Danfoss EKE 100 Superheat Controller Installation Guide

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Superheat Controller

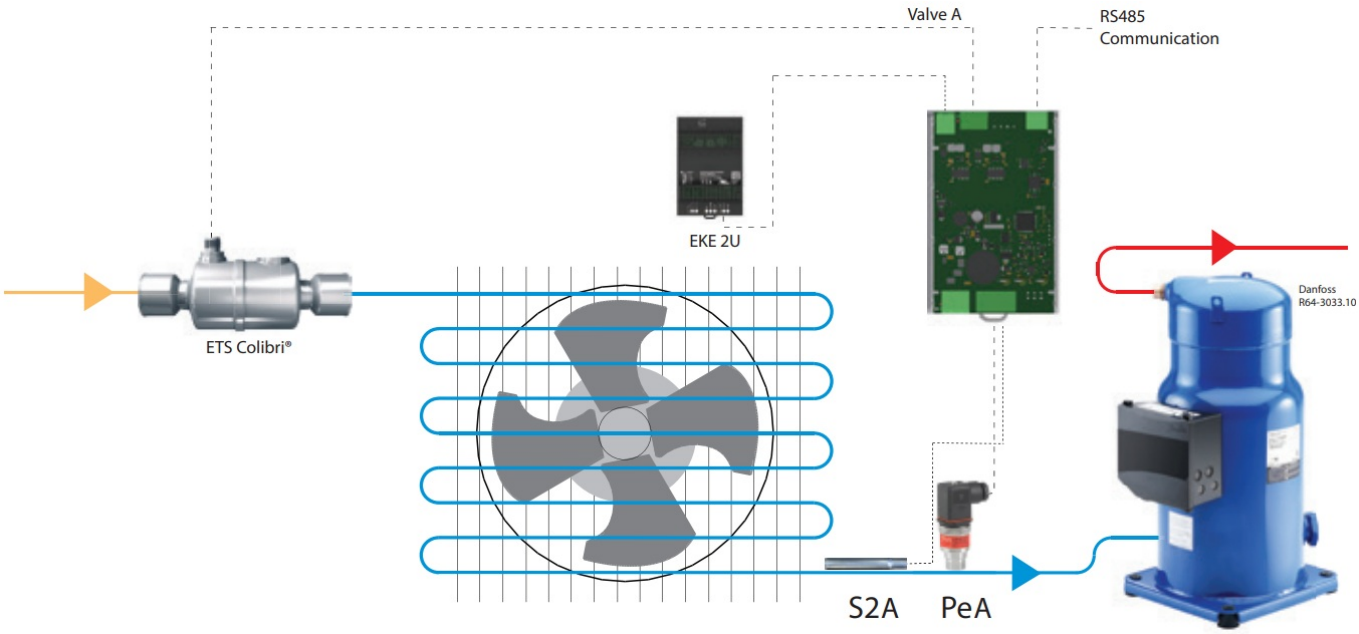
Contents

Introduction

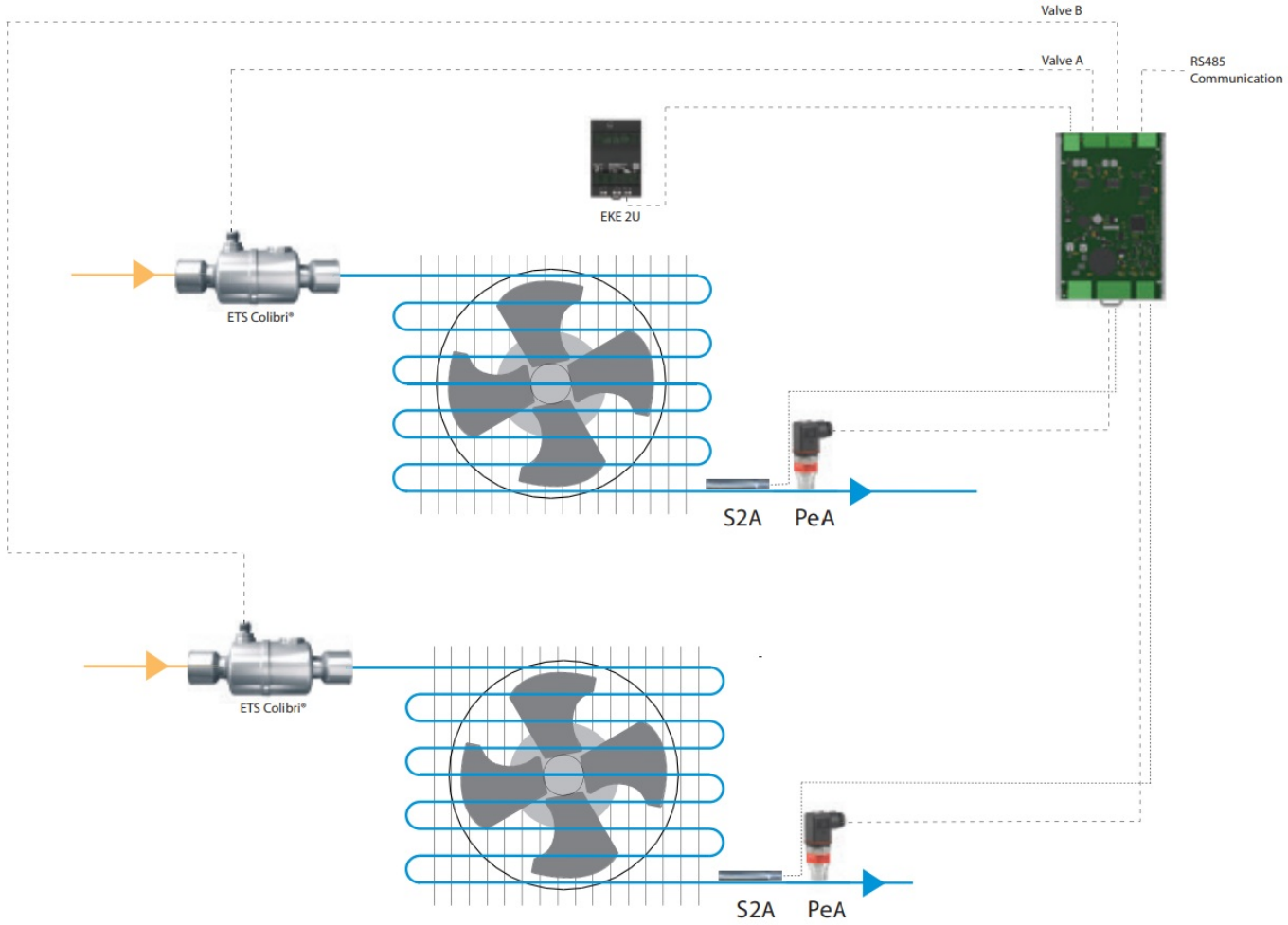
Superheat controller EKE 100 is for use where superheat must be accurately controlled or as driver for stepper motor valves typically in air conditioning, heat pumps, commercial refrigeration, food retailing and industrial application.
Compatible valves: ETS 6/ETS 8M(Bipolar coil)/ETS C/KVS C/ ETS L/ETS 500-800P/ CCMT L/CCMT/CCM/ CTR

Basic application

EKE 100 1Valve SH control



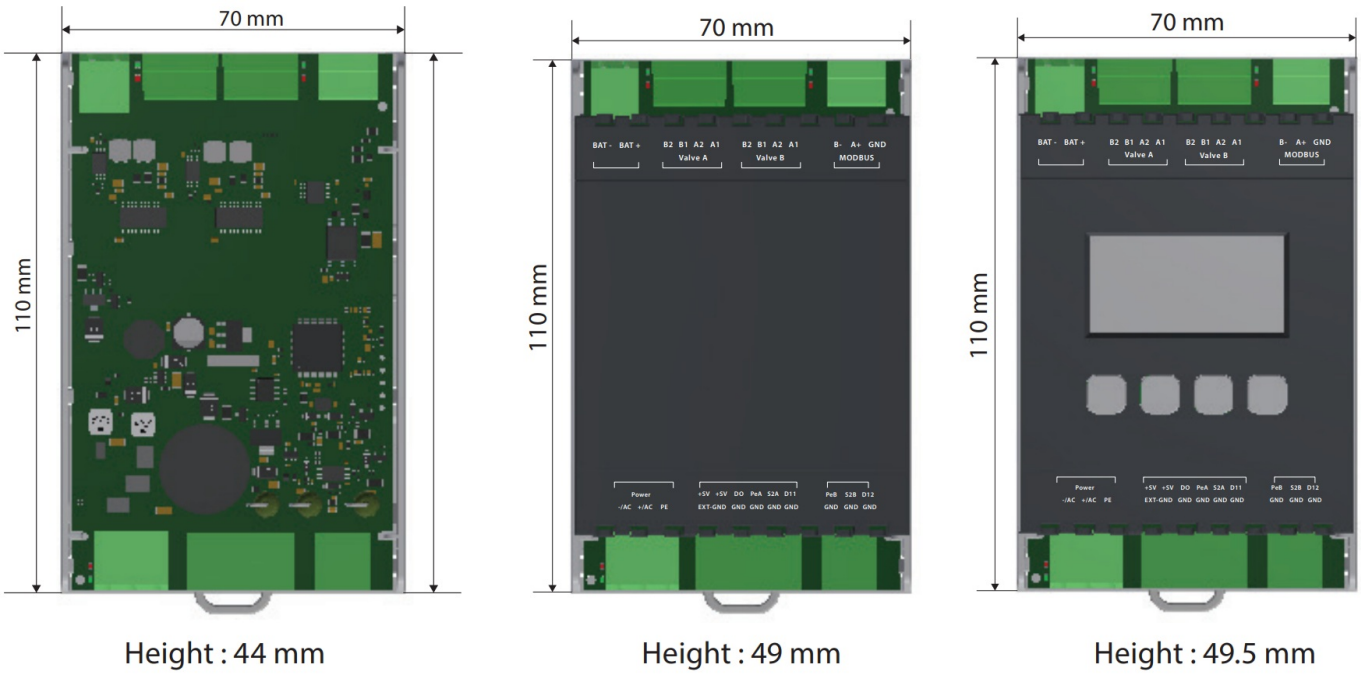
EKE 100 2Valve SH control



Note:

For driver function connect analog signal to pressure port(PeA/PeB).

Dimension

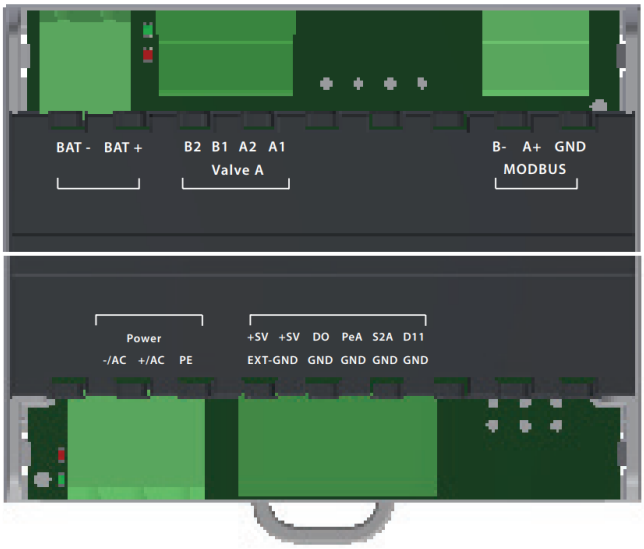


Technical specification

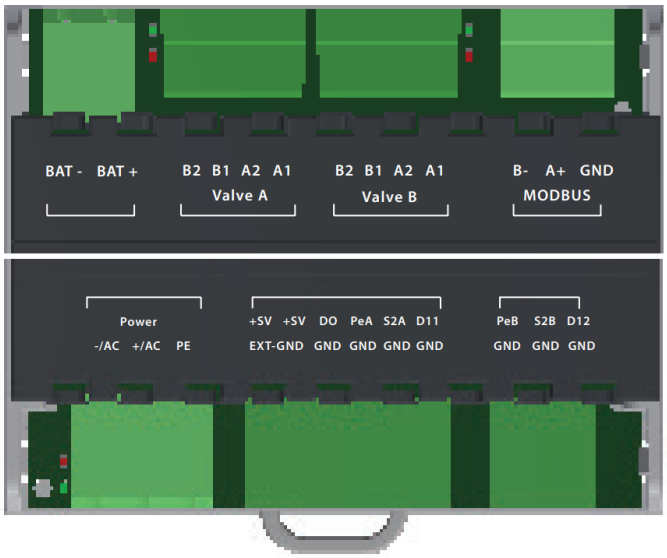
	EKE100 1V	**EKE100 2V**
Code number	IP00: 080G5050 IP20: 080G5051 IP20 W display: 080G5052	IP00: 080G5055 IP20: 080G5056 IP20 W display: 080G5057
Supply Voltage	24 V AC / DC +/- 20% , 50 / 60 Hz, class II isolation , No galvanic is olation	24 V AC / DC +/- 20% , 50 / 60 Hz, class II isolation , No galvanic i solation
Battery backup Input (Danfoss re commends 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)
Type of temperature sensors	PT 1000/NTC 10K	PT 1000/NTC 10K
No of Pressure sensors	1 (PeA)	2 (PeA,PeB)

Type of pressure sensors	Ratiometric 0.5 – 4.5 V DC Current 4-20mA	Ratiometric 0.5 – 4.5 V DC Curren t 4-20mA
No of digital input	1 (DI1)	2 (DI1,DI2)
Use of digital input	Start/Stop regulation Heat/Cool mo de Battery backup signal (SOH)	Start/Stop regulation Heat/Cool m ode Battery backup signal (SOH)
Digital output	1 output for EKE 100: D0 (open coll ector), max sink current 10 mA	1 output for EKE 100: D0 (open col lector), max sink current 10 mA
PC suite	Kool Prog	Kool Prog
Mounting (DIN rail)	4 DIN	4 DIN
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 and IP20 wit h integrated display models	Available in IP00, IP20 and IP20 w ith integrated display models

Connection Overview



EKE 100 1V



EKE 100 2V

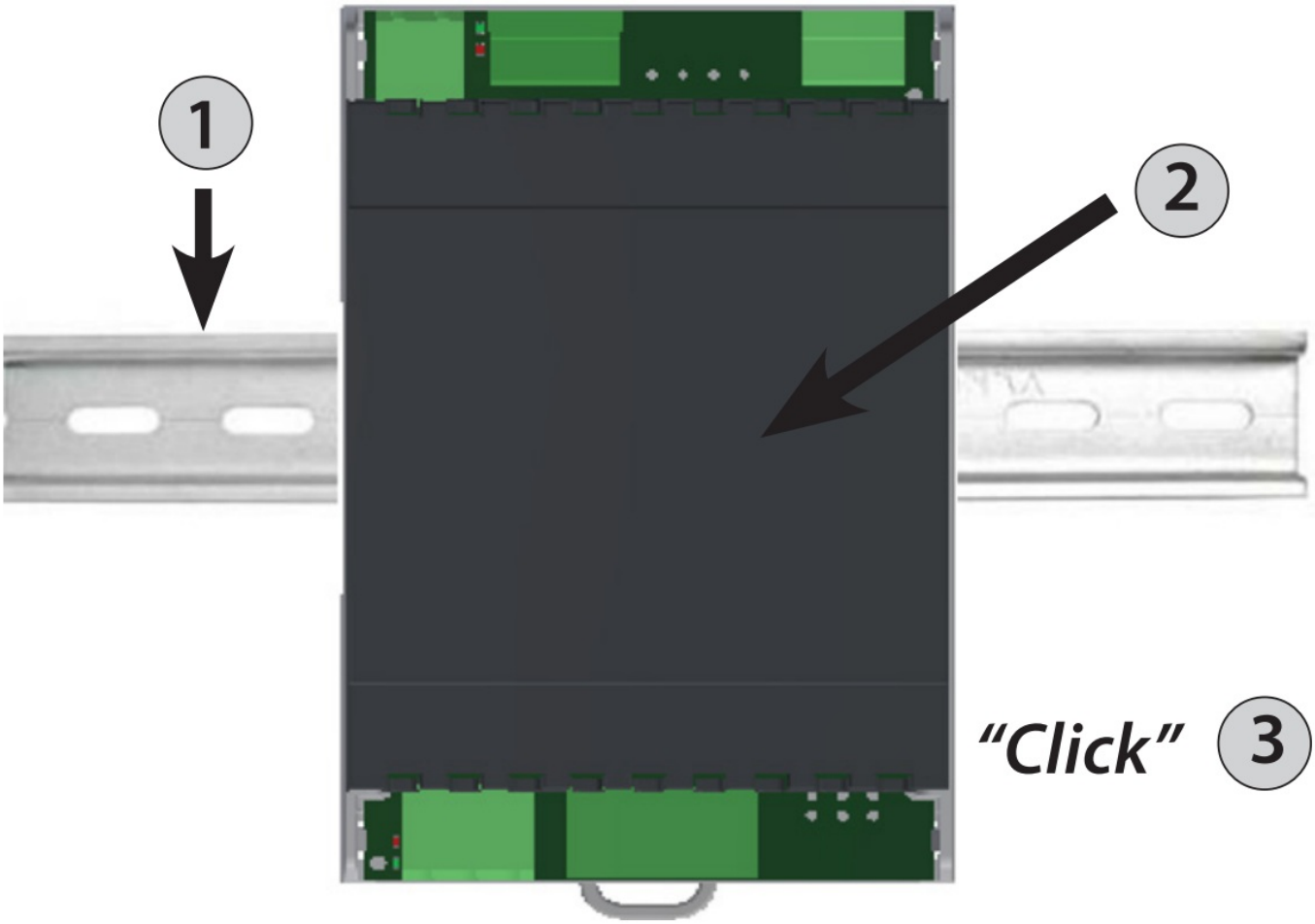
Port	**Description**
– / AC and + / AC	Power supply
PE	Protective earth
+ 5V	Voltage for pressure probe
+ 5V	Voltage for pressure probe
Ext-GND	Do not use
GND	Ground/Comm for I/O signals
DO	Digital Output
PeA	Pressure signal for A circuit/ Analog signal for A circuit
S2A	Temperature signal for A circuit

DI1	Digital Input for A circuit
PeB	Pressure signal for B circuit/ 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

Mounting/Demounting

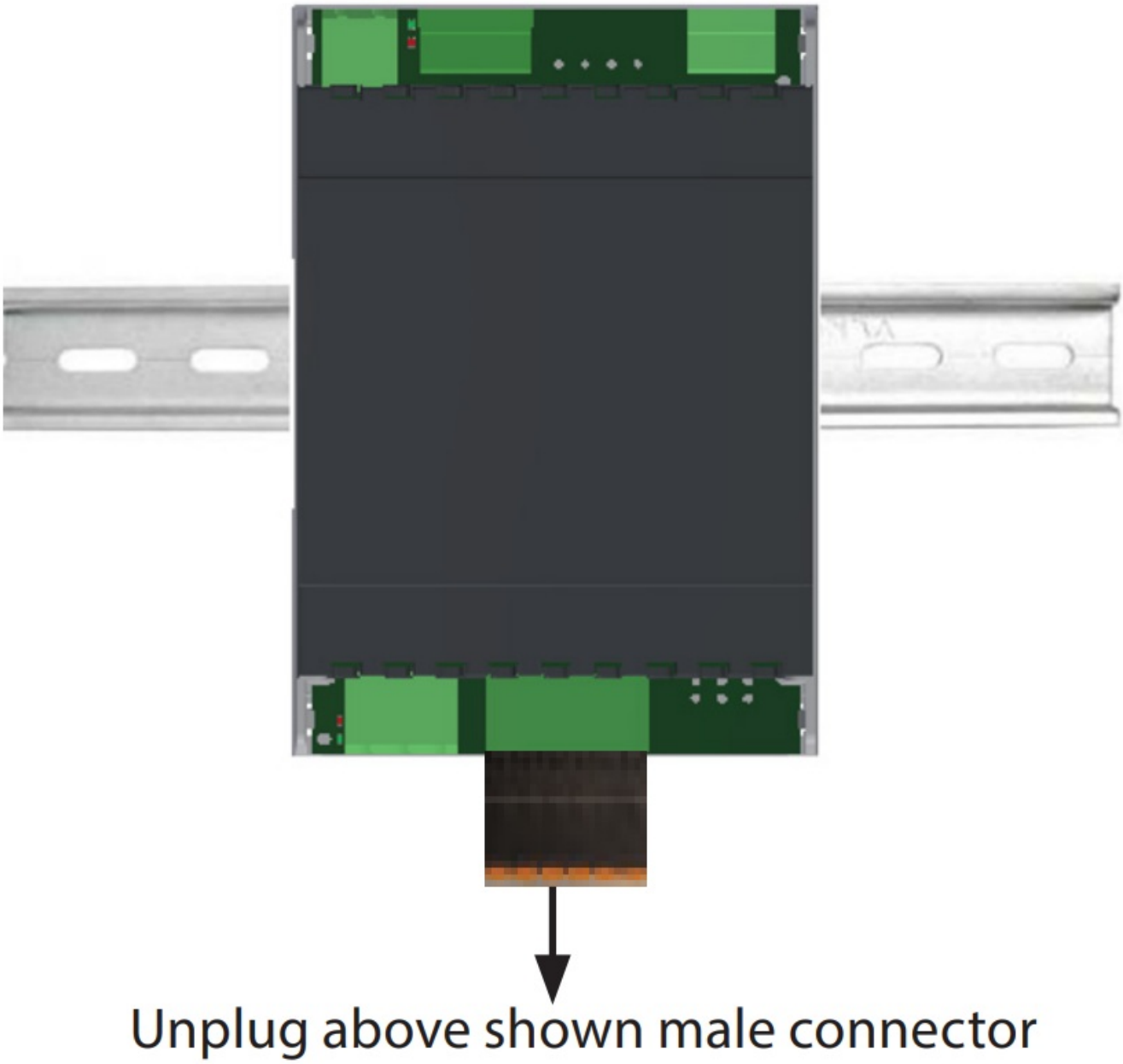
The unit can be mounted onto a 35 mm DIN rail simply by snapping it into place and securing it with a stopper to prevent sliding. It is demounted by gently pulling the stirrup located in the base of the housing.

Mounting :

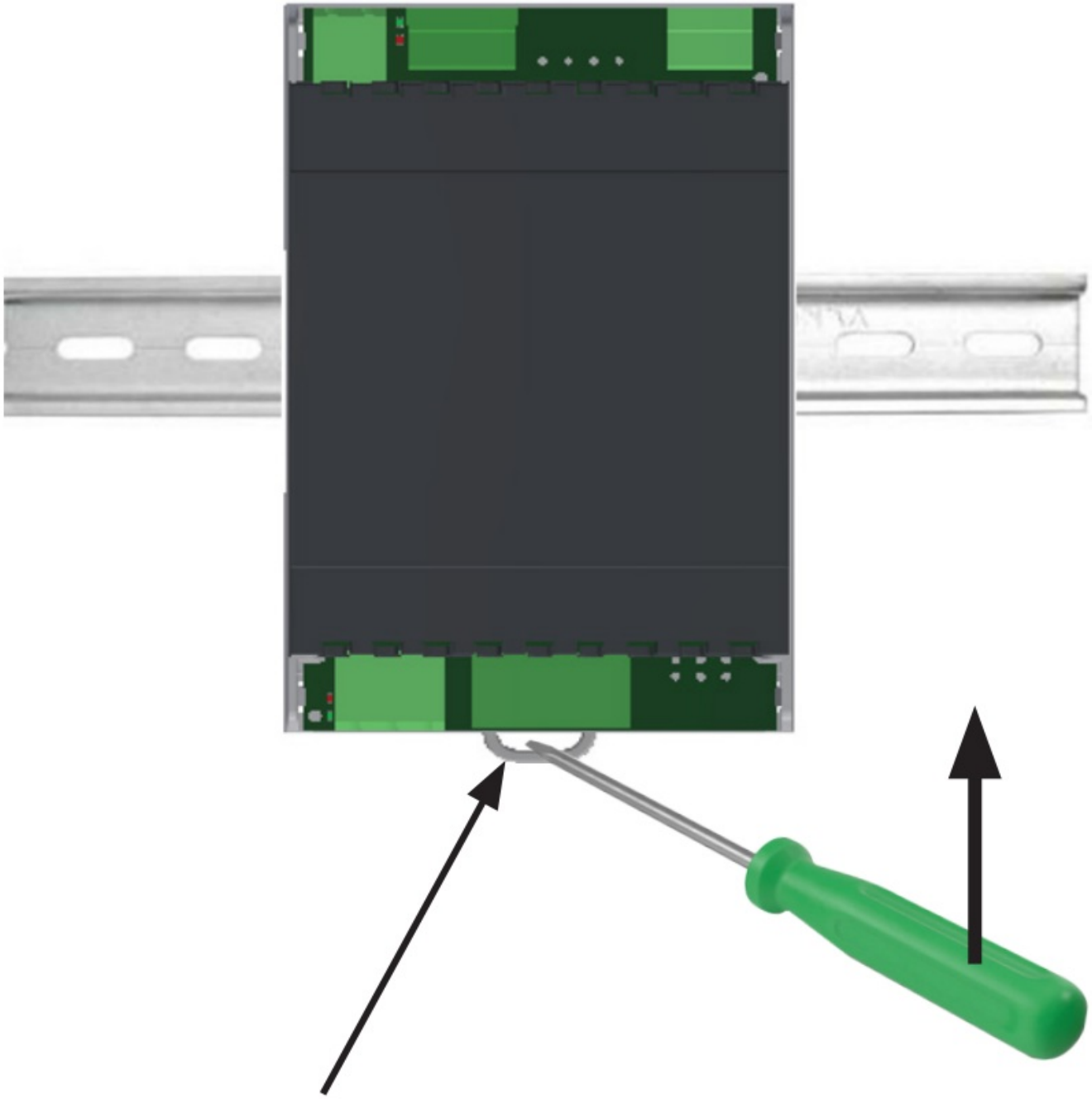


Demounting :

Step 1:



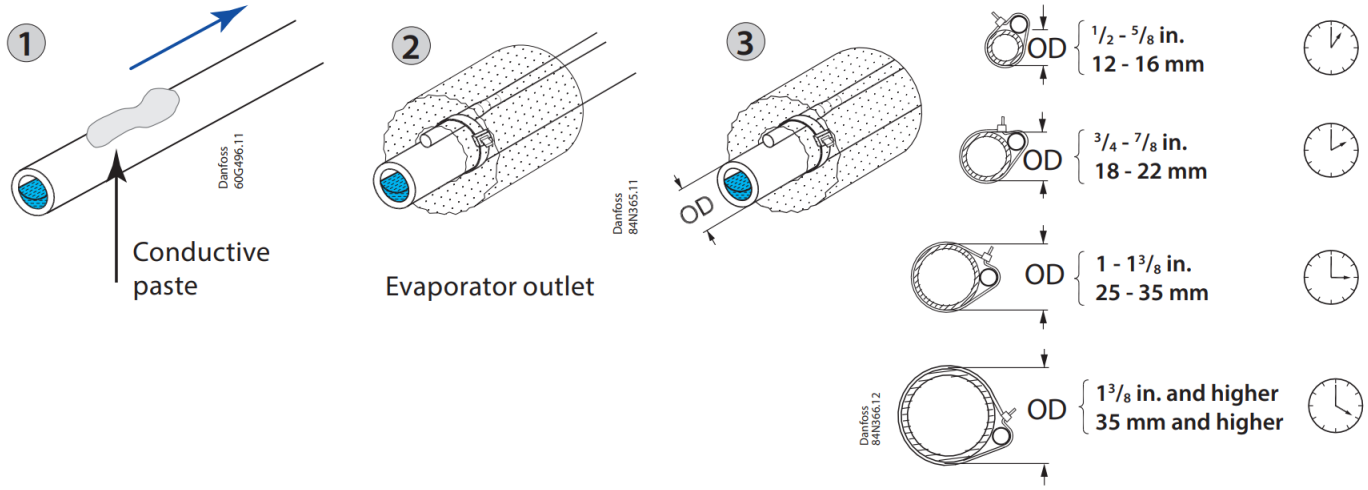
Step 2:



Pull stirrup using screwdriver and remove EKE from rail

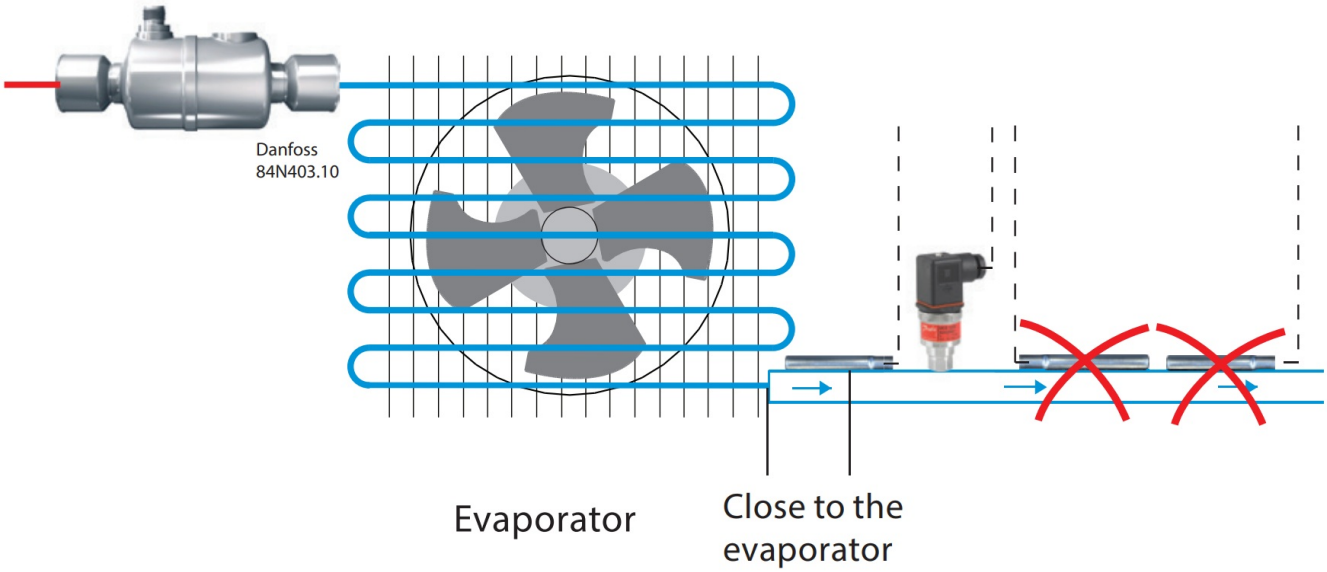
Sensor installation

Sensor mounting: Temperature sensor



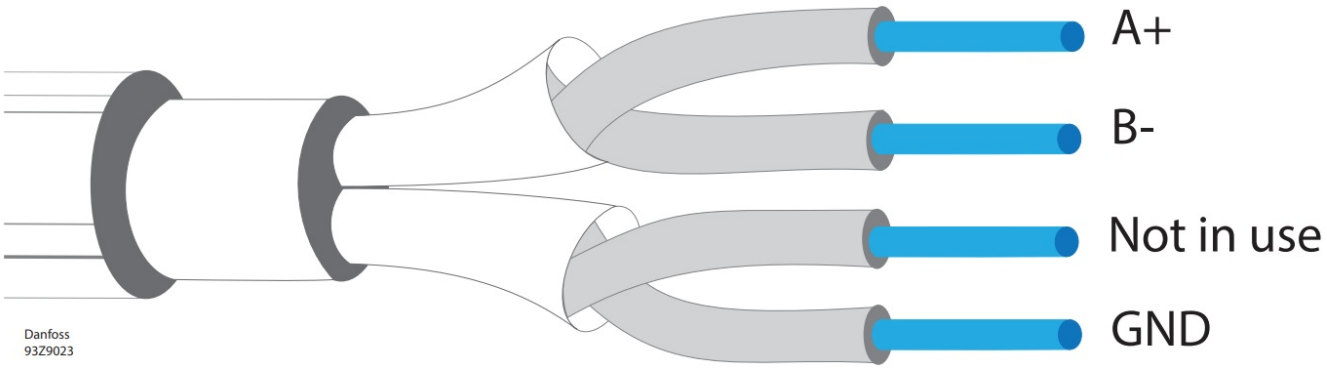
Important Note

- 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 100Ω impedance.
- The controller provides an insulated RS485 communication interface which is connected to the RS485 terminals (see connection overview).
- The max. permissible number of devices simultaneously connected to RS485 cable output is 32.
- The RS485 cable is of impedance 120 Ω with 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 Datasheet



Manual resetting Modbus address

1. Remove Supply power from EKE 100
2. Connect terminal BAT+ to +5V
3. Connect EKE 100 to power
4. 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 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 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 option Common.

Cabling

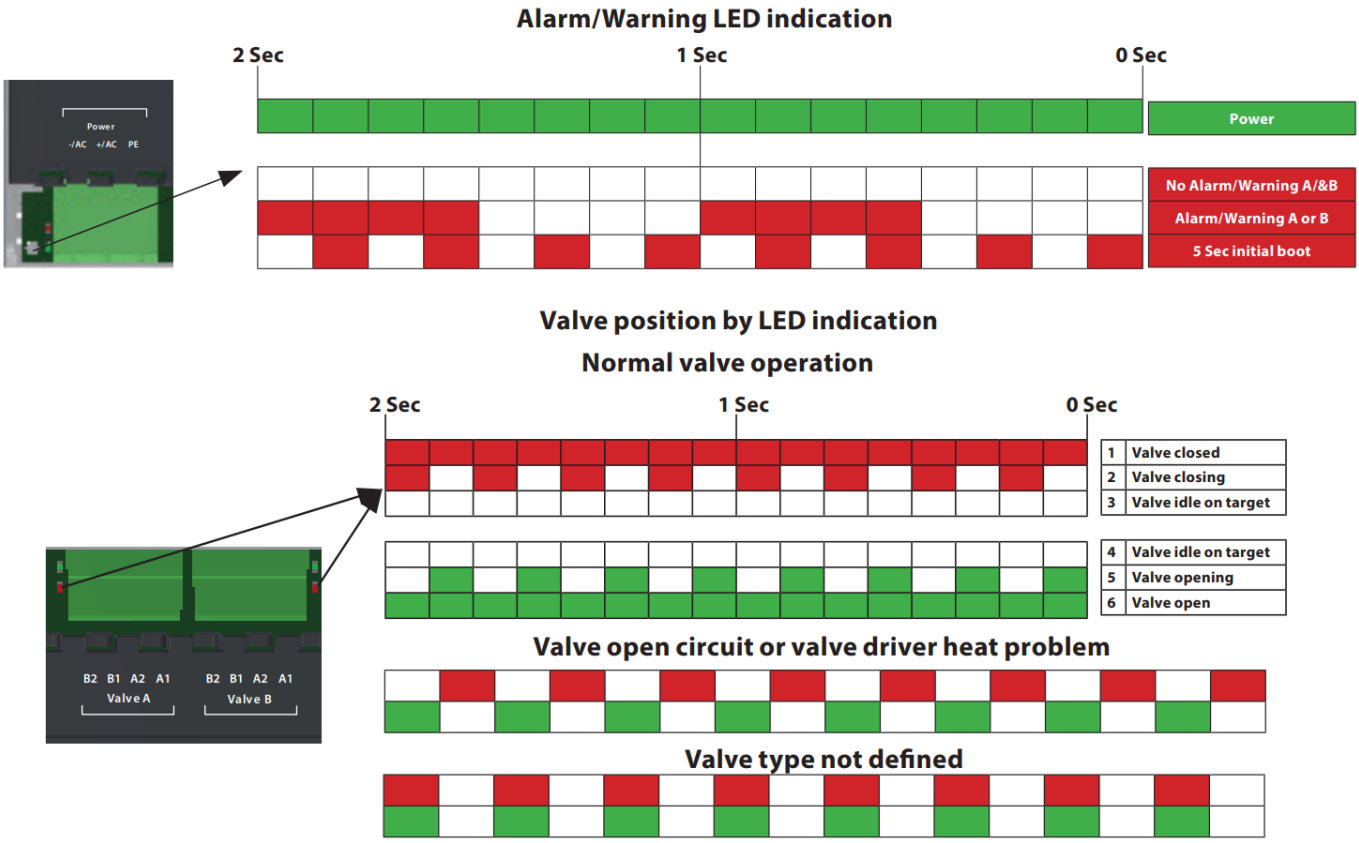
Stepper valve connector	ETS/KVS/CCM/ CCMT/CTR/ CCMT L(Using Danfoss M12 Cable)	ETS 8M Bipolar	ETS 6
A1	White	Orange	Orange
A2	Black	yellow	Yellow
B1	Red	Red	Red
B2	Green	Black	Black
Not connected	–	–	Grey

-  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 assign ment) 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 defined valve.

	Cable length	Wire size min/max (mm2)
Power supply	Max 5m	0.2/2.5
Analog inputs	Max 10m	0.14/1.5
Sensor	Max 10m	–
Stepper valve	Max 30m	0.14/1.5
Digital input	Max 10m	0.14/1.5
Digital output	–	0.2/2.5

- 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 specified length may decrease the accuracy of measured values.
- Separate the sensor and digital input cables as much as possible(at least 10cm) 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



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 in Class I and/or II appliances
- Index of protection: IP00 or IP20 on product, depending on sales number
- Period of electric stress across insulating parts: long – Suitable for using in a normal pollution environment
- Category of resistance to heat and fire: D
- Immunity against voltage surges: category II

- Software class and structure: class A

CE Compliance

- Operating conditions CE: -20T70, 90% RH non-condensing
- Storage conditions: -30T80, 90% RH non-condensing
- Low voltage guideline: 2014/35/EU
- Electromagnetic compatibility EMC: 2014/30/EU and with the following norms:
- EN61000-6-1, (Immunity standard for residential, commercial, and light-industrial environments)
- EN61000-6-2, (Immunity standard for industrial environments)
- EN61000-6-4, (emission standard for industrial environments)
- EN60730 (Automatic electrical controls for household and similar use)

General warnings

- Every use that is not described in this manual 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 manual, 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: vertical
- Installation must comply with local standards and legislation
- 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 – For safety reasons the appliance must be fitted inside an electrical panel with no live parts accessible
- Do not expose the device to continuous water sprays or to a relative humidity greater than 90%.
- Avoid exposure 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 noises – Avoid touching or nearly touching the electronic components on the board to avoid electrostatic discharges
- Use appropriate data communication cables. Refer to the EKE data sheet for the kind of cable to be used and setup recommendations
- 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 electro magnetic noises

- Avoid touching or nearly touching the electronic components fitted on the board to avoid electrostatic discharges

Product warnings

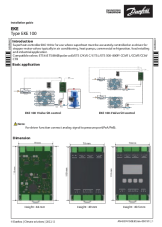
- Use a class II power supply.
- Connecting any EKE inputs to mains voltage will permanently damage the controller.
- Battery Backup terminals does not generate power to recharge a device connected.
- Battery backup – the voltage will close the stepper motor valves if the controller loses its supply voltage.
- Do not connect an external power supply to the digital input DI terminals to avoid damaging the controller.

Danfoss Related products

Power supply	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. sens or AKS 11 (preferred), AKS 12, AK S 21 ACCPBT PT1000 **NTC sensors** EKS 221 (NTC-10 Kohm) MBT 15 3 **ACCPBT** NTC Temp probe (IP 67 /68)	**DST / AKS Pressure Tranducer** Available with ratiometric and 4 – 2 0 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, CCMTL, 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.

Documents / Resources

	Danfoss EKE 100 Superheat Controller [pdf] Installation Guide EKE 100 Superheat Controller, EKE 100, EKE 100 Controller, Superheat Controller, Controller