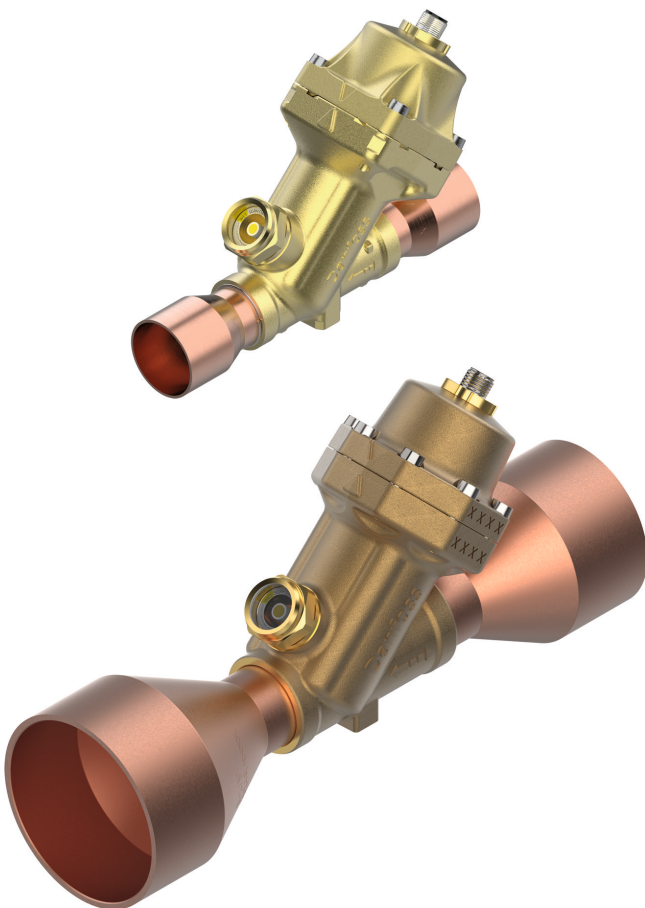


Data Sheet

Electric expansion valve

Type **ETS 175L - 250L - 400L - 500L**

For liquid injection into evaporators



ETS 175L - 250L - 400L - 500L is a series of electric expansion valves for precise liquid injection into evaporators for air conditioning and refrigeration applications. The valve comes with two piston options, a linear and a S-shaped characteristics. The design is fully balanced, providing bi-flow feature as well as tight shut-off function in both flow directions. The valve design uses bi-polar drive providing very precise flow regulation.

ETS 175L - 250L - 400L - 500L valves are compatible with electronic control solutions from Danfoss and other manufacturers.

Features

- Precise positioning for optimal control of liquid injection.
- Wide range for all common refrigerants including A2L.
- Available in oil-free and high temperature version.
- ETS can be operated with flow in both directions.
- Designed with built-in sight glass with moisture indicator.
- Danfoss EKE series, EKF series, MCX are examples of Danfoss controllers with drivers matching the ETS needs.
- For manual operation and service of ETS 175L - 250L - 400L - 500L valves an AST-g service driver is available.

Portfolio overview

ETS 175L - 250L - 400L - 500L is an electric expansion valve series whose function is controlled through a Danfoss electronic controller, or a third party electronic controller that is compatible with the ETS 175L - 250L - 400L - 500L as to control functionality and connections.

Danfoss recommends the use of the EKE 1 series Superheat controllers or EKF driver units together with ETS 175L - 250L - 400L - 500L.

The electronic controller requires precise temperature input from a temperature sensor (refrigerant temperature) and precise pressure inputs (evaporator pressure) from a pressure transmitter.

Table 1: System product






EKF 1A/2A Stepper Valve Driver	EKE 1 series superheat controllers (EKE 1B is shown)
	
<p>EKF series is an economical stepper valve driver that translates analog signal provided by master controller to valve driving sequence .</p>	<p>EKE superheat controllers are for DIN rail mounting, and comes in three versions with different combinations of inputs and output relays and different functionality.</p>

Table 2: Sensors and other products for Type ETS 175L - 250L - 400L - 500L

Pressure transmitter (DST P1 10 shown)	Temperature sensor (AKS 12 shown)	Backup power module EKE 2U
		
<p>DST P110 is a digital ratiometric pressure transmitter. Depending on controller type, other ratiometric pressure transmitters can be used as well (e.g. AKS 32R).</p>	<p>AKS is a PT1000 temperature sensor. Depending on controller type, other temperature sensors can be used as well.</p>	<p>EKE 2U Backup power module ensures sufficient power in case of power failures to the controller to ensure closure of the electronic valves .</p>

Functions

Valve operation

The ETS 175L - 250L - 400L - 500L valves operate modulating by electronically controlled activation of the stepper motor. The motor is a type 2-phase bi-polar, which stays in position, unless power pulses from a driver initiate the two discrete sets of motor stator windings for rotation in either directions. The direction of the rotation of the spindle depends on the phase relationship of the power pulses. This is decisive for the travel of the piston.

The motor is operating the spindle, whose rotating movements are transformed into linear motion by the transmission in the cage assembly. The motor housing has a glass sealed M12 connection as standard, which can be connected with a M12 A code 4-pin connector.

The piston design inside the ETS 175L - 250L - 400L - 500L valve is pressure balanced, giving identical bi-flow performance capabilities and nearby identical maximum capacities. Closing the valve by overdriving, ensures that the reference number in steps is always correct.

NOTE:

Depending on the type of controller or driver, there will be limitations in cable length between valve actuator and driver. Both the actual cable length, the level of EMC emission on the location and driver circuit has an impact on the actual distortion of the current to the actuator motor.

Do not overdrive the valve in open position. Please contact Danfoss for further information how and when to apply this counter measure in cases with questionable cable length.

Sight glass and indicator

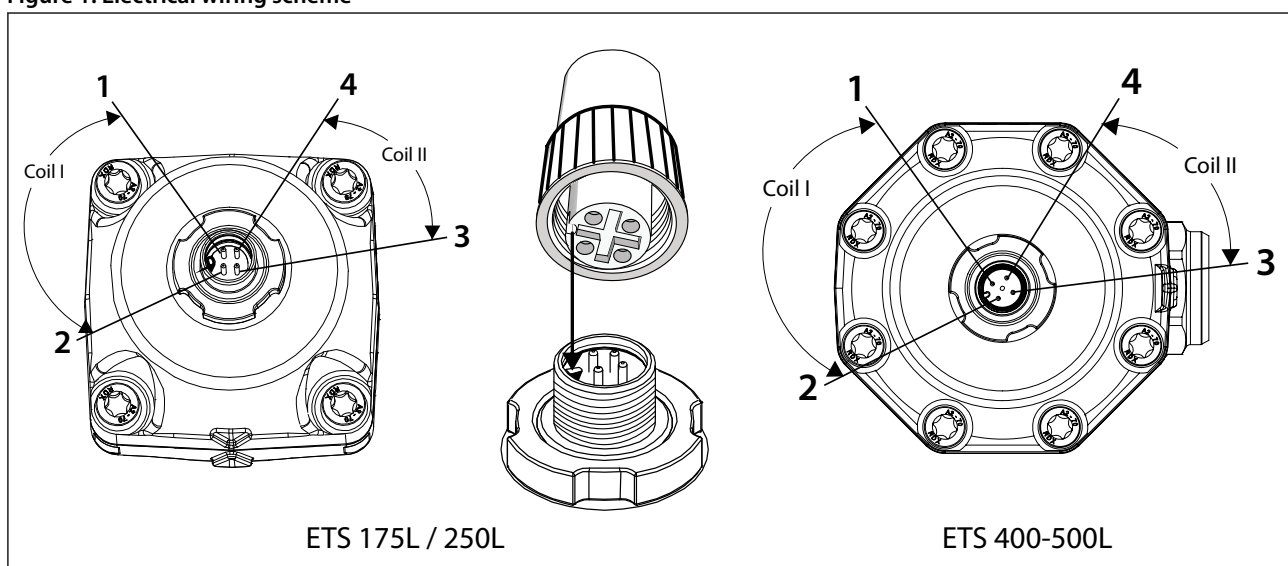
ETS 175L - 250L - 400L - 500L are equipped with sight glass with moisture indicator. The physical position of the valve can be checked through the sight glass.

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.

Some variants comes without sight-glass and indicator, check section ordering for details.

Electrical wiring

Figure 1: Electrical wiring scheme



NOTE:

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

Stepper motor switch sequence

Table 3: Stepper motor switch sequence

		Coil I		Coil II		
		1	2	3	4	
Opening ↓ ↓	1	+12V	GRD	+12V	GRD	Closing ↑ ↑
	2	GRD	+12V	+12V	GRD	
	3	GRD	+12V	GRD	+12V	
	4	+12V	GRD	GRD	+12V	

If the controller driving the ETS 175L - 250L - 400L - 500L valves is from another manufacturer than Danfoss or a custom design,

the following points must be considered in order to overcome potential step loss.

1. To ensure total closing of the valve, the controller should have a function to overdrive the valve in the closed direction. It is recommended to overdrive 5% of the full step range at appropriate intervals. Overdrive should not be performed in open direction of the valve.
2. 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 step after a defined number of changes in opening degree.

⚠ WARNING:

At power failure the ETS 175L - 250L - 400L - 500L valves 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. Danfoss recommends to use EKE 2U backup power module.

Table 4: Design elements

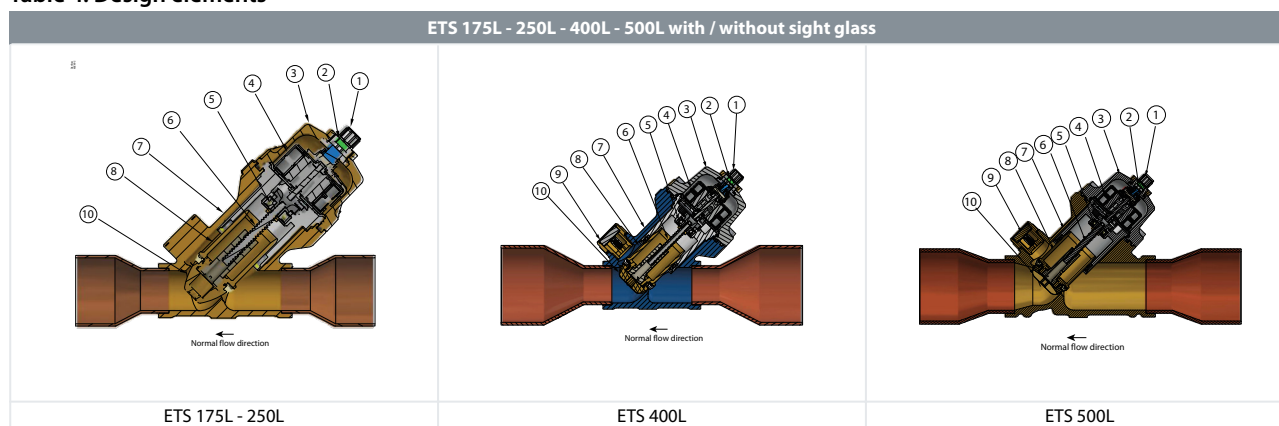
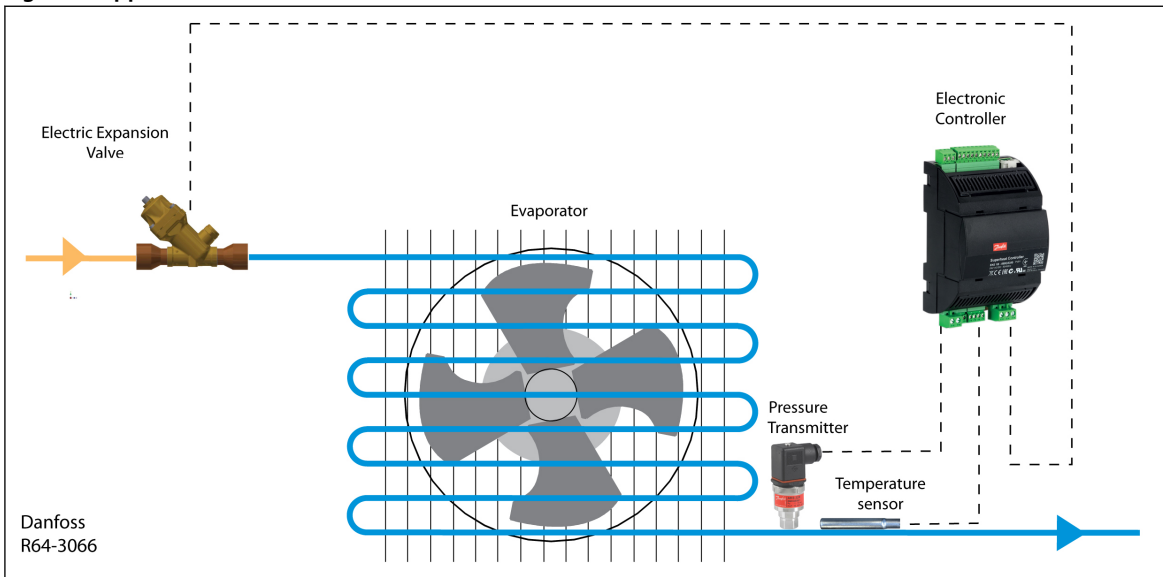


Table 5: Design

Pos. no.	ETS 175L - 250L - 400L - 500L
1	M12 connector
2	Glass seal
3	Cover
4	Stepper motor
5	Bearing
6	Spindle
7	Valvehousing
8	Piston
9	Sight glass
10	Cone

Applications

Figure 2: Applications



Media

ETS L series is designed to be used with the below shown refrigerants and lubricants.

Table 6: Refrigerants and lubricants

Media Data	Value
Refrigerants	R22, R134a, R404A, R407A, R407C, R407F, R407H, R410A, R417A, R422A, R422B, R422D, R438A, R442A, R448A, R449A, R449B, R450A, R452A, R463A, R507A, R513A, R513B, R515A, R515B, R1234ze(E), R1234yf ⁽¹⁾ , R516A ⁽¹⁾
Refrigerant oil for ETS 175L - 250L - 400L	POE, PVE, mineral oil
Refrigerant oil for 500L	POE, PVE ⁽²⁾
Oil free and high temperature application	Yes
Media temperature range	-40 – +70 °C (max. +95 °C for oil-free and high temperature version) -40 – +95 °C (for ETS 500L)

⁽¹⁾ only for oil free valves ETS 175L and 250L

⁽²⁾ Please don't use the ETS 500L and oil-free variants in system with mineral oil because there is the risk of external leakage

Refrigerant safety class (ASHRAE Standard 34/ISO 817)

i NOTE:

For flammable refrigerants R1234ze(E), R1234yf, R516A :

- This product is validated in accordance to EN 378, ISO 5149, ASHRAE 15 or equivalent standards.
- Ignition risk is evaluated in accordance to ISO 5149.
- See safety note below.

i NOTE:

- The product can be applied on systems with R1234ze(E), R1234yf, R516A as the working fluid.
- For countries where safety standards are not an indispensable part of the safety system Danfoss recommend the installer to get a third party approval of the system containing flammable refrigerant.
- Note, please follow specific selection criteria stated in the datasheet for these particular refrigerants.
- The valve must only be used in closed circuit refrigeration system, where no oxygen is present acc. EN 378, ISO 5149 ASHRAE 15 or equivalent standards.

Product specification

Valve technical specifications

Table 7: Electrical specification

Valve technical specification	Value
Motor type	Bi-Polar
Coil resistance @ 25C	52.4 ohm +- 10%
Nominal voltage	Constant Voltage drive: 12V -4/+15%
Phase current	Chopper drive: 200 mA recommended
Phase inductance	70 mH +- 20%
Power consumption	Voltage / current drive: 5.5 / 4.2 W (UL: NEC class 2)
Holding current	Not needed
Excitation methods	Full step, Half step and micro stepping
Number of steps	3810 -0/+400 Full steps (ETS 175L - 250L - 400L), 4999 Full steps (ETS 500L)
Nominal step rate	Constant voltage drive: max. 100pps recommended Chopper drive: max 300pps
Travel time	<13 sec @ 300pps <17 sec @ 300pps (for ETS 500L)
Max duty cycle	100% possible, requiring refrigerant flow through valve. (max. 50% for oil-free and high temperature version)
Dielectric strength	>100MΩ at 500VDC after 4 seconds
Minimum stable control opening degree	10% of opening degree
Reference position	Overdriving against the full close position
Valve configuration	Inline, Straightway
Electrical connections	M12 A-code 4 pin
Compatible Danfoss controllers	Danfoss EKE 1 series superheat controllers, EKF drivers, AK-XM 208C, MCX series

Valve Specification

Table 8: Valve Specification

Data	Value (SI units)	Value (IMP units)
Max working pressure (MWP)	37 barg	537 Psig
Maximum operating pressure differential (MOPD, measured at initial opening)	normal flow: 26 barg	normal flow: 377 psig
	reverse flow:	reverse flow:
	175L: 26 bar g both Voltage and current driven	175L: 377 psig both Voltage and current driven
	250L: 12 barg voltage driven	250L: 174 psig voltage driven
	250L: 17 barg current driven	250L: 246.5 psig current driven
Ambient temperature	400L: 10 barg both Voltage and current driven	400L: 145 psig both Voltage and current driven
	500L: 10 barg both Voltage and current driven	500L: 145 psig both Voltage and current driven
Ambient relative humidity	-40 °C to 70 °C	-40 °F to 158 °F
Ambient relative humidity	Max 95% RH	Max 95% RH
Inlet fluid temperature range	-40 – +70 °C -40 – +95 °C (for ETS 500L) (max. +95 °C for oil-free and high temperature version)	-40 – +158 °F -40 – +203 °F (for ETS 500L) (max. +203 °F for oil-free and high temperature version)
Flow direction	Bi-Flow	
Sightglass / moisture indicator	Type N moisture indicator	
Max, external leakage @37bar @20C with 100% helium	1.56*10 ⁻⁵ mbarL/s	
Enclosure rating IP	IP67	
Insulation resistance	>100 MΩ	
Storage temperature range (°C)	~30 °C to 70 °C	
Shipping and Shelf life	EC 60068-2-30 (damp heat, cyclic), at 25/55 °C. valve in packaging	

Installation data	Value
Installation orientation	Vertical +90°
Ex-factory delivery position	90° open position

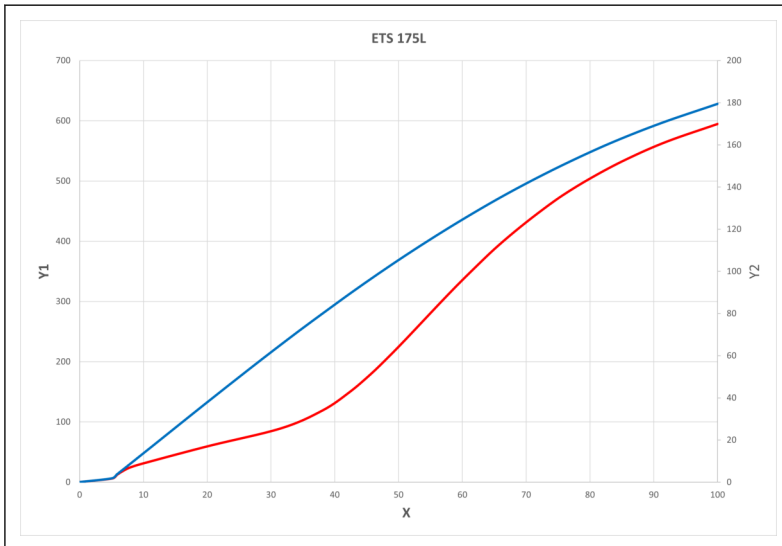
Identification

Figure 3: Identification (example)



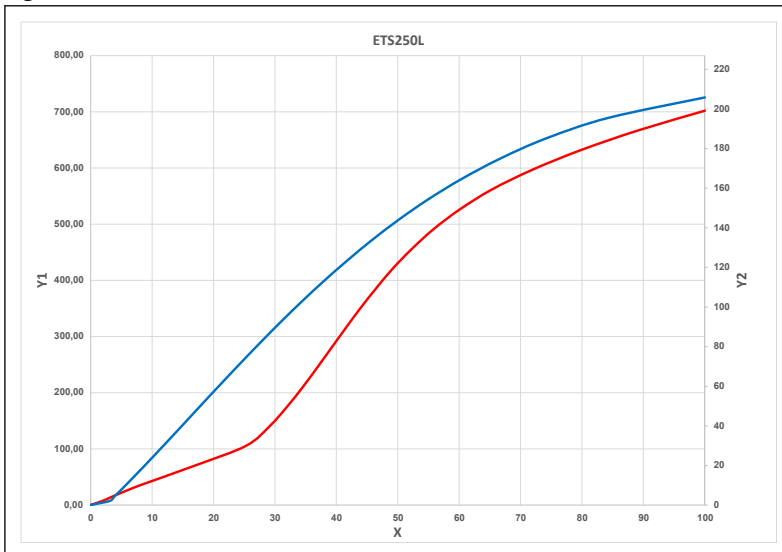
Flow characteristics

Figure 4: ETS 175L flow curves



X	Number of steps [%]
Y1	Capacity [kW]
Y2	Capacity [TR]
— (red)	ETS 175L S curve
— (blue)	ETS 175L L curve

Figure 5: ETS 250L flow curves

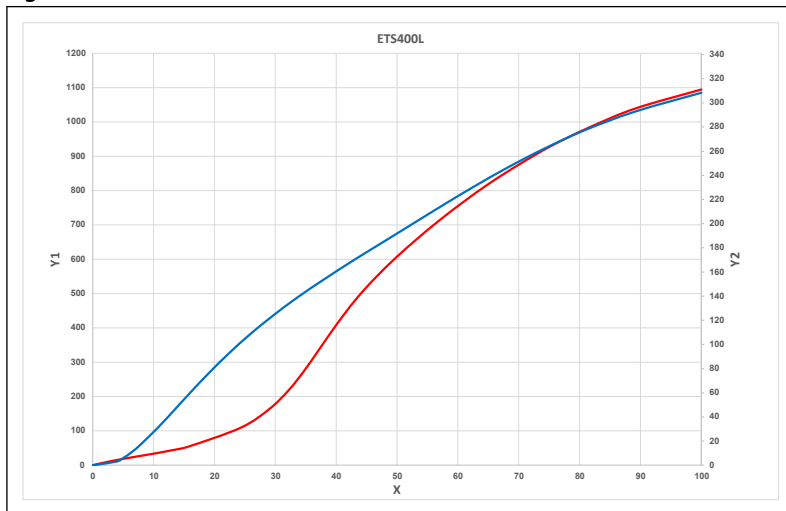


X	Number of steps [%]
Y1	Capacity [kW]
Y2	Capacity [TR]
— (red)	ETS 250L S curve
— (blue)	ETS 250L L curve

Electric expansion valve, Type ETS 175L - 250L - 400L - 500L

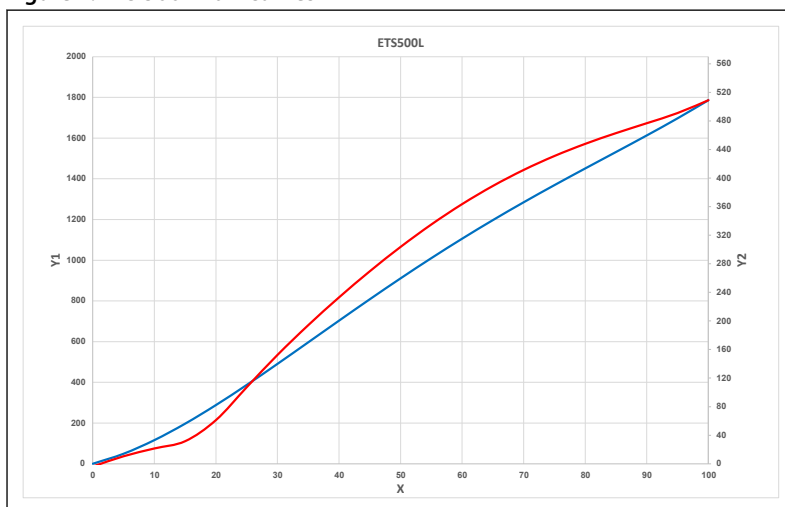
- Evaporating temperature t_e : 5 °C / 40 °F
- Liquid temperature t_l : 28 °C / 82 °F
- Condensing temperature t_c : 32 °C / 90 °F
- Valve position provided by pulses in full steps
- Flow direction: Normal flow

Figure 6: ETS 400L flow curves



X	Number of steps [%]
Y1	Capacity [kW]
Y2	Capacity [TR]
—	ETS 400L S curve
—	ETS 400L L curve

Figure 7: ETS 500L flow curves



X	Number of steps [%]
Y1	Capacity [kW]
Y2	Capacity [TR]
—	ETS 500L S curve
—	ETS 500L L curve

Dimensions

Figure 8: Dimensions ETS 175L - 250L

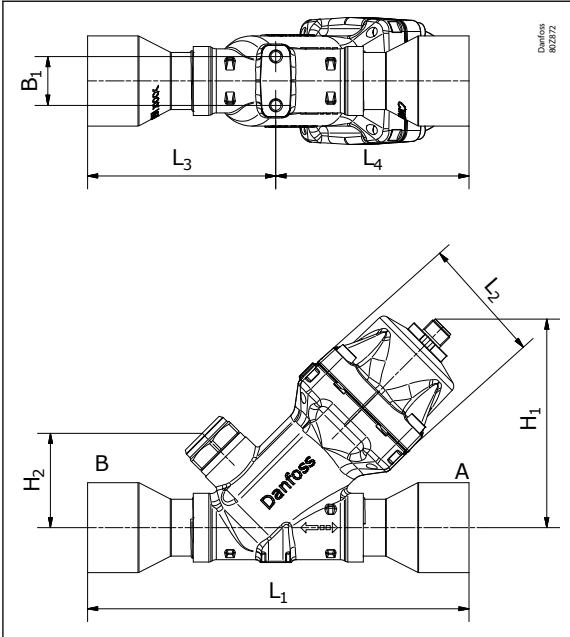


Figure 9: Dimensions ETS 400L

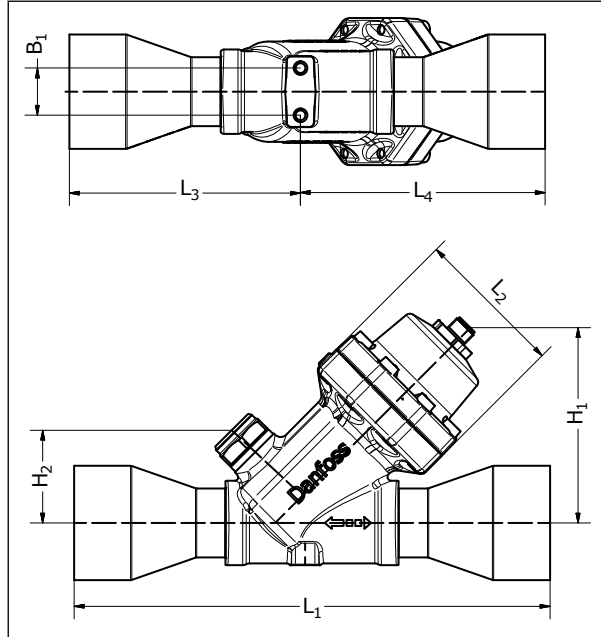
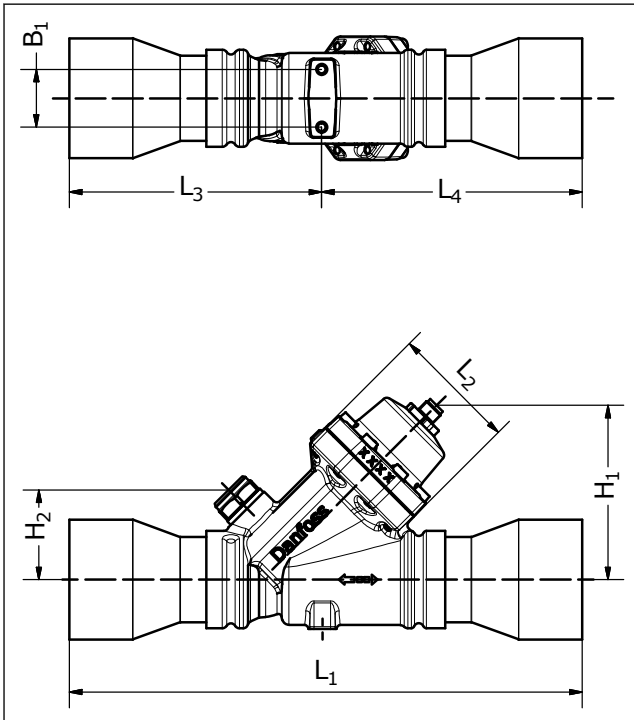


Figure 10: Dimensions ETS 500L



Electric expansion valve, Type ETS 175L - 250L - 400L - 500L

Table 9: Dimensions

Type	Sight glass	Connections		B ₁		H ₁		H ₂		L ₁		L ₂		L ₃		L ₄		Net Weight	
		ODF x ODF (A x B)		[in.]	[mm]	[in.]	[mm]	[in.]	[mm]	[in.]	[mm]	[in.]	[mm]	[in.]	[mm]	[in.]	[mm]	[kg]	[lb]
		[in.]	[mm]																
ETS 175L	Yes	1 1/8 X 1/8	29 X 29	0.9	24.0	3.9	98.8	1.8	46.4	6.6	167.5	2.5	62.5	3.2	82.5	3.3	85.0	1.83	4.03
	No	1 1/8 X 1/8	29 X 29	0.9	24.0	3.9	98.8	1.5	38.1	6.6	167.5	2.5	62.5	3.2	82.5	3.3	85.0	1.83	4.03
	Yes	1 3/8 X 1/3/8	35 X 35	0.9	24.0	3.9	98.8	1.8	46.4	7.0	177.5	2.5	62.5	3.4	87.5	3.5	90.0	1.83	4.03
	Yes	1 5/8 X 1/5/8	41 X 41	0.9	24.0	3.9	98.8	1.8	46.4	7.4	187.5	2.5	62.5	3.6	92.5	3.7	95.0	1.83	4.03
	Yes	1 21/32 X 1 21/32	42 X 42	0.9	24.0	3.9	98.8	1.8	46.4	7.4	187.5	2.5	62.5	3.6	92.5	3.7	95.0	1.83	4.03
ETS 250L	Yes	1 1/8 X 1/8	29 X 29	0.9	24.0	3.9	98.8	1.8	46.4	6.6	167.5	2.5	62.5	3.2	82.5	3.3	85.0	1.84	4.06
	Yes	1 3/8 X 1/3/8	35 X 35	0.9	24.0	3.9	98.8	1.8	46.4	7.0	177.5	2.5	62.5	3.4	87.7	3.5	90.0	1.84	4.06
	Yes	1 5/8 X 1/5/8	41 X 41	0.9	24.0	3.9	98.8	1.8	46.4	7.4	187.5	2.5	62.5	3.6	92.5	3.7	95.0	1.84	4.06
	Yes	1 5/8 X 2/1/8	41 X 54	0.9	24.0	3.9	98.8	1.8	46.4	8.0	202.0	2.5	62.5	8.0	107.0	3.7	95.0	1.84	4.06
	Yes	1 21/32 X 1 21/32	42 X 42	0.9	24.0	3.9	98.8	1.8	46.4	7.4	187.5	2.5	62.5	3.6	92.5	3.7	95.0	1.84	4.06
	No	1 21/32 X 1 21/32	42 X 42	0.9	24.0	3.9	98.8	1.5	38.1	7.4	187.5	2.5	62.5	3.6	92.5	3.7	95.0	1.84	4.06
ETS 400L	Yes	1 5/8 X 1/5/8	41 X 41	0.9	24.0	4.0	101	1.9	47	7.9	202	3.0	76	3.8	98	4.1	104	2.35	5.18
	Yes	2 1/8 X 2/1/8	54 X 54	0.9	24.0	4.0	101	1.9	47	9.5	242	3.0	76	4.6	118	4.9	124	2.35	5.18
	Yes	2 5/8 X 2/5/8	67 X 67	0.9	24.0	4.0	101	1.9	47	10.7	272	3.0	76	5.2	132	5.5	139	2.65	5.18
ETS 500L	Yes	2 5/8 X 3/1/8	67 X 79	1.4	35	4.2	106	2.1	54	12.7	323	3	76	6.5	165	6.2	158	3.72	8.2
	Yes	2 5/8 X 2/5/8	67 X 67	1.4	35	4.2	106	2.1	54	12.2	311	3	76	6	153	6.2	158	3.72	8.2
	Yes	3 1/8 X 3/1/8	79 X 79	1.4	35	4.2	106	2.1	54	13.2	335	3	76	6.5	165	6.7	170	3.72	8.2
	Yes	2 5/8 X 3/1/8	67 X 79	1.4	35	4.2	106	2.1	54	12.7	323	3	76	6.5	165	6.2	158	3.72	8.2
	Yes	2 5/8 X 2/5/8	67 X 67	1.4	35	4.2	106	2.1	54	12.2	311	3	76	6	153	6.2	158	3.72	8.2
	Yes	3 1/8 X 3/1/8	79 X 79	1.4	35	4.2	106	2.1	54	13.2	335	3	76	6.5	165	6.7	170	3.72	8.2

Ordering

Table 10: Ordering standard version

Type	Linear/S-shape	Built-in sight glass	Rated capacity								Connections		Code no.	
			R134a		R1234ze(E)		R513A		R515B		ODF x ODF		Single pack	Industrial pack
			(kW)	(TR)	(kW)	(TR)	(kW)	(TR)	(kW)	(TR)	(in)	(mm)		
ETS 175L	Linear	Yes	631	180	495	142	542	156	481	139	1-1/8 x 1-1/8		034G3602	
	S-shape	Yes	595	169	467	134	510	147	454	131	1-1/8 x 1-1/8		034G3624	
	Linear	No	631	180	495	142	542	156	481	139	1-1/8 x 1-1/8		034G3604	
	Linear	Yes	631	180	495	142	542	156	481	139	1-3/8 x 1-3/8			034G3603
	Linear	No	631	180	495	142	542	156	481	139	1-3/8 x 1-3/8		034G3625	
	Linear	Yes	631	180	495	142	542	156	481	139	1-3/8 x 1-3/8		034G3600	
	S-shape	Yes	595	169	467	134	510	147	454	131	1-3/8 x 1-3/8		034G3601	
	Linear	Yes	631	180	495	142	542	156	481	139	1-5/8 x 1-5/8		034G3626	
	S-shape	Yes	595	169	467	134	510	147	454	131	1-5/8 x 1-5/8		034G3627	
	Linear	Yes	631	180	495	142	542	156	481	139		42 x 42	034G3628	
S-shape	Yes	595	169	467	134	510	147	454	131		42 x 42	034G3629		
ETS 250L	Linear	Yes	724	206	567	163	622	179	551	158	1-1/8 x 1-1/8		034G3616	
	S-shape	Yes	701	200	558	160	612	176	543	156	1-1/8 x 1-1/8		034G3617	
	Linear	Yes	724	206	567	163	622	179	551	158	1-3/8 x 1-3/8		034G3607	
	S-shape	Yes	701	200	558	160	612	176	543	156	1-3/8 x 1-3/8		034G3608	
	Linear	Yes	724	206	567	163	622	179	551	158	1-3/8 x 1-3/8			034G3610
	Linear	Yes	724	206	567	163	622	179	551	158	1-5/8 x 1-5/8		034G3605	
	Linear	Yes	724	206	567	163	622	179	551	158	1-5/8 x 1-5/8			034G3609
	Linear	No	724	206	567	163	622	179	551	158	1-5/8 x 1-5/8		034G3618	
	S-shape	Yes	701	200	558	160	612	176	543	156	1-5/8 x 1-5/8		034G3606	
	Linear	Yes	724	206	567	163	622	179	551	158	1-5/8 x 2-1/8		034G3619	
	S-shape	Yes	701	200	558	160	612	176	543	156	1-5/8 x 2-1/8		034G3620	
	Linear	Yes	724	206	567	163	622	179	551	158		42 x 42	034G3621	
	S-shape	Yes	701	200	558	160	612	176	543	156		42 x 42	034G3622	
	Linear	No	724	206	567	163	622	179	551	158		42 x 42	034G3611	
	S-shape	No	701	200	558	160	612	176	543	156		42 x 42	034G3623	
	Linear	Yes	724	206	567	163	622	179	551	158	2 1/8 x 2 1/8		034G3637	
	S-shape	Yes	701	200	558	160	612	176	543	156	2 1/8 x 2 1/8		034G3638	
	S-shape	No	701	200	558	160	612	176	543	156		42 x 42		034G3670
	S-shape	Yes	701	200	558	160	612	176	543	156	1-3/8 x 1-3/8			034G3671
	S-shape	Yes	701	200	558	160	612	176	543	156	1-5/8 x 1-5/8			034G3672
ETS 400L	S-shape	Yes	1095	311	854	246	943	271	830	239	1-5/8 x 1-5/8		034G3630	
	S-shape	Yes	1095	311	854	246	943	271	830	239	2-1/8 x 2-1/8		034G3631	
	Linear	Yes	1085	308	846	243	934	269	823	237	1-5/8 x 1-5/8		034G3632	
	Linear	Yes	1085	308	846	243	934	269	823	237	2-1/8 x 2-1/8		034G3633	
	Linear	Yes	1085	308	846	243	934	269	823	237	1-5/8 x 1-5/8			034G3634
	Linear	Yes	1085	308	846	243	934	269	823	237	2-1/8 x 2-1/8			034G3635
	Linear	Yes	1085	308	846	243	934	269	823	237	2-5/8 x 2-5/8		034G3636	
	S-shape	Yes	1095	311	854	246	943	271	830	239	1-5/8 x 1-5/8			034G3673
	S-shape	Yes	1095	311	854	246	943	271	830	239	2-1/8 x 2-1/8			034G3674
	S-shape	Yes	1786	507	1396	402	1535	442	1357	390	2 5/8 X 3 1/8	67 X 79	034G3661	
ETS 500L	S-shape	Yes	1786	507	1396	402	1535	442	1357	390	2 5/8 X 2 5/8	67 X 67	034G3662	
	S-shape	Yes	1786	507	1396	402	1535	442	1357	390	3 1/8 X 3 1/8	79 X 79	034G3663	
	Linear	Yes	1786	507	1396	402	1535	442	1357	390	2 5/8 X 3 1/8	67 X 79	034G3664	
	Linear	Yes	1786	507	1396	402	1535	442	1357	390	2 5/8 X 2 5/8	67 X 67	034G3665	
	Linear	Yes	1786	507	1396	402	1535	442	1357	390	3 1/8 X 3 1/8	79 X 79	034G3666	

Table 11: Ordering oil-free and high temperature version:

Type	Linear/S-shape	Built-in sight glass	Rated capacity						Connections		Code no.	
			R1234ze(E)		R513A		R515B		ODF x ODF		Single pack	Industrial pack
			(kW)	(TR)	(kW)	(TR)	(kW)	(TR)	(in)	(mm)		
ETS 175L	Linear	Yes	495	142	542	156	481	139	1-3/8 x 1-3/8		034G3650	
	Linear	Yes	495	142	542	156	481	139	1-1/8 x 1-1/8		034G3651	
ETS 250L	Linear	Yes	567	163	622	179	551	158	1-3/8 x 1-3/8		034G3654	
	S-shape	Yes	558	160	612	176	543	156	1-3/8 x 1-3/8		034G3652	
	Linear	Yes	567	163	622	179	551	158	1-5/8 x 1-5/8		034G3653	
	S-shape	Yes	558	160	612	176	543	156	1-5/8 x 1-5/8		034G3655	
	S-shape	Yes	558	160	612	176	543	156	1-5/8 x 1-5/8		034G3658	
ETS 400L	Linear	Yes	846	243	934	169	823	237	1-5/8 x 1-5/8		034G3658	
	Linear	Yes	846	243	934	169	823	237	2-1/8 x 2-1/8		034G3659	
	S-shape	Yes	854	246	943	271	830	239	2-1/8 x 2-1/8		034G3657	
	Linear	Yes	846	243	934	169	823	237	2-5/8 x 2-5/8		034G3660	
	S-shape	Yes	854	246	943	271	830	239	1-5/8 x 1-5/8		034G3656	
	S-shape	Yes	854	246	943	271	830	239		35		034G3667
	S-shape	Yes	854	246	943	271	830	239				034G3667
ETS 500L	S-shape	Yes	1396	402	1535	442	1357	390	2-5/8 x 2-5/8		034G3668	
	Linear	Yes	1396	402	1535	442	1357	390	2-5/8 x 2-5/8		034G3669	
	S-shape	Yes	1396	402	1535	442	1357	390	3-1/8 x 3-1/8		034G3678	
	Linear	Yes	1396	402	1535	442	1357	390	3-1/8 x 3-1/8		034G3679	

NOTE:

The Rated capacity is based on:
 Evaporating temperature t_e : 5 °C / 40 °F
 Liquid temperature t_l : 28 °C / 82 °F
 Condensing temperature t_c : 32 °C / 90 °F
 Full stroke opening in normal flow direction

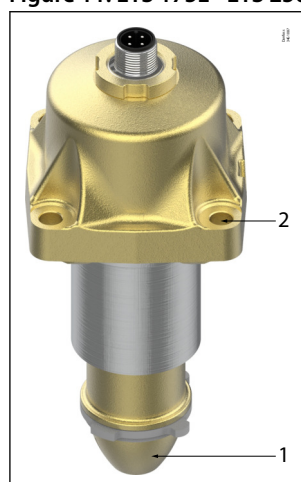


Valve sizing using calculation software

It is strongly recommended to use Coolselector®2 to find the correct valve for your application. The software can be downloaded from the Danfoss website. You can download it from [http:// coolselector.danfoss.com](http://coolselector.danfoss.com)

Spare parts for ETS valve

Figure 11: ETS 175L - ETS 250L



- | | |
|---|------------------------------|
| 1 | Piston i.e Linear or S-curve |
| 2 | Position for Screw (x4) |

Electric expansion valve, Type ETS 175L - 250L - 400L - 500L

Table 12: Actuator kit

Code no.	034G3612	034G3613	034G3614	034G3615
Item	ETS175L-linear-Actuator kit	ETS175L-SCurve-Actuator kit	ETS250L-linear-Actuator kit	ETS250L-SCurve-Actuator kit
Parts				
1 pcs.				Actuator assembly
1 pcs.				O-ring
4 pcs.				Screw M6x25mm

Table 13: Ordering oil-free and high temperature version:

Code no.	034G3644	034G3645	034G3646	034G3647
Item	ETS175L-linear-Actuator kit	ETS175L-SCurve-Actuator kit	ETS250L-linear-Actuator kit	ETS250L-SCurve-Actuator kit
Parts				
1 pcs.				Actuator assembly
1 pcs.				O-ring
4 pcs.				Screw M6x25mm

Figure 12: ETS 400L - 500L

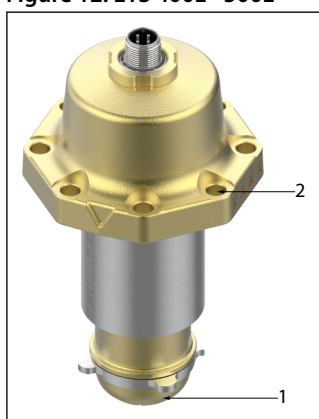


Table 14: Actuator kit

Code no.	034G3641	034G3642	034G3680	034G3681
Item	ETS400L-linear-Actuator kit	ETS400L-SCurve-Actuator kit	ETS500L-linear-Actuator kit	ETS500L-SCurve-Actuator kit
Parts				
1 pcs.				Actuator assembly
1 pcs.				O-ring
8 pcs.				Screw M6x25mm

Table 15: Ordering oil-free and high temperature version:

Code no.	034G3648	034G3649	034G3682	034G3683
Item	ETS400L-linear-Actuator kit	ETS400L-SCurve-Actuator kit	ETS500L-linear-Actuator kit	ETS500L-SCurve-Actuator kit
Parts				
1 pcs.				Actuator assembly
1 pcs.				O-ring
8 pcs.				Screw M6x25mm

Accessories

M12 cable

Figure 13: M12 angle cable dimensions

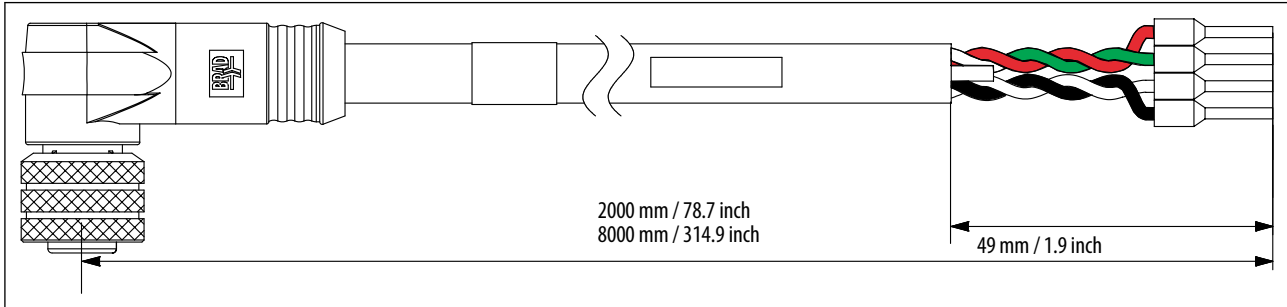


Table 16: M12 cable features

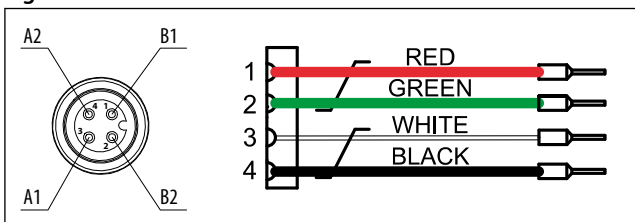
Cable	Cable length (L)	Insulation	Packing	Code no.
Angle cable	2 m / 6.6 ft	SR-PVC	Single pack	034G7073
Angle cable	8 m / 26.2 ft	SR-PVC	Single pack	034G7074
Straight cable	12.2 m / 40 ft	SR-PVC	Single pack	034G7078

Table 17: Specification

Feature	Description
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 mm ²
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

Connections

Figure 14: Connections



Service driver AST G code 034G0013

Figure 15: Service driver AST G



Troubleshooting

Symptom	Possible Cause	Remedy
No valve movement	Lack of proper electrical connection	<ul style="list-style-type: none"> • Check the connection between valve and a controller
	Wrong parameter setting in controller	<ul style="list-style-type: none"> • Check valve settings in controller i.e pre-selected valves, no. of steps, phase current, direction of valve rotation, steps per second
	Broken motor/ short circuit	<ul style="list-style-type: none"> • Check the resistance between coil I and coil II. Resistance in each coil should be 52.4 ohms @20°C. Details on Electrical wiring • Replace a complete valve
	Insufficient power supply to valve	<ul style="list-style-type: none"> • Check the current/voltage supply from controller to valve
Internal leakage (due to 'Step Loss')	Control pulse to valve is influenced by high external electrical noise	<ul style="list-style-type: none"> • Separate the cable from high power lines
	Longer cable length between valve and controller	<ul style="list-style-type: none"> • Check the maximum cable length allowed between the controller and the valve • For longer cable distance, use cable with bigger wire diameter • Use cable filter
	Accumulated backlash in valve	<ul style="list-style-type: none"> • Controller should overdrive the valve to compensate the lost steps after a number of changes in opening degree
	Insufficient power supply to the valve	<ul style="list-style-type: none"> • Check the current/voltage supply from controller to valve • Check the supply power to controller
Insufficient capacity	Expansion valve too small	<ul style="list-style-type: none"> • Check refrigeration system capacity and compare with expansion valve capacity. Replace with larger valve if necessary
	Suction pressure too low Evaporator superheat too high	<ul style="list-style-type: none"> • Check superheat performance, the settings SH min and SH max. in the super heat controller • Check valve capacity • Check 'total number of steps' defined in the controller • Also check section 'High Superheat'
	Expansion valve blocked with foreign material Evaporator wholly or partly iced up	<ul style="list-style-type: none"> • Remove and examine the valve • De-ice evaporator
High superheat	Lack of sub-cooling	<ul style="list-style-type: none"> • Check refrigerant • Also refer to section Insufficient capacity
	Controller is not setup/tuned properly	<ul style="list-style-type: none"> • Check the controller superheat settings and sensors connected to it • Tune PID parameters in the controller
Flash gas	Lack of sub-cooling ahead of expansion valve	<ul style="list-style-type: none"> • Check refrigerant for flash gas ahead of expansion valve / external subcooler • If the valve is placed much higher than condenser outlet, check pressure difference
	Oversized valve selected	<ul style="list-style-type: none"> • Limit max opening degree of the valve setting in controller • Check refrigeration system capacity and compare with expansion valve capacity. Use proper valve size suitable for the system

Certificates, declarations and approvals






The list contains all certificates, declarations, and approvals for this product type. Individual code number may have some or all of these approvals, and certain local approvals may not appear on the list.

Some approvals may change over time. You can check the most current status at danfoss.com or contact your local Danfoss representative if you have any questions.

Table 18: Approvals list

File name	Document type	Document topic	Approval authority
EAC RU Д-ДК.БЛ08.В.00191_18	EAC Declaration	Machinery & Equipment	EAC
LLC CDC EURO-TYSK UA.089.D.00188-17	UA Declaration	PED	LLC CDC EURO TYSK
LLC CDC EURO-TYSK UA.TR-089.0993-17	Pressure - Safety Certificate	PED	LLC CDC EURO TYSK
EAC RU Д-ДК.БЛ08.В.00189_18	EAC Declaration	EMC	EAC
EAC RU Д-ДК.АИ30.В.04973	EAC Declaration	PED	EAC
EAC RU Д-ДК.АИ30.В.04995	EAC Declaration	PED	EAC
Manufacturers Declaration Danfoss 034R9813.01	Manufacturers Declaration		Danfoss
EAC RU Д-ДК.ГА02.В.08524	EAC Declaration	PED	EAC

Table 19: Approvals

					
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