MRPC

CO2 MATRIX RECIRCULATOR PACKAGE™

FEATURING THE

Matrix II

MICROPROCESSOR™ CONTROL PANEL

ALL COMPONENTS • WORKMANSHIP • PERFORMANCE
EXCLUSIVE COMPREHENSIVE 3 YEAR WARRANTY

Member of iiar
International Institute of Ammonia Refrigeration
www.iiar.org

RETA

IARW International Association of Refrigerated Warehouses

RVS Corporation, Bryan, TX.

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

Pressure vessels and vessel packages are manufactured to ASME requirements in the modern Bryan, Texas facility. With over 100,000 square feet of manufacturing area, (10) overhead cranes, state of the art plasma cutting, plate rolling and welding equipment, RVS has the capacity to handle all types of ASME pressure vessel and vessel 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.

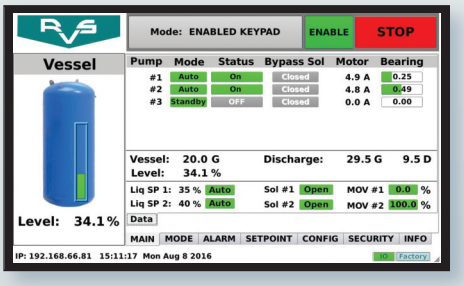
RVS was acquired by EVAPCO, Inc. in 1994 as a wholly owned subsidiary. EVAPCO is recognized as the leading supplier of innovative and high quality heat transfer equipment to the Industrial Refrigeration, HVAC, Process Cooling and Power Industries. The success of EVAPCO/RVS has been the result of a continual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

EVAPCO/RVS'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/RVS is an employee owned company with a dedicated team committed to excellence.

MRPC CO2 Matrix Recirculator Package

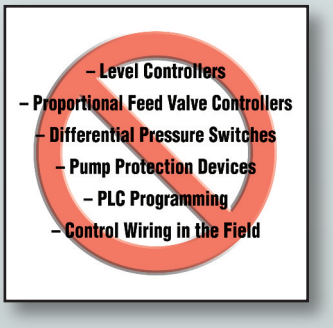
The MRPC CO2 Matrix Recirculator Package utilizes the highest quality and most advanced components available in the industry and features the Matrix II Microprocessor™ Control Panel. The Matrix II has been engineered by RVS to provide total recirculator control including liquid feed and level control, pump protection, pump bearing wear monitoring, and RVS's patented pump bypass flow control (U.S. Patent No. 7,437,880). The MRPC CO2 Matrix Recirculator Package with Matrix II is state of the art and confidently backed by RVS with an **EXCLUSIVE and COMPREHENSIVE 3-YEAR WARRANTY**!

Matrix II Microprocessor™ Control Panel Features and Benefits:



Matrix II Display

- Faster Processing Speed and Color HMI Touch Screen Display
- Control and Protection for Up to Six Pumps Plus a Transfer Pump
- Integrated Pump Bearing Wear Monitor on the Display Screen with Safety Cutouts and Alarms
- Patented Pump Bypass Flow Control
- Pump Differential Pressure and Current Monitoring with Safety Cutouts and Alarms
- Automatic Operation of Pumps and Proportional Liquid Feed or Solenoid Valves
- Digital Liquid Level Display on Screen and High/Low Level Monitoring with Safety Cutouts and Alarms
- External Communication and Remote Monitoring
- Factory Wired, Packaged, and Tested – Simple, Ready to Go Installation with Single Point Power Connection. See RVS Bulletin 590 for More Information on Matrix II

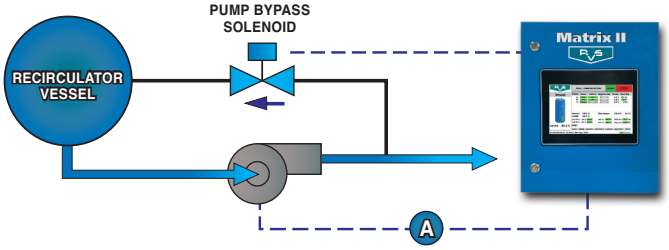


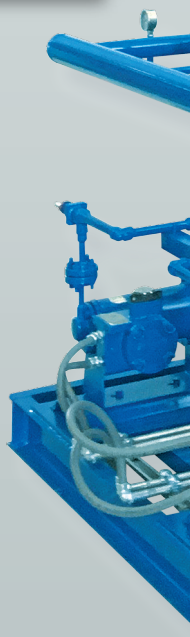
- No Control System in the Industry Provides Comparable Pump Protection and Control

Patented Pump Bypass Flow Control

U.S. Patent No. 7,437,880

- Matrix II 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





ASME, 600 PSIG, Recirculator Vessel

- National Board Registration
- Vertical or Horizontal Vessel Configuration Available from 24" to 84" Outside Diameter
- Internally Routed Minimum Bypass Flow, Motor Cooling, Oil Pot Vent (if oil pot supplied) Line Piping Reduces Insulation Cost and Potential for Shipping Damage
- Stainless Steel Nameplate Bracket and Standoff to Prevent Corrosion

#5 Liquid Level Column

- Liquid Level Indicating Column With Isolation Valves, Flanges, and Drain
- Five Level Indicators With Frost Shields
- Danfoss Coax Cable Type, Electronic Level Probe
- High Level Shutdown Mechanical Float Switch for Compressor Protection

Proportional Liquid Feed Assembly (Not Shown is Optional)

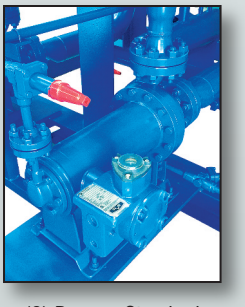
- Modulating Valve Minimizes Pressure Surges and Protects Pumps from Cavitation
- Backup Solenoid Valve Provides Positive Shutoff In the Event of a Power Failure
- Can Be Configured as a Single or Dual Liquid Feed Assembly

Oil Recovery Options (See Page 6)

- Standard Model – No Oil Recovery for Brine System
- Oil Pot with Heater – ASME, 600PSIG (As Shown)
- Oil Rectifier System

RVS Recirculation Pumps

- Manufactured by Teikoku – Double Containment, Seal-less, Leak Proof, Hermetic Pumps
- Bearing Wear Monitor at the Pump and on the Matrix II Display Screen
- Secondary Containment System Eliminates Leaks to Atmosphere
- Low NPSH with Capacities from 60-350 GPM in 460 or 575 Volt Service, CSA Approved
- Motor Cooling, Individual Pump Minimum Flow and Bypass Lines, and Piped Internal to the Main Vessel



(2) Pumps–Standard

RVS Quality

- Surfaces Prepped to SSPC-SP6
- Vessel Hydrostatically Pressure Tested in Accordance with ASME BPVC, Section VIII, Div. 1
- Factory Package Piping Welded and Tested in Accordance with ASME B31.5
- Entire Assembly is Fully Evacuated to Eliminate Moisture and Charged With Dry Nitrogen
- Entire Assembly is Coated With a High Solids Epoxy Paint
- Controls Wired, Programmed, and Tested
- Exclusive and Comprehensive 3 Year Warranty when Equipped with the Matrix II Microprocessor Control Panel

Options

- Larger Vessel Diameters
- Corrosion Allowance on Vessel Shell, Heads and/or Nozzles
- Post Weld Heat Treatment (PWHT)
- Stainless Steel Vessel, Oil Pot, and/or Level Column Construction
- SA333 Grade 6 LowTemperature or Stainless Steel Piping
- Non-Destructive Examination of Pipe Welds
- Seismic Design Calculations
- Electromechanical Control Panel with Starters and Disconnects

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 evaporator 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 4, select the pumps with sufficient gpm capacity.

STEP 5: From Table 5, select the RVS Liquid Feed Assembly (LFA) model number (Optional).

STEP 6: See page 6 for Oil Recovery Options and specify desired type.

WHEN ORDERING PLEASE SPECIFY:

Recirculator model number and pump. Please include total required capacity in tons of refrigeration, saturated suction temperature, recirculation rate, surge volume, liquid feed temperature, voltage/frequency, liquid feed assembly (LFA) model number (optional), and type of oil recovery option.

Table 1A MRPC VERTICAL RECIRCULATOR CAPACITIES - TONS OF REFRIGERATION CO2

MODEL NO.	EVAPORATOR TEMPERATURE °F							
	20°F	10°F	0°F	-10°F	-20°F	-30°F	-40°F	-50°F
MRPC-24V	154	145	136	126	117	108	98.7	89.6
MRPC-30V	245	230	216	201	186	171	157	142
MRPC-36V	352	331	310	289	268	246	225	204
MRPC-42V	478	455	422	393	364	335	306	277
MRPC-48V	630	593	556	519	480	441	403	366
MRPC-54V	796	749	702	655	606	557	509	462
MRPC-60V	981	923	865	807	747	687	628	570
MRPC-72V	1408	1325	1243	1159	1072	986	901	818
MRPC-84V	1925	1811	1699	1584	1466	1348	1232	1118

Capacities based on +20°F liquid supply temperature

Table 1B MRPC HORIZONTAL RECIRCULATOR CAPACITIES - TONS OF REFRIGERATION CO2

MODEL NO.	EVAPORATOR TEMPERATURE °F							
	20°F	10°F	0°F	-10°F	-20°F	-30°F	-40°F	-50°F
MRPC-24H	154	145	136	126	117	108	98.7	89.6
MRPC-30H	245	230	216	201	186	171	157	142
MRPC-36H	352	331	310	289	268	246	225	204
MRPC-42H	478	455	422	393	364	335	306	277
MRPC-48H	630	593	556	519	480	441	403	366
MRPC-54H	796	749	702	655	606	557	509	462
MRPC-60H	981	923	865	807	747	687	628	570
MRPC-72H	1408	1325	1243	1159	1072	986	901	818
MRPC-84H	1925	1811	1699	1584	1466	1348	1232	1118

Capacities based on +20°F liquid supply temperature

SURGE VOLUME - OPERATING CHARGE - WEIGHT

Table 2A

MODEL NO.	VERTICAL PACKAGE		
	Surge Volume Cubic Feet (Ft^3)	Operating Charge Cubic Feet (Ft^3)	Shipping Weight LBS. (Approx.)
MRPC-24V	11.6	2.8	4160
MRPC-30V	19.3	4.2	4825
MRPC-36V	27.4	5.8	6140
MRPC-42V	52.6	10.3	8435
MRPC-48V	71.7	13.1	9385
MRPC-54V	88.1	15.8	11355
MRPC-60V	110.1	19.4	14280
MRPC-72V	142.2	37.2	21270
MRPC-84V	192.3	48.2	28610

Table 2B

MODEL NO.	HORIZONTAL PACKAGE		
	Surge Volume Cubic Feet (Ft^3)	Operating Charge Cubic Feet (Ft^3)	Shipping Weight LBS. (Approx.)
MRPC-24H	6.9	8.9	4860
MRPC-30H	13.2	12.3	5425
MRPC-36H	21.2	15.9	6565
MRPC-42H	33.8	17.1	8500
MRPC-48H	49.4	18.6	9605
MRPC-54H	60.8	26.3	11505
MRPC-60H	81.2	27.6	14930
MRPC-72H	122.0	38.5	21515
MRPC-84H	183.1	41.4	30590

Table 3

CONVERSION CHART - GALLONS/MINUTE/TON OF REFRIGERATION CO2

OVERFEED RATE	EVAPORATOR TEMPERATURE °F							
	20°F	10°F	0°F	-10°F	-20°F	-30°F	-40°F	-50°F
1:1	0.231	0.212	0.197	0.184	0.173	0.167	0.155	0.147
1.2:1	0.2772	0.2544	0.2364	0.2208	0.2076	0.2004	0.186	0.1764
1.8:1	0.4158	0.3816	0.3546	0.3312	0.3114	0.3006	0.279	0.2646
2:1	0.462	0.424	0.394	0.368	0.346	0.334	0.31	0.294
3:1	0.693	0.636	0.591	0.552	0.519	0.501	0.465	0.441

Table 4

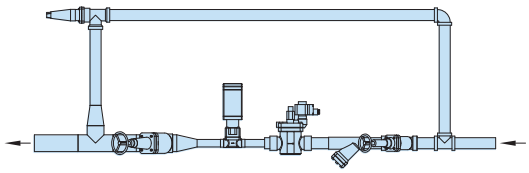
TEIKOKU/RVS PUMP SELECTIONS

MODEL NO.	MAX. GPM	PSID	HP	MIN. FLOW
RVSCO2-60-60-5	60	62	5.2	21
RVSCO2-155-60-12	155	60	12.3	45
RVSCO2-225-60-23	225	67	22.8	92
RVSCO2-350-60-23	350	61	22.8	185

NOTE: Maximum GPM is the pump capacity available to the system when using the Matrix II Microprocessor™ Control Panel. If the Matrix II is not used, subtract the MIN. FLOW from the MAX. GPM to get the available system GPM.

RVS has selected a complete line of low NPSHR, "canned" (heremetic), seal-less, low-probability pumps for industrial refrigeration service manufactured by Teikoku. All pumps feature and include 300 Class ANSI flanges and include a secondary containment system which prevents any leakage to atmosphere. All pumps also feature a bearing wear monitor / indicator on the pump housing to measure and display bearing wear. When supplied with the Matrix II, the bearing wear monitoring system is simultaneously displayed on the easy to see and access color HMI touch screen on the Matrix II panel. The Matrix II provides continuous monitoring along with bearing wear safety cutouts, auto pump switching, and alarms.

RVS CO2 LIQUID FEED ASSEMBLY (LFA)



Single Liquid Feed Assembly (LFA) with Motorized Valve

Liquid Feed Assembly (factory assembled) includes a motorized valve, solenoid valve (120 volt), strainer, two globe shut-off valves, and one angle hand expansion bypass valve.

Table 5 SINGLE FEED ASSEMBLY - **DANFOSS** - MOTORIZED +20°F LFT

MODEL NO.	INLET LINE SIZE	TR @ 0°F	TR @ -20°F	TR @ -40°F
DM-075-C	3/4"	38	42	41
DM-100-C	1"	49	68	68
DM-125-C	1-1/4"	116	116	116
DM-150-C	1-1/2"	156	156	155
DM-200-C	2"	250	250	249
DM-250-C	2-1/2"	417	417	414
DM-300-C	3"	574	575	571

Table 5 is mass flow based on using the stated Liquid Feed Temperature (LFT) and show Tons of Refrigeration (TR) at the stated evaporating (saturated suction) temperature.

Dual Motorized Liquid Feed Assemblies are available - contact your local Representative or the Factory.

MRPC OIL RECOVERY OPTIONS

BASE MODEL – NO OIL RECOVERY

The base model MRPC recirculation package does not include any oil recovery. This is suited for a volatile brine type system where there is no compression or where oil recovery is accomplished by other means.

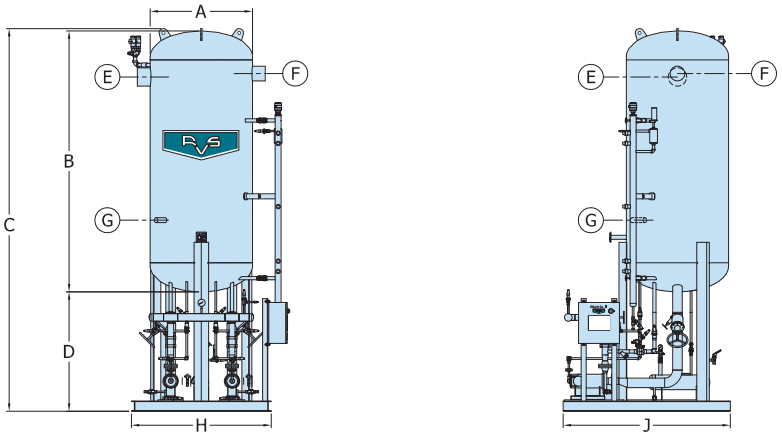
OIL POT WITH HEATER

For liquid recirculation systems with compression, an oil pot with immersion heater, interconnecting piping and valves is available as an option. The oil pot overpressure relief assembly is not included and must be supplied by others.

OIL RECTIFIER SYSTEM

For low temperature liquid recirculation systems with compression using a POE, fully miscible type oil, an oil rectifier (heat exchanger) with oil reservoir, interconnecting piping and valves is available as an option. The typical arrangement includes the oil reservoir mounted at an elevation on the vessel suitable for gravity draining the oil return to the compressor at floor level. The oil rectifier is supplied with inlet / outlet connections requiring a supply of warm CO2 liquid for operation. The oil reservoir overpressure relief assembly is not included and must be supplied by others.

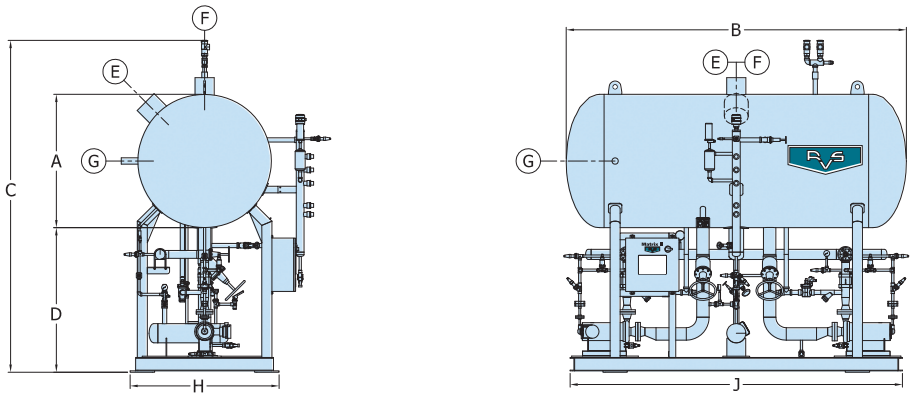
MRPC RECIRCULATOR SYSTEM – VERTICAL



MODEL NUMBER	A Vessel Diameter	B Vessel Length	C Overall Height	D Floor to Btm of Vessel	E Wet Return	F Gas Outlet	G Liquid Make-Up	H Base Width	J Base Length
MRPC-24V	24	112-1/2	181	64	5	4	2	60	89
MRPC-30V	30	115	185	66	6	5	2-1/2	73	96
MRPC-36V	36	118	188	66	8	6	2-1/2	76	102
MRPC-42V	42	144	213	66	8	6	3	82	105
MRPC-48V	48	147	220	70	8	8	3	82	92
MRPC-54V	54	150	223	70	10	8	4	82	95
MRPC-60V	60	153	224	70	10	8	4	82	98
MRPC-72V	72	159	237	78	12	10	4	86	115
MRPC-84V	84	165	247	82	14	12	5	96	126

All dimensions are given in inches and are for reference only. Consult factory for certified drawing.

MRPC RECIRCULATOR SYSTEM – HORIZONTAL



MODEL NUMBER	A Vessel Diameter	B Vessel Length	C Overall Height	D Floor to Btm of Vessel	E Wet Return	F Gas Outlet	G Liquid Make-Up	H Base Width	J Base Length
MRPC-24H	24	135-1/2	112	78	5	4	2	61	135-1/2
MRPC-30H	30	138	115	75	6	5	2-1/2	61	135-1/2
MRPC-36H	36	141	118	72	8	6	2-1/2	61	135-1/2
MRPC-42H	42	144	118	66	8	6	3	61	135-1/2
MRPC-48H	48	147	124	66	8	8	3	61	135-1/2
MRPC-54H	54	150	130	66	10	8	4	65	135-1/2
MRPC-60H	60	153	135	65	10	8	4	67	149-1/2
MRPC-72H	72	159	159	77	12	10	4	87	159
MRPC-84H	84	165	177	83	14	12	5	81	165

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EVAPCO Products are Manufactured Worldwide.

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