

# Installation and Operation Instructions for

## Low Temperature

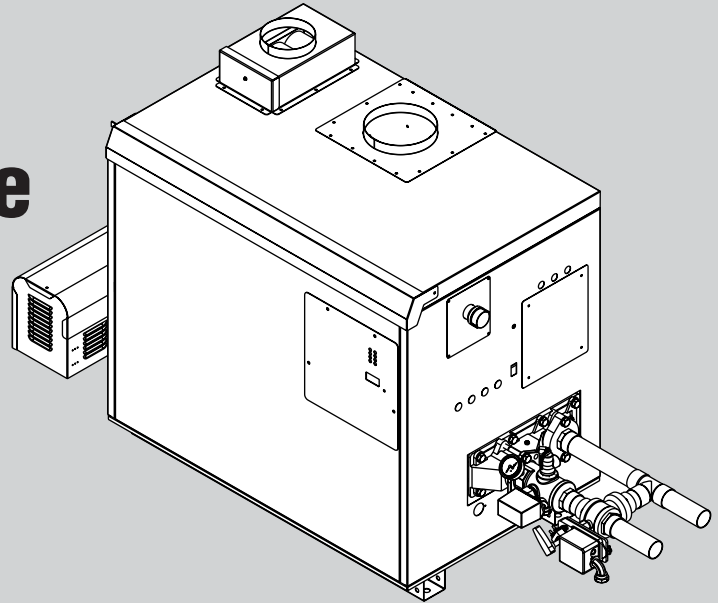
## Pennant™

Hydronic Boiler

Model PNCH

Water Heater

Model PNCV



**FOR YOUR SAFETY:** This product must be installed and serviced by a professional service technician, qualified in hot water boiler installation and maintenance. Improper installation and/or operation could create carbon monoxide gas in flue gases which could cause serious injury, property damage, or death. Improper installation and/or operation will void the warranty. For indoor installations, as an additional measure of safety, Laars strongly recommends installation of suitable Carbon Monoxide detectors in the vicinity of this appliance and in any adjacent occupied spaces.

### ⚠ WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

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 YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a nearby phone. 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.

### ⚠ AVERTISSEMENT

Assurez-vous de bien suivre les instructions données dans cette notice pour réduire au minimum le risque d'incendie ou d'explosion ou pour éviter tout dommage matériel, toute blessure ou la mort.

Ne pas entreposer ni utiliser d'essence ni d'autres vapeurs ou liquides inflammables dans le voisinage de cet appareil ou de tout autre appareil.

#### QUE FAIRE SI VOUS SENTEZ UNE ODEUR DE GAZ:

- Ne pas tenter d'allumer d'appareils.
- Ne touchez à aucun interrupteur. Ne pas vous servir des téléphones dans le bâtiment où vous trouvez.
- Appelez immédiatement votre fournisseur de gaz depuis un voisin. Suivez les instructions du fournisseur.
- Si vous ne pouvez rejoindre le fournisseur de gaz, appelez le service des incendies.

L'installation et l'entretien doivent être assurés par un installateur ou un service d'entretien qualifié ou par le fournisseur de gaz.



**Heating Systems Company**

A subsidiary of BRADFORD WHITE Corporation

## SECTION 1. General Information

**USING THIS MANUAL – Because the Pennant Boilers and Pennant Water Heaters are identical appliances, with the exception of materials of manufacture, labels and ultimate use application, this manual provides information for the proper installation, operation and maintenance of both products. Where differences exist between the application of the appliances and their operation, the sections pertinent to only one appliance or the other will be so identified.**

In the Commonwealth of Massachusetts, this appliance must be installed by a licensed plumber or gas fitter.

### **⚠ WARNING**

To minimize the risk of electric shock, fire or other hazards which could result in property damage, injury, or death. The Pennant hydronic, boiler or water heater **must** be installed in accordance with the procedures detailed in this manual, or the Laars Heating Systems warranty may be voided. The installation must conform to the requirements of the local jurisdiction having authority, and, in the United States, to the latest edition of the National Fuel Gas Code, ANSI Z223.1/NFPA54. In Canada, the installation must conform to the latest edition of the Natural Gas and Propane Installation Code, CSA B149.1 and/or applicable local codes. Where required by the authority having jurisdiction, the installation of Pennant appliances must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1. Any modifications to the boiler, its gas controls, or wiring may void the warranty. If field conditions require modifications, consult the factory representative before initiating such modifications.

### **⚠ AVERTISSEMENT**

Afin de réduire au minimum les risques de commotion électrique, de feu ou d'autre nature, qui pourraient causer des dommages matériels, des blessures ou des accidents mortels, les chaudières à eau chaude ou les chauffe-eau Pennant **doivent** être installés conformément aux directives détaillées contenues dans ce manuel, à défaut de quoi la garantie fournie par Laars Heating Systems serait annulée. L'installation doit être conforme aux exigences de la réglementation locale en vigueur et, aux États-Unis, à l'édition la plus récente du Natural Fuel Gas Code (Code pour le gaz combustible naturel) ANSI Z223.1/NFPA54. Au Canada, l'installation doit respecter les exigences de la plus récente édition du Code d'installation du gaz naturel et du propane CSA B149.1, et/ou des codes locaux de construction en vigueur. Lorsque la réglementation locale l'exige, l'installation des appareils électroménagers Pennant doit respecter les exigences du Standard for Controls and Safety Devices for Automatically Fired Boilers (Code pour les équipements de commande et de sécurité des chaudières à combustion automatique), ANSI/ASME CSD-1. Toute modification apportée à la chaudière, aux régulateurs de gaz ou au câblage, peut compromettre la garantie. Si certaines conditions particulières rendent des adaptations nécessaires, consulter un représentant du fabricant avant d'entreprendre ces modifications.

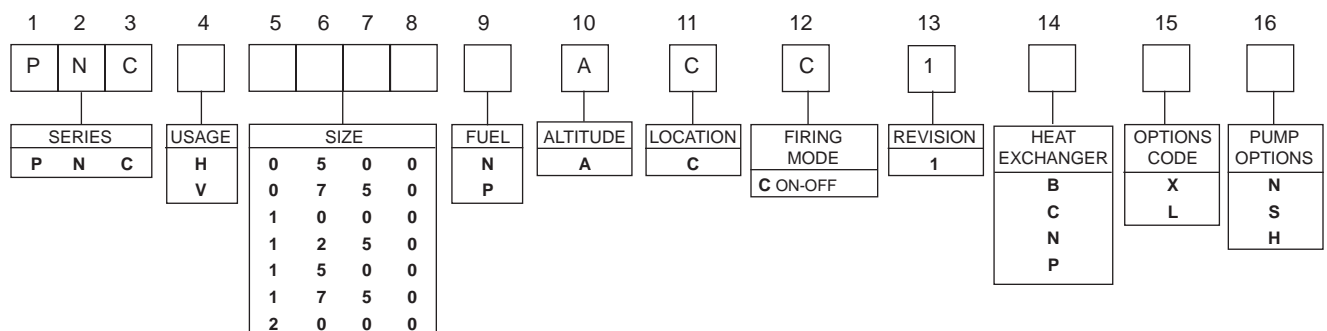
### 1.1 Introduction

This manual provides information necessary for the installation, operation, and maintenance of Laars Heating Systems' Low temperature Pennant copper tube appliances, sizes 500-2000 (standard appliances are covered in a separate manual). Read it carefully before installation.

All application and installation procedures should be reviewed completely before proceeding with the installation. Consult the Laars Heating Systems factory, or local factory representative, with any issues or questions regarding this equipment. Experience has shown that most operating issues are caused by improper installation.

The Pennant appliance is protected against over pressurization. A pressure relief valve is fitted to all appliances. It is installed on the outlet header, at the water outlet of the appliance.

**IMPORTANT:** The inlet gas pressure to the appliance must not exceed 13 in. w.c. (3.2 kPa).



Item	Description	Size 500	Size 750	Size 1000	Size 1250	Size 1500	Size 1750	Size 2000
<b>Sheet Metal Components - See Figure 19</b>								
1	Panel, Jacket, Side Left	5C3420	5C3420	5C3420	5C3420	5C3420	5C3420	5C3420
2	Panel, Jacket, Side Right	5C3521	5C3521	5C3521	5C3521	5C3521	5C3521	5C3521
3	Panel, Jacket, Front	5C3320	7C3320	10C3320	12C3320	15C3320	17C3320	20C3320
3	Panel, Jacket, Front, Left					15C3320	17C3320	20C3320
4	Panel, Jacket, Front, Right					15C3320	17C3320	20C3320
5	Panel, Jacket, Rear	5C3220	7C3220	10C3220	12C3220	15C3220	17C3220	20C3220
5A	Panel, Jacket, Rear, Filter Enclosure					15C3026	15C3026	15C3026
6	Panel, Jacket, Top	5C3021	7C3021	10C3021	12C3021	15C3021	17C3021	20C3021
7	Panel, Jacket, Top, Left					15C3025	17C3025	20C3025
8	Control Door, Access	5C3011	5C3011	5C3011	5C3011	5C3011	5C3011	5C3011
9	Plate, Gas Pipe Seal	5C3304 (2)	5C3304 (2)	10C3304 (2)	20C3304 (2)	20C3304 (2)	20C3304 (2)	20C3304 (2)
10	Plate, Cover, Wiring	5C3502	5C3502	5C3502	5C3502	5C3502	5C3502	5C3502
11	Plate, Vent	5C3004	5C3004	10C3004	20C3004	20C3004	20C3004	20C3004
12	Cover, Vent Plate				20C3006	20C3006	20C3006	20C3006
13	Plate, Cover, Filter	5C3002	5C3002	5C3002	20C3002	20C3002	20C3002	20C3002
14	Collar, Vent	5C3106	10C3100	10C3100	15C3100	15C3100	20C3100	20C3100
16	Air Filter	R2014700 (1)	R2014700 (1)	R2014700 (1)	R2014700 (2)	R2014700 (2)	R2014700 (2)	R2014700 (2)
16A	Trim, Jacket, Front	5C3019	7C3019	10C3019	12C3019	15C3019	17C3019	20C3019
16B	Housing, Rain Shield, Pump	5C3015	5C3015	5C3015	5C3015	5C3015	5C3015	5C3015
16C	Cover, Housing, Pump	5C3016	5C3016	5C3016	5C3016	5C3016	5C3016	5C3016
16D	Bracket, Support, Pump Cover	5C3017	5C3017	5C3017	5C3017	5C3017	5C3017	20C3017
<b>Internal Components - See Figures 20 and 21</b>								
17	Base Assembly	5C1020	7C1020	10C1020	12C1020	15C1020	17C1020	20C1020
18	Chamber, Front	5C2003	7C2003	10C2003	12C2003	15C2003	17C2003	20C2003
18A	Chamber, Left Side, Front	5C2015	5C2015	5C2015	5C2015	5C2015	5C2015	5C2015
18B	Chamber, Right Side, Front	5C2016	5C2016	5C2016	5C2016	5C2016	5C2016	5C2016
19	Chamber, Rear	5C2006	7C2006	10C2006	12C2006	15C2006	17C2006	20C2006
20	Chamber Assembly, Left, Bottom	5C2602	5C2602	5C2602	5C2602	5C2602	5C2602	5C2602
21	Chamber Assembly, Right, Bottom	5C2200	5C2200	5C2200	5C2200	5C2200	5C2200	5C2200
22	Chamber, Top	5C2001	7C2001	10C2001	12C2001	15C2001	17C2001	20C2001
23	Chamber, Side, Top	5C2002	5C2002	5C2002	5C2002	5C2002	5C2002	5C2002
24	Exhaust Plenum	5C2007	10C2007	10C2007	20C2007	20C2007	20C2007	20C2007
25	Bracket, Chamber, Front	5C2009	7C2009	10C2009				

Item	Description	Size	Size	Size	Size	Size	Size	Size	Size
26	Bracket, Chamber, Front Left	500	750	1000	1250	1500	1750	2000	
27	Bracket, Chamber, Front Right				12C2011	15C2011	17C2011	20C2011	
27A	Divider, Chamber, Front				12C2009	15C2009	17C2009	20C2009	
27B	Divider, Upper, Chamber, Front				15C2005	15C2005	15C2010	20C2002	
28	Divider, Lower, Chamber, Front	5C2004	7C2004		15C2002	15C2002			
29	Cover, Chamber								
30	Cover, Chamber, Front Left	5C2005	5C2005	10C2004	12C2010	15C2004	17C2010	20C2010	
32	Door, Chamber Access	(1)	(1)	(1)	5C2005	5C2005	5C2005	5C2005	(2)
33	Cover, Chamber, Front Right	2400-286	2400-286	2400-286	2400-286	2400-286	2400-286	2400-286	(2)
34	Ignitor, Hot Surface, with Gasket	(1)	(1)	(2)	(2)	(2)	(2)	(2)	(2)
35	Tile, Side (Right and Left)	T2015600	T2015600	T2015600	T2015600	T2015600	T2015600	T2015600	(2)
35A	Tile, Front	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
35B	Tile, Front, Left Side	T2017300							
35A	Tile, Front, Right Side	(1)							
36	Tile, Rear								
37	Tile, Rear, Left Side	T2016200	T2016800	T2016800	T2016800	T2016800	T2016800	T2016800	(1)
37A	Tile, Rear, Right Side	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
37B	Tile, Rear, Center	T2016300	T2017100	T2017100	T2017100	T2017100	T2017100	T2017100	(1)
38	Tile, Bottom	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
39	Tile, Bottom, Left Side	T2016900	T2016900	T2016900	T2016900	T2016900	T2016900	T2016900	(2)
39A	Tile, Bottom, Right Side	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(2)
39B	Tile, Bottom, Center	T2015700							
		(1)							
		T2017500	T2016600	T2016600	T2016600	T2016600	T2016600	T2016600	
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	
		T2016600	T2018100	T2018100	T2018100	T2018100	T2018100	T2018100	
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	
		T2017200	T2017200	T2017200	T2017200	T2017200	T2017200	T2017200	
		(1)	(1)	(1)	(1)	(1)	(2)	(2)	
		T2015500							
		(1)							
		T2017400	T2017400	T2017400	T2017400	T2017400	T2017400	T2017400	
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	
		T2016500	T2017400	T2018000	T2018000	T2018000	T2018000	T2018000	
		(1)	(1)	(1)	(1)	(1)	(1)	(1)	
		T2015900	T2015900	T2015900	T2015900	T2015900	T2015900	T2015900	
		(1)	(1)	(1)	(1)	(1)	(2)	(2)	

Item	Description	Size 500	Size 750	Size 1000	Size 1250	Size 1500	Size 1750	Size 2000
41	Heat Exchanger, Copper	R2014901	R2014902	R2014903	R2026701	R2014904	R2026702	R2014905
	Heat Exchanger, Cupro-Nickel	R2027801	R2027802	R2027803	R2027804	R2027805	R2027806	R2027807
42	Water Barrier, Inlet/outlet	20305101	20305101	20305101	20305101	20305101	20305101	20305101
43	Water Barrier, Inlet	10338300	10338300	10338300	10338300	10338300	10338300	10338300
44	Gasket, Header	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)	S0095100 (2)
45	Cover, In/Out, Glass-Lined Cast Iron	10364504	10364504	10364504	10364504	10364504	10364504	10364504
	Cover, In/Out, Bronze	10364501	10364501	10364501	10364501	10364501	10364501	10364501
46	Well, Temperature Control	RE2058300	RE2058300	RE2058300	RE2058300	RE2058300	RE2058300	RE2058300
47	Gasket, Flange	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)	S0063700 (2)
48	Flange, Cast Iron	10391302	10391302	10391302	10391302	10391302	10391302	10391302
	Flange, Bronze	20255401	20255401	20255401	20255401	20255401	20255401	20255401
49	Relief Valve, PNCH, 75 PSI	A0063300	A0063600	A0063600	A0063600	A0063600	A0063600	A0002700
	Relief Valve, PNCV, 125 PSI	RA0001200	RA0001200	RA0001200	RA0001200	A0064400	A0064400	A0066400
50	Tee, Adapter, Outlet, Cast Iron	20130001	20130001	20130001	20130002	20130002	20130002	20130002
	Tee, Adapter, Outlet, Bronze	20150301	20150301	20150301	20150301	20150301	20150301	20150303
51	Flow Switch	RE0013000	RE0013000	RE0013000	RE0013000	RE0013000	RE0013000	RE0013000
52	Gauge, Temperature/Pressure	RA0079000	RA0079000	RA0079000	RA0079000	RA0079000	RA0079000	RA0079000
54	Low Water Cutoff	R0021901	R0021901	R0021901	R0021901	R0021901	R0021901	R0021901
55	Pump Housing, Glass-lined, Cast Iron	R20607600	R20607600	R20607600	R20607600	R20607600	R20607600	R20607600
	Pump Housing, Bronze	10483300	10483300	10483300	10483300	10483300	10483300	10483300
56	Gasket, Pump Adapter	S0024600	S0024600	S0024600	S0024600	S0024600	S0024600	S0024600
57	Pump Adapter, Glass-lined Cast Iron	10364200	10364200	10364200	10364200	10364200	10364200	10364200
	Pump Adapter, Bronze	10364201	10364201	10364201	10364201	10364201	10364201	10364201
58	Baffle, Diffuser, Pump Inlet	10338400	10338400	10338400	10338400	10338400	10338400	10338400
59	Pressure Switch	RE0240900 (2)	RE0240900 (2)	RE0240900 (2)	RE0240900 (3)	RE0240900 (3)	RE0240900 (3)	RE0240900 (3)
60	Blower	A2111900 (1)	A2111900 (1)	A2111900 (1)	A2111900 (2)	A2111900 (2)	A2111900 (2)	A2111900 (2)
61	Weldment, Blower Mount	5C5300 (1)	5C5300 (1)	5C5300 (1)	5C5300 (2)	5C5300 (2)	5C5300 (2)	5C5300 (2)
62	Damper, Duct Assembly, Blower	15C5400 (2)	15C5400 (2)	15C5400 (2)	15C5400 (2)	15C5400 (2)	15C5400 (2)	15C5400 (2)
<b>Electrical Components - See Figure 21A</b>								
64	Bracket, Control Panel Mounting	5C7103	5C7103	5C7103	5C7103	5C7103	5C7103	5C7103
65	Terminal Board, Field Wiring	E2307400	E2307401	E2307402	E2307403	E2307404	E2307405	E2307406

Item	Description	Size	Size	Size	Size	Size	Size	Size	Size
66	Ignition Control, Single Trial	E2107300 (1)	E2107300 (1)	E2107300 (2)	E2107300 (2)	E2107300 (2)	E2107300 (2)	E2107300 (2)	E2107300 (2)
	Ignition Control, Three Trial	E2313900 (1)	E2313900 (1)	E2313900 (2)	E2313900 (2)	E2313900 (2)	E2313900 (2)	E2313900 (2)	E2313900 (2)
67	Diagnostic Board	E2105500	E2105500	E2105500	E2105500	E2105500	E2105500	E2105500	E2105500
68	Indicator Light Panel Board	E2105600	E2105600	E2105600	E2105600	E2105600	E2105600	E2105600	E2105600
69	Temperature Control	E2321700	E2321700	E2321700	E2321700	E2321700	E2321700	E2321700	E2321700
70	High Limit, Auto Reset, PNCH	RE0014400	RE0014400	RE0014400	RE0014400	RE0014400	RE0014400	RE0014400	RE0014400
	High Limit, Auto Reset, PNCV, 210F Max.	E2217700	E2217700	E2217700	E2217700	E2217700	E2217700	E2217700	E2217700
71	High Limit, Manual Reset, PNCH	RE0015900	RE0015900	RE0015900	RE0015900	RE0015900	RE0015900	RE0015900	RE0015900
	High Limit, Manual Reset, PNCV, 210F Max.	E2217800	E2217800	E2217800	E2217800	E2217800	E2217800	E2217800	E2217800
72	Relay, Pump (SPST)	E0098300	E0098300	E0098300	E0098300	E0098300	E0098300	E0098300	E0098300
	Relay, Fan (DPDT)	E0076600	E0076600	(2)	(2)	(2)	(2)	(2)	(2)
73	Terminal Bus (12 Position)	E2040500	E2040500	E2040500	E2040500	E2040500	E2040500	E2040500	E2040500
74	Transformer	E2310400	E2310400	E2310400	E2312800	E2312800	E2312800	E2312800	E2312800
75	Circuit Breaker	E2318800	E2318800	E2318800	E2318800	E2318800	E2318800	E2318800	E2318800
	Switch, Rocker	E2322700	E2322700	E2322700	E2322700	E2322700	E2322700	E2322700	E2322700
	Sensor, Universal (shipped loose)	R2014800	R2014800	R2014800	R2014800	R2014800	R2014800	R2014800	R2014800
	Switch, Rocker (main power) <i>not shown</i>	E2343300	E2343300	E2343300	E2343300	E2343300	E2343300	E2343300	E2343300
<b>Gas Train Components - See Figure 20</b>									
76	Manifold, Gas Supply	5C6700	7C6700	10C6700	12C6700	15C6700	17C6700	20C6700	20C6700
77	Valve, Ball	V2003100	V2003100	V2003200	V2003300	V2003300	V2003300	V2003300	V2003300
<b>Burner Trays - Note: Burner Tray Assemblies contain item numbers 78 through 80.</b>									
not shown	Burner Tray Assembly, 3 Burners, Right, Nat	5C6600 (1)	5C6600 (1)	5C6600 (2)	5C6600 (2)	5C6600 (1)	5C6600 (1)	5C6600 (1)	5C6600 (1)
	Burner Tray Assembly, 3 Burners, Left, Nat	5C6500 (1)	5C6500 (2)	5C6500 (3)	5C6500 (3)	5C6500 (1)	5C6500 (2)	5C6500 (2)	5C6500 (4)
	Burner Tray Assembly, 4 Burners, Right, Nat	10C6600 (1)	10C6600 (1)	10C6600 (1)	10C6600 (1)	10C6600 (1)	10C6600 (1)	10C6600 (2)	10C6600 (2)
	Burner Tray Assembly, 4 Burners, Left, Nat	10C6500 (2)	10C6500 (2)	10C6500 (2)	10C6500 (2)	10C6500 (2)	10C6500 (2)	10C6500 (2)	10C6500 (4)
	Burner Tray Assembly, 3 Burners, Right, LP	5C6620 (1)	5C6620 (1)	5C6620 (2)	5C6620 (2)	5C6620 (1)	5C6620 (1)	5C6620 (1)	5C6620 (1)
	Burner Tray Assembly, 3 Burners, Left, LP	5C6520 (1)	5C6520 (1)	5C6520 (3)	5C6520 (3)	5C6520 (1)	5C6520 (1)	5C6520 (2)	5C6520 (2)





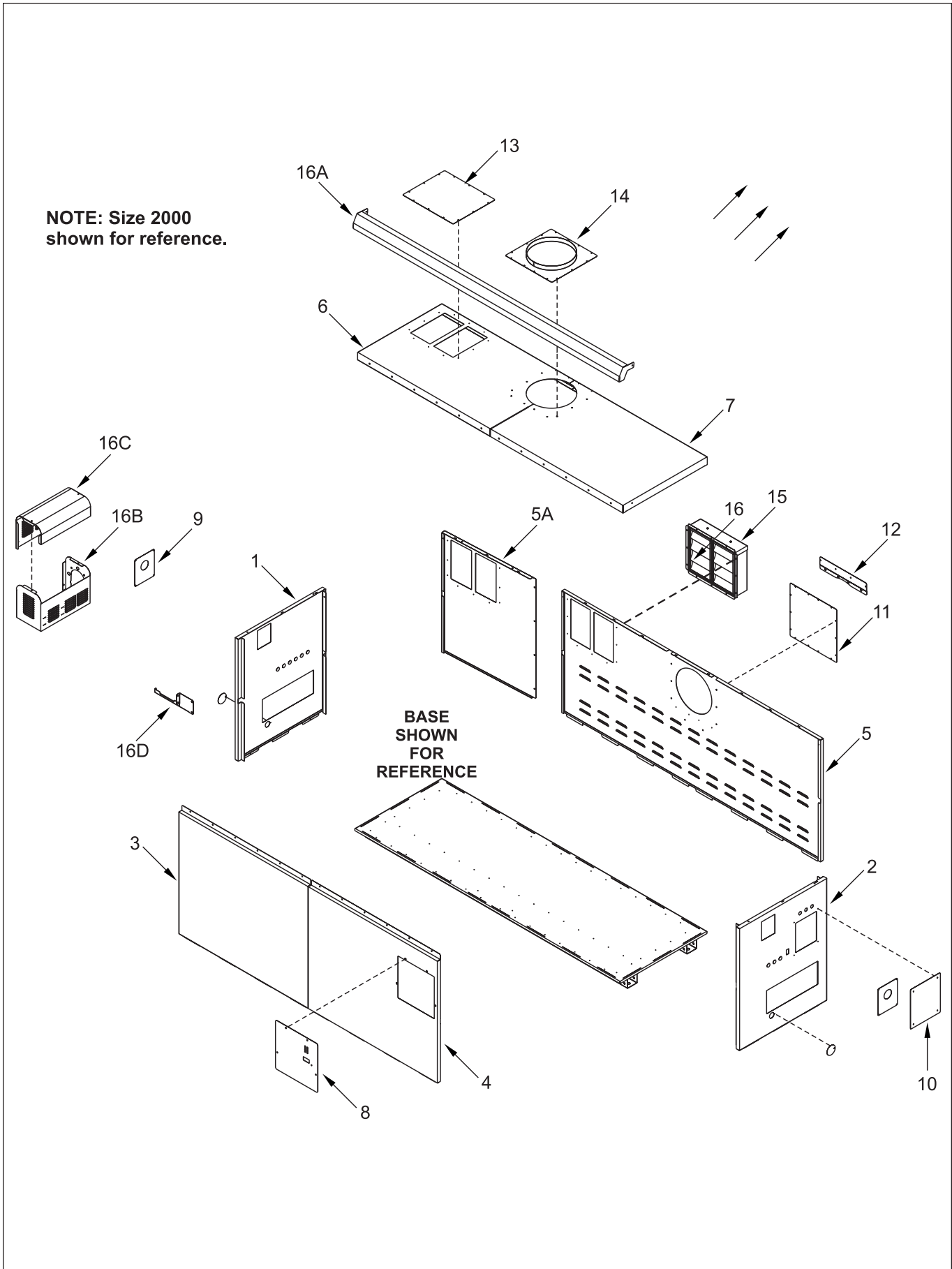


Figure 19. Sheet Metal Components.



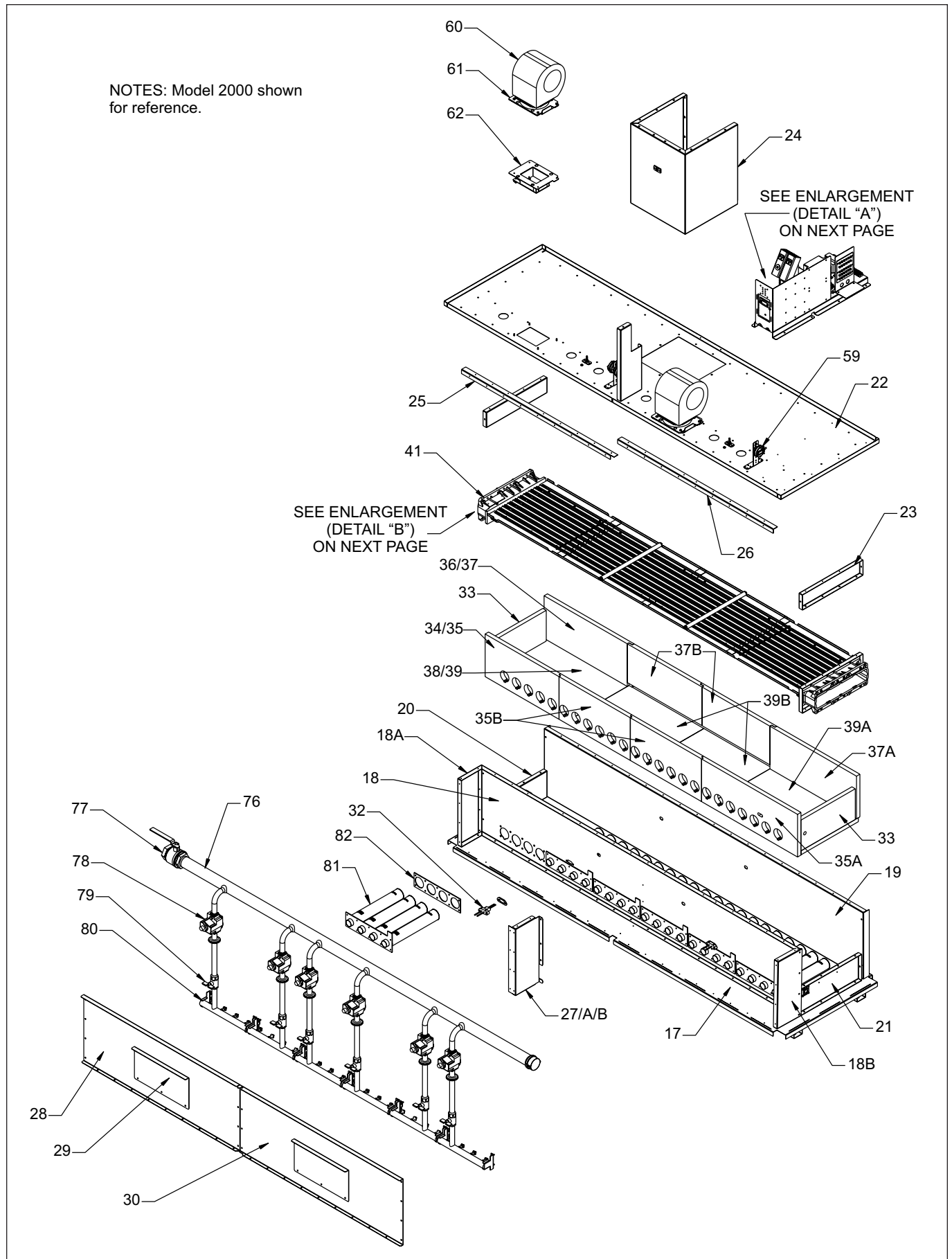
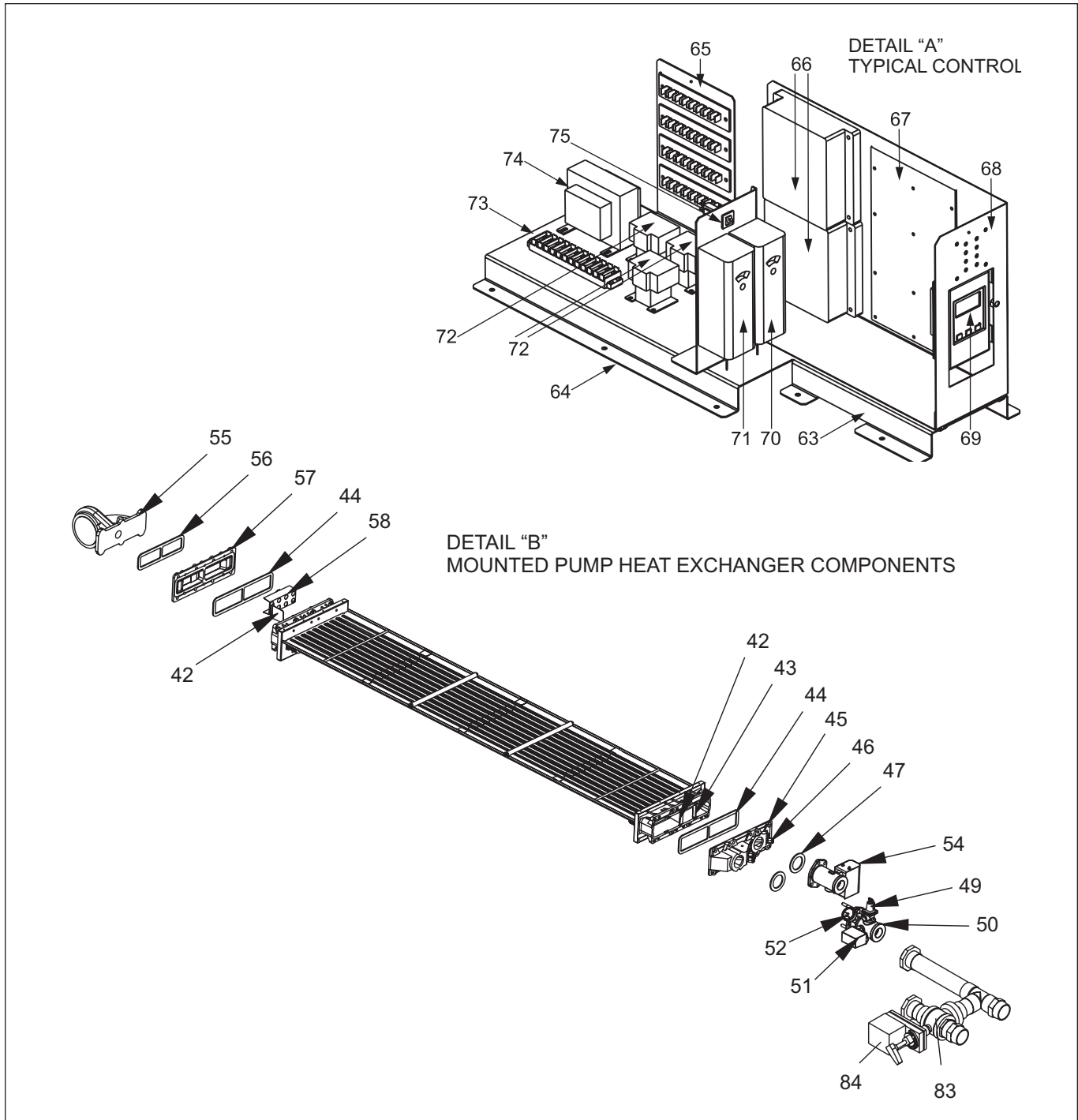


Figure 20. Internal Components.



**Figure 21. Detail of Internal Components.**

*Laars Heating Systems Company reserves the right to change specifications, components, features, or to discontinue products without notice.*



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