



Data sheet

Electric expansion valve Type ETS 500P, ETS 800P



ETS 500P, ETS 800P are extension to current electric expansion valves ETS program by integrate dual ETS 250 or dual ETS 400 in parallel. They can be used for precise liquid injection in evaporators for air conditioning and refrigeration applications with high capacity.

The valve piston and linear positioning design is fully balanced, providing bi-flow feature as well as solenoid tight shut-off function in both flow directions.

The valve design uses bi-polar drive providing very precise flow regulation.

ETS 500P and ETS 800P are compatible with electronic control solutions from Danfoss and other manufacturers.

Features

- Refrigerants: R134a, R513A, R1234ze, other refrigerants are on request.
- Rated capacity for R134a: ETS 500P: 471 TR / 1652 kW ETS 800P: 640 TR / 2245 kW
- Maximum working pressure: 25 bar / 363 psig.
- Compatible with oil free applications.
- Precise positioning for optimal control of liquid injection.
- Balanced design.
- Built-in sight glass with moisture indicator.
- Can be operated with flow in both directions and are solenoid tight.
- Low power consumption.
- Danfoss controller type EKE 1 series can be used to drive ETS 500P and ETS 800P.
- For manual operation and service of ETS valves an AST-G service driver is available.



Approvals

CE RoHS

Technical data

Compatible refrigerants	R134a, R513A, R1234ze.				
Compatible refrigerants	For other refrigerants, please contact your local Danfoss representative.				
Refrigerant oil	All mineral oils and ester oils and also support oil free applications.				
Comply with P.E.D.	Yes				
Max. opening pressure differential (MOPD) normal flow	25 bar (363 psig)				
Max. opening pressure differential (MOPD) reverse flow	10 bar (145 psig)				
Max. working pressure (PS/MWP) 25 bar (363 psig)					
Inlet fluid temperature	-40 °C – 65 °C (-40 °F – 149 °F). For higher temperature valve, please contact Danfoss.				
Ambient temperature	-40 °C – 60 °C (-40 °F – 140 °F)				
Material of Construction Body and AST enclosure in brass, connections in copper.					
Motor enclosure	IP67				
Stepper motor type	Bi-polar - permanent magnet				
itep mode 2 phase full step					
Phase resistance	52 Ω ±10%				
Phase inductance	85 mH				
Sten angle	7.5° (motor)				

Electrical data

Motor enclosure	IP67			
Stepper motor type	Bi-polar - permanent magnet			
Step mode	2 phase full step			
Phase resistance	52 Ω ±10%			
Phase inductance	85 mH			
Step angle	7.5° (motor) 0.9° (lead screw) Gearing ration 8.5:1. (38/13)²:1			
Nominal voltage	Constant voltage drive: 12 V dc -4% – 15%			
Phase current	Using chopper drive: 100 mA RMS -4% – 15%			
Holding current	Constant voltage drive: Depends on application Chopper drive: full current allowed (100% duty cycle)			
Max. total power	Voltage / current drive: 5.5 / 1.3 W (UL: NEC class 2)			
Step rate	Constant voltage drive: 150 steps/sec Chopper current drive: 0 – 300 steps/sec. 300 recommended			
Total steps	For each ETS 250 or ETS 400: 3810 [160 / -0] steps			
Full travel time	For each ETS 250 or ETS 400: 25.4 / 12.7 sec. (voltage / current)			
Lifting height	For each ETS 250 or ETS 400: 17.2 mm (0.7 in.)			
Reference position	Overdriving against the full close position			
Electrical connection	M12 connector			

Compatible Danfoss controllers Danfoss EKE 1 series



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Design



Sight glass and indicator

ETS 500P and ETS 800P are equipped with sight glass with moisture indicator. The physical position of the piston in the valve can be checked through the sight glass.

Insufficient sub cooling can produce flash gas which is visible through the sight glass. The moisture indicator in the sight glass indicates dry or wet state of the refrigerant by changing its colour.





Note: Electrical check of stepper motor and wiring: Coil I = 52 ohm, coil II = 52 ohm

Connections





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The dual ETS 250 on ETS 500P and dual ETS 400 on ETS 800P are supposed to open/close simultaneously, thus they should be connected to one common EKE 1 series controller.

To make one controller drives dual ETS 250 / ETS 400, follow next additional steps to set the controller correctly prior to commissioning :

- 1. Go to "Valve selection" in "Valve configuration".
- 2. Select "ETS 250" (for ETS 500P) or "ETS 400" (for ETS 800P)
- 3. Change valve type to "User defined valve".
- Change valve drive current to 282 mA. (Single ETS 250 / ETS 400 requires 141 mA peak current. ETS 500P / ETS 800P requires 2 times of the current as of the single valve.)
 Done.

Stepper motor switch sequence

	STEP	Co	oil I	Co		
		Red	Green	White	Black	
	1	+	-	+	-	
↑ CLOSING ↑	2	+	-	-	+	\downarrow OPENING \downarrow
	3	-	+	-	+	
	4	-	+	+	-	
	1	+	-	+	-	

If the controller driving the ETS valve is from another manufacturer than Danfoss or a custom design, the following points must be considered in order to overcome potential step loss.

a. To ensure total closing of the valve, the controller should have a function to overdrive the valve in the closing direction. It is recommended to overdrive ten percent of the full step range at appropriate intervals. b. The amount of lost steps may increase as a function of the amount of changes of the opening degree. Such designed controller should be able to compensate the lost steps after a defined number of changes in opening degree.



At power failure the ETS valve will remain in the opening position it has at the moment of power failure, unless a safety device in the form of a battery backup is installed.

Capacity Normal flow direction



Opening [%]





Capacity based on: R134a $T_e = 5 \text{ °C} / 41 \text{ °F}$

 $\begin{array}{rcl} T_c &=& 32 \ ^\circ C \ / \ 89.6 \ ^\circ F \\ T_1 &=& 28 \ ^\circ C \ / \ 82.4 \ ^\circ F \end{array}$

Q₀ [kW]



Coolselector2®

For easy and precise selection of valve, use Danfoss' CoolSelector2[®] software. You can find the ETS valves on the group, "*Electronic expansion valves*". You can download it from <u>http://coolselector.danfoss.com</u>



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Ordering ETS 500P / ETS 800P

Ordering

EKE 1 series controllers



	Rated capacity ¹)							Connection		
Туре	R13	R134a		R513A		R1234ze		$ODF \times ODF (A \times B)$	Code no.	
	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]		[in.]	Single pack	
ETS 500P	1652	471	1518	433	1289	367		2 ⁵ / ₈ ×3 ¹ / ₈	034Z1017	
ETS 800P	2245	640	2060	587	1760	501		3 ¹ / ₈ ×3 ¹ / ₈	034Z1018	
ETS 800P	2245	640	2060	587	1760	501		2 ⁵ / ₈ × 2 ⁵ / ₈	034Z1019	

1) The rated capacity is based on:

5 °C / 40 °F 28 °C / 82 °F 32 °C / 90 °F Evaporating temperature t_e: Liquid temperature t_i : Condensing temperature t_c : Full stroke opening in normal flow direction

Туре	Pack format	Code no.
Electronic controller EKE 1A	Single pack	080G5300
Electronic controller EKE 1B	Single pack	080G5350
Electronic controller EKE 1C	Single pack	080G5400



Note: The controller will be supplied seperately.

M12 angle female connector is intended for use with a standard M12 male connector, available on stepper motor valves.

This cable is designed to offer high flexibility and small outer diameters with tensile strength. The angle way M12 cable consist of paired, twisted wires, which decreases mutual influence between signals transmitted along the cable and reduces influence of external sources of interference.

The cables thus provides a higher degree of protection against lost steps compared to other cables.

RoHS EHL CE La us

Jacket	PVC - black
Cable outer sheath	Oil - resistant
Water proof rating	IP 67
Operating temperature range	-40 - +80 °C
Wire type	Twisted pair, cross section 20 AWG / 0.5 mm2
Cable outer diameter	7.0 mm
Minimum bending radius	10 x cable diameter
Cable combustibility / test	Flame retardant / VW-1 / CSA FT - 1
M12 standard	EN 61076-2-101
Reference standard	UL style 2464 and DIN VDE 0812
LVD directive	2014/35/EU

Ordering

Cable	Cable length (L)	Insulation	Packing format	Code no.
PVC - black	2 + 0.089 m / 6.6 + 0.3 ft	SR-PVC	Single pack	034G7073
	8 + 0.3 m / 26.2 +1 ft	SR-PVC	Single pack	034G7074

Dimensions



M12 angle cable

Note:

The cable will be

supplied seperately.

Specification







All Danfoss products fulfill the requirements in REACH.

One of the obligations in REACH is to inform customers about presence of Candidate list substances if any, we hereby inform you about one substance on the candidate list: A moist indicator in the sight glass contains a paper which is impregnated with Cobalt Dichloride (CAS no: 7646-79-9) in a concentration above 0.1% w/w.

- Avoid skin contact with the paper - Do not inhale the dust from the paper - The paper must be disposed as hazardous waste.

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