
**Valve Capacities
Metric Units**

Solenoid Valves

20 mm to 150 mm Port Size

Type HS4A, HS4W

Suction Line Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (bar)	HS4A								HS4W	
		Port Size (mm)									
		20	25	32	40	50	65	80	100	125	150
10	0.15	50	91	127	272	363	599	807	1,288	1,895	3,237
	0.20	57	104	146	313	417	689	928	1,481	2,180	3,724
	0.40	80	145	203	436	581	959	1,293	2,063	3,037	5,188
5	0.15	45	82	115	247	330	544	734	1,171	1,723	2,943
	0.20	52	95	133	284	379	625	843	1,346	1,981	3,383
	0.40	72	132	184	395	526	869	1,171	1,869	2,751	4,699
0	0.15	41	75	105	224	299	493	665	1,060	1,561	2,666
	0.20	47	86	120	257	343	566	763	1,218	1,793	3,062
	0.40	65	119	166	356	475	783	1,056	1,685	2,480	4,236
-5	0.15	37	67	94	202	270	445	600	957	1,408	2,406
	0.20	43	77	108	232	309	510	688	1,098	1,615	2,759
	0.40	59	106	149	319	426	702	947	1,511	2,224	3,800
-10	0.15	33	61	85	182	242	399	539	859	1,265	2,161
	0.20	38	69	97	208	277	458	617	984	1,449	2,475
	0.40	52	95	133	285	379	626	844	1,347	1,983	3,387
Kv		5.5	10	14	30	41	67	90	144	209	357

Continued on next page.

Metric
Ammonia

Solenoid Valves

20 mm to 150 mm Port Size
Type HS4A, HS4W

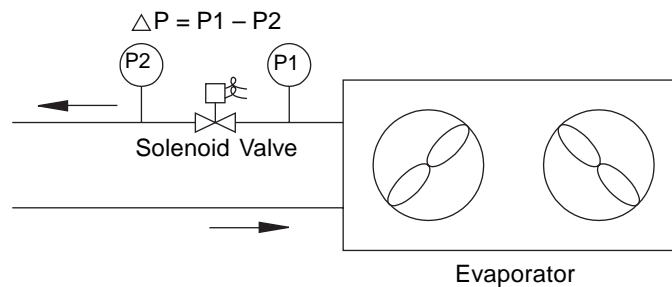
Suction Line Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (bar)	HS4A								HS4W	
		Port Size (mm)									
		20	25	32	40	50	65	80	100	125	150
-15	0.15	30	54	76	162	222	362	487	779	1,130	1,931
	0.20	34	62	87	185	254	414	556	890	1,292	2,207
	0.40	46	84	118	252	344	562	755	1,209	1,754	2,996
-20	0.15	26	48	67	144	197	322	432	692	1,004	1,715
	0.20	30	55	77	164	225	367	493	789	1,145	1,956
	0.40	40	74	103	221	302	493	662	1,060	1,538	2,627
-25	0.15	23	42	59	127	174	284	382	611	886	1,514
	0.20	27	48	67	145	198	323	434	694	1,007	1,720
	0.40	35	64	89	191	262	427	574	919	1,333	2,277

Suction Line Valve Capacities: Two-Stage System (kW Ammonia)

-30	0.15	24	44	61	131	179	292	392	627	911	1,555
	0.20	27	49	69	148	202	330	444	710	1,030	1,760
	0.40	35	64	90	192	262	428	576	921	1,337	2,283
-35	0.15	21	38	53	113	155	253	340	544	790	1,350
	0.20	23	42	59	127	174	285	382	612	888	1,517
	0.40	29	54	75	161	220	359	482	772	1,120	1,913
-40	0.15	18	32	45	97	133	217	292	467	677	1,157
	0.20	20	36	51	108	148	242	325	520	754	1,289
	0.40	24	44	61	131	179	292	393	628	912	1,557
Kv		5.5	10	14	30	41	67	90	144	209	357

Notes: Conditions for evaporator temperatures are based on the evaporator temperature shown and 30°C liquid. Capacity changes 3% for each 5.6°C increase or decrease in liquid temperature. Capacities for evaporator temperatures between -25°C and -40°C are based on -10°C liquid temperature. (Example: Flooded evaporator). For pressure drop across the valve less than 0.15 bar, use HS9B, HCK2, or HCK5 Gas-Powered Check Valves. For liquid overfeed evaporator suction between normal 2:1 to 5:1 rate, add 20% to the evaporator load or use the next larger port size to accommodate liquid volume accompanying the suction gas and to reduce impact velocity.



Ammonia

Metric

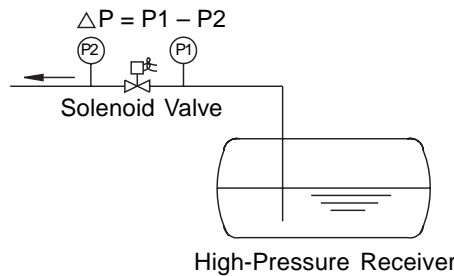
Solenoid Valves

4 mm to 150 mm Port Size
Type HS6, HS7, HS4A, HS4W

High Pressure Liquid Line Valve Capacities (kW Ammonia)

Pressure Drop Across Valve (bar)	HS6	HS8	HS7			HS4A						HS4W			
	Port Size (mm)														
	4	13	20	25	32	20	25	32	40	50	65	80	100	125	150
0.2	38	273	765	983	1,530	601	1,093	1,530	3,278	4,480	7,320	9,833	15,733	22,835	39,005
0.3	47	335	937	1,204	1,873	736	1,338	1,873	4,014	5,486	8,965	12,043	19,269	27,967	47,771
0.4	54	386	1,082	1,391	2,163	850	1,545	2,163	4,635	6,335	10,352	13,906	22,250	32,293	55,161
0.5	60	432	1,209	1,555	2,418	950	1,727	2,418	5,182	7,083	11,574	15,547	24,876	36,105	61,672
Kv	0.35	2.5	7	9	14	5.5	10	14	30	41	67	90	144	209	357

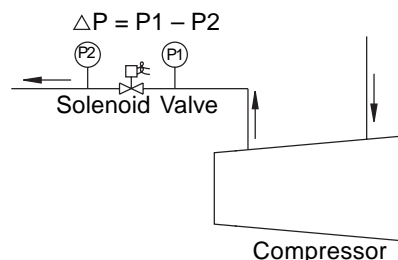
Notes: Ammonia capacities are based on +25°C liquid temperature and -10°C evaporator temperature, and no flashing through the valve.



High Pressure Discharge Line Valve Capacities (kW Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HS6	HS8	HS7			HS4A						HS4W			
			Port Size (mm)														
			4	13	20	25	32	20	25	32	40	50	65	80	100	125	150
25	55	0.15	3.8	27	75	96	150	59	107	150	322	439	718	965	1,544	2,240	3,827
		0.20	4.3	31	86	111	173	68	123	173	370	506	827	1,111	1,778	2,581	4,408
		0.40	6.1	43	121	156	242	95	173	242	519	709	1,159	1,557	2,492	3,616	6,177
		0.60	7.3	52	147	189	294	115	210	294	630	861	1,407	1,890	3,023	4,388	7,496
30	60	0.15	4.0	28	79	102	159	62	113	159	340	465	760	1,021	1,633	2,370	4,049
		0.20	4.6	33	91	118	183	72	131	183	392	536	876	1,176	1,882	2,732	4,666
		0.40	6.4	46	128	165	257	101	183	257	550	752	1,229	1,650	2,641	3,833	6,547
		0.60	7.8	56	156	201	312	123	223	312	668	914	1,493	2,005	3,209	4,657	7,954
35	65	0.15	4.2	30	84	108	167	66	120	167	359	490	801	1,077	1,723	2,500	4,270
		0.20	4.8	34	97	124	193	76	138	193	414	565	924	1,241	1,986	2,882	4,923
		0.40	6.8	48	136	174	271	107	194	271	581	794	1,298	1,743	2,789	4,048	6,914
		0.60	8.2	59	165	212	330	130	236	330	707	966	1,578	2,120	3,392	4,924	8,410
Kv			0.35	2.5	7	9	14	5.5	10	14	30	41	67	90	144	209	357

Notes: Ammonia capacities are based on condensing temperatures, discharge gas temperature shown, and -10°C evaporator pressure. For evaporator temperatures between -40°C and +10°C capacities are within 3%.



Metric

Ammonia

Solenoid Valves

4 mm to 150 mm Port Size
Type HS6, HS8, HS7, HS4A, HS4W

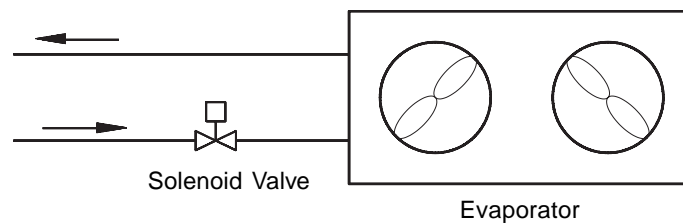
Pumped Liquid Line Valve Capacities (kW Ammonia; 4:1 Recirculation)

Pressure Drop Across Valve (bar)	HS6	HS8	HS7			HS4A						HS4W			
	Port Size														
	4	13	20	25	32	20	25	32	40	50	65	80	100	125	150
0.2	11	81	228	293	455	179	325	455	975	1,333	2,178	2,926	4,682	6,795	11,607
0.3	14	100	279	358	557	219	398	557	1,195	1,633	2,668	3,584	5,734	8,322	14,215
0.4	16	115	322	414	644	253	460	644	1,379	1,885	3,081	4,138	6,621	9,610	16,415
0.5	18	129	360	463	720	283	514	720	1,542	2,108	3,444	4,627	7,402	10,744	18,352
Kv	0.35	2.5	7	9	14	5.5	10	14	30	41	67	90	144	209	357

Notes: Ammonia capacities are based on -10°C liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%. Based on 4:1 recirculation. For other recirculation rates, divide 4 by the new recirculation rate and multiply values in table to arrive at new capacity.

Ammonia

Metric



Pressure Regulators

20 mm to 150 mm Port Size

Type HA4A, HA4W

Suction Line Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (bar)	HA4A										HA4W	
		Port Size (mm)											
		20 @ 25%	20 @ 50%	20	25	32	40	50	65	80	100	125	150
10	0.15	12	25	50	91	127	272	372	608	816	1,306	1,895	3,237
	0.20	14	29	57	104	146	313	428	699	939	1,502	2,180	3,724
	0.40	20	40	80	145	203	436	596	974	1,308	2,092	3,037	5,188
	0.60	24	48	96	175	245	526	719	1,174	1,577	2,524	3,663	6,256
	1.00	30	60	121	219	307	658	899	1,469	1,973	3,157	4,582	7,826
	1.50	35	71	142	258	361	773	1,057	1,727	2,320	3,712	5,387	9,202
5	0.15	11	23	45	82	115	247	338	552	742	1,187	1,723	2,943
	0.20	13	26	52	95	133	284	389	635	853	1,365	1,981	3,383
	0.40	18	36	72	132	184	395	540	882	1,185	1,895	2,751	4,699
	0.60	22	44	87	158	222	475	649	1,060	1,424	2,279	3,307	5,649
	1.00	27	54	108	197	275	590	806	1,318	1,770	2,832	4,110	7,021
	1.50	32	63	126	229	321	688	940	1,536	2,063	3,300	4,790	8,182
0	0.15	10	21	41	75	105	224	306	500	672	1,075	1,561	2,666
	0.20	12	24	47	86	120	257	352	575	772	1,235	1,793	3,062
	0.40	16	33	65	119	166	356	487	795	1,068	1,709	2,480	4,236
	0.60	20	39	78	142	199	426	583	952	1,279	2,046	2,970	5,073
	1.00	24	48	96	175	245	525	718	1,173	1,576	2,522	3,660	6,253
	1.50	28	55	111	202	282	605	827	1,352	1,816	2,905	4,217	7,203
-5	0.15	9.3	19	37	67	94	202	276	451	606	970	1,408	2,406
	0.20	11	21	43	77	108	232	317	518	696	1,113	1,615	2,759
	0.40	15	29	59	106	149	319	436	713	958	1,533	2,224	3,800
	0.60	17	35	70	127	178	380	520	850	1,141	1,826	2,650	4,527
	1.00	21	43	85	155	216	464	634	1,036	1,391	2,226	3,231	5,519
	1.50	24	48	96	175	246	526	719	1,175	1,579	2,526	3,666	6,261
-10	0.15	8.3	17	33	61	85	182	248	405	545	871	1,265	2,161
	0.20	10	19	38	69	97	208	284	464	624	998	1,449	2,475
	0.40	13	26	52	95	133	285	389	636	854	1,366	1,983	3,387
	0.60	15	31	62	112	157	337	460	752	1,011	1,617	2,347	4,009
	1.00	19	37	74	135	189	405	553	904	1,214	1,943	2,820	4,817
	1.50	21	41	82	150	210	450	615	1,004	1,349	2,159	3,133	5,351
Kv		1.38	2.75	5.5	10	14	30	41	67	90	144	209	357

Continued on next page

Metric Ammonia

Pressure Regulators

20 mm to 150 mm Port Size
Type HA4A, HA4W

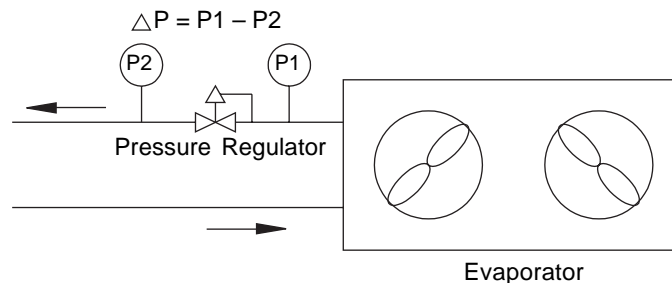
Suction Line Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (bar)	HA4A										HA4W	
		Port Size (mm)											
		20 @ 25%	20 @ 50%	20	25	32	40	50	65	80	100	125	150
-15	0.15	7.4	15	30	54	76	162	216	357	481	768	1,130	1,931
	0.20	8.5	17	34	62	87	185	247	408	550	878	1,292	2,207
	0.40	12	23	46	84	118	252	336	554	747	1,192	1,754	2,996
	0.60	14	27	54	98	138	295	394	650	877	1,399	2,059	3,516
	1.00	16	32	64	116	162	348	464	766	1,033	1,648	2,426	4,143
-20	0.15	6.6	13	26	48	67	144	192	317	428	682	1,004	1,715
	0.20	7.5	15	30	55	77	164	219	362	488	778	1,145	1,956
	0.40	10	20	40	74	103	221	294	486	655	1,045	1,538	2,627
	0.60	12	23	47	85	119	256	341	563	760	1,212	1,784	3,047
-25	0.15	5.8	12	23	42	59	127	170	280	377	602	886	1,514
	0.20	6.6	13	27	48	67	145	193	318	429	684	1,007	1,720
	0.40	8.8	18	35	64	89	191	255	421	568	906	1,333	2,277
	0.60	10	20	40	73	102	218	291	480	648	1,034	1,521	2,598

Suction Line Valve Capacities: Two Stage System (kW Ammonia)

-30	0.15	6.0	12	24	44	61	131	174	288	388	619	911	1,555
	0.20	6.8	14	27	49	69	148	197	325	439	700	1,030	1,760
	0.40	9	18	35	64	90	192	256	422	569	908	1,337	2,283
-35	0.15	5.2	10	21	38	53	113	151	250	336	537	790	1,350
	0.20	5.8	12	23	42	59	127	170	280	378	603	888	1,517
	0.40	7.4	15	29	54	75	161	214	354	477	761	1,120	1,913
-40	0.15	4.5	8.9	18	32	45	97	130	214	288	460	677	1,157
	0.20	5.0	10	20	36	51	108	144	238	321	513	754	1,289
	0.40	6.0	12	24	44	61	131	174	288	388	619	912	1,557
Kv		1.38	2.75	5.5	10	14	30	41	67	90	144	209	357

Notes: Conditions: Capacities for evaporator temperatures to -25°C are based on the evaporator temperature shown and +30°C liquid. Capacity changes 3% for each 5.6°C increase or decrease in liquid temperature. Capacities for evaporator temperatures between -25°C and -40°C are based on -10°C liquid temperature. (Example: Flooded evaporator). For liquid overfeed evaporator suction between normal 2:1 to 5:1 rate, add 20% to the evaporator load or use the next larger port size to accommodate liquid volume accompanying the suction gas and to reduce impact velocity. For pressure drop across the valve less than 0.15 bar, use HS9B, HCK2, or HCK5 Gas-Powered Check Valves.



Ammonia

Metric

Pressure Regulators

20 mm to 150 mm Port Size

Type HA4A, HA4W

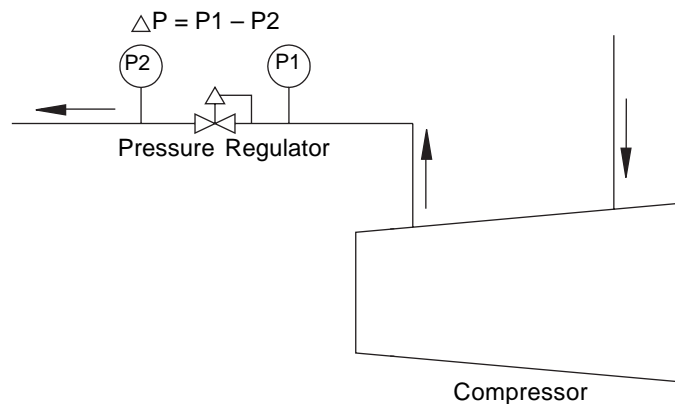
High Pressure Discharge Line Valve Capacities (kW Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HA4A									HA4W		
			Port Size (mm)											
			20 @ 25%	20 @ 50%	20	25	32	40	50	65	80	100	125	150
25	55	0.15	15	29	59	107	150	322	439	718	965	1,544	2,240	3,827
		0.20	17	34	68	123	173	370	506	827	1,111	1,778	2,581	4,408
		0.40	24	48	95	173	242	519	709	1,159	1,557	2,492	3,616	6,177
		0.60	29	58	115	210	294	630	861	1,407	1,890	3,023	4,388	7,496
		1.00	37	73	146	266	372	798	1,091	1,782	2,394	3,830	5,559	9,496
		2.00	49	99	197	358	502	1,075	1,469	2,400	3,224	5,159	7,488	12,790
30	60	0.15	16	31	62	113	159	340	465	760	1,021	1,633	2,370	4,049
		0.20	18	36	72	131	183	392	536	876	1,176	1,882	2,732	4,666
		0.40	25	50	101	183	257	550	752	1,229	1,650	2,641	3,833	6,547
		0.60	31	61	123	223	312	668	914	1,493	2,005	3,209	4,657	7,954
		1.00	39	78	156	283	396	849	1,161	1,896	2,547	4,076	5,916	10,105
		2.00	53	106	211	384	538	1,152	1,574	2,573	3,456	5,530	8,026	13,710
35	65	0.15	16	33	66	120	167	359	490	801	1,077	1,723	2,500	4,270
		0.20	19	38	76	138	193	414	565	924	1,241	1,986	2,882	4,923
		0.40	27	53	107	194	271	581	794	1,298	1,743	2,789	4,048	6,914
		0.60	32	65	130	236	330	707	966	1,578	2,120	3,392	4,924	8,410
		1.00	41	82	165	300	420	900	1,230	2,010	2,700	4,319	6,269	10,708
		2.00	56	113	225	409	573	1,228	1,678	2,743	3,684	5,895	8,556	14,615
Kv			1.38	2.75	5.5	10	14	30	41	67	90	144	209	357

Metric

Ammonia

Notes: Ammonia capacities are based on condensing temperatures, discharge gas temperature shown, and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 3%.



Pressure Regulators

20 mm to 150 mm Port Size
Type HA4A, HA4W

High Pressure Discharge Line Valve Capacities (kg/s Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HA4A										HA4W	
			Port Size (mm)											
			20 @ 25%	20 @ 50%	20	25	32	40	50	65	80	100	125	150
25	55	0.15	0.01	0.03	0.05	0.09	0.13	0.28	0.39	0.63	0.85	1.36	1.98	3.38
		0.20	0.01	0.03	0.06	0.11	0.15	0.33	0.45	0.73	0.98	1.57	2.28	3.89
		0.40	0.02	0.04	0.08	0.15	0.21	0.46	0.63	1.02	1.37	2.20	3.19	5.45
		0.60	0.03	0.05	0.10	0.19	0.26	0.56	0.76	1.24	1.67	2.67	3.87	6.62
		1.00	0.03	0.06	0.13	0.23	0.33	0.70	0.96	1.57	2.11	3.38	4.91	8.38
		2.00	0.04	0.09	0.17	0.32	0.44	0.95	1.30	2.12	2.85	4.56	6.61	11.29
30	60	0.15	0.01	0.03	0.06	0.10	0.14	0.31	0.42	0.69	0.92	1.47	2.14	3.65
		0.20	0.02	0.03	0.06	0.12	0.17	0.35	0.48	0.79	1.06	1.70	2.46	4.21
		0.40	0.02	0.05	0.09	0.17	0.23	0.50	0.68	1.11	1.49	2.38	3.46	5.91
		0.60	0.03	0.06	0.11	0.20	0.28	0.60	0.82	1.35	1.81	2.89	4.20	7.18
		1.00	0.04	0.07	0.14	0.26	0.36	0.77	1.05	1.71	2.30	3.68	5.34	9.12
		2.00	0.05	0.10	0.19	0.35	0.49	1.04	1.42	2.32	3.12	4.99	7.24	12.37
35	65	0.15	0.02	0.03	0.06	0.11	0.15	0.33	0.45	0.74	0.99	1.59	2.31	3.94
		0.20	0.02	0.03	0.07	0.13	0.18	0.38	0.52	0.85	1.14	1.83	2.66	4.54
		0.40	0.02	0.05	0.10	0.18	0.25	0.54	0.73	1.20	1.61	2.57	3.73	6.38
		0.60	0.03	0.06	0.12	0.22	0.30	0.65	0.89	1.46	1.96	3.13	4.54	7.76
		1.00	0.04	0.08	0.15	0.28	0.39	0.83	1.13	1.85	2.49	3.98	5.78	9.88
		2.00	0.05	0.10	0.21	0.38	0.53	1.13	1.55	2.53	3.40	5.44	7.89	13.48
Kv			1.38	2.75	5.5	10	14	30	41	67	90	144	209	357

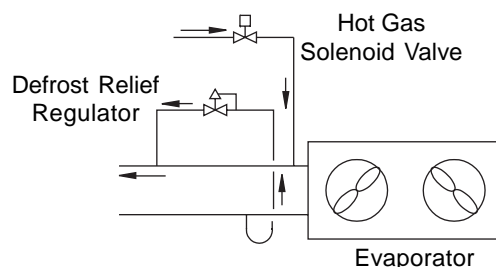
Notes: Ammonia capacities are based on condensing temperatures, inlet discharge gas temperature as shown.

20 mm to 65mm Port Size Type HA4AK, HS4A, HA4AOS

Hot Gas Defrost Nominal Valve Sizing Capacities (Evaporator Size in kW Ammonia)

Application	Type	Port Size (mm)					
		20	25	32	40	50	65
Hot Gas Solenoid*	HS4A, HA4AOS	32 to 53	53 to 98	98 to 137	137 to 257	257 to 373	373 to 580
Defrost Relief Regulator	HA4AK	60 to 84	84 to 158	158 to 211	211 to 338	338 to 492	492 to 791

Notes: *HS4A Solenoid valve or an outlet pressure regulator with electric shut-off (HA4AOS). Evaporator kW at 5°C TD (temperature differential), valve capacities are conservative. These capacities can be modified up or down depending on the type of evaporator, temperature, mass, frost thickness, defrosting time, etc. Typical for -30°C evaporator temperature.



Ammonia

Metric

Pressure Regulators

20 mm to 100 mm Port Size

Type HA4AO

Hot Gas By-Pass Line Valve Capacities (kW Ammonia)

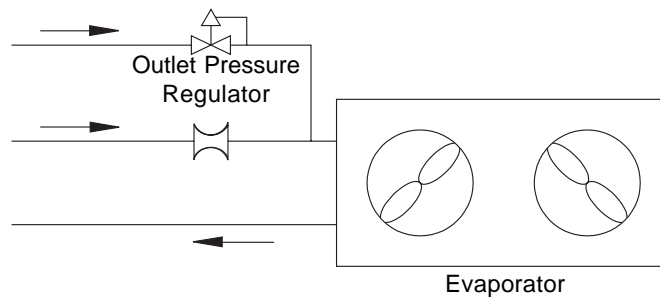
Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HA4AO									
			Port Size (mm)									
			20 @ 25%	20 @ 50%	20	25	32	40	50	65	80	100
25	55	8	66	132	265	482	674	1,445	1,974	3,226	4,334	6,934
30	60	8	75	151	302	549	769	1,647	2,251	3,679	4,941	7,906
35	65	8	86	171	342	622	871	1,867	2,552	4,171	5,602	8,964
Kv			1.38	2.75	5.5	10	14	30	41	67	90	144

Notes: Ammonia capacities are based on condensing temperatures, discharge gas temperature as shown, and -10°C evaporator temperature. For evaporator temperatures between -40°C and +10°C capacities are within 3%.

Hot Gas By-Pass Line Valve Capacities (kg/s Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HA4AO									
			Port Size (mm)									
			20 @ 25%	20 @ 50%	20	25	32	40	50	65	80	100
25	55	8	0.06	0.12	0.23	0.43	0.60	1.28	1.74	2.85	3.83	6.12
30	60	8	0.07	0.14	0.27	0.50	0.69	1.49	2.03	3.32	4.46	7.13
35	65	8	0.08	0.16	0.32	0.57	0.80	1.72	2.35	3.85	5.17	8.27
Kv			1.38	2.75	5.5	10	14	30	41	67	90	144

Notes: Ammonia capacities are based on condensing temperatures, and discharge gas temperatures as shown.



Metric

Ammonia

Pressure Regulators

20 mm to 80 mm Port Size
Type HA4AL

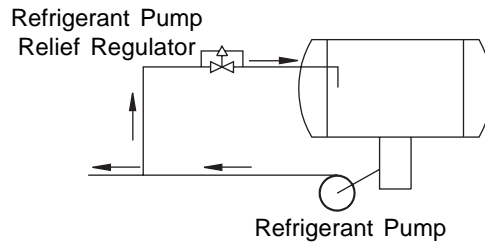
Ammonia

Metric

Refrigerant Pump Relief Line Valve Capacities (m³/h Ammonia)

Pressure Drop across Valve (Bar)	HA4AL								
	Port Size (mm)								
	20 @ 25%	20 @ 50%	20	25	32	40	50	65	80
0.5	1.2	2.4	4.8	8.7	12	26	36	58	78
1	1.7	3.4	6.8	12	17	37	50	82	111
1.5	2.1	4.1	8.3	15	21	45	62	101	135
2	2.4	4.8	10	17	24	52	71	116	156
2.5	2.7	5.3	11	19	27	58	80	130	175
3	2.9	5.9	12	21	30	64	87	143	192
3.5	3.2	6.3	13	23	32	69	94	154	207
4	3.4	6.8	14	25	34	74	101	165	221
Kv	1.38	2.75	5.5	10	14	30	41	67	90

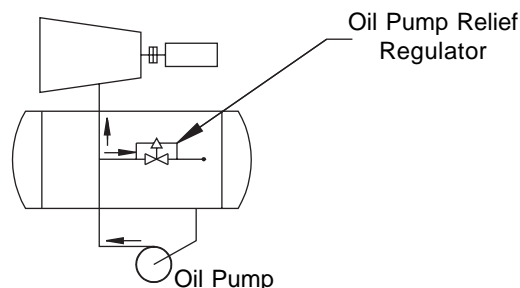
Notes: Capacities are based on -10°C liquid ammonia and no flash gas. For temperatures between -40°C and +10°C capacities are within 5%.



Oil Pump Relief Line Valve Capacities (m³/h Oil)

Pressure Drop across Valve (Bar)	HA4AL								
	Port Size (mm)								
	20 @ 25%	20 @ 50%	20	25	32	40	50	65	80
0.5	1.0	2.1	4.1	7.5	11	23	31	50	68
1	1.5	2.9	5.8	11	15	32	44	71	96
1.5	1.8	3.6	7.2	13	18	39	53	87	117
2	2.1	4.1	8.3	15	21	45	62	101	135
2.5	2.3	4.6	9.2	17	24	50	69	113	151
3	2.5	5.1	10	18	26	55	75	123	166
3.5	2.7	5.5	11	20	28	60	82	133	179
4	2.9	5.8	12	21	30	64	87	142	191
Kv	1.38	2.75	5.5	10	14	30	41	67	90

Notes: Capacities are based on oil with less than 300 SSU viscosity.



Gas-Powered Suction Stop Valves

32 mm to 150 mm Port Size

Type HS9B, HCK2, HCK5

Suction Line Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (bar)	Port Size (mm)							
		32	40	50	65	80	100	125	150
10	0.02	62	149	174	279	395	867	1,099	1,411
	0.04	87	210	246	394	558	1,224	1,552	1,992
	0.07	115	277	324	520	737	1,615	2,048	2,629
	0.15	169	407	477	764	1,082	2,373	3,008	3,862
5	0.02	57	138	162	259	367	805	1,020	1,310
	0.04	81	195	228	366	518	1,136	1,440	1,849
	0.07	107	257	301	483	684	1,499	1,900	2,440
	0.15	156	377	442	708	1,003	2,199	2,788	3,579
0	0.02	53	128	150	240	340	745	944	1,212
	0.04	75	180	211	339	479	1,051	1,332	1,711
	0.07	99	238	278	446	632	1,386	1,757	2,256
	0.14	144	347	406	652	923	2,023	2,565	3,292
-5	0.02	49	118	138	221	313	687	871	1,118
	0.04	69	166	195	312	442	969	1,228	1,576
	0.07	91	219	256	411	582	1,276	1,618	2,077
	0.14	131	315	369	591	837	1,835	2,327	2,987
-10	0.02	45	108	127	203	288	631	800	1,027
	0.04	63	153	179	286	405	889	1,127	1,447
	0.07	83	201	235	377	534	1,171	1,484	1,905
	0.15	120	290	339	544	770	1,688	2,140	2,748
-15	0.02	41	99	116	186	263	577	731	939
	0.04	58	139	163	262	371	813	1,030	1,323
	0.07	76	183	215	344	487	1,069	1,355	1,739
	0.15	108	260	305	489	692	1,518	1,924	2,470
-20	0.02	37	90	105	169	240	525	666	855
	0.04	53	127	148	238	337	739	937	1,203
	0.07	69	167	195	313	443	971	1,231	1,580
	0.15	98	236	276	443	627	1,375	1,744	2,239
-25	0.02	34	82	96	153	217	476	603	774
	0.04	48	115	134	215	305	669	848	1,088
	0.07	62	150	176	282	400	877	1,111	1,427
	0.15	89	215	252	404	573	1,255	1,592	2,043
-30	0.02	30	74	86	138	195	429	543	698
	0.04	43	103	121	194	274	601	763	979
	0.07	56	135	158	253	359	786	997	1,280
	0.15	80	192	225	361	511	1,120	1,420	1,823
Kv		17	41	48	77	109	239	303	389

Continued on next page.

Metric

Ammonia

Gas-Powered Suction Stop Valves

32 mm to 150 mm Port Size
Type HS9B, HCK2, HCK5

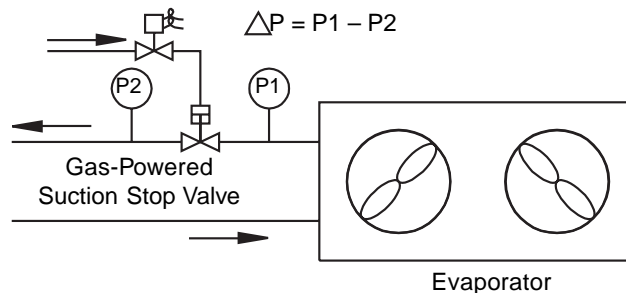
Suction Line Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (bar)	Port Size (mm)							
		32	40	50	65	80	100	125	150
-35	0.02	27	64	76	122	174	379	482	619
	0.04	38	90	106	171	243	531	675	866
	0.07	50	117	138	223	317	692	880	1,129
	0.15	70	164	193	312	443	969	1,232	1,580
-40	0.02	24	57	67	109	154	337	429	550
	0.04	34	80	94	152	216	471	599	768
	0.07	44	104	122	197	280	611	777	997
	0.15	60	142	167	269	383	836	1,063	1,364
-45	0.02	21	51	59	96	136	298	379	486
	0.04	30	70	83	133	190	414	527	676
	0.07	38	90	106	172	244	534	679	871
	0.15	53	124	146	236	335	732	931	1,195
-50	0.02	19	44	52	84	119	261	332	426
	0.04	26	61	72	116	165	361	459	589
	0.07	33	78	92	148	211	461	586	751
	0.15	44	103	121	195	277	606	770	989
-55	0.02	16	38	45	73	104	226	288	369
	0.04	22	53	62	100	142	310	394	506
	0.07	28	66	78	126	179	391	497	637
	0.15	36	84	99	159	227	495	630	808
-60	0.02	14	33	39	63	89	194	247	317
	0.04	19	45	52	85	120	263	334	429
	0.07	23	55	65	104	148	324	412	529
	0.15	27	65	76	123	175	382	485	623
Kv		17	41	48	77	109	239	303	389

Ammonia

Metric

Notes: For liquid overfeed systems, nominal 2:1 to 5:1 ratio, add 20% to the evaporator load and select a valve based on the increased load. For gravity flooded application, the valve should be the same port size as properly sized liquid leg or gas line. Above capacities are based on liquid temperature equal to evaporator temperature.



In-Line Check Valves

16 mm to 100 mm Port Size

Type HCK4

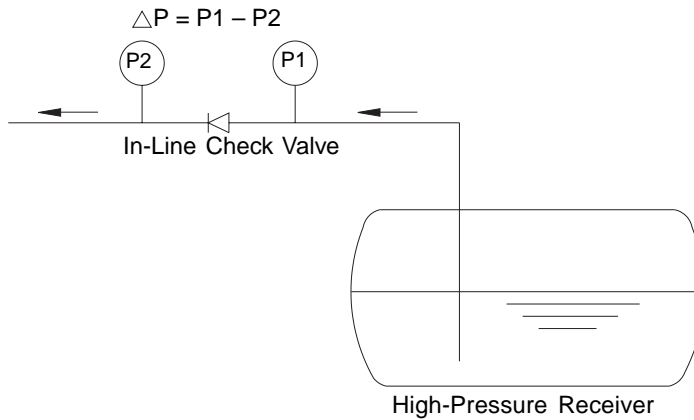
High Pressure Liquid Line Valve Capacities (kW Ammonia)

Pressure Drop Across Valve (bar)	HCK4								
	Port Size (mm)								
	16	20	25	32	40	50	65	80	100
0.07	323	452	646	776	2,198	2,779	4,137	5,171	11,764
0.15	473	662	946	1,135	3,217	4,069	6,056	7,570	17,221
0.20	546	765	1,093	1,311	3,715	4,698	6,992	8,741	19,885
0.30	669	937	1,338	1,606	4,550	5,754	8,564	10,705	24,354
0.40	773	1,082	1,545	1,854	5,253	6,644	9,889	12,361	28,121
0.50	864	1,209	1,727	2,073	5,873	7,428	11,056	13,820	31,440
Kv	5	7	10	12	34	43	64	80	182

Notes: Ammonia capacities are based on +25°C liquid temperature and -10°C evaporator temperature and no flashing through the valve.

Metric

Ammonia



In-Line Check Valves

16 mm to 100 mm Port Size
Type HCK4

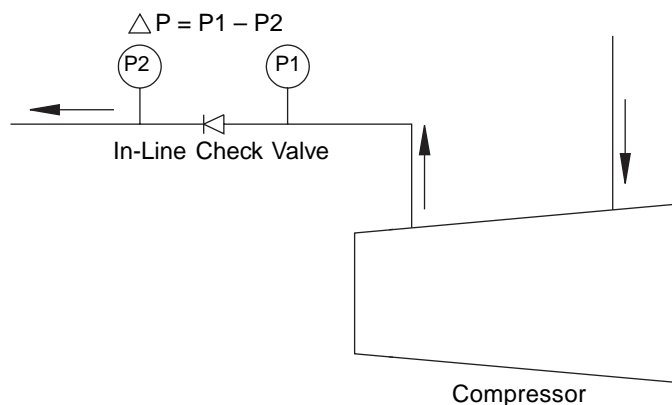
High Pressure Discharge Line Valve Capacities (kW Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HCK4								
			Port Size (mm)								
			16	20	25	32	40	50	65	80	100
25	55	0.07*	37	51	73	88	250	316	470	588	1,338
		0.15	54	75	107	129	364	461	686	858	1,951
		0.20	62	86	123	148	420	531	790	988	2,247
		0.40	87	121	173	208	588	744	1,107	1,384	3,149
30	60	0.07*	39	54	78	93	264	334	497	622	1,414
		0.15	57	79	113	136	386	488	726	907	2,064
		0.20	65	91	131	157	444	562	836	1,046	2,379
		0.40	92	128	183	220	623	789	1,174	1,467	3,338
35	65	0.07*	41	57	82	98	279	352	524	656	1,491
		0.15	60	84	120	144	407	514	766	957	2,177
		0.20	69	97	138	165	469	593	883	1,103	2,510
		0.40	97	136	194	232	659	833	1,240	1,549	3,525
Kv			5	7	10	12	34	43	64	80	182

Ammonia

Metric

Notes: Ammonia capacities are based on condensing temperatures, discharge gas temperatures as shown, and -10°C evaporator temperature. For evaporator temperatures between -40°C and +10°C, capacities are within 3%.
*When sizing in-line check valves for compressor discharge, a minimum of .07 bar pressure drop at minimum compressor capacity (fully unloaded) must be maintained. Use piston type HCK1 for applications where pressure drop is less than 0.07 bar.



In-Line Check Valves

16 mm to 100 mm Port Size

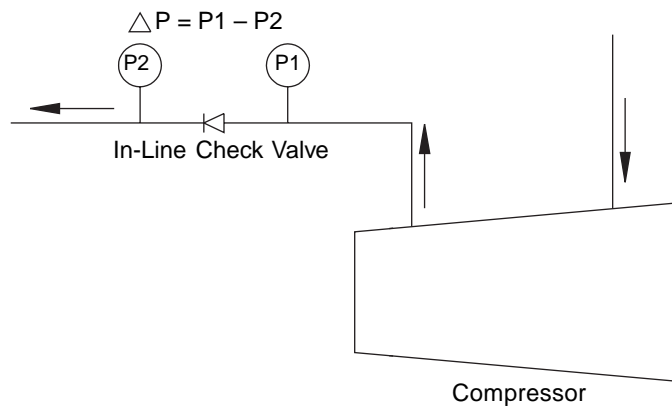
Type HCK4

High Pressure Discharge Line Valve Capacities (kg/s Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	HCK4								
			Port Size (mm)								
			16	20	25	32	40	50	65	80	100
25	55	0.07*	0.03	0.05	0.06	0.08	0.22	0.28	0.42	0.52	1.18
		0.15	0.05	0.07	0.09	0.11	0.32	0.41	0.61	0.76	1.72
		0.20	0.05	0.08	0.11	0.13	0.37	0.47	0.70	0.87	1.98
		0.40	0.08	0.11	0.15	0.18	0.52	0.66	0.98	1.22	2.78
30	60	0.07*	0.04	0.05	0.07	0.08	0.24	0.30	0.45	0.56	1.28
		0.15	0.05	0.07	0.10	0.12	0.35	0.44	0.65	0.82	1.86
		0.20	0.06	0.08	0.12	0.14	0.40	0.51	0.75	0.94	2.15
		0.40	0.08	0.12	0.17	0.20	0.56	0.71	1.06	1.32	3.01
35	65	0.07*	0.04	0.05	0.08	0.09	0.26	0.33	0.48	0.60	1.38
		0.15	0.06	0.08	0.11	0.13	0.38	0.47	0.71	0.88	2.01
		0.20	0.06	0.09	0.13	0.15	0.43	0.55	0.81	1.02	2.32
		0.40	0.09	0.13	0.18	0.21	0.61	0.77	1.14	1.43	3.25
Kv			5	7	10	12	34	43	64	80	182

Notes: Ammonia capacities are based on condensing temperatures, and discharge gas temperature as shown.

*When sizing in-line check valves for compressor discharge, a minimum of 0.07 bar pressure drop at minimum compressor capacity (fully unloaded) must be maintained. Use piston type HCK1 for applications where pressure drop is less than 0.07 bar.



Metric
Ammonia

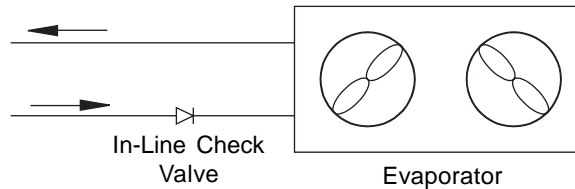
In-Line Check Valves

16 mm to 100 mm Port Size
Type HCK4

Pumped Liquid Line Valve Capacities (kW Ammonia; 4:1 Recirculation)

Pressure Drop Across Valve (bar)	HCK4								
	Port Size (mm)								
	16	20	25	32	40	50	65	80	100
0.07	96	135	192	231	654	827	1,231	1,539	3,501
0.15	141	197	282	338	957	1,211	1,802	2,253	5,124
0.20	163	228	325	390	1,105	1,398	2,081	2,601	5,917
0.30	199	279	398	478	1,354	1,712	2,548	3,186	7,247
0.40	230	322	460	552	1,563	1,977	2,943	3,678	8,368
0.50	257	360	514	617	1,748	2,210	3,290	4,112	9,356
Kv	5	7	10	12	34	43	64	80	182

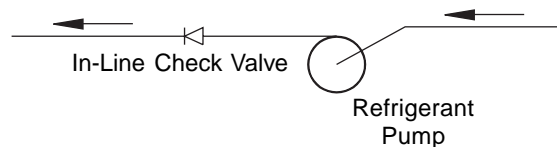
Notes: Ammonia capacities are based on -10°C pumped liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%. Based on 4:1 recirculation. For other recirculation rates, divide 4 by the new recirculation rate and multiply values shown in table to arrive at new capacity.



Pump Discharge Liquid Line Valve Capacities (m³/h Ammonia)

Pressure Drop Across Valve (bar)	HCK4								
	Port Size (mm)								
	16	20	25	32	40	50	65	80	100
0.07	1.6	2.3	3.3	3.9	11	14	21	26	59
0.15	2.4	3.3	4.8	5.7	16	20	30	38	87
0.20	2.7	3.8	5.5	6.6	19	24	35	44	100
0.30	3.4	4.7	6.7	8.1	23	29	43	54	123
0.40	3.9	5.4	7.8	9.3	26	33	50	62	141
0.50	4.3	6.1	8.7	10	30	37	56	70	158
Kv	5	7	10	12	34	43	64	80	182

Notes: Ammonia capacities are based on -10°C pumped liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%.



Ammonia

Metric

Piston Type Check Valves

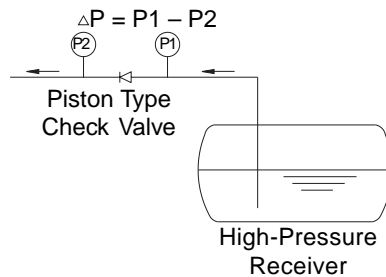
20 mm to 150 mm Port Size

Type HCK1, HCK1W

High Pressure Liquid Line Valve Capacities (kW Ammonia)

Pressure Drop Across Valve (bar)	HCK1								HCK1 W	
	Port Size (mm)									
	20	25	32	40	50	65	80	100	125	150
0.07	452	582	905	2,650	3,103	4,977	7,045	15,448	19,585	25,144
0.15	662	852	1,325	3,879	4,542	7,286	10,313	22,614	28,670	36,807
0.20	765	983	1,530	4,480	5,244	8,413	11,909	26,112	33,105	42,501
0.30	937	1,204	1,873	5,486	6,423	10,303	14,585	31,981	40,545	52,053
0.40	1,082	1,391	2,163	6,335	7,417	11,897	16,842	36,928	46,817	60,105
0.50	1,209	1,555	2,418	7,083	8,292	13,302	18,830	41,287	52,343	67,200
Kv	7	9	14	41	48	77	109	239	303	389

Notes: Ammonia capacities are based on +25°C liquid temperature and -10°C evaporator temperature.



Metric

Ammonia

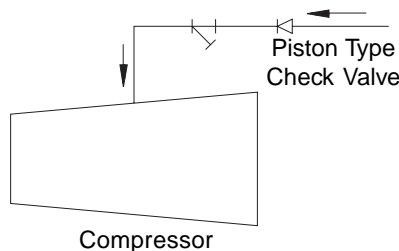
20 mm to 80 mm Port Size

Type HCK1

Compressor Side Port Suction Line Capacities (kW Ammonia)

Economizer Temp. °C	Pressure Drop Across Valve (bar)	HCK1						
		Port Size						
		20	25	32	40	50	65	80
5	0.07	40	51	79	233	272	437	618
	0.15	58	74	115	338	396	635	899
	0.20	66	85	133	389	455	730	1,033
	0.40	92	118	184	540	632	1,013	1,435
-5	0.07	33	42	65	191	223	358	507
	0.15	47	61	94	276	323	519	734
	0.20	54	70	108	317	371	595	843
	0.40	75	96	149	436	511	820	1,160
-15	0.07	26	34	53	154	180	289	409
	0.15	38	49	76	222	260	416	590
	0.20	43	56	87	254	297	476	674
	0.40	59	76	118	344	403	646	915
Kv		7	9	14	41	48	77	109

Notes: Ammonia capacities are based on +30°C condensing temperature and economizer temperatures as shown.



Piston Type Check Valves

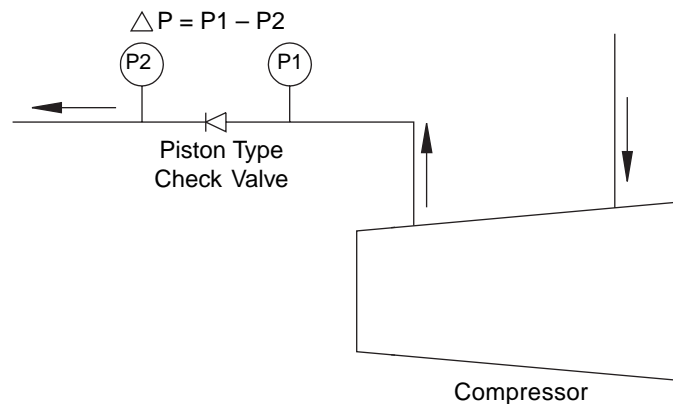
20 mm to 150 mm Port Size

Type HCK1, HCK1W

High Pressure Discharge Line Valve Capacities (kW Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	Port Size (mm)									
			HCK1								HCK1 W	
			20	25	32	40	50	65	80	100	125	150
25	55	0.07	51	66	103	301	353	566	801	1,756	2,227	2,859
		0.15	76	97	152	444	520	833	1,180	2,587	3,280	4,211
		0.20	86	111	173	506	593	951	1,346	2,951	3,742	4,804
		0.40	121	156	242	709	831	1,332	1,886	4,136	5,243	6,731
30	60	0.07	54	70	109	319	373	598	847	1,857	2,355	3,023
		0.15	79	101	158	462	541	867	1,228	2,693	3,414	4,383
		0.20	91	118	183	536	627	1,006	1,425	3,124	3,960	5,084
		0.40	128	165	257	752	880	1,412	1,999	4,383	5,556	7,134
35	65	0.07	57	74	115	336	393	631	893	1,958	2,483	3,187
		0.15	83	107	167	489	572	918	1,300	2,849	3,613	4,638
		0.20	97	124	193	565	662	1,062	1,503	3,296	4,178	5,364
		0.40	136	174	271	794	930	1,491	2,111	4,629	5,869	7,534
Kv			7	9	14	41	48	77	109	239	303	389

Notes: Ammonia capacities are based on condensing temperatures, discharge gas temperatures as shown, and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 3%.



Ammonia

Metric

Piston Type Check Valves

20 mm to 150 mm Port Size

Type HCK1, HCK1W

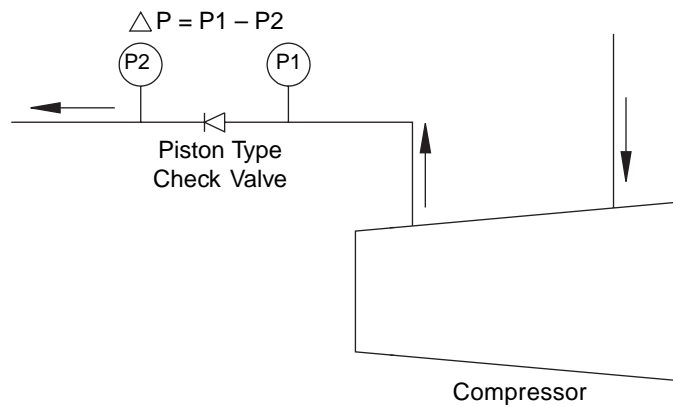
High Pressure Discharge Line Valve Capacities (kg/s Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	Port Size (mm)									
			HCK1								HCK1 W	
			20	25	32	40	50	65	80	100	125	150
25	55	0.07	0.05	0.06	0.09	0.27	0.31	0.50	0.71	1.55	1.97	2.52
		0.15	0.07	0.09	0.13	0.39	0.46	0.74	1.04	2.28	2.90	3.72
		0.20	0.08	0.10	0.15	0.45	0.52	0.84	1.19	2.61	3.30	4.24
		0.40	0.11	0.14	0.21	0.63	0.73	1.18	1.67	3.65	4.63	5.94
30	60	0.07	0.05	0.06	0.10	0.29	0.34	0.54	0.76	1.68	2.12	2.73
		0.15	0.07	0.09	0.14	0.42	0.49	0.78	1.11	2.43	3.08	3.95
		0.20	0.08	0.11	0.17	0.48	0.57	0.91	1.29	2.82	3.57	4.59
		0.40	0.12	0.15	0.23	0.68	0.79	1.27	1.80	3.95	5.01	6.44
35	65	0.07	0.05	0.07	0.11	0.31	0.36	0.58	0.82	1.81	2.29	2.94
		0.15	0.08	0.10	0.15	0.45	0.53	0.85	1.20	2.63	3.33	4.28
		0.20	0.09	0.11	0.18	0.52	0.61	0.98	1.39	3.04	3.85	4.95
		0.40	0.13	0.16	0.25	0.73	0.86	1.38	1.95	4.27	5.41	6.95
Kv			7	9	14	41	48	77	109	239	303	389

Metric

Ammonia

Notes: Ammonia capacities are based on condensing temperatures, and discharge gas temperatures as shown.



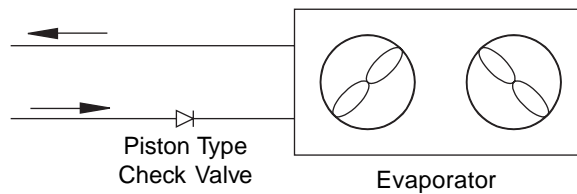
Piston Type Check Valves

20 mm to 150 mm Port Size
Type HCK1, HCK1W

Pumped Liquid Line Valve Capacities (kW Ammonia; 4:1 Recirculation)

Pressure Drop Across Valve (bar)	HCK1								HCK1 W	
	Port Size (mm)									
	20	25	32	40	50	65	80	100	125	150
0.07	135	173	269	789	923	1,481	2,097	4,597	5,828	7,482
0.15	197	253	394	1,154	1,352	2,168	3,069	6,729	8,531	10,953
0.20	228	293	455	1,333	1,561	2,503	3,544	7,770	9,851	12,647
0.30	279	358	557	1,633	1,911	3,066	4,340	9,517	12,065	15,490
0.40	322	414	644	1,885	2,207	3,540	5,012	10,989	13,932	17,886
0.50	360	463	720	2,108	2,467	3,958	5,603	12,286	15,576	19,997
Kv	7	9	14	41	48	77	109	239	303	389

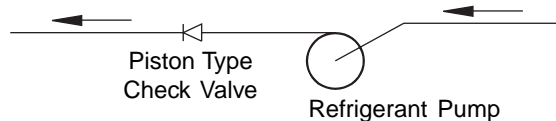
Notes: Ammonia capacities are based on -10°C liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%. Based on 4:1 recirculation. For other recirculation rates, divide 4 by the new recirculation rate and multiply values shown in table to arrive at new capacity.



Pump Discharge Liquid Line Valve Capacities (m³/h Ammonia)

Pressure Drop Across Valve (bar)	HCK1								HCK1 W	
	Port Size (mm)									
	20	25	32	40	50	65	80	100	125	150
0.07	2.3	2.9	4.6	13	16	25	35	78	99	126
0.15	3.3	4.3	6.7	20	23	37	52	114	144	185
0.20	3.8	4.9	7.7	23	26	42	60	131	167	214
0.30	4.7	6.1	9.4	28	32	52	73	161	204	262
0.40	5.4	7.0	11	32	37	60	85	186	236	302
0.50	6.1	7.8	12	36	42	67	95	208	263	338
Kv	7	9	14	41	48	77	109	239	303	389

Notes: Ammonia capacities are based on -10°C liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%.



Ammonia

Metric

Combination Stop/Check Valves

32 mm to 150 mm Port Size

Type SCK

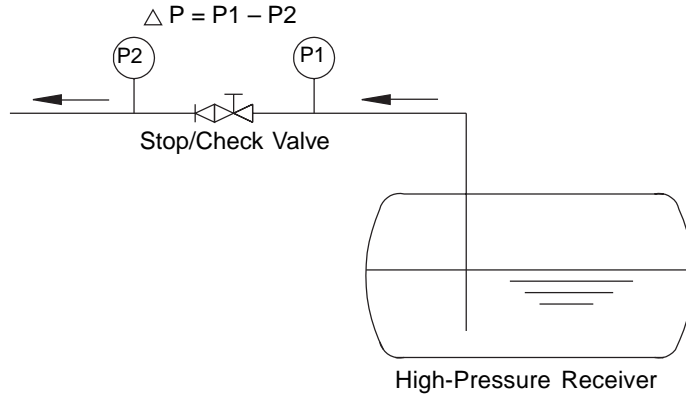
High Pressure Liquid Line Valve Capacities (kW Ammonia)

Pressure Drop Across Valve (bar)	SCK							
	Port Size (mm)							
	32	40	50	65	80	100	125	150
0.07	2,348	2,796	4,641	7,821	11,462	17,332	33,547	45,847
0.15	3,438	4,092	6,793	11,449	16,778	25,372	49,107	67,113
0.20	3,969	4,725	7,844	13,220	19,374	29,297	56,704	77,496
0.30	4,861	5,787	9,607	16,191	23,728	35,882	69,448	94,912
0.40	5,613	6,683	11,093	18,696	27,399	41,432	80,192	109,595
0.50	6,276	7,471	12,403	20,903	30,633	46,323	89,657	122,531
Kv	36	43	72	121	177	268	519	709

Notes: Ammonia capacities are based on +25°C liquid temperature, -10°C evaporator temperature, and no flashing through the valve.

Metric

Ammonia



Combination Stop/Check Valves

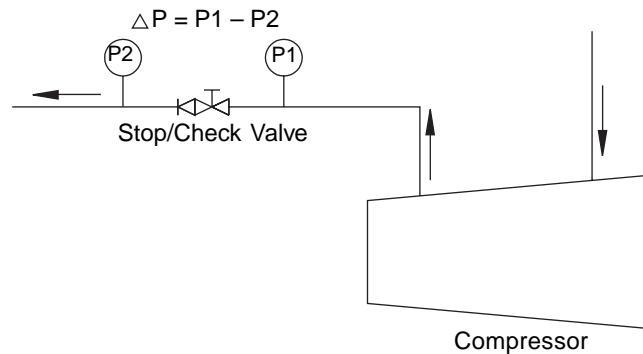
32 mm to 150 mm Port Size

Type SCK

High Pressure Discharge Line Valve Capacities (kW Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	SCK							
			Port Size (mm)							
			32	40	50	65	80	100	125	150
25	55	0.07	265	316	529	889	1,301	1,970	3,814	5,211
		0.15	386	461	772	1,297	1,897	2,873	5,563	7,600
		0.20	445	531	889	1,494	2,186	3,309	6,409	8,755
		0.40	623	744	1,246	2,094	3,063	4,637	8,980	12,268
30	60	0.07	280	334	560	940	1,376	2,083	4,034	5,510
		0.15	408	488	817	1,372	2,007	3,039	5,886	8,041
		0.20	471	562	941	1,581	2,313	3,503	6,783	9,267
		0.40	660	789	1,320	2,219	3,246	4,915	9,518	13,002
35	65	0.07	295	352	590	991	1,450	2,196	4,253	5,809
		0.15	431	514	861	1,447	2,117	3,206	6,208	8,481
		0.20	496	593	993	1,668	2,441	3,695	7,157	9,776
		0.40	697	833	1,395	2,344	3,428	5,191	10,052	13,732
Kv			36	43	72	121	177	268	519	709

Notes: Ammonia capacities are based on condensing temperatures, discharge gas temperature as shown, and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$, capacities are within 3%. When sizing stop/check valves for compressor discharge, a minimum of 0.07 bar pressure drop at minimum compressor capacity (fully unloaded) must be maintained. Use piston type HCK1 for applications where pressure drop is less than 0.07 bar.



Ammonia

Metric

Combination Stop/Check Valves

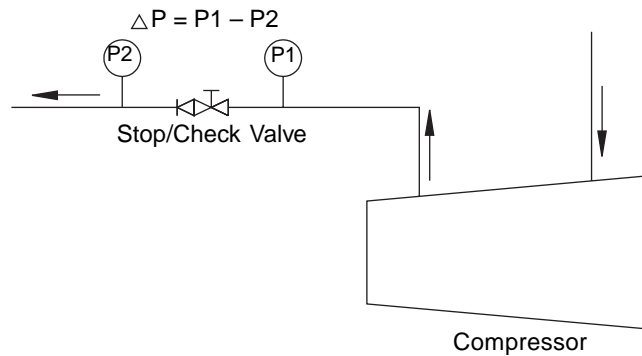
32 mm to 150 mm Port Size

Type SCK

High Pressure Discharge Line Valve Capacities (kg/s Ammonia)

Cond. Temp. °C	Discharge Gas Temp. °C	Pressure Drop Across Valve (bar)	SCK							
			Port Size (mm)							
			32	40	50	65	80	100	125	150
25	55	0.07	0.23	0.28	0.47	0.79	1.15	1.74	3.37	4.60
		0.15	0.34	0.41	0.68	1.15	1.68	2.54	4.91	6.71
		0.20	0.39	0.47	0.79	1.32	1.93	2.92	5.66	7.73
		0.40	0.55	0.66	1.10	1.85	2.70	4.09	7.93	10.83
30	60	0.07	0.25	0.30	0.50	0.85	1.24	1.88	3.64	4.97
		0.15	0.37	0.44	0.74	1.24	1.81	2.74	5.31	7.25
		0.20	0.42	0.51	0.85	1.43	2.09	3.16	6.12	8.36
		0.40	0.60	0.71	1.19	2.00	2.93	4.43	8.59	11.73
35	65	0.07	0.27	0.33	0.54	0.91	1.34	2.03	3.92	5.36
		0.15	0.40	0.47	0.79	1.34	1.95	2.96	5.73	7.82
		0.20	0.46	0.55	0.92	1.54	2.25	3.41	6.60	9.02
		0.40	0.64	0.77	1.29	2.16	3.16	4.79	9.27	12.67
Kv			36	43	72	121	177	268	519	709

Notes: Ammonia capacities are based on condensing temperatures, and discharge gas temperatures as shown. When sizing stop/check valves for compressor discharge, a minimum of 0.07 bar pressure drop at minimum compressor capacity (fully unloaded) must be maintained. Use piston type HCK1 for applications where pressure drop is less than 0.07 bar.



Metric
Ammonia

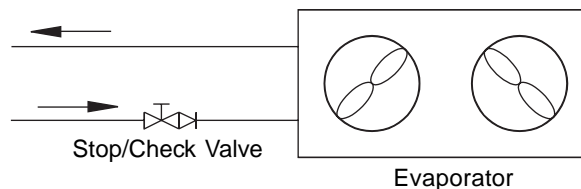
Combination Stop/Check Valves

32 mm to 150 mm Port Size
Type SCK

Pumped Liquid Line Valve Capacities (kW Ammonia; 4:1 Recirculation)

Pressure Drop Across Valve (bar)	SCK							
	Port Size (mm)							
	32	40	50	65	80	100	125	150
0.07	699	832	1,381	2,327	3,411	5,158	9,983	13,643
0.15	1,023	1,218	2,021	3,407	4,993	7,550	14,613	19,971
0.20	1,181	1,406	2,334	3,934	5,765	8,718	16,874	23,061
0.30	1,447	1,722	2,859	4,818	7,061	10,677	20,666	28,244
0.40	1,670	1,989	3,301	5,563	8,153	12,329	23,863	32,613
0.50	1,868	2,223	3,691	6,220	9,116	13,785	26,680	36,462
Kv	36	43	72	121	177	268	519	709

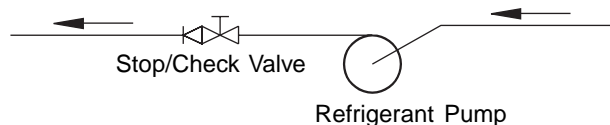
Notes: Ammonia capacities are based on -10°C liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%. Based on 4:1 recirculation. For other recirculation rates, divide 4 by the new recirculation rate and multiply values shown in table to arrive at new capacity.



Pump Discharge Liquid Line Valve Capacities (m³/h Ammonia)

Pressure Drop Across Valve (bar)	SCK							
	Port Size (mm)							
	32	40	50	65	80	100	125	150
0.07	12	14	23	39	58	87	169	231
0.15	17	21	34	58	84	128	247	338
0.20	20	24	39	67	97	147	285	390
0.30	24	29	48	81	119	181	349	477
0.40	28	34	56	94	138	208	403	551
0.50	32	38	62	105	154	233	451	616
Kv	36	43	72	121	177	268	519	709

Notes: Ammonia capacities are based on -10°C liquid temperature and -10°C evaporator temperature. For evaporator temperatures between -40°C and $+10^{\circ}\text{C}$ capacities are within 5%.



Ammonia

Metric

Shut-Off Valves

13 mm to 65 mm Port Size

Type AS, GS

Economic Line Sizing/Capacity Table (kW Ammonia)

Service	Conditions		Type AS, GS						
	Temp. °C	Pressure (bar)	Port Size						
			13 mm	20 mm	25 mm	32 mm	40 mm	50 mm	65 mm
Suction Lines	-6.7	2.3	—	—	30	56	75	126	180
Single Stage Compressor	-17.8	1.1	—	—	20	37	49	80	120
Suction Lines	-28.9	0.2	—	—	15	26	36	59	87
Booster	-40	-0.3	—	—	—	15	22	35	51
Liquid	-6.7	2.3	—	—	18	32	43	73	103
Overfeed	-17.8	1.1	—	—	12	22	30	48	72
Return	-28.9	0.2	—	—	8	14	19	31	46
Lines (4x)	-40	-0.3	—	—	—	8	12	19	28
Hot Gas Feed	+21.1	7.9	8	15	26	50	69	128	187
Hot Gas Main	+21.1	7.9	15	30	52	99	138	257	373
Compressor Discharge	+30	10.7	—	—	44	85	118	220	318
Condenser Drains	+30	—	21	51	84	176	271	493	774
Liquid Mains	+30	—	100	187	320	503	711	1598	2313
Liquid Feed Branch	+30	—	193	363	620	975	1380	3101	4481
Liquid Overfeed Supply (4x)	-12.2	—	32	60	102	162	229	507	732

Metric

Ammonia

Threaded Shut-Off Valve Flow Coefficients (13 mm to 32 mm)

Size	13 mm	20 mm	25 mm	32 mm
Kv Angle	7.8	8.7	22.5	26.0
Kv Globe	5.2	6.1	15.6	18.2

Socket Weld Shut-Off Valve Flow Coefficients (13 mm to 65 mm)

Size	13 mm	20 mm	25 mm	32 mm	40 mm	50 mm	65 mm
Kv Angle	5.2	7.8	22.5	26	45.9	69.2	149.7
Kv Globe	3.5	6.9	15.6	18.2	35.5	58	141

Shut-off (stop) valves are nearly always sized on the line size determined by the system designer. Angle type shut-off valves have lower pressure drop than globe valves. Whenever possible, good engineering practice is to use angle valves in order to reduce pressure drop and also reduce cost.

Shut-Off Valves

80 mm to 400 mm Port Size

Type AW, GW, EW, DW

Economic Line Sizing/Capacity Table (kW Ammonia)

Service	Conditions		Type AW, GW, EW, DW								
	Temp. °C	Pressure (bar)	Port Size								
			80 mm	100 mm	125 mm	150 mm	200 mm	250 mm	300 mm	350 mm	400 mm
Suction Lines	-6.7	2.3	289	514	827	1207	2211	3590	5245	6410	8131
Single Stage Compressor	-17.8	1.1	190	333	549	792	1457	2330	3330	4069	5928
Suction Lines	-28.9	0.2	141	243	401	581	1077	1711	2496	3052	4090
Booster	-40	-0.3	81	144	235	344	637	1014	1475	1802	2436
Liquid	-6.7	2.3	165	297	475	697	1274	2066	3013	3682	4428
Overfeed	-17.8	1.1	113	200	330	475	876	1401	1999	2443	3323
Return	-28.9	0.2	74	128	213	308	570	901	1320	1612	2161
Lines (4x)	-40	-0.3	46	79	129	189	352	556	817	1000	1341
Hot Gas Feed	+21.1	7.9	292	510	813	1190	2094	3340	4847	5924	—
Hot Gas Main	+21.1	7.9	581	1021	1630	2369	4189	6681	9694	11848	—
Compressor Discharge	+30	10.7	500	876	1397	2042	3594	5734	8318	10166	13668
Condenser Drains	+30	—	1320	2605	4646	7146	14784	—	—	—	—
Liquid Mains	+30	—	3629	6364	10159	14847	—	—	—	—	—
Liquid Feed Branch	+30	—	7036	12341	19698	28790	—	—	—	—	—
Liquid Overfeed Supply (4x)	-12.2	—	1151	2017	3221	4706	—	—	—	—	—

Ammonia

Metric

Butt-Weld Shut-Off Valve Flow Coefficients (80 mm to 400 mm)

Size	80 mm	100 mm	125 mm	150 mm	200 mm	250 mm	300 mm	350 mm	400 mm
Kv Angle	177	277	519	709	1241	2119	2941	3979	4877
Kv Globe	169	251	497	683	1194	2033	2829	3763	—

Thermostatic Expansion Valves

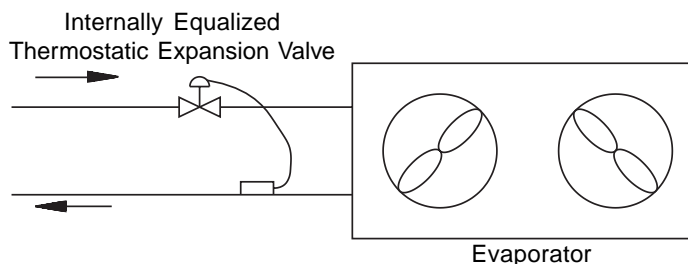
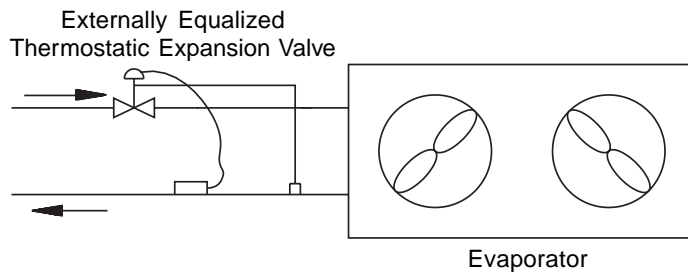
1 to 140 kW Ammonia

Type HTG

Ammonia Capacities in kW

Evap Temp. °C	Pressure Drop Across Valve (bar)	Model Number									
		HTG 1AZ	HTG 2AZ	HTG 3AZ	HTG 5AZ	HTG 7½AZ	HTG 10AZ	HTG 15AZ	HTG 20AZ	HTG 25AZ	HTG 40AZ
+4.4°C	5.5	2.7	5.4	8.1	14	20	27	41	54	68	109
	6.9	3.0	6.0	9.1	15	23	30	45	61	76	121
	8.3	3.3	6.6	10	17	25	33	50	67	83	133
	9.7	3.6	7.0	11	18	27	36	54	72	90	143
-6.7°C	6.9	3.0	6.0	9.1	15	23	30	45	60	75	120
	8.3	3.3	6.6	10	17	25	33	49	66	82	132
	9.7	3.6	7.0	11	18	27	36	53	71	89	142
	11.0	3.8	7.7	11	19	29	38	57	76	95	152
-15°C	6.9	3.0	5.9	8.8	15	22	30	45	59	74	119
	8.3	3.3	6.5	10	16	24	33	49	65	81	130
	9.7	3.5	7.0	11	18	26	35	53	70	88	141
	11.0	3.8	7.4	11	19	28	38	56	75	94	151
-23°C	8.3	2.8	5.5	8.4	14	21	28	42	55	69	111
	9.7	3.0	6.0	9.1	15	23	30	45	60	75	120
	11.0	3.2	6.4	9.5	16	24	32	48	64	80	128
	12.4	3.4	6.8	10	17	25	34	51	68	85	136

Notes: Capacities are based on +30°C condensing temperature, and vapor-free liquid at the inlet. Refer to evaporator manufacturer recommendations for direct expansion ammonia feed sizing and derating of capacities for suction temperatures below -20°C.



Hand Expansion (Regulating) Valves

10 mm to 32 mm Port Size
Type RT, VT Threaded

Liquid Make Up Capacities (kW Ammonia)

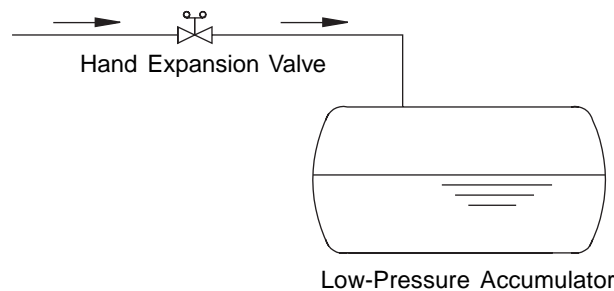
Size	Turns Open							
	1	2	3	4	5	6	7	7½
10 mm	26	52	104	156	208	—	—	—
13 mm	26	78	156	234	286	—	—	—
20 mm	26	208	390	571	753	—	—	—
25 mm	26	78	156	312	571	857	1091	1169
32 mm	26	78	234	519	1039	1506	1818	1922

13 mm to 100 mm Port Size
Type RS, VS Socket Weld
Type RW, VW Butt Weld

Liquid Make Up Capacities (kW Ammonia)

Size	Turns Open							
	1	2	3	4	5	6	7	7½
13 mm	26	52	78	104	156	208	234	286
20 mm	26	52	130	234	364	519	675	753
25 mm	26	78	156	312	571	857	1091	1169
32 mm	26	78	234	519	1039	1506	1818	1922
40 mm	156	390	1169	1818	2597	3506	3896	—
50 mm	312	1039	1948	2857	3766	4675	5713	—
65 mm	1117	2259	3947	5635	7272	9090	11167	—
80 mm	1688	3376	5973	8570	10907	13504	16881	—
100 mm	2597	5194	9090	12985	16881	20776	25970	—

Notes: Based on +25°C condensing temperature and 3.5 bar pressure drop across the valve. Shaded area exceeds 2 m/sec. Consider larger line size to inlet of valve to minimize “water hammer” when opening or closing the adjacent solenoid valve. Size hand expansion valve for 50% “on” time. (i.e. For 400 kW recirculator, select valve based on 2 x 400 = 800 kW.)



Ammonia

Metric

Hand Expansion (Regulating) Valves

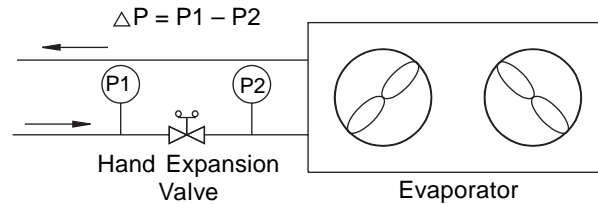
10 mm to 32 mm Port Size

Type RT, VT Threaded

Liquid Overfeed Capacities (kW Ammonia; 4:1 Recirculation)

Size	Pressure Drop (bar)	Turns Open							
		1	2	3	4	5	6	7	7½
10 mm	0.3	3.8	7.5	15	23	30	—	—	—
	0.6	5.3	11	21	32	43	—	—	—
	1.0	6.5	13	26	39	52	—	—	—
	1.5	7.5	15	30	45	60	—	—	—
	2.0	9.2	18	37	55	74	—	—	—
12 mm	0.3	3.8	11	23	34	41	—	—	—
	0.6	5.3	16	32	48	59	—	—	—
	1.0	6.5	20	39	59	72	—	—	—
	1.5	7.5	23	45	68	83	—	—	—
	2.0	9.2	28	55	83	102	—	—	—
20 mm	0.3	3.8	30	56	83	109	—	—	—
	0.6	5.3	43	80	117	154	—	—	—
	1.0	6.5	52	98	143	189	—	—	—
	1.5	7.5	60	113	166	218	—	—	—
	2.0	9.2	74	138	203	268	—	—	—
25 mm	0.3	3.8	11	23	45	83	124	158	169
	0.6	5.3	16	32	64	117	176	223	239
	1.0	6.5	20	39	78	143	215	274	293
	1.5	7.5	23	45	90	166	249	316	339
	2.0	9.2	28	55	111	203	305	388	415
32 mm	0.3	3.8	11	34	75	151	218	263	278
	0.6	5.3	16	48	106	213	309	372	394
	1.0	6.5	20	59	130	261	378	456	482
	1.5	7.5	23	68	151	301	437	527	557
	2.0	9.2	28	83	185	369	535	646	683

Notes: Capacities are based on -20°C liquid. For other evaporator temperatures these values will change only slightly due to density and latent heat variations. Based on 4:1 recirculation. For other recirculation rates, divide 4 by the new recirculation rate and multiply values shown in table to arrive at new capacity.



Hand Expansion (Regulating) Valves

10 mm to 100 mm Port Size

Type RS, VS Socket Weld

Type RW, VW Butt Weld

Liquid Overfeed Capacities (kW Ammonia; 4:1 Recirculation)

Size	Pressure Drop (bar)	Turns Open							
		1	2	3	4	5	6	7	7½
12 mm	0.3	3.8	7.5	11	15	23	30	34	41
	0.6	5.3	11	16	21	32	43	48	59
	1.0	6.5	13	20	26	39	52	59	72
	1.5	7.5	15	23	30	45	60	68	83
	2.0	9.2	18	28	37	55	74	83	102
20 mm	0.3	3.8	7.5	19	34	53	75	98	109
	0.6	5.3	11	27	48	74	106	138	154
	1.0	6.5	13	33	59	91	130	169	189
	1.5	7.5	15	38	68	105	151	196	218
	2.0	9.2	18	46	83	129	185	240	268
25 mm	0.3	3.8	11	23	45	83	124	158	169
	0.6	5.3	16	32	64	117	176	223	239
	1.0	6.5	20	39	78	143	215	274	293
	1.5	7.5	23	45	90	166	249	316	339
	2.0	9.2	28	55	111	203	305	388	415
32 mm	0.3	3.8	11.3	34	75	151	218	263	278
	0.6	5.3	16	48	106	213	309	372	394
	1.0	6.5	20	59	130	261	378	456	482
	1.5	7.5	23	68	151	301	437	527	557
	2.0	9.2	28	83	185	369	535	646	683
40 mm	0.3	23	56	169	263	376	508	564	—
	0.6	32	80	239	372	532	718	798	—
	1.0	39	98	293	456	652	880	978	—
	1.5	45	113	339	527	753	1017	1130	—
	2.0	55	138	415	646	923	1246	1385	—
50 mm	0.3	45	151	282	414	546	677	828	—
	0.6	64	213	399	585	771	958	1170	—
	1.0	78	261	489	717	945	1173	1434	—
	1.5	90	301	565	829	1092	1356	1657	—
	2.0	111	369	692	1015	1339	1662	2031	—
65 mm	0.3	162	327	572	816	1054	1317	1629	—
	0.6	229	463	809	1154	1490	1862	2304	—
	1.0	280	567	991	1415	1825	2282	2823	—
	1.5	324	655	1145	1635	2109	2637	3262	—
	2.0	397	803	1403	2003	2585	3231	3997	—
80 mm	0.3	245	489	865	1242	1580	1957	2446	—
	0.6	346	692	1224	1756	2234	2766	3458	—
	1.0	424	847	1499	2151	2738	3390	4237	—
	1.5	490	979	1733	2486	3164	3918	4897	—
	2.0	600	1200	2123	3046	3877	4800	6000	—
100 mm	0.3	376	753	1317	1881	2446	3010	3763	—
	0.6	532	1064	1862	2660	3458	4256	5320	—
	1.0	652	1304	2282	3259	4237	5215	6519	—
	1.5	753	1507	2637	3767	4897	6027	7534	—
	2.0	923	1846	3231	4616	6000	7385	9231	—

Notes: Capacities are based on -20°C liquid. For other evaporator temperatures, these values will change only slightly due to density and latent heat variations. Based on 4:1 recirculation. For other recirculation rates, divide 4 by the new recirculation rate and multiply values shown in table to arrive at new capacity.

Ammonia

Metric

Pressure-Relief Valves

Type H5600R, H5602R, H5600A, H5601, H5602, H5613, H5604

Pressure-Relief Valve Capacity Ratings

Cat. No.	Air Capacity	Standard Pressure Settings (bar)								
		10.3	12.1	13.8	15.5	17.2	19.0	20.7	22.4	24.1
H5600R H5602R	kg/h	288	355	378	425	468	514	558	601	648
H5600A	kg/h	852	982	1113	1244	1374	1505	1636	1766	1897
H5601 H5602	kg/h	971	1120	1268	1417	1566	1714	1863	2012	2160
H5613	kg/h	1437	1656	1876	2096	2316	2536	2756	2976	3196
H5604	kg/h	1954	2252	2552	2850	3149	3449	3748	4047	4345

Notes: These are atmospheric relief valves. Setting equal pressure above atmosphere when outlet is connected via proper piping to the atmosphere (outside). For valve sizing and selection, see page 34.

Metric

Ammonia

Pulse Width Valves

20 mm to 50 mm Port Size

Type PWV

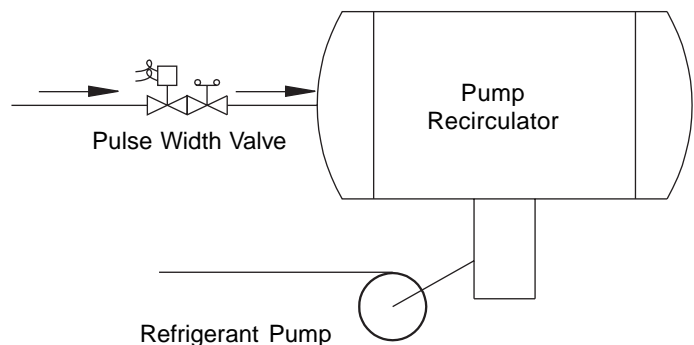
Liquid Make Up Capacities (kW Ammonia)

Cat No.	Size	Turns Open				
		2	3	4	5	6
PWV1	20 mm	42	98	183	281	401
PWV2	25 mm	60	123	239	440	661
PWV3	32 mm	60	183	401	805	1164
PWV5	50 mm	802	1506	2208	2911	3613

Notes: Based on 30°C condensing temperature and 3.5 bar pressure drop across the valve.

Recommended Inlet Line Size

Line Size	kW Ammonia
20 mm	141
25 mm	281
32 mm	615
40 mm	950
50 mm	2170
65 mm	3170
80 mm	5980



Sealed Motor Valves

20 mm to 100 mm Port Size

Type HMM

Suction Valve Capacities (kW Ammonia)

Evap. Temp. °C	Pressure Drop Across Valve (Bar)	Sealed Motor Valve							
		Port Size (mm)							
		20	25	32	40	50	65	80	100
10	0.02	19	34	48	102	137	225	304	485
	0.04	27	48	68	145	193	318	429	685
	0.08	37	68	95	204	272	449	605	966
	0.10	42	76	106	228	304	501	676	1,078
	0.15	51	93	130	278	370	611	824	1,315
	0.20	59	107	149	320	426	703	948	1,513
5	0.02	17	31	44	93	124	205	277	442
	0.04	24	44	61	132	176	290	391	624
	0.08	34	62	87	186	248	408	551	879
	0.10	38	69	97	207	276	456	615	981
	0.15	46	84	118	253	337	556	749	1,196
	0.20	53	97	136	290	387	639	862	1,375
0	0.02	16	28	40	85	113	186	251	401
	0.04	22	40	56	120	159	263	355	566
	0.08	31	56	79	168	225	370	500	797
	0.10	34	63	88	188	251	413	557	889
	0.15	42	76	107	229	305	504	679	1,083
	0.20	48	88	123	263	350	578	780	1,244
-5	0.02	14	26	36	77	102	169	228	363
	0.04	20	36	50	108	144	238	321	512
	0.08	28	51	71	152	203	335	452	720
	0.10	31	57	79	170	226	373	504	803
	0.15	38	69	96	207	275	454	613	978
	0.20	43	79	111	237	316	521	703	1,121
-10	0.02	13	23	32	69	92	152	205	327
	0.04	18	32	45	97	130	214	289	461
	0.08	25	46	64	137	183	301	406	649
	0.10	28	51	71	153	204	336	453	723
	0.15	34	62	87	186	247	408	550	878
	0.20	39	71	99	213	283	468	630	1,006
Kv		5.5	10	14	30	40	66	89	142

Notes: Continued on next page.

Ammonia

Metric

Sealed Motor Valves

20 mm to 100 mm Port Size

Type HMM, HMMR

Suction Valve Capacities (kW Ammonia)

Evap Temp. °C	Pressure Drop Across Valve (Bar)	Sealed Motor Valve							
		Port Size (mm)							
		20	25	32	40	50	65	80	100
-15	0.02	11	21	29	62	83	137	184	294
	0.04	16	29	41	87	117	192	260	414
	0.08	23	41	57	123	164	270	364	581
	0.10	25	46	64	137	182	301	406	647
	0.15	30	55	77	166	221	365	492	785
-20	0.02	10	19	26	56	74	122	165	263
	0.04	14	26	36	78	104	172	232	370
	0.08	20	36	51	109	146	241	325	518
	0.15	22	41	57	122	162	268	361	577
-25	0.02	9	16	23	49	66	109	147	234
	0.04	13	23	32	69	93	153	206	329
	0.08	18	32	45	97	129	214	288	459
	0.15	20	36	50	108	144	237	320	510

Suction Line Valve Capacities: Two Stage System (kW Ammonia)

-30	0.02	9	17	23	50	67	111	149	238
	0.04	13	23	33	70	94	155	209	334
	0.08	18	33	46	98	131	216	291	465
	0.15	24	44	61	131	174	288	388	619
-35	0.02	8	15	21	44	59	97	131	209
	0.04	11	21	29	62	83	136	184	293
	0.08	16	29	40	86	115	189	255	407
	0.15	21	38	53	113	151	250	336	537
-40	0.02	7	13	18	39	52	85	115	183
	0.04	10	18	25	54	72	119	160	256
	0.08	14	25	35	74	99	164	221	353
	0.15	18	32	45	97	130	214	288	460
Kv		5.5	10	14	30	40	66	89	142

Notes: Capacities for evaporator temperatures to -25°C assume evaporator temperature shown and 30°C liquid. Capacity changes 3% for each 5.6°C increase or decrease in liquid temperature. Capacities for evaporator temperatures between -25°C and -40°C are based on -10°C liquid temperature. (Example: Flooded evaporator.) For liquid overfeed evaporator suction between normal 2:1 to 5:1 rate, add 20% to the evaporator load or use the next larger port size to accommodate liquid volume accompanying the suction gas and to reduce impact velocity.

Sealed Motor Valves

20 mm to 100 mm Port Size
Type HMM

High Pressure Liquid Line Valve Capacities (kW Ammonia)

Pressure Drop bar	Sealed Motor Valve						
	Nominal size						
	20	25	32	40	50	80	100
0.2	601	1093	1530	3278	4480	9833	15733
0.3	736	1388	1873	4014	5486	12043	19269
0.4	850	1545	2163	4635	6335	13906	22250

Notes: Capacities assume +30°C saturated liquid, and -10°C evaporator, and no flashing through the valve.

Ammonia

Metric

HMMR Liquid Make-up Capacities (kW Ammonia)

HMMR	Sealed Motor Valve						
	Nominal size						
	20	25	32	40	50	80	100
High to Intermediate Pressure	584	1035	1460	3190	4250	9290	14600
Intermediate to Low Pressure	377	665	940	2050	2740	5990	9400
Cv	1.83	3.33	4.67	10.0	13.3	30	47

Notes: Capacities assume +30°C liquid, and -10°C evaporator temperature. Intermediate to low capacity based on -10°C saturation temperature and -40°C evaporating temperature.