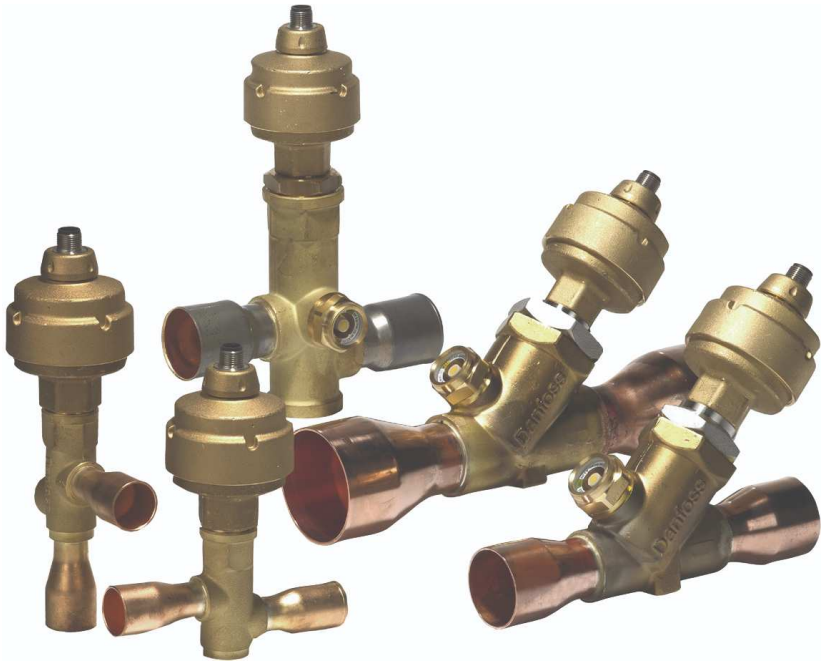
Data sheet



Electric expansion valve

ETS 12.5 - ETS 400

Description

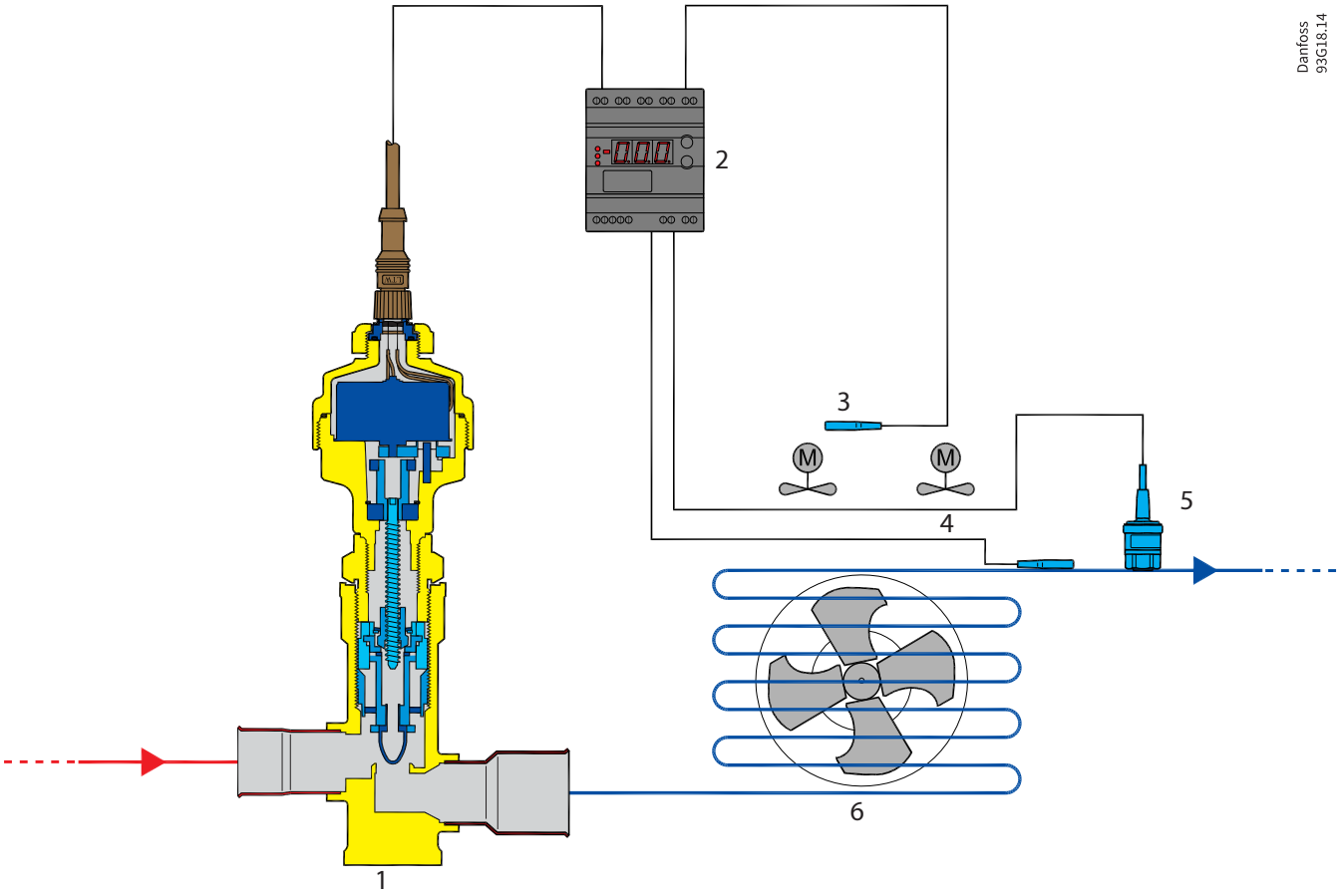
ETS is a series of electric expansion valves for precise liquid injection in evaporators for air conditioning and refrigeration applications. The valve piston and linear positioning design is fully balanced, providing bi-flow feature as well as solenoid tight shut-off function in both flow directions.
The valve design uses bi-polar drive providing very precise flow regulation. ETS valves are compatible with electronic control solutions from Danfoss and other manufacturers.

Features & benefits

- Precise positioning for optimal control of liquid injection and wide range for all common refrigerants
- ETS 250, ETS 400 provides 34 bar / 493 psig and all ETS can be operated with flow in both directions and are solenoid tight
- ETS 50 to ETS 400 have a balanced design
- ETS 50 and ETS 100 feature improved process and productivity due to waterless brazing i.e soldering without wet cloth for cooling
- Special ETS 250 and ETS 400 available for oil free applications and ETS 50 – ETS 400 are all designed with built-in sight glass with moisture indicator
- Internal and external corrosion resistant design
- Low power consumption
- Cable and connector assemblies as accessories
- Danfoss EKE 1A, EKE 1B, EKE 1C, MCX061V, MCX152V are examples of Danfoss controllers with drivers matching the ETS needs
- For manual operation and service of ETS valves an AST-g service driver is available

Applications

Valve application

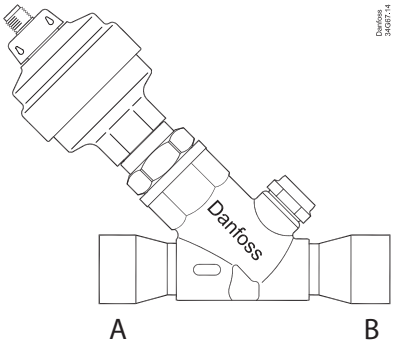


1	ETS	4	Temperature sensor
2	Controller/Driver	5	Pressure transmitter
3	Temperature sensor	6	Evaporator

Ordering

Product code numbers

ETS 250, ETS 400 valve incl. actuator



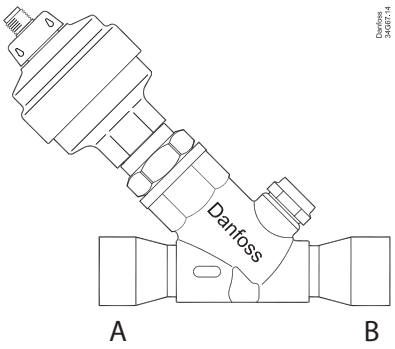
Type	Rated capacity[1]									
	R410A		R407C		R22		R134a		R404A	
	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]
ETS 250	–	–	1212	349	1106	319	874	252	828	239
ETS 400	–	–	1933	556	1764	509	1394	402	1320	381

[1] 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

Connection		Code no.
ODF × ODF (A × B)		
[in]	[mm]	Single pack
1 ⅛ x 1 ⅛	28 x 28	034G2600
1 ⅜ x 1 ⅜	35 x 35	034G2601
1 ⅝ x 1 ⅝	–	034G2602
–	42 x 42	034G2611*
2 ⅛ x 2 ⅛	–	034G2624
1 ⅝ x 1 ⅝	–	034G3500
2 ⅛ x 2 ⅛	54 x 54	034G3501

*ETS 250 and ETS 400 have integrated sight glass except 034G2611.

ETS for oil free applications valve incl. actuator



Type	Rated capacity[1]									
	R410A		R407C		R22		R134a		R404A	
	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]	[kW]	[TR]
Oil free ETS 250	–	–	1212	349	1106	319	874	252	828	239
Oil free ETS 400	–	–	1933	556	1764	509	1394	402	1320	381

[1] 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

For smaller capacities of ETS oil free valves see ETS Colibri

Connection		
ODF x ODF (A x B)		Code no.
[in]	[mm]	Single pack
1 ⅜ x 1 ⅜	35 x 35	034G2625
1 ⅝ x 1 ⅝	–	034G2626
1 ⅝ x 1 ⅝	–	034G3514
2 ⅛ x 2 ⅛	54 x 54	034G3515

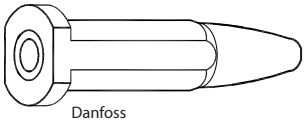
Note:

ETS 250 and ETS 400 have integrated sight glass

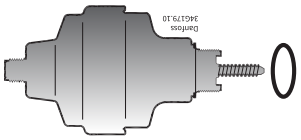
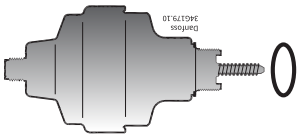
Cable	Cable length (L)	Insulation	Packing format	Code no.
PVC - black	2 + 0.089 m / 6.6 + 0.3 ft	SR-PVC	Single pack	034G7073
	8 + 0.3 m / 26.2 +1 ft	SR-PVC	Single pack	034G7074

Spare parts code numbers

Cone/piston for ETS 12.5 / ETS 25

Items	Description	Quantity [pcs]	Code no.
 Danfoss 34G181.10	Cone/piston for ETS 12.5 + metal gasket	1	**034G2345**
	Cone/piston for ETS 25 + metal gasket	1	**034G2346**

Actuator with integrated M12 connection

Items	Description	Quantity [pcs]	Code no.
	Actuator with integrated M12 with Ceramic bearing (incl. metal gasket) for ETS 12.5, ETS 25	1	**034G2088**
	Actuator with integrated M12 with ceramic bearing (incl. metal gasket) for ETS 25B, ETS 50, ETS 100, ETS 250, ETS 400	1	**034G2087***
	Metal Gasket	1	**034G2344**

*For oil free spare parts of ETS 250 and ETS 400. Please contact Danfoss.

Note:

ETS valve type ETS 12.5, ETS 25, ETS 50 and ETS 100 are currently in process of being phased out, Please select ETS Colibri sizes 12C – 100C as a replacement.

For further information see: Colibri.danfoss.com

Functions

Operation

Valve operation

The ETS valves operate modulating by electronically controlled activation of the AST 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 AST motor housing has a glass sealed M12 connection as standard, which can be connected with customized cable and plug/socket combinations.

The piston design inside the ETS 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.

Operating the ETS series requires a controller with either 12 V DC voltage drive (5.5 W) or using chopper current drive (100 mA RMS).

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.
In order to increase max. cable length considerably, install a 10 mH filter type Danfoss AKA 211 on the four power terminals.
Please contact Danfoss for further information how and when to apply this countermeasure in cases with questionable cable length.

Product details

General data

Table: Technical data

Compatible refrigerants	Wide range for all common refrigerants R1234ze, R134A, R22, R404A, R407A, R407C, R407F, R410A, R422B, R422D, R438A, R448A, R449A, R450A, R452A, R507, R513A and other refrigerants. Special valves for R744 (CO_2) are available. For other refrigerants, please contact your local Danfoss representative.
Refrigerant oil	All mineral oils and ester oils and special ETS 250 and ETS 400 support oil free applications
Comply with P.E.D.	Yes
Max. opening pressure differential (MOPD) normal flow	33 bar (478.6 psi)
Max. opening pressure differential (MOPD) reverse flow	ETS 12.5, ETS 25, ETS 50, ETS 100: 33 bar (478.6 psi) ETS 250, ETS 400: 10 bar (145 psi)
Max. working pressure (PS/MWP)	ETS 12.5, ETS 25, ETS 50, ETS 100: 45.5 bar (660 psig) ETS 250, ETS 400: 34 bar (493 psig)
Inlet fluid temperature	-40 – 65 °C (-40 – 149 °F). For higher temperature valve, please contact Danfoss.
Ambient temperature	-40 – 60 °C (-40 – 140 °F)
Material of Construction	ETS 50, ETS 100: Body and AST enclosure in brass, connections in bi-metal (stainless steel/copper). ETS 12.5, ETS 25, ETS 250, ETS 400: Body and AST enclosure in brass, connections in copper.

Table: 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 ratio: 8.5:1. $(38/13)^2$:1
Nominal voltage	Constant voltage drive: 12 V dc -4% – 15%, 150 steps/sec.
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	ETS 12.5, ETS 25, ETS 50: 2625 [160 / -0] steps ETS 100: 3530 [160 / -0] steps ETS 250, ETS 400: 3810 [160 / -0] steps
Full travel time	ETS 12.5, ETS 25, ETS 50: 17 / 8.5 sec. (voltage / current) ETS 100: 23 / 11.5 sec. (voltage / current) ETS 250, ETS 400: 25.4 / 12.7 sec. (voltage / current)
Lifting height	ETS 12.5, ETS 25, ETS 50: 13 mm (0.5 inch) ETS 100: 16 mm (0.6 inch) ETS 250, ETS 400: 17.2 mm (0.7 inch)
Reference position	Overdriving against the full close position
Electrical connection	M12 connector
Compatible Danfoss controllers	Danfoss EKE 1A, EKE 1B, EKE 1C, MCX061V, MCX152V and more

NOTE:
Technical data also applicable for ETS 250 and ETS 400 oil free version.
Full lifetime of standard ETS can only be ensured if oil is present in the system.
Oil free applications: Special ETS 250 and ETS 400 are available for higher capacity and use ETS Colibri for smaller capacity.

Stepper motor switch sequence

	STEP	Coil I		Coil II		
		Red	Green	White	Black	
↑ CLOSING ↑	1	+	-	+	-	↓ OPENING ↓
	2	+	-	-	+	
	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.

⚠ **Warning:**
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.

Coolselector2®

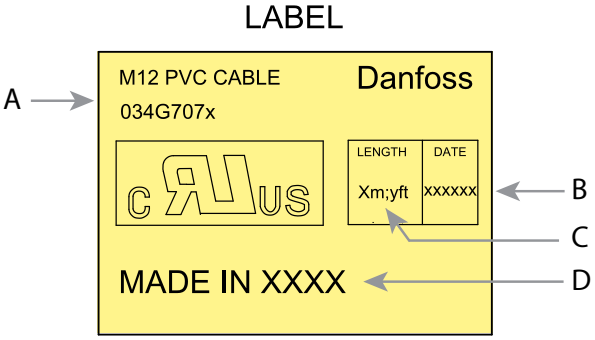
For easy and precise selection of valve, use Danfoss' CoolSelector² software. You can find the ETS valves on the group, "*Electronic expansion valves*".

You can download it from http://coolselector.danfoss.com

Specification

Jacket	PVC - black
Cable outer sheath	Oil - resistant
Waterproof rating	IP67
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

Identification

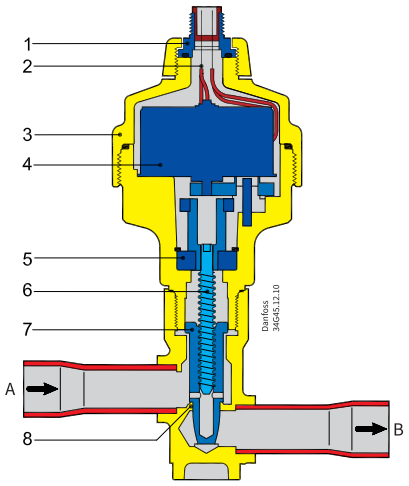


Related products

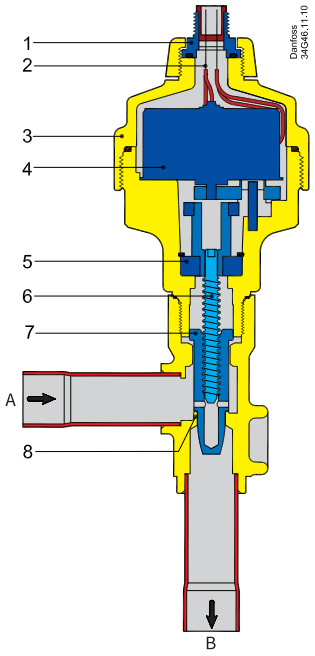
EKE 1A, EKE 1B, EKE 1C	EKS 221, ACCPBT, AKS 11/AKS 12	AKS 32R, AKS 33, NSK	AST-G
			Code no. 034G0013
Superheat controller	Temperature sensor	Pressure transmitter	Service driver

Design

Note: Flow direction from A to B refers to the normal flow

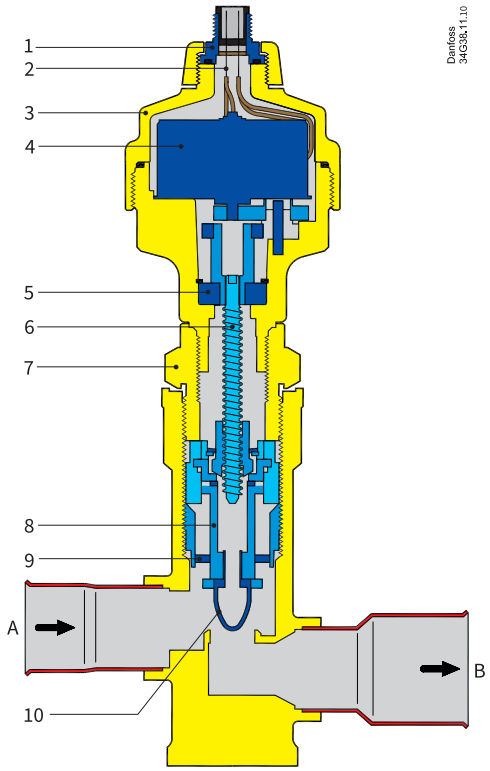


ETS 12.5, ETS 25 - straight



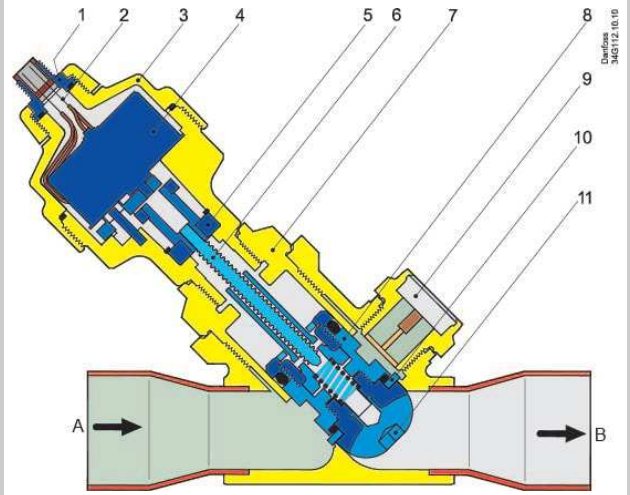
ETS 12.5, ETS 25 - angleway

1 M12 connection
2 Glass seal
3 AST motor housing
4 Stepper motor
5 Bearing
6 Spindle
7 Cone and lead nut
8 Valve seat



ETS 50 & 100

1 M12 connector
2 Glass seal
3 AST motor housing
4 Stepper motor
5 Bearing
6 Spindle
7 Top Nut
8 Valve piston
9 Valve seat
10 Valve cone



ETS 250 & 400

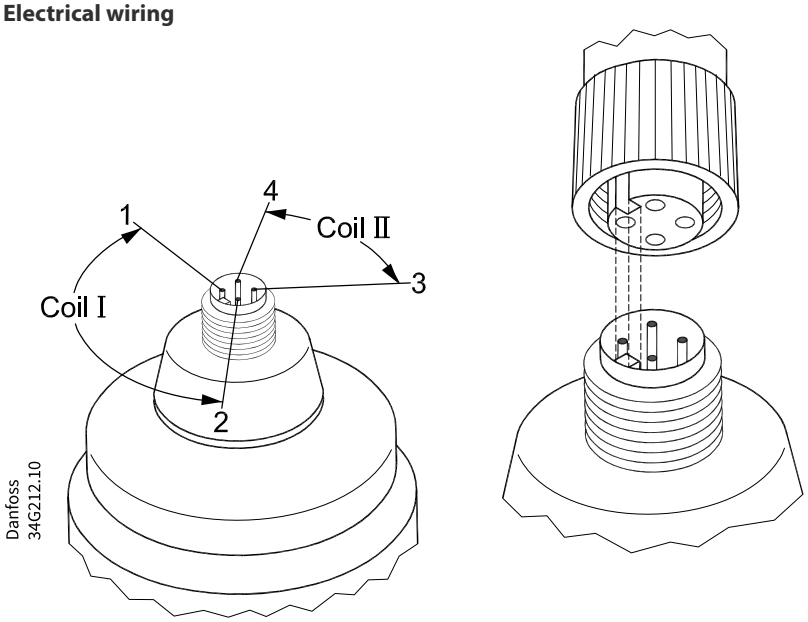
1 M12 connector
2 Glass seal
3 AST motor housing
4 Stepper motor
5 Bearing
6 Spindle
7 Top Nut
8 Valve piston
9 Sight glass with indicator
10 Valve seat
11 Valve cone

Sight glass and indicator

ETS 50, ETS 100, ETS 250 and ETS 400 are equipped with sight glass with moisture indicator. The physical position of the piston in the valve can be checked through the sight glass. It also helps to determine the flow direction of the refrigerant in the system (ETS 50 and ETS 100).

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.

Electrical wiring



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

Capacity

Step 1

Determine the correction factor for sub cooling Δt_{sub}

Correction factors for sub cooling Δt_{sub}

From the correction factors table (see below) a sub cooling of 15K / 27 °F, R410A corresponds to a factor of 1.15.

Connection factor	Δt_{sub}									
	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
	7.2 °F	18 °F	27 °F	36 °F	45 °F	54 °F	63 °F	72 °F	81 °F	90 °F
R22	1.00	1.06	1.11	1.15	1.20	1.25	1.30	1.35	1.39	1.44
R410A	1.00	1.08	**1.15**	1.21	1.27	1.33	1.39	1.45	1.50	1.56
R407C	1.00	1.08	1.14	1.21	1.27	1.33	1.39	1.45	1.51	1.57
R134a	1.00	1.08	1.13	1.19	1.25	1.31	1.37	1.42	1.48	1.54
R404A/R507	1.00	1.10	1.20	1.29	1.37	1.46	1.54	1.63	1.70	1.78

Step 2

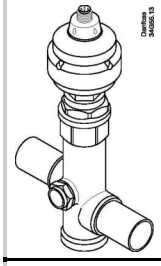
Corrected evaporator capacity is

Q_e (Corrected) = 500 kW/1.15 = 435 kW (124 TR)

Step 3

Now select the appropriate capacity table, R410A, and choose the column for an evaporating temperature of t_e = 10 °C / 50 °F.
Using the corrected evaporator capacity, select a valve that provides an equivalent or greater capacity at an acceptable pressure drop across the valve of 12.7 bar / 184 psi.

ETS 100 delivers 503.8 kW / 143 TR at 14 bar which is slightly higher than 12.7 bar / 184 psi pressure drop across the valve. Based on the required connection size of 11/8 in., the ETS 100 is the proper selection for this example.



	t_e[°C]	Rated capacity [kW] in the normal flow direction															
		ETS 50								ETS 100							
		Pressure drop Δp [bar]															
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
R410A	-40	173.7	224.6	255.1	275.5	289.5	299.2	305.7	309.6	323.5	418.1	475	512.9	539.1	557.2	569.2	576.4
	-30	169.3	220.8	252.3	273.5	288.3	298.6	305.7	310.1	315.2	411.2	469.7	509.2	536.8	556.1	569.2	577.5
	-20	163.3	214.9	246.8	268.6	284.1	295	302.5	307.4	304	400.1	459.6	500.2	528.9	549.2	563.3	572.4
	-10	155.9	206.8	238.8	260.9	276.6	287.9	295.8	301	290.3	385	444.6	485.7	515.1	536.1	550.8	560.5
	-5	151.7	202	233.7	255.8	271.6	283	291	296.4	282.5	376	435.2	476.3	505.8	527	541.9	551.8
	10	137.5	184.5	214.8	236.1	251.5	262.7	270.6	275.8	256	343.5	399.9	439.6	468.3	489.1	**503.8**	513.6

Step 4

ETS 100, 11/8 x 11/8 inch connection size: **Single pack code no. 034G0507.**

Note:

For easy and precise selection of valve, use Danfoss' CoolSelector software. You can download it from

http://www.danfoss.com/businessareas/refrigerationandairconditioning/ product+selection+tools+details/coolselector.htm

Correction for subcooling Δt_{sub}

The evaporator capacities used must be corrected if subcooling deviates from 4 K / 7.2 °F.

The corrected capacity can be obtained by dividing the required evaporator capacity by the correction factor. Selections can then be made from the tables below.

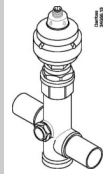
Correction factor	Δt_{sub}									
	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
	7.2 °F	18 °F	27 °F	36 °F	45 °F	54 °F	63 °F	72 °F	81 °F	90 °F
R22	1.00	1.06	1.11	1.15	1.20	1.25	1.30	1.35	1.39	1.44
R410A	1.00	1.08	1.15	1.21	1.27	1.33	1.39	1.45	1.50	1.56
R407C	1.00	1.08	1.14	1.21	1.27	1.33	1.39	1.45	1.51	1.57
R134a	1.00	1.08	1.13	1.19	1.25	1.31	1.37	1.42	1.48	1.54
R404A / R507	1.00	1.10	1.20	1.29	1.37	1.46	1.54	1.63	1.70	1.78

Note:
Insufficient subcooling can produce flash gas.

Rated Capacity [kW] [SI units]

	t_e [°C]	Rated capacity [kW] in the normal flow direction															
		ETS 12.5								ETS 25							
		Pressure drop Δp [bar]															
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
R410A	**-40**	46.4	60.0	68.1	73.5	77.3	79.9	81.6	82.6	95.3	123.2	140.0	151.1	158.8	164.1	167.7	169.8
	-30	45.2	59.0	67.3	73.0	76.9	79.7	81.6	82.7	92.9	121.2	138.4	150.0	158.1	163.8	167.7	170.1
	-20	43.6	57.4	65.9	71.7	75.8	78.7	80.7	82.0	89.6	117.9	135.4	147.4	155.8	161.8	165.9	168.6
	-10	41.6	55.2	63.7	69.6	73.8	76.8	78.9	80.3	85.5	113.5	131.0	143.1	151.7	157.9	162.2	165.0
	-5	40.5	53.9	62.4	68.3	72.5	75.5	77.6	79.0	83.3	110.8	128.2	140.3	149.0	155.2	159.6	162.5
	10	36.7	49.2	57.3	63.0	67.1	70.1	72.2	73.5	75.4	101.2	117.8	129.5	137.9	144.0	148.3	151.2
R407C	**-40**	42.1	52.8	58.6	62.0	63.9	64.9	65.0	64.6	86.5	108.5	120.5	127.5	131.4	133.3	133.6	132.7
	-30	41.9	53.0	59.2	63.0	65.2	66.3	66.7	66.4	86.0	109.0	121.7	129.4	133.9	136.3	137.1	136.6
	-20	41.2	52.8	59.3	63.4	65.8	67.2	67.8	67.8	84.7	108.5	121.9	130.2	135.3	138.2	139.4	139.3
	-10	40.2	52.0	58.8	63.1	65.9	67.5	68.3	68.4	82.6	106.9	120.9	129.8	135.4	138.7	140.3	140.6
	-5	39.6	51.4	58.4	62.8	65.6	67.3	68.2	68.4	81.3	105.7	120.0	129.0	134.9	138.4	140.2	140.6
	10	37.1	48.9	56.0	60.6	63.7	65.5	66.7	67.1	76.3	100.5	115.0	124.6	130.9	134.8	137.1	138.0
R22	**-40**	40.2	51.3	57.9	62.1	65.0	66.9	68.0	68.6	82.6	105.5	118.9	127.7	133.6	137.5	139.8	141.1
	-30	39.8	51.3	58.1	62.6	65.7	67.7	69.1	69.8	81.8	105.4	119.4	128.7	135.0	139.2	142.0	143.5
	-20	39.1	50.8	57.9	62.6	65.9	68.1	69.6	70.4	80.3	104.4	118.9	128.7	135.4	140.0	143.0	144.8
	-10	38.0	49.9	57.1	62.1	65.5	67.9	69.5	70.5	78.1	102.5	117.4	127.5	134.6	139.5	142.8	144.9
	-5	37.4	49.3	56.6	61.6	65.1	67.5	69.2	70.2	76.9	101.2	116.3	126.5	133.7	138.8	142.2	144.4
	10	35.2	46.8	54.1	59.2	62.9	65.4	67.2	68.4	72.3	96.2	111.3	121.7	129.2	134.5	138.2	140.6
R134a	**-40**	35.6	43.2	46.8	48.5	49.0	48.6	47.7	46.3	73.1	88.8	96.3	99.7	100.7	100.0	98.0	95.1
	-30	35.8	44.0	48.0	50.0	50.7	50.6	49.9	48.6	73.5	90.4	98.6	102.7	104.2	104.0	102.5	99.9
	-20	35.6	44.3	48.8	51.1	52.1	52.2	51.7	50.6	73.3	91.1	100.2	105.0	107.0	107.3	106.2	104.0
	-10	35.2	44.3	49.1	51.7	53.0	53.3	53.0	52.1	72.3	91.0	100.9	106.2	108.8	109.6	108.9	107.1
	-5	34.8	44.1	49.0	51.8	53.2	53.7	53.4	52.6	71.6	90.6	100.8	106.4	109.3	110.3	109.8	108.2
	10	33.3	42.8	48.1	51.2	53.0	53.7	53.8	53.2	68.3	88.0	98.9	105.3	108.9	110.4	110.5	109.4
R404A	**-40**	31.9	39.6	43.4	45.2	45.9	45.8	45.0	43.8	65.7	81.4	89.2	93.0	94.3	94.0	92.5	90.0
	-30	31.5	39.5	43.6	45.8	46.7	46.7	46.2	45.1	64.7	81.2	89.7	94.0	95.9	96.1	94.9	92.8
	-20	30.7	39.0	43.3	45.7	46.9	47.1	46.8	45.9	63.0	80.1	89.1	94.0	96.3	96.9	96.1	94.3
	-10	29.5	37.9	42.5	45.1	46.4	46.9	46.7	45.9	60.7	78.0	87.4	92.7	95.4	96.3	95.9	94.4
	-5	28.9	37.3	41.9	44.6	46.0	46.5	46.3	45.6	59.4	76.6	86.1	91.6	94.5	95.5	95.2	93.8
	10	26.5	34.6	39.2	41.9	43.5	44.1	44.1	43.5	54.4	71.0	80.5	86.2	89.3	90.6	90.6	89.4

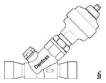
Rated Capacity [kW] [SI units]



	t_e [°C]	Rated capacity [kW] in the normal flow direction															
		ETS 50								ETS 100							
		Pressure drop Δp [bar]															
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
R410A	-40	173.7	224.6	255.1	275.5	289.5	299.2	305.7	309.6	323.5	418.1	475.0	512.9	539.1	557.2	569.2	576.4
	-30	169.3	220.8	252.3	273.5	288.3	298.6	305.7	310.1	315.2	411.2	469.7	509.2	536.8	556.1	569.2	577.5
	-20	163.3	214.9	246.8	268.6	284.1	295.0	302.5	307.4	304.0	400.1	459.6	500.2	528.9	549.2	563.3	572.4
	-10	155.9	206.8	238.8	260.9	276.6	287.9	295.8	301.0	290.3	385.0	444.6	485.7	515.1	536.1	550.8	560.5
	-5	151.7	202.0	233.7	255.8	271.6	283.0	291.0	296.4	282.5	376.0	435.2	476.3	505.8	527.0	541.9	551.8
	10	137.5	184.5	214.8	236.1	251.5	262.7	270.6	275.8	256.0	343.5	399.9	439.6	468.3	489.1	503.8	513. 6
R407C	-40	158.5	199.3	222.0	235.6	243.8	248.1	249.7	249.1	295.1	371.2	413.3	438.7	453.9	462.0	464.9	463.8
	-30	157.6	200.3	224.4	239.3	248.5	253.7	256.1	256.2	293.5	373.0	417.8	445.5	462.6	472.5	476.9	477.1
	-20	155.3	199.5	224.9	241.0	251.2	257.3	260.5	261.3	289.2	371.5	418.8	448.7	467.7	479.2	485.1	486.6
	-10	151.7	196.8	223.3	240.4	251.5	258.5	262.5	263.9	282.4	366.4	415.9	447.6	468.4	481.4	488.7	491.4
	-5	149.4	194.7	221.7	239.2	250.8	258.1	262.4	264.2	278.1	362.6	412.8	445.4	466.9	480.6	488.6	491.9
	10	140.7	185.7	213.2	231.6	244.0	252.3	257.4	259.9	261.9	345.7	397.0	431.2	454.4	469.8	479.2	483.9
R22	-40	151.5	193.5	218.1	234.2	245.1	252.2	256.6	258.8	282.1	360.2	406.2	436.2	456.3	469.6	477.7	481.9
	-30	149.9	193.2	218.9	236.0	247.6	255.4	260.4	263.1	279.1	359.7	407.6	439.4	460.9	475.5	484.8	489.9
	-20	147.1	191.3	218.0	235.9	248.2	256.6	262.2	265.5	273.9	356.2	405.9	439.2	462.1	477.9	488.2	494.3
	-10	143.2	187.8	215.2	233.8	246.7	255.7	261.8	265.6	266.6	349.7	400.8	435.3	459.4	476.2	487.5	494.5
	-5	140.8	185.5	213.1	231.9	245.1	254.4	260.7	264.6	262.3	345.4	396.8	431.8	456.4	473.7	485.4	492.8
	10	132.4	176.2	203.9	223.0	236.7	246.5	253.2	257.6	246.5	328.1	379.6	415.3	440.8	458.9	471.5	479.7
R134a	-40	133.1	161.8	175.4	181.6	183.4	182.1	178.6	173.3	247.8	301.3	326.6	338.2	341.5	339.1	332.5	322.6
	-30	133.9	164.7	179.7	187.1	189.9	189.5	186.7	182.1	249.3	306.6	334.6	348.5	353.6	352.8	347.6	339.0
	-20	133.4	166.1	182.6	191.2	195.0	195.4	193.4	189.5	248.4	309.2	340.0	356.0	363.1	363.9	360.1	352.8
	-10	131.7	165.9	183.7	193.5	198.3	199.6	198.3	195.1	245.2	308.8	342.1	360.3	369.2	371.6	369.3	363.3
	-5	130.3	165.1	183.6	193.9	199.2	200.9	200.0	197.1	242.6	307.4	341.9	361.1	370.8	374.1	372.4	367.0
	10	124.5	160.3	180.2	191.9	198.3	201.2	201.3	199.3	231.8	298.5	335.5	357.2	369.3	374.6	374.8	371.1
R404A	-40	119.8	148.6	162.8	169.8	172.3	171.9	169.2	164.7	223.0	276.6	303.1	316.1	320.9	320.0	315.0	306.7
	-30	118.0	148.2	163.7	171.7	175.2	175.6	173.6	169.8	219.7	276.0	304.7	319.7	326.2	326.9	323.2	316.1
	-20	115.0	146.1	162.6	171.6	176.0	177.1	175.7	172.5	214.0	272.1	302.8	319.6	327.6	329.7	327.2	321.3
	-10	110.8	142.3	159.5	169.3	174.4	176.1	175.4	172.7	206.3	265.0	297.1	315.2	324.6	327.9	326.6	321.5
	-5	108.3	139.8	157.2	167.3	172.6	174.6	174.1	171.7	201.7	260.3	292.7	311.4	321.4	325.1	324.2	319.7
	10	99.4	129.7	147.1	157.5	163.3	165.8	165.8	163.7	185.0	241.6	273.9	293.2	304.0	308.7	308.6	304.8

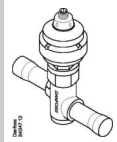
The capacities stated in the tables are for the normal flow direction. For ETS 50 and 100 specifically, the capacity in reverse flow direction varies between 90% and 125% of the capacity in normal flow direction.

Rated Capacity [kW] [SI units]

	t_e [°C]	Rated capacity [kW] in the normal flow direction															
		ETS 250								ETS 400							
		Pressure drop Δp [bar]															
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
R407C	-40	811	1017	1129	1195	1232	1249	1252	1244	1294	1622	1801	1905	1964	1992	1997	1984
	-30	806	1022	1141	1213	1255	1277	1284	1280	1286	1629	1820	1934	2002	2037	2049	2041
	-20	794	1017	1143	1220	1268	1295	1306	1305	1266	1621	1823	1947	2023	2065	2083	2082
	-10	774	1002	1133	1216	1269	1300	1315	1317	1235	1598	1808	1940	2024	2073	2097	2101
	-5	762	990	1124	1209	1264	1297	1314	1318	1215	1580	1793	1929	2016	2068	2095	2102
	10	715	941	1078	1167	1226	1264	1285	1293	1141	1502	1719	1862	1956	2016	2049	2062
R22	-40	779	995	1122	1205	1261	1297	1320	1331	1243	1587	1790	1922	2011	2069	2105	2123
	-30	771	994	1126	1214	1273	1314	1339	1353	1230	1585	1796	1936	2031	2095	2136	2159
	-20	757	984	1121	1213	1277	1320	1349	1366	1207	1569	1789	1935	2036	2106	2151	2178
	-10	737	966	1107	1202	1269	1315	1347	1366	1175	1541	1766	1918	2024	2098	2148	2179
	-5	724	954	1096	1193	1261	1309	1341	1361	1156	1522	1748	1903	2011	2087	2139	2171
	10	681	906	1049	1147	1218	1268	1303	1325	1086	1446	1673	1830	1942	2022	2078	2114
R134a	-40	684	832	902	934	943	937	919	891	1092	1328	1439	1490	1505	1494	1465	1422
	-30	688	847	924	963	977	975	960	937	1098	1351	1474	1535	1558	1555	1532	1494
	-20	686	854	939	983	1003	1005	995	975	1094	1362	1498	1569	1600	1603	1587	1555
	-10	677	853	945	995	1020	1027	1020	1003	1080	1360	1507	1587	1627	1637	1627	1600
	-5	670	849	944	997	1024	1033	1029	1014	1069	1354	1506	1591	1634	1648	1641	1617
	10	640	824	927	987	1020	1035	1035	1025	1021	1315	1478	1574	1627	1650	1651	1635
R404A	-40	615	763	836	871	884	881	867	844	981	1217	1333	1390	1410	1406	1383	1346
	-30	606	761	840	881	899	900	890	870	967	1214	1340	1406	1434	1436	1419	1387
	-20	591	750	835	881	903	908	901	884	942	1197	1332	1405	1440	1448	1437	1410
	-10	569	731	819	869	894	903	899	884	908	1166	1306	1386	1426	1440	1433	1411
	-5	556	718	807	858	885	895	892	879	887	1145	1287	1369	1412	1428	1423	1402
	10	510	666	755	807	837	849	849	838	814	1062	1204	1288	1335	1355	1354	1336

Rated Capacity [TR]

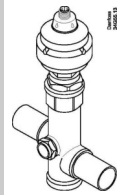
(TR = ton of refrigeration)



	t_e [°F]	Rated capacity [TR] in the normal flow direction															
		ETS 12.5								ETS 25							
		Pressure drop Δp [psi]															
		40	60	80	100	125	150	175	200	40	60	80	100	125	150	175	200
R410A	-40	14.9	17.2	18.9	20.1	21.3	22.1	22.7	23.2	30.7	35.5	38.8	41.4	43.7	45.5	46.7	47.6
	-20	14.6	16.9	18.6	19.9	21.1	22.0	22.7	23.1	29.9	34.8	38.3	40.9	43.4	45.2	46.6	47.6
	0	14.0	16.4	18.1	19.4	20.7	21.6	22.3	22.8	28.8	33.7	37.2	39.9	42.5	44.4	45.9	46.9
	20	13.3	15.7	17.4	18.7	20.0	20.9	21.6	22.2	27.4	32.2	35.7	38.4	41.0	43.0	44.5	45.5
	40	12.5	14.7	16.4	17.7	18.9	19.9	20.6	21.1	25.7	30.3	33.7	36.4	38.9	40.9	42.3	43.4
	50	12.0	14.2	15.8	17.1	18.3	19.2	19.9	20.5	24.7	29.2	32.5	35.1	37.6	39.6	41.0	42.1
R407C	-40	13.4	15.2	16.3	17.2	17.8	18.2	18.4	18.5	27.5	31.2	33.6	35.3	36.7	37.5	37.9	38.0
	-20	13.4	15.2	16.5	17.4	18.2	18.6	18.9	19.0	27.5	31.3	33.9	35.8	37.3	38.3	38.8	39.1
	0	13.2	15.1	16.5	17.4	18.3	18.8	19.2	19.3	27.1	31.1	33.9	35.9	37.6	38.7	39.4	39.7
	20	12.8	14.8	16.3	17.3	18.2	18.8	19.2	19.4	26.4	30.5	33.4	35.5	37.4	38.6	39.4	39.9
	40	12.4	14.4	15.8	16.9	17.8	18.5	18.9	19.2	25.4	29.5	32.5	34.7	36.6	38.0	38.9	39.4
	50	12.1	14.1	15.5	16.6	17.5	18.2	18.7	18.9	24.8	28.9	31.9	34.1	36.1	37.4	38.4	38.9
R22	-40	12.9	14.8	16.1	17.1	18.0	18.6	19.0	19.3	26.5	30.3	33.1	35.1	36.9	38.2	39.1	39.7
	-20	12.8	14.7	16.1	17.2	18.1	18.8	19.3	19.6	26.3	30.3	33.1	35.3	37.2	38.7	39.7	40.4
	0	12.6	14.6	16.0	17.1	18.1	18.8	19.4	19.8	25.8	29.9	32.9	35.1	37.2	38.7	39.8	40.6
	20	12.2	14.2	15.7	16.8	17.9	18.7	19.3	19.7	25.1	29.3	32.3	34.6	36.8	38.4	39.6	40.4
	40	11.7	13.8	15.3	16.4	17.5	18.3	18.9	19.3	24.1	38.3	31.4	33.7	35.9	37.6	38.9	39.7
	50	11.5	13.5	15.0	16.1	17.2	18.0	18.6	19.1	23.6	27.7	30.8	33.1	35.4	37.4	38.3	39.2
R134a	-40	11.2	12.4	13.1	13.6	13.9	13.9	13.8	13.6	22.9	25.5	27.0	27.9	28.5	28.6	28.4	27.9
	-20	11.3	12.6	13.5	14.0	14.3	14.5	14.5	14.3	23.2	26.0	27.7	28.8	29.5	29.8	29.7	29.3
	0	11.3	12.7	13.7	14.3	14.7	14.9	14.9	14.8	23.2	26.2	28.1	29.3	30.2	30.6	30.7	30.4
	20	11.2	12.7	13.7	14.4	14.9	15.1	15.2	15.2	22.9	26.1	28.1	29.5	30.6	31.1	31.3	31.2
	40	10.9	12.5	13.5	14.3	14.8	15.2	15.3	15.3	22.4	25.6	27.8	29.3	30.5	31.2	31.5	31.5
	50	10.7	12.3	13.4	14.1	14.8	15.3	15.1	15.3	22.0	25.3	27.5	29.1	30.3	31.1	31.4	31.4
R404A	-40	10.1	11.4	12.1	12.6	12.9	13.1	13.0	12.8	20.8	23.4	25.0	25.9	26.6	26.8	26.7	26.4
	-20	10.0	11.3	12.2	12.7	13.1	13.3	13.3	13.2	20.6	23.3	25.0	26.2	27.0	27.3	27.4	27.1
	0	9.8	11.1	12.0	12.6	13.1	13.4	13.4	13.3	20.0	22.9	24.8	26.0	27.0	27.4	27.5	27.4
	20	9.4	10.8	11.7	12.4	12.9	13.2	13.3	13.2	19.3	22.2	24.1	25.4	26.5	27.0	27.3	27.2
	40	8.9	10.3	11.2	11.9	12.4	12.7	12.9	12.8	18.2	21.1	23.0	24.4	25.5	26.1	26.4	26.4
	50	8.6	9.9	10.9	11.5	12.1	12.4	12.5	12.5	17.6	20.4	22.4	23.7	24.9	25.5	25.8	25.8

Rated Capacity [TR]

(TR = ton of refrigeration)



	t_e [°F]	Rated capacity [TR] in the normal flow direction															
		ETS 50								ETS 100							
		Pressure drop Δp [psi]															
		40	60	80	100	125	150	175	200	40	60	80	100	125	150	175	200
R410A	-40	55.9	64.6	70.8	75.4	79.7	82.9	85.2	86.8	104.2	120.3	131.8	140.4	148.5	154.4	158.6	161.6
	-20	54.6	63.4	69.8	74.6	79.1	82.5	85.0	86.7	101.6	118.0	129.9	138.9	147.4	153.6	158.2	161.5
	0	52.6	61.4	67.9	72.8	77.5	81.0	83.6	85.5	97.8	114.3	126.4	135.6	144.3	150.9	155.7	159.2
	20	49.9	58.7	65.1	70.1	74.8	78.4	81.1	83.1	93.0	109.2	121.2	130.4	139.3	146.0	151.0	154.6
	40	46.8	55.2	61.4	66.3	71.0	74.6	77.2	79.2	87.1	102.7	114.4	123.5	132.2	138.8	143.8	147.5
	50	45.0	53.2	59.3	64.1	68.7	72.2	74.8	76.8	83.8	99.0	110.4	119.3	127.8	134.4	139.3	142.9
R407C	-40	50.4	57.3	61.9	65.1	67.9	69.6	70.6	71.0	93.9	106.6	115.2	121.2	126.4	129.6	131.5	132.2
	-20	50.4	57.6	62.5	66.0	69.1	71.1	72.4	73.0	93.8	107.2	116.4	122.9	128.7	132.4	134.7	135.9
	0	49.7	57.2	62.5	66.3	69.6	71.9	73.4	74.2	92.6	106.6	116.3	123.4	129.6	133.9	136.6	138.2
	20	48.5	56.2	61.7	65.7	69.3	71.8	73.5	74.6	90.4	104.7	114.9	122.3	129.1	133.8	136.9	138.8
	40	46.8	54.6	60.1	64.3	68.1	70.8	72.7	73.9	87.1	101.6	111.9	119.7	126.8	131.8	135.3	137.5
	50	45.7	53.5	59.0	63.2	67.1	69.9	71.8	73.1	85.2	99.5	109.9	117.7	125.0	130.1	133.7	136.1
R22	-40	48.5	55.6	60.6	64.3	67.7	70.1	71.8	72.9	90.3	103.6	112.9	119.8	126.1	130.5	133.7	135.7
	-20	48.1	55.5	60.8	64.7	68.3	70.9	72.8	74.0	89.6	103.4	113.1	120.4	127.2	132.0	135.5	137.8
	0	47.3	54.9	60.3	64.4	68.2	71.0	73.1	74.5	88.1	102.2	112.3	119.9	127.1	132.3	136.0	138.7
	20	46.0	53.6	59.2	63.5	67.5	70.4	72.6	74.1	85.6	99.9	110.3	118.1	125.6	131.1	135.1	138.0
	40	44.2	51.9	57.5	61.8	65.9	68.9	71.2	72.9	82.3	96.6	107.0	115.0	122.7	128.4	132.6	135.7
	50	43.2	50.8	56.4	60.7	64.8	67.9	70.2	71.9	80.4	94.5	104.9	112.9	120.6	126.4	130.7	133.8
R134a	-40	41.8	46.4	49.2	50.9	51.9	52.2	51.8	50.9	77.7	86.4	91.6	94.7	96.7	97.1	96.4	94.8
	-20	42.3	47.3	50.4	52.4	53.8	54.2	54.1	53.4	78.7	88.1	93.9	97.6	100.1	101.0	100.7	99.5
	0	42.3	47.7	51.1	53.4	55.1	55.8	55.9	55.5	78.7	88.8	95.2	99.4	102.5	103.9	104.1	103.3
	20	41.8	47.5	51.3	53.8	55.7	56.7	57.0	56.8	77.8	88.5	95.4	100.1	103.7	105.6	106.2	105.8
	40	40.8	46.7	50.7	53.4	55.6	56.9	57.4	57.4	75.9	87.0	94.4	99.5	103.6	105.9	106.9	106.8
	50	40.1	46.1	50.1	53.0	55.3	56.6	57.2	57.3	74.6	85.8	93.4	98.6	102.9	105.4	106.6	106.7
R404A	-40	37.9	42.6	45.6	47.4	48.6	49.0	48.9	48.2	70.6	79.4	84.8	88.2	90.5	91.3	91.0	89.8
	–20	37.5	42.5	45.7	47.8	49.3	50.0	50.0	49.6	69.9	79.2	85.1	89.0	91.8	93.0	93.1	92.3
	0	36.6	41.8	45.2	47.5	49.2	50.1	50.4	50.1	68.1	77.8	84.2	88.4	91.7	93.3	93.8	93.3
	20	35.2	40.5	44.0	46.4	48.4	49.4	49.8	49.7	65.5	75.3	81.9	86.4	90.1	92.0	92.8	92.6
	40	33.3	38.5	42.1	44.6	46.6	47.8	48.3	48.3	62.0	71.7	78.4	83.0	86.8	89.0	90.0	89.9
	50	32.2	37.3	40.9	43.4	45.4	46.6	47.2	47.2	59.9	69.5	76.1	80.7	84.6	86.8	87.8	87.8

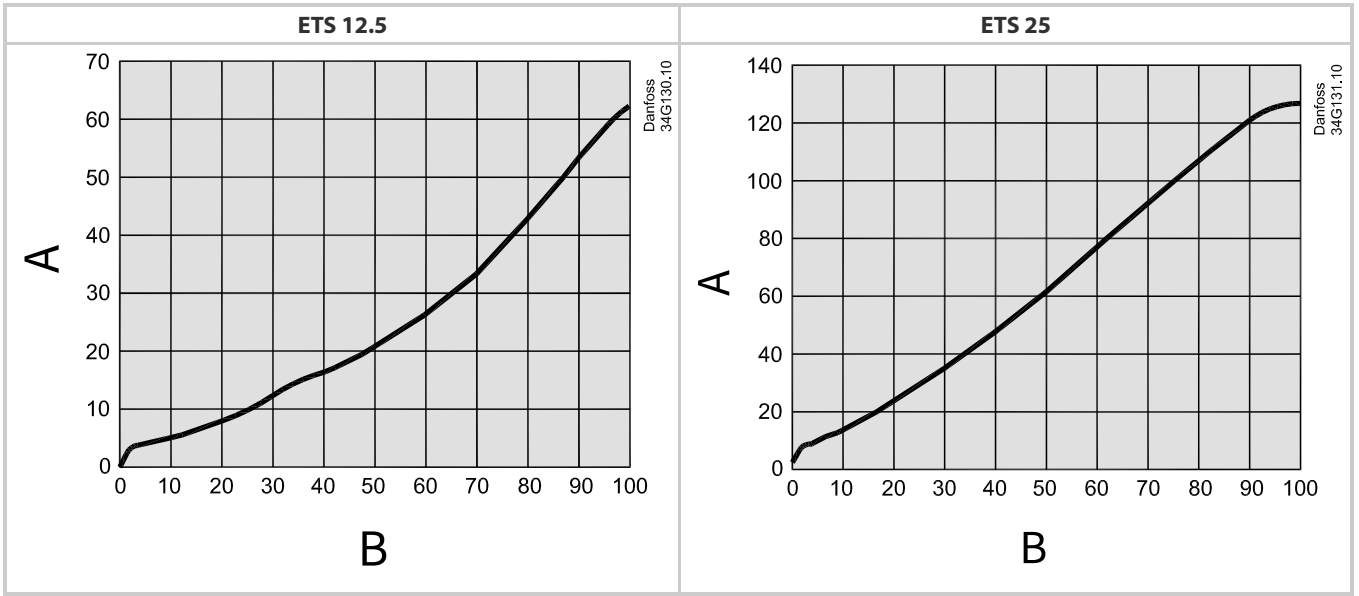
The capacities stated in the tables are for the normal flow direction. For ETS 50 and 100 specifically, the capacity in reverse flow direction varies between 90% and 125% of the capacity in normal flow direction.

Rated Capacity [TR]

(TR = ton of refrigeration)

	t_e [°F]	Rated capacity [TR] in the normal flow direction															
		ETS 250								ETS 400							
		Pressure drop Δp [psi]															
		40	60	80	100	125	150	175	200	40	60	80	100	125	150	175	200
R407C	-40	258	292	315	331	344	351	355	356	411	466	502	527	548	561	567	568
	-20	257	293	318	335	350	359	364	366	410	468	507	535	558	573	581	584
	0	254	292	317	336	352	363	369	372	405	465	506	536	562	579	589	594
	20	247	286	313	333	350	362	369	374	395	456	499	531	559	577	589	596
	40	238	277	305	325	343	356	364	369	380	442	486	518	548	568	581	589
	50	232	271	299	319	338	351	360	365	371	432	476	509	539	560	574	582
R22	-40	250	286	312	331	348	361	369	375	398	456	497	528	556	575	589	598
	-20	248	286	313	333	351	365	374	381	395	455	499	531	560	582	597	607
	0	243	282	310	331	351	365	376	383	388	450	495	528	560	583	599	611
	20	236	276	305	326	347	362	373	381	377	440	486	521	553	578	595	608
	40	227	267	296	318	339	355	366	375	363	425	471	507	540	566	584	598
	50	222	261	290	312	333	349	361	370	354	416	462	498	531	557	576	590
R134a	-40	215	239	253	262	267	268	266	262	342	381	404	417	426	428	425	418
	-20	217	243	259	269	276	279	278	275	347	388	414	430	441	445	444	439
	0	217	245	263	275	283	287	288	285	347	391	420	438	452	458	459	455
	20	215	244	264	276	286	292	293	292	343	390	420	441	457	465	468	466
	40	210	240	261	275	286	292	295	295	334	383	416	438	456	466	471	470
	50	206	237	258	272	284	291	294	295	329	378	411	434	453	464	469	470
R404A	-40	195	219	234	243	249	252	251	247	311	349	373	388	398	401	400	394
	-20	193	218	235	245	253	256	256	254	307	348	374	391	403	409	409	405
	0	188	215	232	244	253	257	258	257	300	342	370	389	403	410	412	410
	20	181	208	226	238	248	253	256	255	288	331	360	380	396	404	408	406
	40	171	198	216	229	239	245	248	247	273	315	344	365	381	391	395	395
	50	165	192	210	222	233	239	242	242	263	306	334	355	371	381	385	385

Normal flow direction:

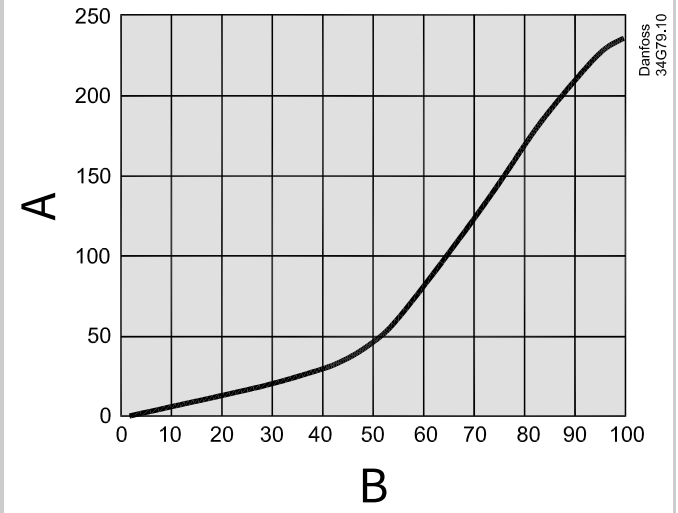


Note:

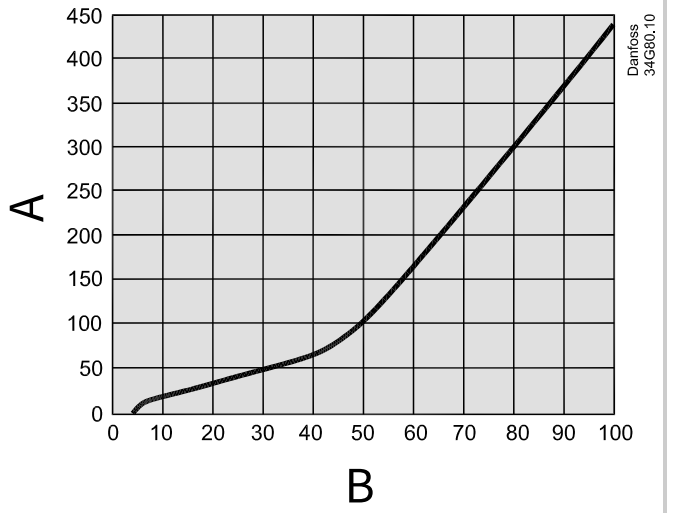
A = Q_0 [kW]

B = Opening [%]

ETS 50

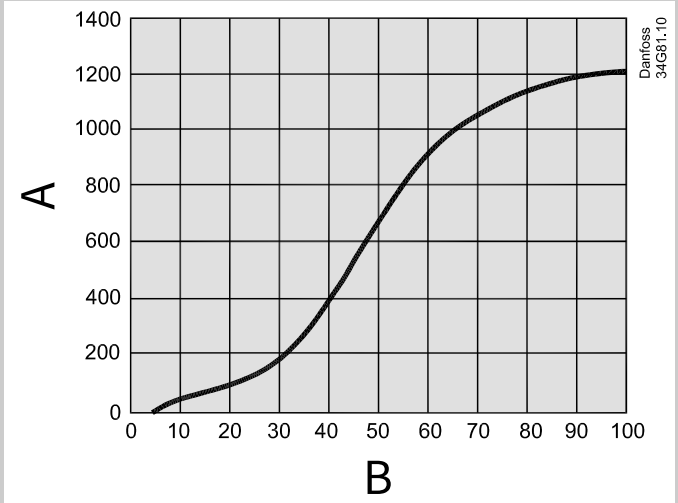


ETS 100

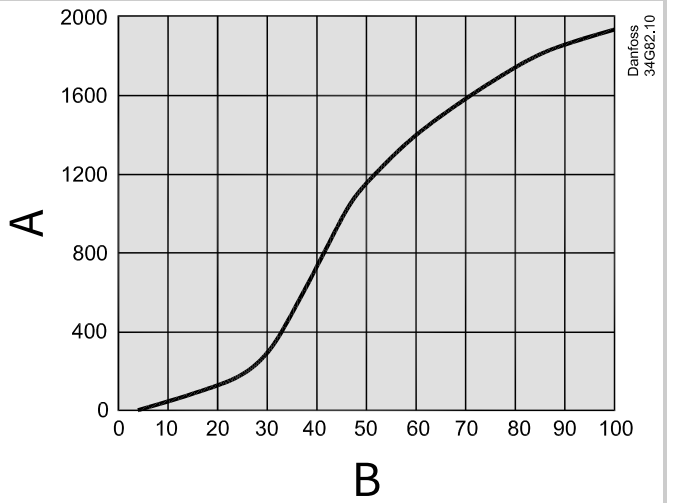


Note:
A = Q_0 [kW]
B = Opening [%]

ETS 250



ETS 400



Note:
A = Q_0 [kW]
B = Opening [%]

Capacity based on: R407C
T_e = 5 °C / 41 °F
T_c = 32 °C / 89.6 °F
T_l = 28 °C / 82.4 °F

Performance and environmental conditions

Valve sizing

For optimum performance, it is important to correct the evaporator capacity. Selection is also dependent on an acceptable pressure drop across the valve. The evaporator capacity must be corrected if sub cooling deviates from 4K / 7.2 °F. In order to select the correct size of ETS you will need the following information:

Refrigerant: R410A, R407C, R404A, R507, R134a, R22, R1234ze

- Evaporator capacity Qe in [kW] or [TR]
- Evaporating temperature te in [°C] or [°F]
- Condensing temperature tc in [°C] or [°F]
- Max. acceptable pressure drop in the ETS valve in [bar] or [psi] Δp
- Sub cooling Δt_{sub}
- Connection size

Valve selection

Example

When selecting the valve it may be necessary to apply a correction factor to the actual evaporator capacity. This correction factor is required when system conditions are different from table conditions. Selection also depends on having an acceptable pressure drop across the valve. The following example illustrates correct selection of the valve.

Refrigerant: R410A

- Evaporator capacity: Q_e = 500 kW / 143 TR
- Condensing temperature: t_c = 25 °C / 77 °F
- Condensing pressure: p_c = 23 bar / 330 psig
- Evaporating temperature: t_e = +10 °C / 50 °F
- Evaporating pressure: p_e = 9.8 bar / 142 psig
- Liquid Line Loss: p_l = 0.5 bar (estimate)
- Max. Pressure drop in the valve: Δp = pc - pl - pe = 23 - 0.5 - 9.8 = 12.7 bar / 184 psi
- Connection size: 1 ⅛ × 1 ⅛ inch

Dimensions

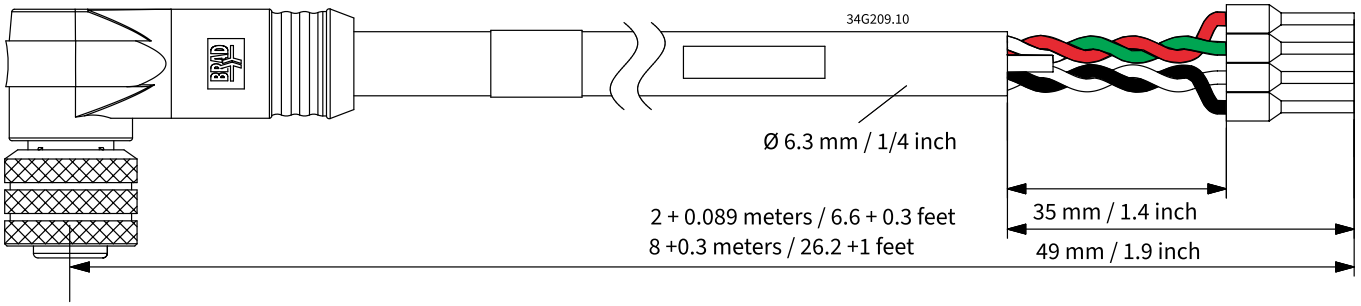
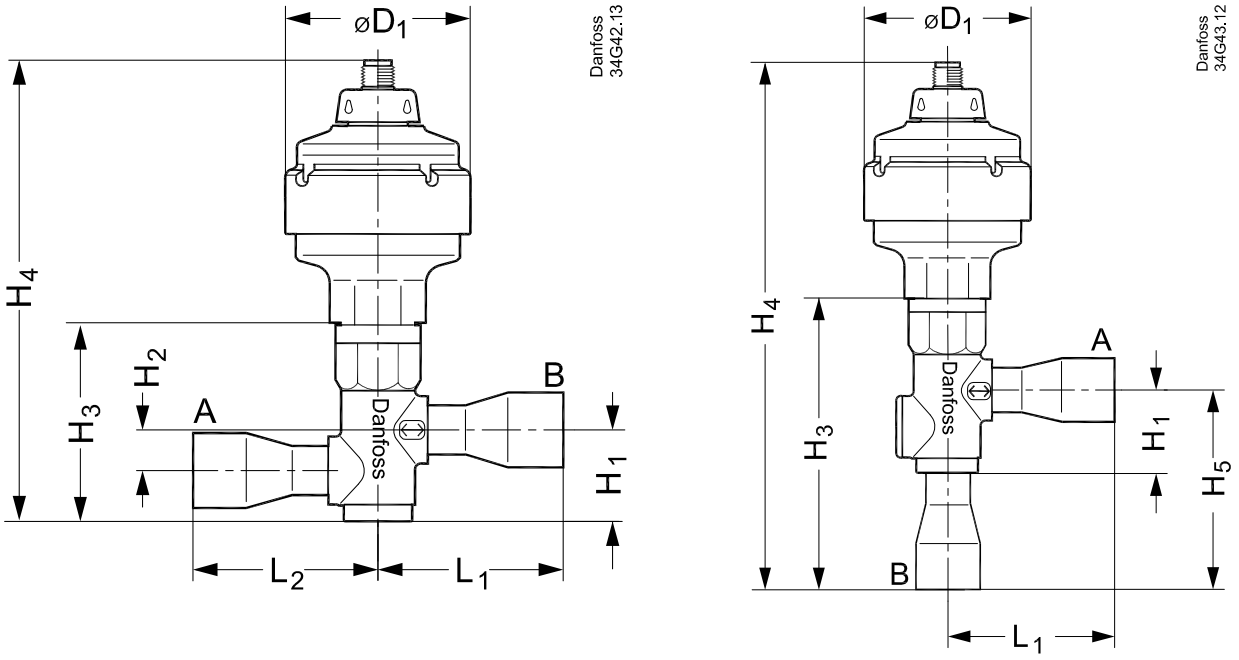
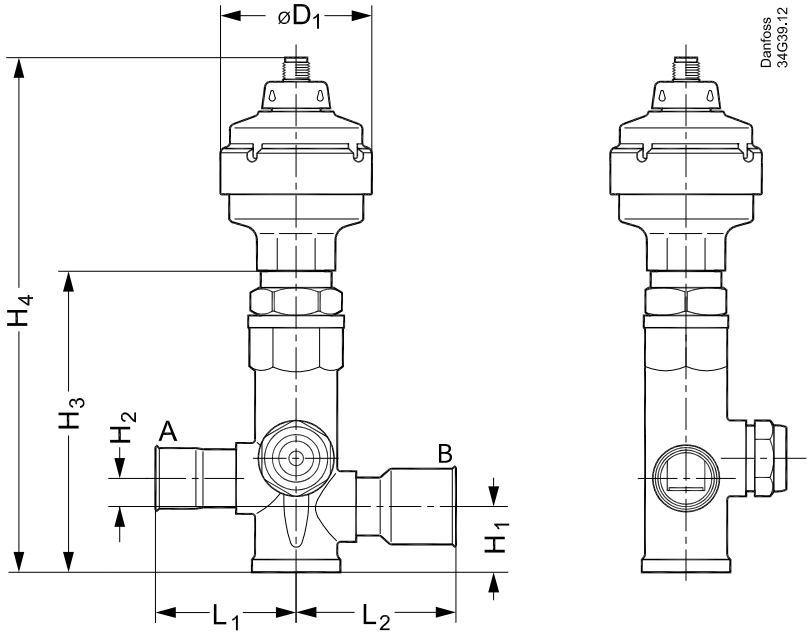


Figure: ETS 12.5 and ETS 25



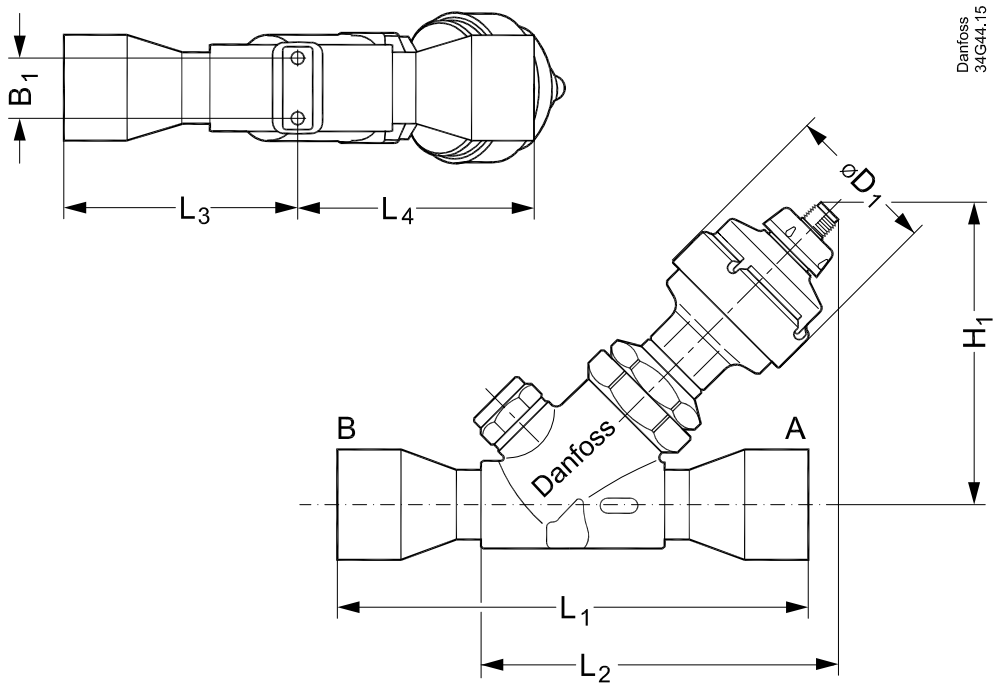
Type	Connections		H1		H2		H3		H4		H5		L1		L2		øD1		Net weight	
	ODF × ODF (A × B)		[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[kg]	[lb.]
	[in]	[mm]																		
ETS 12.5 and 25 straight	½ x ½	12 × 12	1.2	30	0.5	13	2.5	64	5.9	150	–	–	2.4	60	2.4	60	2.4	60	0.7	1.5
	⅝ x ⅝	16 × 16	1.2	30	0.5	13	2.5	64	5.9	150	–	–	2.4	60	2.4	60	2.4	60	0.7	1.5
	⅞ x ⅞	22 × 22	1.2	30	0.5	13	2.5	64	5.9	150	–	–	2.4	60	2.4	60	2.4	60	0.7	1.5
ETS 12.5 and 25 angle	½ x ½	12 × 12	1.2	30	–	–	2.5	64	7.6	194	2.9	74	2.4	60	–	–	2.4	60	0.7	1.5
	⅝ x ⅝	16 × 16	1.2	30	–	–	2.5	64	7.6	194	2.9	74	2.4	60	–	–	2.4	60	0.7	1.5
	⅞ x ⅞	22 × 22	1.2	30	–	–	2.5	64	7.6	194	2.9	74	2.4	60	–	–	2.4	60	0.7	1.5

Figure: ETS 50 and ETS 100



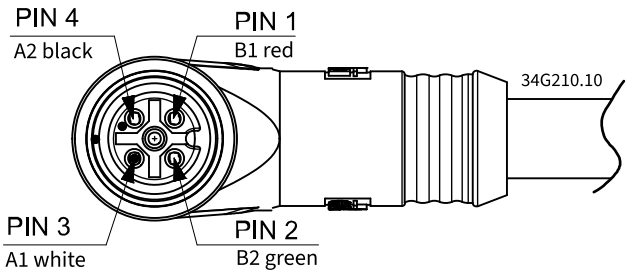
Type	Connections		H1		H2		H3		H4		L1		L2		øD1		Net weight	
	ODF × ODF (A × B)		[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[kg]	[lb.]
	[in]	[mm]																
ETS 50	⅞ x ⅞	22 × 22	1.0	26.2	0.5	13.0	4.7	118.0	8.1	205.0	2.2	56.0	2.2	56.0	2.4	60.0	1.5	3.3
	⅞ x 1 ⅛	22 × 28	1.0	26.2	0.5	13.0	4.7	118.0	8.1	205.0	2.2	56.0	2.5	63.0	2.4	60.0	1.5	3.3
	1 ⅛ x 1 ⅛	28 × 28	1.0	26.2	0.5	13.0	4.7	118.0	8.1	205.0	2.5	63.0	2.5	63.0	2.4	60.0	1.5	3.3
	1 ⅛ x 1 ⅜	28 × 35	1.0	26.2	0.5	13.0	4.7	118.0	8.1	205.0	2.5	63.0	2.9	74.0	2.4	60.0	1.5	3.3
ETS 100	1 ⅛ x 1 ⅛	28 × 28	1.2	30.0	0.7	17.0	5.0	127.0	8.4	214.0	2.6	66.0	2.6	66.0	2.4	60.0	1.7	3.7
	1 ⅛ x 1 ⅜	28 × 35	1.2	30.0	0.7	17.0	5.0	127.0	8.4	214.0	2.6	66.0	3.0	76.0	2.4	60.0	1.7	3.7
	1 ⅜ x 1 ⅜	35 × 35	1.2	30.0	0.7	17.0	5.0	127.0	8.4	214.0	3.0	76.0	3.0	76.0	2.4	60.0	1.7	3.7
	1 ⅝ x 1 ⅝	–	1.2	30.0	0.7	17.0	5.0	127.0	8.4	214.0	3.3	84.0	3.3	84.0	2.4	60.0	1.7	3.7

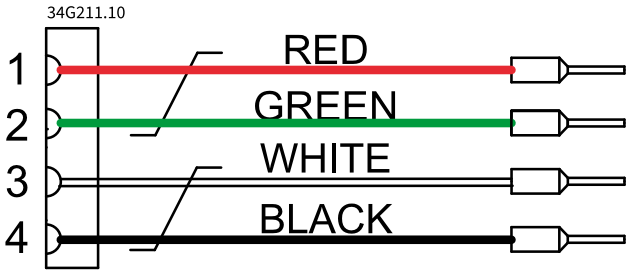
Figure: ETS 250 and ETS 400



Type	Connections		H1		L1		L2		L3		L4		øD1		B1		Net weight	
	ODF × ODF (A × B)		[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[in]	[mm]	[kg]	[lb.]
	[in]	[mm]																
ETS 250	1 1/8 x 1 1/8	28 × 28	4.7	120.0	6.7	168.5	5.6	143.0	3.3	83.0	3.4	85.5	2.4	60.0	0.95	24.0	1.9	4.2
	1 3/8 x 1 3/8	35 × 35	4.7	120.0	7.0	178.5	5.6	143.0	3.5	88.0	3.6	90.5	2.4	60.0	0.95	24.0	1.9	4.2
	1 5/8 x 1 5/8	–	4.7	120.0	7.4	188.5	5.6	143.0	3.7	93.0	3.8	95.5	2.4	60.0	0.95	24.0	1.9	4.2
	–	42 × 42	4.7	120.0	7.4	188.5	5.6	143.0	3.7	93.0	3.8	95.5	2.4	60.0	0.95	24.0	1.9	–
	2 1/8 x 2 1/8	–	4.7	120.0	8.1	204.0	5.6	143.0	4.0	101.0	4.1	103.0	2.4	60.0	0.95	24.0	1.9	4.2
ETS 400	1 5/8 x 1 5/8	–	4.8	121.0	8.0	203.0	5.7	144.5	3.9	99.0	4.1	104.0	2.4	60.0	0.95	24.0	2.2	4.9
	2 1/8 x 2 1/8	54 × 54	4.8	121.0	9.6	243.0	5.7	144.5	4.7	119.0	4.9	124.0	2.4	60.0	0.95	24.0	2.2	4.9

Connections





Accessories

M12 angle cable

- 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.

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When you click on the link you will be directed to the latest version of the 'Declaration of Conformity'. Products developed and sold before this date of issue conform to the directives/standards in force at the time of their sale.

Approval type	Title	Certification body	Approval topic
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UA Declaration	Danfoss UA 8481	Danfoss	UA RoHS
Mechanical Safety Certificate	UL MH7648	UL - Underwriters Laboratories inc.	
Pressure Safety Certificate	LLC CDC EURO-TYSK UA.TR.089.1015.02-22	LLC CDC EURO TYSK - Ukraine	PED, Pressure
UA Declaration	Danfoss UA 2023-01-10 Valves PL01 PL40	Danfoss	PED, Pressure
Manufacturer's Declaration	Danfoss MD-UK 034R9822.05	Danfoss	PED, Pressure, EU RoHS
Export Control Declaration	Electronic expansion Valve & Coil	Danfoss	
EU-UK Declaration	Danfoss EU-UK 034R9821.05	Danfoss	EMC, PED, Pressure

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