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Danfoss EKE 100 Super Heat Controller

Product Specifications

- **Product:** EKE Type EKE 100 (PV03)
- **Supply Voltage:** 24 V AC/DC* 50/60 Hz, SELV
- **Battery Backup Input:** Danfoss recommends EKE 2U
- **Number of Valve Outputs:** 1 (EKE 100 1V), 2 (EKE 100 2V)
- **Valve Type:** Bipolar stepper valve
- **Modbus RS485 RTU Baud Rate:** 19200
- **Temperature Sensors:** PT 1000/NTC 10K
- **Pressure Transmitter:** Ratiometric 0.5 – 4.5 V DC, 0-10 V Current 4-20 mA
- **Digital Inputs:** 1 (EKE 100 1V), 2 (EKE 100 2V)
- **Digital Output:** D0 (open collector), max sink current 10 mA

Product Usage Instructions

Installation Guide

The EKE Type EKE 100 (PV03) superheat controller is designed for precise superheat control and driving stepper motor valves in various applications such as air conditioning, heat pumps, refrigeration, and industrial settings.

Basic Application

The EKE 100 can control either 1V or 2V stepper motor valves with RS485

communication capabilities.

Technical Specifications

The EKE 100 comes in two variants: EKE100 1V and EKE100 2V, each with specific features and capabilities as detailed above.

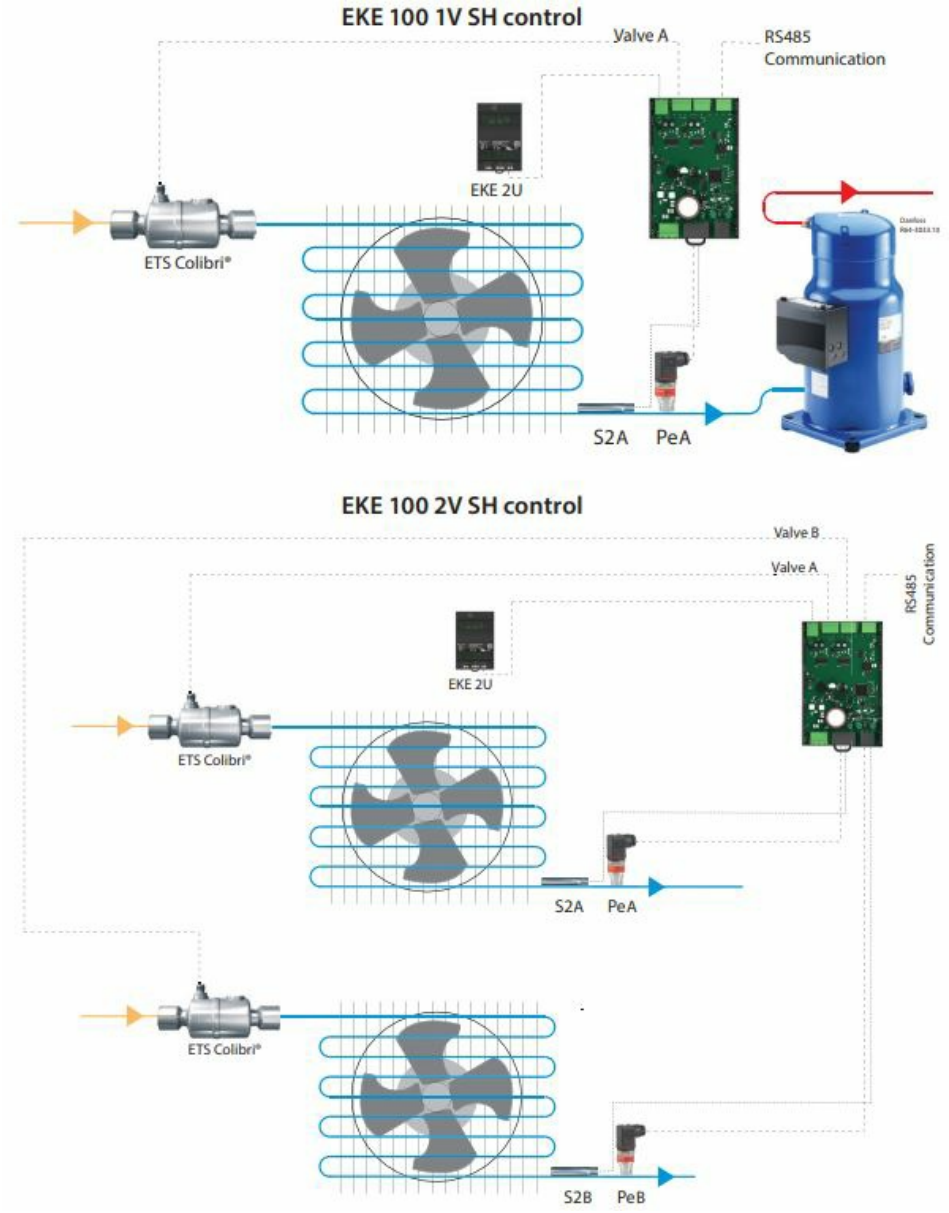
Mounting and Operation

The EKE 100 can be mounted on a DIN rail for easy installation. Ensure the operating temperature, storage temperature, and humidity conditions are within the specified range for optimal performance.

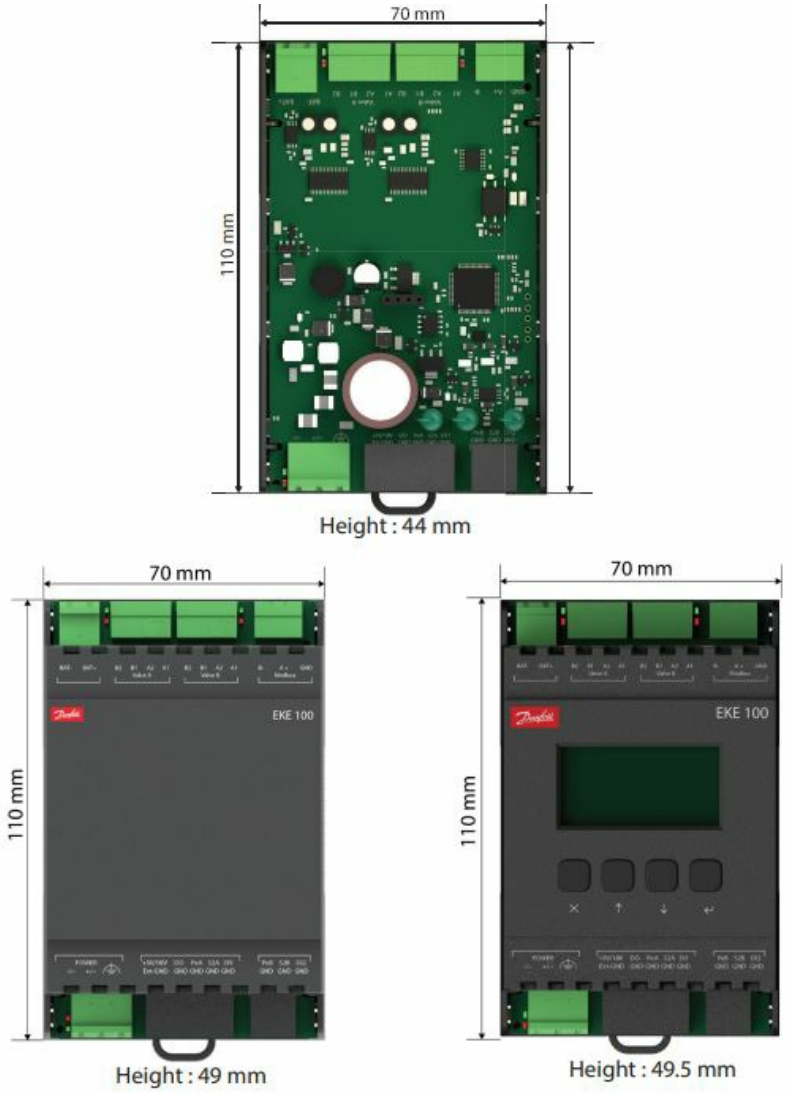
Introduction

- Superheat controller EKE 100 is for use where superheat must be accurately controlled or as a driver for stepper motor valves, typically in air conditioning, commercial and industrial heat pumps, commercial refrigeration, food retail, and industrial applications.
- Compatible valves: ETS 6, ETS 5M (Bipolar), ETS 8M (Bipolar)/ETS C/KVS C/ ETS L/ETS 500-1000P/ CCMT L/CCMT/CCM/CTR

Basic application


EKE 100 1V SH control
Valve A
RS485
Communication
EKE 2U
ETS Colibri®
S2A
PeA
EKE 100 2V SH control
Valve B
Valve A
RS485
Communication
EKE 2U
ETS Colibri®
S2A
PeA
ETS Colibri®
S2B
PeB

Dimension



Technical specification

	EKE100 1V	**EKE100 2V**
Code number	IP00: 080G5050 IP20: 080 G5051 IP20 + display: 080G5052	IP00: 080G5055 IP20: 080 G5056 IP20 + display: 080G5057
Supply Voltage	24 V AC/DC* 50/60 Hz, SE LV **	24 V AC/DC* 50/60 Hz, SE LV **
Battery backup Input (Da nfoss recommends EKE 2U)	24V DC	24V DC

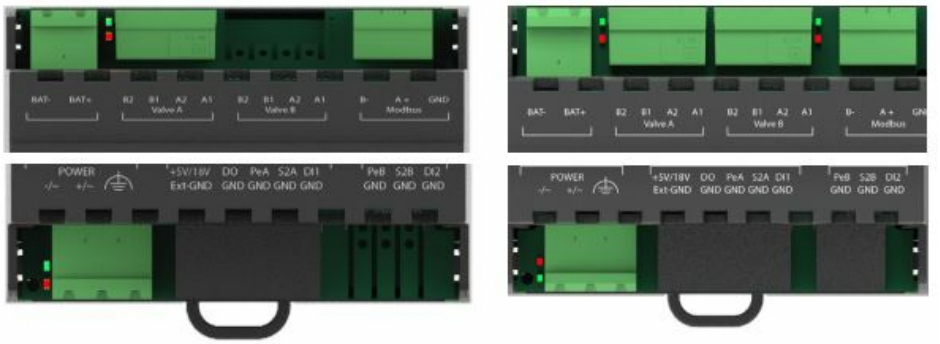
Number of valve outputs	1 stepper motor valve	2 stepper motor valves
Valve type	Bipolar stepper valve	Bipolar stepper valve
Modbus RS485 RTU	Yes (Isolated)	Yes (Isolated)
Baud rate (default setting) ***	19200	19200
Mode (default setting) ***	8E1	8E1
No of temperature sensors	1 (S2A)	2 (S2A,S2B)
Types of temperature sensors	PT 1000/NTC 10K	PT 1000/NTC 10K
No of Pressure transmitters	1 (PeA)	2 (PeA, PeB)
Type of pressure transmitter	Ratiometric 0.5 – 4.5 V DC , 0-10 V Current 4-20 mA	Ratiometric 0.5 – 4.5 V DC , 0-10 V Current 4-20 mA
No of digital inputs	1 (DI1)	2 (DI1,DI2)
Use of digital input (software selectable)	Start/Stop regulation Heat/ Cool mode Battery backup signal (SOH)	Start/Stop regulation Heat/ Cool mode Battery backup signal (SOH)

Digital output	1 output: D0 (open collecto r), max sink current 10 mA	1 output: D0 (open collecto r), max sink current 10 mA
PC suite	KoolProg	KoolProg
Service Tools	EKA 200 + EKE 100 servic e cable	EKA 200 + EKE 100 servic e cable
Mounting (DIN rail)	35 mm DIN rail	35 mm DIN rail
Storage temperature	-30 – 80 °C / -22 – 176 °F	-30 – 80 °C / -22 – 176 °F
Operating temperature	-20 – 70 °C / -4 – 158 °F	-20 – 70 °C / -4 – 158 °F
Humidity	<90% RH, non-condensing	<90% RH, non-condensing
Enclosure	Available in IP00, IP20, an d IP20 with integrated displ ay.	Available in IP00, IP20, an d IP20 with integrated displ ay.

Note:

- The unit is suitable for use on a circuit capable of delivering not more than 50A RMS symmetrical Amperes.
- For the US and Canada, use a class 2 power supply
- Values mentioned are for standard variants

Connection Overview



Port	Description
– / ~ and + / ~	Power supply
⏚	Functional Earth
+ 5 V / 18 V	Voltage for pressure probe **
+ 5 V / 18 V	Voltage for pressure probe **
Ext-GND	Ground for driver signal input
GND	Ground/Comm for I/O signals
DO	Digital Output
PeA	Pressure signal for A circuit/ Driver analog signal for A circuit
S2A	Temperature signal for A circuit
DI1*	Digital Input for A circuit
PeB	Pressure signal for B circuit/ Driver analog signal for B circuit
S2B	Temperature signal for B circuit
DI2	Digital Input for B circuit
BAT – and BAT +	Battery backup inputs

Valve A	Valve port for circuit A
Valve B	Valve port for circuit B
MODBUS (B-, A+, GND)	Modbus port

Note:

- DI is software configurable. If not using with an external signal, then short-circuit it or configure it as not used in software.
- By default, the power supply for the pressure transmitter is set to 0V. Supply will change to 5V if the pressure transmitter is selected as ratiometric and 18V if selected as current type. Supply can be changed manually by selecting it in parameter P014 in the advanced I/O configuration. When using the 2-valve model, both terminals will always supply the same voltage.

See the table below with recommended connection terminals for the driver function.

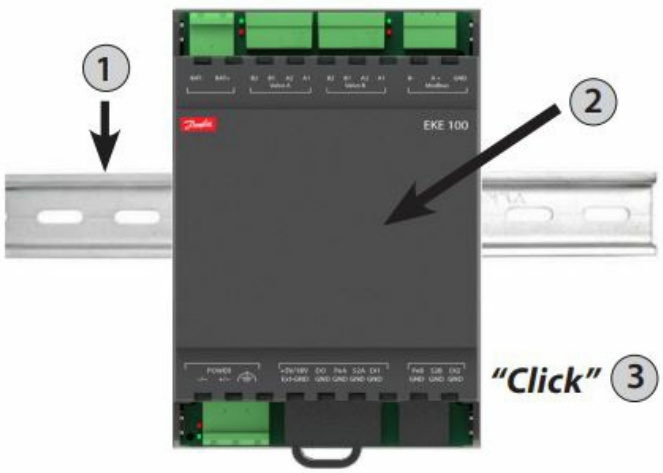
Driver input	**Terminal to use – signal Input A**	**Terminal to use – signal Input B**
Voltage A / Voltage B	Ext. GND + PeA	Ext. GND + PeB
Current A / Current B	GND + PeA	GND + PeB
Voltage A / Current B	GND + PeA	GND + PeB
Current A / Volatge B	GND + PeA	GND + PeB

Mounting/Demounting

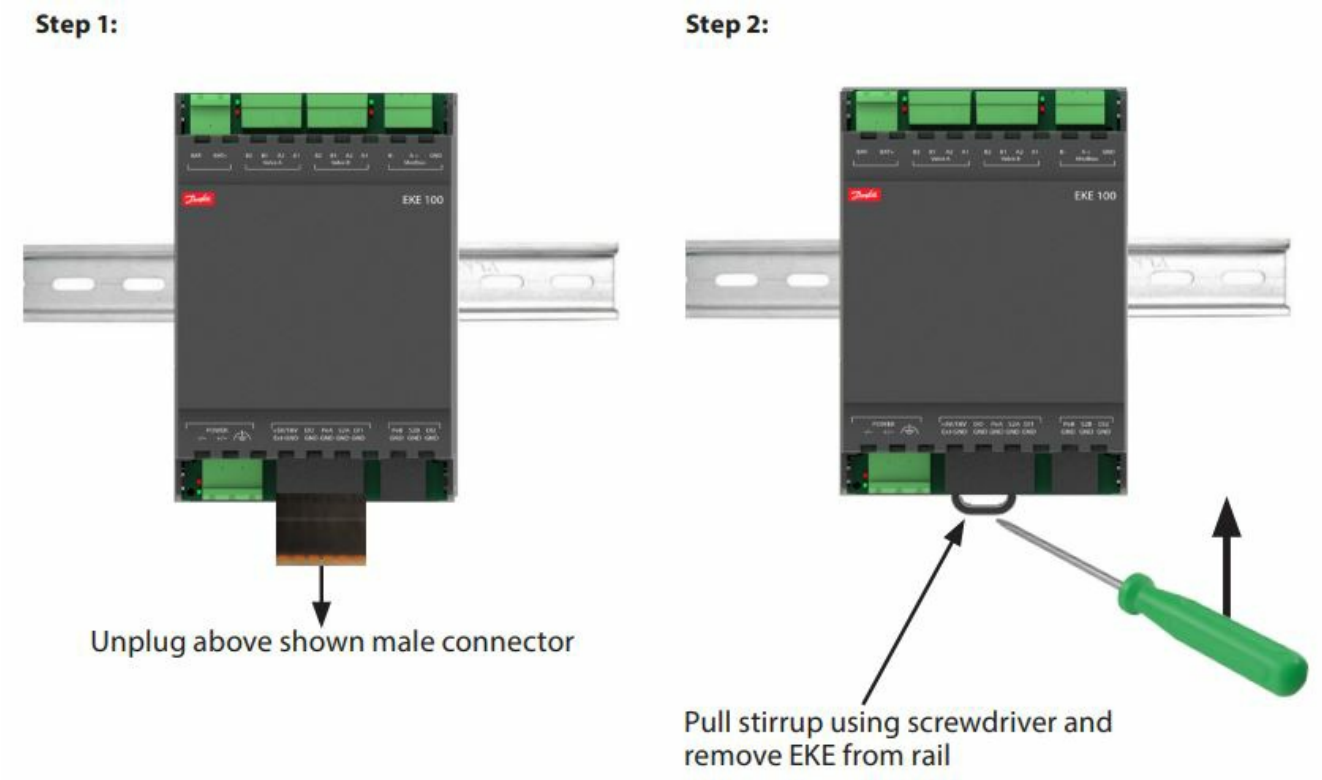
The unit can be mounted onto a 35 mm DIN rail simply by snapping it into place and

securing it with a stopper to prevent sliding. It is demounted by gently pulling the stirrup located in the base of the housing.

Mounting:

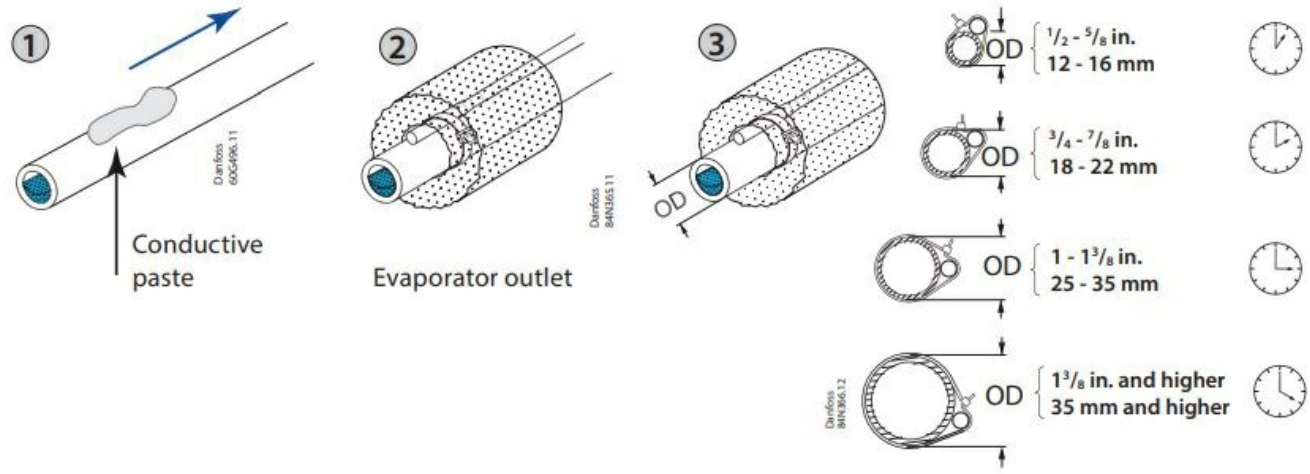


Demounting:



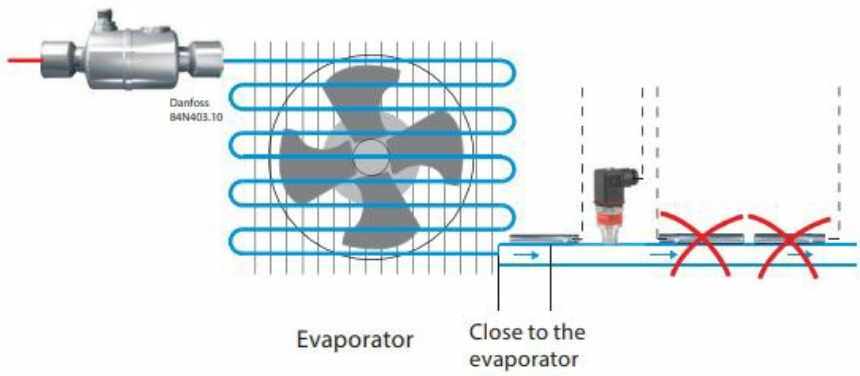
Sensor installation

Sensor mounting: Temperature sensor.



Important Note

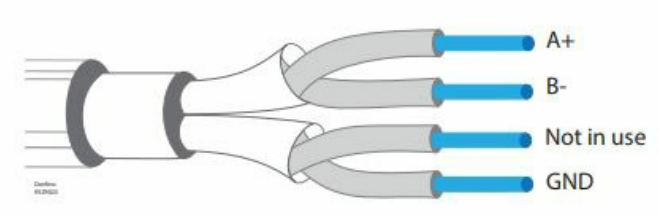
- Mount the sensor on a clean, paint-free surface.
- Remember to use heat-conducting paste and insulate the sensor.
- For precise measurements, mount the sensor max. 5 cm from the outlet of the evaporator.



Modbus installation

- For the Modbus cable, it is best to use 24 AWG shielded twisted-pair cable with a shunt capacitance of 16 pF/ft and 100 Ω impedance.
- The controller provides an insulated RS-485 communication interface, which is connected to the RS-485 terminals (see connection overview).
- The maximum permissible number of devices simultaneously connected to the RS-485 cable output is 32.
- The RS-485 cable is of impedance 120 Ω with a maximum length of 1000 m.
- Terminal resistors 120 Ω for terminal devices are recommended at both ends.
- The EKE communication frequency (baud rate) can be one of the following: 9600, 19200, or 38400 baud, default 19200 8E1.

- The default unit address is 1.
- For detailed info on Modbus PNU, check EKE 100 manuals.



Manual resetting Modbus address:

1. Ensure pressure transmitter settings are set to a ratiometric type transmitter in the configuration.
2. Remove Supply power from EKE 100
3. Connect terminal BAT+ to +5 V / 18 V (Important to make sure step 1 is observed)
4. Connect the EKE 100 to the power.
5. Now Modbus communication options are reset to factory default (Address 1, 19200 baud, mode 8E1)

Signal Sharing

Power and backup supply sharing

- 1 EKE 100 and 1 EKE 2U can share power supply(AC or DC)
- 2 EKE 100 and 1 EKE 2U can share a power supply only with DC

Pressure sensor sharing

- Physical sharing is allowed if used within the same controller, and not allowed if 2 or more controllers are used for sharing.
- Modbus sharing is allowed with more than 1 controller.
- Software sharing is allowed within one controller by selecting the option Common.

Temperature sensor sharing

- Physical sharing is not allowed.
- Modbus sharing is allowed with more than 1 controller.

- Software sharing is allowed within one controller by selecting the option Common.

Cabling

Stepper valve connector	**ETS/KVS/CCM/ CCMT/CTR/ CCMT L (Using Danfoss M12 Cable)**	**ETS 8M Bipolar**	**ETS 6**	**ETS 5M Bipolar**
A1	White	Orange	Orange	Orange
A2	Black	Yellow	Yellow	Yellow
B1	Red	Red	Red	Red
B2	Green	Black	Black	Black
Not connected	–	–	Grey	–

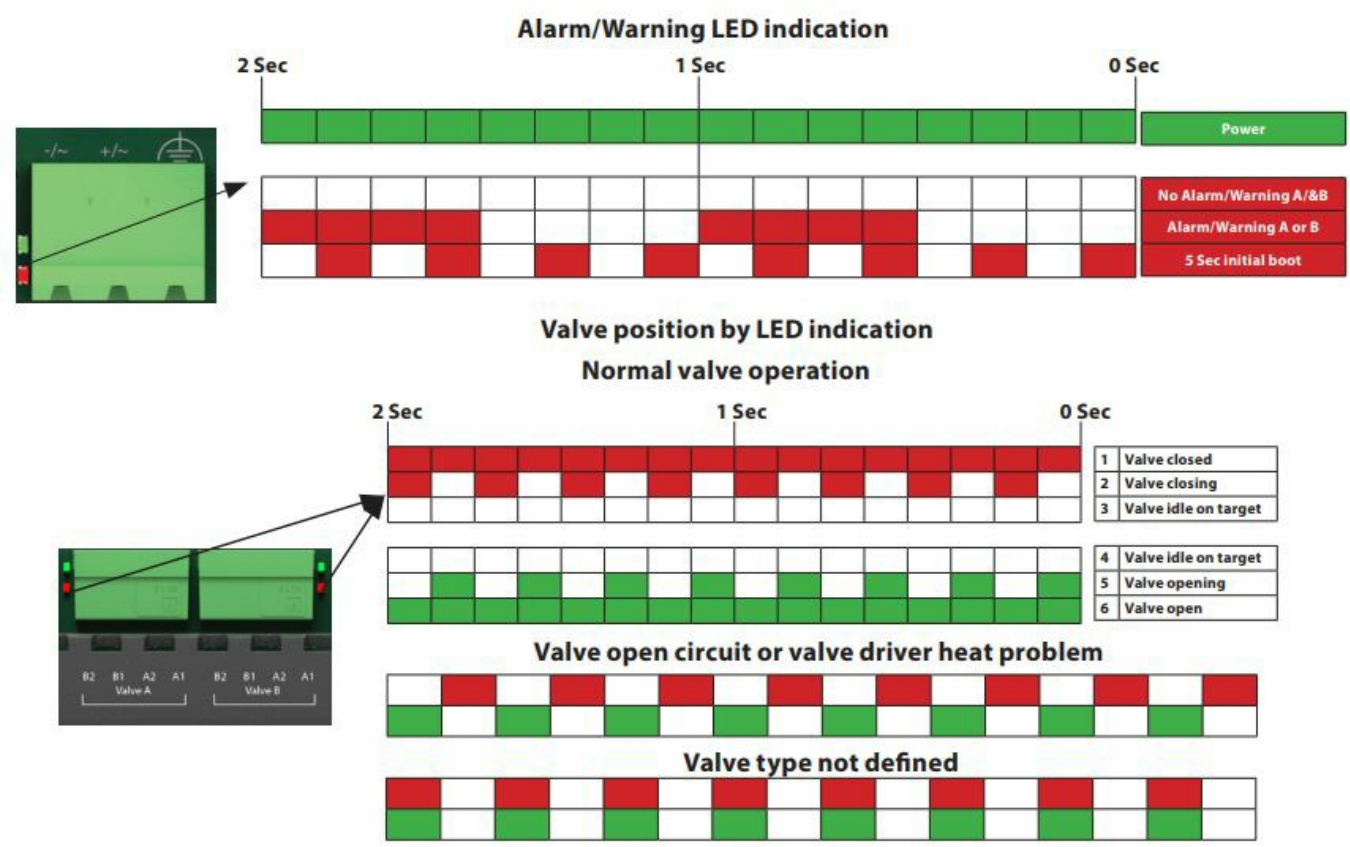
- All valves are driven in a bipolar mode with a 24 V supply chopped to control the current (Current driver).
- The stepper motor is connected to the “Stepper Valve” terminals (see terminal assignment) with a standard M12 connection cable.
- To configure stepper motor valves other than Danfoss stepper motor valves, the correct valve parameters must be set as described in the Valve configuration section by selecting user user-defined valve.

	Cable length	**Wire size min/max (mm2)**
Power supply and Battery input	Max 5m	AWG 24-12 (0.34-2.5 mm2) Torque (0.5-0.56 Nm)
Analog inputs	Max 10m	AWG 24-16 (0.14-1.5 mm2)

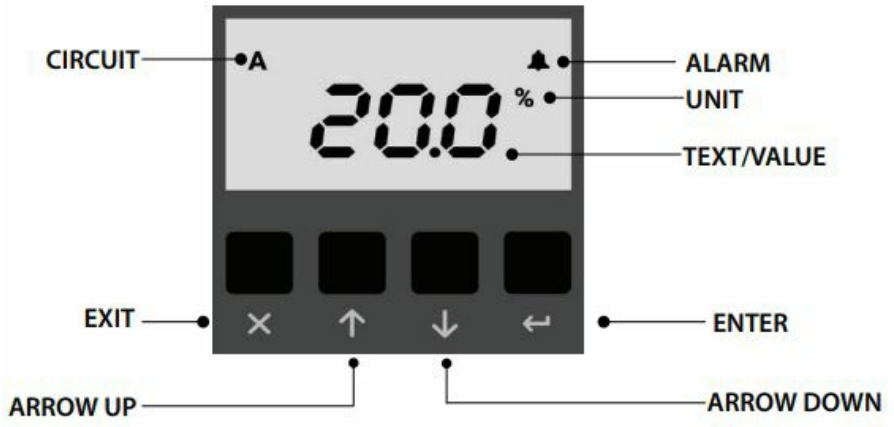
Sensor	Max 10m	AWG 24-16 (0.14-1.5 mm2)
Stepper valve	Max 30m	AWG 24-16 (0.14-1.5 mm2) Torque (0.22-0.25 Nm)
Digital input	Max 10m	AWG 24-16 (0.14-1.5 mm2)
Digital output	Max 10m	AWG 24-16 (0.14-1.5 mm2)

- The max. Cable distance between the controller and the valve depends on many factors, like shielded/unshielded cable, the wire size used in the cable, the output power for the controller, and the EMC.
- Keep controller and sensor wiring well separated from mains wiring.
- Connecting sensor wires more than the specified length may decrease the accuracy of measured values.
- Separate the sensor and digital input cables as much as possible(at least 10 cm) from the power cables to the loads to avoid possible electromagnetic disturbances. Never lay power cables and probe cables in the same conduit (including those in electrical panels)

LED Alarm and Warning



Display Structure



General features and warning

Plastic housing features

- DIN rail mounting complying with EN 60715
- Self-extinguishing V0 according to IEC 60695-11-10 and glowing/hot wire test at 960 °C according to IEC 60695-2-12

Other features

- To be integrated into Class I appliances

- Index of protection: IP00 or IP20 on the product, depending on the sales number
- Period of electric stress across insulating parts: long – Suitable for use in a pollution degree 2 environment
- Category of resistance to heat and fire: IEC/EN 60335-1, 30.2.1 and 30.2.3 of edition 5.2
- Immunity against voltage surges: category II
- Software class and structure: class A
- Type 1 control
- Overvoltage category III (Rated impulse voltage 800 V)

General warnings

- Every use that is not described in the manuals of EKE 100 is considered incorrect and is not authorized by the manufacturer.
- Verify that the installation and operating conditions of the device respect those specified in the manuals, especially concerning the supply voltage and environmental conditions.
- All service and maintenance operations must therefore be performed by qualified personnel.
- The device must not be used as a safety device.
- Liability for injury or damage caused by the incorrect use of the device lies solely with the user.

Installation warnings

- Recommended mounting position: Din rail, Panel mounting
- Ensure that only trained and qualified personnel perform installation, start-up, and maintenance.
- Ensure that electrical work conforms to national and local electrical codes, regulations, and/or standards.
- Before working on the electrical connections, disconnect the device from the main power supply.
- Before carrying out any maintenance operations on the device, disconnect all electrical connections.

- Do not expose the device to continuous water sprays or a relative humidity greater than 90%.
- Do not be exposed to corrosive or pollutant gases, natural elements, environments where explosives or mixes of flammable gases are present, dust, strong vibrations or shock, large and rapid fluctuations in ambient temperature that might cause condensation in combination with high humidity, strong magnetic and/or radio interference (e.g., transmitting antenna)
- Use cable ends suitable for the corresponding connectors. After tightening connector screws, tug the cables gently to check their tightness. Minimize the length of probe and digital input cables as much as possible, and avoid spiral routes around power devices. Separate from inductive loads and power cables to avoid possible electromagnetic noise
- Use appropriate data communication cables. Refer to the above in the present document.
- Minimize the length of probe and digital input cables as much as possible and avoid spiral routes around power devices. Separate from inductive loads and power cables to avoid possible electromagnetic noise
- Avoid touching or nearly touching the electronic components fitted on the board to avoid electrostatic discharges..
- This product is not subject to the UK PSTI regulation, as it is for supply to and use only by professionals with the necessary expertise and qualifications. Any misuse or improper handling may result in unintended consequences. By purchasing or using this product, you acknowledge and accept the professional-use-only nature of its application. Danfoss does not assume any liability for damages, injuries, or adverse consequences (“damage”) resulting from the incorrect or improper use of the product,,t and you agree to indemnify Danfoss for any such damage resulting from your incorrect or improper use of the product.

Product warnings

- Connecting any EKE inputs to mains voltage will permanently damage the controller.
- Battery Backup terminals do not generate power to recharge a device connected.
- Battery backup – the voltage will close the stepper motor valves if the controller loses its supply voltage.

- Do not connect an external power supply to the digital input DI terminals to avoid damaging the controller.

Danfoss Related products

Powersupply	Temperature sensor	Pressure transducer
		
AK-PS Input: 100 – 240 V AC, 45 – 65 Hz Output: 24 V DC: available with 18 VA, 36 VA and 60 VA **ACCTRD** Input: 230 V AC, 50 – 60 Hz Output: 24 V AC, available with 12 VA, 22 VA and 35 VA	**PT 1000** AKS is a High precision temp. sensor AKS 11 (preferred), AKS 12, AKS 21 ACCPBT PT1000 **NTC sensors** EKS 221 (NTC-10 Kohm) MBT 153 **ACCPBT** NTC Temp probe (IP 67 /68)	**DST / AKS Pressure Tranducer** Available with ratiometric and 4 – 20 mA. **NSK** Ratiometric pressure probe **XSK** Pressure probe 4 – 20 mA

Stepper motor valves	M12 cable	Backup power module
		
EKE is compatible with Danfoss stepper motor valves i.e Danfoss ETS 6, ETS, KVS, ETS Colibri®, KVS colibri®, CTR, CCMT, ETS 8M (Bipolar), CCMT L, ETS L	M12 Angle cable to connect Danfoss stepper motor valve and EKE controller	EKE 2U energy storage device for emergency valve shutdown during power outage.

EKA 200 Koolkey	EKE 100 service cable
	
EKA 200 is used as a service/copy key for EKE 100 controller	EKE 100 service cable is used to connect EKE 100 controller to EKA 200 Koolkey

FAQ

What is the recommended supply voltage for the EKE 100?

The recommended supply voltage for the EKE 100 is 24 V AC/DC at 50/60 Hz, SELV.

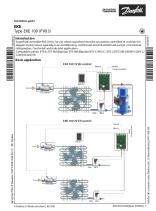
How many valve outputs does the EKE 100 support?

The EKE 100 supports either one valve output for EKE100 1V or two valve outputs for EKE100 2V.

What type of pressure transmitter is compatible with the EKE 100?

The EKE 100 is compatible with a ratiometric pressure transmitter with a range of 0.5 - 4.5 V DC, 0-10 V, and current 4-20 mA.

Documents / Resources

	Danfoss EKE 100 Super Heat Controller [pdf] Installation Guide EKE 100 PV03, EKE 2U, EKE 100 1V, EKE 100 2V, EKE 100 Super Heat Controller, EKE 100, Super Heat Controller, Heat Controller, Controller

References

- User Manual

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controller, Danfoss, EKE 100, EKE 100 1V, EKE 100 2V, EKE 100 PV03, EKE 100 Super Heat Controller, EKE 2U, Heat Controller, Super Heat Controller

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