



# KE2 Refrigeration **Stepper Valve**

General Product Information





# RSV

## KE2 Refrigeration Stepper Valve



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Introducing KE2 Therm Solution's new Refrigeration Stepper Valve, with capacity range from 1 to 3.7 tons in R-404A.

### Introduction

The KE2 Therm RSV electric expansion valve is a stepper motor actuated valve, designed for refrigeration applications. The RSV uses a unipolar stepper motor that provides high precision control. Upgrading your system with an RSV will increase system efficiency and provide the best, most consistent superheat control, and eliminate the headache of adjusting superheat.

### Applications

The KE2 RSV is designed to be used in refrigeration and air-conditioning applications. It has been engineered to be used with common HCFC and HFC refrigerants. The valves nominal capacities are based on R-404A and range from 1 to 3.7 tons.

When using an RSV 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.

When using the RSV with the KE2 Evaporator Efficiency controller, version 4.01 firmware must be installed on the controller.\* Version 4.01 provides pre-configured RSV information, including the motor type, motor step rate, and maximum valve steps.

### Superheat and system efficiency

Not only does the RSV 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 often than not; it is not even being done at all. Instead, technicians trust the factory superheat setting is correct. This typically results in systems in the field running much less efficiently than designed.

### Benefits and Features:

- High precision bi-directional control
- 4-phase, 8-beat, 20 pole unipolar stepper motor
- Neodymium-iron-boron magnet rotor
- 500 steps for high resolution control
- 30 to 90 per second step rate
- External, replaceable coil
- 5 wire coil
- Insulation class E
- Low power consumption

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

### Compact motor design

The compact motor design is the obvious choice due to its ability to provide a cost effective solution. 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.

### Insuring the continuing performance of the RSV

KE2 Therm recommends installing a filter drier in the liquid line ahead of the RSV. This helps to prevent system contaminants from disrupting valve performance, and impeding the refrigerant flow. This general installation recommendation is widely accepted in the industry as best practice when installing electric or mechanical expansion valves.

### Specifications:

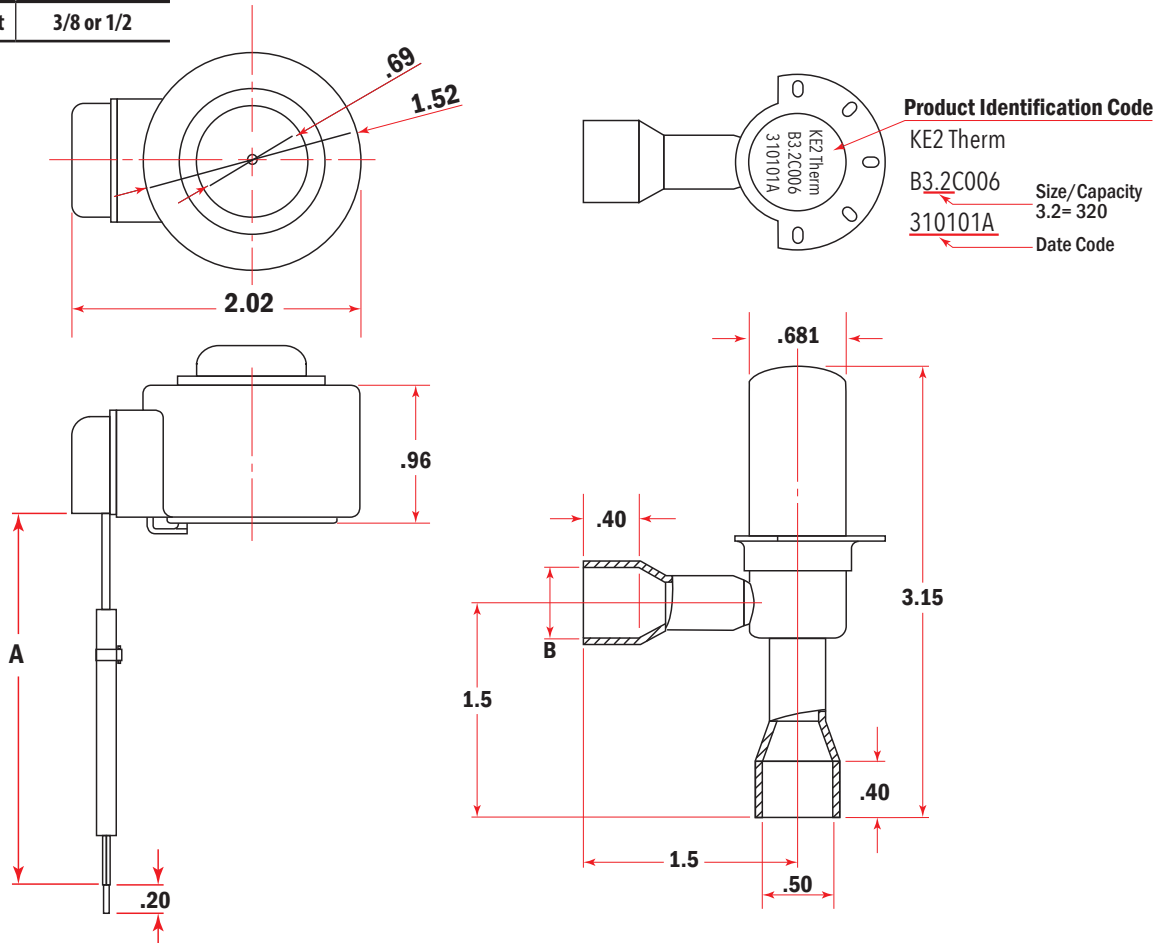
**Capacity:** Up to 3.7 tons based on R-404A  
**Motor Type:** Unipolar  
**Supply voltage:** 12VDC  $\pm$ 10%  
**Stepping current:** 330 mA/phase  
**Ambient Temperature Range:** -22°F to 140°F (-30°C to 60°C)  
**Maximum Rated Pressure (MRP):** 600 psi  
**Maximum Operating Pressure Differential (MOPD):** 500 psi  
**Resistance of Coil:** 36 Ohms,  $\pm$ 3.5 Ohms at 20°C



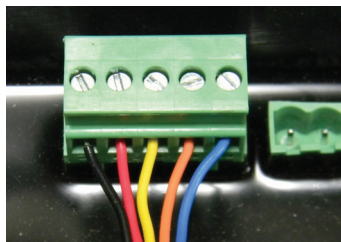
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**RSV Dimensions: Inches**

A	B
5ft, 10ft or 40ft	3/8 or 1/2



**Wiring an RSV valve to the KE2 Evap Controller**



**Ordering**

RSV Description & Part Numbers			
Valve Body	Connections - Inches ODF Inlet x Outlet	Lead Length	Part Number
RSV 130	3/8 x 1/2	5 ft*	21169
RSV 130	3/8 x 1/2	10 ft	21161
RSV 130	3/8 x 1/2	40 ft	21162
RSV 220	3/8 x 1/2	5 ft*	21170
RSV 220	3/8 x 1/2	10 ft	21163
RSV 220	3/8 x 1/2	40 ft	21164
RSV 320	3/8 x 1/2**	5 ft*	21171
RSV 320	3/8 x 1/2**	10 ft	21165
RSV 320	3/8 x 1/2**	40 ft	21166
RSV 320	1/2 x 1/2	5 ft*	21172
RSV 320	1/2 x 1/2	10 ft	21167
RSV 320	1/2 x 1/2	40 ft	21168
RSV-C10 Stator		10 ft	21149
RSV-C40 Stator		40 ft	21150

\*After July 31, 2015 only available special order.  
\*\* Special order only



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**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								
RSV-130	1.51	1.75	1.95	2.14	2.31	2.47	2.62	2.76	1.45	1.67	1.87	2.05	2.21	2.37	2.51	2.65	1.39	1.61	1.80	1.97	2.13	2.28	2.42	2.55	1.35	1.56	1.74	1.91	2.06	2.20	2.33	2.46	1.31	1.51	1.69	1.85	1.99	2.13	2.26	2.38
RSV-220	2.94	3.39	3.79	4.15	4.49	4.80	5.09	5.36	2.81	3.25	3.63	3.98	4.29	4.59	4.87	5.13	2.71	3.12	3.49	3.83	4.13	4.42	4.69	4.94	2.61	3.02	3.37	3.70	3.99	4.27	4.53	4.77	2.53	2.92	3.27	3.58	3.87	4.14	4.39	4.62
RSV-320	4.30	4.97	5.55	6.08	6.57	7.03	7.45	7.86	4.12	4.76	5.32	5.83	6.29	6.73	7.13	7.52	3.96	4.58	5.12	5.61	6.05	6.47	6.87	7.24	3.83	4.42	4.94	5.41	5.85	6.25	6.63	6.99	3.71	4.28	4.79	5.25	5.67	6.06	6.43	6.77

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

Valve Type	40°F						20°F					
	Pressure Drop Across Valve						Pressure Drop Across Valve					
	40	60	80	100	120	140	40	60	80	100	120	140
RSV-130	1.43	1.49	2.02	2.26	2.47	2.67	1.80	2.21	2.55	2.85	3.12	3.37
RSV-220	2.36	2.89	3.34	3.73	4.09	4.41	3.50	4.28	4.94	5.53	6.05	6.54
RSV-320	3.45	4.23	4.88	5.46	5.98	6.46	5.12	6.27	7.24	8.09	8.86	9.57

**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								
RSV-130	1.15	1.33	1.49	1.63	1.76	1.88	2.00	2.10	1.09	1.26	1.41	1.54	1.67	1.78	1.89	1.99	1.04	1.20	1.34	1.47	1.59	1.70	1.80	1.90	1.00	1.16	1.29	1.42	1.53	1.64	1.74	1.83	0.96	1.11	1.24	1.36	1.47	1.57	1.66	1.75
RSV-220	2.23	2.58	2.88	3.16	3.41	3.65	3.87	4.08	2.12	2.44	2.73	2.99	3.23	3.45	3.66	3.86	2.02	2.33	2.61	2.86	3.09	3.30	3.50	3.69	1.94	2.24	2.51	2.75	2.97	3.17	3.37	3.55	1.86	2.15	2.40	2.63	2.84	3.04	3.22	3.40
RSV-320	3.27	3.78	4.23	4.63	5.00	5.35	5.67	5.98	3.10	3.58	4.00	4.38	4.73	5.06	5.37	5.66	2.96	3.42	3.82	4.19	4.52	4.83	5.10	5.40	2.85	3.29	3.68	4.03	4.35	4.65	4.93	5.20	2.73	3.15	3.52	3.85	4.16	4.45	4.72	4.98

**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								
RSV-130	1.11	1.28	1.44	1.57	1.70	1.82	1.93	2.03	1.05	1.21	1.36	1.49	1.61	1.72	1.82	1.92	1.00	1.15	1.29	1.41	1.52	1.63	1.73	1.82	1.00	1.15	1.29	1.41	1.52	1.63	1.73	1.82	0.91	1.05	1.17	1.28	1.39	1.48	1.57	1.66
RSV-220	2.16	2.49	2.79	3.05	3.30	3.52	3.74	3.94	2.04	2.35	2.63	2.88	3.11	3.33	3.53	3.72	1.94	2.24	2.50	2.74	2.96	3.16	3.35	3.53	1.94	2.24	2.50	2.74	2.96	3.16	3.35	3.53	1.76	2.03	2.27	2.49	2.69	2.88	3.05	3.21
RSV-320	3.16	3.65	4.08	4.47	4.83	5.16	5.48	5.77	2.99	3.45	3.86	4.23	4.56	4.88	5.17	5.45	2.84	3.27	3.66	4.01	4.33	4.63	4.91	5.18	2.84	3.27	3.66	4.01	4.33	4.63	4.91	5.18	2.58	2.98	3.33	3.65	3.94	4.21	4.47	4.71

**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