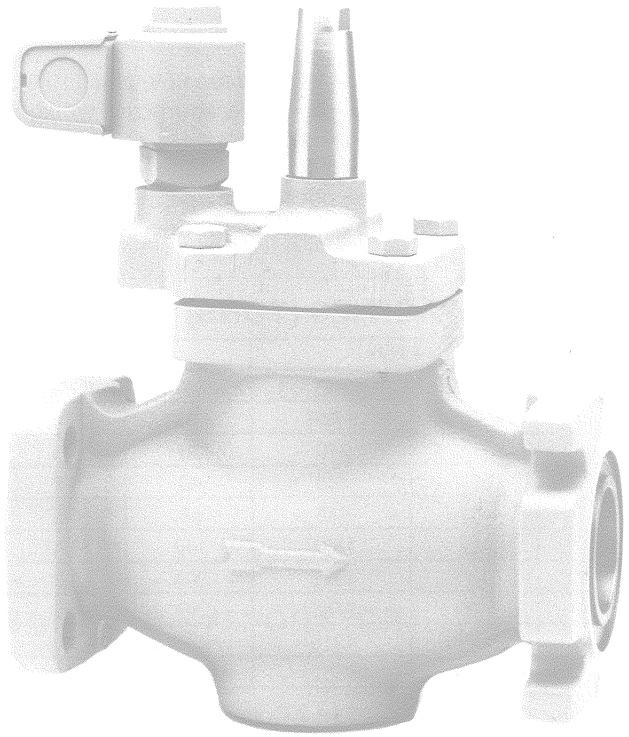
Bulletin S429
November, 1991

HANSEN TECHNOLOGIES CORPORATION



2" HS4A Solenoid Valve

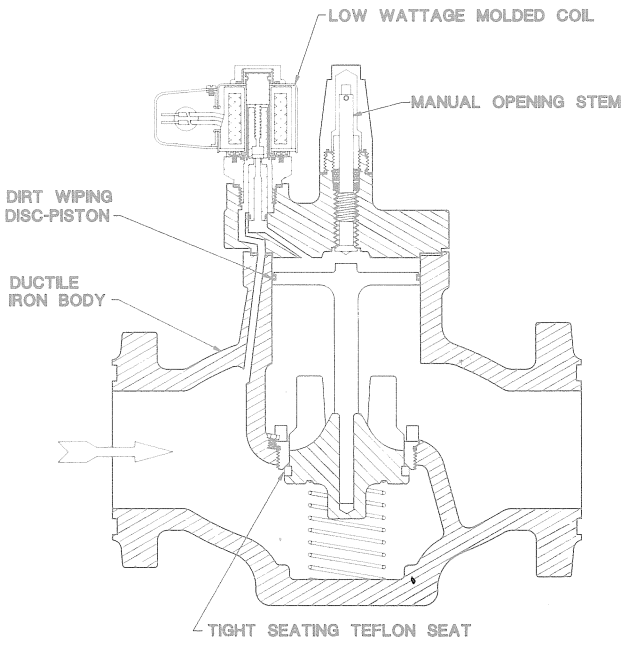
Specifications, Applications, Service Instructions & Parts

HS4A SOLENOID VALVE

¾" thru 4" PORT

Flanged
¾" thru 4"
FPT, SW, WN, ODS
for refrigerants

KEY FEATURES



INTRODUCTION

This flanged, heavy duty, pilot operated, industrial refrigeration solenoid valve controls the on-off flow of refrigerant. It is superior in its ability to overcome dirt and sticky oil during opening and tight closing, as well as operate smoothly in an oil-free "dry" system. When electrically energized, the upstream pressure is ported through the pilot solenoid to the top of the piston to push it downward and open the valve seat wide, when de-energized, pressure is no longer ported to the top of the piston and a spring closes the main valve seat to stop flow in the arrow direction on the valve body.

APPLICATIONS

This advanced design valve is a reliable, standard, stock refrigerant solenoid valve. While primarily for ammonia, this valve is also suitable for R22, other common refrigerants and warm refrigeration oil. Most common use is to automatically stop liquid line feed to recirculating liquid overfeed evaporators, and to level controlled accumulator expansion valves; as a "King" solenoid valve; it is also suitable for hot gas defrost supply and evaporator suction stop applications. (Note: for gravity liquid drain or equalization applications, use Solenoid Valve Type DEVRL having electrically lifted main seat, or low pressure drop HCK2 Gas Powered Suction Stop Valve.)

ADDITIONAL FEATURES

Teflon main & pilot seats
Molded Hansen standard coil
Heavy duty, pilot operation
Spring closing reliability
Simple serviceable design
Available close-coupled strainer
For ammonia, R22, & other refrigerants
Dimensionally replace Parker R/S S4A & S5E

MATERIAL SPECIFICATIONS

Body: Ductile Iron (65,000 PSI tensile)
Adapter: Ductile Iron
Piston: Steel, disc type
V-Port/seat: ¾" thru 1¼"; Steel, plated with teflon seat.
1½" thru 4"; Ductile Iron with teflon seat.
Main Seat: ¾" thru 1¼"; Integral ductile iron.
1½" thru 4"; Stainless steel
Gaskets: Non-asbestos, graphite composite
Solenoid Plunger: Direct lift
Solenoid Coil: Molded, watertight
Pilot orifice: Stainless steel
Safe working pressure: 400 PSIG
Operating temperature: -50F to +150F
(Lower temperatures at pressure down-ratings)

ADVANTAGES

These valves combine modern design and new age materials with advanced manufacturing techniques and intense quality control to offer a significantly superior and reliable product. Their ductile iron bodies are stronger and more rugged than common cast iron or semi-steel valves. They are more dirt resistant than full skirted piston designed valves and use a single, standard, power saving low wattage coil which can be used on all valve sizes. All valves incorporate teflon tight seating and stainless steel spring closing. Non-asbestos gaskets are standard. Main seat is stainless steel on 1½" and larger valves. Valves ¾" thru 1¼" have precision integral dirt-wiping piston disc edge; 1½" and larger valves use spring activated, teflon, dirt-wiping piston seal. The manual opening stem is located on top of valve, up and away from dirt and rust particles to extend stem seal life. This also facilitates easier insulating of valve. Each valve is individually packaged for valve interior cleanliness and ease of storage until ready for use. All valve boxes are clearly marked with catalog numbers and description. These valves are length dimensionally interchangeable with Parker R/S type S4A solenoid valves (R/S 1¼" = Hansen 1¼" 4- bolt).

INSTALLATION

Protect the interior of valve from dirt and moisture during storage and installation. Valve should be installed so that arrow on valve body is in direction of normal refrigerant flow. Valve will not prevent reverse flow. System should be free from dirt, weld slag and rust particles. A 60 mesh close-coupled strainer is available for installation at inlet of valve. Piping sizing, rating, anchoring, and similar prudent precautions should be taken to ensure "liquid hammer" will not occur when valve opens or closes.

ELECTRICAL

The coil will properly operate between 85% and 110% of rated voltage. Coils should only be energized while on pilot solenoid tube; otherwise premature coil burn-out may occur. Vibration resistant, bright, long life neon pilot lights are available. These pilot lights operate on primary voltage; no special coil with secondary winding is necessary.

LIQUID CAPACITIES (TONS)

PORT SIZE	R717†		R22‡	
	PRESSURE DROP (△ P)		PRESSURE DROP (△ P)	
	2 PSI	5 PSI	2 PSI	5 PSI
¾"	171	270	28	45
1"	293	463	49	77
1¼"	407	643	68	107
1½"	842	1331	140	222
2"	1217	1925	203	321
2½"	1761	2785	294	464
3"	2668	4218	445	703
4"	4144	6552	691	1093

† Capacities for R717 based on 20F liquid with no flashing, 5F evaporator temperature and no liquid overfeed. For warm liquid (86F condensing) multiply values by .90.

‡ Capacities for R22 based on 100F liquid, 40F evaporator temperature. For each 10F liquid below 100F, increase values by 5% for R22 and R12, or 7% for R502.

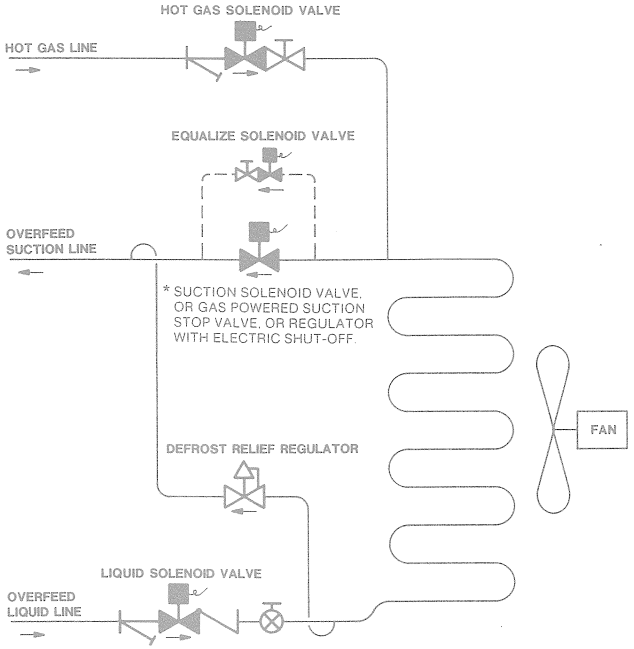
SUCTION CAPACITIES (TONS) 1 TON = 12,000BTU/HR = 3.517KW = 3024KCAL/HR, 2PSI = .14BAR 5 PSI = .35BAR

PORT SIZE	PRESSURE DROP ACROSS VALVE	R717†				R22‡			
		-20F (-28C)	0 F (-17.8C)	+20F (-6.7)	+40F (4.4C)	-20F (-28.9C)	0 F (-17.8C)	+20F (-6.7C)	+40F (4.4C)
¾"	2 PSI	5.8	7.7	9.8	12	2.1	2.7	3.4	4.3
	5 PSI	8.7	12	15	19	3.3	4.2	5.3	6.7
1"	2 PSI	9.9	14	17	21	3.6	4.7	5.9	7.3
	5 PSI	15	21	26	33	5.6	7.3	9.2	11
1¼"	2 PSI	14	18	23	29	5	6.5	8.2	10
	5 PSI	21	29	36	46	7.8	10	13	16
1½"	2 PSI	28	38	48	61	10	13	17	21
	5 PSI	43	59	75	95	16	21	27	33
2"	2 PSI	41	54	70	88	15	19	24	30
	5 PSI	62	86	109	138	23	30	38	48
2½"	2 PSI	59	79	101	127	22	28	35	44
	5 PSI	90	124	157	199	34	44	55	69
3"	2 PSI	90	119	152	193	33	42	54	67
	5 PSI	136	188	238	302	52	66	84	105
4"	2 PSI	140	174	237	299	51	66	83	104
	5 PSI	211	293	370	469	80	103	130	162

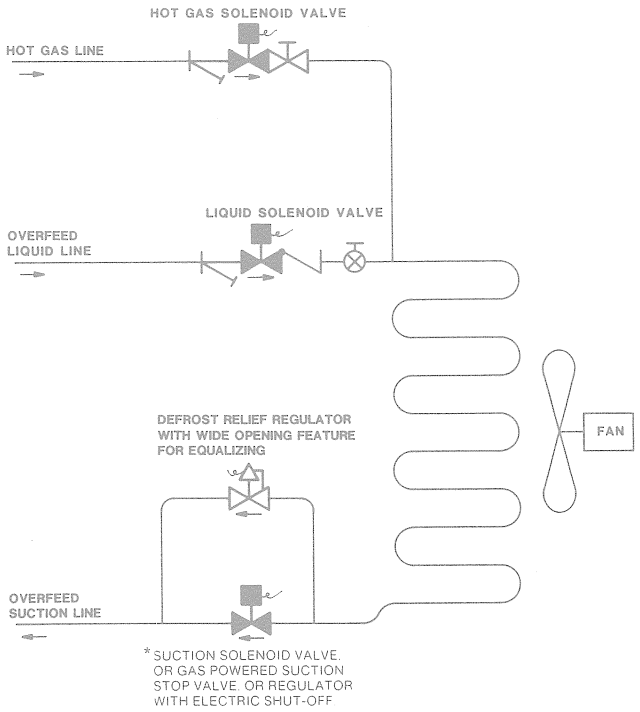
† Based on evaporator temperatures shown and 86F liquid. For each 10F lower liquid temperature increase capacity by 3%.
‡ Based on evaporator temperatures shown and 100F liquid. For each 10F lower liquid temperature increase capacity by 5%.
To convert for R502 multiply table value by .82 (accurate within 8%).

TYPICAL APPLICATIONS FOR HOT GAS DEFROST

BOTTOM FEED EVAPORATOR

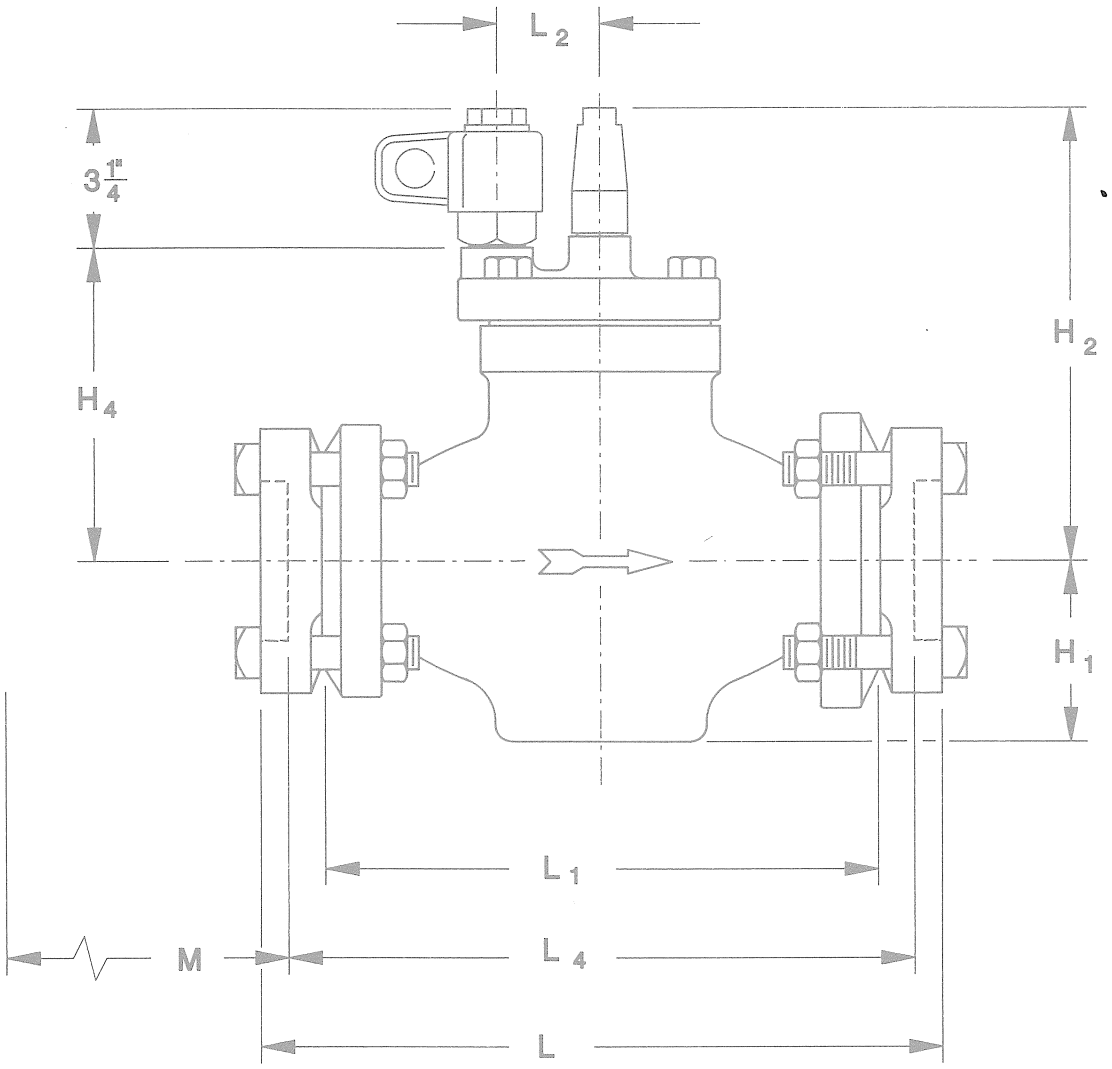


TOP FEED EVAPORATOR



*For suction closure at temperatures below 0 F alternative low pressure drop valves are preferably used such as Hansen Gas Powered Suction Stop Valve type HCK2.

INSTALLATION DIMENSIONS



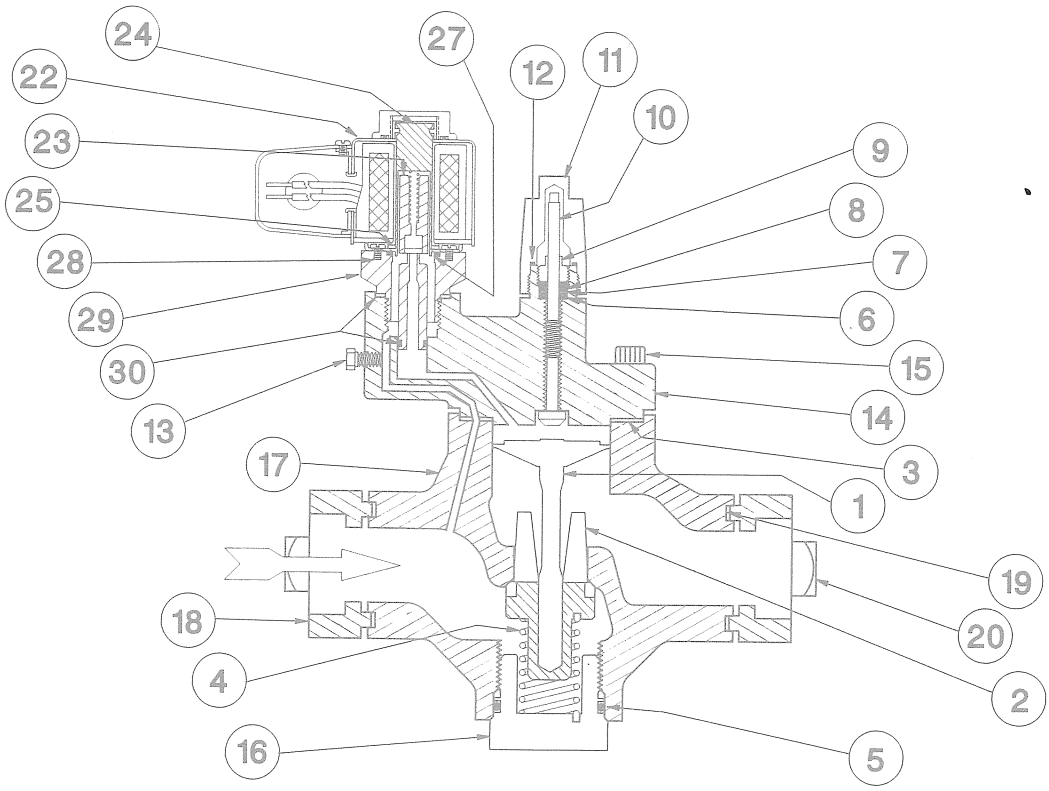
M = Additional length for close-coupled strainer

INSTALLATION DIMENSIONS (inches)

PORT SIZE	H_1	H_3	H_4	L		L_1	L_3	L_4	M	W*
				FPT,SW	WN					
¾", 1"	3½"	6¼"	4⅛"	8 3/16"	9 15/16"	6 3/16"	2⅜"	7 3/16"	3¾"	4¾"
1¼"†	3½"	6¼"	4⅛"	8 3/16"	10 1/16"	6 3/16"	2⅜"	7"	3¾"	4¾"
1½", 2"	3⅛"	8⅞"	5½"	12⅛"	14⅝"	9⅞"	2⅜"	10⅞"	9⅞"	4⅝"
2½"	3⅛"	9⅝"	6⅝"	13"	15⅞"	9⅞"	2⅜"	11"	9⅞"	5⅝"
3"	4⅛"	10"	6⅞"	15⅜"	18⅞"	12¼"	2⅜"	13⅛"	12¼"	6⅝"
4"	4⅞"	10⅝"	7⅜"	17¾"	22½"	14⅛"	2⅜"	15¼"	14⅛"	8⅜"

*Maximum width of valve.
† Alternative special 4-bolt version face-to-face dimensions same as R/S 1¼".

PARTS LIST ¾" thru 1¼"



ITEM	DESCRIPTION	QTY	PART NO.
	Piston Kit consists of:		**75-1019**
1	Piston	1	75-0191
3	Adapter Gasket	1	75-0203
19	Flange Gasket	2	70-0132
	V-Port/Seat Kit ¾"		**75-1020**
	V-Port/Seat Kit 1"		**75-1021**
	V-Port/Seat Kit 1¼"		**75-1022**
	Above kits consist of:		
2a	¾" V-Port/Seat	1	75-0194
2b	1" V-Port/Seat	1	75-0193
2c	1¼" V-Port/Seat	1	75-0192
4	Closing Spring	1	75-0287
5	Bottom Cap O-ring	1	75-0183
	Gasket Kit consists of:		**75-1023**
5	Bottom Cap O-ring	1	75-0183
6	Stem O-ring	1	70-0010
7	Stem Washer	1	70-0026
8	Stem Packing	1	70-0025
9	Packing Nut	1	70-0019
12	Seal Cap O-ring	1	70-0011
19	Flange Gasket	2	70-0132
27	Solenoid Tube Gasket	1	633L1283
30	Port Plug Gasket & O-ring	1	026E1112
	Manual Opening Stem Kit		**75-1024**
	Above kit consists of:		
10	Manual Opening Stem	1	75-0164
	Gasket Kit	1	75-1023
	Seal Cap Kit consists of:		**70-1042**
11	Seal Cap	1	75-0182
12	Seal Cap O-ring	1	70-0011

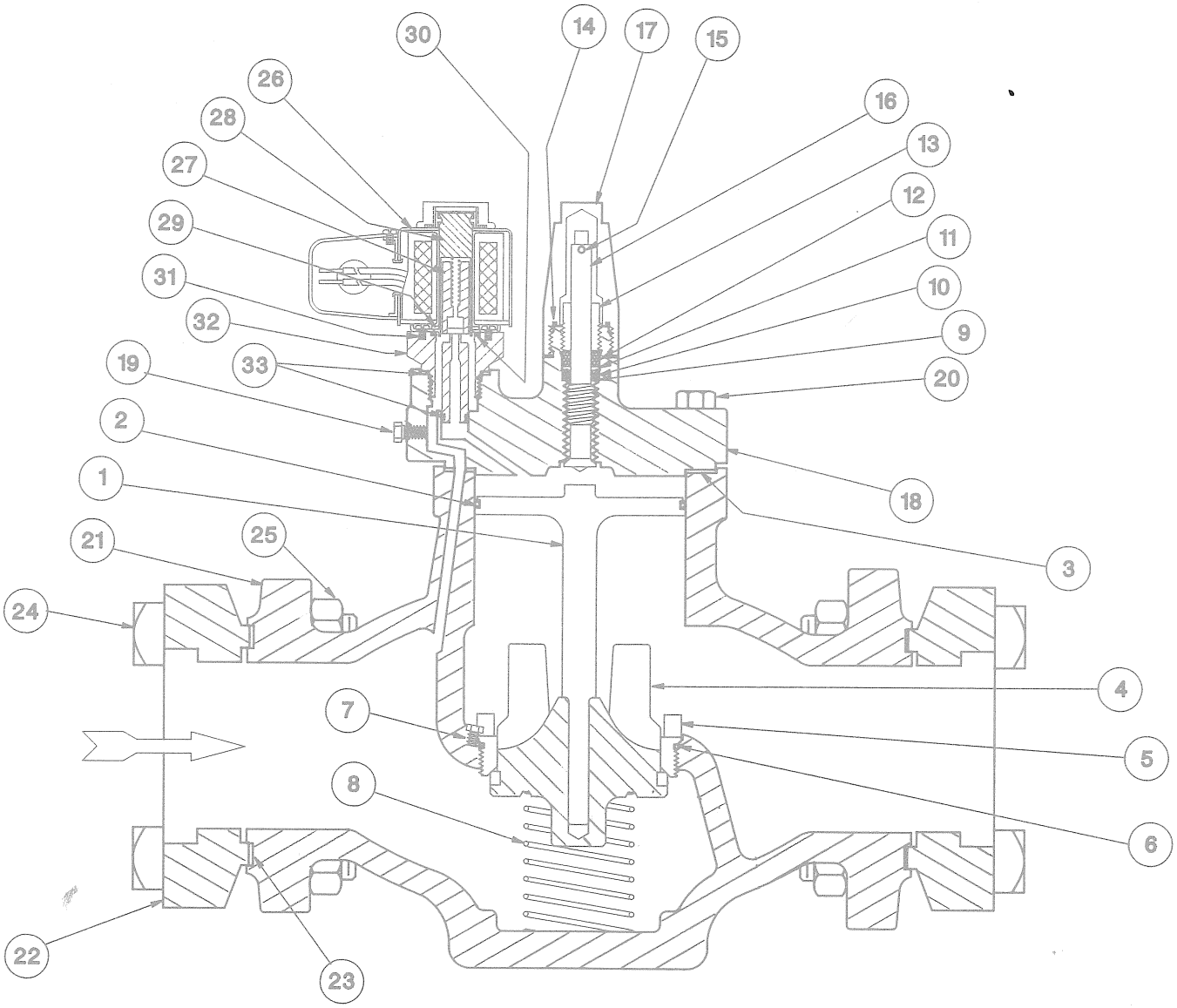
ITEM	DESCRIPTION	QTY	PART NO.
13	Gauge Port Plug (¼" NPT)	1	75-0189
14	Adapter	1	75-0163
15	Adapter Bolts, socket cap	4	75-0190
16	Bottom Cap	1	75-0155
17a	Body, ¾", 1"	1	75-0156
17b	Body, 1¼", 2-Bolt	1	75-0154
18	Flange (Various)	2	FACTORY
19	Flange Gasket	2	70-0132
20	Flange Bolt	4	70-0135
21	Flange Nut	4	70-0136
	Coil Kit (110-120V 50/60Hz)		**70-1008**
	Coil Kit (208-240V 50/60Hz)		**70-1009**
	Coil Kit (other voltages)		**FACTORY**
22	Above kits consist of: coil, retainer, coil cap, O-ring		
	Plunger Kit consists of:		**70-1010**
23	Plunger	1	32F0031
24	Solenoid Tube	1	32F0034
25	Split Washer Spacer	1	32U1339
27	Solenoid Tube Gasket	1	633L1283
28	Tube Screws	4	681X1565
29	**Solenoid Control Module** Above assembly consists of: Control Module Body, Plunger Kit, Port Plug Gasket & O-ring.		**027B1129**

PARTS LIST 1½" thru 4"

ITEM	DESCRIPTION	QTY	PART NO.
	Piston kit 1½", 2"		**75-1025**
	Piston kit 2½"		**75-1026**
	Piston kit 3"		**75-1027**
	Piston kit 4"		**75-1028**
	Above kits consist of:		
1a	Piston 1½", 2"	1	75-0168
1b	Piston 2½"	1	75-0169
1c	Piston 3"	1	75-0159
1d	Piston 4"	1	75-0278
2a	Piston seal 1½", 2"	1	75-0292
2b	Piston seal 2½", 3"	1	75-0293
2c	Piston seal 4"	1	75-0236
3a	Adapter gasket 1½", 2"	1	75-0113
3b	Adapter gasket 2½", 3"	1	75-0093
3c	Adapter gasket 4"	1	75-0224
23a	Flange gasket 1½", 2"	2	75-0138
23b	Flange gasket 2½"	2	75-0125
23c	Flange gasket 3"	2	75-0137
23d	Flange gasket 4"	2	75-0253
	V-Port/seat kit 1½"		**75-1029**
	V-Port/seat kit 2"		**75-1030**
	V-Port/seat kit 2½"		**75-1031**
	V-Port/seat kit 3"		**75-1032**
	V-Port/seat kit 4"		**75-1033**
	Above kits consist of:		
4a	V-Port/seat 1½"	1	75-0369
4b	V-Port/seat 2"	1	75-0177
4c	V-Port/seat 2½"	1	75-0178
4d	V-Port/seat 3"	1	75-0179
4e	V-Port/seat 4"	1	75-0313
3a	Adapter gasket 1½", 2"	1	75-0113
3b	Adapter gasket 2½", 3"	1	75-0128
3c	Adapter gasket 4"	1	75-0093
6a	Seat seal O-ring 1½", 2"	1	75-0224
6b	Seat seal O-ring 2½"	1	75-0275
6c	Seat seal O-ring 3"	1	75-0276
6d	Seat seal O-ring 4"	1	75-0277
7	Seat screw (⅜"—10mm hex)	1	75-0220
8a	Closing spring 1½", 2"	1	75-0171
8b	Closing spring 2½"	1	75-0201
8c	Closing spring 3"	1	75-0248
8d	Closing spring 4"	1	75-0235
	Seal cap kit consists of:		**75-1014**
17	Seal cap	1	75-0139
14	Seal cap O-ring	1	50-0432
5a	Seat 1½", 2"	1	75-0084
5b	Seat 2½"	1	75-0170
5c	Seat 3"	1	75-0071
5d	Seat 4"	1	75-0231
16	Manual opening stem	1	75-0079
18a	Adapter, 1½", 2"	1	75-0060
18b	Adapter, 2½", 3"	1	75-0056
18c	Adapter 4"	1	75-0224
19	Gauge port plug (¼" NPT)	1	75-0189
20a	Adapter bolts 1½", 2" (¾" hex)	4	75-0175
20b	Adapter bolts 2½", 3" ($^{15}/_{16}$")	4	65-0057
20c	Adapter bolts 4" (1⅛" hex)	4	75-0291

ITEM	DESCRIPTION	QTY	PART NO.
	Gasket kit 1½", 2"		**75-1035**
	Gasket kit 2½"		**75-1036**
	Gasket kit 3"		**75-1037**
	Gasket kit 4"		**75-1038**
	Above kits consist of:		
3a	Adapter gasket 1½", 2"	1	75-0113
3b	Adapter gasket 2½", 3"	1	75-0093
3c	Adapter gasket 4"	1	75-0233
2a	Piston seal 1½", 2"	1	75-0292
2b	Piston seal 2½", 3"	1	75-0293
2c	Piston seal 4"	1	75-0236
6a	Seat seal O-ring 1½", 2"	1	75-0274
6b	Seat seal O-ring 2½"	1	75-0275
6c	Seat seal O-ring 3"	1	75-0276
6d	Seat seal O-ring 4"	1	75-0277
9	Back-up washer	1	75-0245
10	Stem O-ring	1	50-0179
11	Stem washer	1	50-0046
12	Stem packing	1	50-0045
13	Packing nut	1	50-0013
14	Seal cap O-ring	1	50-0432
15	Manual opening stem pin	1	75-0173
23a	Flange gasket 1½", 2"	2	75-0138
23b	Flange gasket 2½"	2	75-0125
23c	Flange gasket 3"	2	75-0137
23d	Flange gasket 4"	2	75-0253
30	Solenoid Tube Gasket	1	633L1283
33	Port Plug O-ring & Gasket	1	026E1112
21a	Body 1½", 2"	1	75-0016
21b	Body 2½"	1	75-0018
21c	Body 3"	1	75-0019
21d	Body 4"	1	75-0215
22	Flange (Various)	2	FACTORY
24a	Flange bolt 1½", 2"	8	70-0135
24b	Flange bolt 2½", 3"	8	75-0202
24c	Flange bolt 4"	8	75-0279
25a	Flange nut 1½", 2"	8	70-0136
25b	Flange nut 2½", 3"	8	75-0210
25c	Flange nut 4"	8	75-0280
	Coil kit (110-120V 50/60Hz)		**70-1008**
	Coil kit (208-240V 50/60Hz)		**70-1009**
	Coil kit (other voltages)		**FACTORY**
26	Above kits consist of: coil, retainer, coil cap, O-ring		
	Plunger kit consists of:		**70-1010**
27	Plunger	1	32F0031
28	Solenoid Tube	1	32F0034
29	Split Washer Spacer	1	32U1339
30	Solenoid Tube Gasket	1	633L1283
31	Tube Screws	4	681X1565
32	**Solenoid Control Module** Above assembly consists of: control module body, plunger kit, port plug gasket & O-ring.		**027B1129**

PARTS LIST 1½" thru 4"



SERVICE AND MAINTENANCE

Failure to open: Wrong coil; low line voltage; controlling switch or thermostat not contacting; coil is burned-out; adjacent shut-off valve closed; main valve seat is dirt jammed.

Failure to close: Controlling switch or thermostat not opening contacts; manual opening stem is turned in; valve installed in wrong direction; damage or dirt at main valve seat or pilot seat,

Before opening valve or disassembling pilot for service, be sure it is isolated from the system and all refrigerant is removed (pumped out to zero pressure). Follow usual refrigeration system safe servicing procedure. Read caution section of this bulletin.

To check pilot section of valve, disconnect the electrical coil. Unscrew the coil cap and remove the split threaded retainer. Lift the coil housing away from valve. Remove four solenoid tube screws and remove solenoid tube from valve. Inspect for dirt and damage to teflon seat and stainless steel pilot orifice. Clean, polish or replace parts as necessary. Lightly oil solenoid tube gasket, reassemble pilot section of valve and replace electrical coil assembly.

¾" thru 1¼": Use a ⅜" or 9mm male hexagon wrench to loosen the four adapter bolts, proceeding slowly to avoid refrigerant which may still remain in the valve. If piston parts are stuck, remove the 2" hex bottom cap in order to separate the valve V-port/seat from the disc piston. Inspect disc and piston bore for burrs, nicks and other damage. Remove burrs and nicks, clean or replace disc piston as necessary. Inspect V-port/seat and main valve seat for nicks, marks and divots. Main valve seat may be lapped by hand or power drill to remove marks. Clean, polish or replace the parts as necessary. If necessary, the V-port tapered seat may be reconditioned by removing up to 1/16" of teflon from it on a lathe. Lightly lubricate all parts and gaskets with soft rag containing refrigerant oil. Reassemble valve. Carefully check entire valve for leaks before restoring it to service.

1½" thru 4": Loosen the four adapter bolts using a 12" crescent wrench, being careful to avoid any refrigerant which may still remain in the valve. If disc piston is stuck, it may be removed by inserting a ¼"-20 thread screw into center of piston and lifting straight-up. Inspect piston and piston bore for burrs, nicks and other damage. Remove burrs and nicks, clean or replace piston as necessary. Install new seal on disc piston. These valves have a removable stainless steel main valve seat. To remove seat for inspection, first remove small hex head seat screw. Turn seat counter-clockwise by carefully tapping seat notch with a punch and hammer or turning it out with wrench and a steel bar tool positioned horizontally. Inspect V-port/seat and main valve seat for nicks, marks and divots. Main valve seat may be lapped by hand or power drill to remove marks. Grease and replace seat seal O-ring. Clean, polish or replace the parts as necessary. If necessary, the V-port tapered seat may be reconditioned by removing up to 1/16" of teflon from it on a lathe. Lightly lubricate all parts and gaskets with soft rag containing refrigerant oil. Reassemble valve. Carefully check entire valve for leaks before restoring it to service.

MANUAL OPENING

The stem is located on top of adapter cover. Slowly remove manual opening stem seal cap being cautious to avoid any refrigerant which may have collected under it. Turn stem in (clockwise) to open valve manually; counter-clockwise to return valve to automatic operation.

CAUTION

Hansen valves are only for refrigeration systems. Read these instructions completely before selecting, using or servicing these valves. Only knowledgeable, trained refrigeration mechanics should install, operate or service these valves. Stated low temperature and high pressure limits should not be exceeded. Adapters, bottom cap and control modules should not be removed from valves unless system has been evacuated to zero pressure. See also Safety Precautions in current List Price Bulletin and Safety Precautions sheet supplied with product.

WARRANTY

Hansen valves are guaranteed against defective materials or workmanship for one year F.O.B. factory. No consequential damages or field labor is included.

ORDERING INFORMATION, HS4A SOLENOID VALVES

PORT SIZE	FLANGE STYLE AND SIZES CONNECTIONS AVAILABLE		
	FPT,SW,WN		ODS
	STD	ALSO	STD
¾"	¾"	1", 1¼"	⅞"
1"	1"	¾", 1¼"	1⅛"
1¼"*	1¼"	¾", 1"	1⅜"
1½"	1½"	2"	1⅝"
2"	2"	1½"	2⅛"
2½"	2½"	3"	2⅝"
3"	3"	2½"	3⅛"
4"	4"	—	4⅛"

*1¼" port valve is standard 2-bolt flange design; 4-bolt flange style available upon request to replace 1¼" R/S.

Specify type, connection style and size, voltage for coil, and closed-coupled strainer if required. Pilot lights are available in green, red, amber & white. Please specify color and voltage when ordering solenoid valve.

Optional strainer is a separate 60 mesh, closed-coupled, flanged unit which bolts directly to the solenoid inlet.

See also the following HANSEN solenoid valve bulletins:
S121—HS7 ¾" thru 1¼" port, pilot operated, flanged
S119—HS8 ½" port, pilot operated, flanged
S117—HS6 5/32" port, direct lift, flanged
S114—HS2 5/32" port, direct lift, screwed end

TYPICAL SPECIFICATIONS

"Refrigerant solenoids shall be flanged, pilot operated, with disc type piston, manual opening stem, molded, watertight coils, and spring closing main and pilot teflon seats as manufactured by Hansen Technologies Corporation or approved equal."

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