



# MVI

## MATRIX VERTICAL INTERCOOLER PACKAGE

FEATURING THE  
**Matrix LLC**  
LIQUID LEVEL CONTROL PANEL



MEMBER  
**iiar** International  
Institute of  
Ammonia Refrigeration

**IARW** International Association of  
Refrigerated Warehouses

***Technology for the Future, Available Today!***



# MVI Matrix Vertical Intercooler Package

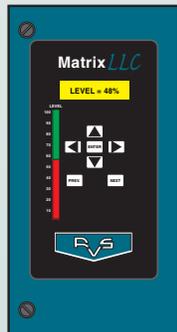
The Matrix Vertical Intercooler Package (MVI) has been engineered for two stage refrigeration systems to provide total refrigerant liquid / vapor separation for high stage compressor protection, flash cooled or subcooled liquid supply to the low side, desuperheating of the low stage booster compression gas, oil collection, and liquid level control in a complete factory assembled, tested, and ready to install product - reducing installation time and total equipment cost compared to field fabricated units. At the heart of the MVI Package is the Matrix LLC (Liquid Level Control) Panel which provides automated refrigerant liquid level control within the intercooler vessel.

The MVI utilizes the highest quality and most advanced components in the industry. All components are maintained in inventory to enable fast, on-time shipments. Custom MVI sizes and arrangements are available - contact the factory for assistance.

## Matrix LLC Liquid Level Control Panel

### Features:

- Microprocessor Technology in a NEMA4 Steel Enclosure, UL/cUL Listed
- Single Power Connection Required
- Door Mounted (7) Button Keypad
- Easy to Read 16 Character Alphanumeric Display with LED Dual Color Bar Graph
- Reads 4-20mA Signal From Level Probe and Provides Visual Readout in Digital Display and Color Bar Graph
- High and Low Level Alarms and Cutouts
- Two 4-20mA Analog Outputs for Control of Proportional Feed Valve(s)
- Built in Transformer for 24VAC or 24VDC Power to Motorized Valve
- Remote Communication and Control Via MOD-BUS RTU Over RS-485
- See RVS Bulletin 515 for More Information on Matrix LLC



### 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

### Proportional Liquid Feed Assembly (Optional - Not Shown)

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



### ASME, 250 PSIG, Intercooler Vessel

- National Board Registration
- Vertical Vessel Configuration Available From 16" to 144" Outside Diameter
- Dual Safety Relief Valve Assembly Set at 250 PSIG (Shipped Loose)
- Pump Vent, Oil Pot Vent and Oil Pot Relief Piping Internally Routed to Vessel Vapor Space
- Stainless Steel Nameplate Bracket and Standoff to Prevent Corrosion

### #6 Liquid Level Column

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

### ASME, 400 PSIG, Oil Pot

- Oil Pot Mounted and Piped With All Required Service Valves
- Single, Replaceable Cartridge Style, Safety Relief Valve
- Relief Valve Discharge Piped Internal to the Main Vessel Vapor Space
- Optional Dual Relief Assembly

### Options

- 300 or 350 PSIG Vessel Design Rating
- Sub-Cooling Coil
- Stainless Steel Vessel, Oil Pot, and/or Level Column Construction
- Corrosion Allowance on Vessel Shell, Heads, and/or Nozzles
- Post Weld Heat Treatment (PWHT)
- SA333 Grade 6 Low Temperature or Stainless Steel Piping
- Non-Destructive Examination of Pipe Welds
- 1.5 kw Oil Pot Heater (Service by Others)
- Seismic Design Calculations



**SELECTION PROCEDURE**

**STEP 1:** From Table 1, select a model with capacity equal to or greater than the required high stage refrigeration tons at the given high stage compressor suction temperature.

**STEP 2:** Determine the method of pre-cooling the liquid feed to the low temperature side of the system. The standard method of pre-cooling is to flash cool the liquid directly into the intercooler vessel. This method provides for the most economical equipment and operating cost. An optional method is to sub-cool the liquid utilizing a pipe coil inside the intercooler vessel. The sub-cooling pipe coil is required for applications where the liquid is being fed to remote locations. If a sub-cooling coil is required, add a 'C' to the model number (i.e., MVIC-36).

**STEP 3:** Available surge volume is listed in Table 2 for both flash and sub-cooled coil type intercoolers. If the intercooler is handling high temperature evaporator return and/or low temperature defrost return loads, consideration must be given to the required surge volume when making a vessel selection (in addition to the required high stage refrigeration tons). Consult factory for assistance.

**STEP 4:** If desired, an optional factory supplied liquid feed valve assembly can be ordered. From Table 3A or 3B, select the liquid feed assembly model with capacity that meets the application. 1) For flash type intercoolers, select the liquid feed assembly to meet the total high stage capacity requirements, less any high temperature evaporator loads which are not fed from the intercooler. 2) For sub-cooled type intercoolers with coil, select the liquid feed assembly to meet the sub-cooling and booster desuperheating loads only. This load can be closely approximated by multiplying the total booster capacity by 0.25. Consult factory for assistance.

**WHEN ORDERING SPECIFY:**

1) Intercooler vessel model number (i.e., MVI-36) for a flash cooled type. For a sub-cooled type intercooler with coil, add a 'C' to the intercooler model (i.e., MVIC-36). 2) The total required high stage compressor capacity in tons of refrigeration, the saturated suction temperature, and the required surge volume. 3) If an optional liquid feed assembly is required, specify the model required from Table 3A or 3B, hand wheel or seal cap valves, Danfoss or Hansen, and single or dual feed arrangement. If dual feed, specify if an equal 50/50 split or primary/secondary split.

**Table 1  
MVI INTERCOOLER CAPACITIES**

MODEL NO.	Tons of Refrigeration R-717*			
	High Stage Suction Temperature (F)			
	+30°F	+20°F	+10°F	0°F
MVI-16	54	49	44	39
MVI-20	87	79	71	63
MVI-24	127	116	104	92
MVI-30	201	183	165	146
MVI-36	292	266	239	213
MVI-42	400	365	328	291
MVI-48	525	479	431	382
MVI-54	661	603	542	481
MVI-60	819	747	672	596
MVI-72	1,179	1,074	966	858
MVI-84	1,612	1,470	1,322	1,173
MVI-96	2,114	1,927	1,733	1,539
MVI-108	2,671	2,435	2,190	1,944
MVI-120	3,279	2,990	2,689	2,387
MVI-144	4,749	4,330	3,894	3,457

\* Capacities based on +95°F liquid supply temperature

**Table 2  
SURGE VOLUME, OPERATING CHARGE, WEIGHT**

MODEL NO.	Flash Cooled Type Intercooler			MODEL NO.	Sub-Cooled With Coil Type Intercooler		
	Surge Volume Cubic Feet (Ft³)	Operating Charge Cubic Feet (Ft³)	Shipping Weight Lbs. (Approx.)		Surge Volume Cubic Feet (Ft³)	Operating Charge Cubic Feet (Ft³)	Shipping Weight Lbs. (Approx.)
MVI-16	5.2	2.1	1,750	MVIC-16	2.9	4.4	1,920
MVI-20	9.8	2.6	2,025	MVIC-20	6.6	5.8	2,240
MVI-24	14.3	3.9	2,330	MVIC-24	7.1	11.0	2,750
MVI-30	22.2	6.4	2,720	MVIC-30	10.5	18.0	3,405
MVI-36	31.6	9.5	3,320	MVIC-36	11.9	29.3	4,330
MVI-42	68.1	13.4	4,320	MVIC-42	37.9	43.6	5,705
MVI-48	87.3	18.1	5,050	MVIC-48	58.9	46.6	6,820
MVI-54	111.1	23.4	6,675	MVIC-54	63.8	70.6	8,650
MVI-60	139.2	28.2	7,485	MVIC-60	79.1	88.3	9,850
MVI-72	197.9	40.5	11,015	MVIC-72	104.7	133.8	14,050
MVI-84	277.0	55.4	13,480	MVIC-84	124.5	207.9	17,650
MVI-96	355.0	76.1	17,145	MVIC-96	175.5	255.7	22,460
MVI-108	443.3	101.8	22,475	MVIC-108	180.4	364.7	29,150
MVI-120	541.2	121.2	31,905	MVIC-120	164.5	497.9	40,100
MVI-144	766.0	173.8	45,250	MVIC-144	238.3	701.4	56,700

**Table 3A  
SINGLE FEED ASSEMBLY - DANFOSS MOTORIZED VALVE**

MODEL NO.**	TONS	INLET LINE	VALVE SIZE	PORT SIZE
DMHT-075	53	3/4"	1"	3/4"
DMHT-100	104	1"	1"	3/4"
DMHT-125	225	1-1/4"	1"	3/4"
DMHT-150	345	1-1/2"	1"	3/4"
DMHT-200	677	2"	1-1/2"	1-1/4"
DMHT-250	1277	2-1/2"	2"	1-1/2"
DMHT-300	2243	3"	3"	2-1/2"
DMHT-400	2554	4"	3"	2-1/2"

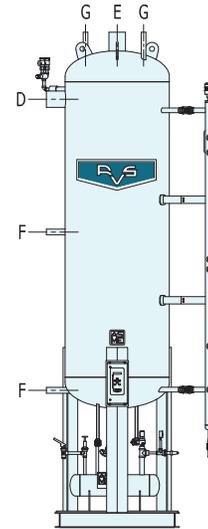
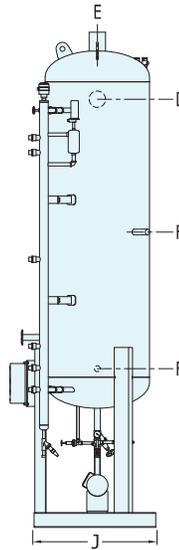
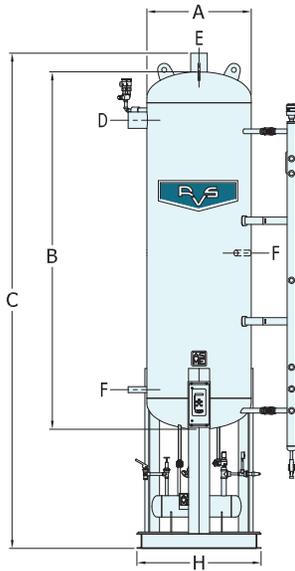
Sealed Motor Liquid Feed Assembly (Assembled) Including Danfoss Sealed Motor Valve (24VDC), Solenoid Valve (120V), Strainer, (2) Globe Isolation Valves, and (1) Angle Bypass Valve

\*\* For Hansen valves, replace the 'D' in the model number with an 'H' (i.e., HMHT-075)

**Table 3B  
SINGLE FEED ASSEMBLY - DANFOSS HAND EXPANSION VALVE**

MODEL NO.**	TONS	INLET LINE	VALVE SIZE
DHXHT-075	37	3/4"	3/4"
DHXHT-100	73	1"	3/4"
DHXHT-125	158	1-1/4"	1-1/4"
DHXHT-150	242	1-1/2"	1-1/2"
DHXHT-200	474	2"	2"
DHXHT-250	894	2-1/2"	2-1/2"
DHXHT-300	1113	3"	2-1/2"

Hand Expansion Liquid Feed Assembly (Assembled) Including Danfoss Hand Expansion Valve, Solenoid Valve (120V), Strainer, (2) Globe Isolation Valves, and (1) Angle Bypass Valve



**VERTICAL INTERCOOLER PACKAGE**

**WITH OPTIONAL SUB-COOLING COIL**

MODEL No.	A VESSEL DIAMETER	B VESSEL LENGTH	C OVERALL HEIGHT	D BOOSTER DISCHARGE	E DRY GAS OUTLET	F LIQUID IN/OUT	H BASE WIDTH	J BASE LENGTH
MVI-16	16	96	152	3	3	1	44	41
MVI-20	20	108	164	3	3	1	44	25
MVI-24	24	112-1/2	169	4	4	1-1/4	44	28
MVI-30	30	115	171	5	5	1-1/4	44	34
MVI-36	36	118	174	6	6	1-1/2	44	36
MVI-42	42	144	200	6	6	2	50	49
MVI-48	48	147	203	8	8	2	56	52
MVI-54	54	150	206	8	8	2	62	58
MVI-60	60	153	209	8	8	2-1/2	70	65
MVI-72	72	159	215	10	10	3	80	77
MVI-84	84	165	220	10	10	3	73	73
MVI-96	96	171	226	12	12	4	81-1/2	81-1/2
MVI-108	108	177	235	12	12	4	95	95
MVI-120	120	183	241	14	14	4	103-1/2	103-1/2
MVI-144	144	195	255	16	16	5	124-1/2	124-1/2

MODEL No.	G COIL IN/OUT
MVIC-16	3/4
MVIC-20	3/4
MVIC-24	1
MVIC-30	1-1/4
MVIC-36	1-1/2
MVIC-42	1-1/2
MVIC-48	1-1/2
MVIC-54	2
MVIC-60	2
MVIC-72	3
MVIC-84	3
MVIC-96	4
MVIC-108	4
MVIC-120	5
MVIC-144	6

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

**Refrigeration Vessels & Systems Corporation**

*A wholly owned subsidiary of EVAPCO, Inc.*

1520 Crosswind Dr. • Bryan, TX 77808 USA

PHONE: 979-778-0095 • FAX: 979-778-0030 • E-MAIL: sales@rvscorp.com • www.rvscorp.com

**EVAPCO, Inc. — World Headquarters & Research/Development Center**

EVAPCO, Inc. • P.O. Box 1300 • Westminster, MD 21158 USA

PHONE: 410-756-2600 • FAX: 410-756-6450 • E-MAIL: marketing@evapco.com

**EVAPCO North America**

**EVAPCO, Inc.**  
**North American Headquarters**  
 P.O. Box 1300  
 Westminster, MD 21158 USA  
 Phone: 410-756-2600  
 Fax: 410-756-6450  
 E-mail: marketing@evapco.com

**EVAPCO South America**

**EVAPCO Brasil**  
**Equipamentos Industriais Ltda.**  
 Al. Vênus, 151 – CEP: 13347-659  
 Indaiatuba – São Paulo – Brasil  
 Phone: (55+11) 5681-2000

**EVAPCO Europe**

**EVAPCO Europe BVBA**  
**European Headquarters**  
 Heersterveldweg 19  
 Industrierrein Oost  
 3700 Tongeren, Belgium  
 Phone: (32) 12-395029  
 Fax: (32) 12-238527  
 E-mail: evapco.europe@evapco.be

**EVAPCO Asia/Pacific**

**EVAPCO Asia/Pacific Headquarters**  
 Evapco (Shanghai) Refrigeration  
 Equipment Co., Ltd.  
 1159 Luoning Rd.,  
 Baoshan Industrial Zone  
 Shanghai 200949, P.R. China  
 Phone: (86) 21-6687-7786  
 Fax: (86) 21-6687-7008  
 E-mail: marketing@evapcochina.com

**EVAPCO...SPECIALISTS IN HEAT TRANSFER PRODUCTS AND SERVICES.**