WATER REGULATING VALVES

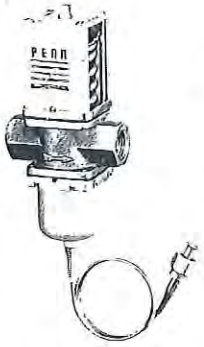
PENN

PRESSURE ACTUATED WATER REGULATING VALVES

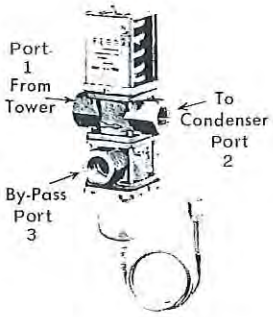
Penn pressure actuated water regulating valves are modulating type valves. They are designed for various applications and are suitable for either open or hermetic refrigeration units.
Series V46 direct acting valves OPEN on pressure increase. They are designed primarily for regulation of water cooled refrigeration condensers.
Series V48 are designed specifically for condensing units cooled either by atmospheric or forced draft cooling towers. They are used on single or multiple condenser hookups to the tower to provide the most economical and efficient use of the tower.
Max. Water Supply Press. 1034 kPa (150psig).
Max. Water Supply Temp. 77°C (170°F).
Max. Bellows Press. 1586 kPa (230 psig) for R-12 models.
2206 kPa (320 psig) for R-22 and all range models.

V46 FACTORY SETTINGS				
Refrig.	Open. Press.		Min. Close Press.	
	kPa	psig	kPa	psig
R12,All Range	724	105	676	98
R22	1241	180	1193	173
Ammonia	1103	160	1055	153

V48 FACTORY SETTINGS				
Refrig.	Open.Press. Port 1 to Port 2		Closing Press Port 1 to Port 3	
	kPa	psig	kPa	psig
R12	655	95	896	130
R22	1138	165	1482	215



SERIES V46



SERIES V48

REFRIG.	VALVE TYPE		CONN. (INS.)	OPENING POINT ADJUSTMENT RANGE		PRESSURE ELEMENT STYLE & CONN.	REPLACEMENT POWER ELEMENT		WATER VALVE RENEWABLE KIT	
	CAT. NO.	MODEL		kPa	psig		CAT. NO.	ELEMENT NO.	CAT. NO.	KIT NO.
V46 SERIES — 2 WAY										
R12 R22 R500 R502	12430	V46AA-1	3/8 NPT	483-1793	70-260	Style 13	12460	SEP91A-600R & SEC37A-601R*	12470	STT14A-600R
	12431	V46AB-1	1/2 "	483-1793	70-260	76cm (30")	12461	SEP91A-602R & SEC37A-602R*	12472	STT15A-602R
	12432	V46AC-1	3/4 "	483-1793	70-260	length	12462	SEP91A-601R & SEC37A-602R*	12473	STT16A-601R
	12433	V46AD-1	1 "	483-1793	70-260	with	12463	SEP91A-603R & SEC37A-600R*		STT17A-609R
	12434	V46AE-1	1-¼ "	483-1793	70-260	¼" Flare				STT17A-601R
	12435	V46AR-1	1½ Flg.	483-1793	70-260	Nut Conn.				
R12,R500	12436	V46AS-1	2 "	483-1172	70-170	Style 5	12466	SEP81A-602R		STT18A-600R
R22,R502	12438	V46AS-2	2 "	1103-1793	160-260	¼" SAE	12467	SEP81A-601R		
R12,R500	12437	V46AT-1	2½ "	483-1172	70-170	Male	12466	SEP81A-602R		STT18A-601R
R22,R502	12439	V46AT-2	2½ "	1103-1793	160-260	Conn.	12467	SEP81A-601R		
R717	12440	V46AB-11	1/2 NPT	690-1379	100-200	Style 15		SEP70A-603R	12472	STT15A-602R
	12441	V46AC-8	3/4 "	690-1379	100-200			SEP70A-601R	12473	STT16A-601R
	12442	V46AD-4	1 "	690-1379	100-200			SEP70A-604R		STT17A-609R
	12443	V46AE-4	1¼ "	690-1379	100-200	¼" NPT				STT17A-601R
	12444	V46AR-2	1½ Flg.	690-1379	100-200	Female				
	12445	V46AS-3	2 "	690-1379	100-200	Conn.		SEP70A-605R		STT18A-600R
	12446	V46AT-3	2½ "	690-1379	100-200					STT18A-601R
V48 SERIES — 3 WAY										
R12	12447	V48AB-1	1/2 NPT	586-758	85-110	Style 13	12461	SEP91A-602R & SEC37A-602R*	12471	STT15A-600R
	12448	V48AC-1	3/4 "	586-758	85-110		12462	SEP91A-601R & SEC37A-602R*		STT16A-600R
	12449	V48AD-1	1 "	586-758	85-110		12463	SEP91A-603R & SEC37A-600R*		STT17A-600R
	12450	V48AE-1	1¼ "	586-758	85-110					STT17A-603R
	12455	V48AF-1	1½ "	586-758	85-110	Style 5	12466	SEP81A-602R		STT17A-604R
R22	12451	V48AB-2	1/2 "	1000-1310	145-190	Style 13	12461	SEP91A-602R & SEC37A-602R*	12471	STT15A-600R
	12452	V48AC-2	3/4 "	1000-1310	145-190		12462	SEP91A-601R & SEC37A-602R*		STT16A-600R
	12453	V48AD-2	1 "	1000-1310	145-190		12463	SEP91A-603R & SEC37A-600R*		STT17A-600R
	12454	V48AE-2	1¼ "	1000-1310	145-190					STT17A-603R
	12456	V48AF-2	1½ "	1000-1310	145-190	Style 5	12467	SEP81A-601R		STT17A-604R

* Replacement element includes SEP element with ¼" male SAE connector and SEC37A capillary kit with 2 flare nuts. Use only on valves specified.

REVERSE ACTING (V46) 2 - WAY VALVES (Close on pressure increase) AVAILABLE ON REQUEST

TYPICAL RATINGS																					
TYPE	REFRIG	BASE * RATING PRESS.		WATER PD ACROSS VALVE		FLOW — litre/s and Imp. Galls/Min. VALVE SIZE															
						3/8"		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"		2-1/2"	
		kPa	PSIG	kPa	PSIG	l/s	Imp GPM	l/s	Imp GPM	l/s	Imp GPM	l/s	Imp GPM	l/s	Imp GPM	l/s	Imp GPM	l/s	Imp GPM	l/s	Imp GPM
V46 2 WAY	R12 R500	172	25	34.5	5	0.25	3.3	0.34	4.5	0.58	7.7	0.95	12.5	1.26	16.7	1.51	20.0	2.52	33.3	3.03	40.0
				69	10	0.33	4.3	0.41	5.4	0.73	9.6	1.10	14.6	1.51	20.0	1.83	24.2	3.03	40.0	3.66	48.3
	R22,502 R717	276	40	34.5	5	0.35	4.6	0.44	5.8	0.73	9.6	1.14	15.0	1.61	21.3	1.92	25.4	2.62	34.6	3.15	41.7
				69	10	0.47	6.2	0.59	7.8	1.01	13.3	1.45	19.2	2.05	27.1	2.40	31.7	3.60	47.5	4.29	56.7
V48 3 WAY	R12	207	30	48	7	—	—	0.42	5.5	0.95	12.5	1.58	20.8	2.18	28.8	2.84	37.5	—	—	—	—
				69	10	—	—	0.52	6.8	1.07	14.2	1.77	23.3	2.46	32.5	3.47	45.8	—	—	—	—
	R22	310	45	48	7	—	—	0.44	5.8	0.96	12.7	1.60	21.2	2.22	29.4	2.97	39.2	—	—	—	—
				69	10	—	—	0.54	7.1	1.10	14.6	1.86	24.6	2.52	33.3	3.56	47.1	—	—	—	—

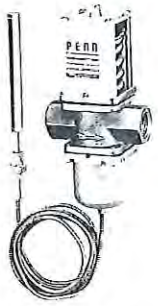
*Base Rating Pressure is the pressure above opening valve pressure.

REFER TECH. PAGE 124-d (V46) and 124-e (V48) FOR DETAILED CAPACITY CHARTS AND VALVE SELECTION DATA

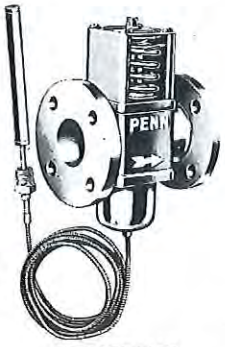
WATER REGULATING VALVES

PENN

TEMPERATURE ACTUATED MODULATNG VALVES



SERIES V47
Temperature Valve
Threaded Type



SERIES V47
Temperature Valve
Flange Type

Temperature actuated valves regulate the flow of water, or other liquids not harmful to the valve, to maintain a desired temperature. They are widely used on industrial applications. Easy manual flushing. Valves are available in three temperature ranges and are furnished with 1.8 m (6 feet) of armored capillary and a Style 4 temperature bulb (½" NPT closed tank immersion).

In addition, an internal by-pass hole is drilled and tapped in the regulator body. A solid plug is installed in this hole and a drilled orifice (see table for size) is furnished in an envelope attached to valve. Valves open on temperature rise.

Max. Water Supply Pressure: 1034 kPa (150 psig).

Max. Water Supply Temperature: 77°C (170°F).

Max. Bulb Temp: 11°C (20°F) above max. range.

Capillary Length: 1.8 m (6 ft.)

VALVE TYPE		Pipe Size	Range Opening Point		Bulb Size	Std. By-Pass Orifice Dia.	Replacement Power Element		Water Valve Renewable Kit	
Cat. No.	Model	NPT	°C	°F			Cat. No.	Element No.	Cat. No.	Kit No.
124101	V47AA-1	3/8"	46 to 82	115 to 180	11/16"x3-1/4"	.062		SET29A-622R	12470	STT14A-600R
124102	V47AA-2	3/8"	71 to 110	160 to 230	11/16"x3-1/4"	.062		SET29A-623R		
124103	V47AA-3	3/8"	24 to 57 Cross Ambient	75 to 135 Cross Ambient	11/16" x 6"	.062		SET29A-601R		
124104	V47AB-3	1/2"	46 to 82	115 to 180	11/16"x3-1/4"	.062		SET29A-624R	12472	STT15A-602R
124105	V47AB-4	1/2"	71 to 110	160 to 230	11/16"x3-1/4"	.062		SET29A-625R		
124106	V47AB-5	1/2"	24 to 57 Cross Ambient	75 to 135 Cross Ambient	11/16" x 10"	.062		SET29A-602R		
124107	V47AC-3	3/4"	46 to 82	115 to 180	11/16"x3-1/4"	.062		SET29A-626R	12473	STT16A-601R
124108	V47AC-4	3/4"	71 to 110	160 to 230	11/16"x3-1/4"	.062		SET29A-627R		
124109	V47AC-6	3/4"	24 to 57 Cross Ambient	75 to 135 Cross Ambient	11/16" x 10"	.062		SET29A-604R		
124110	V47AD-1	1"	24 to 110 Cross Ambient	75 to 135 Cross Ambient	11/16"x16-1/4"	.093		SET29A-605R		STT17A-609R
124111	V47AD-2	1"	46 to 82	115 to 180	11/16" x 6"	.093		SET29A-629R		
124112	V47AD-3	1"	71 to 110	160 to 230	11/16" x 6"	.093		SET29A-630R		
124113	V47AE-1	1-1/4"	24 to 57 Cross Ambient	75 to 135 Cross Ambient	11/16"x16-1/4"	.093		SET29A-605R		STT17A-610R
124114	V47AE-2	1-1/4"	46 to 82	115 to 180	11/16" x 6"	.093		SET29A-629R		
124115	V47AE-3	1-1/4"	71 to 110	160 to 230	11/16" x 6"	.093		SET29A-630R		
124116	V47AR-1	1-1/2"*	24 to 57 Cross Ambient	75 to 135 Cross Ambient	11/16"x16-1/4"	.093		SET29A-605R		
124117	V47AR-2	1-1/2"*	46 to 82	115 to 180	11/16" x 6"	.093		SET29A-629R		
124118	V47AR-3	1-1/2"*	71 to 110	160 to 230	11/16" x 6"	.093		SET29A-630R		
124119	V47AS-1	2"*	46 to 71	115 to 160	11/16" x 10"	.125		SET29A-632R		STT18A-600R
124120	V47AS-2	2"*	71 to 96	160 to 205	11/16" x 10"	.125		SET29A-633R		
124121	V47AS-3	2"*	24 to 46 Cross Ambient	75 to 115 Cross Ambient	11/16" x 43"	.125		SET29A-606R		

* ASME Flange.

Bulb Wells to suit available on application.

TYPICAL RATINGS

Temperature Rise Above Valve Opening Pnt.		Water PD Across Valve		FLOW — litre/s and Imp. Galls/Min. VALVE SIZE													
				3/8"		1/2"		3/4"		1"		1-1/4"		1-1/2"		2"	
°C	°F	kPa	PSIG	l/s	Imp. GPM	l/s	Imp. GPM	l/s	Imp. GPM	l/s	Imp. GPM	l/s	Imp. GPM	l/s	Imp. GPM	l/s	Imp. GPM
8.3	15	34.5	5	0.26	3.5	0.34	4.5	0.58	7.7	1.07	14.2	1.45	19.2	1.67	22.1	2.59	34.2
		69	10	0.32	4.3	0.41	5.4	0.73	9.6	1.26	16.7	1.70	22.5	2.02	26.7	3.03	40.0
		138	20	0.41	5.4	0.51	6.7	0.88	11.7	1.45	19.2	2.05	27.1	2.37	31.3	3.63	47.9
13.3	24	34.5	5	0.35	4.6	0.44	5.8	0.78	10.3	1.32	17.5	1.79	23.6	2.08	27.5	3.19	42.1
		69	10	0.46	6.1	0.59	7.8	1.01	13.3	1.64	21.7	2.27	30.0	2.65	35.0	4.04	53.3
		138	20	0.60	7.9	0.80	10.5	1.26	16.7	2.05	27.1	2.84	37.5	3.28	43.3	5.17	68.3
16.7	30	34.5	5	0.38	5.0	0.46	6.1	0.82	10.8	1.39	18.3	1.89	25.0	2.21	29.2	3.34	44.2
		69	10	0.51	6.7	0.63	8.3	1.07	14.2	1.74	22.9	2.40	31.7	2.84	37.5	4.35	57.5
		138	20	0.66	8.7	0.88	11.7	1.42	18.8	2.27	30.0	3.12	41.3	3.63	47.9	5.74	75.8

PENN SERIES V46 - 2 WAY - WATER REGULATING VALVES SELECTION CHARTS

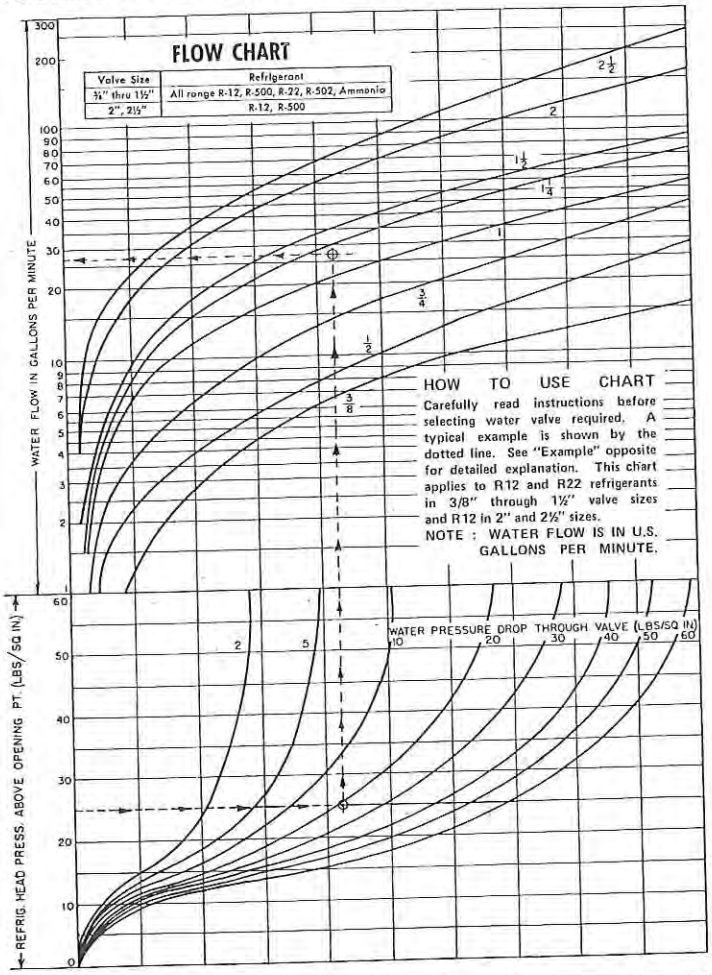
(FOR WATER REGULATING VALVES DETAILED ON TECH. PAGE 124-d)

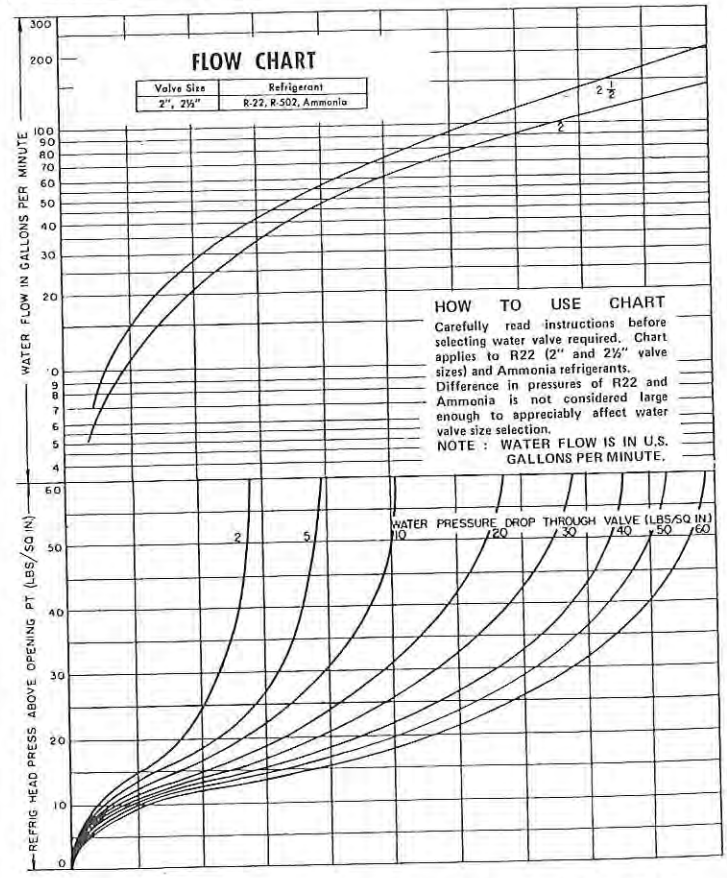
TO SELECT WATER VALVE SIZE

1. Determine maximum water flow required. The manufacturer of the condensing unit will usually provide tables, or calculations can be made from the following:
   a. Maximum BTU's per hour to be removed. (Be sure to add heat gains in refrigeration equipment and heat of compression. If figures are not available it is customary to add 25% to the load for these heat gains.)
   b. Incoming water temperature at time of maximum load.
   c. Outlet water temperature; this must be lower than the condensing temperature of the refrigerant — use condensing unit manufacturer's data, or assume 10°F difference.
   d. Flow (galls/min) $= \frac{\text{(Tons of Refrig.x 15,000 BTU/Hr.)}}{500 \times \text{(Out. Temp.°F}-\text{In. Temp.°F)}}$
2. Draw horizontal line across upper half of Flow Chart through flow required as determined by 1-d above. (Note separate charts.)
3. Determine refrigerant head pressure rise above valve opening point.
   a. Valve closing point (to assure closure under all conditions) must be the refrigerant head pressure equivalent to the highest ambient air temperature expected at time of maximum load. Read this in pounds per sq. in. gauge from "Saturated Vapor Table" for refrigerant selected.
   b. Read from same table the operating head pressure corresponding to selected condensing temperature.
   c. Valve opening point will be about 7 psig above closing point.
   d. Subtract opening pressure from operating pressure. This gives the head pressure rise.
4. Draw horizontal line across lower half of Flow Chart through this value.
5. Determine water pressure drop through valve — this is the pressure actually *available* to force water through the valve.
   a. Determine *minimum* water pressure available from city mains or other source.
   b. From condensing unit manufacturer's tables read pressure drop through condenser corresponding to required flow.
   c. Add to this estimated or calculated drop through piping, etc., between water valve and condenser, and from condenser to drain (or sump of cooling tower).
   d. Subtract total condenser and piping drop from available water pressure. This is the *available* pressure drop through valve.
6. On lower half of curve, mark point on horizontal head pressure line drawn in corresponding to available water pressure drop through valve. Interpolate between curves, or pick curve for nearest *lower* drop for which curve is drawn (this gives an automatic safety factor).
7. From this point draw line vertically upward until it intersects water flow line in upper half of Flow Chart.
8. If intersection falls on a valve size curve this is the valve size.
9. If intersection falls between two curves the required valve size is the *larger* of the two.

EXAMPLE

1. The required flow for an R-12 system is found to be 27 U.S. gpm. Condensing pressure is 125 psig and maximum ambient temperature estimated at 86°F. City water pressure is 40 psig and manufacturer's table gives drop through condenser and accompanying piping and valves as 15 psi. Drop through installed piping approximately 4 psi.
2. Draw line through 27 gpm — see dotted line, upper half of Flow Chart.
3. Closing point of valve is pressure of R-12 corresponding to 86°F. ambient = 93 psig.
4. Opening point of valve is 93 + 7 = 100 psig.
5. Head pressure rise = 125 — 100 = 25 psi.
6. Draw line through 25 psi — see dotted line, lower half of Flow Chart.
7. Available water pressure drop through valve = 40 — 19 = 21 psi.
8. Interpolate just over the 20 psi curve — circle on lower half of Flow Chart.
9. Draw vertical line upward from this point to flow line — circle on Flow Chart marks this intersection.
10. This intersection falls between curves for 1" and 1¼" valves. **1¼" valve is required.**





ORDERING PROCEDURE : REFER TO PAGE 124 AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

PENN SERIES V48 - 3 WAY - WATER REGULATING VALVES SELECTION CHART

(FOR WATER REGULATING VALVES DETAILED ON TECH. PAGE 124-d)

SELECTION OF VALVE SIZE

1. Determine the maximum water flow required through the condenser.
   a. Check condenser manufacturer's recommendations for water flow or use recommended condenser water temperature rise in following calculation.

   $$\text{galls/min/ton} = \frac{30}{(\text{water outlet temp.}^{\circ}\text{F} - \text{water inlet temp.}^{\circ}\text{F})}$$

   b. The normal flow through a condenser used with a cooling tower is 3 U.S. gallons/min/ton.
   c. Total flow (galls/min) = tons of refrig. x galls/min/ton.
2. Draw horizontal line across upper half of Flow Chart through flow required as determined by 1-C above.
3. Determine refrigerant head pressure rise above valve opening point. It is considered good practice in most applications to maintain a condensing temperature between 90°F and 105°F. This corresponds to a pressure range of 100 to 130 psig on R-12 and 170 to 215 psig on R-22. In general, therefore, the refrigerant head pressure rise above the opening point should be 30 psig with R-12 and 45 psig with R-22. Some manufacturers recommend a slightly higher head pressure range.
4. Note that there are two vertical pressure scales in the lower half of the Flow Chart; one for R-12 and one for R-22. Draw a horizontal line across lower half of Flow Chart through the value determined in 3 above. Be sure to use correct scale.
5. Determine allowable water pressure drop through valve. The pumping head should include the pressure drop through the valve (7 psig = 16 ft., 10 psig = 23 ft., 15 psig = 35 ft.).
6. On the lower half of curve, mark point on horizontal head pressure line where it intersects the allowable water pressure drop curve.
7. From this point draw line vertically upward until it intersects water flow line in upper half of Flow Chart.
8. If intersection falls on a valve size, this is the size.
9. If intersection falls between two curves, the required valve size is the larger of the two.

EXAMPLE:

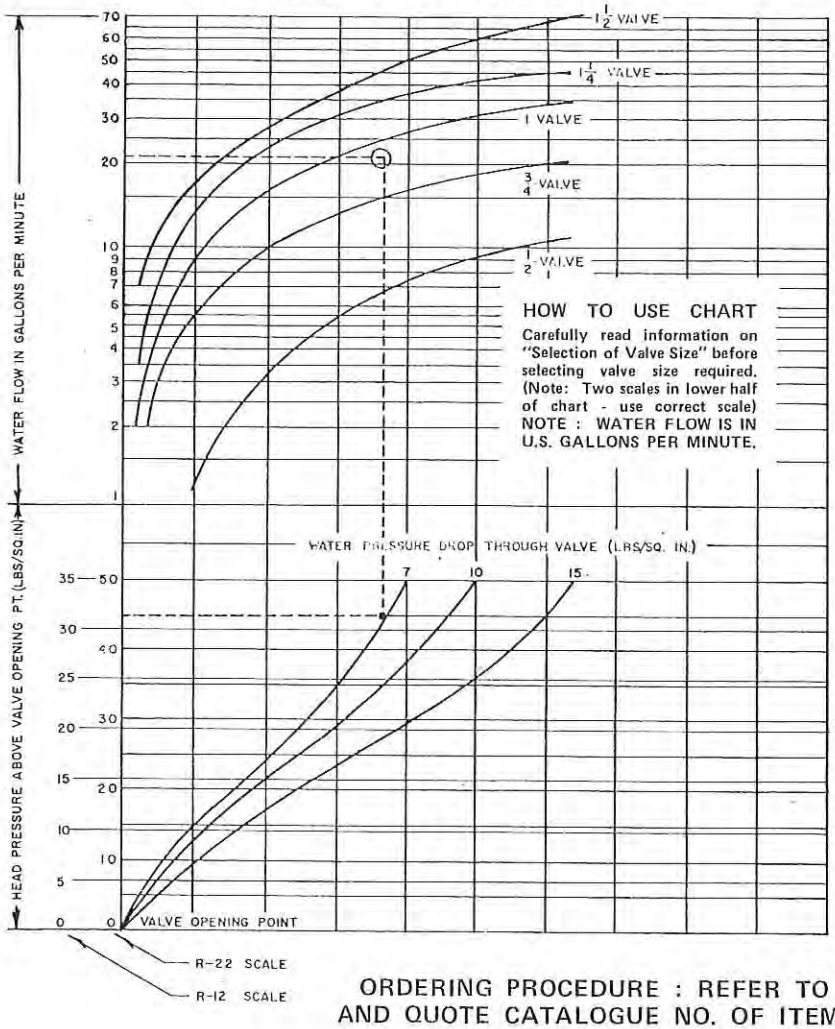
1. The required flow for an R-22 system is found to be 21 U.S. gpm. It is desirable to operate at a condensing temperature between 90°F and 105°F. Head pressure will be between 170 and 215 psig. Allowable water pressure drop is 7 psig.
2. Draw line through 21 U.S. gpm – see dotted line, upper half of Flow Chart.
3. Draw line through head pressure rise of 45 psig – see dotted line lower half of Flow Chart.
4. At intersection of lower horizontal line and pressure drop of 7 psig, draw a vertical line upward from this point to flow line – circle on Flow Chart marks this intersection.
5. This intersection falls between curves for ¾" and 1" valves. A 1" valve is required.

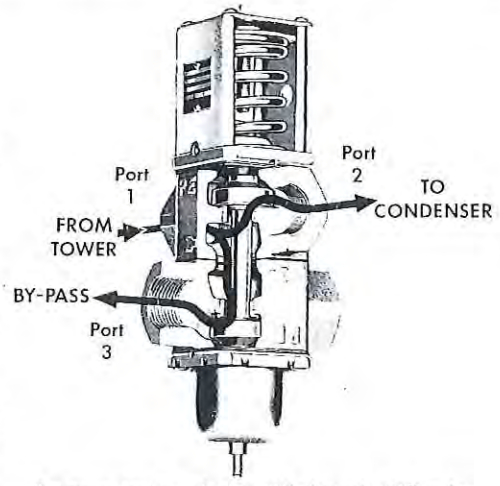
NOTE: If a head pressure rise above the valve opening point is chosen at less than 45 psig for R-22 or less than 30 psig for R-12, the condenser by-pass will be partly open when the desired maximum flow is obtained through the condenser. In these cases, the pump flow required should be taken from the following table:

REQUIRED PUMP FLOW IN U.S. GPM.

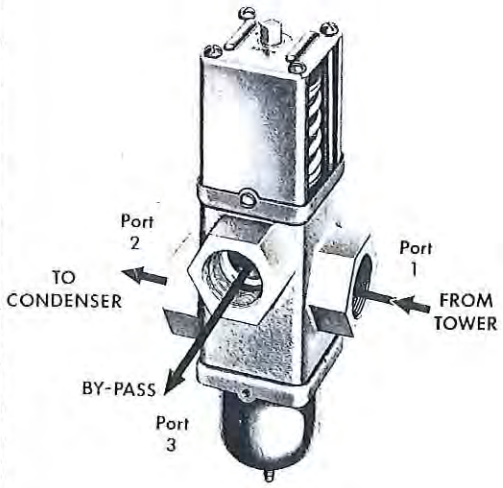
Pressure Drop, psig	Valve Size				
	½"	¾"	1"	1¼"	1½"
7	8	20	27.5	38	53
10	10	23	32.5	46	64
15	12.5	28	39	56	78

FLOW CHART
R12 AND R22 REFRIGERANTS





Cut-away section of sizes ½" through 1¼" valve illustrating water flow.



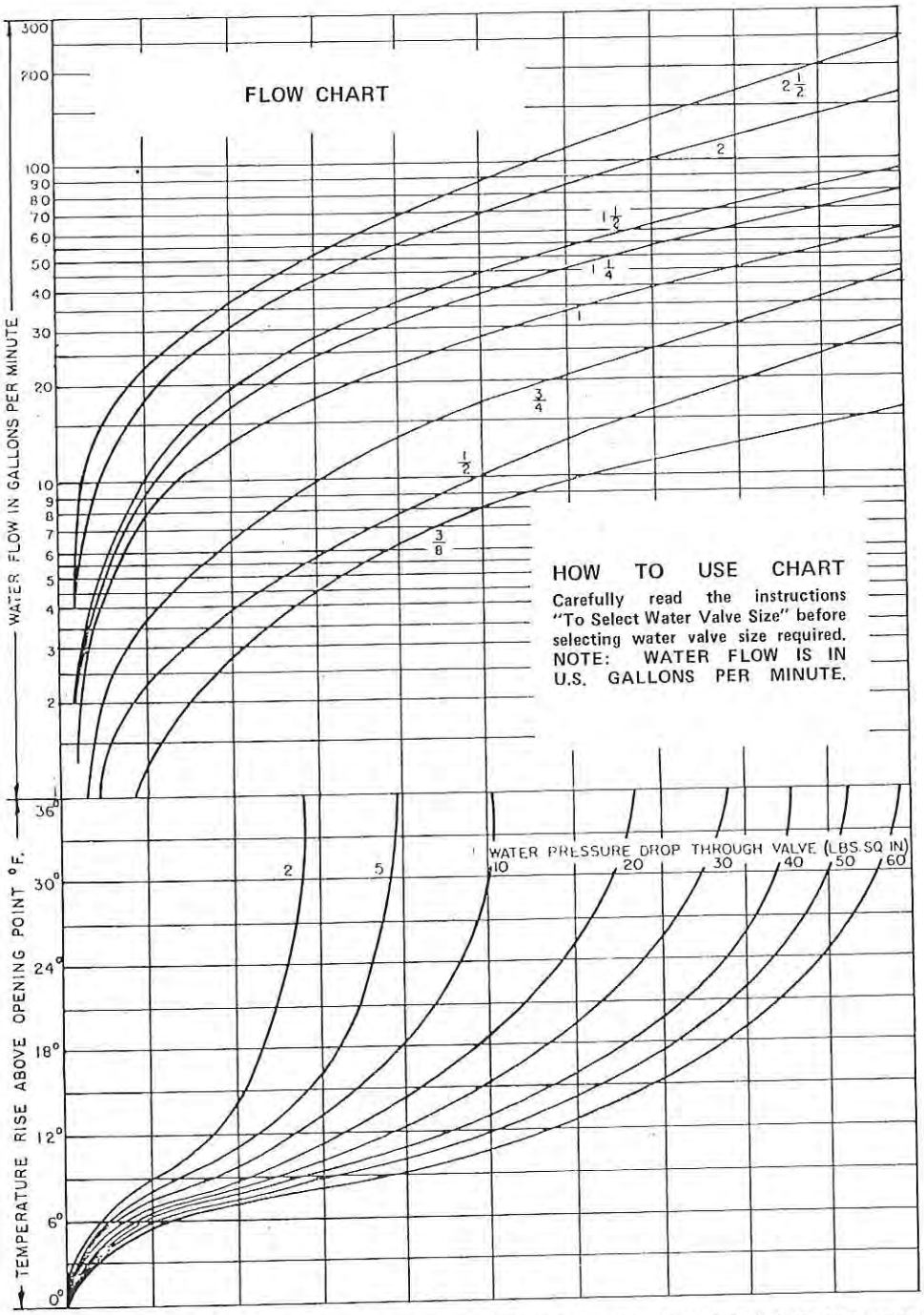
ORDERING PROCEDURE : REFER TO PAGE 124
AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

PENN SERIES V47
TEMPERATURE ACTUATED MODULATING WATER VALVES
SELECTION CHART

(FOR WATER REGULATING VALVES DETAILED ON TECH. PAGE 124-e)

TO SELECT WATER VALVE SIZE

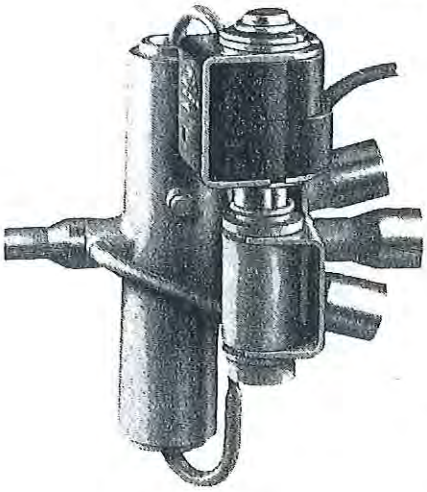
1. Determine the maximum water flow required and draw a horizontal line across upper half of Flow Chart thru this flow.
2. Determine the temperature rise above the valve opening point.
   a. Valve closing point is the highest temperature at which it is desired to have no flow through the valve.
   b. Valve opening point will be about 5°F. above the valve closing point.
   c. Determine the temperature the valve is to maintain.
   d. Subtract the temperature opening point from the operating temperature. This gives the temperature rise.
3. Draw horizontal line across lower half of Flow Chart through this value.
4. Determine the allowable pressure drop through the valve — this is the pressure actually available to force liquid through the valve.
5. On lower half of curve, mark point on drawn-in horizontal temperature line at pressure determined in Step.4. Interpolate between curves, or pick curve for nearest lower pressure drop for which curve is drawn (this gives an automatic safety factor).
6. From this point draw line vertically upward until it intersects drawn-in horizontal water flow line in upper half of Flow Chart.
7. If intersection falls on a valve size curve this is the valve size.
8. If intersection falls between two curves the required valve size is the larger of the two.



ORDERING PROCEDURE : REFER TO PAGE 124 AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

REVERSING VALVES

401RD SERIES REVERSING VALVE FOR HEAT PUMPS



A PERFORMANCE - PROVEN, 4 - WAY REVERSING VALVE DESIGNED TO MEET THE GROWING NEEDS FOR ENERGY - CONSERVING REVERSE CYCLE COMFORT SYSTEMS. THE 401 HAS ONLY TWO MOVING PARTS

401RD RELIABILITY FEATURES

- 4 way pilot construction assures full system pressure differential acting across main slide during shifting.
- Reliability — 4 way pilot provides positive shifting at low system differential pressure.
- Large pilot ports to ensure immunity from system contaminants.
- High efficiency — higher capacity through suction and discharge — low leakage around slide.
- The steel drawn (one piece) enclosing tube on the pilot means increased valve life.

Maximum Operating Pressure Differential (MOPD) 2758 kPa (400 psi).

Maximum Safe Working Pressure 3448 kPa (500 psig).

VALVE		CONNECTIONS		NOMINAL CAPACITY *						ELECTRICAL COIL DATA	
				R12		R22		R502			
CAT. NO.	MODEL	DISCHARGE	SUCTION & COILS	kW	Tons	kW	Tons	kW	Tons	CAT. NO.	TYPE
12518	401RD235	3/8" ODM	5/8" ODF	5.6	1.6	9.1	2.6	7.0	2.0	123288	240 V 50Hz.
12517	401RD2F35	3/8" ODF	5/8" ODF								
12520	401RD345	1/2" ODM	5/8" ODF	6.7	1.9	10.9	3.1	8.1	2.3	COIL STYLE AMF Open Frame	
12519	401RD3F45	1/2" ODF	5/8" ODF								
1257	401RD435	3/8" ODM	5/8" ODF	9.1	2.6	14.8	4.2	11.3	3.2	X 13758-69-18 Amps Inrush 0.25 Holding 0.10 Max. Watts 10.2 VA Holding 24	
1258	401RD4F46	1/2" ODF	3/4" ODF								
12522	401RD457	5/8" ODM	7/8" ODF								
12521	401RD6F36	3/8" ODF	3/4" ODF	13.7	3.9	21.8	6.2	16.5	4.7	Std. Coil Leads 18 AWG, 1/32" insulation 600V, 125°C, 18" long	
1251	401RD6F45	1/2" ODF	5/8" ODF								
12510	401RD6F46	1/2" ODF	3/4" ODF								
12511	401RD6F47	1/2" ODF	7/8" ODF								
1252	401RD6F57	5/8" ODF	7/8" ODF								
12514	401RD10F47	1/2" ODF	7/8" ODF	25.3	7.2	40.4	11.5	30.6	8.7	Other Voltages on application	
12515	401RD10F57	5/8" ODF	7/8" ODF								
1255	401RD10F79	7/8" ODF	1-1/8" ODF								

13.65T — 6/81

* Nominal Capacity based on 38°C (100°F) condensing temperature, 4.4°C (40°F) evaporator temperature and a 14 kPa (2 psi) pressure drop across the suction port.

FIGURE 1. HEATING CYCLE

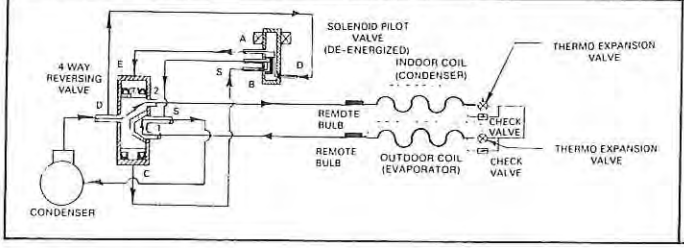
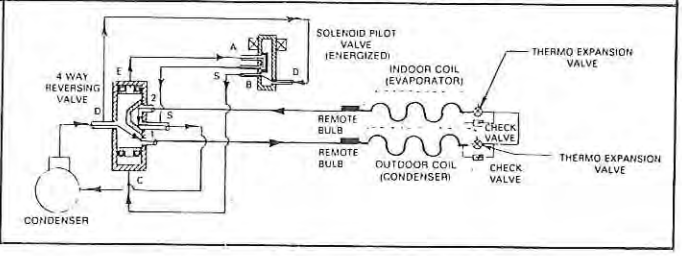


FIGURE 2. COOLING CYCLE



Figures 1 and 2 show a schematic diagram of the 401 series valve on a typical reverse cycle heat pump system.

HEATING CYCLE

In Figure 1 the system is on the heating cycle with discharge gas flowing thru reversing valve ports "D" to "2" making the indoor coil the condenser. The suction gas is flowing from the outdoor coil (evaporator) thru reversing valve ports "1" to "S" and back to the compressor.

With the 4-way solenoid pilot de-energised the slide is positioned so as to connect ports "D" with "A" and "B" with "S". When the pilot is de-energised, high pressure discharge gas builds up on top of the main slide. The area below the main slide is isolated from the high pressure by "C" cup seal and exposed to low pressure suction gas. Thus, the unbalanced force, due to the difference between discharge and suction pressures acting on the full end area of the main slide holds the slide in the "Down" position as shown in Figure 1.

COOLING CYCLE

When the coil is energised the slide in the pilot solenoid valve raises, now connecting pilot ports "D" with "B" and "A" with "S". With the pilot solenoid so positioned, the discharge pressure imposed on the top of the main slide, area "E", will flow thru pilot solenoid valve to the suction side of the system. At the "C" end of the main slide, high pressure discharge gas will accumulate so as to increase the pressure. An unbalanced force in an upward direction is again due to the difference between discharge and suction pressures acting on opposite ends of the main slide.

This unbalanced force moves the main slide to the "Up" position as shown in Figure 2 and the force unbalance across the area of the main slide holds the slide in the new position.

The system has now changed over to the cooling cycle with the discharge gas flowing thru reversing valve ports "D" to "1", making the outdoor coil the condenser with the suction gas flowing thru reversing valve port "2" to "S", making the indoor coil the evaporator.

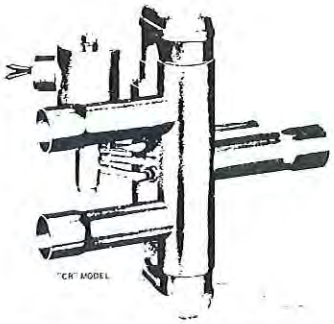
CAUTION

Depending on the manner in which the reversing valve is piped into the system, power failure to the pilot solenoid valve coil will cause the system to "fail safe" on either the heating or the cooling cycle. In Figures 1 and 2, the valve is piped to fail safe on heating. In order to fail safe on cooling, the indoor coil would be connected to reversing valve port "1" and the outdoor coil connected to reversing valve port "2".

REVERSING VALVES

CHATLEFF REVERSING VALVES

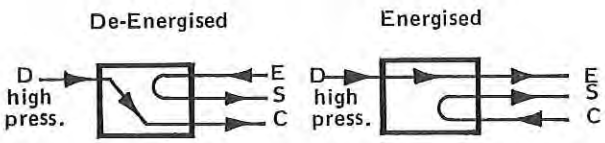
CR SERIES



Chatleff Reversing Valves are immediate-acting, quiet, and may be mounted in any position. "CR" Series Valves operate at a maximum differential of 2758 kPa (400 psi) to a minimum differential of 69 kPa (10 psi) at 15% low voltage. These valves are well suited for low-temperature refrigeration defrost as well as heat-pump duty.

VALVE		Conn. Sizes		Orifice Size		Nominal Capacity kW (Tons)				Flow Press. Operating Differential		Static Press.		Solenoid Coil 240V AC
Cat. No.	Model	Suct. Cond. Evap.	Disch.	Disch.	Suct.	R12	R22	R500	R502	Max.	Min.	Burst	Max. Case Operat.	P/N S240F CAT. NO. 12618
1262	CR560G-2	1.26" to 1.13" ID	.748" to .750" OD	.531"	.890"	17.6 (5)	26.4 (7.5)	21.1 (6)	22.9 (6.5)	2758 kPa (400 psi)	207 kPa (30 psi)	17238 kPa (2500 psig)	3448 kPa (500 psig)	
1263	CR770H-2	1.377" to 1.381"ID	1.126" to 1.13"OD	.750"	1.144"	33.4 (9.5)	52.8 (15)	45.7 (13)	49.2 (14)					

FLOW DIAGRAM



CONSTRUCTION.

Body — Brass.
Solenoid Plunger and Housing — Stainless Steel.
Ports — Copper Tubing
Internal Parts — Teflon, Brass, Aluminium and Steel.
Seats (Main Valve) — Teflon on Brass.
Seats (Pilot Valve) — Stainless Steel on Brass.

RANCO REVERSING VALVES

For Heat Pump Air Conditioning Systems

SOLENOID OPERATED

Types V26, V30 and V25 Reversing Valves are slide-type, 4-way valves which operate under full pressure of a Heat Pump system.
They are hermetically constructed, and operation is controlled by an EC type Solenoid Coil on a single Pilot Valve, which is an integral part of the Main Valve.
These solenoid-operated Reversing Valves are suitable for Heat Pump, Central Air-Conditioning, and Window-Type Air Conditioners, using Refrigerants 12, 22 and 502.
Other controls, such as a temperature-cycling control and a de-icer control, are required in addition to the Reversing Valve for automatic operation of the Heat Pump for cooling and heating.

VALVE TYPE		Port Size (ins.)	Connections ODS		Valve Body Dimensions mm (ins.)		Combined Leak Rate Pilot & Main Valve**	Capacity* kW (Tons)		Max. Operat. Press. Diff. (MOPD)	Min. Operat. Press.	Max. System Press.	Min. Burst Press.
CAT.NO.	MODEL		Disch.	Suct. & Coils	Length	Diam.		R12	R22 R502				
12620	V26-100	0.437	3/8"	1/2"	125.4	25.4	2000	6.2	8.8	2586 kPa (375 psi)	103 kPa (15 psig)	4137 (600)	20685 (3000)
12621	V26-150		3/8"	5/8"	(4-15/16)	(1)	cc/min.	(1.75)	(2.5)				
12622	V30-101	0.609	1/2"	3/4"	199.2	35	4000	12.3	17.6			3448 kPa (500 psig)	17927 kPa (2600 psig)
12623	V30-103		1/2"	7/8"	(7-27/32)	(1-3/8)	cc/min.	(3.5)	(5.0)				
12624	V25-500	0.785	1/2"	7/8"	220.7	44.5	6000	21.1	29.9				
12625	V25-750		3/4"	7/8"	(8-11/16)	(1-3/4)	cc/min.	(6.0)	(8.5)				
12626	V25-751		7/8"	1-1/8"									

** Dry air at 1034kPa (150 PSI) — valve body heated to 71°C (160°F). Manufacturers literature available - Bulletin A1919 - 1.

* Capacity values are based on a 13.8kPa (2 PSI) pressure drop across the suction path of the valve at pumping rates occurring at 48.9°C (120°F) condensing temperature (14°C (25°F) superheat) and 4.4°C (40°F) evaporating temperature (5.6°C (10°F) superheat). The pressure differential across the valve may momentarily drop below the minimum 103 kPa (15 psig) value during reversal. However, if the system can produce a pressure differential of 103 kPa (15 psig) (or higher) across the valve, then reversal will be satisfactory.

ELECTRICAL COIL DATA				
CAT. NO.	COIL TYPE	VOLTS	FREQ.	Coils are designed to operate valves at advertised pressures, at 10% over and 15% under the rated coil voltage at a 26.7°C (80°F) ambient temperature, with 30 ft./minute air movement over them.
12627	EC121	240AC	50	
12629	EC137	12	DC	

REFER FOLLOWING TECH. PAGES 126-a & 126-b FOR REVERSING VALVE FIELD SERVICE INSTRUCTIONS

RANCO

FIELD SERVICE INSTRUCTIONS FOR REVERSING VALVES

These **Field Service Instructions** will aid recognition of a malfunctioning Heat Pump System equipped with a reversing valve.

FIELD PROBLEMS SIMPLIFIED

Heat pump equipment usually includes a reversing valve (added to a refrigerating system to create an "all season" heat pump) which is easily identified and blamed for many failures of the system.

Valves have been needlessly replaced without correcting the original trouble in the system, principally due to inadequate testing and erroneous quick decisions.

A tabulated chart follows these instructions on Valve Troubles, which are so listed to be quickly analysed by "Touch" testing for "possible causes" with suggested "corrections", to simplify testing procedures and cut testing time.

OPERATION OF THE VALVE

The SOLENOID COIL on the 3-WAY PILOT VALVE forces the needles of the pilot valve to OPEN and CLOSE two port openings at the INSTANT of reversing operations for the 4-WAY MAIN VALVE.

Operating Sequence

(1) An ENERGISED COIL (in the heating phase) forces two opposing pilot valve needles, "back needle" and "plunger needle", separated with stainless steel pins, to simultaneously CLOSE the "back" port and to KEEP OPEN the "front" port.

Notes: (a) The **"outlet" port** is the center bleeder tube (called "common capillary") which is brazed into the suction line tube and is a common bleed path for each outside port ("front" and "back" capillaries).

(b) The **"inlet" tubes,** called "back" and "front capillary" and each from its pilot port, are operating paths to the opposite end chambers of the main valve cylinder. These paths conduct the gas which bleeds through a monel screen from "bleeder holes" located in each piston as gas pressure changes occur within the end chambers.

(2) Gas flows out of the RIGHT end chamber, decreasing in pressure there. High pressure gas from the system immediately builds up within the LEFT end chamber since no path is open for escape which was first closed by the needle valve at the pilot "back port".

Note: At the end of each stroke, one of the operating gas paths is closed to the pilot valve.

(3) Difference in pressures between the two end chambers aids the "slide bracket" assembly to move instantly to the RIGHT by the pistons from the pressure differential of the system.

Note: In reversing operation, the "slide" port straddles one or the other of two openings (in section views "E" and "C" tubing schematically piped through the illustrated circled figures 3 and 4 respectively) as directed. The "suction tube" between "E" and "C" is always OPEN to the low pressure side of the system.

(4) While in and during the operating phase of heating, both end chambers EQUALISE in pressure until the "solenoid coil" is DE-ENERGISED (into cooling or de-icing phase) when the opposite operation in reversing takes place within the PILOT and MAIN VALVES.

Notes: (a) During the transfer period, there is sufficient by-pass to prevent overloading the compressor due to an excessive head pressure.

(b) The valve reverses against running pressures with no mechanical or impact noises from the "slide", "slide bracket" or pistons; however, there is an instant of hissing gas as pressures equalise in both end chambers.

SYSTEM TROUBLES THAT AFFECT THE REVERSING VALVE

Any trouble in a heat pump, which will materially affect the normal operating pressures, may prevent the valve from shifting properly. For example, (1) a leak in the system resulting in a loss of charge, (2) a compressor which is not pumping properly, (3) a leaking check valve, (4) defective electrical system or (5) mechanical damage to the valve itself, **each will indicate** an apparent malfunction of the valve.

Make the following checks on the system and its components **before attempting to diagnose any valve trouble** by making the "Touch Test" method of analysis.

(1) Make a physical inspection of the valve and solenoid coil for dents, deep scratches and cracks.

(2) Check the electrical system. This is readily done by having the electrical system in operation so that the solenoid coil is energised.

In this condition, remove the lock nut to free the solenoid coil. Slide it partly off the stem and notice a magnetic force attempting to hold the coil in its normal position.

By moving the coil farther off the stem, a clicking noise will indicate the return of the "plunger" to its non-energised position. When returning the coil to its normal position on the stem, another clicking noise indicates that the "plunger" responded to the energised coil.

If these conditions **have not** been satisfied, other components of the electrical system are to be checked for possible trouble.

(3) Check the heat pump refrigeration system for proper operation as **recommended by the manufacturer of the equipment.**

After all of the previous inspections and checks have been made and determined correct, **then perform the "Touch Test" on the reversing valve** according to chart on the following page.

This test is simply performed by feeling the temperature relationships of the six (6) tubes on the valve and compare the temperature differences. Refer to the chart after the comparative temperatures have been determined for the **"possible cause"** and suggested **"corrective action"** to be taken.

If it is necessary to replace the valve, follow the "procedure for replacing the valve".

PROCEDURE FOR REPLACING THE VALVE

(1) Remove the solenoid coil.

(2) Heat the soldered joints (valve body is not to be heated above 120°C (250°F) to remove the valve.

Note: Exercise care to prevent the valve body being heated above 120°C (250°F). Exceeding this temperature may introduce contaminants into the system. The valve body can be protected from excessive heat by wrapping it with wet cloths and keeping them wet during the removal operation.

(3) It is imperative when installing a new valve that the inside of all tubes of the valve and the system be **protected and kept clean** of moisture and all other foreign matter, such as: flux, dirt, dust, flakes of copper oxide, filings, metal chips, etc.

(4) The valve must be protected (the same as out-lined in (2) above) from excessive heat (valve body is not to be heated over 120°C (250°F) when installed).

Notes: (a) Avoid rough handling of the valve to prevent dents or bends occurring on any portion of the valve.

(b) Keep the axis of the valve body in a horizontal plane which may be rotated to any angle around its axis.

(c) Make certain the limits of the valve capacity are not outside the specified "refrigerant-tonnage" of the system.

(5) After the valve has been completely installed in the system and tested for leaks, return the solenoid coil to the pilot valve.

(6) Recharge the unit with the **weight of the refrigerant gas specified by the manufacturer,** then determine that the unit is operating properly before attempting to operate the reversing valve.

Note: The valve **will not** operate properly on a partially charged system.

(7) Cycle the valve at least a dozen or more times to check the proper operation of the system.

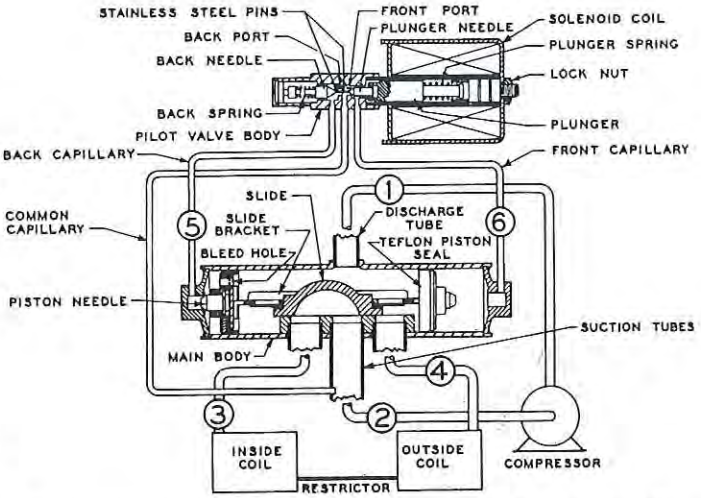
ORDERING DETAILS FOR RANCO REVERSING VALVES – REFER PAGE 126.

TOUCH TEST CHART – REFER NEXT PAGE

RANCO

FIELD SERVICE INSTRUCTIONS FOR REVERSING VALVES

(Continued from previous page)



Sectional View of Reversing Valve, and with the six tubes numbered to match the chart for touch testing valve operation.

TOUCH TEST CHART

VALVE OPERATING CONDITION	Disch. Tube from Compr. 1	Suction Tube to Compr. 2	Tube to Inside Coil 3	Tube to Outside Coil 4	LEFT Pilot Back Capill. Tube 5	RIGHT Pilot Front Capill. Tube 6	Possible Causes	Corrections
NORMAL OPERATION OF VALVE								
Normal COOLING	Hot	Cool	Cool, as (2)	Hot, as (1)	*TVB	*TVB		
Normal HEATING	Hot	Cool	Hot, as (1)	Cool, as (2)	*TVB	*TVB		
MALFUNCTION OF VALVE								
Valve will not shift from cool to heat	Check electrical circuit and coil						No voltage to coil.	Repair electrical circuit.
							Defective coil.	Replace coil.
	Check refrigeration charge						Low charge.	Repair leak, recharge system.
							Pressure differential too high.	Recheck system.
	Hot	Cool	Cool, as (2)	Hot, as (1)	*TVB	Hot	Pilot valve OK. Dirt in one bleeder hole.	De-energise solenoid, raise head pressure, re-energise solenoid to break dirt loose. If unsuccessful, remove valve, wash out. Check on air before installing. If no movement, replace valve, add strainer to discharge tube, mount valve horizontally
							Piston cup leak.	Stop unit. After pressures equalize, restart with solenoid energized. If valve shifts, re-attempt with compressor running. If still no shift, replace valve.
	Hot	Cool	Cool, as (2)	Hot, as (1)	*TVB	*TVB	Clogged pilot tubes.	Raise head pressure, operate solenoid to free. If still no shift, replace valve.
	Hot	Cool	Cool, as (2)	Hot, as (1)	Hot	Hot	Both ports of pilot open. (Back seat port did not close.)	Raise head pressure, operate solenoid to free partially clogged port. If still no shift, replace valve.
	Warm	Cool	Cool as (2)	Warm, as (1)	*TVB	Warm	**Defective Compressor.**	
Start to shift but does not complete reversal	Hot	Warm	Warm	Hot	*TVB	Hot	Not enough pressure differential at start of stroke or not enough flow to maintain pressure differential.	Check unit for correct operating pressures and charge. Raise head pressure. If no shift, use valve with smaller ports.
							Body damage.	Replace Valve.
	Hot	Warm	Warm	Hot	Hot	Hot	Both ports of Pilot open.	Raise head pressure, operate solenoid. If no shift, replace valve.
	Hot	Hot	Hot	Hot	*TVB	Hot	Body damage.	Replace valve.
							Valve hung up at mid-stroke. Pumping volume of compressor not sufficient to maintain reversal.	Raise head pressure, operate solenoid. If no shift, use valve with smaller ports.
	Hot	Hot	Hot	Hot	Hot	Hot	Both ports of Pilot open.	Raise head pressure, operate solenoid. If no shift, replace valve.
Apparent leak in heating	Hot	Cool	Hot, as (1)	Cool, as (2)	*TVB	**WVB	Piston needle on end of slide leaking.	Operate valve several times then recheck. If excessive leak, replace valve.
	Hot	Cool	Hot, as (1)	Cool, as (2)	**WVB	**WVB	Pilot needle and piston needle leaking.	Operate valve several times then recheck. If excessive leak, replace valve.
Will not shift from heat to cool	Hot	Cool	Hot, as (1)	Cool, as (2)	*TVB	*TVB	Pressure differential too high.	Stop unit. Will reverse during equalization period. Recheck system.
							Clogged Pilot tube.	Raise head pressure, operate solenoid to free dirt. If still no shift, replace valve.
	Hot	Cool	Hot, as (1)	Cool, as (2)	Hot	*TVB	Dirt in bleeder hole.	Raise head pressure, operate solenoid. Remove valve and wash out. Check on air before reinstalling If no movement, replace valve. Add strainer to discharge tube. Mount valve horizontally.
	Hot	Cool	Hot, as (1)	Cool, as (2)	Hot	*TVB	Piston cup leak.	Stop unit, after pressures equalise, restart with solenoid de-energised. If valve shifts, re-attempt with compressor running. If it still will not reverse while running, replace valve.
	Hot	Cool	Hot, as (1)	Cool, as (2)	Hot	Hot	Defective Pilot.	Replace Valve.
	Warm	Cool	Warm, as (1)	Cool, as (2)	Warm	*TVB	**Defective compressor.**	

NOTES: *Temperature of Valve Body. **Warmer than Valve Body.

VALVE OPERATED SATISFACTORILY PRIOR TO COMPRESSOR MOTOR BURN OUT — caused by dirt and small greasy particles inside the valve. **To CORRECT:** Remove valve, thoroughly wash it out. Check on air before reinstalling, or replace valve. Add strainer and filter-dryer to discharge tube between valve and compressor.

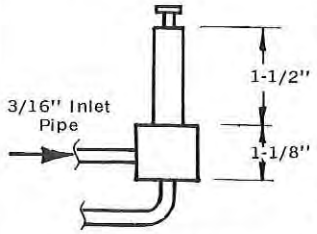
ORDERING DETAILS FOR RANCO REVERSING VALVES — REFER PAGE 126

HOT GAS DEFROST VALVES
FOR HOUSEHOLD REFRIGERATORS

KELVINATOR

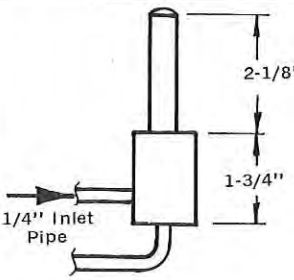
Since the introduction of hot gas defrost model refrigerators in 1955, several types of solenoid valves have been used. Each type of valve requires a particular coil. To obtain correct selection, refer to diagrams below. Note the variations in the external dimensions of the valves.

THREE REPLACEMENT VALVES ARE AVAILABLE



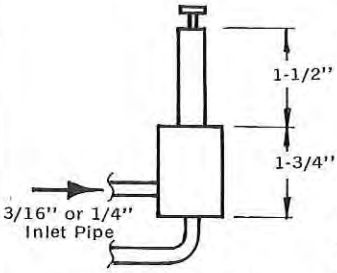
'A' TYPE VALVE
BLUE

"A" type Valve No. RH883
3/16" inlet and outlet tubes.
Use Solenoid Coil
No. KA44673
(Bin No. PG332)
Colour – BLUE
Resistance 3100 - 3900 ohms.
Used on all 1/8, 1/5 and 1/4 h.p. hot gas defrost refrigerators since 1955. Also used on Models 993 and 976.



'C' TYPE VALVE
GREEN

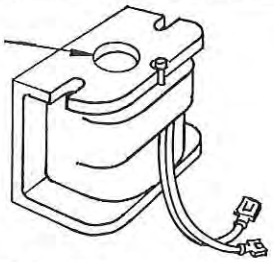
"C" type Valve was originally supplied as RH850, but is no longer available.
Solenoid Coil
No. KA39753
(Bin No. PF538)
Colour – GREEN
is available for use where this type of valve is still fitted to a cabinet.
Resistance 1300 - 1500 ohms.



'B' TYPE VALVE
RED

"B" type Valve No. RH809
3/16" inlet and outlet tubes.
Use Solenoid Coil
No. KA38019
(Bin No. PF316)
Colour – RED
Resistance 2000 - 2500 ohms.
Used only on 1/3 h.p. single refrigerant coil models with a F.C. fan.
Available in either 3/16" or 1/4" inlet pipe. Used on 1968 models onwards.

"B" type Valve No. RH850
1/4" inlet,3/16" outlet tubes.
Use Solenoid Coil
No. KA38019
(Bin No. PF316)
Colour – RED
Resistance 2000 - 2500 ohms.
For use on Models 888 and N220FA.



NOTE: When coil is fitted to the valve, metal sleeve inside coil must be at the top of the coil.
When replacing a coil, be sure the correct coil has been selected.
1. Check measurements of valve.
2. Then select the correct coil.

VALVE			SOLENOID COIL			
CAT. NO.	TYPE	P/N	CAT. NO.	P/N	BIN NO.	COLOUR
126100	A	RH883	126101	KA 44673	PG332	BLUE
126109	B	RH809	126108	KA 38019	PF316	RED
126110	B	RH850				
–	C	NLA	126103	KA 39753	PF538	GREEN

JAGA - CHATLEFF HOT GAS DEFROST VALVES

VALVE		ORIFICE	COIL		CUSTOMER
CAT. NO.	MODEL	(ins.)	CAT. NO.	TYPE	
12631	HQ - 13	1/16	12614	S240B/P	SIMPSON – POPE
12648	HQ - 32	3/32	12665	S240HD/3T	GENERAL PURPOSE
12645	HG - LE	1/16			EMAIL/WESTINGHOUSE
12633	HG - LE3	3/32			EMAIL/WESTINGHOUSE
12632	HG - LK2	1/16	12659	S240HD/34Q	KIRBY
12634	HG - LK3	3/32			KIRBY
12635	HG - AS	1/16	See Above	S240HD/3T or 34Q	GENERAL PURPOSE

WE BELIEVE IN CONTINUALLY STUDYING THE LOCAL AND INTERNATIONAL MARKETS TO MAKE AVAILABLE THE MOST MODERN TYPE OF EQUIPMENT.

LIQUID LEVEL CONTROLS

FS SERIES FLOAT SWITCHES

ALCO FS SERIES FLOAT SWITCHES ARE USED TO ACTIVATE CONTROL DEVICES WHICH MONITOR THE REFRIGERANT LEVEL IN RECEIVERS, ACCUMULATORS AND OTHER VESSELS. SUITABLE FOR USE WITH ALL COMMON REFRIGERANTS, INCLUDING AMMONIA.

The type FS Float Switch provides positive electrical switching action in response to changes in the level of a liquid. The permanent magnet mechanism actuates a single-pole double-throw hermetically-sealed glass tube mercury switch. (A precision snap-acting dry contact switch is available if required.

The switch housing is gasket sealed to prevent infiltration of moisture laden air or corrosive gases. It is also isolated from the float chamber by a stainless steel enclosing tube. The electrical switch and switch mechanism can be easily replaced. Conduit connection can be rotated 360°.

The Float Switch is suitable for use with all common refrigerants having a specific gravity of 0.6 or more.

The liquid level differential is factory set at maximum 33 mm (1-5/16") for a liquid specific gravity of 0.6. It can be adjusted to a minimum of 13 mm (1/2") although it is seldom necessary to do so.

TYPE		DESIGN RATING		ELECTRICAL SWITCH	CONDUIT CONN. NPT (INS.)	LEAD-IN WIRE LENGTH	LINE CONN. (INS.)	ELECTRICAL RATING			
								NON-INDUCTIVE		Motor HP	Pilot Duty VA
CAT.NO.	MODEL	Liquid Temperature	Safe Work Press.					Volts AC	Amps		
1271	FS1RA	+38 to −29°C (+100 to −20°F)	2069 kPa (300 psig)	SPDT Glass Tube Mercury Switch	1/2	610 mm (24")	¾"NPT or 1" Weld	240	2	1/10	250
1272	FS1RA-001	+38 to −46°C (+100 to −50°F)		SPDT Precision Snap-acting Dry Contact Switch				240	4	1/4	—
12037	KF60001	Mercury Switch — FS1RA Series									
12038	KF60003	Dry Micro-Switch only — FS1RA Series									
12047	KF60002	Mercury Switch Mechanism "Kit" — FS1RA Series									
12048	KF60004	Dry Contact Switch for FS1RA-001									

Manufacturers Bulletin 16.20T — 12/75 available on request

Explosion Proof Type FS2RA and FS2RA-001 available on request

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Parker

Refrigerating Specialties Company

REFRIGERANT FLOAT SWITCH for AMMONIA and R-12, R-22, R-500, R-502

TYPE
LL LLSC
LLC LLX
LLS

LL WITH SIDE & BOTTOM CONNECTIONS

LLC WITH METAL COVER

This float controlled, magnetically actuated, mechanically operated, HERMETICALLY SEALED switch assembly can maintain close control of liquid level. The rugged construction makes it relatively insensitive to disturbances of the refrigeration system or vibration of the attached pipe lines.

The electrical switch and operating mechanism are encapsulated within a transparent housing which HERMETICALLY SEALS the moving parts and switch from ambient conditions and yet allows observation of the switching motion for determination of the liquid level.

TYPICAL APPLICATIONS

To control liquid level in: • Liquid over-feed accumulators • Flooded surge drums • Flooded shell & tube chillers • High and low pressure receivers • Intercoolers • Transfer vessels • High or low level monitor.

FEATURES

1. Moving parts and switch Hermetically Sealed. Isolated from moisture, dust and tampering.
2. Visual observation of switching action.
3. Non-mercury, snap-acting switch.
4. Switch assembly can be replaced without opening to refrigerant pressure.
5. Suitable for all common refrigerants and similar liquids.
6. Can be externally actuated with permanent magnet to check electrical circuits.
7. Switch assembly fully rotatable to suit installation position.
8. Large available differential minimizes short cycling or actuation of switch by liquid surges.
9. Stainless steel Float Ball (factory checked for leakage prior to assembly).

ELECTRICAL RATING		
VOLTS	AMPS	PILOT DUTY
230	2	125 VA

FLOAT SWITCH		DESCRIPTION	DESIGN RATING			ELECT. SWITCH	CONN.	SPECIFIC GRAVITY RANGE	DIFF.
CAT.NO.	MODEL		LIQUID TEMP.	AMBIENT TEMP.	PRESS.				
12743	LL	Standard Hermetic	−45°C to +65°C (−50°F to +150°F)	−45°C to +50°C (−50°F to +120°F)	2069 kPa (300 psig)	SPDT Snap-acting non-mercury	Combination 3/4" NPT or 1"Butt Weld	0.57 to 1.70	Adjustable ½ — 2" Fact. Set 2"
12742	LLC	Same as LL plus metal cover							
12744	LLS	Std. Herm. with side & side connections							
12745	LLSC	Same as LLS plus metal cover							
12741	LLX	Explosion proof type							
12748	60-0109-02	Float Switch assembly for LLC, LLSC.							

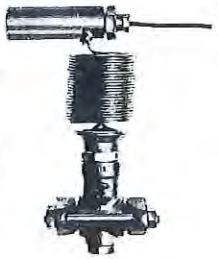
12127 050100

Manufacturers Bulletins 610 and cc-10 available on request

Explosion proof LLXS and Low Temp. −75°C(−100°F), Types LLA, LLAC & LLAX available on request.

LIQUID LEVEL CONTROLS

Thermostatic Liquid Level Control For Ammonia Type TEVA



Type TEVA is designed for use as a liquid level control for flooded evaporators, intermediate receivers, and liquid separators.

Type TEVA consists of a thermostatic expansion valve equipped with a specially designed phial in which a low-voltage electric heater is fitted. This heater provides for the superheating of the thermostatic liquid level control independently of the temperature of the vapours drawn from the evaporator. The device comprises a weld connection to be fitted on the evaporator or receiver at the desired liquid level and the phial being fixed in this connection.

Maximum Test Pressure 2758 kPa (400 psig).
Capillary length 5 m (16.5 ft.).

LIQUID LEVEL CONTROL			Conn.	Rated Capacity*		Orifice Assembly	
Cat. No.	Model	Code No.		kW	Tons	Cat. No.	Code No.
1276	TEVA20-1**	68G6040		3.5	1	12716	6-0466+
						12717	68G2050
1277	TEVA20-2	68G6041		7.0	2	12718	68G2051
1278	TEVA20-3	68G6042	1/2"	10.6	3	12719	68G2052
1279	TEVA20-5	68G6043	Weld	17.6	5	12720	68G2053
12710	TEVA20-8	68G6044	Flange	28.1	8	12721	68G2054
12711	TEVA20-12	68G6045		42.2	12	12722	68G2055
12712	TEVA20-20	68G6046		70.3	20	12723	68G2056
12713	TEVA85-33	68G6047	3/4"	116.1	33	12724	68G2057
12714	TEVA85-55	68G6048	Weld	193.4	55	12725	68G2058
12715	TEVA85-85	68G6049	Flange	299.0	85		68G2059

ACCESSORIES		
Cat. No.	Code No.	Description
STRAINERS		
18152	6-0042	FA15 Suit TEVA20-1 thru 20-20
18154	6-0048	FA20 Suit TEVA 85-33 thru 85-85
POWER ELEMENTS with Electric Heater		
12759	68G3255	Suit TEVA 20-1 thru 20-20
12760	68G3256	Suit TEVA 85-33 thru 85-85
WELD BUSH FOR BULB		
12761	68G0026	Including coupling nut, seal cap and gasket
HEATER (Separate)		
12762	68G0037	24 Volt 10 Watt

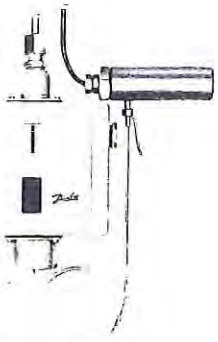
* Rated Capacity is the capacity of the control at −15°C (+5°F) evaporating temperature and +32°C (+90°F) condensing temperature and is based on +4°C (+7°F) sub-cooling ahead of the control valve.
The capacities apply to the evaporating temperature range from 0 to −50°C (+32 to −58°F).

** TEVA 20-1 consists of TEVA 20-2 PLUS a separate discharge orifice Code No. 6-0466.

NOTE: Type TEVA replaces Type TVV. When replacing Type TVV with Type TEVA it is necessary to fit bulb conversion kit in bulb pocket.

Bulb Conversion Kit — TVV to TEVA		
Cat. No.	Code No.	Part
	32E0677	Seal
	68G0513	Union Nut
	68G0514	Interm. Ring
	66-0306	Seal

Liquid Level Alarm, Safety Cut-Out, Liquid Level Control For Fluorinated Refrigerants and Ammonia Type RT 280A



RT 280A is primarily designed as a liquid level alarm and safety cut-out preventing too high a liquid level in liquid separators. Secondarily, RT 280A can also be used as a liquid level differential of up to ± 40 mm (1.6") can be tolerated. RT 280A used as a safety cut-out ensures that a maximum permissible refrigerant liquid level is not exceeded in flooded evaporators, pump vessels or liquid separators.
RT 280A used as a liquid level control is designed to maintain a constant refrigerant liquid level in flooded evaporators, pump vessels or liquid separators.
RT 280A is based on RT 260A. Differential Pressure Control with the lower bellows element replaced by a power element with an electrically heated bulb. The signal from the bulb heating or cooling is converted into an electric on-off impulse after comparison with the reference pressure. The regulating principle is based on the heat conduction difference between the liquid and vapour phases of the refrigerant.

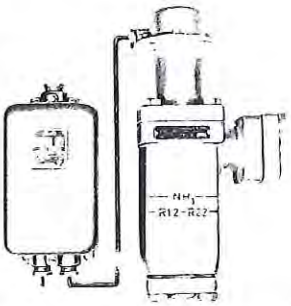
CONTROL			TEMPERATURE RANGES		
CAT. NO.	Model	Code No.	R12	R22,R717	R502
14251	RT280A	17D0040	−50 to +10°C (−58 to +50°F)	−50 to 0°C (−58 to +32°F)	−65 to −5°C (−83 to +23°F)

Switch Type	SPDT. 10(4)A. 380V. 12W. 220V. AC non-inductive 10A. 380V. inductive 4A 110-380V. full load.
Pressure Element	Press.Connection 3/8" BSP with dia. 6/dia. 10mm weld nipple Max.Test Press. 2455 kPa (356psig).
Power Element	Adsorption charge 2m (6.6ft) cap. tube.Max.permissable bulb temperature +60°C(+140°F).
Bulb with Electric Heater	24V. dc or ac (10W) designed for constant cut-in during operation of the system. 1.5m (5 ft.) connecting cable.

REFER NEXT PAGE FOR DANFOSS TYPE 38E ELECTRONIC LIQUID CONTROL

LIQUID LEVEL CONTROLS

Electronic Liquid Control For Fluorinated Refrigerants and Ammonia Type 38E



The liquid level control Type 38E is designed for regulating the liquid level, for example, in — flooded evaporators — low-pressure pump vessels in pump recirculation systems — pump vessels in "gas pump systems" — intermediate coolers, in two-stage refrigeration plants — condensers. 38E can also be used as a protection against too high or too low liquid levels.
The SPDT switch permits connection of an alarm or indication unit.
The liquid level control consists of two separate parts:-

1. A float housing of gas-tight cast iron with a ball float provided with an armature surrounded by a pilot coil.
2. An amplifier with a mains transformer.

When the ball float is raised or lowered by the liquid, the low-tension current through the pilot coil is affected. This effect is amplified by the transistor amplifier so that the contacts make or break circuit. The liquid level control only gives an impulse when the ball float passes the upper or lower position, i.e. the limits for the working differential set on the control. The differential is independent of the specific gravity of the liquid.

FLOAT HOUSING					AMPLIFIER						
Cat. No.	Model	Code No.	Conn.	Max. Test Press.	Cat. No.	Code No.	Volts	Freq.	Voltage Variation	Max. Permiss. Ambient	Description
12731	38E	38E0011	1" Weld Flg.	2841 kPa (412 psig)	12732	38E0220	230/380	50	+10% to −15%	55°C (+130°F)	Contacts make on drop in level
					12734	38E0230	220/380	50			Contacts make on rise in level

KK.10.A2.02

Liquid Level Setting : 40 mm (1.6") between minimum and maximum liquid levels.
Refrigerant Temperature Range : −40 to +55°C (−50 to +130°F).
Max. Pilot coil current 0.02 Amp and Voltage between supply cables max. 20V.
The SPDT switch contacts can break a circuit of max. 6A, 380V, 200VA.

FITTING

The average level is indicated in the float housing by the factory. On the basis of the level marks the float housing is fitted at a level corresponding to the average liquid level required.
The lower pipe o f the float housing should be inclined towards the liquid separator in order to avoid formation of an oil seal which may hamper the movements of the ball float.
The amplifier can be fitted at any distance from the float housing.
The mains voltage to the pilot circuit is either connected to terminals 1 and 2 (220V) or to 1 and 3 (380V).
The pilot coil is connected to terminals 4 and 5.
Terminals 6 and 8 lead to the fixed contact of the amplifier, and terminal 7 leads to the moving contact.

SETTING THE LIQUID LEVEL AND DIFFERENTIAL

To set the control, remove the cover from the amplifier so that the knobs for level (N) and differential (D) can be operated.
The position of the level within the working range is set by rotating the knob N.

1. On the amplifier 38E0220/38E0221 (I) the "O" on the level scale corresponds to low level and the "5" to high level.
2. On the amplifier 38E0230/38E0231 (II) the "O" on the level scale corresponds to high level and the "5" to low level.

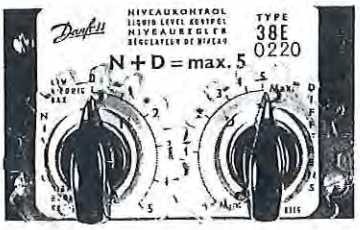
The knob D is set for the differential with which it is desired that the liquid level control should operate.
In this case the "O" always corresponds to the minimum differential =approx. 10 mm (0.4 in), and the "5" to the maximum differential = approx. 40 mm (1.6 in).
The working range of the liquid level control is determined by the free travel of the ball float, and so the sum total of the scale values, for liquid level and differential should not exceed 5(N + D= max. 5). *This maximum limit is observed automatically by the gears fitted on the scales.*

REFER TO PREVIOUS PAGE FOR DANFOSS TYPE TEVA AND RT280A LIQUID LEVEL CONTROLS

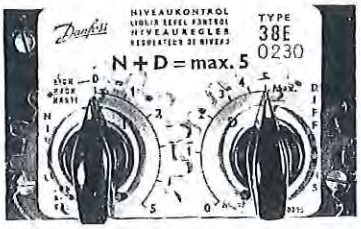
NOTE : FIRST 3 NUMERALS OF CAT. No. INDICATES PAGE No.

EXAMPLE OF SETTING

The photos below show the scales of the two amplifier designs



Design (I)
(38E0220/38E0221)



Design (II)
(38E0230/38E0231)

Contacts 6—7 make circuit at the lower ball float position.
With the setting shown for N (level) = "O" and D (differential) = "5", contacts 6 and 7 will make circuit at the absolutely lowest liquid level, and break it again when the liquid level has risen by approx. 40 mm (1.6 in).
Rotating the knob N in the clockwise direction raises the liquid level When the knob is set for e.g. "5", the liquid level is raised to its maximum value at which contacts 6 and 7 break circuit. As the sum total of N + D cannot exceed "5", the knob D will in this case be set for "O" (min.) corresponding to a differential of approximately 10 mm (0.4 in).
Contacts 6 — 7 make circuit at the higher ball float position.
With N="O" and D= "5", contacts 6 and 7 will make circuit when the ball float passes its maximum liquid level and break it again when, in this case, the level has fallen by approx. 40 mm (1.6in).
Clockwise rotation of the knob N lowers the liquid level.

ARMSTRONG REFRIGERATED PURGERS

WHY YOU MUST GET RID OF AIR AND NON - CONDENSIBLES

Air and non-condensible gases in a refrigerating system pass through with the refrigerant until they reach the condenser, where they are trapped by the liquid seal. They will raise Head Pressure, mainly because they are such good insulators i.e. they obstruct the normal heat transfer processes and the effective condenser surface is reduced with a consequent rise in condenser Head Pressure and Temperature. **Each 4 lbs. of excess Head Pressure caused by air and other non-condensibles increases compressor power costs by approx. 2% and reduces compressor and system capacity by approx. 1%.**

In addition excess head pressure puts strain on bearings, driving motor and belts; more liklihood of gasket failure and possibility of "explosions".

Higher temperature shortens the life of compressor valves and promotes breakdown of lubricating oil.

HOW TO GET RID OF AIR AND NON - CONDENSIBLES

Manual Purging is too expensive and too troublesome and may also infringe environmental Codes dependant on the refrigerant or gas being used. In addition, the wastage would be excessive as by purging off an unseparable mixture of air, non-condensibles and refrigerant, you would have to purge off a lot of compressed refrigerant gas to get rid of a very small amount of air and non-condensibles - and it would not be entirely effective anyway.

Refrigerated Purging - By allowing the vapour to pass into a special purging apparatus in which it is partially condensed by a coil at evaporator temperature and the density of the remainder, thereby reduced.

THE ARMSTRONG AUTOMATIC REFRIGERATED PURGER

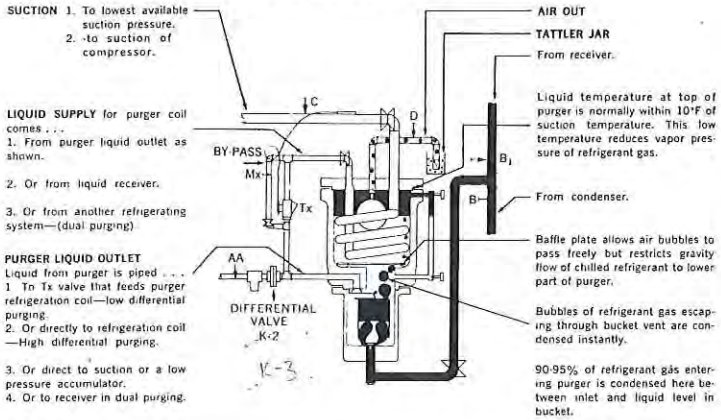
This is a simple dependable refrigerated mechanism which converts contaminated refrigerant gas to chilled compressed air contaminated with low pressure refrigerant gas.

Automatically the compressed air is vented to the atmosphere and the condensed refrigerant discharges to the suction side of the system.

ADVANTAGES WITH AN ARMSTRONG AUTOMATIC REFRIGERATED PURGER

1. **Lowest power cost.**
2. **Full system capacity.**
3. **Minimum refrigerant loss.**
4. **Minimum loss of time and labour.**
5. **No excuse not to purge.**
6. **Reduced wear and tear.**
7. **Immediate re-starting after repairs, no need to pump out system.**
8. **Reduced cooling water consumption in many instances.**
9. **Less chance of a so called "ammonia explosion".**

Purger Operating



PURGER CAPACITY

When suction is above atmospheric an Armstrong Purger will handle a refrigeration system as large as 500 Tons.

If suction is below atmospheric the system size should be no larger than 250 Tons. Multiple purgers frequently are installed.

Ammonia Model 370H-1 is supplied with K1 Check Valve and K3 Differential Valve. See below for separate ordering.

CAT. NO.	TYPE	DESCRIPTION
12814	K1	Check Valve
12815	K3	Differential Valve

WHEN ORDERING — SPECIFY :

1. The refrigerant
2. Maximum High-Side Pressure — Liquid Specific Gravity and Gas Density.
3. Minimum Suction Pressure — Liquid Specific Gravity and Gas Density.
4. Are special construction materials required?.

ADDITIONAL INFORMATION IS AVAILABLE ON REQUEST

MATERIALS OF CONSTRUCTION

Series 370 Models

Caps and Coil Housing : Forged steel to meet ASTM-A-350 Grade LF-1 specifications for temperatures to −50°F (−45.6°C).
Bottom Body : 1030 Forged Steel.
Studs : ASTM-A-193 Grade B-7.
Note Cap, Housing and Body assembly safely will withstand hydraulic pressures of 450 psi. (3103 kPa.)
Baffle Plate : Stainless Steel.
Refrigeration Coil : 2.36 sq. ft. of external surface made of carbon steel or stainless steel tubing. See Table.
Air Release Mechanism : Carbon steel frame, stainless steel working parts.
Liquid Discharge Mechanism : Stainless Steel.

Series 371 Models

Cap : Carbon Steel.
***Coil Housing :** ASTM-A-182-F11.
***Bottom Body :** ASTM-A-182-F11.
Bolts, Studs : ASTM-A-193 Grade B-7.
Coil : Stainless Steel.
Working Parts : Stainless Steel.
*Steam Trap Forgings designed for operation at 900 psi (6206kPa.) at 900°F (482°C) or 1200 psi (8274 kPa.) at 100°F (37.8°C).

Series 270-4 Models

Cap, Coil Housing and Bottom Body : Cast Bronze (ASTM-B-62-85-5-5-5).
Working Parts : Stainless Steel.

STANDARD MODELS			
CAT.NO.	Refrigerant to be purged	Model No.	Coil Material
1281	Ammonia	370H-1	Carbon Steel
1282	Butadiene	370H-7	Carbon Steel
1283	Butane	370H-1	Carbon Steel
1284	CO_2 to 300 psi	370-6	Stainless Steel
1285	CO_2 to 800 psi	371-1	Stainless Steel
1286	Ethylene	370-4	Stainless Steel
1287	Methyl Chloride	370-8	Carbon Steel
1288	Propane	370-3	Carbon Steel
1288	Propene	370-3	Carbon Steel
1288	Propylene	370-3	Carbon Steel
1289	R-11	270-4	Copper
12810	R-13 to 600 psi	371-2	Stainless Steel
12811	R-12, 22, 502	370-2	Carbon Steel
12812	Sulfur Hexafluoride - SF6	371-2	Stainless Steel
12813	Vinyl Chloride	370-5	Stainless Steel

The different 370 and 371 model numbers cover purgers with bucket weights, float weights and orifice sizes for refrigerants of different specific gravities and operating pressures. For example, a No.370-2 R12 purger would not work on an ammonia system.

PHILLIPS FLOAT CONTROL VALVES

CATALOGUE NUMBER SUMMARY PAGE - FOR ORDERING PURPOSES

SERIES 101 LOW SIDE FLOAT VALVE — EXTERNAL MOUNTING ADJUSTABLE LEVEL

REFRIG	CAT NO	VALVE TYPE	ORIFICE
R717	1352	101	1/8
	13511		5/32
	1355		3/16
R12 R22	1351	101F 101V	1/8
	13512		5/32
	1356		3/16
R717	1354	101A	1/4
	13521		5/16
	13523		3/8
R12 R22	1353	101AF 101AV	1/4
	13524		5/16
	13526		3/8

SERIES 300 LOW SIDE FLOAT VALVE — INSERT MOUNTING DIRECT FEED — FIXED LEVEL

R717	13527	300H	3/32D
	13515		3/32
	13516		7/64
	13517		1/8
	13528		9/64
R717	13519	300A	5/32
	13518		3/16
	13529		7/32

SERIES 301 LOW SIDE FLOAT VALVE — INSERT MOUNTING REMOTE FEED — FIXED LEVEL

R717	13539	301H	3/16
	13530		7/32
	13540		9/32
R717	13541	301A	3/16
	13542		7/32
	13531		9/32

SERIES 301-E LOW SIDE FLOAT VALVE — EXTERNAL MOUNTING REMOTE FEED — FIXED LEVEL

R717	13576	301-E	3/32D
	13577		3/32
	13532		7/64
	13533		1/8
	13578		9/64
R717	13520	301-G	5/32
	13534		3/16
	13579		7/32
R717	13580	301-J	3/16
	13581		7/32
	13535		9/32
R717	13536	301-K	3/16
	13582		7/32
	13583		9/32

FIRST 3 NUMERALS OF CAT. No. INDICATES PAGE No.

SERIES 701 FLOAT CONTROL PILOT OPERATED

Refrig.	CAT NO	MAIN VALVE	Orifice	MET'G PLUG
R717	13544	701-JRS	3/8	230-25
	13547	701-S	9/16	245-25
	13569			445-25
R12 R22	13543	701-JRSF	3/8	230-25
	13570			430-25
	13571			445-25
	13572		9/16	845-25
	13546	701SF	9/16	445-25
	13573			445-38
STRAINER				
	135249	S701-JR		
	135250	S701		
PILOT VALVES				
	13533	301-E	1/8	
	13555	101-VP-18	3/32	

SERIES 700-H HIGH SIDE FLOAT CONTROL — PILOT OPERATED

Refrig.	CAT NO	MAIN VALVE	METERING PLUG
R717	13586	700-JRH	3°
	13587		5°
	13588		10°
R12 R22	13589	700-JRHF	3°
	13590		5°
	13591		10°
	13592		15°
PILOT VALVE			
	13564	275-AP	1/8" Orifice

SERIES 270-A HIGH SIDE — REFRIGERANT CONTROL VALVE — OIL DRAIN VALVE
Complete With Chamber

Refrig.	CAT NO	VALVE TYPE	ORIFICE
R717	13594	270-A	1/16
	13553		3/32
	13595		1/8
R12	13596	270-AF	3/32
	13554		1/8
	13597		3/16
R22	13598	270-AF	1/16
	13599		3/32
	135100		1/8

SERIES 275-AF LOW SIDE OIL FEED/LEVEL VALVE
Complete with Chamber

R717 R12 R22	13565	275-AF	3/32
	13562		1/8
	13566		3/16

NOTE : CARTRIDGE KITS
* Indicates Valves and orifice sizes listed in this catalogue.

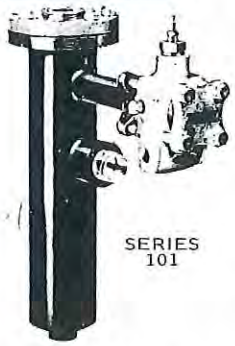
CARTRIDGE KITS

CAT NO	KIT NO	SUITS VALVE	ORIFICE
135149	K152K	101*	5/64
135150			3/32
135151			7/64
135140			*1/8
135142			9/64
135141			*5/32
135142			*3/16
		101-VP18*	*3/32
135145	K152L	101A*	*1/4
135146			*5/16
135147			*3/8
			13/32
	K310	300H*	*3/32D
135130		301E*	*3/32
135131		300 300HM	*7/64
135132		300J	*1/8
135133		300P	*9/64
135134	K310A	300A*	*5/32
135135		301G* 300AM	*3/16
135136		300YA	*7/32
135137	K355	301A* 301H*	*3/16
135138		301J* 301K*	*7/32
135139		301 301D	*9/32
135251	K270A1	270A*	*1/16
135252			5/64
135253			*3/32
135254	K270A2	270A*	*1/8
135255			*3/16
135256		275A*	*3/32
135257			*1/8
135258			*3/16
135259	K100	100	1/16
135260			5/64
135261			3/32
135262			7/64
135263			1/8
135264			9/64
135265			5/32
135266			3/16
135267	K101AB		3/8
135268		101AB	1/2
135269	K152K26	101VP26Ch.	1/8
135270	K152KF18	101F18Ch.	3/32
135271			1/8
135270			3/16
135271		101VPF18Ch	3/32
135272	K152KF26	101VPF26Ch	1/8
135101	K201	201	1/16
135102			5/64
135103			3/32
135276	K280	225 225B 250VP	1/16
135277			5/64
135278			3/32
135279			7/64
135280			1/8
135281			9/64
135282			5/32

REFER TO FOLLOWING TECH. PAGES FOR DETAILED SPECIFICATIONS AND SELECTION DATA

Phillips

FLOAT CONTROL VALVES



SERIES 101

SERIES 101 LOW SIDE FLOAT VALVES

EXTERNAL MOUNTING - ADJUSTABLE LEVEL

The Series 101 Low Side Float Valves for external mounting, are suitable for flooded chillers and other types of evaporators where level adjustment is desirable.
An external level adjusting stem is provided for raising or lowering the level to suit an installation.
Valves for R12 and R22 are fitted with a different spring and heavier float ball and seal cap for the adjusting stem. These are rugged, dependable float valves, suitable for all temperature levels.

LARGER SIZES AVAILABLE ON APPLICATION

VALVE TYPE		ORIFICE	CONN.
R717	R12 & R22	INS.	
101	101F 101V	1/8"	1/2" FPT
		5/32"	
		3/16"	
101A	101AF 101AV	1/4"	3/4" FPT
		5/16"	
		3/8"	

OPERATION : The Series 101 valves modulate the flow of the liquid refrigerant in direct response to the movement of the float immersed in the liquid. The float ball is linked through a forked lever to act upon a needle or a plunger directly over the orifice controlling the refrigerant flow. A spring is interposed over the needle, working opposite to the lever, and tends to support the weight of the float ball. Spring pressure can be regulated by an external adjusting stem to make the float ball lighter or heavier, causing the liquid level to be respectively lower or higher to any desired point within the range of the spring. Turning the adjusting stem counter-clockwise will raise the liquid level, while turning the stem clockwise will lower the level. Total level change, at a particular setting, from fully closed to fully open valve, is about 50mm (2") on the 101 and 101-A valves.

SERIES 300H 300A

SERIES 300-H and 300-A LOW SIDE FLOAT VALVES

INSERT MOUNTING - DIRECT FEED - FIXED LEVEL

These valves are designed for Ammonia, especially unit coolers and other evaporators where the cartridge and back seating feature is desirable. The working needle and seat are contained in a cartridge which may be replaced through the use of a secondary seat shut-off arrangement without pump down of the evaporator. Valve resetting is not required when changing cartridge. The liquid level is approximately at the middle of the valve mounting.
Valves for R12 and R22 are available on application. Also available on application are the Series 300-HM and 300-AM Valves - Similar to the Series 300-H and 300-A respectively, however a difference in linkage allows them to be mounted 25mm (1") lower on horizontal drums, making them particularly useful on low capacity evaporators using small diameter surge drums.

VALVE TYPE R717	ORIFICE INS	CONN.
300H	3/32D	1/2" FPT
	3/32	
	7/64	
	1/8	
	9/64	
300A	5/32	
	3/16	
	7/32	
301H	3/16	3/4" FPT
	7/32	
	9/32	
301A	3/16	
	7/32	
	9/32	

SERIES 301-H and 301-A LOW SIDE FLOAT VALVES

INSERT MOUNTING - REMOTE FEED - FIXED LEVEL

Similar to the Series 300, but Remote Feed designed for Ammonia, for use with large capacity air units, milk tanks, ice builder coils and other evaporators, where the cartridge and back seating feature is desirable.
Valves for R12 and R22 are available on application.

OPERATION : The Low Side Series 300 and 301 Valves modulate the flow of liquid refrigerant in direct response to the movement of the float ball immersed in the liquid. The rounded end of the float rod acts on a cam needle and then a pusher, to operate a needle inside the valve cartridge containing the main control orifice. On a falling liquid level the weight of the float ball acts to open the cartridge orifice. On a rising level, the orifice closes due to the liquid inlet pressure and also the force of the spring in the cartridge. Stem on front of valve is backed out fully for normal valve operation.

SERIES 301H 301A

VALVE R717	ORIFICE INS	CONN.	VALVE R717	ORIFICE INS	CONN.
301-E	3/32D	1/2" FPT	301-J	3/16	3/4" FPT
	3/32			7/32	
	7/64			9/32	
	1/8				
	9/64				
301-G	5/32	3/4" FPT	301-K	3/16	
	3/16			7/32	
	7/32			9/32	

SERIES 301E With Chamber

SERIES 301 - E, G, J, K LOW SIDE FLOAT VALVES

EXTERNAL MOUNTING - REMOTE FEED - FIXED LEVEL

The Series 301 - E, G, J, K Low Side Float Valves, external mounting are applicable to all types of evaporators and vessels where liquid level adjustment is not necessary. These valves can also be applied to small flooded chillers. The needle and seat orifice are contained in an easily replaced cartridge and no valve resetting is required during a replacement operation.

OPERATION : The Series 301-E Valves modulate the flow of liquid refrigerant in direct response to the movement of the float immersed in the liquid. A cam needle acts on a pusher and operates a needle inside the cartridge containing the needle and orifice. Average liquid level would be at about the middle of the valve mounting, or somewhat below.

CAPACITIES : Refer Tech. Page 135-c

ORDERING PROCEDURE : REFER TO PAGE 135 AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

FLOAT CONTROL VALVES

Phillips

SERIES 701 FLOAT CONTROL - PILOT OPERATED

WITH SERIES 301 FIXED LEVEL PILOT or SERIES 101 ADJUSTABLE LEVEL PILOT

The Series 701 Valves are pilot operated, usually by a low side pilot float valve. The pilot operated valve meters the flow of liquid refrigerant to the evaporator in response to demand, as indicated from changes in the liquid level. It is a modulating type of control. The 701 valves are flanged, piston type, with manual lifting stem. The internal metering parts are sized for the load and operating condition, with the proper spring for each refrigerant. Teflon seat discs are standard, and are replaceable.

The pilot float valve is sized for each 701 body size and is available with either a Series 301 fixed level valve or a Series 101 adjustable level valve. The pilot valves are externally mounted.

MAIN VALVE R717	PORT SIZE INS	METERING PLUG	CONN. NPT	STRAINER (Optional)	EACH INSTALLATION REQUIRES MAIN VALVE PLUS:					
					SERIES 301 FIXED LEVEL PILOT FLOAT VALVE				SERIES 101 ADJUST. LEVEL PILOT FLOAT VALVE	
					CODE NO.	ORIFICE	OUTLET		CODE NO.	ORIFICE	OUTLET
701-JRS	3/8	230.25	3/4"	S701-JR	301E	1/8"	1/2" FPT	OR	101-VP-18	3/32"	1/2" FPT
	3/8	430.25*									
	3/8	445.25*									
	9/16	845.25*									
701-S	9/16	245.25	1-1/4"	S701							
	9/16	445.25									
	9/16	445.38*									

* Metering Plug applicable for R12 and R22 only.

OPERATION : The PHILLIPS Type 701 valves are actuated by controlling pressures in the power cylinder above the piston. The pilot can be any control device having a small orifice, such as a float valve, TX valve, or magnetic solenoid placed between the evaporator and power cylinder. However, for modulating action, the pilot must be a naturally modulating type such as the float valve. The valve is opened by lowering the pressure above the piston, and closed by raising the pressure above the piston. The pilot orifice, in response to level changes performs the function of controlling the pressure in the power cylinder. A bleed port in the piston, with flow around the piston, permits continuous flow of liquid to the chamber above the piston. Piston clearance is controlled at the factory. A pressure gauge in the pilot line can indicate valve action. When the pilot valve closes, the pressure in the cylinder builds up to high side pressure, closing the 701 valve. When the pilot valve opens the 701 also opens, since the cylinder pressure is released and approaches evaporator pressure. A constant intermediate pressure in the pilot line indicates a steady flow of refrigerant through the 701 valve. Pilot float valves for R12 and R22 have a seal cap above the adjusting stem and a weighted float ball.

AVAILABLE ON APPLICATION : LARGER SIZES and VALVES FOR R12 & R22

SERIES 700-H HIGH SIDE FLOAT CONTROL

PILOT OPERATED AND DIRECT FEED WITH SERIES 275-A PILOT FLOAT VALVE

The Series 700-H High Side Pilot Operated Valves are actuated by a pilot float valve. The pilot float valve feels the level in the receiver, or pilot receiver, or in the condenser drain line; modulating the main valve according to the condensing rate. The combination keeps the condensers drained, and individual sets of high side controls can be installed on each condenser, where it is not convenient to tie them together to a common drain header. The 700-H valves are flanged piston type, with manual lifting stem.

VALVES FOR R12 and R22 - AVAILABLE ON APPLICATION

MAIN VALVE			PILOT VALVE		
TYPE	METERING PLUG (DEGREES)	CONN.	TYPE	ORIFICE	CONN.
700 – JRH	3	3/4" FPT	275 – AP	1/8"	3/4" FPT
	5				
	10				
	15				

LARGER SIZES AVAILABLE ON APPLICATION

ORDERING PROCEDURE : REFER TO PAGE 135 AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

REFRIGERATION SYSTEM RELIABILITY
ACTROL PARTS TO HELP YOU BUILD REFRIGERATION SYSTEM RELIABILITY

PHILLIPS FLOAT CONTROL VALVE CAPACITIES

VALVE TYPE	ORIFICE (INS)	R717 AMMONIA INLET PRESSURE 552 kPa (80 PSIG) TONS	kW	690 kPa (100 PSIG) TONS	kW	1103 kPa (160 PSIG) TONS	kW	R12 INLET PRESSURE 552 kPa (60 PSIG) TONS	kW	862 kPa (125 PSIG) TONS	kW	R22 INLET PRESSURE 552 kPa (80 PSIG) TONS	kW	1103 kPa (160 PSIG) TONS	kW
101 (R717)	1/8	16	56	18	63	21	74	2.4	8.4	2.7	9.5	3.9	13.7	4.5	15.8
(101F-R12)	5/32	20	70	22	77	26	91	3.0	10.6	3.5	12.3	4.9	17.2	5.6	19.7
(101V-R22)	3/16	25	88	28	99	33	116	3.9	13.7	4.3	15.1	6.2	21.8	7.1	25.0
101A (R717)	1/4	51	179	56	197	66	232	7.6	26.7	8.6	30.2	12	42.2	14	49.2
(101AF-R12)	5/16	65	229	71	250	85	299	9.6	33.8	11	38.7	16	56.3	18	63.3
(101AV-R22)	3/8	81	285	89	313	NR	NR	12	42.2	14	49.2	19	66.8	23	80.9
	3/32D	3.2	11.3	3.6	12.7	4.2	14.8	0.48	1.7	0.5	1.8	0.75	2.6	0.9	3.2
300H (R717)	3/32	5.1	17.9	5.6	19.7	6.6	23.2	0.75	2.6	0.9	3.2	1.2	4.2	1.4	4.9
	7/64	8.1	28.5	8.9	31.3	10	35.2	1.2	4.2	1.3	4.6	2.0	7.0	2.3	8.1
301E (R717)	1/8	10	35.2	11	38.7	13	45.7	1.5	5.3	1.7	6.0	2.4	8.4	2.9	10.2
	9/64	13	45.7	14	49.2	17	59.8	1.9	6.7	2.2	7.7	3.1	10.9	3.6	12.7
300A (R717)	5/32	16	56	18	63	21	74	2.4	8.4	2.7	9.5	4.0	14.1	4.5	15.8
	3/16	20	70	22	77	26	91	3.0	10.6	3.5	12.3	4.9	17.2	5.5	19.3
301G (R717)	7/32	26	91	28	98	33	116	3.9	13.7	4.3	15.1	6.2	21.8	7.1	25.0
301A 301H	3/16	33	116	36	127	42	148	4.8	16.9	5.5	19.3	7.8	27.4	9.0	31.7
301J 301K	7/32	41	144	45	158	52	183	6.0	21.1	6.8	23.9	9.7	34.1	11	38.7
(R717)	9/32	51	179	56	197	*	*	7.6	26.7	8.6	30.2	12	42.2	14	49.2
*301A & 301K	9/32	51	179	56	197	66	232	7.6	26.7	8.6	30.2	12	42.2	14	49.2

*Valve Types 301H and 301J with 9/32" orifice are not suitable for inlet pressures exceeding 690 kPa (100 PSIG) for Ammonia applications — Use either 301A or 301K.

VALVE TYPE	ORIFICE (INS)	METERING PLUG	R717 AMMONIA INLET PRESSURE 690 kPa (100 PSIG) TONS	kW	931 kPa (135 PSIG) TONS	kW	1103 kPa (160 PSIG) TONS	kW	R12 INLET PRESSURE 552 kPa (60 PSIG) TONS	kW	862 kPa (125 PSIG) TONS	kW	R22 INLET PRESSURE 552 kPa (80 PSIG) TONS	kW	1103 kPa (160 PSIG) TONS	kW
701-JRS		230.25	89	313	96	338	100	352	12	42	14	49	20	70	23	81
(R717)	3/8	430.25	NOT APPLICABLE FOR AMMONIA						19	67	22	77	31	109	36	127
701-JRSF		445.25	NOT APPLICABLE FOR AMMONIA						27	95	31	109	44	155	51	179
(R12 & R22)	9/16	845.25	NOT APPLICABLE FOR AMMONIA						48	169	55	193	78	274	90	317
701-S (R717)	9/16	245.25	140	492	150	528	170	598	NOT APPLICABLE FOR R12				NOT APPLICABLE FOR R22			
701-SF		445.25	220	774	240	844	260	914	30	106	34	120	49	172	57	200
(R12 & R22)		445.38	NOT APPLICABLE FOR AMMONIA						53	186	61	215	86	302	100	352

VALVE TYPE	METERING PLUG (DEGREES)	R717 AMMONIA INLET PRESSURE 138 kPa (20 PSIG) TONS	kW	414 kPa (60 PSIG) TONS	kW	690 kPa (100 PSIG) TONS	kW	R12 INLET PRESSURE 414 kPa (60 PSIG) TONS	kW	690 kPa (100 PSIG) TONS	kW	R22 INLET PRESSURE 414 kPa (60 PSIG) TONS	kW	690 kPa (100 PSIG) TONS	kW
700-JRH	3	35	123	65	229	80	281	15	53	17	60	21	74	27	95
(R717)	5	50	176	NA	NA	NA	NA	21	74	23	81	30	106	38	134
700-JRHF	10	85	299	NA	NA	NA	NA	35	123	40	141	52	183	65	229
(R12 & R22)	15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: "NA" — Valve not suitable for these inlet pressures. Valves with 15° metering plug suitable R12, R22 Low press. only.

Capacity values are maximum capacities with no liquid sub-cooling at evaporator temperatures from +4°C to −40°C (+40°F to −40°F).
To develop the capacities, the outlet or evaporator pressure must be less than half the inlet pressure.

LIQUID SUB-COOLING FACTOR					
Sub-cooling °C (°F)	3 (5)	5.5 (10)	11 (20)	17 (30)	28 (50)
FACTOR	1.25	1.47	1.75	1.9	2.2

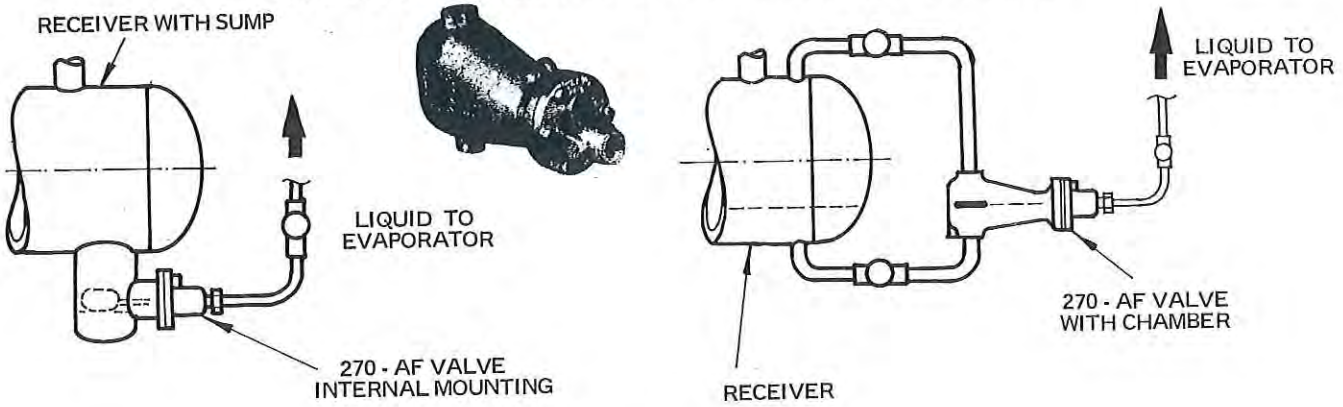
The valve capacities are calculated for operation with a saturated liquid condition at the entrance of the valve, and at condensing pressure. When the liquid is sub-cooled, the capacity of the valve is increased according to the amount indicated in the Table above. With variable loads, such as ice builders, receiving tanks and blast freezers etc., some extra capacity should be provided.
To find the capacity of a particular valve, find the capacity under the appropriate refrigerant and inlet pressure and MULTIPLY by the appropriate Sub-cooling Factor in the Table above.

ORDERING PROCEDURE : REFER TO PAGE 135 AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

PHILLIPS
HIGH & LOW SIDE VALVES
FOR
REFRIGERANT CONTROL - OIL DRAIN - OIL FEED

SERIES 270–A & 270–AF DIRECT FEED - HIGH SIDE - REFRIGERANT CONTROL VALVES

SERIES 270-A FOR AMMONIA & SERIES 270-AF FOR R12 and R22



REFRIGERANT CONTROL APPLICATION OF SERIES 270-A HIGH SIDE FLOAT

VALVE	ORIFICE (INS)	CAPACITIES													
		AMMONIA						R12				R22			
		PRESSURE DROP ACROSS VALVE kPa (PSI)													
		552 (80)		690 (100)		1103 (160)		276 (40)		690 (100)		552 (80)		1103 (160)	
		kW	TONS	kW	TONS	kW	TONS	kW	TONS	kW	TONS	kW	TONS	kW	TONS
270-A	1/16	15.8	4.5	17.6	5.0	20.4	5.8	NOT RECOMMENDED				3.9	1.1	4.9	1.4
(R717)	3/32	35.2	10.0	38.7	11.0	45.7	13.0	4.6	1.3	6.0	1.7	8.8	2.5	10.6	3.0
270-AF	1/8	63.3	18.0	70.3	20.0	80.9	23.0	8.8	2.5	11.6	3.3	15.8	4.5	19.0	5.4
(R12, R22)	3/16	—	—	—	—	—	—	18.6	5.3	24.3	6.9	NOT RECOMMENDED			

SERIES 270-A HIGH SIDE OIL DRAIN VALVE

The 270-A High Side Float Valve, opening on a rise of liquid level, when connected to a discharge line oil separator will drain oil to the compressor crankcase, or to an oil reservoir. The valve construction is the simple needle and seat type with semi-steel body and cast semi-steel chamber.

VALVE	ORIFICE (INS)	CONNS.	CAPACITY R12, R22, R717 at 690 kPa (100PSI) PRESSURE DROP	
			Approx. Imp. G.P.M.	Approx. litre/s
270-A (R717) 270-AF (R12, R22)	3/32	3/4" FPT	1.25	0.1

SERIES 275-AF LOW SIDE OIL FEED VALVE

The 275-AF Low Side Float Valve can be used to maintain the level of oil in the crankcase of a compressor. For multiple compressor applications a 275-AF valve should be installed on each compressor. Feed would be from an oil reservoir at a greater or equal pressure than the compressor crankcase. If the oil reservoir is at an equal pressure, it must be elevated at least 60 cm. (2 feet) above the desired compressor crankcase oil level so that gravity feed can take place. For low pressure or gravity feed, larger orifices than the standard 3/32" can be used in the valve.

VALVE	ORIFICE (INS)	CONNS.	M.O.P.D		OIL FLOW CAPACITY PRESSURE DROP ACROSS VALVE							
					3 kPa (1 FT.HEAD)		69 kPa (10 PSI)		138 kPa (20 PSI)		276 kPa (40 PSI)	
			kPa	PSI	l/s	Imp.GPM	l/s	Imp.GPM	l/s	Imp.GPM	l/s	Imp.GPM
275-AF	3/32	3/4" FPT	414	60	.006	0.08	.032	0.42	.044	0.58	.063	0.83
	1/8		241	35	.010	0.13	.051	0.67	.070	0.92	—	—
	3/16		103	15	.025	0.33	.126	1.67	NOT RECOMMENDED			

Note: For high pressure drop application, where low side float valve is required, use 301-E valve.

ORDERING PROCEDURE : REFER TO PAGE 135 AND QUOTE CATALOGUE NO. OF ITEM REQUIRED

PHILLIPS FLOAT CONTROL VALVES
CARTRIDGE KITS

DESCRIPTION : These kits contain parts most frequently required for replacement. Each kit is individually packaged, with the Phillips KIT CATALOG NUMBER, and an orifice size (where applicable), indicated on the label.
ORDERING INSTRUCTIONS : Specify KIT by Actrol-Reidy's Catalogue No. from SUMMARY PAGE No. 135. It is also advisable to specify Orifice size, or Valve Serial No., or Load in Tons (or kW), AND REFRIGERANT.

FLOAT VALVES

KIT. CATALOG NUMBER	FOR VALVE NUMBERS	AVAILABLE ORIFICE SIZES
K100	100	1/16; 5/64; 3/32; 7/64; 1/8; 9/64; 5/32; 3/16
K101AB	101–AB	3/8; 1/2
K101B	101–B	3/8; 1/2; 5/8
K152K	101: 101VP–18" CHAMBER *	5/64; 3/32; 7/64; 1/8; 9/64; 5/32; 3/16: –*3/32
K152K26	101VP–26" CHAMBER	1/8
K152KF18	101F:)18" CHAMBER 101VPF:)	3/32; 1/8; 3/16: 3/32:
K152KF26	101VPF–26" CHAMBER	1/8
K152L	101–A	1/4; 5/16; 3/8; 13/32
K201	201	1/16; 5/64; 3/32
K270A1	270–A	5/64; 3/32
K270A2	270–A	1/8; 3/16
K280	225; 225–B; 250–VP	1/16; 5/64; 3/32; 7/64; 1/8; 9/64; 5/32
K310	300; 300–H; 300–HM; 300–J; 300–P; 301–E	3/32D; 3/32; 7/64; 1/8; 9/64 – –
K310A	300–A; 300–AM; 300–YA; 301–G	5/32; 3/16; 7/32
K355	301; 301–A; 301–D; 301–H; 301–J; 301–K	3/16; 7/32; 9/32

PARTS CONTAINED IN PARTS KITS
(SERVICE BULLETIN IS INCLUDED BUT NOT LISTED BELOW)

KIT CATALOG NUMBER	PART NUMBER & NAME OF PART (QUANTITY IN BRACKETS WHEN MORE THAN ONE OF SAME ITEM IS INCLUDED IN KIT.
K100	2S & 3S Seat & Needle; 19 Gasket (2); 63 Gasket; 5–2 Spring.
K101AB	152B & 153B Seat & Plunger; 19B Gasket; 73 Gasket; 5AB45 Spring.
K101B	152B & 153B Seat & Plunger; 19B Gasket; 73 Gasket; 705A Spring.
K152K	152K Cartridge; 19 Gasket; 5–2A Spring; 63 Gasket.
K152L	152L Cartridge; 19 Gasket; 63 Gasket; 5–30A Spring (with orifices up to & including 3/8": a 5–4 Spring is supplied with 13/32" orifice.)
K152K26	152K Cartridge; 19 Gasket; 63 Gasket; 5–30A Spring.
K152KF18	152K Cartridge; 19 Gasket; 63 Gasket; 5–30 Spring.
K152KF26	152K Cartridge; 19 Gasket; 63 Gasket; 5–60L Spring.
K201	252 & 253 Seat & Needle; 73 Gasket; 11 Lever Pin; 205 Spring.
K270A1	262 & 403S Seat & Needle; 73 Gasket.
K270A2	262A & 263A Seat & Needle; 73 Gasket.
K280	280 Cartridge; 19 Gasket.
K310	310 Cartridge; 308 Pusher; 19 Gasket; 365 Gasket.
K310A	310A Cartridge; 308A Pusher; 365 Gasket.
K355	355 Cartridge; 365 Gasket.

Phillips

"LEVEL EYE" SIGHT GLASS

The Phillips LEVEL EYE is an economical bulls-eye type sight glass. The unique reflex lens indicates the true level of a liquid without requiring a second lens.

Due to its configuration the lens appears dark in the presence of a liquid, and appears light when no liquid is present. The LEVEL EYE shows 38mm (1½ inches) of liquid. For looking into a vessel, pairs of clear lens LEVEL EYES may be used.

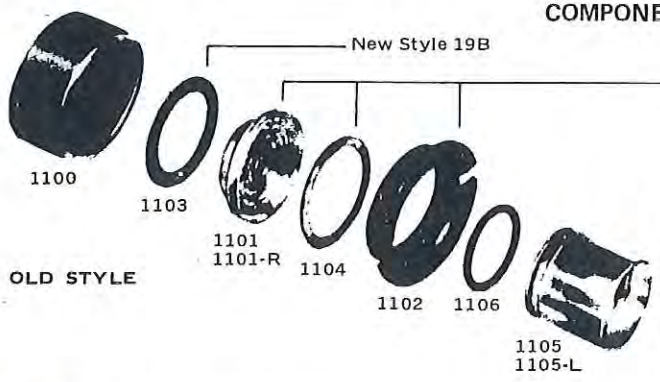
For clear vision with refrigerant temperatures down to −29°C(−20°F), the standard (short) frost shield is usually frost free in average ambient conditions. With refrigerant temperatures below −29°C(−20°F) and ambient temperatures below 0°C(32°F) use the "Long" frost shield.

SPECIFICATIONS : The basic rating of the LEVEL EYE is 3448 kPa (500PSI) at temperatures from −29°C to 121°C (−20°F to 250°F).

APPLICATION : The LEVEL EYE is particularly suitable for refrigerant vessels such as receivers, inter-coolers, accumulators, oil separators and surge drums. The LEVEL EYE may be applied to vessels for other fluid types not injurious to the materials comprising the assembly.

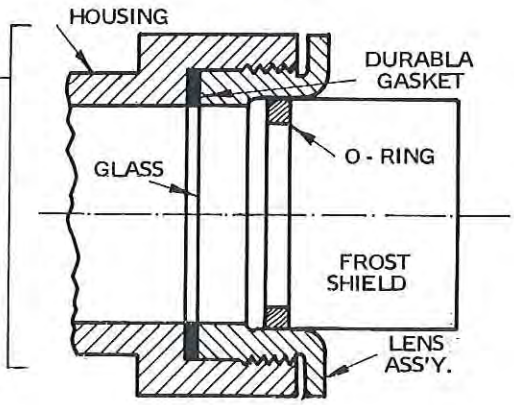
CAT. NO.	TYPE	HOUSING LENGTH	HOUSING TYPE	DESCRIPTION
13611	1100 - R	2"	Weld	Reflex Lens less frost shield
13613	1100L - R	4"		
13617	1100 - RN	2"	Weld	Reflex Lens with frost shield
13614	1100L - RN	4"		
13610	1100	2"	Weld	Clear Lens less frost shield
13612	1100L	4"		
13619	1100N	2"	Weld	Clear Lens with frost shield
13620	1100L - N	4"		

COMPONENT PARTS



NEW STYLE LEVEL EYE II

Combines 3 old style components into 1 new assembly with New Style 19B Gasket.



CAT. NO.	PART NO.	DESCRIPTION
1361	1100	2" Long housing - steel.
1362	1101 *	Clear lens, Glass.
1363	1101 - R *	Reflex lens, Glass.
1364	1102 *	Retainer, Steel.
1365	1103 **	Rubber Gasket Buna - N
1366	1104 *	Fibre Gasket.
1367	1105	Frost Shield, Lucite, Short.
1368	1105 - L	Frost Shield, Lucite, Long.
1369	1106	O-Ring, Buna N.
NEW STYLE LEVEL EYE II		
13616	1102C *	Clear Lens Assembly. Replaces 1101, 1102, 1104.
13615	1102R *	Reflex Lens Assembly. Replaces 1101-R, 1102, 1104
	19B **	Durabla Gasket. Replaces 1103.

LEVEL EYE II

TO PREPARE FOR WELDING.

Remove durabla gasket and lens. Housing can be welded into a 51 mm (2") hole, or over a 40 mm (1-9/16")hole.

TO ASSEMBLE.

Apply suitable oil to the 19B gasket and insert with lens. Tighten to 40 or 81J (30 or 60 ft.lbs) torque for use to 3447 or 6895 kPa (500 or 1000 PSI) respectively.

A light coating of oil on the frost shield, and/or a fine wire held over the O-ring while inserting (allowing air to escape) will aid insertion.

Withdraw wire if used.

IMPORTANT.

Test for pressure tightness before inserting the frost shield.

NOTES

NOTES

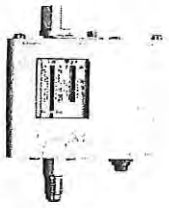
NAME IT AND WE'VE PROBABLY GOT IT IN OUR WIDELY ASSORTED STOCK

PRESSURE CONTROLS

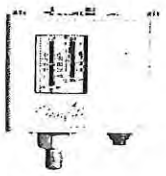
COMMERCIAL

Danfoss

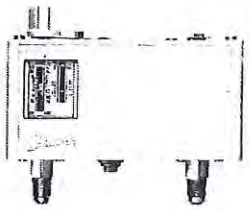
Type KP



KP 1



KP 5A



KP 15

Application KP pressure controls are pressure-controlled electric switches which are used to safeguard against too low a suction pressure and too high a discharge pressure on compressors for refrig. and air conditioning plants. KP pressure controls are also used for starting and stopping refrigeration compressors and condenser fans.

Design Function A KP pressure control contains a pressure-controlled, single-pole change-over switch whose contact position is dependent on the pressure in the inlet connector. The construction of the control is such that starting and stopping pressures can be set independently.

FOR R12, R22, R500, R502

TYPE	PRESSURE CONNECTION**				LOW PRESSURE (LP)				HIGH PRESSURE (HP)				Function on a Rise in Pressure
	¼" Flare		1m Cap. Tube		RANGE PSIG	DIFF.* PSI	MAX. TEST PRESS PSIG	RESET	RANGE PSIG	DIFF.* PSI	MAX. TEST PRESS PSIG	RESET	
	CAT NO	CODE NO	CAT NO	CODE NO									
LOW PRESSURE CONTROLS													
KP1	1391	60-1101	1392	60-1100	6"-107	10-36	284						Start
KP1 (MR)	1393	60-1103	1394	60-1102	28"-100	fixed 10		min					
HIGH PRESSURE CONTROLS													
KP5	1395	60-1171	1396	60-1170					85-455	26-85	469		Stop
KP5 (MR)	1397	60-1173	1398	60-1172					85-455	fixed 43		max	
DUAL PRESSURE CONTROLS													
KP15	1399	60-1241	13910	60-1240	6"-107	10-36			85-455	fixed 57			LP Start
KP15 (MR-H)	13911	60-1243	13912	60-1242	6"-107	10-36	284		85-455	fixed 57	469	max	
KP15 (MR-H&L)	13913	60-1245	13914	60-1244	28"-100	fixed 10		min	85-455	fixed 57		max	HP Stop

ACCESSORY — Capillary 1 m with 1/4" Flare Nuts Code No. 60 - 0071 **CAT. NO. 13923**

FOR R12, R22, R500, R502, R717

TYPE	PRESSURE CONNECTION**				LOW PRESSURE (LP)				HIGH PRESSURE (HP)				Function on a Rise in Pressure
	¼" Flare		1m Cap. Tube		RANGE PSIG	DIFF.* PSI	MAX. TEST PRESS PSIG	RESET	RANGE PSIG	DIFF.* PSI	MAX. TEST PRESS PSIG	RESET	
	CAT NO	CODE NO	CAT NO	CODE NO									
LOW PRESSURE CONTROLS													
KP1A			13915	60-1160	6"-107	10-36	284						Start
KP1A (MR)			13916	60-1161	6"-100	fixed 10		min					
HIGH PRESSURE CONTROLS													
KP5A			13917	60-1230					85-455	26-85	469		Stop
KP5A (MR)			13918	60-1231					85-455	fixed 43		max	
DUAL PRESSURE CONTROLS													
KP15A			13919	60-1285	6"-107	10-36			85-455	fixed 57			LP Start
KP15A (MR-H)			13920	60-1286	6"-107	10-36	284		85-455	fixed 57	469	max	
KP15A (MR-H&L)			13921	60-1287	28"-100	fixed 10		min	85-455	fixed 57		max	HP Stop

ACCESSORIES

SMALL BRACKET — Code No. 60 - 1055 **CAT. NO. 13924** LARGE BRACKET — Code No. 60 - 1056 **CAT. NO. 13925**

* The Differential is the difference between starting and stopping pressures.

KK.20.B1.02

** Pressure Connections : R12, 22, 500, 502 available with flare connections (¼" Flare) or fixed capillary tube connections (copper capillary tubes, 1m in length and with ¼" Flare Nuts at both ends; R717 - Ammonia - available with steel capillary tubes, 1m in length).

Permissible ambient temperatures : −50°C to +65°C (+80°C for maximum 2 hours)

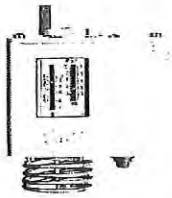
Switch : Single Pole change-over switch (SPDT).

Contact Rating : Alternating Current : Non-inductive Load 16A 380V.
Inductive Load 16A 380V.
L.R. (Locked Rotor) 112A = Max. Starting Current.
Direct Current : 12W. 220V ... pilot current.

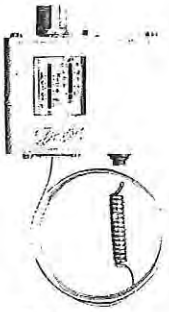
TEMPERATURE CONTROLS
COMMERCIAL

Danfoss

Thermostats
Type KP 61-77



KP 62



KP 61

Applications KP thermostats are temperature-controlled electric switches designed for temperature control of :
Large refrigerators and refrigerated display counters, chest freezers and freezer display counters, commercial freezing systems, commercial refrigeration systems and air conditioning systems.
KP thermostats can be connected direct to single-phase a.c. motors up to 2 hp, or they can be installed in control circuits for d.c. motors and larger a.c. motors.

Design Function A KP thermostat contains a temperature-controlled single-pole change-over switch whose contact position is dependent on the temperature of the sensor. The design of the thermostat is such that starting and stopping temperatures can be set independently. Temperature variations at the sensor cause pressure variations in the bellows. The main spring can be set to various pressures to balance the pressure in the bellows.
The KP is designed so that the snap-function of the switch extends right to the bellows. Thus, the bellows has only two balanced positions, moving only when the cut-in or cut-out values are exceeded.
The design of the KP affords the following advantages :
— High contact ratings — Ultra-short bounce times — High degree of safety against pulsation.
— Vibration-proof up to 4 g in the range 0 — 1000 Hz. — Long mechanical and electrical life.

TYPE	CAT NO	CODE NO	RANGE °C (°F)	DIFFERENTIAL AT — LOWEST TEMP SETTING	DIFFERENTIAL AT — MID TEMP SETTING	DIFFERENTIAL AT — HIGHEST TEMP SETTING	CAP. TUBE LGTH.	BULB TYPE	CHARGE	RESET	MAX. AMBIENT TEMP.	MAX. BULB TEMP.
KP61	14051	60L1100	−30 to +15 (−22 to +59)	4 to 15 (39 to 59)	min 2 (min 36)	1.5 to 8 (35 to 46)	2m (6.5 ft.)	Capillary tube No bulb	Vapour Charge		°C −50 to +55 °F −58 to +149	°C 100 °F 212
KP61	14052	60L1101					5m (16.5 ft.)					
KP61	14053	60L1102					2m (6.5 ft.)	Capillary tube and 3/8" coiled remote bulb.				
KP62	14054	60L1106						Coiled Room bulb				
KP63	14055	60L1107	−50 to −10 (−58 to +14)	5 to 15 (41 to 59)	min. 3 (min 37)	2 to 10 (36 to 50)	2m (6.5 ft.)	Capillary tube No bulb				
KP63	14056	60L1108						Capillary tube and 3/8" coiled remote bulb.				
KP68	14057	60L1111	−5 to +35 (23 to 95)	4 to 15 (39 to 59)	min 2.5 (min 36)	2 to 10 (36 to 50)		Coiled Room bulb				
KP69	14058	60L1112					2m (6.5 ft.)	Capillary tube and 3/8" coiled remote bulb.				
KP71	14059	60L1113	−5 to +20 (23 to 68)		2 to 10 (36 to 50)			3/8" diam. cylindrical remote bulb.	Adsorption Charge	min		
KP71	14060	60L1115			fixed 3 (fixed 37)							
KP73	14061	60L1116	−25 to +15 (−13 to +59)		2.5 to 12 (36 to 54)			3/8" diam. double contact bulb				
KP73	14062	60L1117			8 to 20 (46 to 68)			¼" diam. cylindrical remote bulb.				
KP75	14063	60L1120	10 to 45 (50 to 113)		2.5 to 10 (36 to 50)			25mm diam. duct bulb				
KP77	14064	60L1121	20 to 60 (68 to 140)		3.5 to 15 (38 to 59)			3/8" diam. cylindrical remote bulb.				

KK.20.B1.02

Brackets — Refer KP Pressure Controls

Permissible ambient temperature for the Thermostat Housing : −50°C to +65°C (+80°C for maximum 2 hours)
Switch/Contact rating : Same as for KP Pressure Controls.

TERMINOLOGY

Differential - Is the difference between starting and stopping temperature.
Mechanical differential (self-differential). The differential that is set with the differential spindle.
Operating differential - Is the one at which the plant operates. It is always larger than the mechanical differential.
Operating differential depends on several factors :

1. Velocity of the medium. The higher the velocity of the air or liquid passing the bulb, the smaller the operating differential will be. Therefore the bulb must always be positioned where the air or liquid circulation is most rapid.
2. Temperature variation of the medium (variation of temperature per time unit). The thermal differential increases with a rising rate of temperature variation.
3. Heat transmission to the sensor. The best possible contact ought to be ensured between the sensor and the medium to be temperature-controlled. Difficulties can arise, especially if the sensor is inserted in a sensor pocket. The use of heat-conductive compound will, normally, result in satisfactory heat transmission.

NOTES

SPEEDY SERVICE

WE ARE ORGANIZED TO MAKE PROMPT DELIVERY FROM OUR VAST STOCKS. WHETHER YOUR ORDER IS SMALL OR LARGE WE WILL EXCERCISE GREAT CARE IN SELECTING AND PACKING YOUR ORDER. MORE THAN 90% OF ALL ORDERS RECEIVED ARE DESPATCHED THE SAME DAY. WE AIM TO KEEP YOU AND YOUR JOB MOVING SATISFACTORILY.