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January 2012

KE2 HybridStepper Valve

General Product Information

KE2 Therm Solutions,
Advanced Energy Saving Technology
for Commercial Refrigeration and AC Systems

KE2 Hybrid**Stepper Valve**
Electric Expansion Valve General Product Information

HSV

KE2 Hybrid**Stepper Valve**

The company already bringing you the best in refrigeration controls introduces the KE2 Hybrid Stepper Valve (HSV), the latest in Electronic Expansion Valve technology.

Introduction

Designed to be used with the KE2 Evaporator Efficiency and KE2 Simple Superheat controllers to provide the best evaporator refrigerant flow control. Upgrading your system with an HSV will increase system efficiency and provide the best, most consistent superheat control, and eliminate the headache of adjusting superheat.

Applications

The KE2 HSV is designed to be used in refrigeration and air-conditioning applications. It has been engineered to be used with common HCFC and HFC refrigerants including subcritical CO_2 and R-410A. The valves nominal capacities are based on R-404A and range from 1 to 10 tons.

When using an HSV in place of a traditional mechanical expansion valve, the system is ensured to be at the desired superheat over a much wider range of operating conditions. TEVs are affected by changing system conditions and may become out of adjustment over time. Owners do not want to incur the expense of paying a qualified technician to periodically check, and if necessary, reset their system's superheat.

Superheat and system efficiency

Not only does the HSV eliminate the need to adjust superheat, it will also save time at installation. Setting superheat is a tedious and time consuming process, that is difficult to do until the system is pulled down to temperature. It is becoming less and less common to properly set superheat and more commonly than not; it is not even being done at all. Instead, technicians trust the factory superheat setting is correct. This results in commonly finding systems in the field running much less efficiently than designed.

When superheat is not adjusted properly, the evaporator does not get the proper amount of refrigerant to maximize the available surface area of the coil. With less of the evaporator being used to refrigerate the space, the system must run longer to maintain the desired space temperature. This causes the compressor to run countless extra hours at the expense of the system owner. Most owners do not have sophisticated energy monitoring on each piece of equipment to show them the actual expense associated with this problem. They don't realize this amounts to hundreds if not thousands of unnecessary operation dollars per year. KE2 Therm is here to help.

Applying HSVs to systems is the most reliable way to ensure the superheat and the system are running at peak efficiency. When the HSV is used in conjunction with a KE2 Therm controller, the valve no longer relies on the antiquated control method of TEVs. Instead the HSV is constantly being adjusted by the controller to maintain the superheat setpoint.

Hybrid motor design

A hybrid motor design is the obvious choice due to its ability to provide more power at an affordable price. The increased power of the motor provides enough power to control with up to 450 pound pressure differential. The ability to directly drive the position of the valve eliminates the need for a geared drive train. The elimination of unnecessary parts reduces potential failure modes in the valve.

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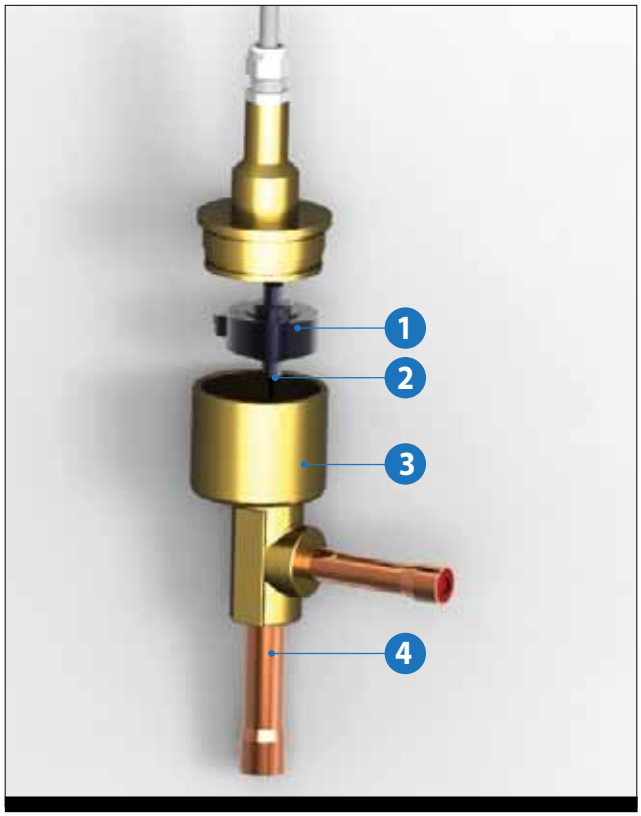
Benefits and Features

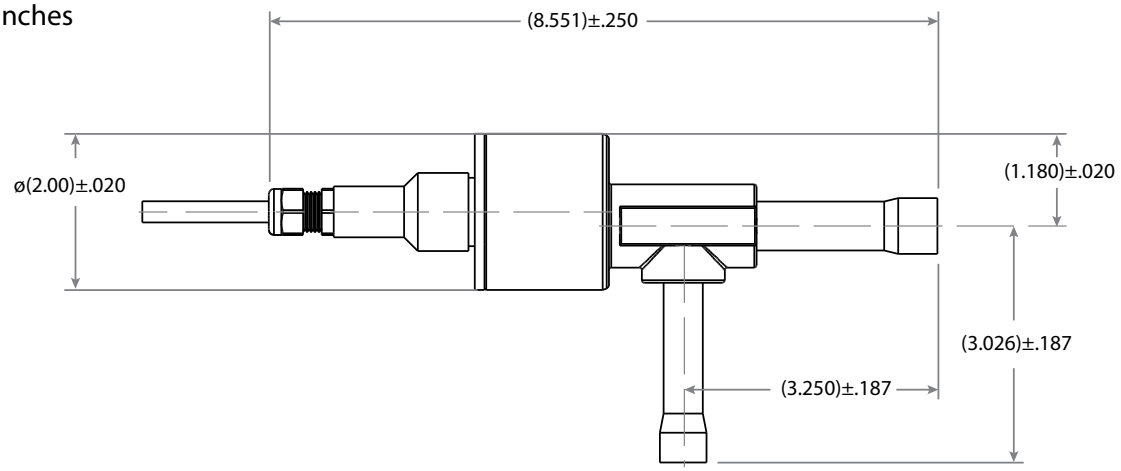
1. Two-phase, bipolar hybrid design provides exceptional power for high pressure applications
2. Gearless drive with fewer moving parts eliminates failure modes and reduces friction
3. Brass body provides inherent corrosion resistance
4. ODF extended copper fittings increase ease of installation, without disassembling the valve



Specifications

Capacity: Up to 10 tons based on R-404A (35 kW)
Motor Type: Two-phase, bipolar
DC Voltage Range Across Motor Leads: 12VDC nominal, 10.8 to 13.2 VDC for L/R drive
DC Current Across Motor Leads: 240 mA nominal, 220 to 260mA for chopper drive
Operating Temperature: -22°F to 140° F (-30°C to 60°C)
Maximum Rated Pressure (MRP): 700 psi (48 bar)
Maximum Operating Pressure Differential: 450 psig (31 bar)
Number of Steps: 1,300
Steps to Overdrive Valve for Initialization: 1,500
Resistance of Coil: 50 Ohms, ±3.5 Ohms at 25°C
Inductance of Coil: 60 mH, ±9 mH at 1khz,1 Vrms
Compatible Oils: POE, mineral, alkylbenzene

Dimensions - Inches



Nomenclature/Ordering

Example:	HSV	300	-	3/8 x 1/2	-	10
	Hybrid Stepper Valve	**300** **600** **900**		**Connections - Inches ODF Inlet x Outlet** HSV300 - **3/8 x 1/2; 1/2 x 5/8** HSV600 -**1/2 x 5/8; 5/8 x 7/8** HSV900 - **5/8 x 7/8**		**Cable Length** **16 in., 10 ft., 40 ft.** (standard is 10 ft. unless specified)

Capacity Tables - Capacities in Tons - Nominal Capacity

R-22 **Capacities in Tons -** Nominal Capacity

Valve Type	40°F								20°F								0°F								-20°F								-40°F							
	Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
HSV-300	3.42	3.94	4.41	4.83	5.22	5.58	5.92	6.24	3.27	3.78	4.22	4.62	4.99	5.34	5.66	5.97	3.15	3.63	4.06	4.45	4.81	5.14	5.45	5.74	3.04	3.51	3.92	4.30	4.64	4.96	5.26	5.55	2.95	3.40	3.80	4.17	4.50	4.81	5.10	5.38
HSV-600	6.71	7.75	8.67	9.50	10.3	11.0	11.6	12.3	6.43	7.42	8.30	9.09	9.82	10.5	11.1	11.7	6.19	7.14	7.99	8.75	9.45	10.1	10.7	11.3	5.98	6.90	7.71	8.45	9.13	9.76	10.4	10.9	5.79	6.69	7.48	8.19	8.85	9.46	10.0	10.6
HSV-900	10.3	11.8	13.2	14.5	15.7	16.7	17.8	18.7	9.82	11.3	12.7	13.9	15.0	16.0	17.0	17.9	9.45	10.9	12.2	13.4	14.4	15.4	16.4	17.2	9.13	10.5	11.8	12.9	13.9	14.9	15.8	16.7	8.84	10.2	11.4	12.5	13.5	14.4	15.3	16.1

R-134a **Capacities in Tons -** Nominal Capacity

Valve Type	40°F								20°F								0°F							
	Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
HSV-300	3.34	3.86	4.31	4.73	5.11	5.46	5.79	6.10	3.48	4.02	4.49	4.92	5.31	5.68	6.03	6.35	2.67	3.08	3.44	3.77	4.07	4.35	4.62	4.87
HSV-600	6.57	7.59	8.48	9.29	10.0	10.7	11.4	12.0	6.84	7.90	8.83	9.67	10.5	11.2	11.9	12.5	6.09	7.04	7.87	8.62	9.31	9.95	10.6	11.1
HSV-900	10.0	11.6	13.0	14.2	15.3	16.4	17.4	18.3	10.5	12.1	13.5	14.8	16.0	17.1	18.1	19.1	9.31	10.8	12.0	13.2	14.2	15.2	16.1	17.0

R-404A **Capacities in Tons -** Nominal Capacity

Valve Type	40°F								20°F								0°F								-20°F								-40°F							
	Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
HSV-300	2.60	3.00	3.35	3.67	3.97	4.24	4.50	4.74	2.46	2.84	3.18	3.48	3.76	4.02	4.26	4.49	2.35	2.71	3.03	3.32	3.59	3.84	4.07	4.29	2.26	2.61	2.92	3.20	3.45	3.69	3.91	4.13	2.16	2.50	2.79	3.06	3.31	3.53	3.75	3.95
HSV-600	5.11	5.90	6.60	7.22	7.80	8.34	8.85	9.33	4.84	5.59	6.24	6.84	7.39	7.90	8.38	8.83	4.62	5.34	5.97	6.53	7.06	7.55	8.00	8.44	4.44	5.13	5.74	6.28	6.79	7.26	7.70	8.11	4.25	4.91	5.49	6.02	6.50	6.95	7.37	7.77
HSV-900	7.80	9.01	10.1	11.0	11.9	12.7	13.5	14.2	7.39	8.53	9.50	10.4	11.3	12.1	12.8	13.5	7.06	8.15	9.10	10.0	10.8	11.5	12.2	12.9	6.79	7.84	8.80	9.60	10.4	11.1	11.8	12.4	6.50	7.50	8.39	9.19	9.92	10.6	11.3	11.9

R-407A **Capacities in Tons -** Nominal Capacity

Valve Type	40°F								20°F								0°F								-20°F								-40°F							
	Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve								Pressure Drop Across Valve							
	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250	75	100	125	150	175	200	225	250
HSV-300	3.38	3.90	4.36	4.78	5.16	5.52	5.85	6.17	3.24	3.74	4.18	4.58	4.95	5.29	5.61	5.91	3.12	3.60	4.03	4.41	4.77	5.10	5.41	5.70	3.02	3.48	3.89	4.27	4.61	4.93	5.22	5.51	2.92	3.37	3.77	4.13	4.46	4.77	5.06	5.33
HSV-600	6.64	7.67	8.57	9.39	10.1	10.8	11.5	12.1	6.37	7.35	8.22	9.01	9.73	10.4	11.0	11.6	6.14	7.08	7.92	8.68	9.37	10.0	10.6	11.2	5.93	6.85	7.66	8.39	9.06	9.68	10.3	10.8	5.74	6.63	7.42	8.12	8.78	9.38	9.95	10.5
HSV-900	10.1	11.7	13.1	14.3	15.5	16.6	17.6	18.5	9.73	11.2	12.6	13.8	14.9	15.9	16.9	17.8	9.37	10.8	12.1	13.3	14.3	15.3	16.2	17.1	9.06	10.5	11.7	12.8	13.8	14.8	15.7	16.5	8.77	10.1	11.3	12.4	13.4	14.3	15.2	16.0

Liquid Temperature Correction Factors																
°F	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
R-22	1.57	1.51	1.46	1.40	1.34	1.29	1.23	1.17	1.12	1.06	1.00	0.94	0.88	0.82	0.76
R-134a	1.70	1.63	1.56	1.49	1.42	1.35	1.28	1.21	1.14	1.07	1.00	0.93	0.86	0.78	0.71
R-404A	2.01	1.92	1.82	1.72	1.62	1.52	1.42	1.31	1.21	1.11	1.00	0.89	0.78	0.66	0.54
R-407A	1.78	1.70	1.63	1.55	1.47	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.75	0.66

thermsolutions

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R-407C **Capacities in Tons** - Nominal Capacity

Valve Type	40°F										20°F										0°F										-20°F										-40°F									
	Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve									
	75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250		
HSV-300	3.35	3.86	4.32	4.73	5.11	5.46	5.79	6.11			3.20	3.69	4.13	4.52	4.88	5.22	5.54	5.84			3.08	3.55	3.97	4.35	4.70	5.03	5.33	5.62			2.98	3.44	3.85	4.22	4.56	4.87	5.16	5.44			2.89	3.34	3.73	3.06	3.31	3.53	3.75	3.95	
HSV-600	6.58	7.59	8.49	9.30	10.1	10.7	11.4	12.0			6.29	7.26	8.12	8.89	9.60	10.3	10.9	11.5			6.05	6.99	7.81	8.56	9.25	9.88	10.5	11.1			5.86	6.77	7.57	8.29	8.96	9.57	10.2	10.7			5.68	6.56	7.34	6.02	6.50	6.95	7.37	7.77	
HSV-900	10.0	11.6	13.0	14.2	15.3	16.4	17.4	18.3			9.60	11.1	12.4	13.6	14.7	15.7	16.6	17.5			9.24	10.7	11.9	13.1	14.1	15.1	16.0	16.9			9.00	10.3	11.6	12.7	13.7	14.6	15.5	16.3			8.68	10.0	11.2	12.3	13.3	14.2	15.0	15.9	

R-407F **Capacities in Tons** - Nominal Capacity

Valve Type	40°F										20°F										0°F										-20°F										-40°F									
	Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve									
	75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250		
HSV-300	3.43	3.96	4.42	4.85	5.23	5.60	5.93	6.26			3.26	3.76	4.20	4.60	4.97	5.32	5.64	5.94			3.15	3.64	4.07	4.46	4.82	5.15	5.46	5.76			2.99	3.45	3.86	4.23	4.57	4.88	5.18	5.46			2.89	3.33	3.72	4.08	4.41	4.71	5.00	5.27	
HSV-600	6.74	7.78	8.70	9.53	10.3	11.0	11.7	12.3			6.40	7.39	8.26	9.05	9.78	10.5	11.1	11.7			6.20	7.16	8.00	8.77	9.47	10.1	10.7	11.3			5.88	6.79	7.59	8.32	8.98	9.60	10.2	10.7			5.67	6.55	7.32	8.02	8.66	9.26	9.82	10.4	
HSV-900	10.3	11.9	13.3	14.6	15.7	16.8	17.8	18.8			9.80	11.3	12.6	13.8	14.9	16.0	16.9	17.8			9.47	10.9	12.2	13.4	14.5	15.5	16.4	17.3			9.00	10.4	11.6	12.7	13.7	14.7	15.6	16.4			8.66	10.0	11.2	12.3	13.2	14.2	15.0	15.8	

R-410A **Capacities in Tons** - Nominal Capacity

Valve Type	40°F										20°F										0°F										-20°F										-40°F									
	Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve									
	75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250		
HSV-300	3.30	3.81	4.26	4.66	5.04	5.39	5.71	6.02			3.09	3.57	3.99	4.38	4.73	5.05	5.36	5.65			2.92	3.37	3.77	4.13	4.46	4.77	5.05	5.33			3.93	4.54	5.08	5.56	6.01	6.42	6.81	7.18			2.63	3.04	3.40	3.72	4.02	4.30	4.56	4.80	
HSV-600	6.48	7.49	8.37	9.17	9.91	10.6	11.2	11.8			6.08	7.02	7.85	8.60	9.29	9.93	10.5	11.1			5.74	6.63	7.41	8.11	8.76	9.37	9.94	10.5			7.73	8.93	9.99	10.9	11.8	12.6	13.4	14.1			5.17	5.97	6.68	7.31	7.90	8.45	8.96	9.44	
HSV-900	9.90	11.4	12.8	14.0	15.1	16.2	17.2	18.1			9.30	10.7	12.0	13.1	14.2	15.2	16.1	17.0			8.80	10.1	11.3	12.4	13.4	14.3	15.2	16.0			11.8	13.6	15.3	16.7	18.0	19.3	20.5	21.6			7.90	9.12	10.2	11.2	12.1	12.9	13.7	14.4	

R-507 **Capacities in Tons** - Nominal Capacity

Valve Type	40°F										20°F										0°F										-20°F										-40°F									
	Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve										Pressure Drop Across Valve									
	75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250			75	100	125	150	175	200	225	250		
HSV-300	2.51	2.90	3.24	3.55	3.83	4.10	4.35	4.58			2.37	2.74	3.06	3.35	3.62	3.87	4.11	4.33			2.25	2.60	2.91	3.18	3.44	3.68	3.90	4.11			2.25	2.60	2.91	3.18	3.44	3.68	3.90	4.11			2.05	2.36	2.64	2.90	3.13	3.34	3.55	3.74	
HSV-600	4.93	5.70	6.37	6.98	7.54	8.06	8.55	9.01			4.66	5.38	6.02	6.59	7.12	7.61	8.08	8.51			4.43	5.11	5.71	6.26	6.76	7.23	7.67	8.08			5.71	6.61	7.39	8.09	8.73	9.33	9.90	10.4			4.03	4.65	5.20	5.69	6.15	6.57	6.97	7.35	
HSV-900	7.54	8.70	9.70	10.7	11.5	12.3	13.1	13.8			7.12	8.22	9.20	10.1	10.9	11.6	12.3	13.0			6.76	7.81	8.70	9.60	10.3	11.0	11.7	12.3			8.73	9.56	10.3	11.0	11.7	12.3	6.15	7.10	7.90	8.70	9.40	10.0	10.7	11.2	

Liquid Temperature Correction Factors

°F	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140
R-407C	1.72	1.65	1.58	1.51	1.44	1.37	1.29	1.22	1.15	1.07	1.00	0.92	0.85	0.77	0.69
R-407F	1.72	1.65	1.58	1.51	1.44	1.37	1.30	1.22	1.15	1.08	1.00	0.92	0.84	0.76	0.68
R-410A	1.77	1.69	1.62	1.55	1.47	1.40	1.32	1.24	1.16	1.08	1.00	0.92	0.83	0.73	0.63
R-507	2.05	1.94	1.84	1.74	1.64	1.53	1.43	1.32	1.22	1.11	1.00	0.89	0.77	0.65	0.52

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