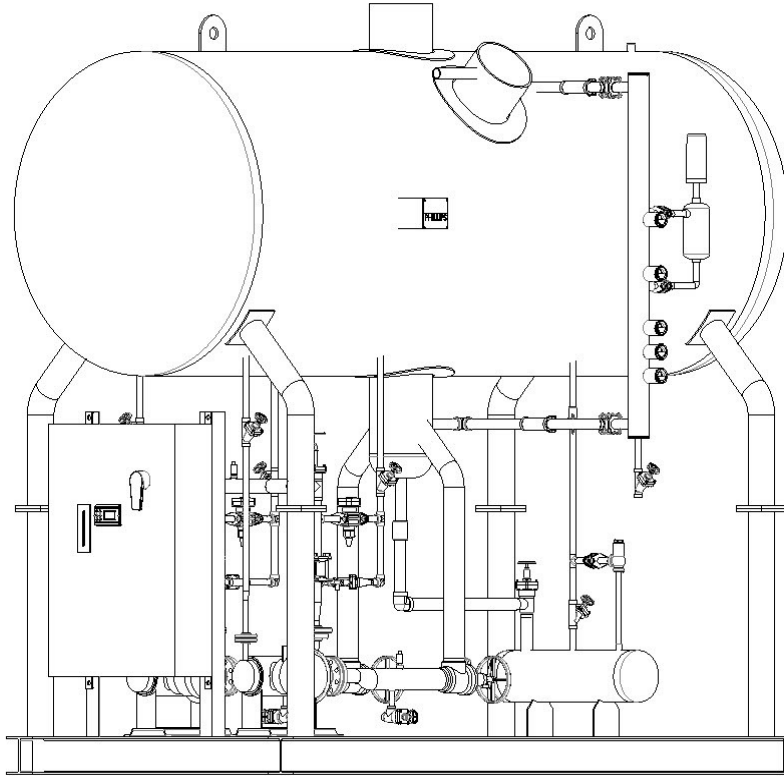


## HORIZONTAL AND VERTICAL PACKAGES

For Ammonia (R717) and Other Refrigerants



Phillips® mechanical pump recirculation packages are available in vessel sizes up to 144” diameter in both vertical and horizontal orientation. Each pump recirculation package is custom designed for optimum performance at customer’s operating conditions, and trimmed out to customer’s specification. Vessel and packaging design & construction meet all applicable codes including ASME Section VIII Division 1 Pressure Vessel Code, ASME B31.5 Refrigeration Piping Code, ASHRAE 15, and ANSI/IIAR 2.

**Recirculator Vessel:** Engineered to provide necessary surge volume, maintain adequate liquid-vapor separation velocity, and ensure dry gas for compressor suction return. Standard pressure rating is 250PSIG. Includes dual relief assembly shipped loose.

**Pumps:** Selected to meet given system flow requirements as a function of BTU removal and overfeed rate. Nikisso pump are standard, other makes available. Typical package design includes 2 pumps (1 as standby), with options for 3 or 4 pumps as dictated by economics or other considerations.

**Valves:** Standard design includes the use of Phillips check valves and Danfoss stop valves & bypass valves. Extended bonnet valves, in sizes where available, are provided for operating temperatures below -20°F. Customer can choose to use other manufacturer’s specialties.

**Level Column:** Standard offering includes valved and flanged vessel connections, (5) Phillips Level Eye sight glasses and mounted high level float switch, level probe connection on top and installed drain valve.

**Oil Pot:** 300 PSI ASME Code vessel, inlet and vent piped to recirculator vessel, provided with relief and combination stop valve-deadman valve.

**Base Structure:** Fully welded structural steel base



**Common Options:**

**Optional Liquid Makeup:** Multiple options available including solenoid-hand expansion, pulse-width valve, motorized valve or block valve, all with hand expansion bypass. All components optimized for customer's operating conditions.

**Optional Control Panel:** Standard Danfoss/AIMM control panel or completely custom-designed controls are available. Danfoss/AIMM offering includes:

- Optional control panel is UL/cUL listed
- Main power disconnect
- ATL pump starters
- Pump protection capabilities (cavitation detection using pressure transducers)
- Outputs for bypass solenoid and transfer solenoid
- Liquid level control with multi-valve makeup control capabilities
- RS485 serial communications
- Door mounted LED bar graph to indicate liquid level
- Built-in VFD fixed-speed control
- Easy to understand controller interface on the Danfoss MCX platform.
- Optional horn is available for audible alert to alarms

**Other Options:**

- Level Control Options:
  - Additional float switches on level column for low level alarm and/or operating level
  - Additional Level Eye sight glasses
  - Level probe
- Recirculator vessel Post Weld Heat Treat
- Low temperature piping components when necessary (ASME B31.5 low temp pipe exemption is used whenever allowed)
- Pressure ratings above 250PSIG
- Stainless steel oil pot
- Oil pot heater—1.5kW or 2kW with integral thermostat
- Pump selection at recirculation rates other than 3:1
- Factory wiring
- Special paint

## Sizing Information

Phillips engineers will optimize pump selection for your application. Pumps are typically sized for 30PSID. Please indicate if you have a different requirement at the time of quotation.

### PUMP CAPACITY REQUIREMENTS—NH3 FLOW GPM PER TON

OVERFEED RATE	EVAPORATOR TEMPERATURE (°F)								
	30°	20°	10°	0°	-10°	-20°	-30°	-40°	-50°
3 : 1	.206	.201	.196	.191	.186	.182	.178	.174	.171
4 : 1	.275	.268	.261	.254	.249	.243	.238	.232	.228
5 : 1	.412	.401	.391	.382	.373	.364	.356	.349	.342



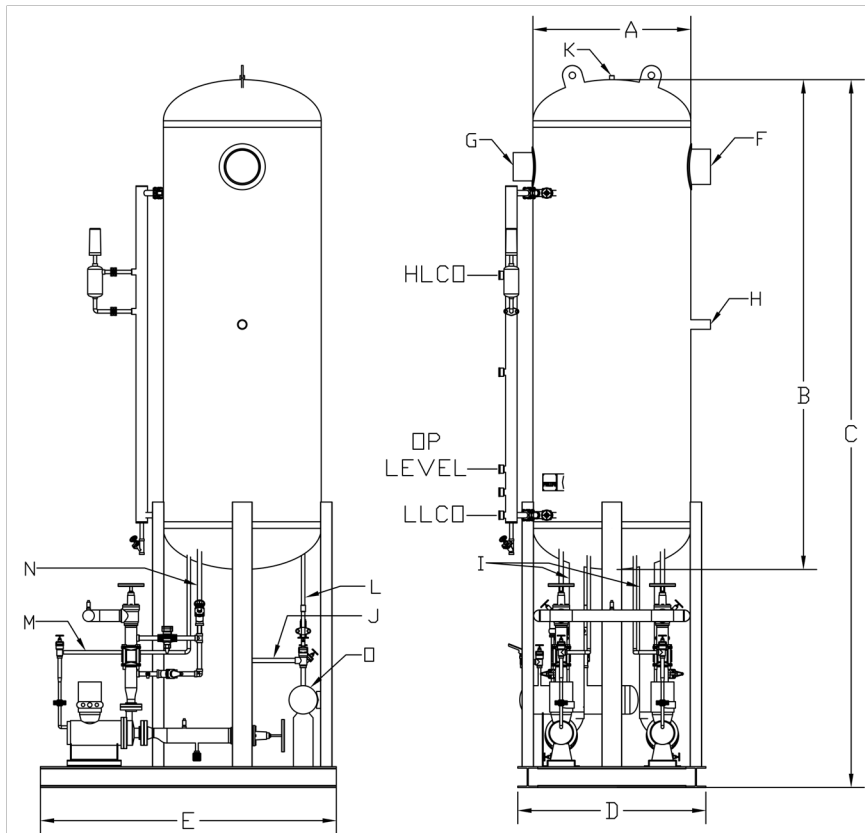
# Sizing Information—Vertical Package (Tons of Refrigeration)

	EVAPORATOR TEMPERATURE, °F									
	SINGLE STAGE*					TWO STAGE**				
	30	20	10	0	-10	-20	-20	-30	-40	-50
PVR24	172	155	138	123	109	96	114	100	87	75
PVR30	272	245	219	3195	173	152	181	158	138	119
PVR36	396	356	319	284	251	221	263	230	200	173
PVR42	543	488	437	389	344	303	360	316	274	237
PVR48	712	640	573	510	452	398	473	414	360	311
PVR54	896	806	721	642	569	501	595	521	453	391
PVR60	1110	999	894	796	705	621	738	646	562	485
PVR72	1597	1436	1286	1145	1014	893	1061	929	808	697
PVR84	2172	1953	1748	1557	1379	1214	1443	1264	1099	949
PVR96	2850	2563	2294	2043	1810	1593	1894	1659	1442	1245
PVR108	3602	3240	2900	2583	2288	2014	2394	2097	1823	1574
PVR120	4443	3996	3571	3186	2822	2484	2953	2586	2249	1941
PVR144	6389	5747	5144	4582	4058	3572	4247	3719	3234	2791

SURGE VOLUME CU. FT.	EST. SHIP WT LBS.
14.0	2700
20.7	3000
30.0	3400
55.0	4000
69.2	4400
83.2	5600
98.4	7100
121	9200
147	13700
220	15800
278	19800
292	24800
422	36600

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

\*\*Two stage capacities based on +20°F liquid supply



Model Number	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	LLCO*	OP LEVEL*	HLCO*
	OD	OAH	Pkg Ht	Base Width	Base Length	Wet Suction	Dry Suction	Liq. Feed	Pump Suction	Drain to Oil Pot**	Relief	Oil Pot Vent	Pump Vent/Cooling	Bypass	Oil Pot			
PVR24	24	113	179	60	72	6	5	1-1/4	4	1	1/2	3/4	3/4	3/4	8 x 36	2	16	73
PVR30	30	116	182	60	75	8	6	1-1/2	4	1	3/4	3/4	3/4	3/4	8 x 36	2	16	69
PVR36	36	119	185	72	78	8	6	2	4	1	3/4	3/4	3/4	3/4	8 x 36	2	16	69
PVR42	42	146	212	72	81	10	8	2-1/2	4	1	3/4	3/4	3/4	3/4	8 x 36	2	16	87
PVR48	48	149	215	72	84	10	10	2-1/2	4	1	3/4	3/4	3/4	3/4	8 x 36	2	16	84
PVR54	54	152	218	72	87	12	10	3	5	1	3/4	3/4	3/4	3/4	8 x 36	2	16	81
PVR60	60	155	221	72	90	12	12	3	5	1-1/4	3/4	3/4	3/4	1	10 x 36	2	16	78
PVR72	72	161	227	78	96	16	14	4	6	1-1/4	3/4	3/4	3/4	1	10 x 36	2	16	69
PVR84	84	167	233	90	104	18	16	5	8	1-1/2	3/4	1	3/4	1-1/4	12 x 36	2	16	63
PVR96	96	173	239	102	108	20	18	5	8	1-1/2	3/4	1	3/4	1-1/4	12 x 36	2	16	70
PVR108	108	179	245	114	114	20	20	6	10	1-1/2	1	1	3/4	1-1/4	12 x 36	2	16	70
PVR120	120	185	251	126	126	24	24	6	10	1-1/2	1	1	3/4	1-1/2	12 x 36	2	16	62
PVR144	144	197	263	150	150	24	24	8	12	1-1/2	1-1/4	1	3/4	1-1/2	12 x 36	2	16	62

\* Reference line for LLCO, Operating Level and HLCO is bottom head-shell seam

All dimensions are in inches

\*\*For temperatures below -20°F oil drain size is 1-1/2"



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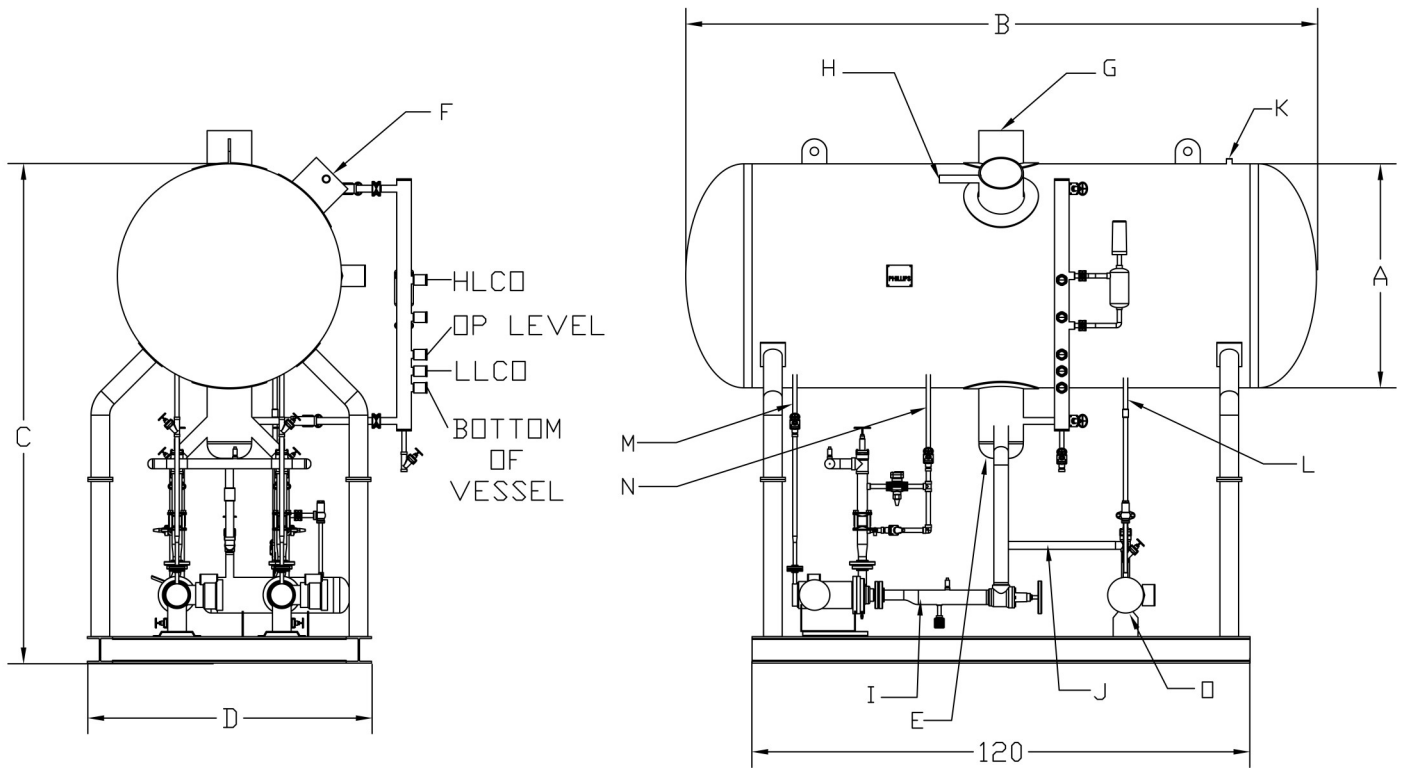
# Sizing Information—Horizontal Package (Tons of Refrigeration)

	EVAPORATOR TEMPERATURE, °F									
	SINGLE STAGE*					TWO STAGE**				
	30	20	10	0	-10	-20	-20	-30	-40	-50
PHR24	131	118	106	94	83	73	87	76	66	57
PHR30	202	182	163	145	128	113	134	117	102	88
PHR36	313	282	252	225	199	175	208	182	153	127
PHR42	419	377	337	301	266	234	279	244	212	183
PHR48	572	514	460	410	363	319	380	333	289	250
PHR54	737	663	594	529	465	405	477	418	363	313
PHR60	911	819	733	653	578	509	605	530	461	398
PHR72	1328	1194	1069	952	843	742	849	744	647	558
PHR84	1795	1615	1445	1287	1140	1004	1159	1015	883	762
PHR96	2354	2117	1895	1688	1495	1316	1518	1320	1148	998
PHR108	3031	2727	2345	2089	1850	1628	1936	1695	1474	1272
PHR120	3670	3301	2955	2631	2330	2052	2439	2136	1858	1603
PHR144	5421	4876	4365	3887	3443	3031	3604	3156	2744	2368

SURGE VOLUME CU. FT.	ESTIMATED SHIP WT LBS.
8.7	3100
14.8	3400
22.3	3900
28.7	4200
39.4	4600
50.6	5800
63.9	7300
90.2	9400
127	13700
168	15800
222	19600
276	24600
402	36200

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

\*\*Two stage capacities based on +20°F liquid supply



Model Number	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	LLCO*	OP LEVEL*	HLCO*
PHR24	24	137	90	60	6 x 30	6	5	1-1/4	4	1	3/4	3/4	3/4	3/4	8 x 36	4	6	12
PHR30	30	140	96	60	8 x 30	8	6	1-1/2	4	1	3/4	3/4	3/4	3/4	8 x 36	4	7	15
PHR36	36	143	102	60	10 x 34	8	6	1-1/2	4	1	3/4	3/4	3/4	3/4	8 x 36	4	8	18
PHR42	42	146	110	62	12 x 36	10	8	2	4	1	3/4	3/4	3/4	3/4	8 x 36	6	10	21
PHR48	48	149	116	65	14 x 36	10	8	2-1/2	4	1	3/4	3/4	3/4	3/4	8 x 36	6	11	24
PHR54	54	152	120	72	16 x 36	10	10	2-1/2	4	1	3/4	3/4	3/4	1	8 x 36	6	12	27
PHR60	60	155	126	72	16 x 36	12	10	3	5	1-1/4	3/4	3/4	3/4	1	10 x 36	6	13	30
PHR72	72	161	138	84	20 x 40	14	12	4	6	1-1/4	3/4	3/4	3/4	1	10 x 36	8	16	36
PHR84	84	167	156	96	24 x 48	16	16	4	8	1-1/2	3/4	1	3/4	1	12 x 36	8	18	42
PHR96	96	173	168	96	30 x 52	18	16	5	8	1-1/2	3/4	1	3/4	1-1/4	12 x 36	8	20	48
PHR108	108	179	180	96	30 x 52	20	18	5	8	1-1/2	1	1	3/4	1-1/4	12 x 36	8	21	54
PHR120	120	185	192	108	36 x 52	24	20	6	10	1-1/2	1	1	3/4	1-1/2	12 x 36	8	23	60
PHR144	144	197	216	120	36 x 52	24	24	8	12	1-1/2	1-1/4	1	3/4	1-1/2	12 x 36	8	27	72

\*Dimensions are taken from bottom of vessel

All dimensions are in inches

\*\*For temperatures below -20°F oil drain size is 1-1/2"

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