

E²V

Proportional electronic expansion valve

The new series of CAREL electronic expansion valves (*E²V*) with proportional modulation and excellent technical and functional characteristics, allow a better control of refrigeration units, lower operation costs such as running and installation costs.

E²V series can be used in many air-conditioning and refrigeration applications at low and normal temperatures, and offers compatibility with the most common refrigerants.

Thanks to a 15 mm nozzle it is possible to modulate the refrigerant flow.

The internal mechanism is fitted on a calibrated spring with ball bearings. This feature guarantees a stable and reliable regulation reducing the risks of failures.

E²V is completely manufactured using laser-welding techniques on high-quality materials (AISI 316L), as well as technopolymers.

Carel has paid special attention to the smallest details in designing *E²V*, to ensure very high reliability for operations up to 30 bars (435 PSI) of differential pressure and of up to 40 bars (580 PSI) of absolute pressure.

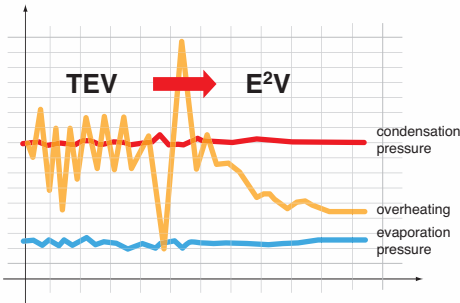
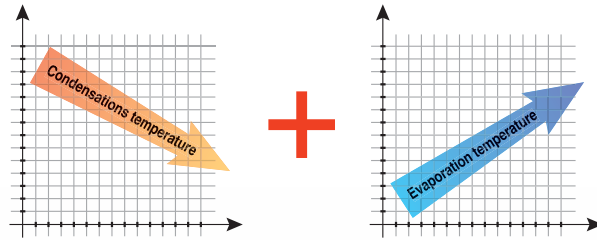
Other features include exclusive axial motion of the nozzle and seal gasket in the closing position.

By installing just one expansion valve, the use of non-return valves can be avoided, making the refrigerant circuit much simpler.

E²V



The new state-of-the-art of the expansion



Precision control

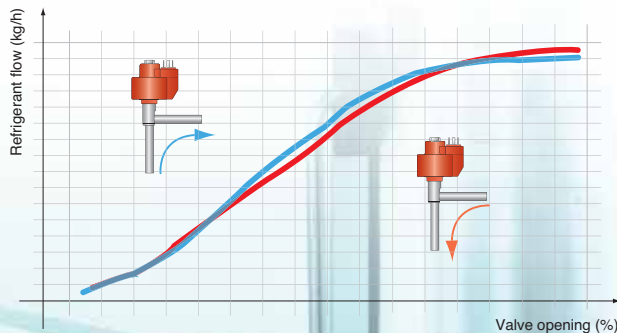
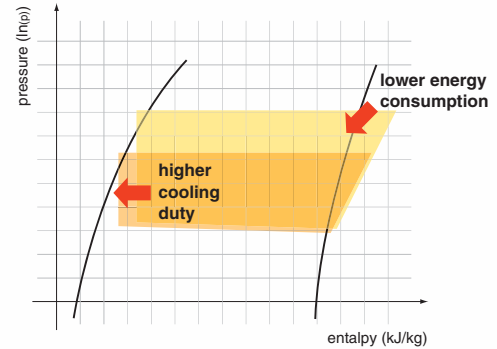
E²V stands out for its quality of control and for its capacity to quickly reach and maintain the operating stability of the unit. The latter aspect makes it ideal for precision air-conditioning, telecommunications (shelters) and industrial refrigeration applications. In addition to the energy savings, **E²V** also ensures an increase in performance and stability of the unit.

Energy savings

The wide range of operation at various differential pressures and the precision in terms of control allows significant energy savings. The use of **E²V** technology ensures savings that translates into a very fast return on investment.

In addition, it has been proven that in commercial refrigeration units, the reduction in consumption that can be achieved using the **E²V** together with floating condensing pressure control is around 20% annually, with peaks of up to 30%.

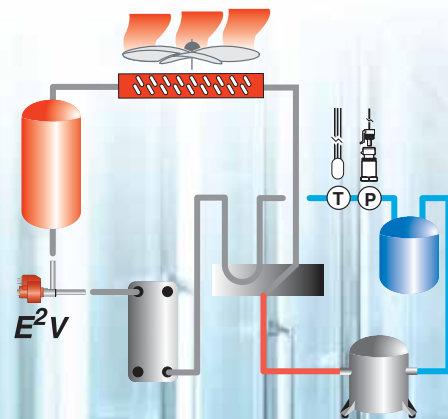
Similar results can be achieved in all refrigeration applications operating year round, for example close control air-conditioning and process refrigerators.



Wide range of operation

The proportional modulation of the refrigerant (from 10 to 100%) and its extreme precision allow the same size of **E²V** to be used in units with highly variable capacities, on different sized units and/or in a variety of operating conditions (floating pressure), with significant logistic benefits.

E²V keeps the superheat at lower values than those values achieved by a traditional expansion valve, maintaining stability and high precision in all operating conditions.



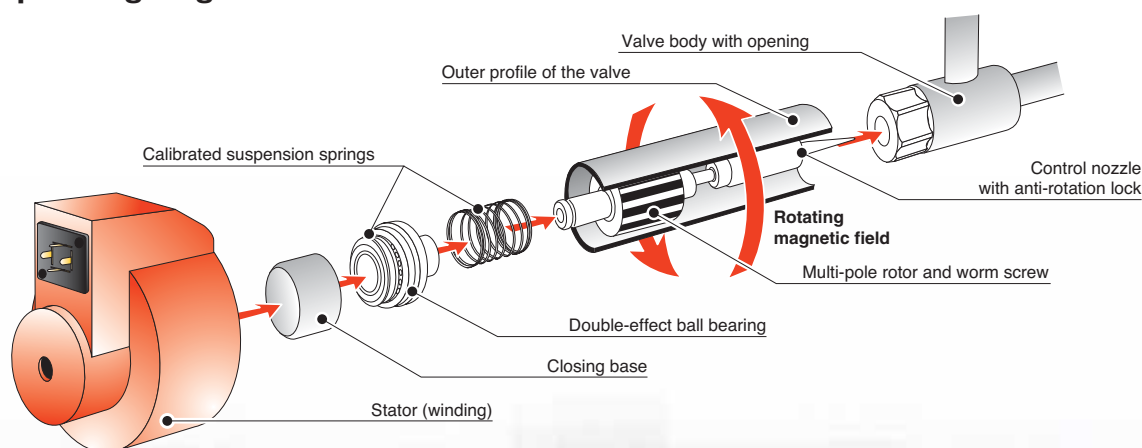
Bi-directional flow

E²V valves maintain their flow characteristics, and consequently their precision, in both directions of operation, allowing it to replace the operation of two traditional expansion valves in reverse-cycle heat pumps.

In both directions the cooling capacity is identical and the same is true for the linearity of the flow.

technology in all kind of refrigerating applications

Operating diagram of the internal mechanism



Control systems

CAREL offers a range of solutions for the management of **E²V** electronic expansion valves.

The operation of **E²V** is based on the control of the refrigerant superheat, along with some additional control functions (MOP, LOP): to calculate these values, a pressure probe and a temperature probe need to be installed at the evaporator outlet.

The refrigerant expansion is managed by the CAREL control algorithm, which calculates the ideal position of the moving element in real time, and then uses the driver with built-in stepper motor to move it to the calculated position.

The probe readings, control algorithm and positioning driver can all be managed using integrated devices or separate modules.

In the first case, the devices are integrated into the main controller (for example, a MasterCase with built-in EEV driver). In the second case, separate modules can be managed by a programmable controller (pCO) using **EVD200** driver, by a parametric controller (μC^2) using **EVD400**, or by a simple digital input taken from any parametric controller

made by CAREL or other manufacturers, using **EVD300** or **EVD400**.

When programmable controllers are used, the EasyTools system allows the control algorithm to be customised so as to adapt operation to the specific needs of the installation (pump down, dehumidification upon request). For parametric controllers, on the other hand, the functions provided represent a complete solution for the needs of standard systems.

Supervision: Preventive maintenance and efficient alarm management can be implemented by monitoring the refrigerant superheat value and consequently the degree of opening of **E²V** and the values of other parameters, from the supervisory system (local or remote).



Technical specifications

E²V

Compatibility	CFC, HCFC, HFC
Maximum operating Pressure (MOP)	Up to 40 bars (580 PSI)
Maximum operating Pressure ΔP (MOPD)	30 bars (435 PSI)
P.E.D.	N/A: Gr. 1, art. 3, par. 3
Refrigerant temperature	-40T65 °C (-40T122 °F)
Room temperature	-30T50 °C (-22T122 °F)

Stator E²V - Two pole low voltage stator (2 phases - 24 polar shoes)

Phase current	450 mA
Drive frequency	100 Hz \pm 10
Phase resistance (25 °C / 77 °F)	36 Ω \pm 10%
Index of protection	IP65 with connector E2VCON*, IP67 with cable E2VCAB*
Step angle	15 °C
Linear advance/step	0.03 mm
Connections	4 wires (AWG 18/22)
Control steps	480

E²V - cooling capacity (kW @ 80% opening)

Air-Conditioning - Condensation= 50 °C Evaporation= 5 °C

	R22	R134a	R404a	R410a	R407c	R507c
E2V-09	3,4	2,7	2,2	3,9	3,5	2,2
E2V-11	4,9	3,8	3,2	5,7	5,0	3,1
E2V-14	7,6	6,0	4,9	8,8	7,8	4,8
E2V-18	12,4	9,7	8,0	14,4	12,6	7,9
E2V-24	21,6	16,9	14,0	25,0	22,0	13,7
E2V-30	33,2	26,0	21,4	38,5	33,8	21,1
E2V-35	44,7	35,0	28,9	51,8	45,5	28,4

NT Refrigeration - Condensation= 40°C Evaporation= -15°C

E2V-09	3,4	2,6	2,3	4,1	3,4	2,2
E2V-11	4,9	3,7	3,3	5,9	4,9	3,2
E2V-14	7,6	5,7	5,1	9,2	7,7	5,0
E2V-18	12,3	9,3	8,3	15,0	12,5	8,2
E2V-24	21,4	16,3	14,5	26,1	21,7	14,3
E2V-30	32,9	25,0	22,2	40,0	33,3	21,9
E2V-35	44,4	33,6	30,0	54,0	44,9	29,5

LT Refrigeration - Condensation= 40°C Evaporation= -40°C

E2V-09	3,4	-	2,1	4,1	3,3	2,1
E2V-11	4,8	-	3,0	5,8	4,7	3,0
E2V-14	7,6	-	4,7	9,1	7,4	4,7
E2V-18	12,3	-	7,6	14,8	12,0	7,6
E2V-24	21,4	-	13,2	25,8	20,8	13,2
E2V-30	32,9	-	20,3	39,6	32,0	20,3
E2V-35	44,3	-	27,4	53,4	43,1	27,3

Codes

The part numbers currently available for the E²V are listed below.
For requirements not featured or for any further information, please contact Carel (e-mail: eev-technology@carel.com).

Valve codes

E2V*AS000	Without connections, 10 mm steel pipe
E2V*ASF00	Copper connections 12 mm - 12 mm ODF
E2V*ASM00	Copper connections 16 mm - 16 mm ODF
E2V*ARB00	Threaded brass fittings, 3/8"-1/2" SAE

The valve packages do not include the connector.

Option/spare part codes

E2VCON0000	Pack of 5 IP65 cable connectors
E2VCAB0600	Co-moulded cable-connector, 3.0 metres IP67
E2VCAB0300	Co-moulded cable-connector, 6.0 metres IP67
E2VFIL0000	Pack of 10 filters for SAE fittings
E2VNUT0000	Pack of 20 stator lock nuts
E2VSTA0000	Spare stator for E2V*A*

Dimensions (E2V*AS000)

