



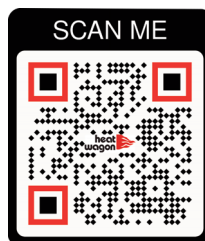
342 N. Co. Rd. 400 East
Valparaiso, IN 46383
219-464-8818 • Fax 219-462-7985
www.heatwagon.com

Installation and Maintenance Manual

Please retain this manual for future reference.

Electric

Construction Heaters



**For Indoor Use Only
Not For Use Outdoors**

For your safety: Do not use this heater in a space where gasoline or other liquids having flammable vapors are stored.

IMPORTANT INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USING THIS HEATER

1. This heater is hot when in use. To avoid burns, do not let bare skin touch hot surfaces. Use handle when moving this heater. Keep combustible materials at least 6 feet (2 meter) from the front of the heater and keep them away from sides and rear
2. Extreme caution is necessary when the heater is used near children or invalids and whenever the heater is left unattended
3. Always unplug the heater when not in use
4. Do not operate any heater with a damaged cord or plug or after the heater malfunctions, has been dropped or damaged in any manner. Return heater to authorized service facility for examination, electrical or mechanical adjustment or repair
5. Do not use outdoors
6. This heater is not intended for use in bathrooms, laundry areas and similar indoor locations. Never locate the heater where it may fall into a bathtub or other liquid container
7. Do not run cord under carpeting. Do not cover cord with throw rugs, runners, or the like. Arrange cord away from traffic area and where it will not be tripped over
8. TO DISCONNECT HEATER, reduce ambient thermostat to zero. Fan will continue to run (P1800,4000,6000) until unit cools and shuts down automatically, turn switches off, disconnect power. For P600, P900 let fan run one minute then after cooldown, turn switch off, disconnect power.
9. Connect to properly grounded outlets only
10. Do not insert or allow foreign objects to enter any ventilation or exhaust opening as this may cause an electric shock or fire, or damage the heater
11. To prevent a possible fire, do not block air intakes or exhaust in any manner. Do not use on soft surfaces, where openings may become blocked
12. A heater has hot and arcing or sparking parts inside. Do not use in areas where gasoline, paint or flammable liquids are used or stored
13. Do not point to flammable materials
14. Use heater only as described in this manual. Any other use not recommended by the manufacturer may cause fire, electric shock or injury to persons
15. Always plug heaters directly into a wall outlet/receptacle. Never use with an extension cord or relocatable power tap (outlet/power strip)
16. SAVE THESE INSTRUCTIONS

Installation and Maintenance Manual Models P600, P900, P1800-I, P1800-3, P1800D, P4000 and P6000 Construction Heaters

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WARRANTY

All new Heat Wagon and Sure Flame heaters and fans are guaranteed against defective materials and workmanship for one (1) year from invoice date.

Warranty repairs may be made only by an authorized, trained and certified Heat Wagon dealer. Warranty repairs by other entities will not be considered. Warranty claims must include model number and serial number.

LIMITATIONS

Evidence of improper electric power, misapplication or evidence of abuse may be cause for rejection of warranty claims.

Travel time, mileage and shipping charges will not be allowed. Minor adjustments of heaters are dealers' responsibility. Defective parts must be tagged and held for possible return to the factory for 60 days from date of repair. The factory will provide a return goods authorization, (RGA) for defective parts to be returned.

No warranty will be allowed for parts not purchased from Heat Wagon.
Heater is not intended for use in pest remediation.

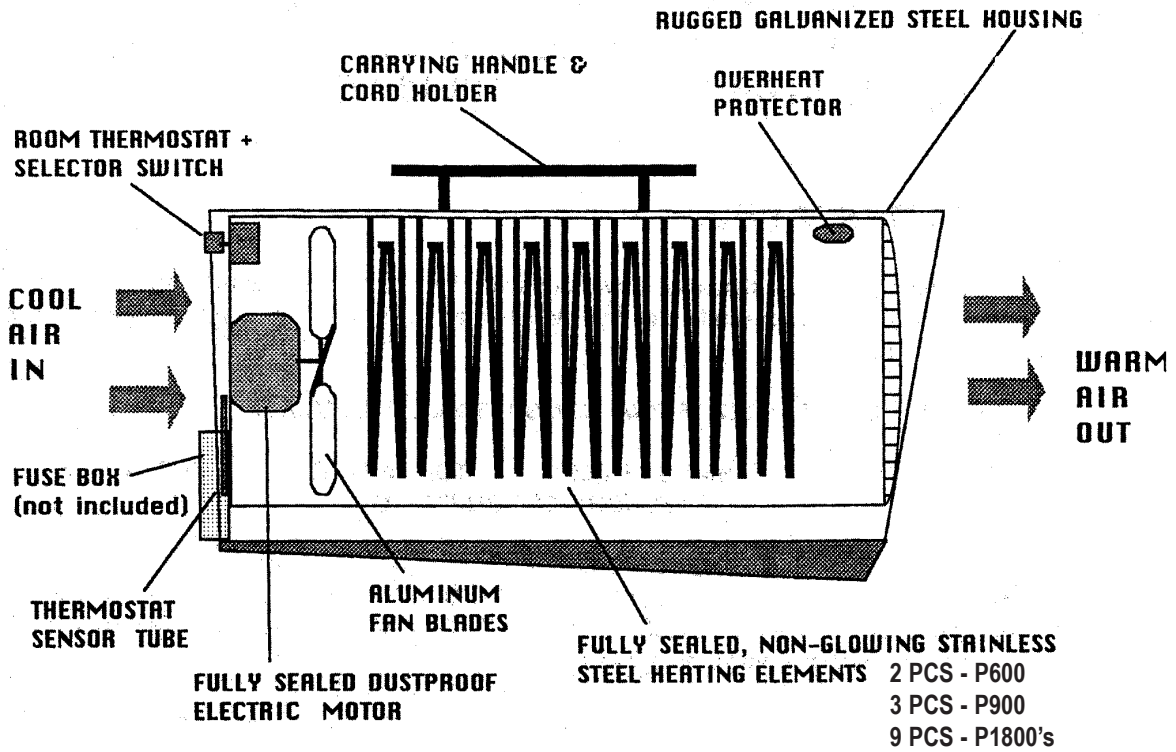


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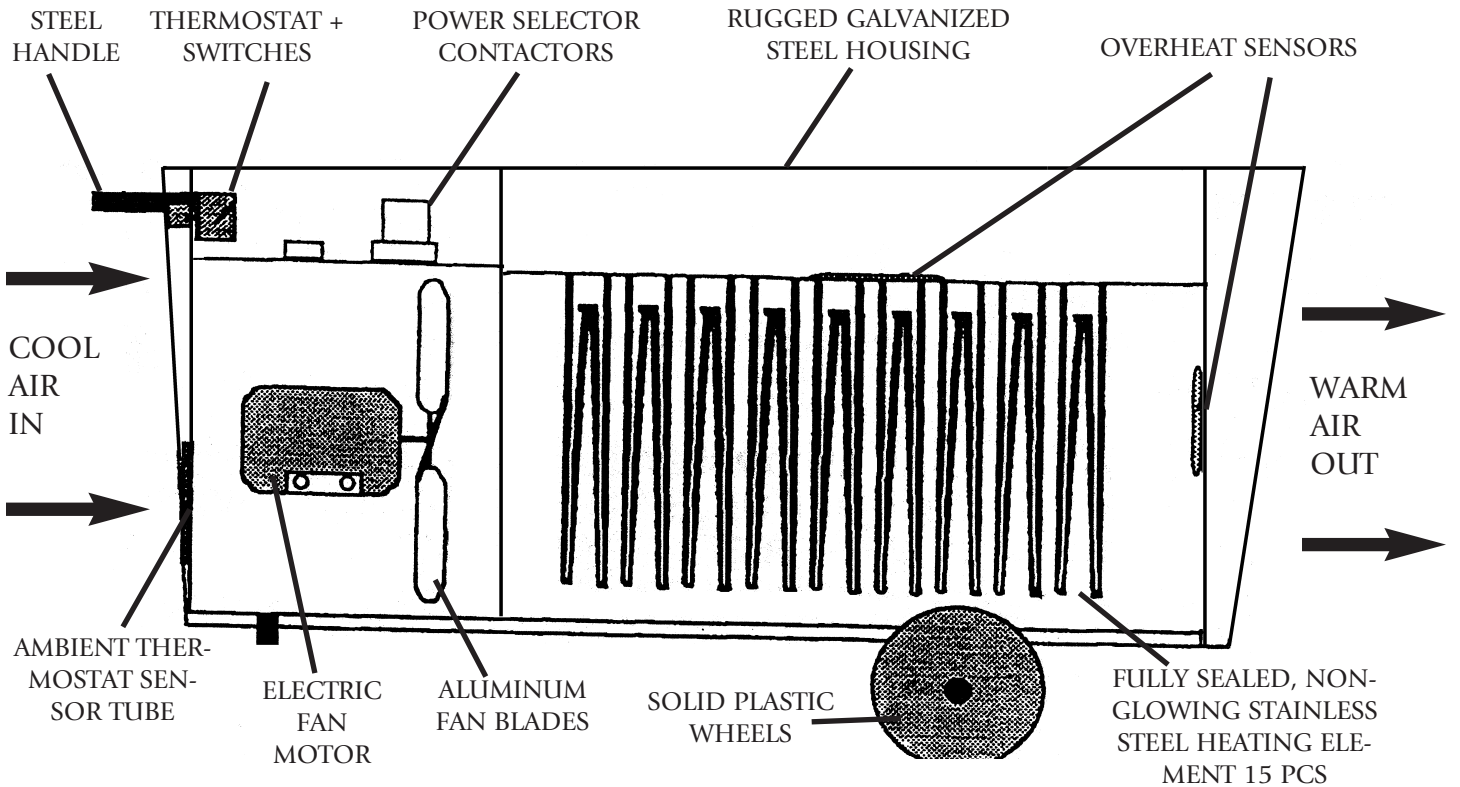
SPECIFICATIONS

	P600	P900	P1800-1	P1800-3	P1800D	P4000	P6000
Heat Output (Max BTU's)							
(First Stage)	20,500	30,700	65,000	65,000	65,000	136,000	204,700
(Second Stage)	20,500	30,700	41,000	41,000	41,000	51,200	81,864
(Third Stage)	N/A	N/A	65,000	65,000	65,000	102,400	163,728
	N/A	N/A	N/A	N/A	N/A	136,500	204,606
Watts (Max)	6,000	9,000	18,000	18,000	18,000	40,000	60,000
(First Stage)	N/A	9,000	12,000	12,000	12,000	16,000	24,000
(Second Stage)	N/A	N/A	18,000	18,000	18,000	32,000	48,000
(Third Stage)	N/A	N/A	N/A	N/A	N/A	40,000	60,000
Electrical Rating	240V 60Hz 1Ø	240V 60Hz 1Ø	240V 60Hz 1Ø	240V 60Hz 3Ø	240V 60Hz 3Ø	480V 60Hz 3Ø	480V 60Hz 3Ø
Min. Voltage at Heater	208	208	208	208	208	440	440
Amp Draw (Max)	25	38.0	75	50	50	50	75
(First Stage)	25	38.0	50	34	34	20	30
(Second Stage)	N/A	N/A	75	50	50	40	60
(Third Stage)	N/A	N/A	N/A	N/A	N/A	50	75
Air Flow	250 CFM (425 Cu. m/hr)	350 CFM (600 Cu. m/hr)	590 CFM (1,000 Cu. m/hr)	590 CFM (1,000 Cu. m/hr)	940 CFM (1,590 Cu. m/hr)	1,800 CFM (3,000 Cu. m/hr)	1,800 CFM (3,000 Cu. m/hr)
Ambient Thermostat	32 to 100°F	32 to 100°F	32 to 100°F	32 to 100°F	32 to 100°F	32 to 100°F	32 to 100°F
Weight	32.9 lbs	48 lbs	62 lbs	62 lbs	62 lbs	130 lbs	142 lbs
Ducting (Max)	N/A	N/A	N/A	N/A	12" x 50' (straight) Duct PN-WD1225 12"x25' Long	14" x 50' (straight) Duct PN-WD1425 14"x25' Long	14" x 50' (straight) Duct PN-WD1425 14"x25' Long
Temp Rise (from 0°F ambient)	100°F	100°F	100°F	100°F	100°F	100°F	100°F
dB Noise	53 dB(A) 1m	55 dB(A) 1m	58 dB(A) 1m	58 dB(A) 1m	58 dB(A) 1m	82 dB(A) 1m	82 dB(A) 1m
UL Listed	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dimensions	20"L x 12"W x 17"H	23"L x 12"W x 18"H	30"L x 14"W x 20"H	30"L x 14"W x 20"H	30"L x 14"W x 20"H	46"L x 20"W x 25"H	46"L x 20"W x 25"H

PRINCIPAL OF OPERATION
P600, P900, P1800-1, P1800-3



PRINCIPAL OF OPERATION
P4000, P6000



OPERATION

REVIEW AND UNDERSTAND ALL WARNINGS IN THIS MANUAL. THEY ARE ESSENTIAL FOR SAFE USE OF THE HEATER. FOLLOW ALL LOCAL CODES.

To start heating:

1. Place the heater on a stable, level surface. Make sure that no explosive or combustible fumes or dust are present. See that the heater is not exposed to water spray, rain, or dripping water.

Minimum clearances from combustible materials:

Outlet: 6 feet, Sides: 1 foot, Top: 2 feet, Rear: 2 feet

Floor: combustible

2. Connect heater to proper power source. The P600 requires a 240V, 60Hz single phase 25 Amp power source. The P900 requires a 240V, 60Hz single phase, 40 Amp power source. The P1800-1 requires a 240V, 60 Hz single phase, 75 Amp power source. The P1800-3 requires a 240V, 60 Hz three phase, 50 Amp power source. The P4000 requires a 480V, 60 Hz three phase, 50 Amp power source. The P6000 requires a 480V three phase, 75 Amp power source. Also, ALL POWER SOURCES NEED TO BE EQUIPPED WITH A CIRCUIT BREAKER!

Note: When power is first applied to unit, the heater fan may blow air out of heater INLET. If this condition occurs, (after first removing power from cord) reverse the first two hot wires at heater terminal inlet block. (3 Phase Models Only)

3. Set the remote thermostat to a temperature above the ambient room temperature by turning the knob. NOTE: The heater will start only if the thermostat "calls for heat" meaning that it is set to higher than prevailing ambient temperature.
4. Set the selector switch to the desired heating setting. For the P1800 series, the options are #1 for ventilation (fan only), #2 for low heat output of 12Kw (41,000 Btu's), or #3 for high output of 18Kw (65,000 Btu's).

For the P4000, the switches are labeled S1 with a heat output of 16Kw (54,600 Btu's), S1 and S2 with a heat output of 32Kw (109,200 Btu's) or S1, S2 and S3 with a heat output of 40Kw (136,000 Btu's).

For the P6000, the switches are labeled S1 with a heat output of 24Kw (81,900 Btu's), S1 and S2 with a heat output of 48Kw (163,800 Btu's) or S1, S2 and S3 with a heat output of 60Kw (204,700 Btu's).

The heater will now operate automatically, controlled by the thermostat.

To Stop Heating: (P1800, P4000, P6000)

1. Turn all switches to "Off".
2. Allow fan to run until unit stops automatically, controlled by unit cooldown thermostat (fan switch). Heater may cycle more than once.
3. Unplug the power supply cable after the fan has stopped cooling down the heater completely.

To Stop Heating: (P600, P900)

1. Reduce ambient (room) thermostat to "Heat Off" position.
2. Allow fan to run for at least two minutes.
3. Flip switch to "Off" position.
4. Unplug heater.

NOTE: The heater is equipped with an overheat limit switch which may cause the heater to stop. Check and remove the cause for overheating before re-starting.

Never disconnect supply plug to stop the heater while in operation!!

MAINTENANCE

Never service heater while it is plugged in, running or hot. Severe bodily injury or electric shock may occur.

Only qualified persons are allowed to open heater for service.

1. Keep heater clean (ex. dry wall dust). Use pressurized air to blow fan blades clean.
NOTE: Use moderate pressure to avoid damage to fan blades.
2. Inspect heater before and after each use.
3. The bearings of the fan motor are permanently lubricated and sealed No additional lubrication is needed.

GENERAL ELECTRIC HEATER SIZING ISSUES

When running Heat Wagon electric heaters from a generator, it is extremely important to make sure that the generator selected for your heater is not undersized. The single largest service issue with Heat Wagon electric heaters is improper set up relating to inadequate voltage due to too small of an electric source and/or too small of a power cord.

Generator Selection for Heat Wagon Electric Heaters

The chart below will help you when it comes to selecting the correct generator required for your Heat Wagon heater:

Model	Watts	Phase	BTU'S	Volts	Amps	CFM	Recommendations
P1500	1,500	1 Phase	5,100	120	15	120	3KW
P600	6,000	1 Phase	20,500	240	25	250	10KW
P900	9,000	1 Phase	30,700	240	38	350	15KW
P1800-1	18,000	1 Phase	64,000/41,000	240	75	590	25KW
P1800-3	18,000	3 Phase	64,000/41,000	240	50	590	25KW
P1800D	18,000	3 Phase	64,000/41,000	240	50	950	25KW
P4000	40,000	3 Phase	136,000/109,200/54,600	480	50	1,800	50KW
P6000	60,000	3 Phase	204,700/163,800/81,900	480	70	1,800	75KW

So, by reviewing the above chart, a P1800-1 would require a minimum 18,000 Watt (18KW), 240 volt single phase generator that can provide 75 amps of continuous power.

Heating Coil Ohm Readings

P600 - 20

P900 - 20

P1800's - 26

P4000 - 85

P6000 - 54

ELECTRICAL CORD SELECTION FOR HEAT WAGON ELECTRIC HEATERS

Once you have established that you have enough power to properly run a Heat Wagon Electric Heater, you still need to deliver the power to the heater adequately. You will need to do a Voltage Drop Formula. The Voltage Drop Formula is amps (source), times resistance (cord's wire size) equals voltage drop. A cords wire size resistance chart is below:

Wire Size Resistance Chart

#4	0.000308	Resistance per Foot
#6	0.000403	Resistance per Foot
#8	0.000641	Resistance per Foot
#10	0.00102	Resistance per Foot
#12	0.00162	Resistance per Foot
#14	0.00258	Resistance per Foot
#16	0.00409	Resistance per Foot
#18	0.00651	Resistance per Foot

A sample formula is listed below:

Example: P1800-1 phase 75 amp
Minimum Voltage Required=208V
150 ft. x 12 gauge wire (0.00162) = .24
75 amps x .24 = 18.0 volt drop
220v (at source) – 18v = 202 volts
Conclusion: Heater will not run, wire too small or cord too long.

Options to Correct the Situation:

1. Increase gauge of wire: If you increased your wire 6 gauge wire, then your formula would be as follows:

Example: P1800-1 phase 75 amp
Minimum Voltage Required=208V
150 ft. x 6 gauge wire (0.000403) = 0.0605
75 amps x 0.0605 = 4.53 volt drop
220 volts (at source) –4.53 volts= 215.46 volts

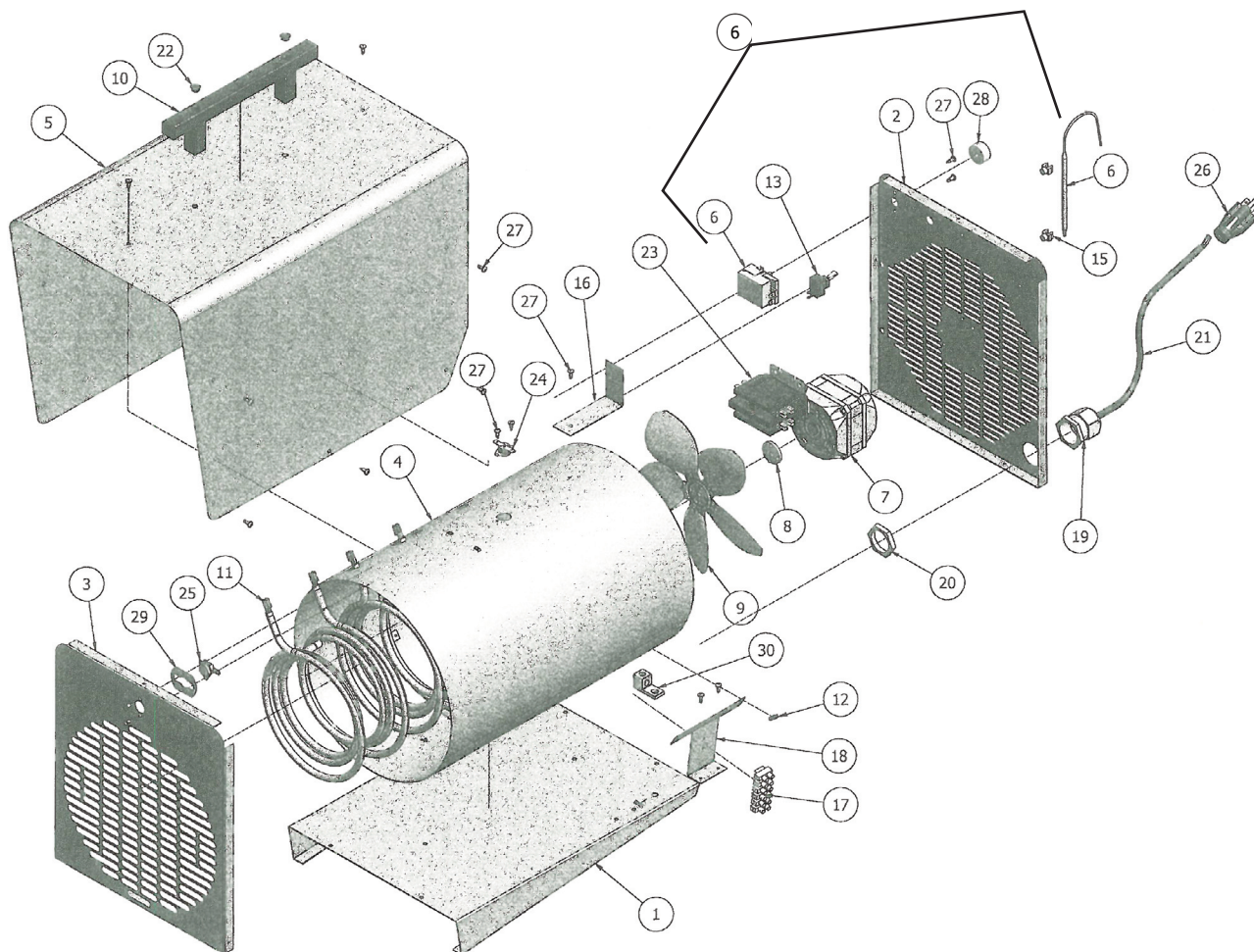
Now, your heater will run properly.

2. Run a shorter cord. If by chance you could use a 50ft cord instead of a 150ft cord, then your formula would be as follows:

Example: P1800-1 phase 75 amp
Minimum Voltage Required=208V
50ft. x 12 gauge wire (0.00162) = .08
75 amps x .08= 6 volt drop
220 volts (at source) –6 volts= 214 volts

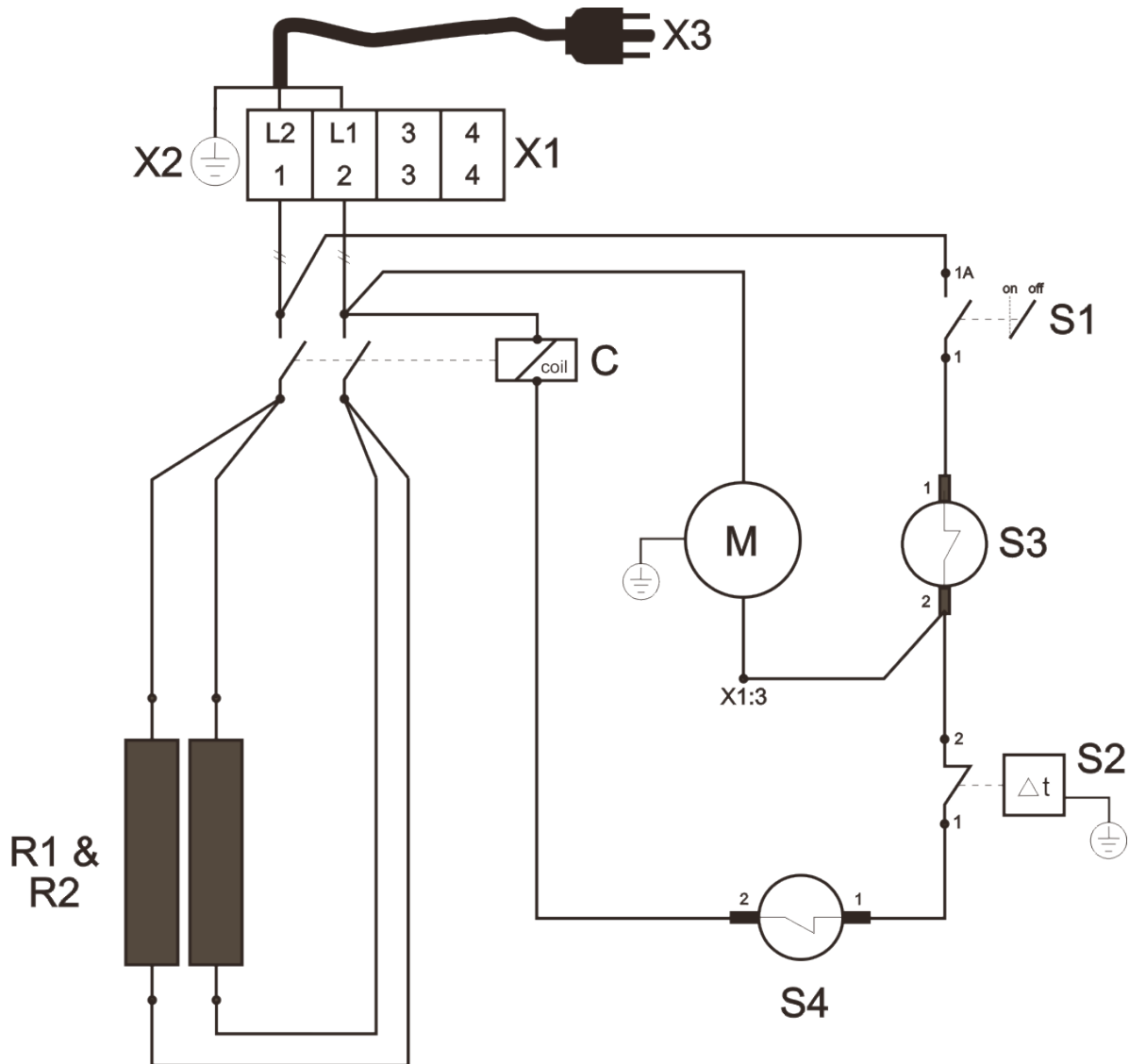
Now, your heater will run properly

P600 PARTS BREAKDOWN



Key #	Description	Part#	Key #	Description	Part#
1	Bottom Plate	HWP 4027013	16	Bracket for Inner Mantle	HWP 4027015
2	Rear Panel	HWP 4027011	17	Terminal Block	HWP 36704
3	Front Panel	HWP 4027012	18	Bracket for Terminal Block	HWP 4027016
4	Inner Mantle	HWP 4027014	19	Strain Reliever	HWP 36922
-	Air Guide Ring, Inner Mantle (not shown)	HWP 4027020	20	Locking Nut, Strain Reliever	HWP 36923
5	Outer Mantle	HWP 4027010	21	Power Cord	ACC 30A10
6	Room Thermostat (Knob Not Included) (Ambient)	HWP 20220	22	Plug, Handle (2 pcs)	HWP 80110
7	Fan Motor	HWP 14145	23	Contactors	HWP 22670
8	Hub, Fan Motor	HWP 17907	24	Overheat Limit Switch	HWP 21201
9	Fan Blade	HWP 16109	25	Limiter, Air Outlet	HWP 21206
10	Handle	HWP 80100	26	Plug Only	HWP 00275-00T
11	Heating Element (2)	HWP 42800	28	Knob, Room Thermostat	HWP 20577
12	Wire Bushing (Guard Ring)	HWP 36809	29	Bracket for Limiter	HWP 4027017
13	Toggle Switch	HWP 26900 (400021)	30	Ground Lug	Not Included
15	Plastic Bracket for Bulb (2)	HWP 37910			

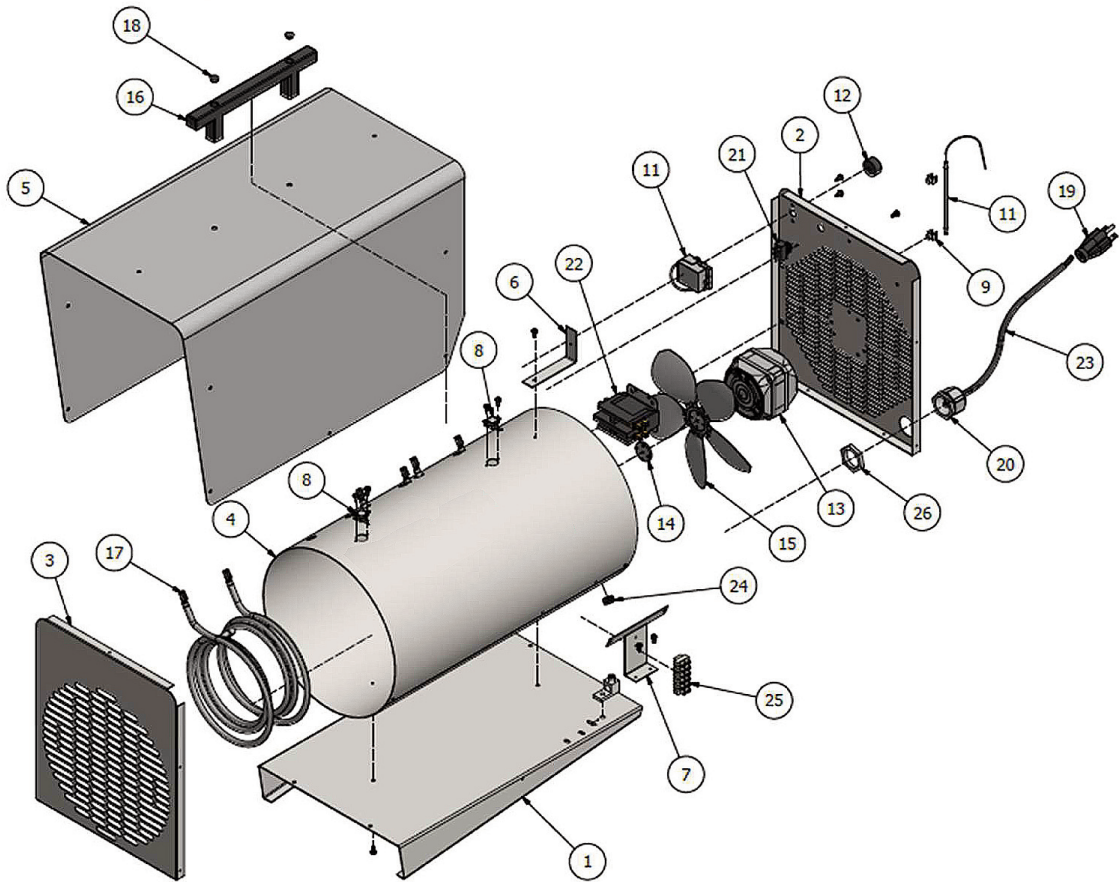
P600 WIRING DIAGRAM



Key #	Description	Part#
C	Contactors	HWP 22670
M	Fan Motor	HWP 14145
R1-R2	Heating Element	HWP 42800
S1	Toggle Switch	HWP 26900 (40021)
S2	Room Thermostat	HWP 20220
S3	Overheat Limit Switch	HWP 21201
S4	Limiter, Air Outlet	HWP 21206
X1	Terminal Block	HWP 36704
X2	Grounding Lug	Not Included
X3	Power Cord & Plug Assembly	ACC 30A10

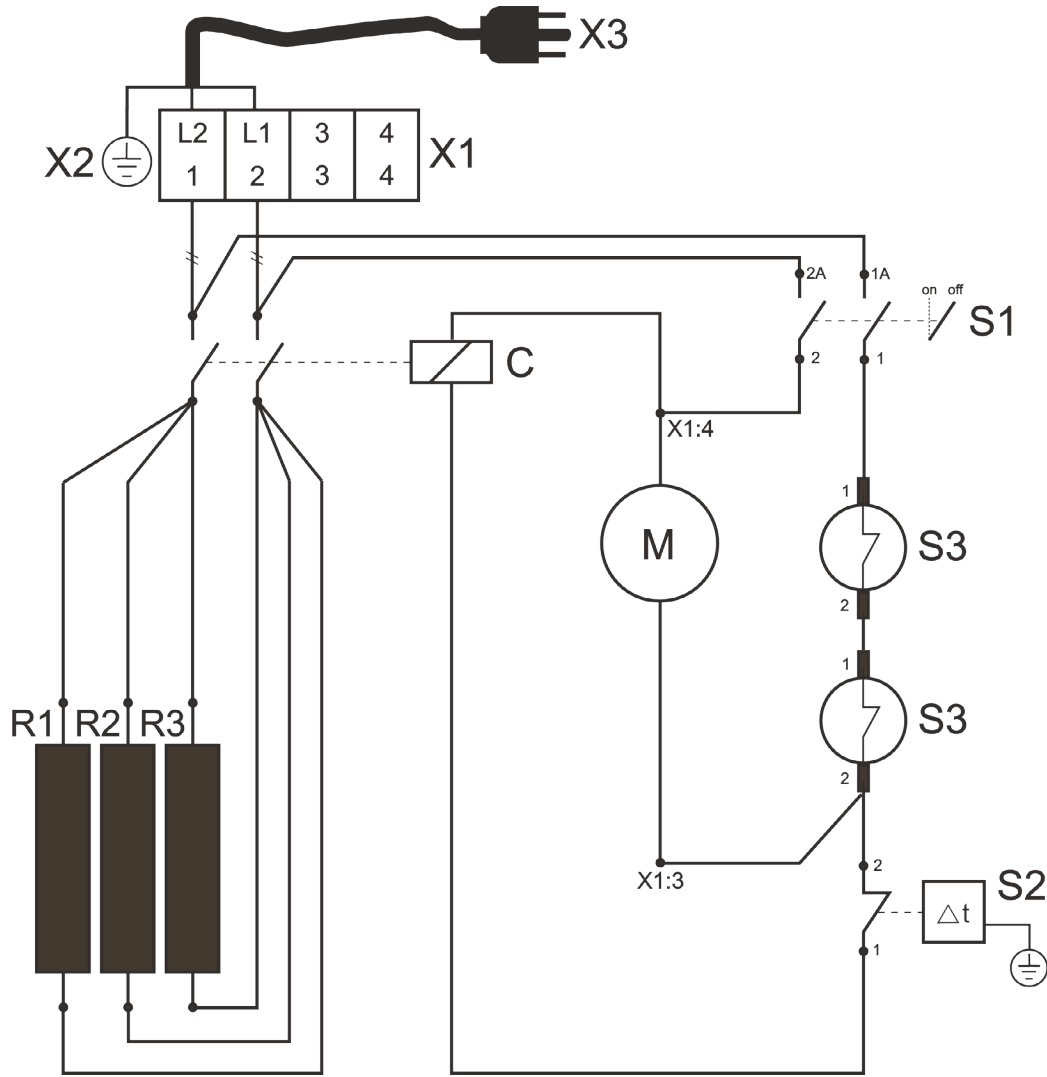
Note: Grounded plug NEMA 14-30

P900 PARTS BREAKDOWN



Key #	Description	Part#	Key #	Description	Part#
1	Bottom Plate	HWP 40081001	15	Fan Blade	HWP 16110
2	Rear Panel	HWP 40081002	16	Handle	HWP 80100
3	Front Panel	HWP 40081003	17	Heating Element	HWP 42800 (Qty. 3)
4	Inner Mantle	HWP 40081004	18	Plug for Handle (2PK)	HWP 80110
5	Outer Mantle	HWP 40081005	19	Plug	HWP 00275-00T
6	Bracket, Inner Mantle	HWP 40081006	20	Strain Reliever	HWP 36922
7	Bracket, Terminal Block	HWP 40081007	21	Toggle Switch	
8	Overheat Limit Switch Qty. 1	HWP 21200 (180024)		For S/N A0001-A120	HWP 400021
	Overheat Limit Switch Qty. 2 for			For S/N B0121-B0270	HWP 26901
	Serial #2132 & beyond	HWP 21200 (180024)		For S/N B0270-Greater	HWP 26902
9	Plastic Bracket for Thermostat	HWP 37910	22	Contactors	HWP 22670
11	Ambient Thermostat (Knob Not Included)	HWP 20220	23	Power Cord Assembly	ACC 50A10
12	Knob for Thermostat	HWP 20577	24	Guard Ring / Wire Bushing	HWP 36809
13	Fan Motor	HWP 180014 (14201)	25	Terminal Block	HWP 36704
14	Fan Hub, Plastic	HWP 17907	26	Jam Nut	HWP 36923

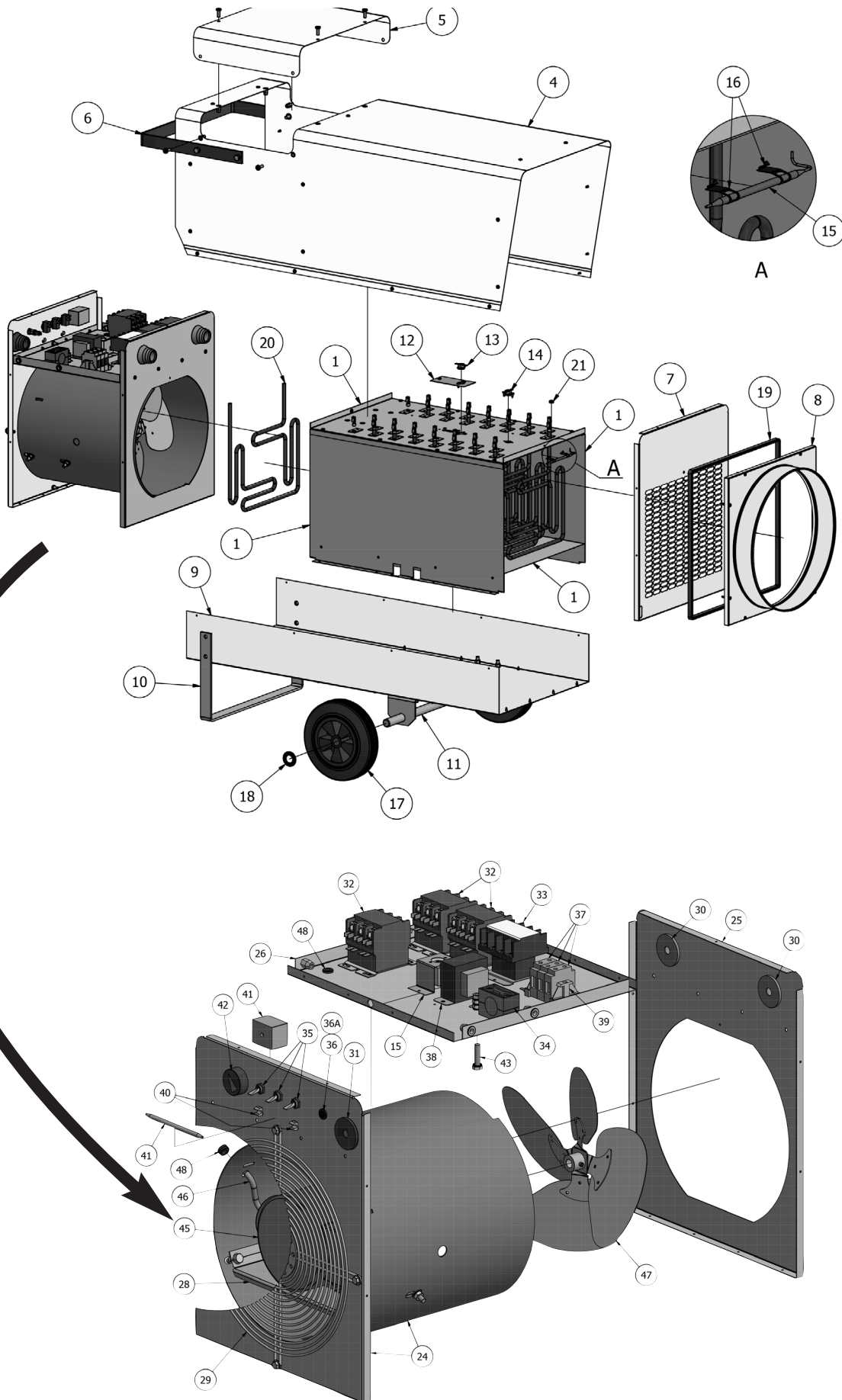
P900 WIRING DIAGRAM



Key #	Description	Part#
C	Contactor	HWP 22670
M	Fan Motor	HWP 14201 (180014)
R1-R3	Heating Element	HWP 42800
S1	Toggle Switch	See Key #21 on page 11
S2	Ambient Thermostat	HWP 20220
S3	Overheat Limit Switch Qty. 1	HWP 21200 (180024)
	Overheat Limit Switch Qty. 2 for Serial #2132 & beyond	HWP 21200 (180024)
X1	Terminal Block	HWP 36704
X2	Grounding Lug	Not Included
X3	Power Cord & Plug Assembly	ACC 50A10

Note: Grounded plug NEMA 14-30

P4000 - P6000 PARTS BREAKDOWN

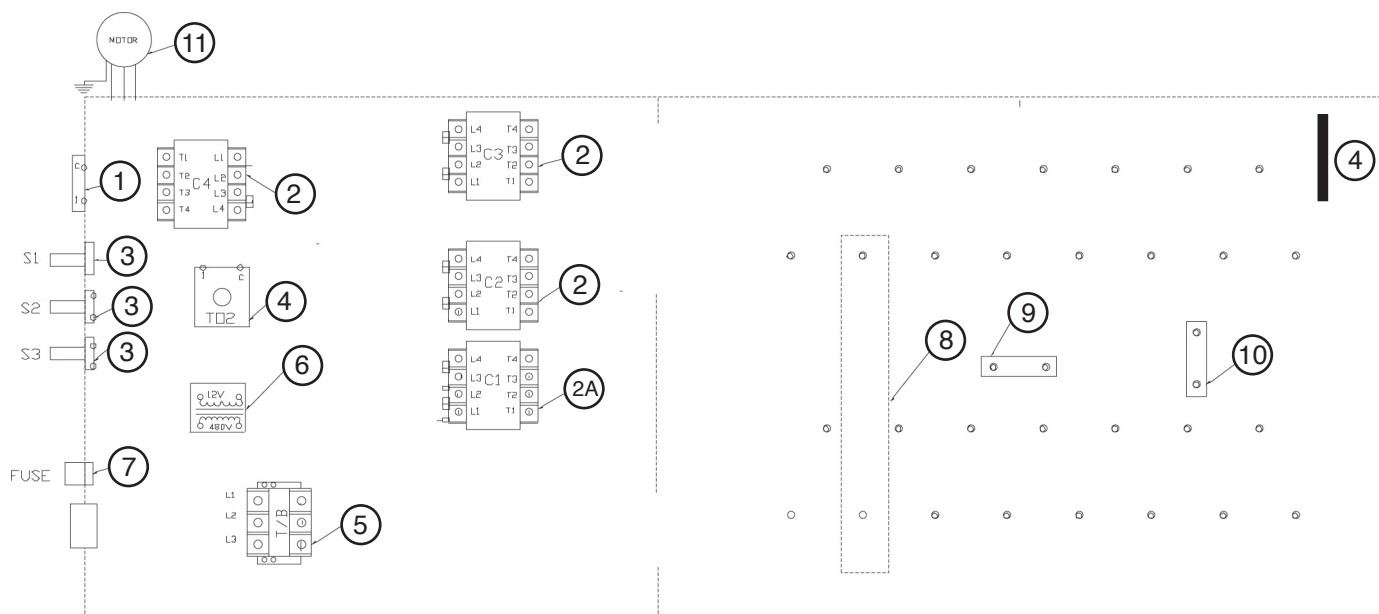


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P4000 - P6000 PARTS BREAKDOWN

Key #	Part#	Description	
1	HWP 400003	Heat Exchanger Chamber	
4	HWP 400002	Hood (Including Connection Hatch)	
5	HWP 400027	Connection Hatch Only	
6	HWP 400001	Handle	
7	HWP 400006	Front Panel	
8	HWP 400008	Duct Adapter	
9	HWP 400007	Bottom Frame	
10	HWP 400011	Support Leg	
11	HWP 400005	Wheel Shaft	
12	HWP 400012	Plate, Fan Thermostat	
13	HWP 180024	Overheat Limit Switch (Inner)	
14	HWP 180025	Cooldown Thermostat	
15	HWP 20550	Overheat Limit Switch, Air Outlet (PETE)	
16	HWP 82770	Metal Bracket, or Bulb	
17	HWP 400004	Wheel	
18	HWP 74600	Locking Washer	
19	HWP 40019	Gasket, Rubber	
20	HWP 400026	Heating Element (15 Per Heater, P4000)	
	HWP 600026	Heating Element (15 Per Heater, P6000)	
21	HWP 36809	Guard Ring, Rubber	
24	HWP 400015	Rear Panel	
25	HWP 400009	Partition Panel / Bracket	
26	HWP 400010	Contactormounting Plate	
28	HWP 40028	Mounting Plate, Fan Motor	
29	HWP 400019	Fan Guard Grill	
30	HWP 400020	Bushing, Medium	
31	HWP 400016	Bushing, large	
32	HWP 22669	Contactormounting Plate (3 Per Heater)*	
33	HWP 400022	Contactormounting Plate (1 Per Heater)	
34	HWP 180016	Strain Reliever (Qty 2)	
	HWP 36904	Strain Reliever (P6000 only)	
35	HWP 400021	Toggle Switch	
36	HWP 38110	Fuse Holder	<i>*For P4000 S/N prior to 2142 use 400022</i>
36A	HWP PEF1	Fuse	<i>For P6000 S/N prior to 0561 use 400022</i>
37	HWP 36615	Terminal Block (3 per heater)	
38	HWP 28400	Transformer	
39	HWP 36616	Locking Clamp + End Plate	
40	HWP 37910	Plastic Bracket	
41	HWP 180017	Ambient Thermostat	
41	HWP 20220	Ambient Thermostat (Knob Not Included)	
		For P4000, S/N 2022 & Beyond	
		For P6000, S/N 0531 & Beyond	
42	HWP 400018	Thermostat Knob (for 180017)	
42	HWP 20577	Thermostat Knob (for 20220)	
43	HWP 400043	Ground Bolt	
45	HWP 400014	Fan Motor	
47	HWP 400012	Fan Blade	
48	HWP 36802	Bushing, Small	
 Not Shown			
	ACC WD1425	Duct for P4000, P6000 (14"x25' long)	
	SFP S1500-105	Bracket for Terminal Block	
	HWP 32116	Heating coil wire (sold by the foot)	

P4000 - P6000 CONTROL BOX



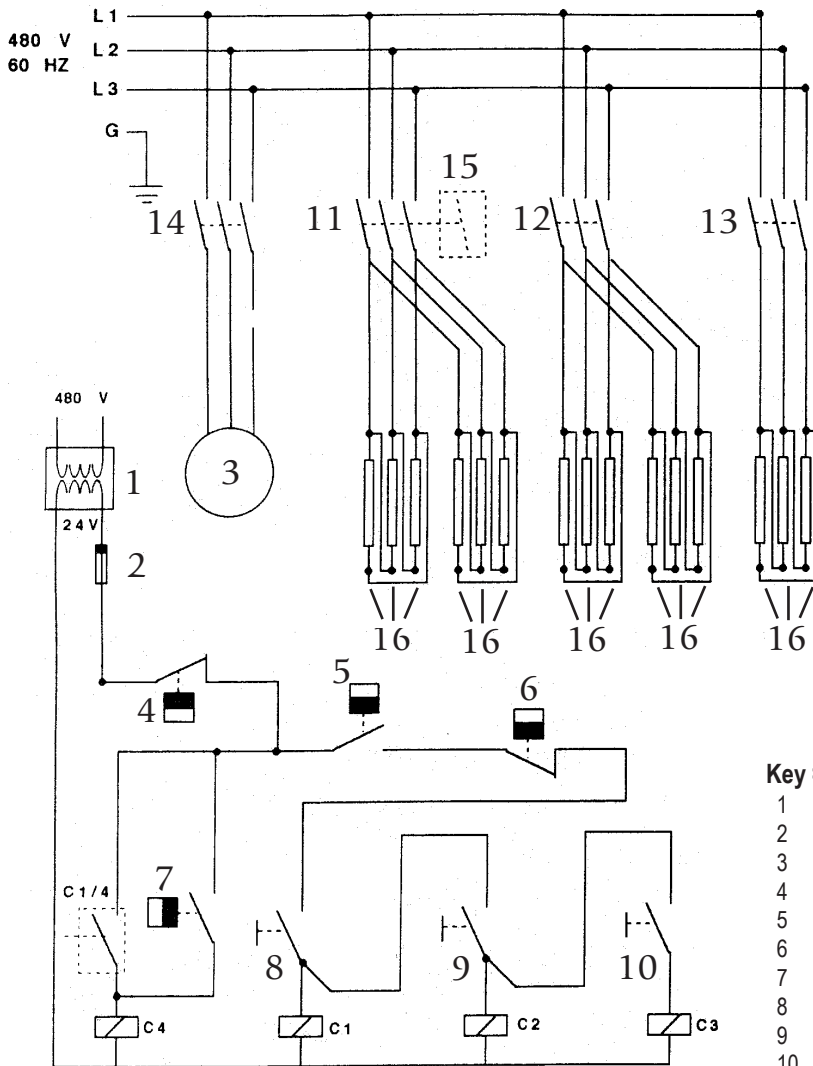
Item	Part No.	Description	Item	Part No.	Description
1	See Part #41, P.16	AMBIENT THERMOSTAT	7	HWP PEF1	FUSE
2	HWP 22669	CONTACTOR, 3-POLE*	8	HWP 400026	HEATING ELEMENT - P4000
2A	HWP 400023-24	CONTACTOR, 3-POLE, 2A + AUX	8	HWP 600026	HEATING ELEMENT - P6000
3	HWP 400021	SWITCH	9	HWP 180024	OVERHEAT LIMIT SWITCH (INNER)
4	HWP 20550	OUTLET AIR THERMOSTAT (PETE)	10	HWP 180025	UNIT COOLDOWN T-STAT
5	HWP 36615	TERMINAL BLOCK	11	HWP 400014	FAN MOTOR
6	HWP 28400	TRANSFORMER (PETR)			

*For P4000 S/N prior to 2142 use 400022

For P6000 S/N prior to 0561 use 400022

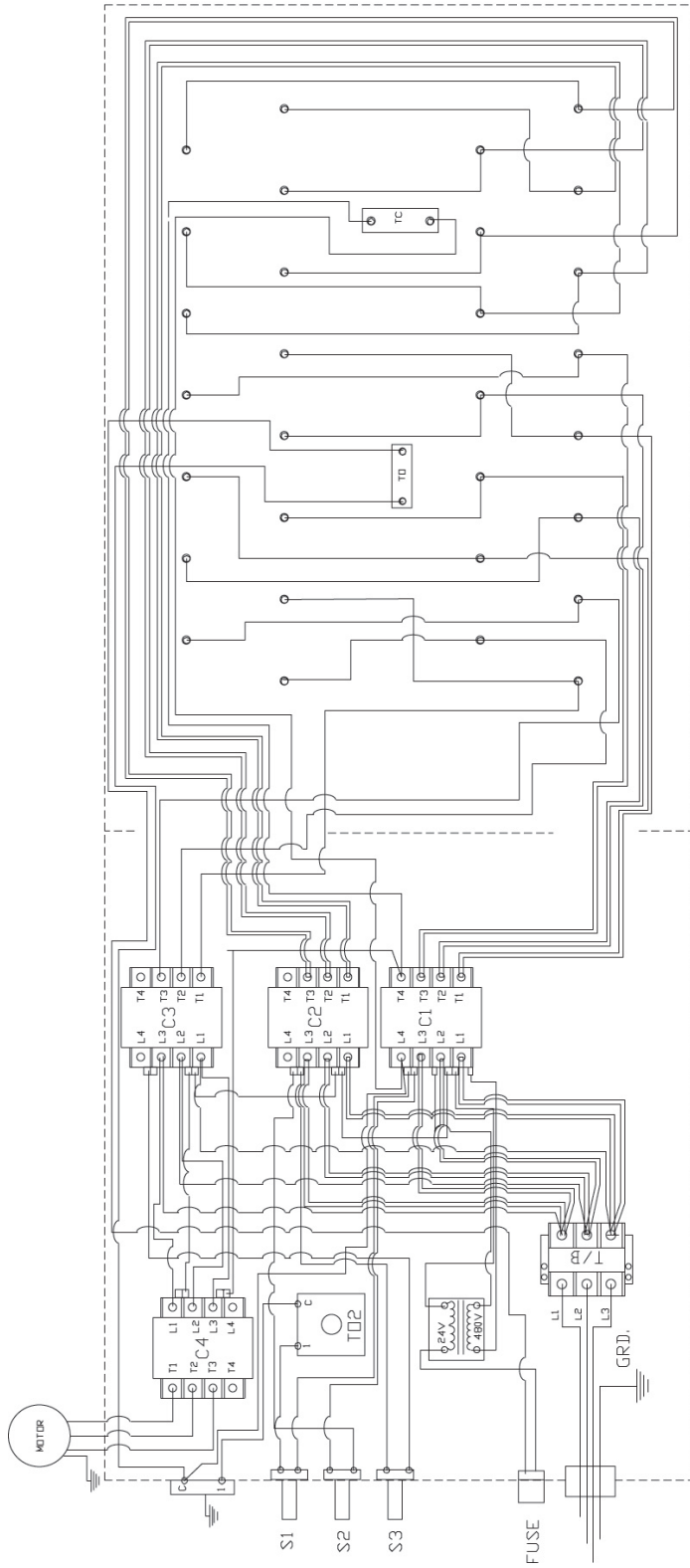
P4000 - P6000 WIRING

480 Volt 60 Hz 3 PH



Key #	Part#	Description
1	HWP 28400	Transformer
2	HWP PEF1	Fuse
3	HWP 400014	Fan Motor
4	HWP 180024	Overheat Limit Switch
5	HWP 180017	Ambient Thermostat
6	HWP 20550 (PETE)	Limit Switch - Outer
7	HWP 180025	Unit Cooldown Switch
8	HWP 400021	Control Switch (for output 16KW)
9	HWP 400021	Control Switch (for output + 16KW)
10	HWP 400021	Control Switch (for output + 8KW)
11	HWP 400022	Contactors & Coil (for output 16KW)
12	HWP 22669	Contactors & Coil (for output + 16KW)
13	HWP 22669	Contactors & Coil (for output + 8KW)
14	HWP 22669	Fan Contractor
15	HWP 400022	Pole 4 of Contactor C1
16	HWP 400026	Heating Elements, 2.7KW each for P4000
16	HWP 600026	Heating Elements, 4.0KW each for P6000

P4000 - P6000 WIRING



HEAT WAGON	MODEL
DATE OF 1998 DRAWING	P40000
FROM	TD
1994	CURR.

ELECTRIC HEATER TROUBLESHOOTING

Before beginning the Troubleshooting section, please review the Set-up and Installation section of this manual. Most technical issues can be resolved with proper set-up and preventative maintenance.

Symptom	Cause	Check	Remedy
Turn thermostat up and motor does not come on:	No power on any phase.	Check for 240V between L1 and L2 (for single phase models). Check for power between L1 and L2, L2 and L3, and between L1 and L3 (for 3 phase models). Overheat Limit (TO)	Refer to Setup and Operation section.
	Overheat Limit (TO)	Check for continuity. The switch should be closed.	Replace
	Main Switch assembly	Check for continuity.	Replace
	Motor	Check for proper voltage to motor.	Replace
	Motor Relay (P4000 and P6000 Only)	Check for 24 volts to contactor.	Make sure contactor pulls in. If not, replace.
	Control Transformer (P4000 and P6000 only)	Check for 24 volts out from Control Transformer.	Replace
Motor Starts but air comes out the inlet:	Reversed power (hot) wires	Check power at terminal block	Switch first two power wires at terminal block
Motor starts but no heat:	Ambient Thermostat	Turn thermostat above ambient temperature.	Replace
	Overheat limit(s)	Check for continuity. It is a closed switch	Replace
	Contactors	Make sure they are clean, tight, and that they pull in when voltage is applied	Replace
	Circuit Breakers (P1800-1 only)	Check that none are tripped and power flows thru.	Replace
	Heating Elements	Visual check for burns. Check resistance of each individual element	P600 & P900 20 K Ohms, P1800 Series 26 K Ohms, P4000 85 K Ohms, P6000 54 K Ohms
Heater operates, fan doesn't cool the unit after thermostat is satisfied.	Fan Cooldown Thermostat	Check for resistance.	Replace
		Check for proper wiring.	Rewire
High limit tripping	Low Volume of Air	Duct restrictions.	Straighten duct.
		Dust buildup on inlet grill	Clean fan area.



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