Data sheet



Superheat controller

EKE 1A,B,C (PV05), 1D (PV02)

For air conditioning, commerical/Industrial heatpumps and refrigeration applications

Description

The flexible pre-programmed EKE superheat controller from Danfoss provides ultimate software control, allowing you to tailor the performance of your system to your exact requirements. EKE is ideal for controlling a wide range of commercial air conditioning and refrigeration applications, such control helps you to achieve the highest efficiency in the system reducing the operational cost by up to 20% with minimal effort. EKE is generally used where there is a requirement for accurate control of superheat or temperature control in connection with air conditioning and refrigeration. The superheat is regulated to the lowest possible value within a short period of time. It regulates the superheat of the evaporator by charging optimally even when there are great variations of load resulting in reduction of energy consumption and operational cost

Features & benefits

- Chillers
- Processing plant / cabinet cooling
- Cold store (air coolers)
- A/C plant / air conditioning
- Commercial and Industrial heat pumps
- Transport cooling
- Stepper motor driver

Applications

EKE series devices are used where precise control of superheat in air conditioning system is needed. It helps achieving high energy efficiency and reliable operation

EKE serves 2 main applications:

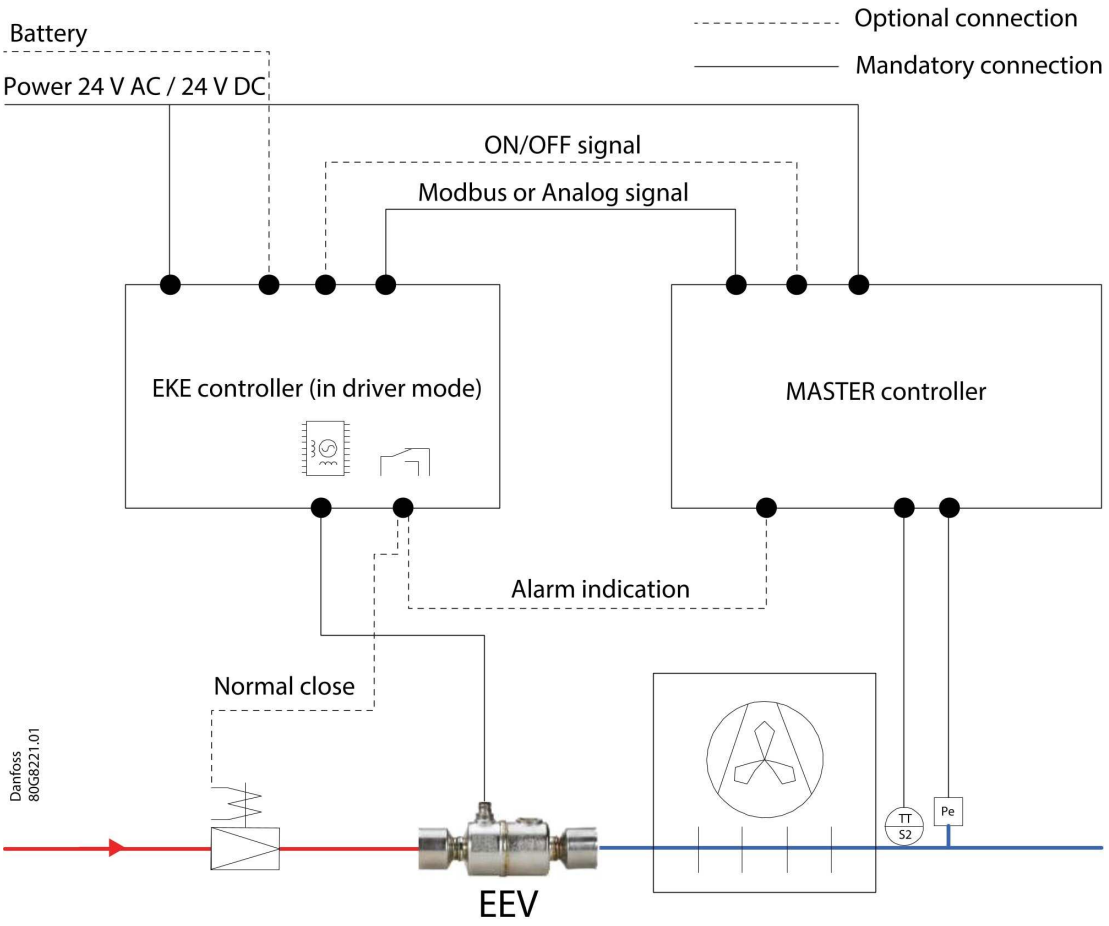
- Driver mode
- Controller mode
  1. Superheat controller
  2. Temperature controller

Driver mode

Driver mode: A master is commanding the valve open degree to the EKE controller. The control signal can be fed for example by:

- Analog signal e.g., 0 – 10 V, a 4 – 20 mA
- Bus communication via RS485 (Modbus RTU).

Figure: EKE as driver mode



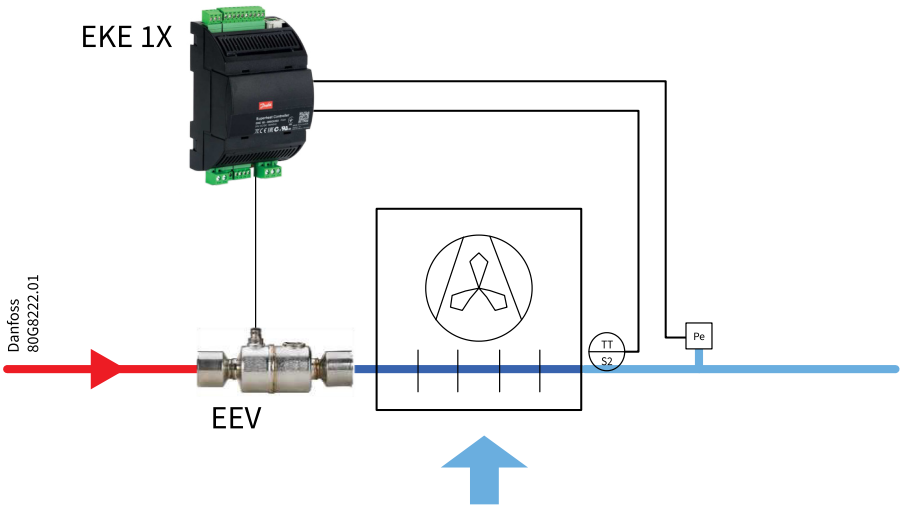
NOTE:

'Normal closed' valve in front of EEV is optional alternative to a battery backup solution which closes the EEV in case of power fail. The digital output can also be used as alarm indication to the master controller. The master can send a start signal to EKE DI terminals

Controller mode:

Superheat control: EKE can serve as a PI controller that controls the superheat of the evaporator based on a pressure Pe and temperature (S2) sensors. In superheat mode the controller will control the superheat to be stable and close to the superheat reference. If superheat is too low the flow in the expansion is decreased and superheat will be higher

Figure: Superheat control application



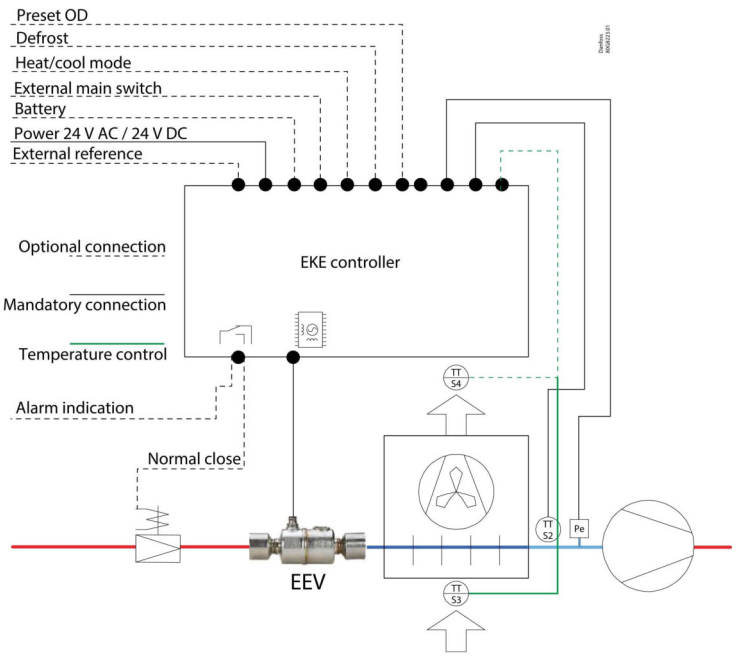
Temperature controller the temperature control is an ON/OFF thermostat that opens/closes the stepper valve or modulating thermostat that regulates temperature more smoothly following a temperature reference point. The temperature control can be accomplished via a signal from temperature sensor S3 placed in the air flow before the evaporator or S4 placed in the air flow after the evaporator

EKE has 2 methods of controlling temperature:

- ON/OFF thermostat
- Modulating thermostat (MTR)

The need for cooling can either be defined by the incoming media (S3) or the outgoing media (S4) temperature

Figure: Temperature control application



NOTE:

EKE1A can only work in the driver mode or superheat control mode as it supports only one temperature sensor input

Ordering

Product code numbers

Material Description	Packing format	Code number
EKE 1A Superheat controller	Multi pack	080G5300
EKE 1B Superheat controller	Multi pack	080G5350
EKE 1D Superheat controller	Multi pack	080G5360
EKE 1C Superheat controller	Multi pack	080G5400

Accessories code numbers



080G0075

Electron. control accessories, ACCCBI Cable, U.I. 1.5m, MCX series

ACCCBI Cable, U.I. 1.5m, Used for product: MCX series, Packing format: Multi pack, Quantity per packing format: 100

Related products

080G5300 080G5350 080G5360 080G5400



080G0294

Control panel, MMIGRS2

Function: Programmable Controller, Supply voltage [V] AC: 24, Communication type: CANBUS, Packing format: Single pack, Quantity per packing format: 1

Related products

080G5300 080G5350 080G5360 080G5400



080Z0058

Electron. control accessories, AK-PS 130 STEP3 Accessory Power Supply, Power supply

AK-PS 130 STEP3 Accessory Power Supply, Used for product: Power supply, Packing format: Single pack, Quantity per packing format: 1

Related products

080G5300 080G5350 080G5360 080G5400



080G5555

Backup power module, EKE 2U

Supply voltage [V] AC: 24, Approval: UL; RoHS; CE, Max. current output/phase [A]: 2, Used for product: EKE 1A; EKD 316C; EIM 365; EKE 1D; MCX152V; EKE 1C; MCX061V; EKD 316; EKE 1B, Packing format: Multi pack

Related products

080G5300 080G5350 080G5360 080G5400



080Z0057

Electron. control accessories, AK-PS 063 STEP3 Accessory Power Supply, Power supply

AK-PS 063 STEP3 Accessory Power Supply, Used for product: Power supply, Packing format: Single pack, Quantity per packing format: 1

Related products

080G5300 080G5350 080G5360 080G5400



080Z0059

Electron. control accessories, AK-PS 250 STEP3 Accessory Power Supply, Power supply

AK-PS 250 STEP3 Accessory Power Supply, Used for product: Power supply, Packing format: Single pack, Quantity per packing format: 1

Related products

080G5300 080G5350 080G5360 080G5400



080G0073

Programming key, MMIMYK

Function: Programmable Controller, Supply voltage [V] AC: 24, Communication type: TTL; CANBUS; RS485; MODBUS, Packing format: Single pack, Quantity per packing format: 1

Related products

080G5300 080G5350 080G5360 080G5400



080Z0054

Electron. control accessories, DEL AK-PS 150, Accessory, Power Supply, Power supply

DEL AK-PS 150, Accessory, Power Supply, Used for product: Power supply, Packing format: Single pack, Quantity per packing format: 1

Related products

080G5300 080G5350 080G5360 080G5400

Overview

Product portfolio

Table: Portfolio overview

Features		EKE 1A	EKE 1B	EKE 1C	EKE 1D
Power supply:					
Power supply type	24 V AC / DC ± 20%	•	•	•	•
Battery backup input	18 – 24 V DC	•	•	•	•
Class of insulation		Class II			
Data communication					
MODBus	RS 485 RTU		•	•	
Wired CANbus				(4 wires)	(3 wires)
CANbus RJ 12	Danfoss MMI service port	•	•	•	•
Inputs:					
Number of temperature sensors		1	2	3	2
Temperature sensor types	PT1000			•	
	NTC 10K, type EKS	•	•	•	•
	NTC 10K, type ACCPBT	•	•	•	•
	NTC 10K, type Sensata	•	•	•	•
Number of pressure sensor		1	1	2*	1
Pressure transmitter types	Ratiometric 0.5 – 4.5 V	•	•	•	•
	Voltage signal 0 – 10 V	•	•	•	•
	Current signal 0 – 20 mA			•	
Share pressure signal	Hardware (Up to 5 devices)	•	•		•
	Via wired CANbus (not possible to share ratiometric sensor)			•	•
	Via MODbus		•	•	
Number of external references		1	1	1	1
External reference	0 – 20 mA			•	
	User defined current			•	
	0 – 10 V	•	•	•	•
	0 – 5V	•	•	•	•
	User defined voltage (max 10V)	•	•	•	•
Digital input dry contact		3	2		
Outputs					
Digital output		1			
Relay	Normally open	3A General purpose, 250V ac, 100k			
	Normally closed	2A General purpose, 250V ac, 100k			

Relay function	Alarm relay or LLSV (Liquid Line Solenoid Valve)				
User interfaces	Koolprog software tool	•	•	•	•
	MMIGRS2 screen	•	•	•	•
	Master controller		•	•	•

*The 2nd pressure sensor is mounted on AI4

Functions

Operation

The EKE 1x products supports a wide range of functionalities illustrated in table 3 and 4. Check the user guide for more detail about configurations and other detailed options.

Table: Hardware functions

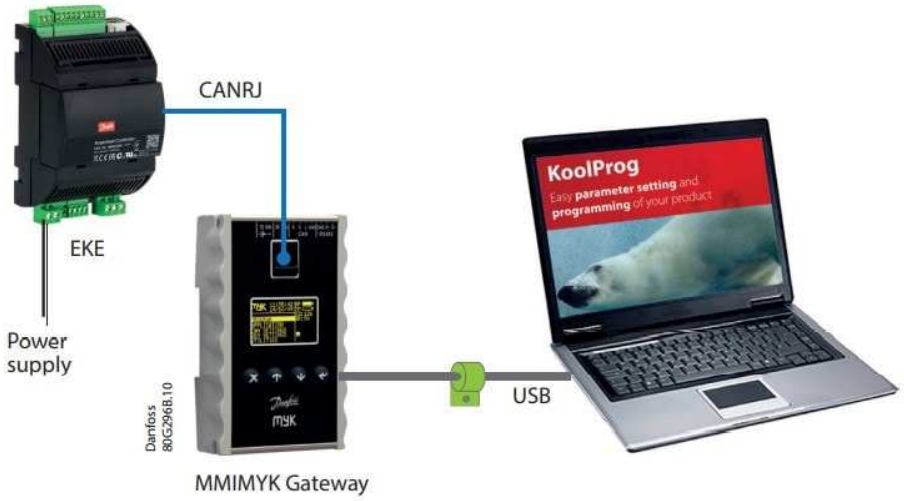
Hardware functions		
Digital inputs	Used to interact with the EKE for systems where the EKE is not connected to a system controller via data communication. The available digital inputs DI can be used for the following functions: **a.** Injection control ON/OFF(DI1). **b.** Defrost sequence (DI2). **c.** Heating and cooling selection mode (DI2) **d.** Preset OD (DI2)	
Digital output (Relay)	• The relay for the liquid line solenoid valve will operate when refrigeration is required • The contact of the relay is closed in alarm situations and when the controller is de-energized. • The digital output DO1 O013 can be configured for solenoid valve, max capacity or for alarm function.	
	NC1+C1	
	Power On	NO
	Power On +Alarm	NC
	Power Off	NC
	NO1+C1	
	Power On	NC
	Power On +Alarm	NO
	Power Off	NO
Handling power failure	For safety reasons the liquid flow to the evaporator must be cut off in case of power failure. The valve's stepper motor will remain open in power failure situation There are two ways of coping with this situation, one of the following two solutions can be applied in the system • Mounting of a solenoid valve in front of EEV (using LLSV relay signal from EKE) • Mounting of a battery backup for EEV valve (Use Danfoss EKE 2U)	
Analog Inputs	External reference signal used for: • Driving the stepper motor valve to a desired opening degree (Driver mode) • Displacing temperature reference, superheat reference or max OD The voltage signal e.g., 0 – 10 V can be used in all EKE controllers whereas current signal e.g., 0 – 20 mA signal is only available in EKE 1C	
Communication: RS485 Modbus / CANbus	The controller can be provided with data communication for connecting to other devices in the systems. In this case, monitoring and data collection can be performed from one device i.e., PLC – which will be beneficial for the diagnostic or during the installation processes. For example, it is possible to substitute the physical sensors of the EKE controller by writing sensor values via Bus. The frequency of update should be according to the Modbus maximum update interval G004 (Refer to parameter list)	

Light-emitting diodes (LEDs)	Two sets of light emitting diodes make it possible to follow the operation status of the valve and the controller. They indicate the following • Power/data transmission and alarm/error indication • Stepper valve operational status
	LED status: **Red constant** valve is closed **Green constant** valve is fully open **Flashing red** valve is moving in close direction **Flashing green** valve is moving in open direction **Flashing red and green** error

User Interface

KoolProg is a software tool that can configure the EKE Controllers in fast and easy way
The main features of the KoolProg are listed as follows

- Make online changes to parameter configurations
- Monitor live status of inputs and outputs
- Quickly analyze controller behavior. and program patterns by using the graphical trending tool. KoolProg Software is available for download free of charge at http://koolprog.danfoss.com. The customer will first be guided through a registration process before download can commence



NOTE:
For updated EKE software versions it is required to install the latest KoolProg software versions to have the full compatibility to guarantee a reliable USB connection to a host device (e.g. industrial PC), you must: keep USB cable length < 1 m. Kool Prog software do not support multiple EKE controllers in a daisy chain network. EKE must be powered up before starting programming. The user must make the program for EKE based on the product version and software version. EKE will not be programmed correctly if uploaded program with wrong version

Set parameters	Copy to device	On-line service
• Create your own configuration files on your PC without having to connect a controller • Import a parameter configuration file to your PC from a connected controller. Save the file and download it to other controllers of the same model • Select the most frequently used parameters as your favorites • Find all the technical documentation for each controller model within one location	• Quickly program one. or multiple controllers by using the progress and completion status indicators	• Quickly analyze controller behavior and program patterns by using the graphical trending tool • Make online changes to parameter configurations • Monitor live status of inputs and outputs

User interface Display MMIGRS2

MMIGRS2 is a remote interface that connects with EKE controller through the CAN RJ or CANbus network. All the information about the user interface is loaded inside the EKE controller; that's why there is no need of programming the MMIGRS2 interface. MMIGRS2 is powered externally or from the controller which it is connected to and automatically shows its user interface.

Figure: MMIGRS2 Display connection with EKE

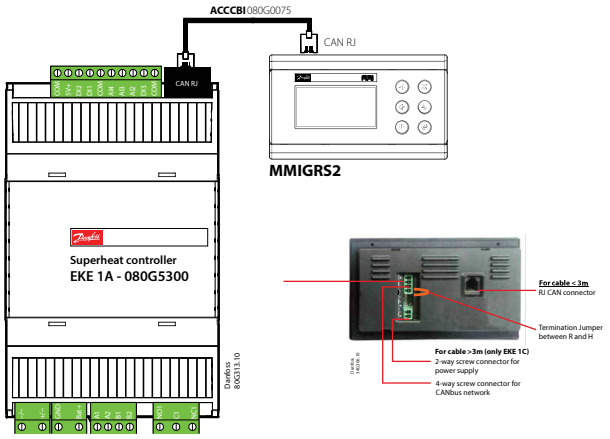
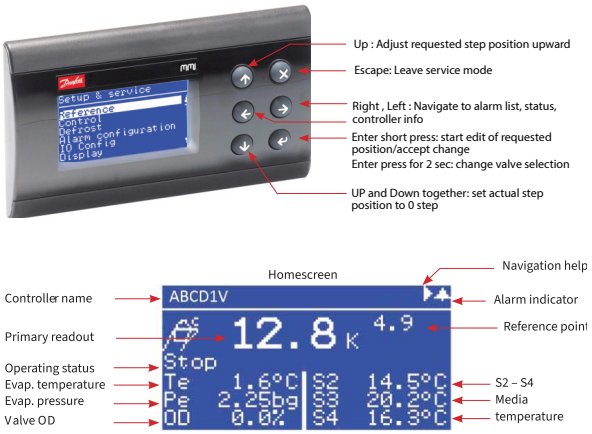


Figure: MMIGRS2 Main screen



On the main screen the following data are displayed:

- The main analog inputs measurements or other information
- The icon indicating if unit is operating in superheat mode or temperature mode
- Shows the status of the controller
- The alarm or service icon

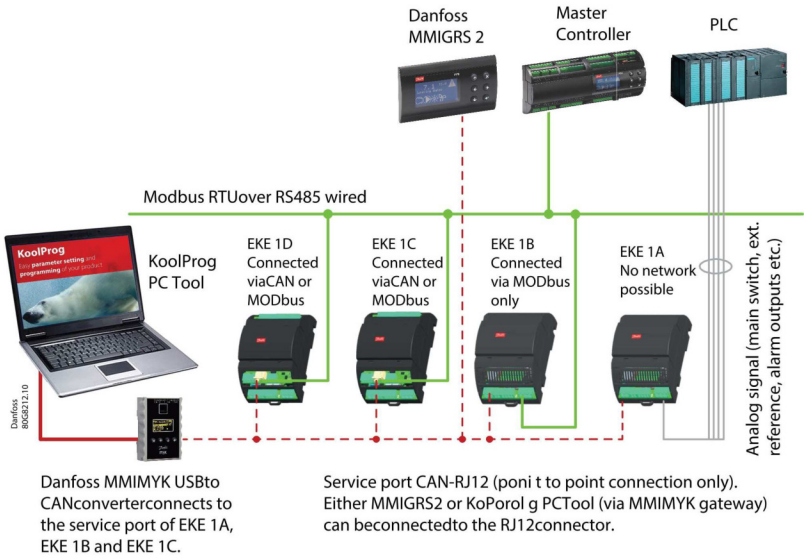
NOTE:
When MMI is not connected to EKE via telephone cable the autodetection feature of the EKE CAN address will not work. Therefore, check the following MMIGRS2 setting: 1) enter BIOS menu pressing and holding X + Enter keys for 5 s 2) select "MCXselection"->" Manual Mode" and set the CAN address of the EKE you wish to connect to.

NOTE:
To use EKE 1x controllers with MMI using RJ 12 cable, the CAN R and H terminals behind MMI should be shorted. If CAN wired connections are used, the first and the last node in the CAN connection should be terminated using 120-ohm resistor

Operation system master

EKE 1x superheat controller can be interfaced with a system master the over the network or via analog or digital signals. The master could be e.g., a Danfoss MCX controller or a PLC system

Figure: EKE controller operation with system master



Alarms

Table: Alarms

Label	Alarm Name	Modbus PNU	Bit Number	CAN Index	CAN Subindex	Bit Number (CAN)
E100	Valve configuration error	1901	8	5507	6C	0
E101	Configuration error	1901	9	5507	6C	1
E102	Sensor supply overload	1901	10	5507	6C	2
E024	S2 suction pipe sensor error	1901	11	5507	6C	3
E025	S3 media inlet sensor error	1901	12	5507	6C	4
E026	S4 media outlet sensor error	1901	13	5507	6C	5
E020	Pe evaporator transmitter error	1901	14	5507	6C	6
E121	Pc condenser transmitter error	1901	15	5507	6C	7
E019	External reference signal alarm	1901	0	5507	6C	8
E011	No refrigerant selected	1901	1	5507	6C	9
E103	No valve configured	1901	2	5507	6C	10
E122	Shared signal timeout	1901	3	5507	6C	11
E128	Ext. ref. signal timeout	1901	4	5507	6C	12
A997	Battery critical low voltage	1901	5	5507	6C	13
A996	Battery too high voltage	1901	6	5507	6C	14
W001	Battery low voltage	1901	7	5507	6C	15
A994	Low S4 media outlet temperature	1902	8	5507	6C	16
A993	High temperature	1902	9	5507	6C	17
A992	Low temperature	1902	10	5507	6C	18
A991	High evaporation pressure (MOP)	1902	11	5507	6C	19
A990	Low evaporation pressure (LOP)	1902	12	5507	6C	20
A989	High condensing temperature	1902	13	5507	6C	21
A988	High superheat	1902	14	5507	6C	22
A987	Low superheat	1902	15	5507	6C	23
A986	Lack of valve capacity	1902	0	5507	6C	24
W002	Standby mode	1902	1	5507	6C	25

W003	Manual control	1902	2	5507	6C	26
E104	SH ref. too close to SH close setpoint	1902	3	5507	6C	27
E105	LOP setpoint too close to MOP setpoint	1902	4	5507	6C	28
E129	No sensor configured for S4	1902	5	5507	6C	29
E106	No sensor configured for S3	1902	6	5507	6C	30
E107	SH min higher than SH max	1902	7	5507	6C	31
E108	OD min higher than OD max	1903	8	5507	6E	0
E109	No transmitter configured for Pc	1903	9	5507	6E	1
E114	Check valve step mode vs positioning	1903	10	5507	6E	2
E115	Valve speed too fast	1903	11	5507	6E	3
E116	Valve speed too slow	1903	12	5507	6E	4
E117	Valve emergency speed too fast	1903	13	5507	6E	5
E118	Valve emergency speed too slow	1903	14	5507	6E	6
E119	Valve start speed too slow	1903	15	5507	6E	7
A999	DI1 unstable input	1903	0	5507	6E	8
A998	DI2 unstable input	1903	1	5507	6E	9
A983	DI3 unstable input	1903	2	5507	6E	10
E125	AI5 can't operate with AKS sensor	1903	4	5507	6E	12
E126	Valve short circuit or driver too hot	1903	5	5507	6E	13
A982	Thermostatic signal missing	1903	6	5507	6E	14
A981	SH control signal missing	1903	7	5507	6E	15
E123	Low supply voltage	1904	8	5507	6E	16
E132	No sensor configured for S2	1904	9	5507	6E	17
E133	No transmitter configured for Pe	1904	10	5507	6E	18
E134	Ext. ref configuration error	1904	11	5507	6E	19
E135	DI H/C can't operate with the thermostat	1904	12	5507	6E	20
A984	PWR backup module failure	1904	13	5507	6E	21
A985	Replace PWR backup module	1904	14	5507	6E	22

Settings

Table: Control functions

Valve Driver	The EKE controls the opening degree of the valve, the control signal can be an analog signal or a value via communication bus
Superheat reference calculation	**Fixed superheat** the controller keep the superheat at a fixed reference value determined by the user. SH fixed setpoint can be varied according to the need of application.
	Minimum Stable Superheat (MSS): The superheat control algorithm will attempt to regulate the superheat down to the lowest stable value between the minimum superheat setting, "Min SH" and the maximum superheat setting, "Max. SH".
	LoadAP Superheat LoadAP is a kind of preprogrammed MSS curve. In Load ap application, SH reference follows a defined curve as shown in the diagram. This two-point curve is defined by SH max and SH min, this method will give a robust SH reference and can in many cases be the best fit for systems.
	Delta temp. superheat SH reference is calculated as a ratio between the media temperature and evaporator temperature. This reference mode is only possible if media temperature (S3) sensor is available and if the system uses fin and tube evaporator.
Temperature control *	EKE has a feature to regulate the temperature control. This can be done with either
	Thermostat cut in/cut out function: if temperature is above the set point + differential, cooling is started with maximum cooling capacity. In maximum capacity superheat is controlled to be on superheat set point. Cooling is active until the temperature is below set point.
	Modulating Thermostat (MTR): When temperature is getting close to the MTR reference the cooling capacity gradually reduce so that the temperature can be stable on the MTR reference and the superheat will be floating.
Protection functions	**Failsafe operation:** During operation if sensors error occurs, the valve position can be set to full close, fixed
	opening degree or average calculated OD as required.
	Superheat close: When the superheat is below a set minimum value, the valve will close faster to protect the compressor from the risk of getting liquid in the suction line and bring the superheat back to superheat reference.
	Maximum Operating Pressure (MOP): To reduce the strain on the compressor, a maximum operating pressure is set. If the pressure comes above this limit the controller will control the valve to provide a lower pressure instead of a low superheat.
	Low Operating Pressure (LOP): known as cold start feature, it allows applications such as heat pumps to operate at lower ambient conditions to prevent compressor from stopping due to low suction pressure in the startup phase.
	High Condensing temperature protection (HCTP):** High condensing temperature protection will make sure that the load on the condenser is reduced in case a too high condensing temperature is reached. This is done by limiting the valve opening degree.
	Minimum S4/leaving media (freeze protection) *: Lowers the flow in the expansion valve if temperature of leaving media out of the evaporator is below a minimum value set by the user.
Other functions	**Fast Start up:** Quickly open an EEV valve when compressor turns ON to prevent too low suction pressure as well as for faster stabilization of superheat or temperature set point. This can be ensured by setting either P-control, start opening degree with protection or fixed opening degree without protection. This start up condition is kept until the start time expire or superheat reaches at setpoint.
	Defrost sequence: The controller does not itself handle defrost of the evaporator. It is however possible to enter a special defrost sequence which will overrule the normal control of the valve.
	Manual control: The valve can be controlled manually by setting the desired opening degree via Analog signal or communication bus used for commissioning purpose. A special service mode is also available for service and testing purpose.
	Service mode: Service mode is designed to provide a very simple way of operating the valve for diagnostic and service purpose. There is neither application nor protection in this mode. The user can open and close the valve using simple button presses on MMIGRS2.

* Not available in EKE 1A

** Only Available EKE 1C

Product details

General data

Table: General specification

Feature	Description
Power supply	Galvanic isolation by switch mode power supply Input voltage rating (AC): 24 V AC ± 20 % (min.19.2 V AC – max. 28.8 V AC) Input frequency (AC): 50 / 60 Hz Input voltage rating (DC): 24 V DC (min. 20 – max. 40 V DC) Provides 5 W at 5 V and 15 V outputs isolated from the 24 V input Insulation between power supply and the extra-low voltage. Class of insulation class II
Power consumption	Total power consumption with following valve in operation and MMIGRS2 connected to the controller: CCMT 16 – CCMT 42: 15VA/10W ETS 8M (Bipolar), CCMT L ETS 6: 11 VA / 7.5W ETS 12C – ETS 100C: 20VA / 14W KVS C: 20VA / 14W ETS 12.5 – ETS 400 7 VA / 5W CCMT 2 – CCMT 8 7 VA / 5W CTR 20: 7 VA / 5W
Plastic housing	• DIN rail mounting complying with EN 50022 • Self-extinguishing V0 according to IEC 60695-11-10 and glowing / hot wire test at 960 °C according to IEC 60695-2-12 • Material used for enclosure are UL94-V0 and RoHS compliant • Ball test: 125 °C according to IEC 60730-1 • Leakage current: ≥ 250 V according to IEC 60112
Connectors	• Plug able screw connector Pitch 3.5 mm, relay and power connector pitch 5 mm, CAN MMI: Modular Jack 6P4C • Material used for connectors are RoHS and UL approved

Table: Electrical specification

Feature	Type	Description
Protection	Short circuit	Motor driver: dissipative over current protection
	Over voltage	Analog input: current limit and internal clamp diode digital input: current limit and internal clamp diode Communication: transceiver IC
	Over temperature	Motor driver: thermal shutdown at 150 °C
	Unstable digital input	Continuous variation of the digital input state

Table: Input/Output

I/O	Type	Specifications
Analog inputs		• Max. 15 V input voltage • Open circuit HW diagnostics available for voltage input on: AI3, AI4 (EKE 1C) AI4 (EKE 1A and EKE 1B). ⚠**WARNING :** Do not connect voltage sources without current limitation (overall 80 mA) to analog inputs while unit is not powered.
	0 – 5 V	EKE 1C (AI3, AI4) and EKE1A/1B/1D AI3 | Accuracy ± 40 mV, resolution 1.2 mV.
	0 – 10 V	EKE 1C (AI3, AI4) and EKE1A/1B/1D AI3 | Accuracy ± 50 mV, resolution 2.5 mV.
	0 – 20 mA (EKE 1C only)	Accuracy ± 100 µA, resolution 10 µA. Input resistance: <100 Ω
	NTC sensor	NTC temperature probes: 10 kΩ at 25 °C range: 300 kΩ to 100 Ω Accuracy: 50 – 120 °C: 1.5 K, -40 – 50 °C: 0.4 K, 0 °C: 0.2 K resolution: ≤ 0.1 K, ≤ 0.3 K (EKC 1C, AI5)
	Pt1000 sensor	Range: 723 Ω to 1684 Ω Accuracy: ≤ 0.5 K Resolution: ≤ 0.1K
	Pressure sensor	Type: Ratiometric • Accuracy: 1.6 % • Range: 0.5 – 4.5 V • Resolution: 1.2 mV • Supply voltage: 5 V DC / 15 mA, overload protection approximately 150 mA
Digital Input DI	Voltage free contacts	Steady current of 1 mA (EKE 1C only). A cut-in input will activate a function. Cleaning current of 100 mA at 15 V DC. On: RIL <= 300 Ω . Off: RIH >= 3.5kΩ. No destructive if Vbat + is connected to DI (only for DI on bottom pcb). Min. pulse time 64 ms.
Digital output (D01)	Relay	Normally open: 3 A general purpose, 250 V AC, 100 k cycle normally open: 3 A Inductive (AC-15), 250 V AC, 100 k cycle normally closed: 2 A general purpose, 250 V AC, 100 k cycle
Stepper motor	Bipolar stepper motor output	Other valves: • Speed 10 – 400 pps • Drive mode full step, half step, 1/8 microstep • Max. peak phase current: 1.2 A (848 mA RMS) • Max. output power 12 W

Battery backup		VBATT: 18 – 24 V DC: Leakage: <15 µA @30 V DC Optional: critical low alarm below 12V Optional: low alarm at 17 V, high voltage alarm at 27 V The valve will not close at power fail if voltage is higher than 27 V Required power to do 1 closing of stepper valve: ETS 6: 110 J / 30 VmAh ETS 12.5 – ETS 400: 60 J / 17 VmAh KVS 15 / KVS 42: 60 J / 17 VmAh ETS 12C – ETS 100C: 55 J / 15 VmAh KVS 2C / KVS 5C: 55 J / 15 VmAh CCMT 2 – CCMT 8: 60 J / 17 VmAh CCMT 16 – CCMT 42: 175 J / 49 VmAh CTR 20: 60 J / 17 VmAh **NOTE:** Danfoss recommends using EKE 2U as a battery backup
Communication	RS-485 RTU (only for EKE 1B and 1C)	Galvanic isolation. No Built-in termination. Supported commands with max. of 50 ms response time: 0 x 03, 0 x 04, 0 x 06 Supported commands without defined max response time: 0x08, 0x10, 0x14, 0x15, 0x2b
	CAN	• EKE 1A/1B: CANOpen over RJ12 connector. • EKE 1C: CANOpen over CAN 4pin terminal and RJ12 connector. • EKE 1D: CANOpen over CAN 3pin terminal and RJ12 connector. **NOTE:** • For EKE EKE 1A/1B, RJ12 connector is used directly connect and supply a user interface MMI • Refer to the user guide for information about type of connection cables

Identification

Product label is positioned in the front of the product

Figure: Example EKE 1C



Example: EKE 1C

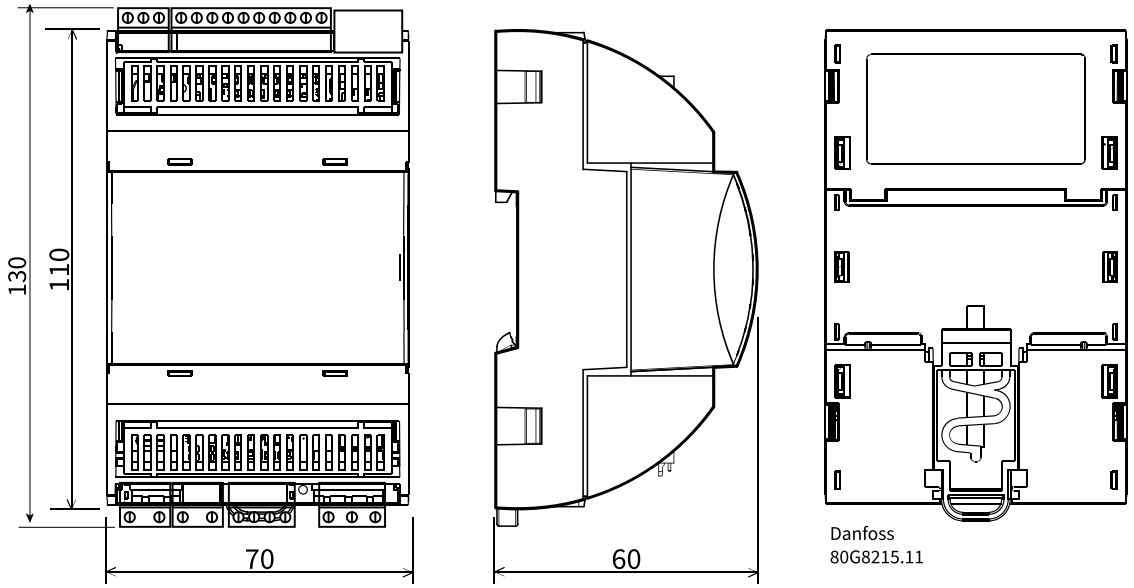
Performance and environmental conditions

Table: Environmental conditions

Feature	Description
Operating conditions	-20 – 60 °C, 90% RH non-condensing
Storage / transport conditions	-30 – 80 °C, 90% RH non-condensing
Vibration and shock	According to IEC 60068-2-27 Ea
Integration	In class I and / or II appliances
Index of protection	IP40 only on the front cover (General IP20)
PCB protection	None (no conformal coating)
Period of electric stress across insulating parts	Long
Resistance to heat and fire	Category D
	Immunity against voltage surges category II
Approvals	CE compliance: This product is designed to comply with the following EU standards: • Low voltage guideline: 2014/35/EU • Electromagnetic compatibility EMC: 2014/30/EU and with the following norms 1. EN61000-6-1. EN61000-6-3, (immunity and emission standard for residential. commercial and light industrial environments) 2. EN61000-6-2. EN61000-6-4, (immunity and emission standard for industrial environments) 3. EN60730-1 and EN60730-2-9 (Automatic electrical controls for household and similar use) • RoHS compliance to 2011/65/EU and no components from negative list acc. to 500B0751

Dimensions

Figure: EKE 1A, EKE 1B, EKE 1C, EKE 1D dimensions



Net weight:

- EKE 1C: 170 g
- EKE 1A / EKE 1B / EKE 1D: 130 g

Connections

Figure: EKE 1A connectors

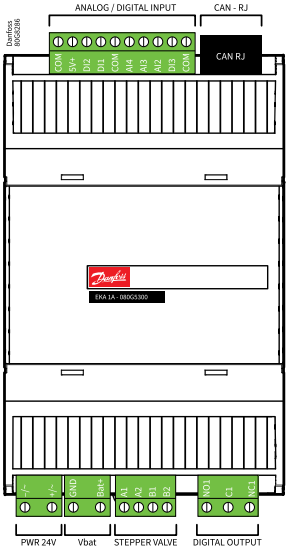


Figure: EKE 1B connectors

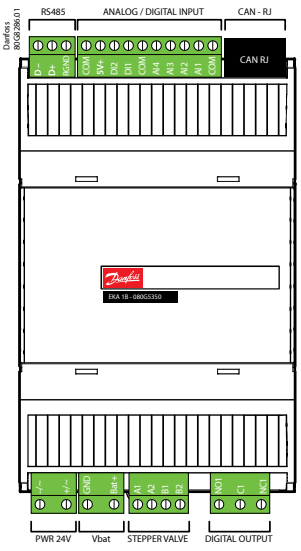


Figure: EKE 1D connectors

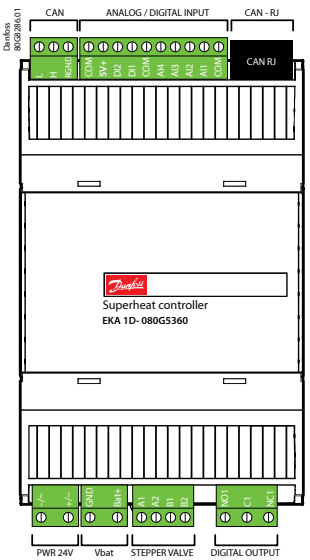


Figure: EKE 1C connectors: Front

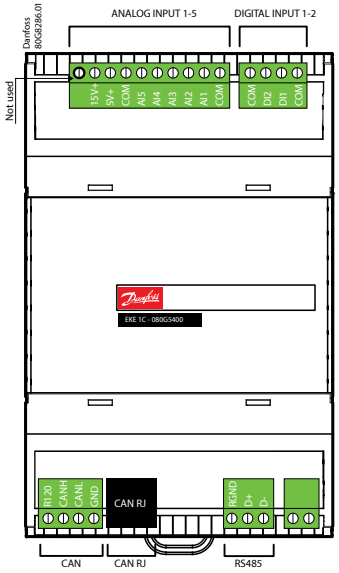


Figure: EKE 1C connectors: Back

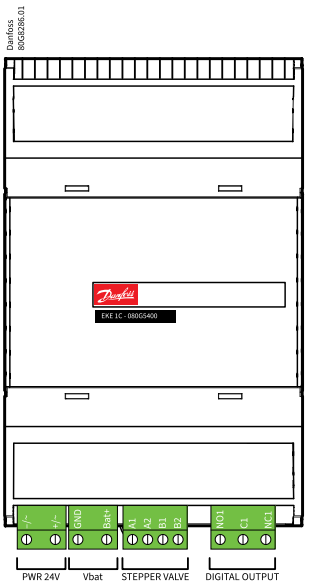


Figure: EKE 1A connection overview

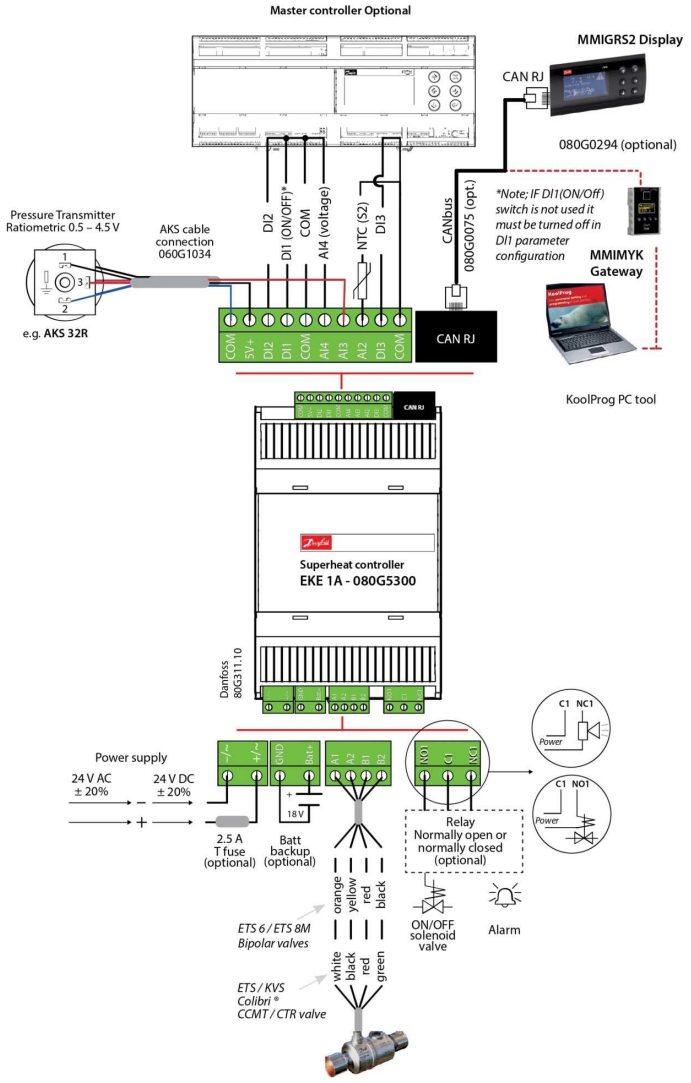


Table: EKE 1A pinout

COM	**Common**	
DI3	Digital input 3	Software configurable DI
AI2	Analog input NTC 10K	S2
AI3	Analog inputs 0 – 5 V / ratiometric pressure transmitter	Pe
AI4	analog inputs 0 – 10 V	External Reference signal
COM	Common	
DI1	Digital input 1	Main switch (hardware)
DI2/3	Digital input 2 and 3	Software configurable DI
5V+	Power output for ratiometric pressure transmitter 0 – 5V	
COM	Common	

NOTE: If DI1(On/Off) switch is not used it must be short circuited

Figure: EKE 1B connection

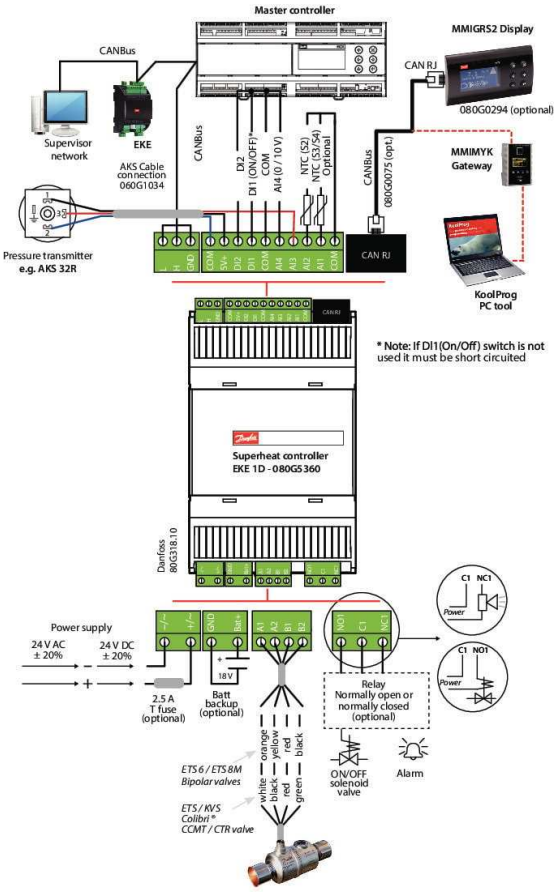


Table: EKE 1B pinout

COM	Common	
AI	Analog inputs NTC 10K	S3/S4 selectable via software
AI2	Analog input NTC 10K	S2
AI3	Analog inputs 0 – 5 V / ratiometric pressure transmitter	Pe
AI4	analog inputs 0 – 10 V	External reference signal
COM	Common	
DI1	Digital input 1	Main switch (hardware)
DI2/3	Digital input 2 and 3	Software configurable DI
5V+	Power output for ratiometric pressure transmitter 0 – 5V	
COM	Common	

NOTE: If DI1(On/Off) switch is not used it must be short circuited

Figure: EKE 1C - Front board connection overview

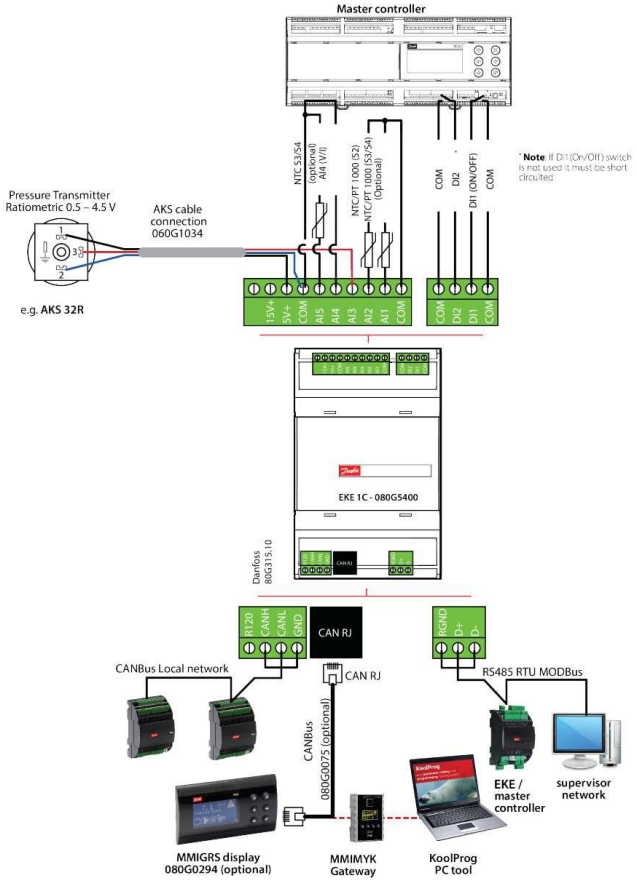
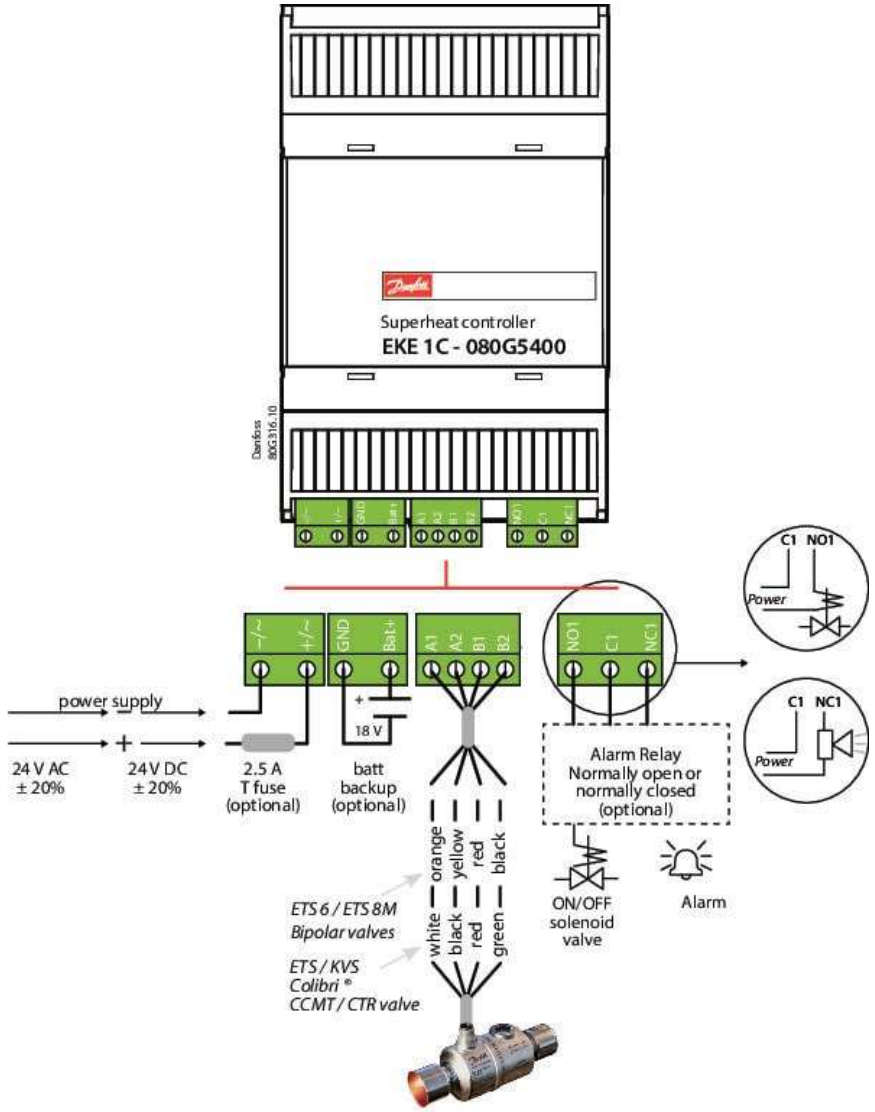


Table: EKE 1C pinout

COM	Common	
AI1	Analog inputs temperature NTC 10K / PT1000	S3/S4 selectable via software
AI2	Analog inputs temperature NTC 10K / PT1000	S2
AI3	Analog inputs voltage / current	Pe
AI4	Analog inputs voltage / current	Ext. Ref. or Pc
AI5	Analog inputs NTC temperature	S3/S4 selectable via software
COM	Common	
5V+	Power outputs for ratiometric pressure transmitter 0 – 5V	
15V+	Power output for current signal pressure transmitter	
DI1	Digital input 1	Main switch (hardware)
DI2	Digital input 2	Software configurable DI
24V+	Not used in EKE 1C	
AO1	Not used in EKE 1C	

NOTE: If DI1(On/Off) switch is not used it must be short circuited

Figure: EKE 1C - Back board connection overview



Different types of 4 – 20 mA pressure transmitters need different supply levels. Check the guide bellow

Table: EKE 1C pressure transmitters range

User selection EKE connection	Signal	EKE Connection
Not defined	–	–
AKS 32R	Ratiometric 10 – 90%	5 V supply from EKE
112CP (Sensata)	Ratiometric 10 – 90%	5 V supply from EKE
OEM Ratio	Defined by parameters	5 V supply from EKE
NSK (Saginomiya)	Ratiometric 10 – 90%, 0.5 to 4.5 V	5 V supply from EKE
AKS 32 1 – 5 V	1 – 5 V	15 V supply from EKE
OEM Voltage	Defined by parameters	15 V supply from EKE
Bus shared	Via RS485 Modbus	–
AKS 32 1 – 6V	1 – 6 V	15 V supply from EKE
AKS 32 0 – 10V	0 – 10 v	15 V supply from EKE
AKS 33	4 – 20 mA	15 V supply from EKE
XSK (Saginomiya)	4 – 20 mA	15 V supply from EKE
OEM current	Defined by parameters	15 V supply from EKE

NOTE: EKE 1A/1B/1D only support ratiometric 0.5 to 4.5 V pressure transmitter

Figure: Connection for 4 – 20 mA

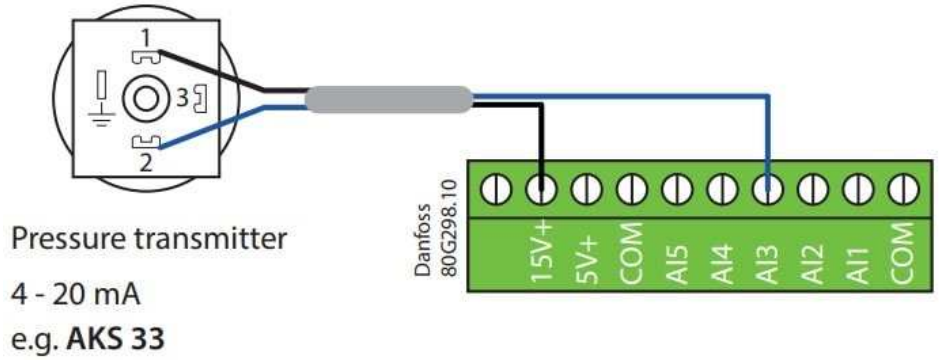


Figure: EKE 1D connection overview

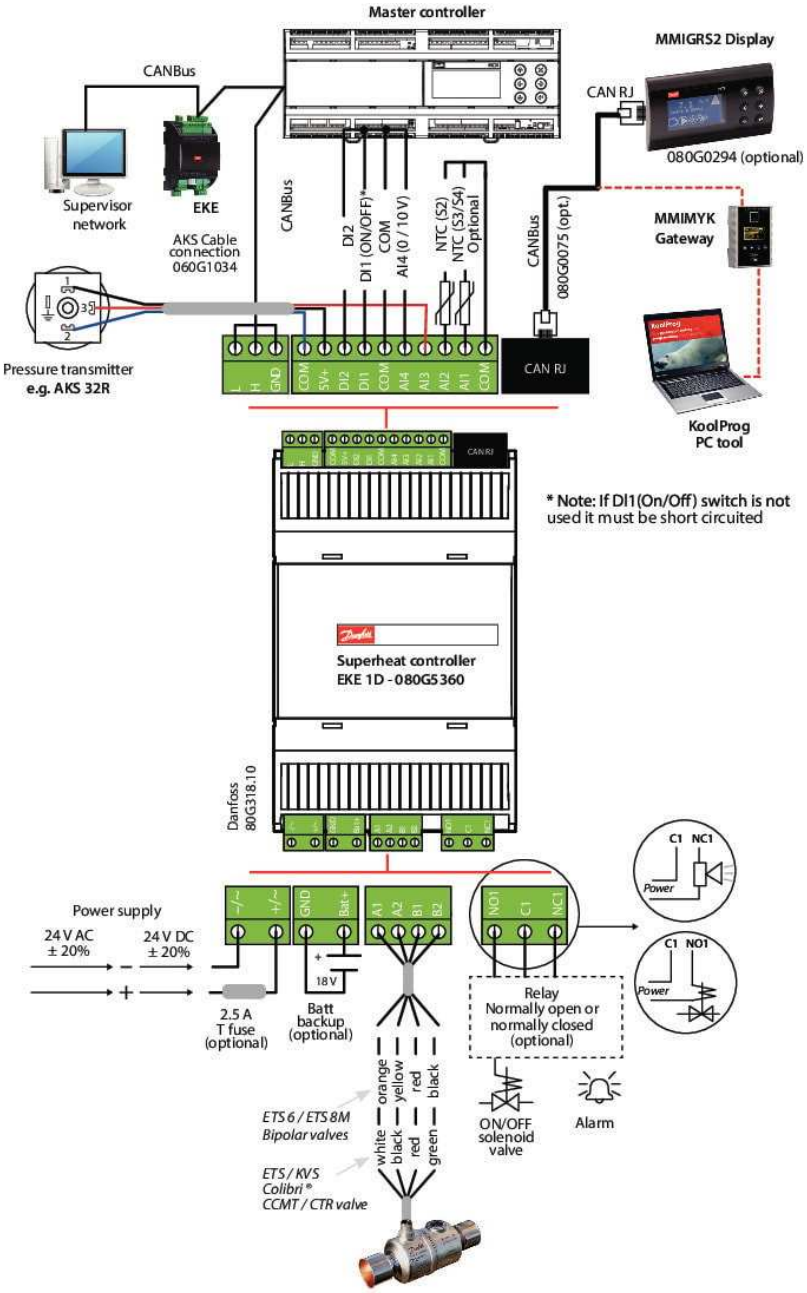


Table: EKE 1D pinout

COM	Common	
AI	Analog inputs NTC 10K	S3/S4 selectable via software
AI2	Analog input NTC 10K	S2
AI3	Analog inputs 0 – 5 V / ratiometric pressure transmitter	Pe
AI4	analog inputs 0 – 10 V	External reference signal
COM	Common	
DI1	Digital input 1	Main switch (hardware)
DI2/3	Digital input 2 and 3	Software configurable DI
5V+	Power output for ratiometric pressure transmitter 0 – 5V	
COM	Common	

Installation

Mounting

DIN rail 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

Figure: Mounting

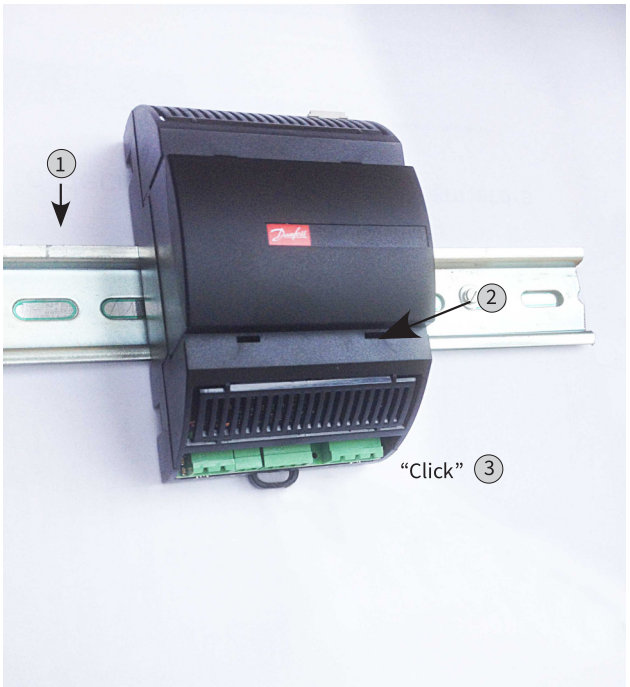
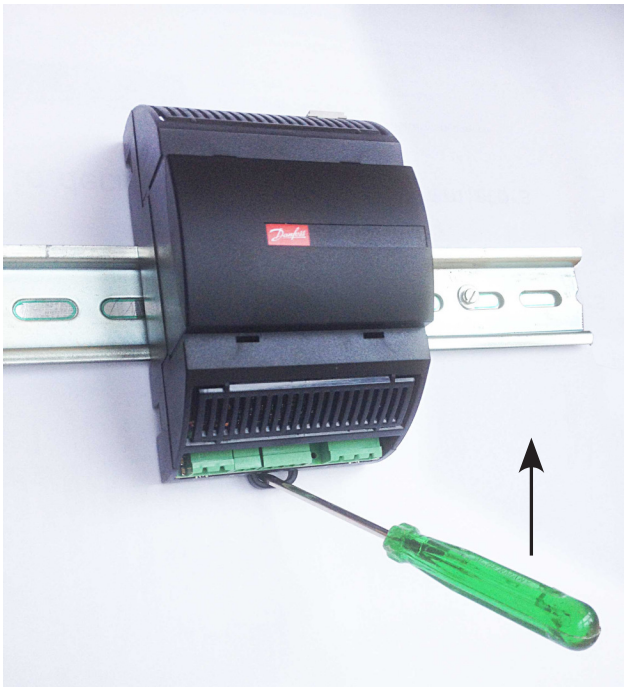


Figure De-Mounting



Certificates, declarations and approvals

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

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
Manufacturer's Declaration	Danfoss MD 080R1250.02	Danfoss	EAEU RoHS, EU RoHS
Export Control Declaration	Electronic Superheat Controller and Electronic Valve driver and injection controller	Danfoss	
UA Declaration	Danfoss UA 8537	Danfoss	UA RoHS
EAC Declaration	EAC KZ 7100841.13.12.01062	EAC - Eurasian Customs Union	EMC
Electrical Safety Certificate	EAC KZ 7100841.01.01.01245	EAC - Eurasian Customs Union	EMC, LVD
Manufacturer's Declaration	Manufacturers Declaration 080R5341-AA (EU 2023/2854)	Danfoss	
Manufacturer's Declaration	Information to the User in accordance with Article 3(2) and 3(3) of EU Regulation 2023/2854 (the Data Act) 080R5341 080R5341	Danfoss	Compliance misc. Standards
Electrical Safety Certificate	UL E31024	UL - Underwriters Laboratories inc.	
EU-UK Declaration	Danfoss EU-UK 080R4003.03	Danfoss	EMC, LVD

Contact details

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Danfoss offers a wide range of support along with our products, including digital information, software, mobile apps and expert guidance. See the possibilities below.

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