuel input and supply pressures.

2) Do not attempt to start the burner if the unit is full of vapor or gas, or if the combustion chamber is very hot.

3) Do not leave combustible material near the unit.

4) Shut off the manual fuel supply valve if the burner has been shut down for an extended period of time.

5) Do not start unit unless all the access doors are securely in place.

6) Refer to literature regarding controls, gas valves and other components.

START-UP PROCEDURES

PRE-CHECKS

1. Ensure the main disconnect switch is in the “off” position.

2. Ensure the burner on-off switch is in the “off” position.

3. Check all electrical and gas connections and tighten if necessary

4. Check main rating plate voltage against the supplied voltage to disconnect.

5. Check main blower by rotating blower shaft by hand to ensure it is free to turn.

6. Tighten bearing set screws, and pulley set screws.

7. Remove shipping blocks from vibration isolators (if equipped)

8. Check for loose items shipped inside blower section (if supplied) and remove.

9. Check heater outlets for obstruction.

10. Check all fuse blocks to determine that correct fusing is installed.

11. Check the supply fan motor thermal overload setting against the rating plate value.

12. Check building system gas supplies and be sure all lines are purged of air,

13. Check building system gas supply pressure.

CAUTION

GAS UNITS

At maximum input the gas pressure must fall within the range specified on the unit rating plate. Optional high and low gas pressure switched (if supplied) must be reset.

14. Check all piping for tightness and correct any signs of leaks.

⚠ WARNING

Fire or explosion hazard can cause property damage, severe injury, or death. Check for gas leaks with rich soap and water solution any time work is done on a gas line. Never use an open flame to detect gas leaks.

START-UP

1) Turn on power to the unit.

2) Enable the unit (Fan Only)

3) Ensure supply blower rotation is correct.

4) Check supply blower motor amps against rating plate values. If actual figure is significantly different that the rating plate value, take corrective actions with respect to duct work and accessories external to the unit

5) Set thermal overloads to appropriate motor performance after all adjustments have been made.

6) Enable burner.

7) Verify unit's sequence of operation corresponds to sequence provided in the supplied literature.

8) Refer to start-up check list and field report for settings that are to be checked on the unit.
Note: Factory set pre purged timer is set to "65 seconds".

9) Combustion analysis must be completed, to ensure proper operation of heat exchanger.

10) Disable burner. Ensure the burner shuts down as per the sequence of operation.

11) Disable unit. Ensure the unit shuts down as per the sequence of operation.

SHUT DOWN

1. EMERGENCY SHUT DOWN

a) Set disconnect switch to "off' position.

b) Close the manual main fuel valve.

c) Set the unit controls to the “off” position.

2. SERVICE SHUT DOWN

a) Set the unit controls to the “off” position.

b) Close the manual main fuel valve.

MAINTENANCE

Regular maintenance is necessary to ensure the efficient operation and long life of this unit. This maintenance should be performed by or supervised by qualified service personnel. A maintenance schedule should be prepared for the unit based on its application and location.

1. For checking gas leak tightness of safety, use a rich soap and water solution and spray/apply on the points of connection.
2. Turn shut off valve on and wait, if air bubbles form, turn shut off valve closed.
3. Repeat steps 1 and 2 until no more air bubbles form.

Note: It is important to check at least an annual basis.

RECOMMENDED QUARTERLY MAINTENANCE

WARNING

Fire or explosion hazard can cause property damage, severe injury, or death. Check for gas leaks with rich soap and water solution any time work is done on a gas line. Never use an open flame to detect gas leaks.

WARNING
Personal Protective Equipment (PPE) Required!

1) Replace air filters if necessary. Replace filters only with type equivalent to those supplied with the unit by the factory. Location of filter access panels are marked on the unit. To replace filters, remove service panel or open blower door, slide out dirty filters and replace with same size filters in order to prevent possibility of dust collecting inside of unit. Filter sizes are written on the filters and rating plate. For a complete list of filters sizes, contact manufacturer.

2) Inspect blower wheels and housing, clean if necessary.

3) Check for loose connections in the wiring.

4) Check the voltage at the unit while it is in operation.

5) Inspect all contactor to ensure that they are clean and making good contact.

6) Check all belts. Adjust or replace as necessary.

7) Check motor amperage draws against rating plate values.

8) Check all bearings and lubricate if necessary.

9) Check all dampers, linkages and damper actuators; adjust and tighten as required.

10) Inspect combustion fan assembly for wear,

11) Inspect combustion blower wheel for cleanliness.

12) Check the fuel supply pressure to the unit.

13) Check operation of all safety controls.

14) Check the flame sensor signal.

15) Check the manifold pressure.

RECOMMENDED YEARLY MAINTENANCE

WARNING

Fire or explosion hazard can cause property damage, severe injury, or death. Check for gas leaks with rich soap ans water solution any time work is done on a gas line. Never use an open flame to detect gas leaks.

WARNING

Personal Protective Equipment (PPE) Required!

1) Perform the recommended quarterly maintenance.

2) Check Flame Sensor and Igniter.

   a. Remove attached wires; be sure to note the terminals so as to ensure proper re-assembly.

   b. Remove flame sensor and igniter from the burner assembly, using appropriate tools.

   c. Visually inspect the flame sensor and igniter for cracks in the porcelain, warping of the rods, or corrosion build up. If these parts show any ware it's the manufacture recommendation to replace this device(s).

3) Complete a combustion analysis report, to ensure proper operation of heat exchanger.

4) Ensure the unit shuts down as per the sequence of operation.

5) Inspect Burner assembly, clean & service if required.

6) Ensure gas has been turned off to the unit and a site specific lock out procedure is in place.

7) Remove flame sensor and igniter

8) Remove gas line connection at burner assembly.

9) Remove the combustion fan.

10) Remove all fastening bolts from the burner box and keep at hand for re-use.

11) Remove burner box from unit.

12) Remove all old gasket material from burner box flanges, and attachment flanges.

13) Inspect burner and burner orifices for residue, debris or corrosion.

Note: *Orifices shall be cleaned with an approved orifice cleaning tool.* ***(DO NOT DRILL, REEM, OR ALTER THE ORIFICES IN ANY WAY****.)*

14) Ensure no debris from cleaning process is left inside the burner box.

15) Re-install the burner box. Install a new burner box gasket. Ensue all mounting bolts are in place. Use high temperature silicone to seal the burner to the mounting flanges.

16) Re-install combustion fan. Install a new gasket. Ensue all mounting bolts are in place.

17) Re-install flame rod and igniter.

WARNING

Failure to replace all fasteners, seals, or removed components may result in serious injury, death, and/or severe equipment damage.

18) Redo combustion analysis report and compare to previous one, to ensure proper operation of heat exchanger.

19) Inspect and clean the condensate collection and disposal systems to ensure proper drainage.

20) Ensure the unit shuts down as per the sequence of operation.

PHOENIX PRODIGY
SMC-1108

OPERATORS MANUAL

VERSION 1.1

I. NORMAL START-UP SEQUENCE

1) *Call for Heat*

SMC-1108 will indicate power by illuminating the RUN LED. The combustion blower is ramped to full speed. Upon proof of closer of the modulating gas valve the Relay 1 is energized during the purge time. Upon the timing out of the purge timer the combustion blower will ramp to minimum speed for trial for ignition.

2) *Trial for Ignition*

Upon timing out the combustion blower drops to low speed and the ignition controller is powered. The pilot line solenoid is powered opening the pilot gas flow to the burner. Simultaneously the ignition controller initiates spark. Upon proof of flame ignition controller opens the main gas valves allowing gas to flow to the modulating gas valve, and the PLC will enter System Preheat.

3) *System Preheat*

During this stage SMC-1108 will ramp the firing valve and combustion blower to midrange without energizing the main supply fan. Preheat lasts approximately 60 seconds. Upon completion of the system pre-heat the main supply fan energizes and the unit will begin to operate in one of the following modulation modes.

II. HEAT MODES

1) *Maintain Discharge Temperature.*

The unit will adjust the firing rate to maintain discharge temperature. This option can be selected by CONTROL BY OTHERS/DISCHARGE TEMP. CONTROL BUTTON on NOVA SMC-108 Display main screen. Remote setpoint selection signal can be adjust discharge temperature setpoint with 0-10VDC or 4-20mA signal. The setpoint range is 0-40DegC. Terminal 18 and 19 is increase setpoint(10DegC) override command and terminal 18 and 15 is decrease setpoint(5DegC) override command.

2) ***External Modulation Control***

SMC-1108 is capable of responding to a 0-10Vdc or 4-20mA signals. To configure SMC-1108 to respond to an external signal the CONTROL BY OTHERS/DISCHARGE TEMP. CONTROL button on NOVA SMC-1108 Display main screen must not be selected. The control signal connects to terminals 9 and 10. SMC-1108 will remain in control of errors and will lock out if any error condition occurs. The BMS has complete control over the discharge temperature.
The BMS supplier must supply SMC-1108 with either 0- 10 VDC or 4-20 mA signal. The signal is to be supplied to terminals 9 and 10. After normal startup sequence is finished. The unit will now only respond to the BMS signal and is unable to self adjust to changes in conditions.
SMC-1108 will respond to the incoming signals and modulate to a corresponding firing rate. The firing curve is composed of discrete steps. Each step is controlled by a trigger voltage or current that once reached the combustion will move to the next combustion step. When tuning a the BMS system the following points must be consider:

How the SMC-1108 Responds to External Modulation Control

SMC-1108 automatically scales the incoming signal to the internal combustion curve that has been programmed at the factory. The curve is made of discrete steps. There are dead- bands in the signal in which the unit will not modulate with an increase or decrease in the control signal.
Once a signal is received the controller will modulate to the corresponding firing point. During this transition SMC-1108 will not respond to changes in the control signal. As a result the Control system must be tuned for a very slow response. Poor temperature control will result if the system is not tuned correctly.

Switching From a mA control signal to VDC

When using a 4-20 mA signal, put a 500Ω register between terminal 9 and 10. Remove a 500Ω register between terminal 9 and 10, when using 0-10Vdc signal.

III. Other Operations (Software controlled)

1) *Low Limit*

The unit will shut down the supply fan if the duct temperature falls below the factory set point.

2) *System Preheat*

The unit can use a built in time delay before the contacts to the main supply fan are energized. This will allow a preheating of the heat exchanger to insure that only warm air will be supplied to the space. Preheat operation begins with a normal trial for ignition. Once flame has proven the unit will modulate to the midpoint of the firing range. The unit will remain at the midpoint until the preheat cycle is ended. Once ended the main supply fan contacts will energize and normal heat mode operation will begin.

3) *Standby mode*

Standby mode is to be used in conjunction with an on/off thermostat or when periodic heating is required. In Standby mode SMC-1108 is continually powered. In this mode the heat cycle will remain powered down until there is a call for heat from indicated by a 24VAC signal on terminal 21. Upon a call for heat a normal start up sequence is run and the unit will then enter heat mode. Once the call for heat is satisfied and the 24VAC signal is lost on terminal 21 SMC-1108 will exit heat. The unit will enter a post heat purge. During this time the combustion blower and firing valve are ramped to full fire. Upon completion of the post heat purge the burner and combustion blower are shut down. The main supply fan will remain in operation for a period of time to allow for cooling of the heat exchanger.

4) *Fan on in Standby Mode*

With this option the main supply fan will remain in operation regardless of the call for heat when the Standby option is selected. During transition between heat and standby operation the supply fan may cycle on and off for a short duration.

IV. ERROR SIGNALS

1) *High Limit Error*

This condition will occur when SMC-1108 has a duct temperature greater than the factory set point. This condition is indicated by the blinking of Alarm indication light 5 times(one short and four long blinking) every 10 seconds. The unit will indicate the high limit error and will lock until reset. The main supply blower will remain energized. Upon completion of the post heat purge the burner and combustion blower are shut down.

2) *Air Proving Error*

Air proving error occurs when the air proving switch is opened. This condition is indicated by the blinking of Alarm indication light 3 times(one short and two long blinking) every 10 seconds. The fan operation must be checked as well as the function of the air proving switch itself. Improper operation will cause poor and irregular combustion. The unit must be reset to reinitiate.

3) *Flame Error*

Flame error occurs when the flame signal is lost to SMC-1108. Lock occurs after the fourth attempt during trial for ignition and in any instance in which flame is lost after heat mode has been achieved. This condition is indicated by the blinking of Alarm indication light 4 times(one short and three long blinking) every 10 seconds. The unit must be reset to reinitiate.

4) *Valve Error*

Valve error occurs when SMC-1108 looses communication with the modulating gas valve or abnormal operation of the modulating gas valve has been detected. This condition is indicated by the blinking of Alarm indication light 2 times(one short and one long blinking) every 10 seconds. The unit will lock out and will require resetting to reinitiate.

V. Trouble Shooting

AIR PROVING ERROR	• SMC-1108 has lost the Air proving signal • Check combustion blower operation • Check air proving switch operation
FLAME ERROR	• SMC-1108 has lost the 24 VAC on terminal 20 • Check gas supply • Check ignition module for proper operation • Check all fail safes for proper operation • Check valves, manual and solenoid, for proper operation
HIGH LIMIT ERROR	• SMC-1108 has received a temperature reading above the factory set value. • Check main blower and dampers for proper operation. • Check discharge sensor for correct attachment.
LOW LIMIT ERROR	• SMC-1108 has detected a temperature below that set by the as the low limit. • Check unit for proper operation. • Check discharge sensor for correct attachment. Open contacts on the Discharge sensor terminals will cause indication of a low limit condition.
VALVE ERROR	• SMC-1108 has lost communication with the modulating gas valve. • Check that valve is powered and operating correctly. • Check for signal (0-10VDC) on terminal 24. The unit will not fire until valve has proven closed (<=2.0 VDC signal on terminal 11)

NO DISPLAY ON PLC CONTROLER	• SMC-1108 requires 120VAC on terminal 2 for operation. Check fuses on both the control panel and Circuit board and replace as necessary. • Verify correct wiring, wiring connections and grounding of the electrical components.
BOARD WILL NOT ENTER HEAT MODE	• SMC-1108 requires 24VAC on terminal 21 to enter heat mode. • SMC-1108 requires a 2.0 VDC signal on terminal 24 before initiating trial for ignition. • Flame has not proven. SMC-1108 requires a 24VAC signal on terminal 20 before entering heat mode. The controller will use 4 trials for ignition before indicating “flame error”.
UNIT WILL NOT MODULATE	• Check for free rotation of the modulating valve • Check for correct feedback signal
SUPPLY FAN DOES NOT INGAGE	• Check for power on terminal 5 on the SMC-1108. If power is trace unit wiring as per diagram to determine fault. • Check for power on terminal 6. If power is not present trace wiring as per diagram to determine fault. • If power is present on 5 but not 6 the system is not calling for the supply air.

VI. Wiring

1	120VAC Neutral
2	120VAC Power
5	24VAC for purge timer common
6	Normally open contact to purge timer
7	Modulating gas valve control signal (2-10 VDC)
8	Solid State Relay (-VDC)
9	Building Management System signal or Remote setpoint selection signal(common)
10	Building Management System signal or Remote setpoint selection signal (0-10VDC/4-20mA)
11	Solid State Relay (+VDC)
12	Temperature sensor 24VDC power
13	Temperature sensor signal(0-10VDC)
14	Temperature sensor 24VDC common
15	Decrease setpoint override command
16	Air proving switch common
17	Air proving switch normally open contact
18	Increase/Decrease setpoint override command
19	Increase setpoint override command
20	Flame detect in (24VAC)
21	Heat mode/Standby (Switched 24VAC)
24	Modulating gas valve feedback signal (2-10 VDC)

Appendix A

Configuring Phoenix Prodigy SMC-1108

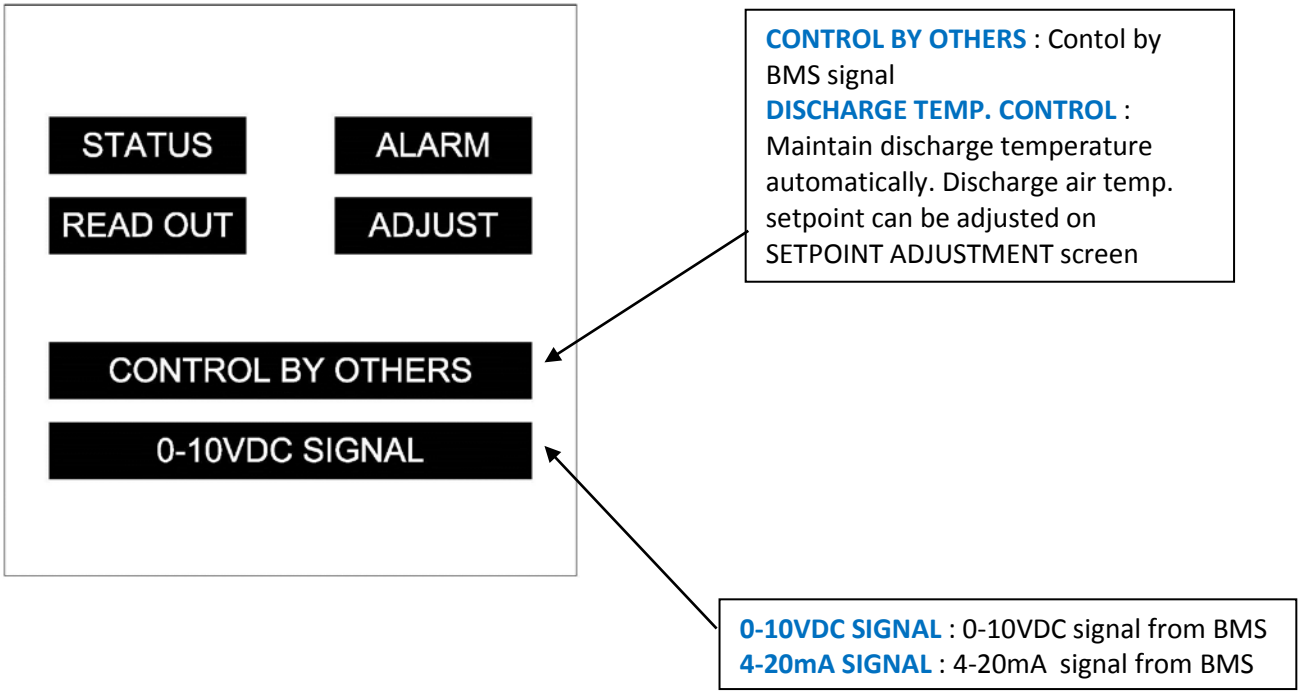
To correctly configure SMC-1108 NOVA SMC-1108 Display must be used to communicate with the controller. Factory training is required. Changes to the control configuration can cause poor combustion, improper or undesired operation.

Setting up NOVA SMC-1108 Display

To establish communication between SMC-1108 Display and SMC-1108 use Ethernet cable and connect 24VDC power (terminal 16) and 24VDC common (terminal 9) to SMC-1108 Display.

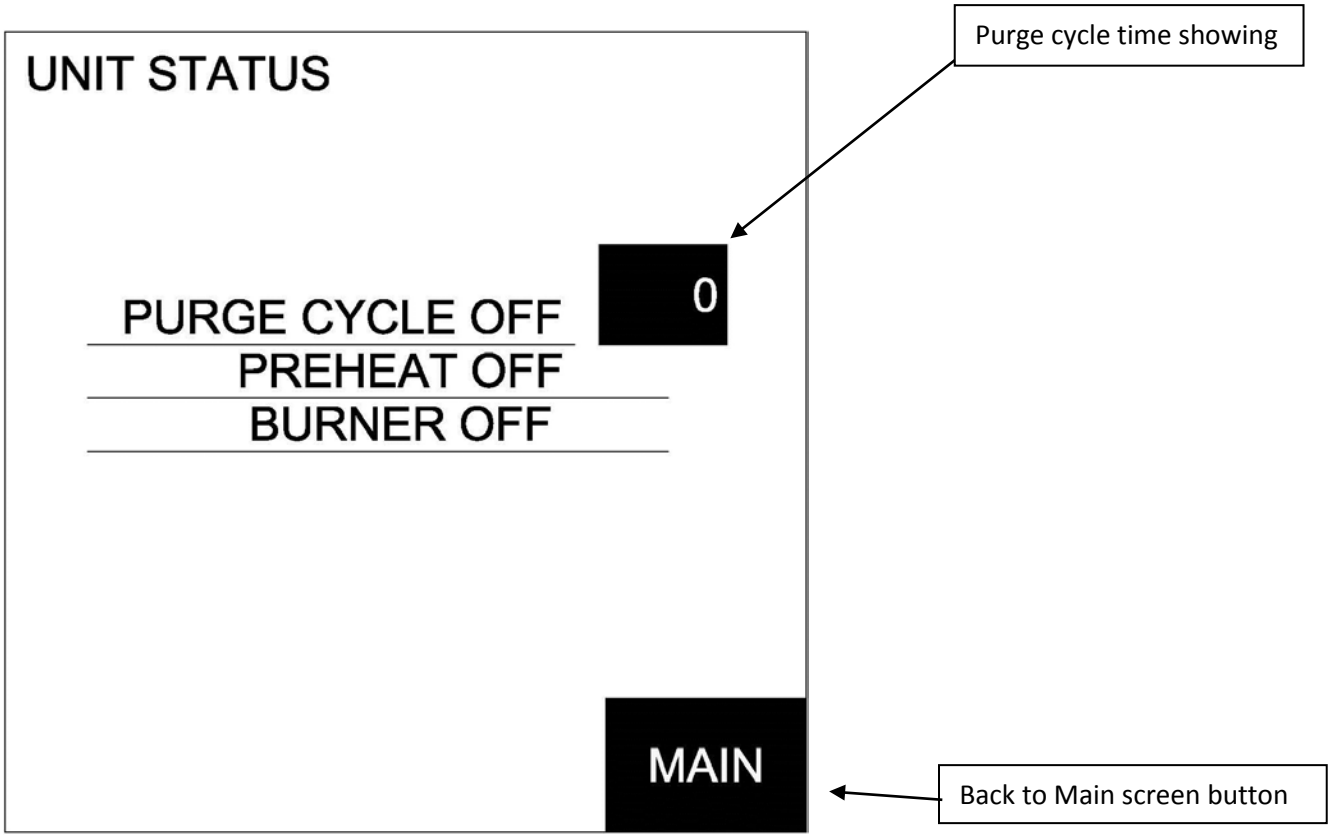
Main screen on NOVA SMC-1108 Display

This screen provides STATUS/ALARM/READ OUT/ADJUST screen access buttons, burner control type selection and control signal type selection.



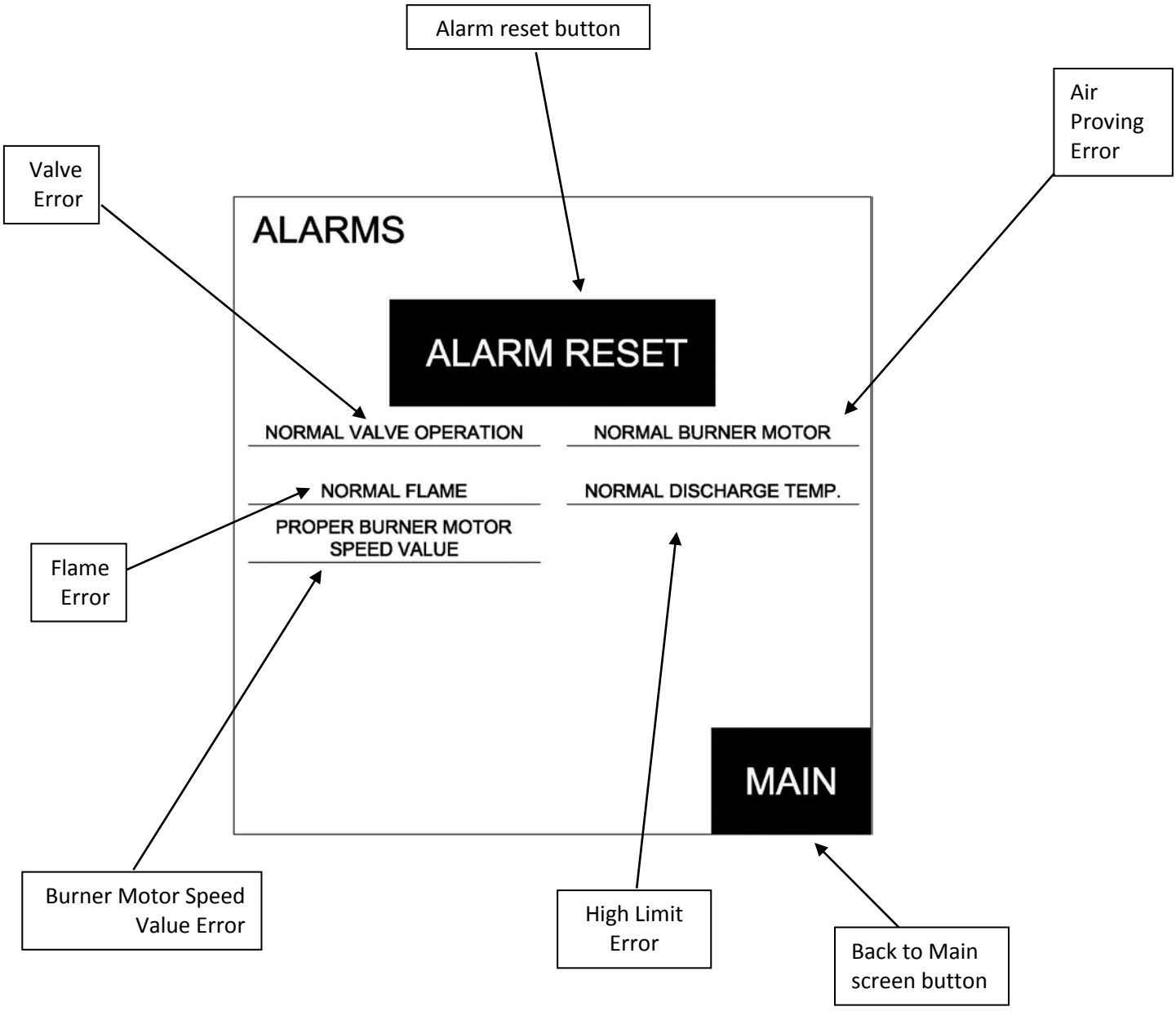
UNIT STATUS screen on NOVA SMC-1108 Display

This screen provides a view of PURGE CYCLE/PREHEAT/BURNER status.



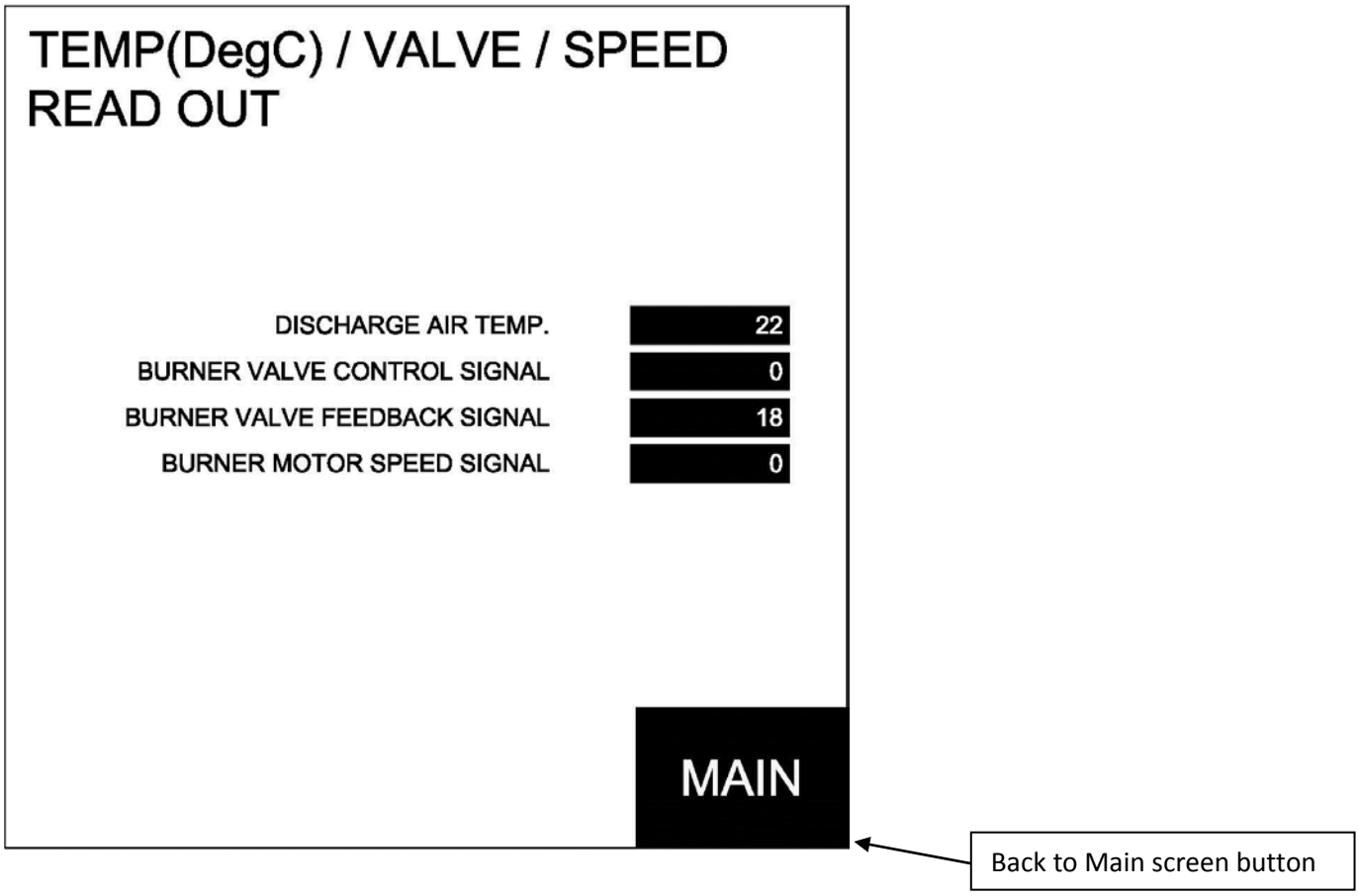
ALARMS screen on NOVA SMC-1108 Display

This screen shows VALVE ERROR/AIR PROVING ERROR/FLAME ERROR /HIGH LIMT ERROR/BURNER MOTOR SPEED VALUE ERROR. See IV. ERROR SIGNALS page for detail information of each alarm. BURNER MOTOR SPEED VALUE ERROR will occur when burner motor speed value entered incorrectly.



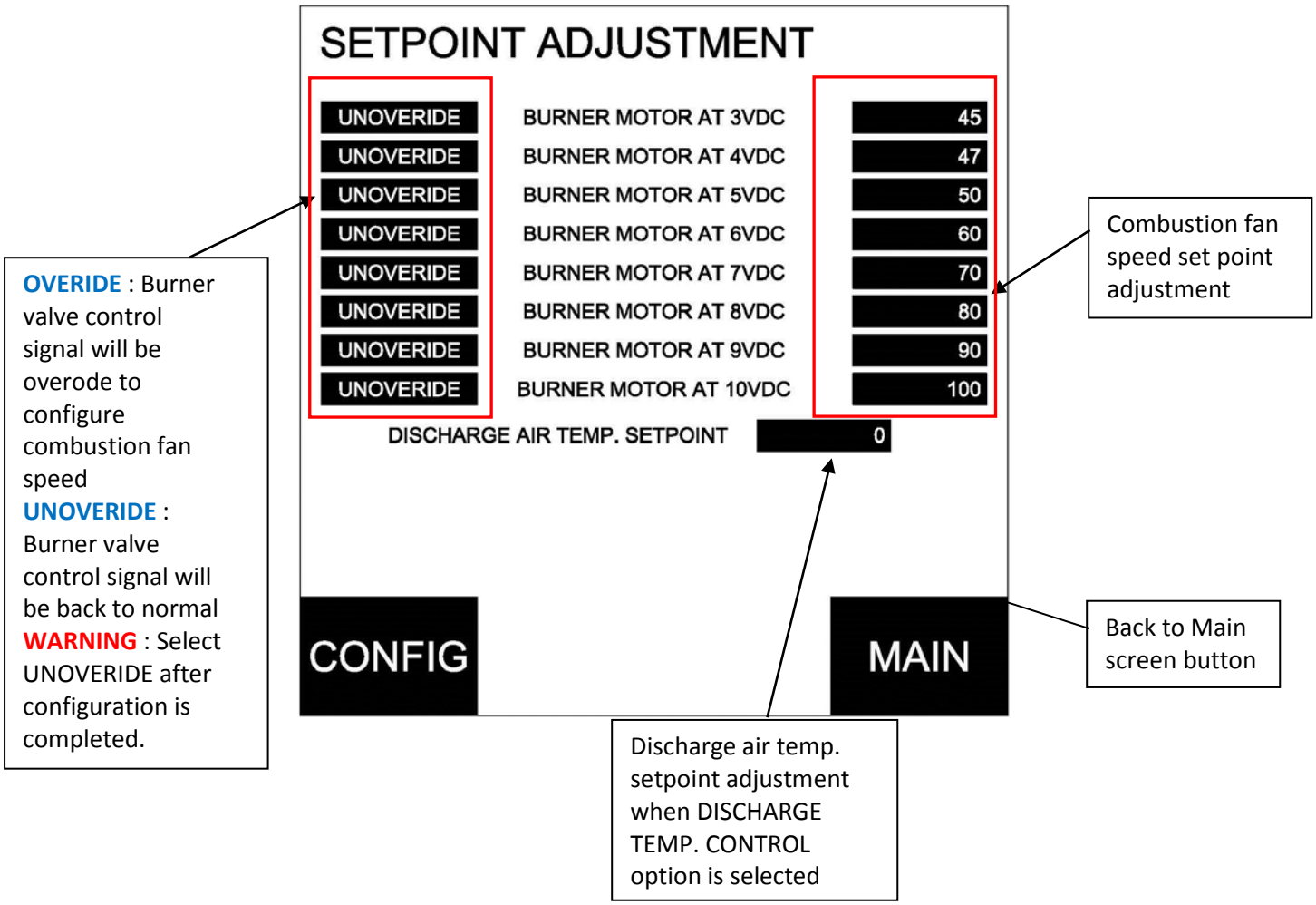
TEMP (DegC)/VALVE/SPEED READ OUT screen on NOVA SMC-1108 Display

This screen shows DISCHARGE AIR TEMPERATURE (DegC)/BRUENR VALVE CONTROL SIGNAL (0-10VDC)/BURNER VALVE FEEDBACK SIGNAL (2-10VDC)/BURNER MOTOR SPEED SIGNAL (0-10VDC).



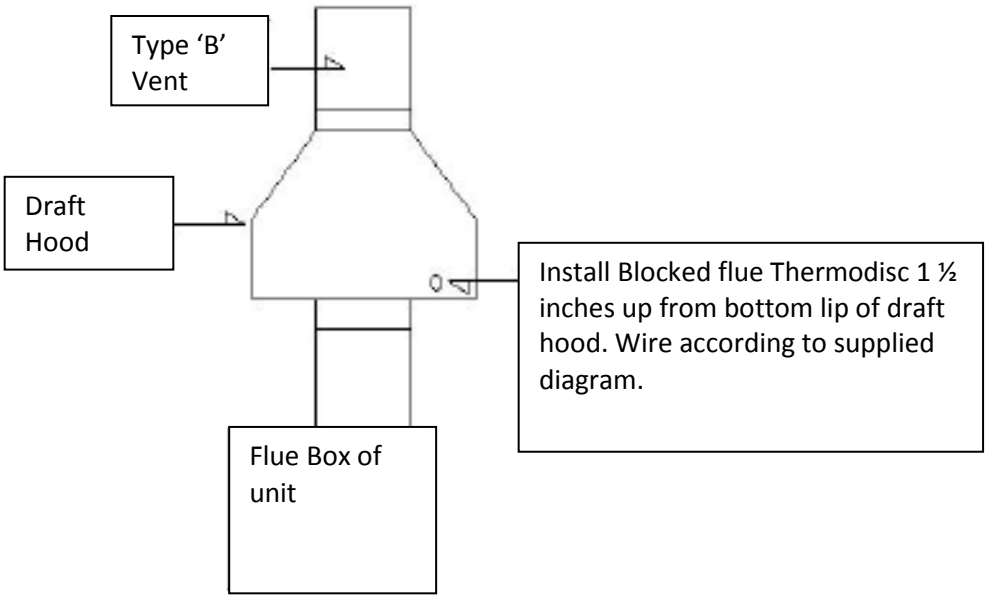
SETPOINT ADJUSTMENT screen on NOVA SMC-1108 Display

This screen provides to configure eight combustion set points.



Combustion fan speed signal is 0-10VDC(0-60Hz). Value 45 is 4.5VDC signal. So the last digit is decimal digit. If combustion fan speed set points have been incorrectly configured, BURNER MOTOR SPEED VALVE ERROR will occur. Once this rough curve has been established override this system to high fire. Open the firing valve and set the manifold pressure. Shut the firing valve and force the system to low fire. Reopen the firing valve when the system is at low fire. Walk the system through each point in the combustion curve and check combustion making adjustments to the gas valve voltage as necessary. Once complete exit system tune and recheck complete curve.
High fire should be running between 5-7% oxygen, 7-9% CO_2 while at low fire that number will vary from 18-20% oxygen, 0.1-1% CO_2. Remember as the dirt accumulates the combustion fan performance will drop off so allow excess oxygen during initial factory set up.

Appendix B


Type 'B' Vent
Draft Hood
Install Blocked flue Thermodisc 1 ½ inches up from bottom lip of draft hood. Wire according to supplied diagram.
Flue Box of unit