Explore our solutions
danfoss.com

Ultimate system efficiency and reliability

Electric expansion valves and stepper motor valve controllers for precise system flow control in HVAC-R applications.

Ecosystem around electric expansion valves and stepper motor valve controllers

Benefit from an entire Danfoss ecosystem of controllers, drivers, valves, sensors and programming tools to reduce complexity and total costs of ownership, and maximize your systems energy efficiency.

HVAC controllers
Alsmart® platform
and MCX series

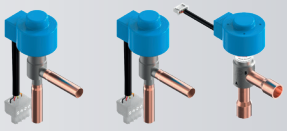
SH Controllers
and valve drivers
EKE100

Valve Driver only
EKF 1V and 2V

Temp. sensor
NTC & PT1000

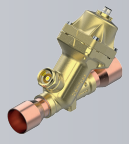
Pressure Sensor
Ratiometric, 4-20mA,
and 0-10V

The Ecosystem

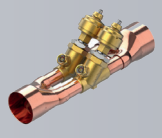


ETS 5M / ETS 5T / ETS 8M

ETS Colibri



ETS L series



ETS P Manifold

CCMT

Service cable
EKE 100

Koolkey
EKA 200*

Programming
KoolProg

Backup Power
EKE 2U

Power Supply
AK-PS

*EKE 100 operates with EKA 200 Koolkey

Your toolbox to make your system calculation, find a product data sheet and order.

Coolselector

Ref Tool

Low-GWP Tool

Troubleshooter

Explore our comprehensive range of Electronic Controllers and Valves

Beyond our electric expansion valves, Danfoss offers a wide array of controllers and valves designed to optimize your HVAC-R systems:

Our electronic controls form a complete system for monitoring and optimizing commercial and industrial refrigeration and air conditioning systems. Learn more about specific solutions like the EKE 347 Electronic Valve Controller and our Electronic Temperature Controls.

Alsmart® universal programmable controllers

- Modular controller platform for powerful HVAC application management to take your thermodynamic knowledge to the next level
- Unmatched hardware configuration and connectivity flexibility
- Easy programmable with Alsmart® Design programming tool
- Remote monitoring with the web-based Alsmart® Service Tool

EKE superheat controller

- Helps OEMs develop more efficient chillers, rooftops, heat pumps, CRAC units, cold rooms and food retail equipment faster to reduce development and operational costs
- Best-in-class adaptive superheat control for ultimate system accuracy and efficiency
- Increased system protection with fail safe operation
- EKE 100 can manage one or 2 bipolar stepper motor valves

EKE 2U backup power module

- Designed to enhance system reliability, EKE 2U supplies power to stepper motor controllers to close valves in case of power loss. This prevents from liquid migration to the compressor during power shortage
- Main features: fast charging, applicable to many controllers and valves

EKF stepper motor valve driver

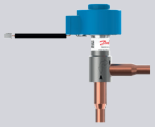
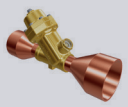
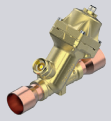
- Cost-competitive, robust, versatile and easy to configure stepper motor driver
- Appropriate for electric expansion valve management
- As well as suitable for Turbocor oil-free staging valves, for hot gas bypass and liquid or vapor injection
- Available for 1 or 2 valves and compatible with all models on the market

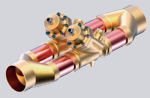
DST P110 pressure sensor, NTC temperature sensor

- Highly precise, providing a +/-1% Total Error Band accuracy across the application focused temperature range
- Custom calibration profiles can be adapted to suit application-specific requirements, supporting a more efficient superheat control

PT1000

- Temperature range from -50°C to 100°C
- Color coded cables for easy installation

		Electric Expansion Valves (stepper motor valves / motor valves)					
		 					
		ETS 5M and ETS 8M		ETS 6	ETS C	ETS L	
		• Low flow noise and operation noise • Optimized valve flow characteristics • Accurate valve control, also at low opening degrees • Bi-flow, with high performance in both flow directions		• Easy to install • Works with all common refrigerants • Compact and lightweight	• Precise control of liquid injection • Fast opening/closing time • Solenoid tight shut-off • Fully hermetic laser welded design • Compact, lightweight and in-line design • Oil-free and ATEX approved	• Precise positioning for optimal control of liquid injection • High quality manufacturing standard • Fine capacity regulation settings • High reliability and precision • Compatible with oil-free and high temperature applications	
Main applications	Chillers	Yes	Yes	Yes	Yes	Yes	Yes
	Heat pumps	Yes	Yes	Yes	Yes	Yes	Yes
	Close controls	Yes	Yes	Yes	Yes		
	Transport Refr.	Yes		Yes			
	Air Drier	Yes		Yes	Yes	Yes	Yes
	Food Retail						
	Cold Rooms	Yes	Yes	Yes	Yes	Yes	Yes
	Industrial Applic.					Yes	Yes
Technical specifications	Subtypes	ETS 5M: 07 • 10 • 13 • 17 • 20 • 24 • 25 • 30 • 35 • 40	ETS 8M: 40 • 45 • 55 • 65	ETS 6: 10 • 14 • 18 • 25 • 32 • 40	ETS C: 12C • 24C • 25C • 50C • 100C	ETS L: 175 • 250 • 400• 500	
	Capacity (in main applications)	8.9 - 41.0 kW (R410A) 2.5 - 11.6 TR (R410A)	60.0 - 114.2 kW (R410A) 17.1 - 32.5 TR (R410A)	2.7 - 40.2 kW (R407C) 0.77 - 11.4 TR (R407C)	91 - 635 kW (R410A) 26 - 183 TR (R410A)	10- 1000 (R1234ze)	
	Primary Refrigerants	R410A • R32 • R454B • R404A • R134a • R448A • R449A • R290	R410A • R32 • R454B • R404A • R448A . R449A • R290	R410A • R22 • R407C • R404A • R134a	R410A • R32 • R454B • R290 • R134a	R134a • R513A • R515B • R1234ze	
	Connections	ODM Solder [mm]	ODM /ODF Solder [mm]	ODF Solder [mm]	ODF Solder [in.] / [mm]	ODF Solder [in.] / [mm]	
	Principles	Unipolar/bipolar stepper (480 steps, 1 - 2 excitation)*	Unipolar/bipolar stepper motor (500 steps, 1 - 2 excitation)	Unipolar Stepper motor (480 steps, 1 - 2 excitation)	Bipolar stepper motor (600 steps)	Bipolar stepper motor (3810 steps)	
	Max. OPD	36 - 42 bar depending on orifice size	39 bar (A->B), 39 bar (B->A)	35 bar	40 bar	26 bar	
	Max. working pressure (PS)	49 bar	49 bar	47 bar	50 bar	37 bar	
	Media temp.	-40 - 80 °C	-30 - 70°C*	-30 - 70 °C	-40 - 120°C	-40 - 95 °C	
	Flow characteristics	Linear / S-curve	Linear / S-curve	Linear	Linear	Linear / S-curve	
	Approvals	CE • PED • CQC • UL (2025)	UL • CE • PED	UL • CE • PED • CQC	UL • CE • PED • CQC • ATEX	UL • CE • PED • CRN	
	IP rating	67	67	66	67	67	
Materials	Valve body	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Brass	
Accessories	Danfoss controllers/ drivers	EIM 336 • EKE 1x SH controllers and valves drivers • EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	EIM 336 • EKE 1x SH controllers and valves drivers • EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	EIM 336 • EKE 1x SH controllers and valves drivers• EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	EIM 336 • EKE 1x SH controllers and valves drivers• EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	EIM 336 • EKE 1x SH controllers and valves drivers• EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	
	Cables	0.7 m • 1 m • 1.5 m • 2.7 m • 4.0 m	2 m • 3 m • 6 m • 0.7m, 4.8m	0.7 m • 1.5 m • 3 m	Optional 2m - 12m	Optional 2m - 12m	

	Electric Expansion Valves (Pulse Width Modulation)		Electric Expansion Valves (stepper motor valves / motor valves) designed for R744 (CO_2)				
							
ETS P	AKV-P	AKV	ETS 5T	CCM	CCMT	CCMT light	ICMTS
• Compatible with oil free applications • Precise positioning for optimal control of liquid injection	• Supplied as parts programme with valve, coil and orifice • No need of adjustment • Allow a wide regulation range		• Ideal for high pressure transcritical systems (CCMT & ICMTS) or subcritical systems (CCM & CCMT) • Maintain optimal gas cooler pressure by controlled throttling of the gas from the gas cooler into the intermediate receiver (or evaporator) • Achieve optimal intermediate receiver pressure and higher system efficiency by controlled by-pass of the gas from the receiver into the compressor suction line				
Yes			Yes				
Yes			Yes				
			Yes				
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Yes	Yes				
				Yes	Yes	Yes	Yes
ETS 800P • ETS 1000P	AKV 10P0 • AKV 10P8	AKV 15 • AKV 20	ETS 5T: 08•10•14•18	CCM10 • CCM20 • CCM30 CCM 50 • CCM 40	CCMT 2 • CCMT 4 • CCMT 8	CCMT 3L, 5L, 8L, 10L	ICMTS 20 A33 • ICMTS 20A • ICMTS 20 B66 • ICMTS 20B • ICMTS 20C
1965-3458KW(R134a) 558-983TR(R134a)	0.4 - 33 kW 0.1 - 9.4 TR	0.6 - 530 kW (R404A) 0.17 - 151 TR (R404A)	4-19kW (R744)	10 - 3200 kW 2) 2.8 - 910 TR 2)	10 - 130 kW 1) 2.8 - 37 TR 1)	10 - 130 kW 1) 2.8 - 37 TR 1)	10 - 675 kW 1) 2.8 - 192 TR 1)
R134a • R513A • R515B • R1234ze	R744	R407C • R134a • R404A • R410a	R744	HFC • R744	HFC • R744	R744	HFC • R717 • R744
ODF Solder [in.] / [mm]	ODF Solder [in.] / [mm]	ODF Solder [in.] / [mm]	ODM [mm]	ODF Solder / Butt weld [in.]	ODF Solder / Butt weld [in.]	ODF Solder / Butt weld [in.] / Bi-metal	Butt weld [mm]
Bipolar stepper motor (3810 steps)	Direct, servo, pulse-width modulation	Servo, Pulse-width modulation	Unipolar/bipolar stepper (480 steps, 1 - 2 excitation)*	Electronic stepper motor (3530 steps)	Electronic stepper motor (1100 steps)	Electronic stepper motor (210 steps)	Electronic stepper motor (250 steps)
26 bar	18-35 bar	18 - 22 bar	120 bar(g)	50 bar	90 bar	90 bar	90 bar
37 bar	90 bar	28 - 46 bar	140 bar	90 bar	140 bar	140 bar / 2030 psig Steel connections 130 bar / 1885 psig Bi-metal connections 120 bar / 1740 psig Bi-metal connections for UL approval140 bar	140 bar
-40 - 70 °C	-60 - 60 °C	-50 - 60°C	-40 - 80 °C	-40 - 40 °C	-40 - 60 °C	–20 - 55 °C / -4 - 131 °F on inlet -40 - 55 °C / -40 - 131 °F on outlet	-60 - 120 °C
S-curve	ON-OFF	ON-OFF	Linear / S-curve*				
CE • PED	UL • PED	UL • DEMKO • SETI • SEV • LVD • PED	RoHS • REACH • PED • CQC • UL 429 (Q4 2025)	UL • PED	UL • PED	CE • cURus • EAC	UL • PED
67	Depends on coil type*	Depends on coil type*	67	67	67	68	67
Brass	Brass	Brass	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel	Steel
EIM 336 • EKE 1x SH controllers and valves drivers• EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	AK-CC	AK-CC	EIM 336 • EKE 1x SH controllers and valves drivers •EKF valve drivers • EKE 100 (2025) • Alsmart® system controllers	EKC 326 • AK-PC 781 • AK-CC 750 • XM 208C	EKC 326 • AK-PC 781 • AK-CC 750 • XM 208C	EKE 1P • EKE 2U • AK-PC 572 • AK-PC 7xx • AK-XM 208C 1)	EKC 326 • AK-PC 781
Optional 2m - 12m	Depends on coil type*	Depends on coil type*	0.7 m • 1 m • 1.5 m • 2.7 m• 4.0 m	0.3 m	0.3 m	0.3 m	2 x 1.5 m

		Stepper motor c		
		EKE 100 1V IP00	EKE 100 1V IP20	EKE 100 1V IP20 with display
Features	Type			
Application	Chiller	x	x	x
	Heat pump	x	x	x
	IT cooling	x	x	x
	Transport Refrigeration			
	Cold room	x	x	x
	Food retail	x	x	x
Power supply type	24V AC/DC	x	x	x
Battery backup	EKE 2U	x	x	x
Valve support	Biploar stepper motor	x	x	x
	No of valves supported	1	1	1
Pressure transmitter support	Radiomtric 0.5 - 4.5V	x	x	x
	0-10V	x	x	x
	4-20mA	x	x	x
	No of pressure transmitter	1	1	1
Temperature sensor	NTC 10K	x	x	x
	PT1000	x	x	x
	No of temperature sensor	1	1	1
Field bus communication	MODbus R5485	x	x	x
	CAN FD	NA	NA	NA
Digital input	No of digital input	1	1	1
Digital output	Relay			
	LLSV function			
	Open collector	x	x	x
	No of digital output	1	1	1
External reference	0-10V	x	x	x
	0-20mA	x	x	x
Interface and service tools	KoopOrog PC suite	x	x	x
	MMIGRS2 external display			
	AS-UI04 external display			
	Koolkey	x	x	x
	Integrated display			x
	Dip witch			
Installation and mounting	IP rating	IP20	IP20	IP20
	35mm din rail	x	x	x
Software features	SH Management	x	x	x
	Valve driver function	x	x	x
	Cut-in/Cut-out thermostatic function	x	x	x
	MTR thermostatic function	x	x	x
	Superheat close	x	x	x
	Maximum operating pressure (MOP)	x	x	x
	Low operating pressure (LOP)	x	x	x
	Heat/cool toggle	x	x	x
	Compressor feedforward function	x	x	x
	High condensation temperature protection (HTCP)			
	Minimum S4 limitation			
	Defrost sequence	x	x	x
	Manual control and service	x	x	x
	Discharge gas temperature (liquid injection)			
	Discharge gas temperature (wet and vapor injection)			
Alarm management	Superheat alarm	x	x	x
	Open circuit alarm	x	x	x
	Battery alarm	x	x	x
	DGT alarm			

controller series			Unit controller Alsmart®	Stepper valve driver series	
EKE 100 2V IP00	EKE 100 2V IP20	EKE 100 2V IP 20 with display	Controllers: AS-CX06 Mid+, AS-CX06 Mid+ SSR, AS-CX06 Pro+ Optional expansion modules: XP05+, XP10	EKF 1A	EKF 2A
					
x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x		x
x	x	x	x		x
x	x	x	x	x	x
2	2	2	1 + optional up to 16	1	2
x	x	x	x	NA	NA
x	x	x	x	NA	NA
x	x	x	x	NA	NA
2	2	2	10 + optional up to 210	NA	NA
x	x	x	x	NA	NA
x	x	x	x	NA	NA
2	2	2	10 + optional up to 210	NA	NA
x	x	x	x	NA	NA
NA	NA	NA	x	NA	NA
2	2	2	2+10 + optional up to 270	0	0
x	x	x		x	x
1	1	1	6 + optional up to 150+	1	1
x	x	x	x	x	x
x	x	x	x	x	x
x	x	x	x	x	x
			x		
x	x	x		x	x
		x	Optional (AS-UI Snap-on)		
				x	x
IP00	IP20	IP20	IP20, optional IP40	IP00	IP00
x	x	x	x	x	x
x	x	x	x (programmable)	NA	NA
x	x	x	x (programmable)	x	x
x	x	x	x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)		
			x (programmable)		
			x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)		
			x (programmable)		
			x (programmable)		
x	x	x	x (programmable)		
x	x	x	x (programmable)	x	x
x	x	x	x (programmable)	x	x
			x (programmable)		

Extended ranges, models, and capabilities

Meeting wider design requirements from small to large systems, and boosting energy efficiency. Qualified for the main refrigerants in the market, including low and medium-density HFC and HFO blends, A2L options, and natural R290 and CO_2 refrigerants.