



# MIRP

## RECIRCULATOR SYSTEM™

### Featuring:

- New By-Pass Flow Control Technology—Patent Pending
- Matrix Microprocessor Panel—UL & cUL Listed



*Technology for the Future, Available Today!*



Since its founding in 1983, Refrigeration Valves and Systems Corporation (RVS) has become the customer preferred supplier of innovative industrial refrigeration products including factory assembled, packaged recirculation systems and ASME pressure vessels of all types and sizes.

Pressure vessels and recirculator packages are manufactured to ASME requirements in our modern Bryan, Texas facility. With over 50,000 square feet of manufacturing area, (5) overhead cranes, state of the art plasma cutting, plate rolling and welding equipment, RVS has the capacity to handle all of your vessel and recirculator package requirements.

From the smallest pressure vessel to the largest packages, RVS is committed to providing superior technical support and the highest quality products with fast, on-time shipments to meet your construction schedule.

RVS was acquired by EVAPCO, Inc. in 1994. EVAPCO is recognized as the leading supplier of quality heat transfer equipment to the Industrial Refrigeration, HVAC, Process Cooling and Power Industries. The success of EVAPCO/RVS has been the result of a continual commitment to product improvement, quality workmanship, and a dedication to providing unparalleled customer service and satisfaction.

EVAPCO's powerful combination of financial strength and technical expertise has established the company as a recognized manufacturer of market-leading products on a worldwide basis.

EVAPCO is an employee owned company with a strong emphasis on research & development and modern manufacturing plants. EVAPCO has earned a reputation for technological innovation and superior product quality by featuring products that are designed to offer these operating advantages:

- Higher System Efficiency
- Environmentally Friendly
- Lower Annual Operating Costs
- Reliable, Simple Operation and Maintenance

With an ongoing commitment to Research & Development programs, EVAPCO provides the most advanced products in the industry— **Technology for the Future, Available Today!**

## MRP Recirculator System

The new MRP Recirculator System utilizes the highest quality and most advanced components available in the refrigeration industry today. At the heart of the MRP Recirculator System is the Matrix Microprocessor Panel. The Matrix Microprocessor Panel has been engineered to provide total recirculator control including proportional liquid feed and level control, pump protection and a state of the art by-pass flow control (patent pending) to improve pump efficiency and capacity. The standard MRP Recirculator System features Teikoku hermetic pumps with exclusive bearing wear monitor and secondary containment system to eliminate the possibility of a refrigerant release. The MRP Recirculator System is available in a complete range of vessel diameters from 24" to 144", in both vertical and horizontal configurations. Major components are maintained in inventory to enable fast, on-time shipments to meet your most demanding requirements. RVS has the largest production capacity in the refrigeration industry and an experienced staff to provide superior technical support before and after the sale.

### Matrix Microprocessor Panel

The RVS Matrix Microprocessor Panel utilizes the latest technology to provide a total control solution for the MRP Recirculator System. The Matrix Panel features a NEMA-4 enclosure and is UL/cUL listed. The standard MRP Recirculator incorporates a Matrix Microprocessor Panel with starters, disconnects and power transformer requiring only a single power connection in the field. Factory packaging assures a completely tested and functional unit, ready-to-go without expensive field wiring and complicated PLC programming, for simplified installation and start-up.

#### Minimum Pump Flow Control

- Matrix detects low pump flow and automatically opens minimum flow bypass valve
- Eliminates the requirement for oversizing pump and motor to accommodate minimum flow requirement

#### Integrated Pump Control

- Automatic operation of up to 3 pumps
- Pump differential pressure monitoring and safety cutouts
- Motor current monitoring and safety cutouts

#### Liquid Level Management

- Reads 4-20mA signal from level probe and provides digital readout on panel
- Automatic operation of proportional liquid feed valves or solenoid valves
- High and low level alarms
- High and low level cutouts
- Startup mode to provide additional liquid ballast for on/off process operations

#### Communications and Data Logging

- Industry standard protocol MODBUS over RS-485 or Ethernet
- Capable of remote and local monitoring and control of system parameters
- Monitored conditions logged and saved in the event of a failure

#### Operator Interface

- User friendly with large easy to read graphic display
- Simple keypad screen navigation and set-point entry



### Matrix Panel Eliminates...

~~Level Controllers~~  
~~Proportional Feed Valve Controllers~~  
~~Differential Pressure Switches~~  
~~Pump Protection Devices~~





## ASME 250 psig Recirculator Vessel with Dual Relief Assembly

- National Board registration
- Internal bypass and vent lines reduce insulation cost and protects against shipping damage
- Stainless steel nameplate bracket and standoff to prevent corrosion

### Liquid Level Management

- Level indicating column with electronic level probe
- Analog outputs for level monitoring and proportional feed valve control
- Set points for high and low level alarms and shutdowns
- High level shutdown float switch for compressor protection

### Proportional Liquid Feed Assembly

- Modulating valve minimizes pressure surges and protects pumps from cavitation
- Backup solenoid valve provides positive shutoff in the event of a power failure

### Teikoku Pumps

- World's largest manufacturer of hermetic pumps
- Exclusive bearing wear monitor
- Secondary containment system eliminates leaks to atmosphere
- Complete inventory of low NPSH pumps with capacities from 60 to 480 gpm



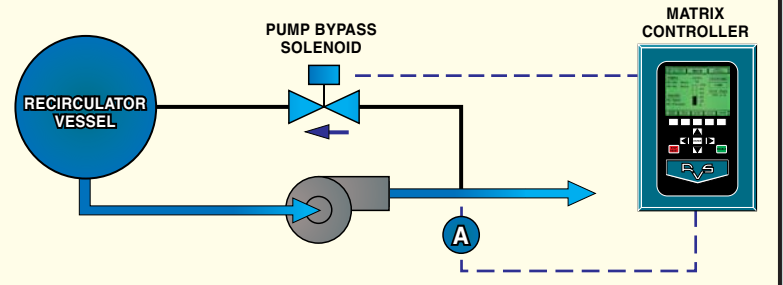
Teikoku Pumps—Standard

### Pump Options Available

- Cornell open drive pumps
- Cornell HT and Buffalo COM-R series hermetic pumps
- Optional stainless steel drain pans

### Pump Bypass Flow Control – Patent Pending

- Matrix Controller monitors pump flow and opens bypass only when necessary due to low flow conditions
- Eliminates the need to size the pump for continuous bypass flow
- More efficient operation requiring smaller, lower horsepower pumps



### Options

- Electromechanical control panel with starters and disconnects
- Conventional on/off solenoid and hand expansion valve liquid feed assemblies (single or dual)
- 1.5kw oil pot heater
- Seismic Design
- Radiography of pipe welds
- SA333 Gr6 Low Temperature Pipe
- Post weld heat treatment





### SELECTION PROCEDURE

STEP 1: From Table 1A or 1B, select a model with a capacity equal to or greater than the required capacity at the given saturated suction temperature.

STEP 2: From Table 2A or 2B, check the available surge volume for the model selected against the required system surge volume. If the available surge volume is inadequate, select the next larger model with sufficient surge volume (or contact the factory).

STEP 3: From Table 3, convert tons of refrigeration to gpm.

STEP 4: From Table 4A or 4B, select the pumps with sufficient gpm capacity and pump differential.

STEP 5: From Table 5A, 5B, 6A, or 6B, select the liquid feed assembly. (Hand expansion or motorized valve)

### WHEN ORDERING PLEASE SPECIFY:

Recirculator model number and pump. Please include required capacity in tons of refrigeration, saturated suction temperature, recirculation rate, surge volume, liquid feed temperature, and voltage/frequency.

**Table 1A MRP VERTICAL RECIRCULATOR CAPACITIES - TONS OF REFRIGERATION R-717**

MODEL NO.	EVAPORATOR TEMPERATURE °F									
	SINGLE STAGE*					TWO STAGE**				
	30°F	20°F	10°F	0°F	-10°F	-20°F	-20°F	-30°F	-40°F	-50°F
MRP-24V	147	135	120	107	93	82	96	82	70	59
MRP-30V	232	212	189	168	147	129	152	130	111	94
MRP-36V	333	305	271	242	211	185	218	187	159	135
MRP-42V	452	415	369	329	287	252	296	254	217	184
MRP-48V	590	541	481	429	374	328	387	331	283	240
MRP-54V	750	688	612	545	475	417	491	420	359	305
MRP-60V	925	848	754	672	586	514	606	519	443	376
MRP-72V	1339	1228	1092	974	848	745	877	751	642	544
MRP-84V	1819	1668	1484	1322	1115	1012	1191	1019	871	739
MRP-96V	2385	2187	1945	1734	1510	1326	1561	1336	1142	968
MRP-108V	3013	2764	2458	2190	1908	1675	1972	1688	1443	1223
MRP-120V	3715	3407	3030	2700	2350	2065	2431	2081	1779	1508
MRP-144V	5358	4914	4370	3894	3393	2978	3506	3002	2565	2174

\* Single stage capacities based on +96°F liquid supply temperature.

\*\* Two stage capacities based on +25°F liquid supply temperature.

**Table 1B MRP HORIZONTAL RECIRCULATOR CAPACITIES - TONS OF REFRIGERATION R-717**

MODEL NO.	EVAPORATOR TEMPERATURE °F									
	SINGLE STAGE*					TWO STAGE**				
	30°F	20°F	10°F	0°F	-10°F	-20°F	-20°F	-30°F	-40°F	-50°F
MRP-24H	112	102	91	81	70	62	73	62	53	45
MRP-30H	187	171	152	136	118	104	122	104	89	75
MRP-36H	278	255	227	202	176	154	182	156	133	112
MRP-42H	386	354	315	281	245	215	253	217	185	157
MRP-48H	513	470	418	373	325	285	336	288	246	208
MRP-54H	693	636	565	504	439	386	454	389	332	282
MRP-60H	864	793	705	628	548	481	566	485	414	351
MRP-72H	1267	1162	1033	921	802	705	829	710	607	515
MRP-84H	1742	1598	1421	1266	1103	969	1140	976	834	707
MRP-96H	2297	2107	1874	1670	1455	1277	1503	1287	1100	933
MRP-108H	2924	2682	2385	2125	1852	1625	1914	1638	1400	1187
MRP-120H	3626	3326	2958	2636	2296	2016	2373	2032	1736	1472
MRP-144H	5264	4828	4293	3826	3334	2926	3445	2949	2520	2136

\* Single stage capacities based on +96°F liquid supply temperature.

\*\* Two stage capacities based on +25°F liquid supply temperature.

### SURGE VOLUME - WEIGHT - OPERATING CHARGE

**Table 2A**

MODEL NO.	VERTICAL PACKAGE		
	Surge Volume Cubic Feet (Ft <sup>3</sup> )	Shipping Weight LBS. (Approx.)	Operating Charge LBS. OF NH <sub>3</sub>
MRP-24V	13.1	2,930	98
MRP-30V	20.9	3,340	147
MRP-36V	31.8	4,090	196
MRP-42V	57.6	4,780	438
MRP-48V	77.7	5,220	554
MRP-54V	97.4	7,610	671
MRP-60V	122.7	8,370	797
MRP-72V	157.8	12,690	1600
MRP-84V	224.4	15,640	2051
MRP-96V	284.5	18,310	2494
MRP-108V	318.0	23,180	4200
MRP-120V	411.8	32,050	4894
MRP-144V	553.9	48,130	6313

**Table 2B**

MODEL NO.	HORIZONTAL PACKAGE		
	Surge Volume Cubic Feet (Ft <sup>3</sup> )	Shipping Weight LBS. (Approx.)	Operating Charge LBS. OF NH <sub>3</sub>
MRP-24H	12.3	3,190	325
MRP-30H	21.9	3,540	374
MRP-36H	34.0	4,270	416
MRP-42H	46.5	4,770	558
MRP-48H	63.7	5,220	602
MRP-54H	86.4	7,640	659
MRP-60H	102.8	8,410	975
MRP-72H	149.5	12,940	1429
MRP-84H	217.6	14,770	1574
MRP-96H	299.6	19,910	1712
MRP-108H	395.1	24,920	1836
MRP-120H	506.7	34,340	1959
MRP-144H	805.7	44,680	2280



Table 3

**CONVERSION CHART - GALLONS/MINUTE/TON R-717**

OVERFEED RATE	EVAPORATOR TEMPERATURE °F								
	30°F	20°F	10°F	0°F	-10°F	-20°F	-30°F	-40°F	-50°F
3:1	.206	.201	.196	.191	.186	.182	.178	.174	.171
4:1	.275	.268	.261	.254	.249	.243	.238	.232	.228
6:1	.412	.401	.391	.382	.373	.364	.356	.349	.342

Table 4A **TEIKOKU/RVS PUMP SELECTIONS**

PUMP MODEL	MAX. GPM	PSID	HP	MIN FLOW
RVS-60-30-2.9	60	30	2.9	8
RVS-120-30-4.5	120	30	4.5	13
RVS-190-30-8.3	190	30	8.3	21
RVS-270-30-11.3	270	30	11.3	40
RVS-375-30-14.7	375	30	14.7	66
RVS-480-30-20	480	30	20	66
RVS-60-45-4.5	60	45	4.5	13
RVS-120-45-8.3	120	45	8.3	13
RVS-190-45-13.4	190	45	13.4	53
RVS-270-45-20	270	45	20	66
RVS-375-45-22.7	375	45	22.7	66
RVS-480-45-22.7	480	45	22.7	66

RVS has selected a complete line of low NPSH Teikoku pumps for industrial refrigeration service. Teikoku is the world's largest manufacturer of Sealless Canned Motor Pumps. The pumps are constructed of 304 Stainless Steel with 300 Class ANSI flanges. Teikoku pump features include a patented TRG monitor to measure bearing wear and rotation, and a complete secondary containment system which prevents leakage to atmosphere in the unlikely event of a canned motor breach.

**Note:** Maximum GPM is the pump capacity available to the system when using the Matrix Micro Panel. If the Matrix Micro Panel is not used, you must subtract the minimum flow from the maximum gpm to get system gpm.

Table 4B **CORNELL OPEN DRIVE PUMP SELECTIONS**

PUMP MODEL	MAX. GPM	PSID	HP	MIN FLOW
2CB-3-4	85	25	3	25
2CB-5-4 (4)	100	33	5	25
2CB-5-4 (5)	150	30	5	25
3CB-10-6 (6)	270	33	10	50
3CB-10-6 (8)	350	25	10	50
3CB-15-6	400	30	15	50
4CB-15-6	480	30	15	50
1.5CBH-5-4	70	42	5	10
1.5CBH-7.5-4	110	53	7.5	10
2.5CBH-10-4	190	50	10	50
2.5CBH-15-4	220	60	15	50
4CB-25-6	480	42	25	50

Cornell Pump has a 39 year history of providing reliable pumps to the refrigeration industry. Cornell open drive pumps feature a double mechanical seal with internal barrier fluid. The seal is cooled and lubricated via a self-contained barrier reservoir, which is automatically pressurized to match system conditions. The inboard face of the seal prevents escape of refrigerant from the pump case while the outboard face retains the system compatible barrier fluid. The system includes a fluid level indicator and limit switch allowing for unattended monitoring and a safety shutdown feature.

Table 5A **SINGLE FEED ASSEMBLY - HAND EXPANSION**

MODEL NO.	SIZE	TR (MT)	TR (LT)
6LF075	3/4"	60	40
6LF100	1"	105	70
6LF125	1-1/4"	225	150
6LF150	1-1/2"	350	230
6LF200	2"	800	520
6LF250	2-1/2"	1200	800
6LF300	3"	1870	1230

Liquid Feed Assembly (assembled) including Hansen HS4A solenoid valve (120 Volt) with strainer and flanges, one globe hand expansion valve, two globe shut-off valves, and one angle bypass valve.

Table 5B **DUAL FEED ASSEMBLY - HAND EXPANSION**

MODEL NO.	SIZE	TR (MT)	TR (LT)
6LF150/150	1-1/2" - 1-1/2"	700	460
6LF150/200	1-1/2" - 2"	1150	750
6LF200/200	2" - 2"	1600	1040
6LF200/250	2" - 2-1/2"	2000	1320
6LF250/250	2-1/2" - 2-1/2"	2400	1600
6LF250/300	2-1/2" - 3"	3070	2030
6LF300/300	3" - 3"	3740	2460

Two Liquid Feed Assemblies (assembled) including (2) Hansen HS4A solenoid valves (120 Volt) with strainers and flanges, (2) globe hand expansion valves, four globe shut-off valves, and one angle bypass valve.

Table 6A **SINGLE FEED ASSEMBLY - MOTORIZED VALVE**

MODEL NO.	VALVE SIZE	LINE SIZE	TR (MT)	TR(LT)
PLF075	3/4"	1"	165	110
PLF100	1"	1-1/4"	290	190
PLF125	1-1/4"	1-1/2"	415	270
PLF150	1-1/2"	2"	910	580
PLF200	2"	2-1/2"	1210	780
PLF300	3"	4"	2640	1700

Sealed motor Liquid Feed Assembly (assembled) including Hansen HMMR sealed motor valve, HS4A solenoid valve (120 Volt) with strainer and flanges, two globe isolation valves, and one angle bypass valve.

Note: Size and capacity shown based on HMMR value.

Table 6B **DUAL FEED ASSEMBLY - MOTORIZED VALVE**

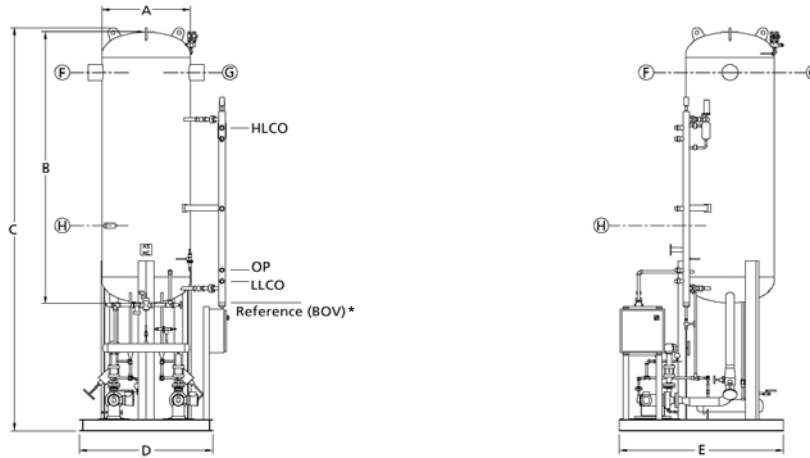
MODEL NO.	VALVE SIZE	LINE SIZE	TR (MT)	TR(LT)
PLF200/200	2" - 2"	2-1/2"	2420	1560
PLF125/300	1-1/4" - 3"	1-1/2" - 4"	3055	1970
PLF150/300	1-1/2" - 3"	2" - 4"	3550	2280
PLF200/300	2" - 3"	2-1/2" - 4"	3850	2480
PLF300/300	3" - 3"	4" - 4"	5280	3400

Two sealed motor Liquid Feed Assemblies (assembled) including (2) Hansen HMMR sealed motor valves, (2) HS4A solenoid valves (120 Volt) with strainers and flanges, four globe isolation valves, and one angle bypass valve.

Note: Size and capacity shown based on HMMR value.



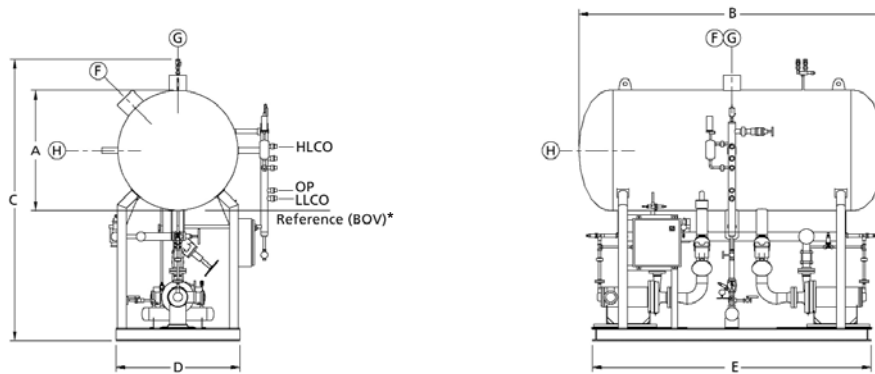
### MRP RECIRCULATOR SYSTEM – VERTICAL



MODEL NUMBER	A Vessel Diameter	B Vessel Length	C Overall Height	D Base Width	E Base Length	F Wet Return	G Dry Gas Outlet	H Liquid Make-up	LLCO* Low Level Cutout	OP* Operating Level	HLCO* High Level Cutout
MRP-24V	24	112	176	60	76	5	4	1-1/4	8	12	64
MRP-30V	30	115	181	79	84	6	5	1-1/4	8	12	65
MRP-36V	36	118	184	82	84	6	6	1-1/2	8	12	68
MRP-42V	42	144	210	82	88	8	6	2	8	18	92
MRP-48V	48	147	217	82	89	8	8	2	12	18	95
MRP-54V	54	150	220	82	91	10	8	2	12	18	91
MRP-60V	60	153	223	82	98	10	8	2-1/2	12	18	93
MRP-72V	72	159	237	90	118	12	10	3	16	24	91
MRP-84V	84	165	247	97	138	12	10	3	16	24	94
MRP-96V	96	171	257	112	138	14	12	4	17	24	92
MRP-108V	108	177	265	117	168	16	12	4	22	30	90
MRP-120V	120	183	271	128	176	16	14	4	22	30	93
MRP-144V	144	195	283	165	192	20	16	5	20	30	89

\*Dimensions from bottom of vessel (BOV) reference line. All dimensions are given in inches and are for reference only. Consult factory for certified drawing.

### MRP RECIRCULATOR SYSTEM – HORIZONTAL



MODEL NUMBER	A Vessel Diameter	B Vessel Length	C Overall Height	D Base Width	E Base Length	F Wet Return	G Dry Gas Outlet	H Liquid Make-up	LLCO* Low Level Cutout	OP* Operating Level	HLCO* High Level Cutout
MRP-24H	24	135	117	58	117	4	4	1	4	7	14
MRP-30H	30	138	120	58	117	5	5	1-1/4	4	7	17
MRP-36H	36	141	124	58	117	6	5	1-1/2	4	7	20
MRP-42H	42	144	124	60	119	8	6	2	6	8	23
MRP-48H	48	147	130	60	119	8	8	2	6	8	26
MRP-54H	54	150	136	64	119	8	8	2	6	8	29
MRP-60H	60	153	141	66	139	10	8	2-1/2	6	10	32
MRP-72H	72	159	165	86	161	10	10	2-1/2	8	12	38
MRP-84H	84	165	177	86	161	12	10	3	8	12	44
MRP-96H	96	171	197	88	188	14	12	3	8	12	50
MRP-108H	108	177	211	99	188	16	12	4	8	12	56
MRP-120H	120	183	227	109	188	16	14	4	8	12	62
MRP-144H	144	195	252	130	188	20	16	5	8	12	74

\*Dimensions from bottom of vessel (BOV) reference line. All dimensions are given in inches and are for reference only. Consult factory for certified drawing.



## MRP Recirculator Systems Factory Assembled Advantages



MRP Recirculator Systems are completely assembled by a factory-trained workforce dedicated to building quality refrigeration products. All packages, vessels and piping are fabricated from ASME Code materials by certified welders. The packages are assembled in a controlled factory environment to the industry's highest quality standards. The finished package is designed for long-life, simplified installation, and easy access to perform routine maintenance functions.



The MRP Recirculator System reduces installation time and cost compared to field fabricated units—the complete package is rigged into place. Extensive labor costs and coordination associated with building a package on site are reduced due to minimal refrigerant connections and welding requirements. Factory wired recirculators require only a single power connection and minimal set-up/start-up to be fully operational. Let RVS be your single-point source for recirculator design and performance. RVS personnel are dedicated to quick response time, insuring that the finished product leaves the factory according to your time requirements and project specifications.



The benefits of zero-leakage hermetic pump technology, pump protection devices, electronic level control and proportional liquid feed are widely acknowledged. With the introduction of the MRP Recirculator System, RVS can offer all these features with one user-friendly control, the Matrix Microprocessor Controller. The Matrix utilizes proven logic, quality components and the latest technology to provide total recirculator control.

The MRP Recirculator System with the exclusive Matrix Microprocessor Controller provides single point responsibility and superior package performance. The combination of factory trained craftsmen, quality materials and proven control technology allows RVS to offer an **EXCLUSIVE 3-YEAR WARRANTY** on every MRP Recirculator System with the Matrix Controller. This standard is unique in the industry and reflects RVS's confidence in the MRP Recirculator System.





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### EVAPCO QUALITY REFRIGERATION SYSTEM COMPONENTS

#### Evaporative Condensers



ATC



UBC

Induced Draft Models



PMCB



LSCB/LRC

Forced Draft Models

#### Rooftop Air Units



Critical Process Air Systems



Penthouse Evaporators



Make-Up Air Systems

#### Evaporators – Stainless Steel • Aluminum • Galvanized Steel • Copper



Unit Coolers



Workroom Units



Low Profile Coolers

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