

Large Plenum Rated Heater CKL Series



Model Code:

CKL 48 140 -3 -8 -6.0 -1.2 -VFD5 -SSR -PT -D200
 A B C -D -E -F -G -H -I -J -K

- A: Series
- B: 20 - 208V 24 - 240V 48 - 480V
- C: Kilowatts
- D: -1 = 1-Phase or -3 = 3-phase
- E: Step Controller -1 to 8 Step Controller
(See Base Model Chart)
- F: CFM: Example: 6000 CFM = 6.0
- G: External Static Pressure - Measured by Inches Water Gauge (WG)
(Provided by Customer)
- H: Motor RPM Control Type + Horsepower (2/3/5/7.5/10)
 VFD - Variable Frequency Drive - (Variable Motor Speed)
 -VFD2=2HP / -VFD3=3HP / -VFD5=5HP / -VFD7.5=7.5HP / -VFD10=10HP
- I: Solid State Relays (SSR) for modulating 1 Stage (Vernier Stage)
- J: Proportional Thermostat and remote sensor to control discharge temperature.
- K: Disconnect Switch

- Spiral finned element
- N.E.M.A. 12 construction
- Fixed louver hood
- Elemental step control
- High mass steel fin heat exchanger
- Filter racks
- 12GA steel frame
- "See Table"
- Dual inlet blower
- 208/240/480 volt
- /16GA steel panels
- Can be ducted
- Totally enclosed motor
- Variable frequency drive
- 24V control
- 3-year limited warranty



The CKL Series Plenum Rated Makeup Air Unit

This large kW special application unit heater is approved for use in concealed areas of buildings. It is specifically designed to provide makeup air for highrise and office buildings, factories, auto body shops, food processing plants, plating shops and machine shops. This heater may be installed in inaccessible areas such as between a concrete ceiling and a drop tile ceiling, in a open plenum or ducted system. The heater is designed to withstand a dirty, dusty, moist or mildly corrosive environment. The heater is not intended for use where flammable vapors, gases, liquids or other combustibles are, or may be, present.

Factory Installed Options

- Disconnect Switch:** Available with a 3-Pole non-fused disconnect with door interlocking feature and a padlock provision.
- Variable Frequency Drive:** By adding a VFD to an AC motor, speed can be varied with precision. VFDs regulate the frequency that is fed to the motor, to run at the speed or with the torque according to the demand needed.

Solid State Relay (SSR): A solid state relay (SSR) enables high-precision, high-frequency temperature control by modulating the heat output as needed to meet the current demand.

Proportional Thermostat: Controls discharge temperature and element step controller for improved energy management.

Base Model Chart

	MODEL	BTUH(000)	VOLTS	PHASE	KILO WATTS	RESISTIVE AMPS	No OF STAGES	KILO WATTS PER STAGE	WEIGHT lbs
208V	CKL2050-3-4	170,650	208	3	50.0	139	4	12.5	650
	CKL2060-3-4	204,780	208	3	60.0	167	4	15.0	650
	CKL2070-3-6	238,909	208	3	70.0	195	6	11.7	650
	CKL2080-3-6	273,040	208	3	80.0	222	6	13.3	700
	CKL2090-3-6	307,170	208	3	90.0	250	6	15.0	700
	CKL20100-3-8	341,300	208	3	100.0	278	8	12.5	850
240V	CKL2450-3-4	170,650	240	3	50.0	120	4	12.5	650
	CKL2460-3-4	204,780	240	3	60.0	145	4	15.0	650
	CKL2470-3-6	238,909	240	3	70.0	169	6	11.7	650
	CKL2480-3-6	273,040	240	3	80.0	193	6	13.3	700
	CKL2490-3-6	307,170	240	3	90.0	217	6	15.0	700
	CKL24100-3-8	341,300	240	3	100.0	241	8	12.5	850
480V	CKL24110-3-8	375,430	240	3	110.0	265	8	13.8	850
	CKL24120-3-8	409,560	240	3	120.0	289	8	15.0	850
	CKL4850-3-4	170,650	480	3	50.0	60	4	12.5	650
	CKL4860-3-4	204,780	480	3	60.0	72	4	15.0	650
	CKL4870-3-6	238,909	480	3	70.0	84	6	11.7	650
	CKL4880-3-6	273,040	480	3	80.0	96	6	13.3	700
	CKL4890-3-6	307,170	480	3	90.0	108	6	15.0	700

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Base Model Chart

480V

MODEL	BTUH(000)	VOLTS	PHASE	KILO WATTS	RESISTIVE AMPS	No OF STAGES	KILO WATTS PER STAGE	WEIGHT lbs
CKL48100-3-8	341,300	480	3	100.0	120	8	12.5	850
CKL48110-3-8	375,430	480	3	110.0	132	8	13.8	850
CKL48120-3-8	409,560	480	3	120.0	145	8	15.0	850
CKL48130-3-8	443,690	480	3	130.0	157	8	16.3	850
CKL48140-3-8	477,820	480	3	140.0	169	8	17.5	900
CKL48150-3-8	511,950	480	3	150.0	181	8	18.8	900
CKL48160-3-8	546,080	480	3	160.0	193	8	20.0	950
CKL48170-3-8	580,210	480	3	170.0	205	8	21.3	850
CKL48180-3-8	614,340	480	3	180.0	217	8	22.5	1000
CKL48190-3-8	648,470	480	3	190.0	229	8	23.8	1000
CKL48200-3-8	682,600	480	3	200.0	241	8	25.0	1000
CKL48210-3-8	716,730	480	3	210.0	253	8	26.3	1000
CKL48220-3-8	750,860	480	3	220.0	265	8	27.5	1000
CKL48230-3-8	784,990	480	3	230.0	277	8	28.8	1000
CKL48240-3-8	819,120	480	3	240.0	289	8	30.0	1000

*Dual rated heaters will draw 13% less amps and 25% less wattage when operated at 208V.

**When placing an order, make sure to add ND (No Diffuser) to the model# if connecting to ductwork. * Does not include motor load.

kW rating load tolerance is plus 5% and minus 10%. Consult factory for special wattages and voltages

BLOWER SPECIFICATIONS

- 1) Quiet forward curve, double inlet, dynamically balanced wheels.
- 2) Galvanized housing and wheels for increased corrosion resistance.
- 3) Keyed wheels, keyed shaft extensions and sealed ball bearings for higher horsepower motors.
- 4) Galvanized mounting supports, vibro-pads and heavy duty mounting hardware.
- 5) Belt drive allows field adjustment of blower RPM to adjust for changes in system SP.

Required Factory Installed Motor Options

MODEL	DESCRIPTION
-VFD2	Variable Frequency Drive 2HP - Variable Motor Speed
-VFD3	Variable Frequency Drive 3HP - Variable Motor Speed
-VFD5	Variable Frequency Drive 5HP - Variable Motor Speed
-VFD7.5	Variable Frequency Drive 7.5HP - Variable Motor Speed
-VFD10	Variable Frequency Drive 10HP - Variable Motor Speed

Optional Factory Installed Options

MODEL	DESCRIPTION
-SSR	Solid State Relays (SSR) for modulating 1 Stage (Vernier Stage)
-PT	Proportional Thermostat and remote sensor to control discharge temperature.
-D100	CKL 100 Amp Disconnect
-D200	CKL 200 Amp Disconnect
-D400	CKL 400 Amp Disconnect

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How to Size a CKL Heater

Step1: Customer Supplied Specs Example:

1. Voltage Required	480V
2. Phase Required	3 Phase
3. ΔT (Temperature Rise)	70
4. Air Volume (CFM)	6000 CFM
5. Static Pressure	1.2" WG

Step2: Calculate KW Requirement

- Calculate BTUH Requirement
BTUH Formula = (CFM x 1.08) x Temperature rise
(1.08 factor assumes air density at sea level)
Example: (6000 x 1.08) x 70 = 453,600 BTUH Requirement
- Convert BTUH to KW Requirement
KW Conversion Formula = BTUH/3413
Example: 453,600/3413 = 133KW.
Then round up to nearest kW in BASE MODELS CHART
= **140KW Requirement**

Step3: Select Base Model

- Refer to **BASE MODELS CHART**
- Select model matching Voltage, Phase and KW Requirements
Example: 480V, 3-Phase, 140kW

Step4: Select Motor Horsepower

- Refer to **AIR DELIVERY / MOTOR SELECTION CHART**
- Find CFM (Column B) matching customer requirement
Example: 6000 CFM
- Refer to Static Pressure (Column E).
Based on system static requirement
Example: 1.2" WG, find the closest " WG
that is equal or above the system requirement.
Example: 2.9" WG
- Refer to Motor HP (Column D) and select related Motor HP
Example: 5HP

Step5: Select Additional Options

- SSR - Solid State Relays (SSR) for modulating 1 Stage (Vernier Stage)
- PT - Proportional Thermostat and remote sensor to control discharge temperature.
- D - (XX) Disconnect Switch
Example: No Additional Options Required

Step6: Compile Final Complete Model Number Based on Model Code Legend

Example: Final Model: CKL48140-3-8-6.0-1.2-VFD5

How to Determine ΔT (Temperature Rise)

Step1: Winter Design Temp For Location

Step2: Desired Heater Discharge Temp

Step3: ΔT (Temperature Rise) = Heater Discharge Temp - Winter Design Temp

Example: 75°F 5°F = 70°F ΔT (Temperature Rise)

Air Delivery / Motor Selection Chart

	A	B	C	D	E
				Motor HP	Max External Static ("WG")
ITEM NUMBER	CFM	FPM			
-2.5-x.x-VFD2	2,500	870	2	2.4	
-2.5-x.x-VFD3	2,500	870	3	3.3	
-3.0-x.x-VFD2	3,000	1,045	2	2.2	
-3.0-x.x-VFD3	3,000	1,045	3	3.1	
-3.5-x.x-VFD3	3,500	1,220	3	2.8	
-3.5-x.x-VFD5	3,500	1,220	5	4.1	
-4.0-x.x-VFD3	4,000	1,394	3	2.6	
-4.0-x.x-VFD5	4,000	1,394	5	3.9	
-4.5-x.x-VFD3	4,500	1,586	3	2.3	
-4.5-x.x-VFD5	4,500	1,586	5	3.7	
-5.0-x.x-VFD3	5,000	1,742	3	2.0	
-5.0-x.x-VFD5	5,000	1,742	5	3.5	
-5.5-x.x-VFD5	5,500	1,916	5	3.1	
-5.5-x.x-VFD7.5	5,500	1,916	7.5	4.4	
-6.0-x.x-VFD5	6,000	2,265	5	2.9	
-6.0-x.x-VFD7.5	6,000	2,265	7.5	4.2	
-6.5-x.x-VFD5	6,500	2,091	5	2.6	
-6.5-x.x-VFD7.5	6,500	2,091	7.5	4.0	
-7.0-x.x-VFD5	7,000	2,439	5	2.3	
-7.0-x.x-VFD7.5	7,000	2,439	7.5	3.8	
-7.5-x.x-VFD5	7,500	2,613	5	2.0	
-7.5-x.x-VFD7.5	7,500	2,613	7.5	3.4	
-8.0-x.x-VFD7.5	8,000	2,787	7.5	3.2	
-8.0-x.x-VFD10	8,000	2,787	10	4.0	
-8.5-x.x-VFD7.5	8,500	2,962	7.5	2.7	
-8.5-x.x-VFD10	8,500	2,962	10	3.7	
-9.0-x.x-VFD7.5	9,000	3,136	7.5	2.4	
-9.0-x.x-VFD10	9,000	3,136	10	3.5	
-9.5-x.x-VFD7.5	9,500	3,310	7.5	2.1	
-9.5-x.x-VFD10	9,500	3,310	10	3.3	
-10.0-x.x-VFD7.5	10,000	3,484	7.5	1.8	
-10.0-x.x-VFD10	10,000	3,484	10	2.9	
-10.0-x.x-VFD10	10,500	3,659	10	2.5	
-11.0-x.x-VFD10	15,000	3,833	10	2.2	
-11.0-x.x-VFD10	11,500	4,007	10	1.8	
-12.0-x.x-VFD10	12,000	4,148	10	1.5	

Motor Amps Chart

Motor HP	208V FLA	240V FLA	480V FLA
2HP	7.8	6.8	3.4
3HP	11.0	9.6	4.8
5HP	17.5	15.2	7.6
7.5HP	25.3	22.0	11.0
10HP	N/A	N/A	14.0

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Step Controller

Standard Feature

The King CKL make up air unit is equipped with a 1 to 8 step controller and an optional vernier stage. This provides on/off control for each heating stage plus one fully modulating step when ordered with Solid State Relays (SSR). The SSR option must be ordered to enable the vernier control option. For example, a 240KW unit will have 7 on/off steps at 30KW and 1 fully modulating step. The last 30KW step will modulate from 0 to 30KW to precisely control the discharge temperature. This is the most cost-effective way to achieve high quality temperature control.



Variable Frequency Drive

Standard Feature

By adding a VFD to an AC motor, speed can be varied with precision. Variable frequency drives sit between the electrical supply and the motor. Power from the electrical supply goes into a drive and the drive then regulates the power that is fed to the motor. This step allows the drive to adjust the frequency and the voltage that fed into to the motor based on your current process demands. This means you run your AC motors at the speed or with the torque according to the demand needed. This is why you can save large amounts of money using the AC drives.



Solid State Relay (SSR)

Optional Feature

A solid state relay (SSR) enables high-precision, high-frequency temperature control by modulating the heat output as needed to meet the current demand. It is a transistor activated by a small DC control signal produced by the temperature controller. This type of relays can switch high amperage in less than a second. They're used for heaters which require very frequent power switching and is mounted on a heat sink to dissipate the heat they generate.



Proportional Thermostat

Optional Feature

A proportional thermostat is designed to allow the appliance to heat more regularly and at low power, in order to minimize variations in the temperature of the room. The temperature of the room varies no more than ± 0.9 °F from the requested temperature. A proportional thermostat, therefore, makes it possible to obtain a more stable and precise temperature for better comfort.

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Internal View

Front View



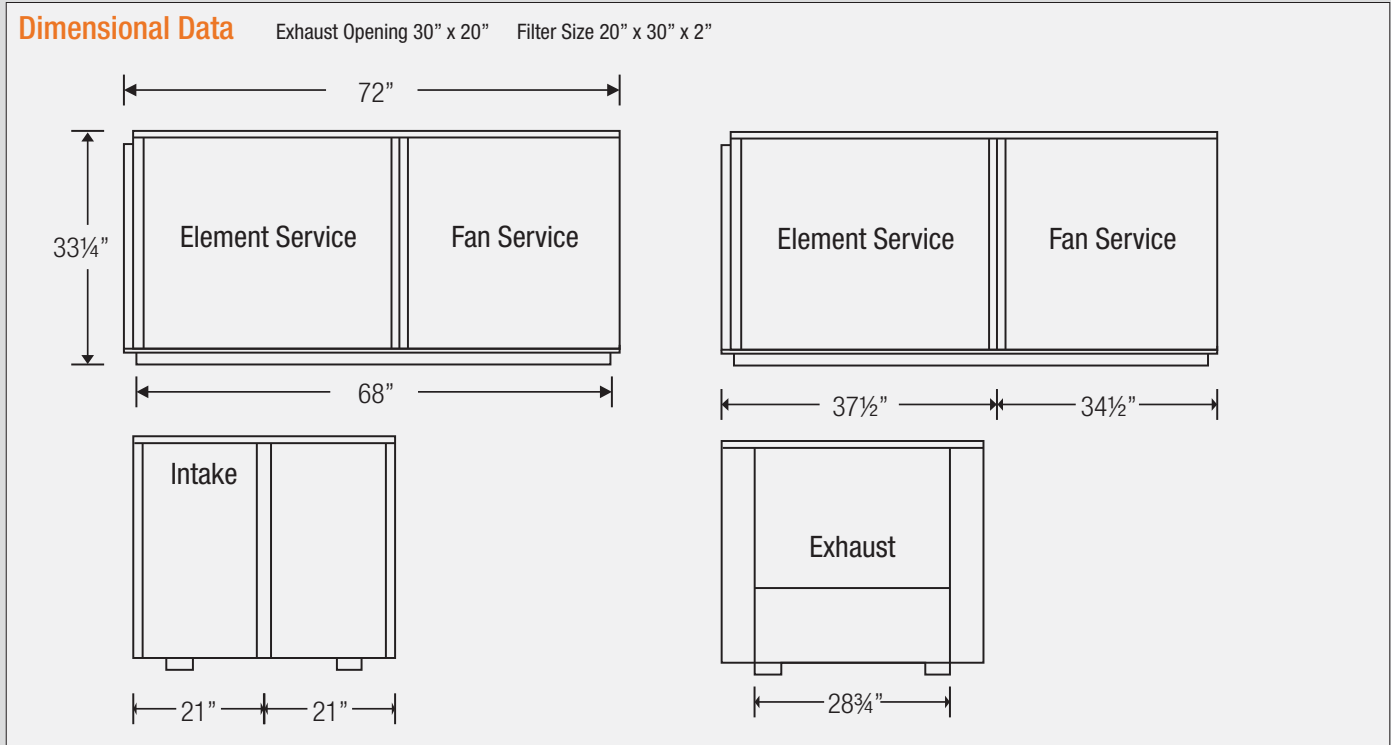
Back View



Motor & Blower



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Engineering Specifications

Contractor shall supply and install CKL Series plenum heaters manufactured by King Electrical Mfg. Company. Heaters shall be of the wattage and voltage as indicated on the plans.

Construction: The heater frame is fabricated from 12 gauge high tensile electro-galvanized Steel forming a durable unibody cabinet. Enclosure panels are 16 gauge electro-galvanized steel. Heater is finished with a rust inhibiting epoxy coating.

Air Outlet Louver: Fixed louvers

Intake and Discharge Screen: Heavy gauge Steel screen protects against foreign objects entering the heater. A filter is provided to prevent dirt and dust build-up in the heater.

Air Filter: Convenient access for replacement of standard filter. Filter not included.

Step Controller: The King CKL make up air unit is equipped with a 1 to 8 step controller and an optional vernier stage. This provides on/off control for each heating stage plus one fully modulating step when ordered with the optional Solid State Relays (SSR).

N.E.M.A. 12 Wiring Compartment: The wiring compartment is sealed with a 1/4" high density polyurethane gasket. This provides excellent protection against moisture, dust and dirt from invading the electrical components and wiring. All optional control accessories are N.E.M.A. 12 rated.

Spiral Fin Elements: The metal sheath element is brazed with spiral fins then molded in to a coil configuration. This combination produces the best heat transfer while eliminating the potential for hot spots by positioning the element in the maximum airflow stream.

Easy Wiring: A large wiring compartment with easy access allows for quick installation.

Mounting: The CKL heater comes with frame mounts.

Blower & Motor: Totally enclosed outdoor ball bearing fan motor. Permanently lubricated, class B insulation, auto-protected, permanent split capacitor and 60° C ambient. Large capacity dual inlet blower handles high static pressure and moves large air volume. Motor leads are enclosed in a sealtight raceway to prolong equipment life and reduce maintenance.

Air Intake Temperature Control: A built-in thermostat located at the intake blower is factory set at 100°F which prevents the heater

from operating when the ambient temperature exceeds this limit. This will prevent the heater from wasting energy and is an extra measure of safety.

Auto-Reset Thermal Cutout: Power is disconnected from the heater if an overheated condition occurs. The element is re-energized automatically when the normal operating temperature returns.

Internal Controls: Magnetic contactors are standard on all units. A transformer is provided for 24 Volt control. This enables the customer to use a standard low voltage thermostat. Sub circuit fusing is provided when the heater ampacity exceeds 48 Amps to comply with UL standards. A fan delay is provided standard on all models to dissipate residual heat from the heating elements.

Variable Frequency Drive (VFD): Regulates the frequency that is fed to the motor, to run at the speed according to the demand needed.

Solid State Relay (SSR) Option: A solid state relay (SSR) enables high-precision, high-frequency temperature control by modulating the heat output as needed to meet the current demand.

Proportional Thermostat Option:

A proportional thermostat is designed to allow the appliance to heat more regularly and at low power, in order to minimize variations in the temperature of the room. The temperature of the room varies no more than ± 0.9 °F from the requested temperature.

Disconnect Switch Option: Available with a 3-Pole non-fused disconnect with door interlocking feature and a padlock provision.

Approvals: ETL Certified to comply with standard for Heating and Cooling Equipment ANSI/UL 1995 fourth edition.

Meets stringent City of Chicago codes for plenum use.