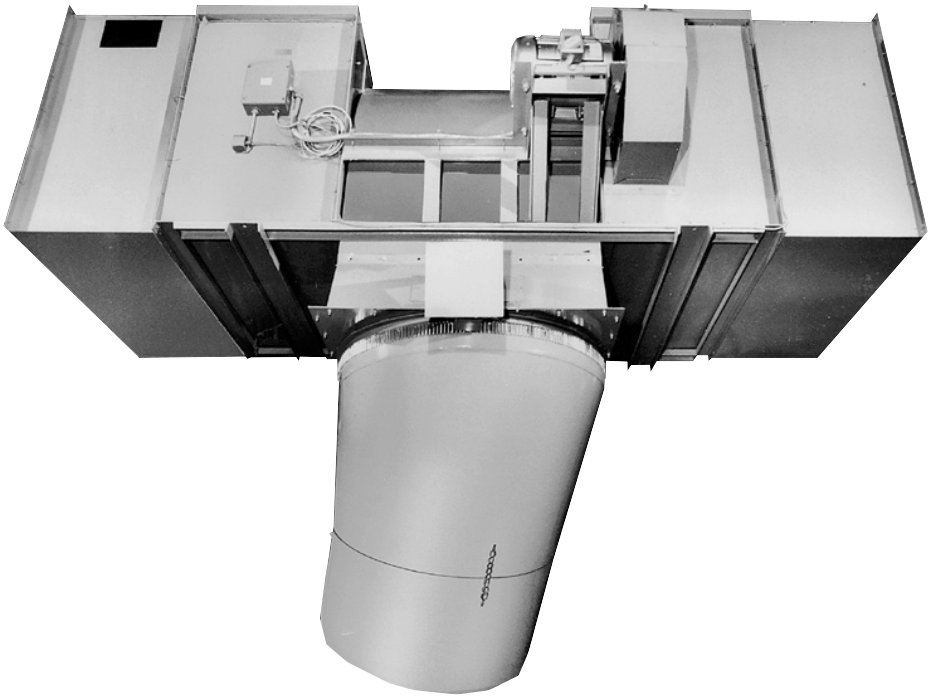
HMS and HMG High Mounting Series Unit Heaters

TECHNICAL GUIDE



STEAM, HOT WATER AND GAS HEATERS TO PROVIDE A COMFORTABLE ENVIRONMENT IN HIGH BAY AREAS

LJINGⓇ

Since 1875, the L.J. Wing Company has been a leader in providing innovative solutions for difficult HVAC problems. Wing HMS and HMG Series heaters provide reliable air heating with steam, hot water or gas for tall open spaces such as aircraft hangars. This technical guide will help you size, select and specify the proper HMS or HMG model to satisfy your project's heating requirements. If you have questions, please contact your local L.J. Wing representative; he will be glad to assist you.

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www.ljwing.com

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PRODUCT DESCRIPTION

Product Offering

L.J. Wing High Mounting Series unit heaters are specifically designed for heating aircraft hangars and other open spaces with very tall ceilings. Two different models are available:
Type HMS - Designed for use with steam or hot water heat sources;
Type HMG - Indirect natural gas-fired heating.

Four models of both HMS and HMG units are offered as shown below.

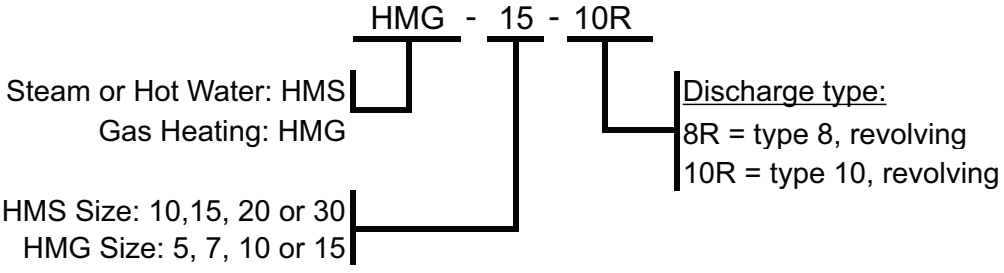
Two styles of L.J. Wing's unique revolving discharge are available with either HMS or HMG units to deliver the air down to the comfort level, five to six feet above the floor. A high-torque motor coupled with an idler gear drive rotates the discharge at approximately one rpm. This creates a gentle sweeping motion of air that results in better overall coverage with minimal temperature gradients from floor to ceiling.

Airflow and Motor Data

HMS SIZE	AIRFLOW (SCFM)	MOTOR HP	WEIGHT (LBS)
10	24,000	10	3,150
15	26,700	15	3,300
20	29,300	15	3,500
30	30,800	20	3,650
HMG			
5	23,700	2 @ 5	5,750
7	26,000	2 @ 5	5,950
10	28,000	2 @ 7 1/2	6,200
15	29,800	2 @ 7 1/2	6,450

ETL Coil Operating Parameters:
Maximum elevation is 9,000 ft. (2,743.2m).
Maximum operating temperature is 250°F (121.1°C).
Minimum operating temperature is 0°F (-17.8°C).
Maximum operating pressure is 100 PSIG (689 kPa).
Minimum operating pressure is 2 PSIG (13.8 kPa).

Model Number Description



SELECTION

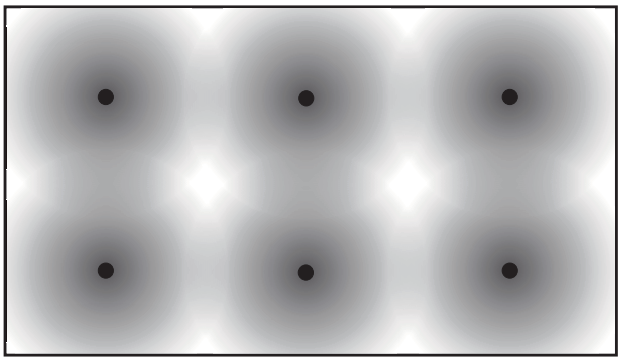
General Guidelines

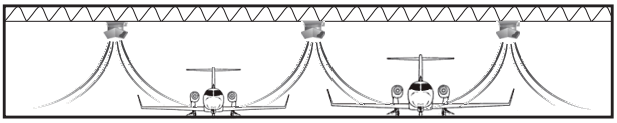
The first step in selecting the proper heater is a calculation of the building heat loss.

Next, select the quantity of HMS or HMG units to offset the calculated building heat loss. With the large heating capacities available with the HMS and HMG units, relatively few heaters are required even for large areas. This reduces the cost of installation, piping, wiring and controls with ongoing savings in operational and maintenance costs.

Finally, select the type of discharge with the lowest maximum mounting height that yields the required coverage.

Please consult your Wing representative for equipment selection at conditions outside the ranges described herein.





Unit Selection Procedure and Performance – HMS Steam

1. Select HMS units to meet the space heating requirements from the HMS – Steam Performance table at the given space temperature.
2. Select the discharge capable of providing the necessary coverage, CV, at the required mounting height, MH.
3. Calculate the Air Temperature Rise, ATR, across the HMG unit:
   ATR = (Q x 1,000)/(1.085 x CFM)
   where CFM is from Airflow, Motor and Sound table on page 4.
4. Calculate the Leaving Air Temperature, LAT:
   LAT = EAT + ATR
5. Calculate the condensate load, CL:
   CL = Q/LH
   where LH = 945 Btu/lbm

Example: Select HMS unit(s) to heat a space 420 feet long by 290 feet wide at a mounting height of 75 feet. Building heat loss is 9,300 MBtuh at a space temperature of 60º F.

Solution:

1. It will take six of any size HMS unit to meet the heating requirements with each HMS unit supplying at least Q = 9,300/6 = 1,550 Mbtuh. It can be seen that the smallest size HMS unit that can provide sufficient heat is size HMS-20: 6 x 1,574 = 9,444 Mbtuh.
2. The required coverage is: 420/3 = 140 feet x 290/2 = 145 feet at a mounting height of 75 feet. Select a 10R discharge with MH = 78 feet with CV = 167 feet x 167 feet.
3. ATR = (1,574 x 1,000)/(1.085 x 29,300)
   ATR = 49.5º F.
4. LAT = 60 + 49.5 = 109.5º F.
5. CL = (1,574 x 1,000)/ 945 = 1, 665.6 lbm/hr.

HMS - Steam Performance

	60° F space temperature					70° F space temperature				
		8R Discharge		10R Discharge			8R Discharge		10R Discharge	
SIZE	Q (Mbtuh)	MH (feet)	CV (feet)	MH (feet)	CV (feet)	Q (Mbtuh)	MH (feet)	CV (feet)	MH (feet)	CV (feet)
10	1,391	54	125x125	62	144x144	1,307	57	132x132	66	152x152
15	1,486	61	136x136	71	156x156	1,397	64	143x143	75	164x164
20	1,574	68	147x147	78	167x167	1,480	72	154x154	83	176x176
30	1,624	72	153x153	82	174x174	1,527	76	161x161	87	183x183

Notes:
1. Performance shown is based on 5 psig steam pressure at the coil.
2. For higher steam pressures, the surface area will be reduced to produce the same performance.
3. Q = Heating Capacity; MH = Maximum Mounting Height; CV = Heating Coverage

Unit Selection Procedure and Performance – HMS Hot Water

1. Select HMS units to meet the space heating requirements from the HMS – Hot Water Performance table at the given space temperature.
2. Select the discharge capable of providing the necessary coverage, CV, at the required mounting height, MH.
3. Calculate the Air Temperature Rise, ATR, across the HMS unit:
   ATR = (Q x 1,000)/(1.085 x CFM)
4. Calculate the Leaving Air Temperature, LAT:
   LAT = EAT + ATR
5. Look up the required water flow rate, GPM, and Water Pressure drop, WPD, from the HMS – Hot Water Performance table

Example: Select HMS unit(s) to heat a space 282 feet long by 282 feet wide at a mounting height of 65 feet using 200° F hot water with a 20° F water temperature drop. Building heat loss is 5,150 MBtuh at a space temperature of 70° F.

Solution:

1. It will take four of any size HMS unit to meet the heating requirements with each HMS unit supplying at least Q = 5,160/4 = 1,290 Mbtuh. It can be seen that the smallest size HMS unit that can provide sufficient heat is size HMS-15: 4 x 1,338 = 5,352 Mbtuh.
2. The required coverage is: 282/2 = 141 feet by 282/2 = 141 feet. Select an 8R discharge with MH = 67 feet and CV = 148 feet x 148 feet.
3. ATR = (1,338 x 1,000)/(1.085 x 26,700)
   ATR = 46.2° F.
4. LAT = 60 + 46.2 = 106.7° F.
5. GPM = 141.9; WPD = 7.0 feet H_2O

HMS - Hot Water Performance

	60° F space temperature					70° F space temperature				
		8R Discharge		10R Discharge			8R Discharge		10R Discharge	
SIZE	Q (Mbtuh)	MH (feet)	CV (feet)	MH (feet)	CV (feet)	Q (Mbtuh)	MH (feet)	CV (feet)	MH (feet)	CV (feet)
10	1,364	55	127x127	63	146x146	1,255	59	137x137	68	158x158
15	1,449	62	139x139	72	159x159	1,338	67	148x148	78	171x171
20	1,534	69	150x150	80	171x171	1,410	74	160x160	86	184x184
30	1,581	74	156x156	84	178x178	1,453	78	167x167	90	191x191

	60° F space temp.		70° F space temp.	
SIZE	GPM (gpm)	WPD (feet H_2O)	GPM (gpm)	WPD (feet H_2O)
10	145.5	7.3	133.9	6.2
15	149.0	7.6	141.9	7.0
20	158.0	8.5	145.0	7.3
30	163.0	8.2	150.0	7.7

Notes:
1. Performance shown is based on 200° F entering water temperature and a 20° F water temperature drop through the coil. Consult factory for performance at other conditions.
2. Q = Heating Capacity; MH = Maximum Mounting Height; CV = Heating Coverage.

SELECTION

Unit Selection Procedure and Performance – HMG

1. Select HMG units to meet the space heating requirements from HMG – Performance table at the given space temperature.
2. Select the discharge capable of providing the necessary coverage, CV, at the required mounting height, MH.
3. Calculate the Air Temperature Rise, ATR, across the HMG unit:
   ATR = (Q x 1,000)/(1.085 x CFM)
4. Calculate the Leaving Air Temperature, LAT:
   LAT = EAT + ATR

Example: Select HMG unit(s) to heat a space 200 feet long by 200 feet wide at a mounting height of 96 feet. Building heat loss is 1,265 MBtuh at a space temperature of 60º F.

Solution:

1. It will take only one of any size HMG unit to meet the heating requirements:
   Q = 1,280 Mbtuh.
   The required coverage is 200 feet by 200 feet.
2. Select a HMG-15 unit with a 10R discharge to yield MH = 100 feet and CV = 211 feet x 211 feet.
3. ATR = (1,280 x 1,000)/(1.085 x 29,800)
   ATR = 39.6º F.
4. LAT = 60 + 39.6 = 99.6º F.

HMG Performance

	60° F space temperature					70° F space temperature				
		8R Discharge		10R Discharge			8R Discharge		10R Discharge	
SIZE	Q (Mbtuh)	MH (feet)	CV (feet)	MH (feet)	CV (feet)	Q (Mbtuh)	MH (feet)	CV (feet)	MH (feet)	CV (feet)
5	1,280	58	135x135	67	155x155	1,280	58	135x135	67	155x155
7	1,280	69	154x154	81	177x177	1,280	69	153x153	81	177x177
10	1,280	80	172x172	93	199x199	1,280	80	172x172	93	198x198
15	1,280	86	183x183	100	211x211	1,280	86	182x182	100	210x210

Note:
1. Q = Heating Capacity; MH = Maximum Mounting Height; CV = Heating Coverage.

DIMENSIONS

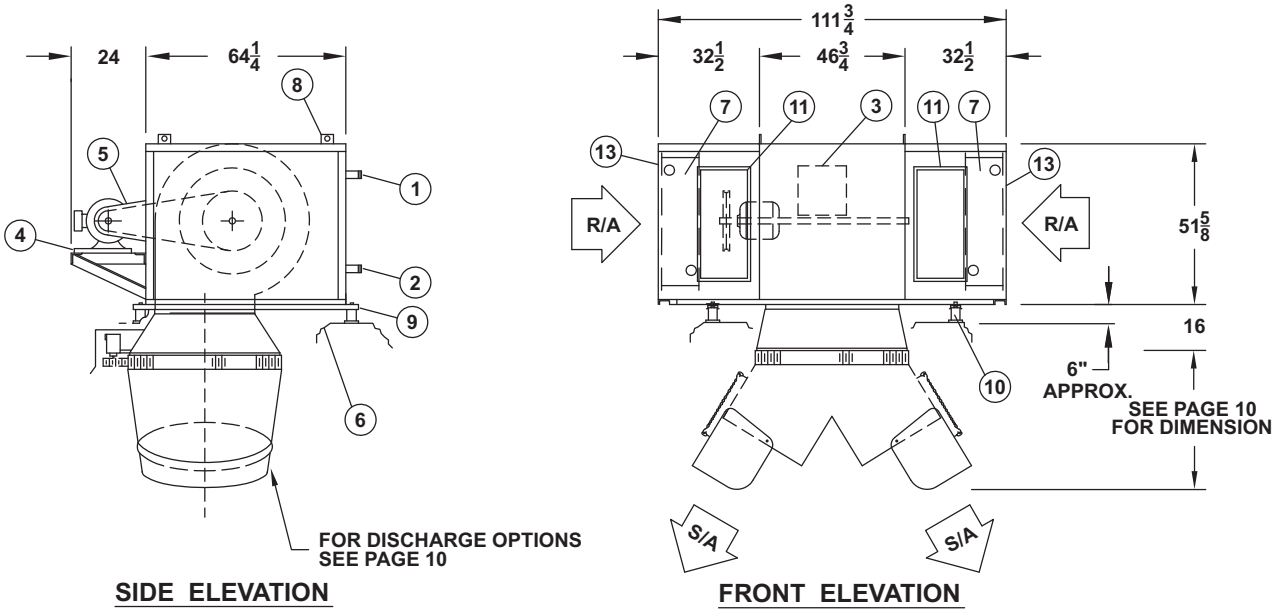
HMS Unit Dimensions

C000589

COMPONENT IDENTIFICATION

1. COIL CONNECTION - 2" NPT TYPICAL INLET CONNECTION FOR STEAM AND OUTLET CONNECTION FOR HOT WATER
2. COIL CONNECTION - 2" NPT TYPICAL OUTLET CONNECTION FOR STEAM AND INLET CONNECTION FOR HOT WATER
3. ELECTRICAL ENCLOSURE
4. ADJUSTABLE MOTOR BASE
5. OSHA BELT GUARD
6. EQUIPMENT SUPPORT (BY OTHERS)
7. HEATING COIL
8. LIFTING LUGS
9. SUPPORT CHANNEL
10. OPTIONAL ISOLATORS (SHIPPED LOOSE)
11. ACCESS DOOR
12. V-BANK FILTER SECTION
13. INLET OPENING WITH BIRDSCREEN

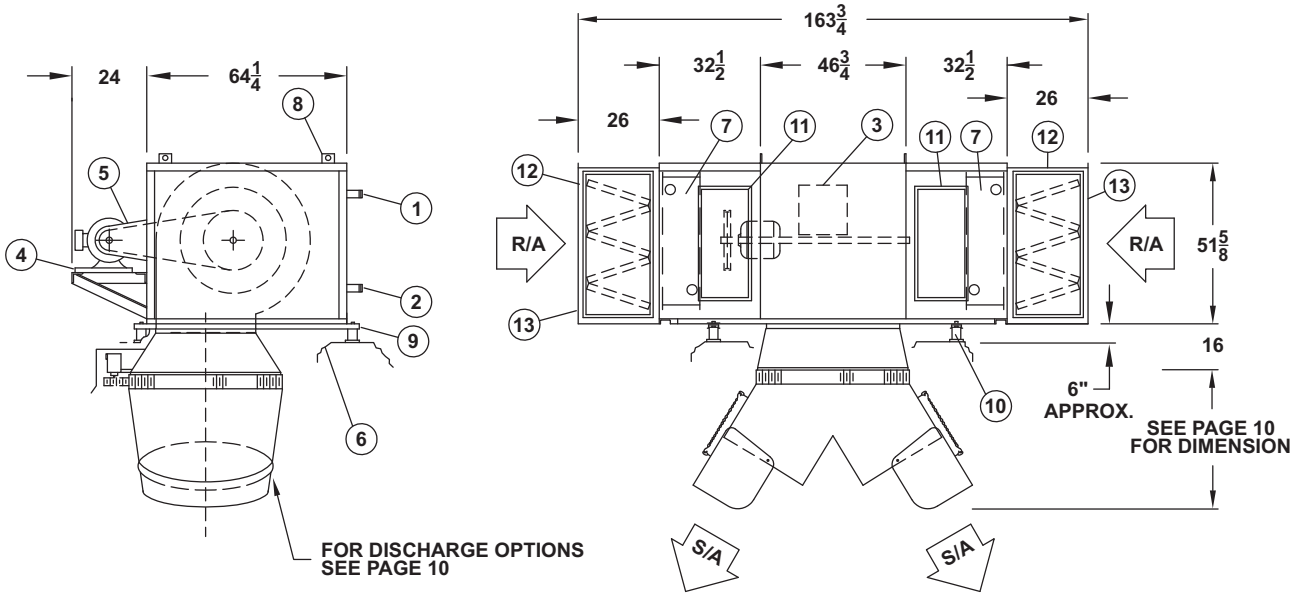
HMS UNIT WITH STEAM OR HOT WATER COILS



SIDE ELEVATION

FRONT ELEVATION

HMS UNIT WITH STEAM OR HOT WATER COILS AND OPTIONAL FILTER SECTION



SIDE ELEVATION

FRONT ELEVATION

DIMENSIONS

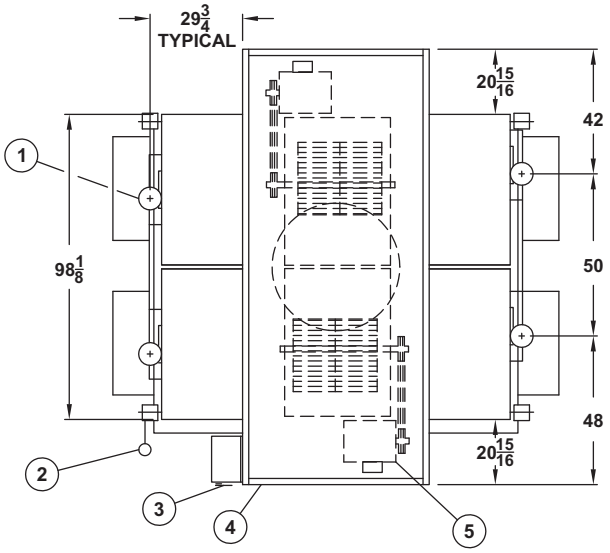
HMG Unit Dimensions

C000590

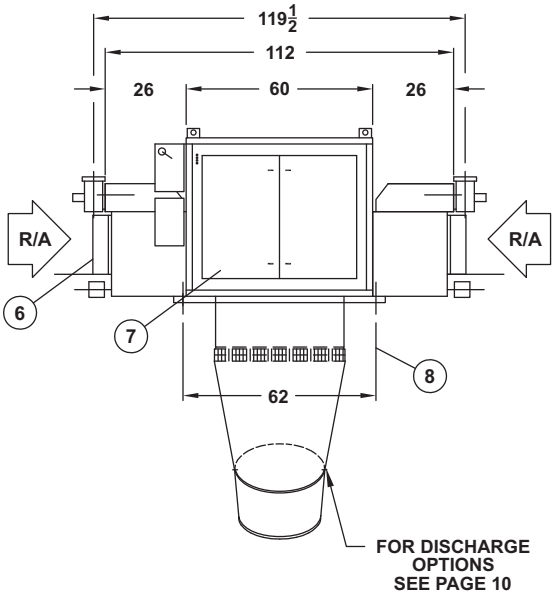
COMPONENT IDENTIFICATION

1. FURNACE FLUE 5" DIAMETER
2. GAS INLET CONNECTION (OPTIONAL)
3. DISCONNECT SWITCH (OPTIONAL)
4. EXTENDED BEARING LUBE LINES
5. MOTOR WITH ADJUSTABLE BASE
6. DUCT FURNACE INLET
7. ACCESS DOORS (BOTH ENDS)
8. DIMENSIONS FOR SUPPORTING UNIT
9. LIFTING LUGS

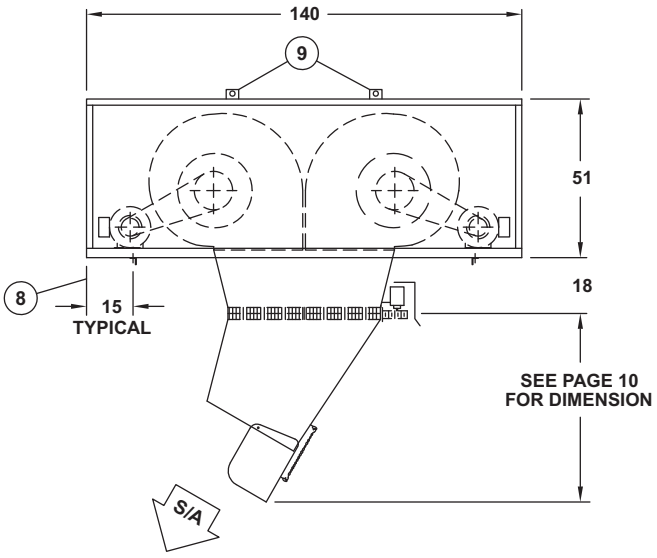
HMG UNIT WITH GAS FURNACES



PLAN VIEW



SIDE ELEVATION



FRONT ELEVATION

DIMENSIONS

Discharges

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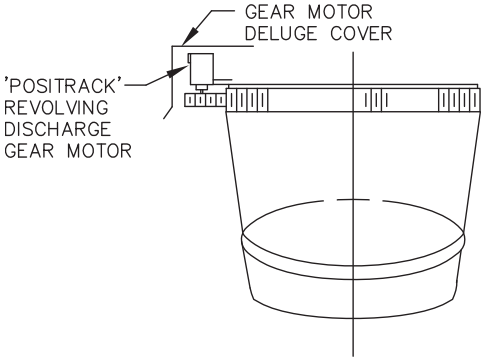
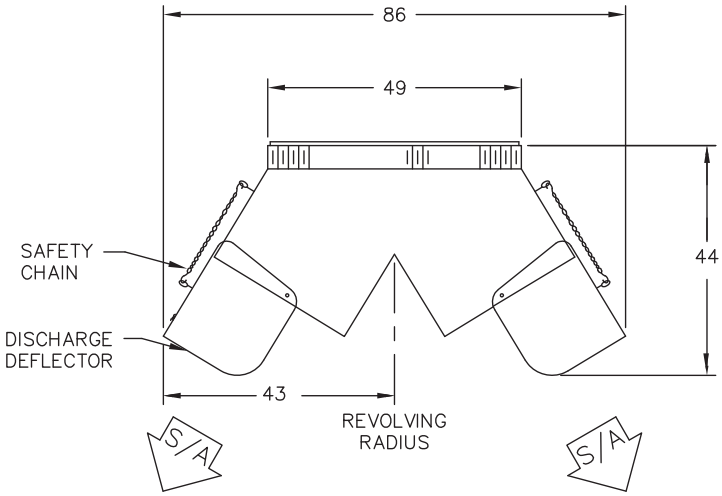
HMS AND HMG DISCHARGES

STYLE 8R DISCHARGE

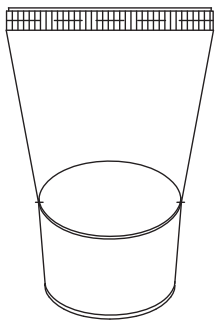


END ELEVATION



SIDE ELEVATION

STYLE 10R DISCHARGE



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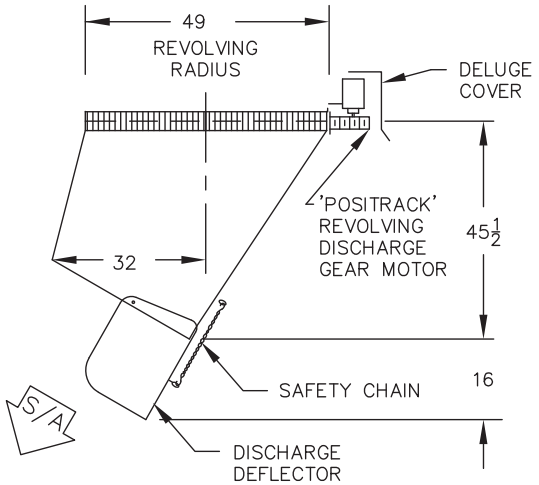
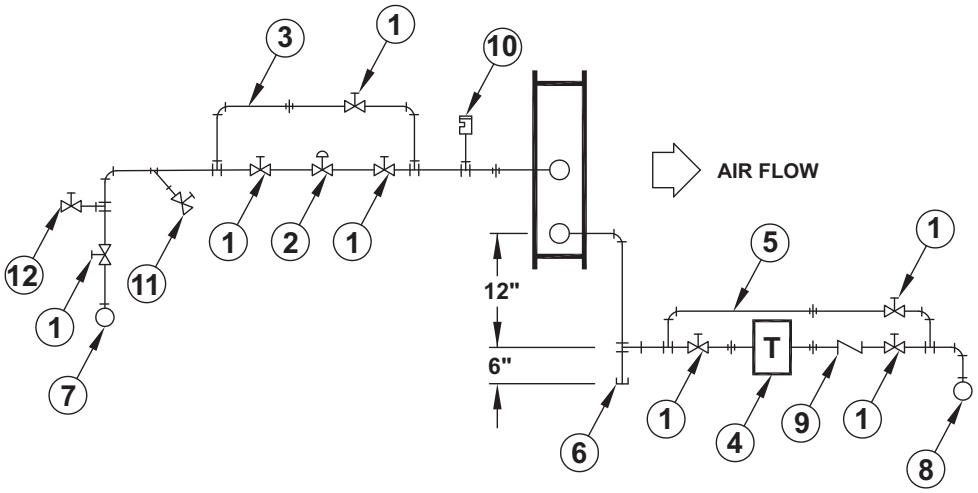


SIDE ELEVATION

Steam and Hot Water Piping Diagram

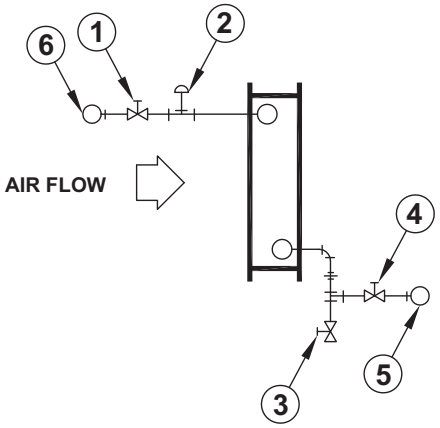
C000697

HMS UNIT HEATER STEAM AND HOT WATER PIPING DIAGRAM



STEAM PIPING LEGEND
(FOR GRAVITY ATMOSPHERIC RETURN SYSTEMS)

1. GLOBE OR GATE VALVE
2. OPTIONAL MOTORIZED SHUT-OFF VALVE
3. BY-PASS TO ALLOW SERVICING OF MOTORIZED VALVE. BYPASS LINE TO BE THE SAME SIZE AS MOTORIZED VALVE.
4. INVERTED BUCKET OR COMBINATION FLOAT AND THERMOSTATIC TRAP WITH VENT.
5. BY-PASS TO PERMIT SERVICING OF TRAP. BY-PASS TO BE ONE PIPE SIZE LARGER THAN TRAP ORIFICE.
6. DIRT POCKET AND DRIP LEG. TO BE THE SAME SIZE AS THE HEATER CONDENSATE RETURN LINE.
7. STEAM SUPPLY MAIN.
8. CONDENSATE RETURN MAIN.
9. 15° SWING CHECK VALVE.
10. 1/2" SPRING LOADED VACUUM BREAKER VENTED TO ATMOSPHERE.
11. STEAM STRAINER WITH BLOW-DOWN VALVE.
12. 1/2" DRAIN VALVE. TO BE OPENED WHEN GLOBE OR GATE SHUTOFF VALVE IS CLOSED.



HOT WATER PIPING LEGEND

1. GLOBE OR GATE VALVE
2. AUTOMATIC AIR VENT
3. COIL DRAIN VALVE
4. WATER FLOW CONTROL VALVE
5. HOT WATER SUPPLY LINE
6. HOT WATER RETURN LINE

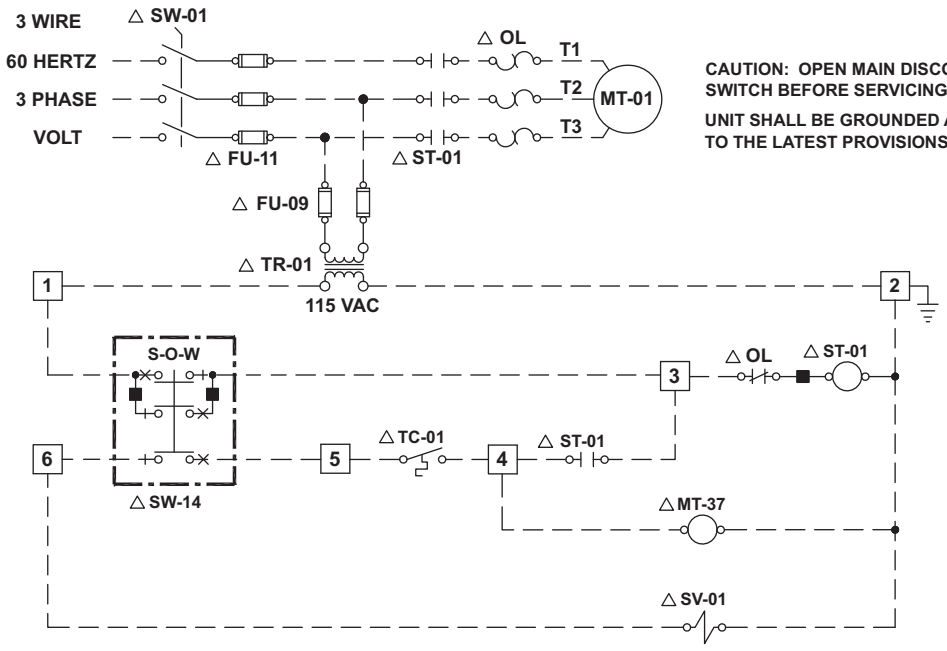
NOTE : ABOVE DIAGRAMS ARE FOR ONLY ONE OF TWO COILS PROVIDED ON UNIT. DUPLICATE PIPING FOR REMAINING COIL.

Wiring Diagram – HMS – Typical 3-Phase

C000698

TYPICAL WIRING DIAGRAM FOR

MODEL HMS-10, HMS-15, HMS-20 AND HMS-30



CAUTION: OPEN MAIN DISCONNECT SWITCH BEFORE SERVICING EQUIPMENT.

UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF NEC

NOTES

NOTE: BECAUSE OF SHIPPING RESTRICTIONS FIELD CONNECTIONS AND/OR WIRING BETWEEN COMPONENTS OR SECTIONS MAY BE REQUIRED

- ○ DENOTES COMPONENT TERMINAL NUMBER AND WIRING
- DENOTES JUMPER WIRE
- DENOTES WIRE CONNECTION
- □ DENOTES CONTROL CABINET TERMINAL BLOCK AND WIRE NUMBER
- △ DENOTES COMPONENTS SUPPLIED AND WIRED BY OTHERS
- – – DENOTES FIELD WIRING BY OTHERS

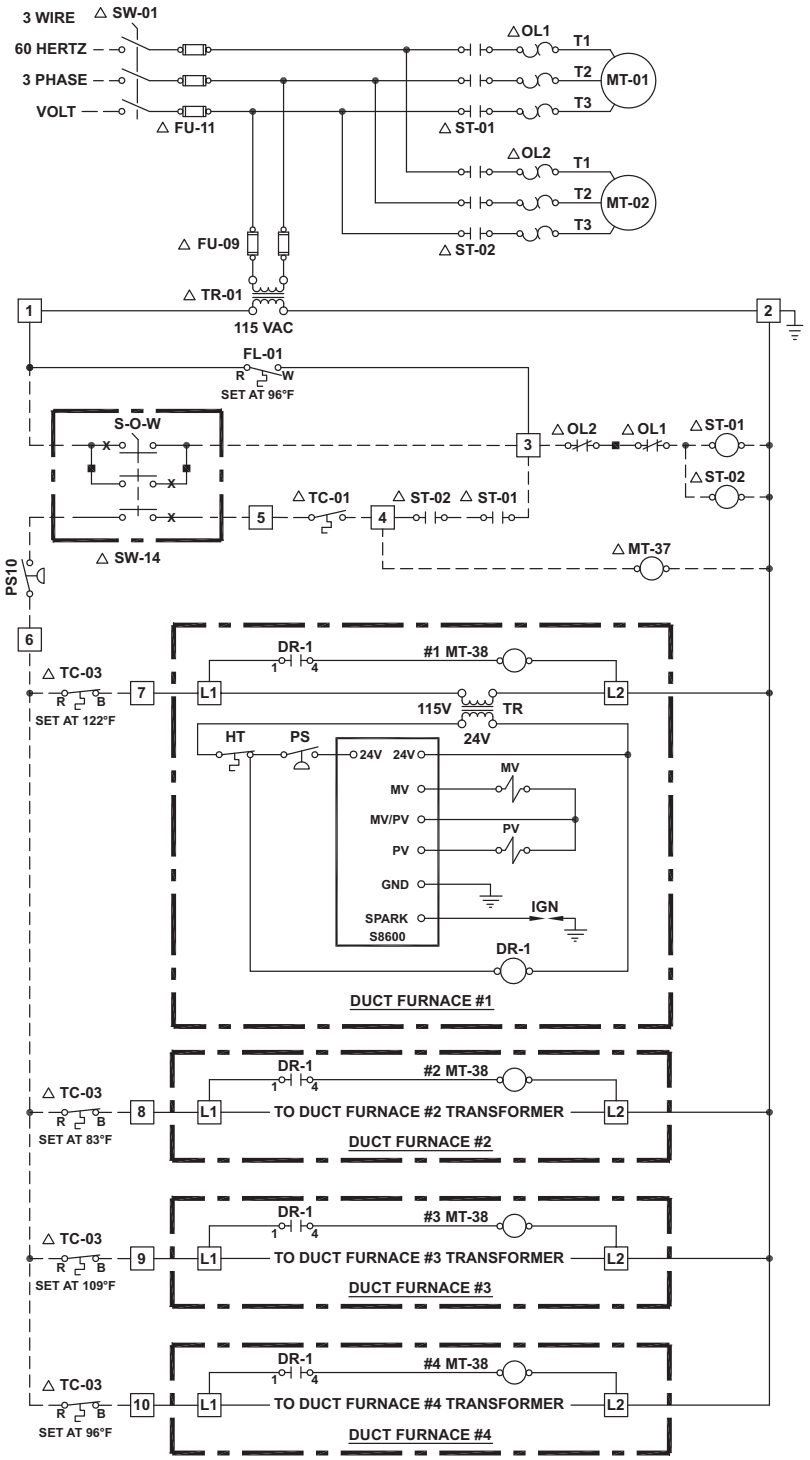
OPTIONAL COMPONENT IDENTIFICATION

△ FU-09	CONTROL CIRCUIT FUSE
△ FU-11	MAIN DISCONNECT FUSE
△ OL	MOTOR OVERLOAD
MT-01	MAIN SUPPLY FAN MOTOR
△ MT-37	REVOLVING DISCHARGE MOTOR
△ ST-01	MAIN SUPPLY FAN MOTOR STARTER
△ SW-01	MAIN DISCONNECT SWITCH
△ SW-14	SUMMER-OFF-WINTER SWITCH (REMOTE)
△ SV-01	STEAM SOLENOID VALVE
△ TC-01	ROOM THERMOSTAT
△ TR-01	CONTROL TRANSFORMER

Wiring Diagram – HMG – Typical 3-Phase

C000699

TYPICAL WIRING DIAGRAM FOR
MODEL HMG-5, HMG-7, HMG-10 AND HMG-15
WITH OPTIONAL TRUSS STAT



CAUTION: OPEN MAIN DISCONNECT SWITCH BEFORE SERVICING EQIPMENT

UNIT SHALL BE GROUNDED ACCORDING TO THE LATEST PROVISIONS OF THE NEC

COMPONENT IDENTIFICATION

	DR-1	DUCT FURNACE DRAFTOR RELAY
	FL-01	SUPPLY FAN SWITCH
△	FU-09	CONTROL TRANSFORMER FUSE
△	FU-11	MAIN DISCONNECT FUSE
	HT	FURNACE HIGH TEMPERATURE LIMIT
	MT-01	SUPPLY FAN MOTOR #1
	MT-02	SUPPLY FAN MOTOR #2
△	MT-37	REVOLVING DISCHARGE MOTOR
	MT-38	DUCT FURNACE DRAFTOR MOTOR
	MV	DUCT FURNACE MAIN GAS VALVE
△	OL1	MOTOR #1 OVERLOAD
△	OL2	MOTOR #2 OVERLOAD
	PS	DUCT FURNACE DRAFTOR MOTOR PROOF OF AIRFLOW SWITCH
	PS10	SUPPLY AIR FAN PROOF OF AIRFLOW SWITCH
	PV	DUCT FURNACE PILOT VALVE
△	ST-01	SUPPLY FAN MOTOR #1 STARTER
△	ST-02	SUPPLY FAN MOTOR #2 STARTER
△	SW-01	MAIN DISCONNECT SWITCH
△	SW-14	SUMMER-OFF-WINTER SWITCH (REMOTE)
△	TC-01	ROOM THERMOSTAT
△	TC-03	TRUSS THERMOSTAT
	TR	DUCT FURNACE TRANSFORMER - 115V/24V
△	TR-01	CONTROL TRANSFORMER

NOTES

NOTE: BECAUSE OF SHIPPING RESTRICTIONS FIELD CONNECTIONS AND/OR WIRING BETWEEN COMPONENTS OR SECTIONS MAY BE REQUIRED

- ○ DENOTES COMPONENT TERMINAL NUMBER AND WIRING
- ■— DENOTES JUMPER WIRE
- —•— DENOTES WIRE CONNECTION
- □ DENOTES CONTROL CABINET TERMINAL BLOCK AND WIRE NUMBER
- △ DENOTES OPTIONAL COMPONENTS
- – – – DENOTES FIELD WIRING BY OTHERS

1-TO-99 TERMINAL BLOCK - 115 VOLT
101-TO-199 TERMINAL BLOCK - 24 VOLT

ELECTRICAL

Amp Draw Table

ITEM	SOURCE	AMPS	MOTOR HORSEPOWER				
			5	7 1/2	10	15	20
A	Blower Motor	AMPS for 208V 3 Ph	16.7	24.2	30.8	46.2	59.4
		AMPS for 230V 3 Ph	15.2	22.0	28.0	42.0	54.0
		AMPS for 460V 3 Ph	7.6	11.0	14.0	21.0	27.0
		AMPS for 575V 3 Ph	6.1	9.0	11.0	17.0	22.0

ITEM	SOURCE	AMPS	CONTROL CIRCUIT AMPS
B	Control Transformer	AMPS for 208V 3 Ph	2.4
		AMPS for 230V 3 Ph	2.2
		AMPS for 460V 3 Ph	1.1
		AMPS for 575V 3 Ph	0.9

NOTES:
1. Above motor amps are based on the latest edition of the National Electrical Code.
2. Control circuit amps are based on standard controls.

Procedure for sizing optional disconnect switch:
1. Find the required blower motor HP from Airflow, Motor and Sound Data table on page 4.
2. Find amp draw for required blower motor HP and electrical service from above chart in **Item A.**
3. Find amps for control circuit from above chart in **Item B**.
4. Add amps from step 2 and step 3, then multiply by 1.25.

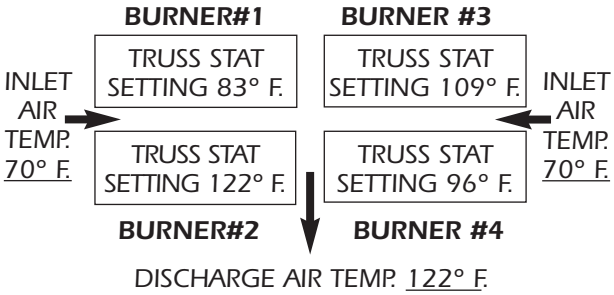
Truss Thermostats (HMG only)

Truss thermostats can be used to control the discharge air temperature of HMG Series unit heaters by turning “on” or “off” individual furnaces based on inlet air temperature. To accomplish this, a truss thermostat is mounted and wired on the inlet duct. It has a bulb-type sensor that is fixed to the outside of the unit.

In this manner, high temperature air that is stratified in the truss can be redistributed to the working levels when the need for it exists – without operating the burners. Process heat that would normally be wasted can be economically put to use.

Also, discharge temperatures can be effectively managed to assure optimum projection. Elevated truss temperatures will increase discharge temperatures. Extremely high temperature air is light in weight and therefore difficult to project from high mounting heights.

Here is a typical four truss thermostat set up:



With the room thermostat calling for heat, a typical four burner unit operates as follows:

Ent. Air Temp.	Disc. Air Temp.	Burners on
70°F	122°F	4 (all)
83°F	122°F	3
96°F	122°F	2
109°F	122°F	1
122°F	122°F	0 (none)

Note: Temperature rise through the unit is 52°F.

SPECIFICATIONS AND SCHEDULE – HMG

Typical Specification – HMG

General
Furnish a factory-assembled HMG model High Mounting Series heater as manufactured by L.J. Wing, Dallas, TX, to heat air in a high ceiling application. Heating medium shall be gas. Performance shall be as shown in the schedule.

Heater Section
Unit shall include four (4) (natural gas)(propane) indirect –fired furnaces. Each furnace shall be complete with power vent system, sealed flue collector, electronic flame supervision, and energy-saving electric ignition system. Each furnace shall display the AGA/CGA seal of design compliance and be factory tested to assure field operation.

The casing of each furnace shall be made of die-formed, heavy-gauge steel, phosphatized to inhibit rust and corrosion. Each furnace shall have a die-formed (aluminized steel) (Series 409 stainless steel) heat exchanger, and its own gas control piping train, arranged to facilitate field piping to a common supply manifold. The safety controls shall include a combustion air pressure switch to verify proper powered vent flow before allowing the gas valve to open.

Finish
Unit casing and discharge shall be fabricated of heavy-gauge, galvannealed sheet steel. Both casing and discharge shall be painted inside and out with an air-dried alkyd enamel finish.

Blower Assembly
The blower section shall include two centrifugal, heavy-duty, double-width, double-inlet blowers. Each blower shall be complete with motor and drive. Blower ratings shall be based on tests made in accordance with AMCA Standard 211, and shall bear the AMCA seal. All air ratings are based on delivery against the external static pressure shown in the schedule with all optional equipment in place and operating.

Blower wheels shall have tapered spun wheel cones or shrouds to provide stable airflow and high rigidity. The fan wheels shall be non-overloading with backward inclined blades of single thickness, welded to the rim and back plate. Riveted construction is unacceptable. Blowers shall be dynamically balanced at operating speed on precision, electronic vibration-amplifying equipment to ensure quiet, smooth-running, trouble-free operation.

Discharge
Unit shall be furnished with a revolving discharge as listed on the schedule to assure proper air projection and distribution. The revolving discharge shall consist of a slowly rotating air distributor, properly balanced and suspended from the heater casing on two prelubricated, sealed, ball bearings. A small, high-torque motor shall rotate the discharge by means of an idler gear drive that ensures positive traction and final rotation at approximately one RPM.

All discharge outlets shall be fitted with adjustable deflectors to facilitate field adjustment of the discharge air pattern.

Options
(A) Furnish magnetic motor starter with overload block that is factory-wired and mounted in a NEMA 1 electrical control box.
(B) Furnish fused disconnect switch that is factory-wired and mounted in a NEMA 1 electrical control box.

Typical Schedule – HMG

Model No.	Airflow (SCFM)	Ent. Air Temp. (° F)	Leav. Air Temp. (° F)	Heat Transfer (MBtuh)	Motor Horsepower (HP)	Electrical Service (volts/phase/Hz)
HMG-15-8R	29,800	60	100	1,280	2 @ 7.5	460/3/60

SPECIFICATIONS AND SCHEDULE – HMS

Typical Specification – HMS

General
Furnish a factory-assembled HMS model High Mounting Series heater as manufactured by L.J. Wing, Dallas, TX, to heat air in a high ceiling application. Heating medium shall be steam or hot water. Performance shall be as shown in the schedule.

Coils
Coils shall be fabricated of seamless return bend type 5/8" O.D. copper tubes with corrugated plate aluminum fins of not less than 0.006 inches thickness. Coils shall be tested and rated in accordance with ARI Standard 410. The coil casing shall be constructed of galvanized sheet metal, minimum 16 gauge.

Finish
Unit casing and discharge shall be fabricated of heavy-gauge, galvannealed sheet steel. Both casing and discharge shall be painted inside and out with an air-dried alkyd enamel finish.

Blower Assembly
The blower section shall include two centrifugal, heavy-duty, double-width, double-inlet blowers. Each blower shall be complete with motor and drive. Blower ratings shall be based on tests made in accordance with AMCA Standard 211, and shall bear the AMCA seal. All air ratings are based on delivery against the external static pressure shown in the schedule with all optional equipment in place and operating.

Blower wheels shall have tapered spun wheel cones or shrouds to provide stable airflow and high rigidity. The fan wheels shall be non-overloading with backward inclined blades of single thickness, welded to the rim and back plate. Riveted construction is unacceptable. Blowers shall be dynamically balanced at operating speed on precision, electronic vibration-amplifying equipment to ensure quiet, smooth-running, trouble-free operation.

Discharge
Unit shall be furnished with a revolving discharge as listed on the schedule to assure proper air projection and distribution. The revolving discharge shall consist of a slowly rotating air distributor, properly balanced and suspended from the heater casing on two prelubricated, sealed, ball bearings. A small, high-torque motor shall rotate the discharge by means of an idler gear drive that ensures positive traction and final rotation at approximately one RPM.

All discharge outlets shall be fitted with adjustable deflectors to facilitate field adjustment of the discharge air pattern.

Options
(A) Furnish magnetic motor starter with overload block that is factory-wired and mounted in a NEMA 1 electrical control box.
(B) Furnish fused disconnect switch that is factory-wired and mounted in a NEMA 1 electrical control box.

Typical Schedule

Model No.	Airflow (SCFM)	Ent. Air Temp. (° F)	Leav. Air Temp. (° F)	Steam Pressure (psig)	Heat Transfer (MBtuh)	Condensate load (lbm/hr)	Motor Horsepower (HP)	Electrical Service (volt/ph./Hz)
HMS-20-10R	29,300	60	110	5	1,574	1,666	15	230/3/60

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