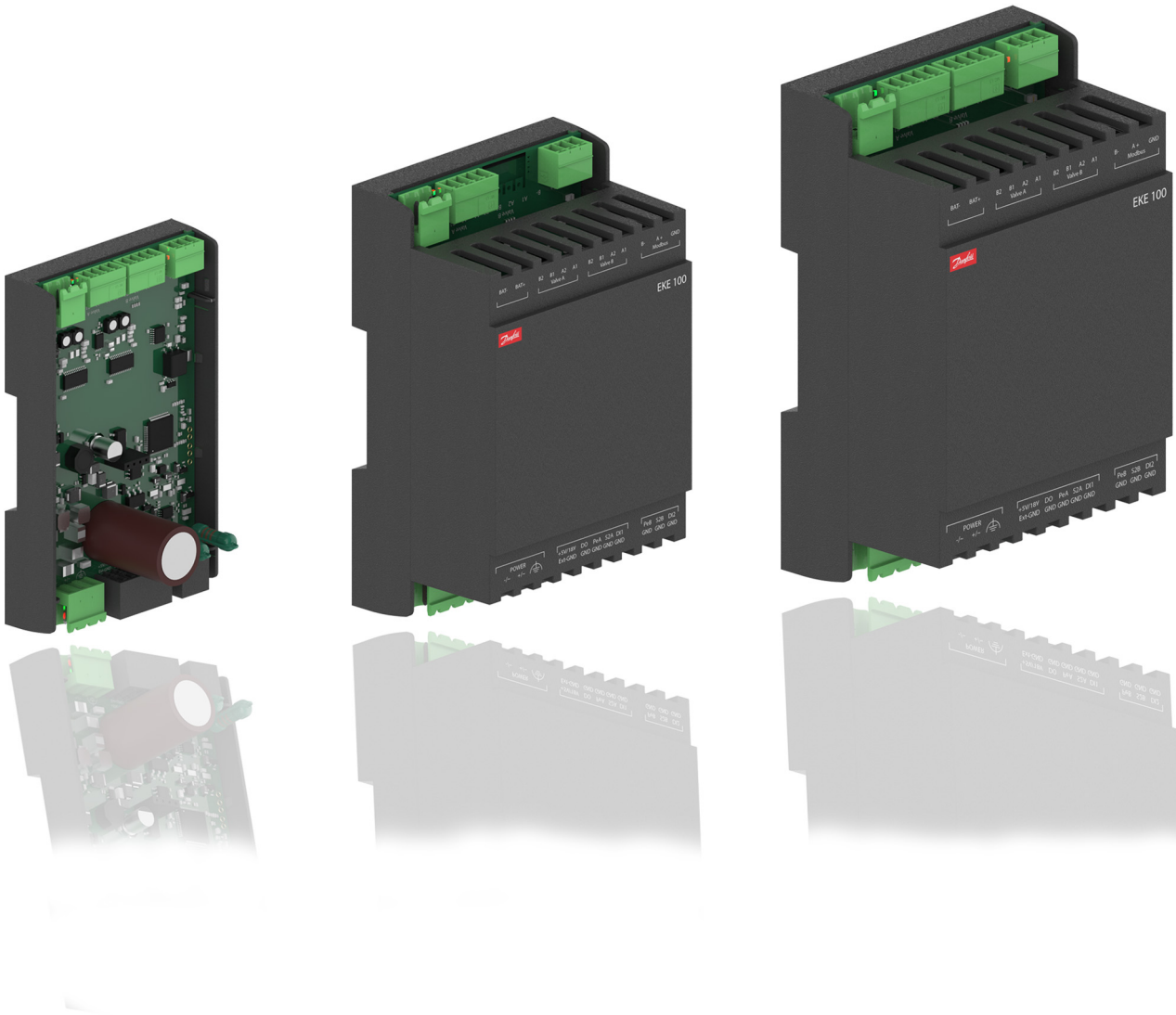
ENGINEERING
TOMORROW

User Guide

Superheat controller and stepper valve driver
Type **EKE 100** (PV03)

For air conditioning, commercial and industrial heat pumps, commercial refrigeration and food retail applications



Contents

1 Introduction

The flexible pre-programmed EKE 100 superheat controller and stepper valve driver from Danfoss provides ultimate software control, allowing you to tailor the performance of your system to your exact requirements. EKE 100 is ideal for controlling a wide range of air conditioning, heat pumps, commercial refrigeration and food retail applications, such control helps you to achieve the highest efficiency in the system. EKE 100 is generally used where there is a requirement for accurate control of superheat or as stepper valve driver. 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.

Typical applications

- Chillers
- Processing plant / Cabinet cooling
- A/C plant / Air conditioning
- Commercial and Industrial heat pumps
- Transport cooling
- Close control systems
- Stepper Motor Driver

2 Portfolio overview

Table 1: EKE 100 1V variant (1 valve output)

Hardware Features	EKE 100 1V		
Code number	080G5050	080G5051	080G5052
Power Supply			
Power supply	24 V AC/DC(1), 50/60 Hz, SELV (2)	24 V AC/DC(1), 50/60 Hz, SELV(2)	24 V AC/DC(1), 50/60 Hz, SELV(2)
Battery backup support	Yes	Yes	Yes
Battery backup Input (Danfoss recommends EKE 2U)	24 V DC	24 V DC	24 V DC
Valve Support			
Number of valve outputs	1 stepper motor valve	1 stepper motor valve	1 stepper motor valve
Valve type	Bipolar	Bipolar	Bipolar
Data Communication			
Modbus RS485 RTU	Yes	Yes	Yes
Baud rate (default setting)	19200	19200	19200
Mode (default setting)	8E1	8E1	8E1
Node (default setting)	1	1	1
Sensor support for SH control			
No of temperature sensors	1	1	1
Type of temperature sensors	PT 1000/NTC 10K	PT 1000/NTC 10K	PT 1000/NTC 10K
List of temperature sensors	PT1000, NTC 10K 3435, EKS 221, ACCPBT NTC10K, MBT 153 10K, 112CP, AKS, NTC10K G	PT1000, NTC 10K 3435, EKS 221, ACCPBT NTC10K, MBT 153 10K, 112CP, AKS, NTC10K G	PT1000, NTC 10K 3435, EKS 221, ACCPBT NTC10K, MBT 153 10K, 112CP, AKS, NTC10K G
No of Pressure transmitter (3)	1	1	1
Type of pressure transmitter (3)	Ratiometric 0.5 - 4.5 V DC , 0-10 V DC, Current 4-20 mA	Ratiometric 0.5 - 4.5 V DC , 0-10 V DC, Current 4-20 mA	Ratiometric 0.5 - 4.5 V DC , 0-10 V DC, Current 4-20 mA
List of pressure transmitter (3)	DST P110 standard, DST P310 Ratio, DST P310 current, AKS 32R, AKS 32 1-5 V, AKS 32 1-6 V, AKS 32 0-10 V, AKS 33, AKS 3000, ACCPBP Ratio, ACCPBP current, 112CP, NSK, XSK, OEM ratio, OEM voltage, OEM current	DST P110 standard, DST P310 Ratio, DST P310 current, AKS 32R, AKS 32 1-5 V, AKS 32 1-6 V, AKS 32 0-10 V, AKS 33, AKS 3000, ACCPBP Ratio, ACCPBP current, 112CP, NSK, XSK, OEM ratio, OEM voltage, OEM current	DST P110 standard, DST P310 Ratio, DST P310 current, AKS 32R, AKS 32 1-5 V, AKS 32 1-6 V, AKS 32 0-10 V, AKS 33, AKS 3000, ACCPBP Ratio, ACCPBP current, 112CP, NSK, XSK, OEM ratio, OEM voltage, OEM current
Digital Input			
No of digital inputs	1	1	1
Use of digital input (1 function per input)	Start/Stop regulation, Heat/Cool mode, Battery backup health signal (SOH)	Start/Stop regulation, Heat/Cool mode, Battery backup health signal (SOH)	Start/Stop regulation, Heat/Cool mode, Battery backup health signal (SOH)
Digital outputs			
Number of digital outputs (Open Collector, max sink current 10mA)	1	1	1
User interface			
Display	No	No	Integrated
PC suite	KoolProg	KoolProg	KoolProg
Gateway to PC suite	EKA 200 + EKE 100 service cable	EKA 200 + EKE 100 service cable	EKA 200 + EKE 100 service cable
Installation and IP			
IP rating	00	20	20
Mounting	35 mm DIN rail	35 mm DIN rail	35 mm DIN rail
Environmental Conditions			
Storage temperature	-30 – 80 °C / -22 – 176 °F	-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	-20 – 70 °C / -22 – 158 °F
Humidity	<90% RH, non-condensing	<90% RH, non-condensing	<90% RH, non-condensing

(1) The unit is suitable for use on a circuit capable of delivering not more than 50A RMS (symmetrical Amperes)

(2) For US and Canada, use class 2 power supply

(3) By default the power supply for pressure transmitter is set for 0V. Supply will change to 5V if pressure transmitter is selected as ratiometric and 18V if selected as current type. Supply can be changed manual by selecting it in parameter P014 in advanced I/O configuration. When using 2 valve model both terminals will always supply the same voltage.

Table 2: EKE 100 2V variant (2 valve output)

Hardware Features	EKE 100 2V		
Code number	080G5055	080G5056	080G5057
Power Supply			
Power supply	24 V AC/DC[4], 50/60 Hz, SELV[5]	24 V AC/DC[4], 50/60 Hz, SELV[5]	24 V AC/DC[4], 50/60 Hz, SELV[5]
Battery backup support	Yes	Yes	Yes
Battery backup Input (Danfoss recommends EKE 2U)	24 V DC	24 V DC	24 V DC
Valve Support			
Number of valve outputs	2 stepper motor valves	2 stepper motor valves	2 stepper motor valves
Valve type	Bipolar	Bipolar	Bipolar
Data Communication			
Modbus RS485 RTU	Yes	Yes	Yes
Baud rate (default setting)	19200	19200	19200
Mode (default setting)	8E1	8E1	8E1
Node (default setting)	1	1	1
Sensor support for SH control			
No of temperature sensors	2	2	2
Type of temperature sensors	PT 1000/NTC 10K	PT 1000/NTC 10K	PT 1000/NTC 10K
List of temperature sensors	PT1000, NTC 10K 3435, EKS 221, ACCPBT NTC10K, MBT 153 10K, 112CP, AKS, NTC10K G	PT1000, NTC 10K 3435, EKS 221, ACCPBT NTC10K, MBT 153 10K, 112CP, AKS, NTC10K G	PT1000, NTC 10K 3435, EKS 221, ACCPBT NTC10K, MBT 153 10K, 112CP, AKS, NTC10K G
No of Pressure transmitter [6]	2	2	2
Type of pressure transmitter [6]	Ratiometric 0.5 - 4.5 V DC , 0-10 V DC, Current 4-20 mA	Ratiometric 0.5 - 4.5 V DC , 0-10 V DC, Current 4-20 mA	Ratiometric 0.5 - 4.5 V DC , 0-10 V DC, Current 4-20 mA
List of pressure transmitter [6]	DST P110 standard, DST P310 Ratio, DST P310 current, AKS 32R, AKS 32 1-5 V, AKS 32 1-6 V, AKS 32 0-10 V, AKS 33, AKS 3000, ACCPBP Ratio, ACCPBP current, 112CP, NSK, XSK, OEM ratio, OEM voltage, OEM current	DST P110 standard, DST P310 Ratio, DST P310 current, AKS 32R, AKS 32 1-5 V, AKS 32 1-6 V, AKS 32 0-10 V, AKS 33, AKS 3000, ACCPBP Ratio, ACCPBP current, 112CP, NSK, XSK, OEM ratio, OEM voltage, OEM current	DST P110 standard, DST P310 Ratio, DST P310 current, AKS 32R, AKS 32 1-5 V, AKS 32 1-6 V, AKS 32 0-10 V, AKS 33, AKS 3000, ACCPBP Ratio, ACCPBP current, 112CP, NSK, XSK, OEM ratio, OEM voltage, OEM current
Digital Input			
No of digital inputs	2	2	2
Use of digital input (1 function per input)	Start/Stop regulation, Heat/Cool mode, Battery backup health signal (SOH)	Start/Stop regulation, Heat/Cool mode, Battery backup health signal (SOH)	Start/Stop regulation, Heat/Cool mode, Battery backup health signal (SOH)
Digital outputs			
Number of digital outputs (Open Collector, max sink current 10mA)	1	1	1
User interface			
Display	No	No	Integrated
PC suite	KoolProg	KoolProg	KoolProg
Gateway to PC suite	EKA 200 + EKE 100 service cable	EKA 200 + EKE 100 service cable	EKA 200 + EKE 100 service cable
Installation and IP			
IP rating	00	20	20
Mounting	35 mm DIN rail	35 mm DIN rail	35 mm DIN rail
Environmental Conditions			
Storage temperature	-30 – 80 °C / -22 – 176 °F	-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	-20 – 70 °C / -22 – 158 °F
Humidity	<90% RH, non-condensing	<90% RH, non-condensing	<90% RH, non-condensing

[4] The unit is suitable for use on a circuit capable of delivering not more than 50A RMS (symmetrical Amperes)

[5] For US and Canada, use class 2 power supply

[6] By default the power supply for pressure transmitter is set for 0V. Supply will change to 5V if pressure transmitter is selected as ratiometric and 18V if selected as current type. Supply can be changed manual by selecting it in parameter P014 in advanced I/O configuration. When using 2 valve model both terminals will always supply the same voltage.

Table 3: Software Features for EKE100 1V and EKE100 2V

Software Features	EKE 100 1V	EKE 100 2V
SH control		
Minimum stable Superheat (MSS)	Yes	Yes
Load AP	Yes	Yes
Delta T	Yes	Yes
Fixed Superheat	Yes	Yes

Software Features	EKE 100 1V	EKE 100 2V
Startup Mode		
Proportional control	Yes	Yes
Fixed opening degree with Proportional control	Yes	Yes
Fixed opening degree without Proportional control	Yes	Yes
Thermostatic Mode		
Cut in/ Cut off	Yes[1]	Yes[2]
MTR	Yes[1]	Yes[2]
Limiter function and other modes		
Heating/Cooling Mode	Yes	Yes
Defrost function	Yes	Yes
SH Close function	Yes	Yes
MOP	Yes	Yes
LOP	Yes	Yes
External refence offset	Yes[1]	Yes[2]
Alarm Management		
Battery Alarm	Yes	Yes
Low Superheat alarm	Yes	Yes
High Superheat alarm	Yes	Yes
Open Circuit detection	Yes[3]	Yes[3]
Minimum S4 limitation	Yes[2]	Yes[2]

[1] Sensor value is avialable to be read via Modbus
[2] The input value for second temprerature/Pressure sensor is avialable to be read via modbus or use the EKE 100 2V variant ulitizing the second set of temperature/pressure ports with only 1 valve output
[3] Turn OFF open cirucit detection when using with ETS 6 valves

3 Application

EKE 100 can be used for the below modes:

- Superheat controller
- Valve driver
- Modbus controlled I/O

When using EKE 100 2V, it can be used in a combination of superheat controller and valve driver.

3.1 Superheat controller

In this mode EKE 100 acts as a superheat controller with minimum 1 Pressure and 1 temperature input per valve output.

There are multiple configurations possible in superheat mode:

- Superheat mode with DI start/stop
- Superheat mode with Modbus
- Superheat mode with Thermostat

Superheat controller with DI start/stop

In this mode EKE 100 will control the superheat based on minimum 1 temperature and pressure sensor. The input for start/stop of EKE 100 will be given through the DI input.

Table 4: Shows connections ports

Product Variant	Pressure sensor	Temperature sensor	Start/Stop
EKE 100 1V	PeA	S2A	DI1
EKE 100 2V	PeA and PeB	S2A and S2B	DI1 and DI2

Figure 1: See below example for EKE 100 1V

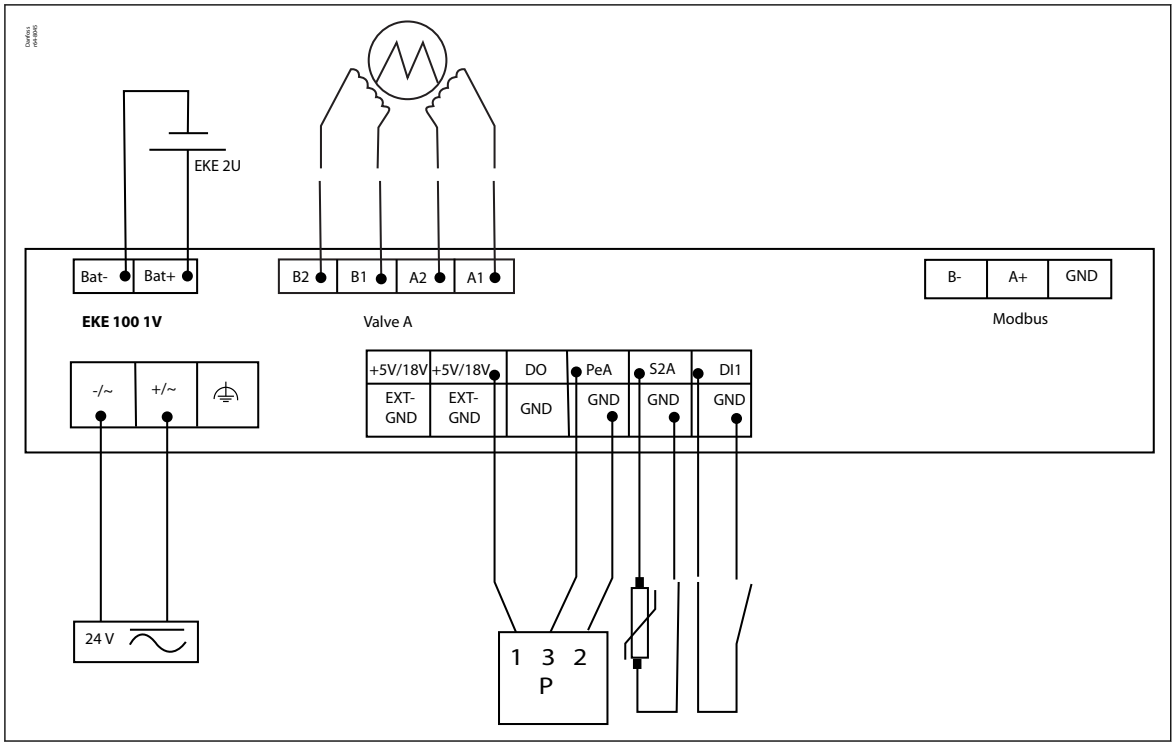
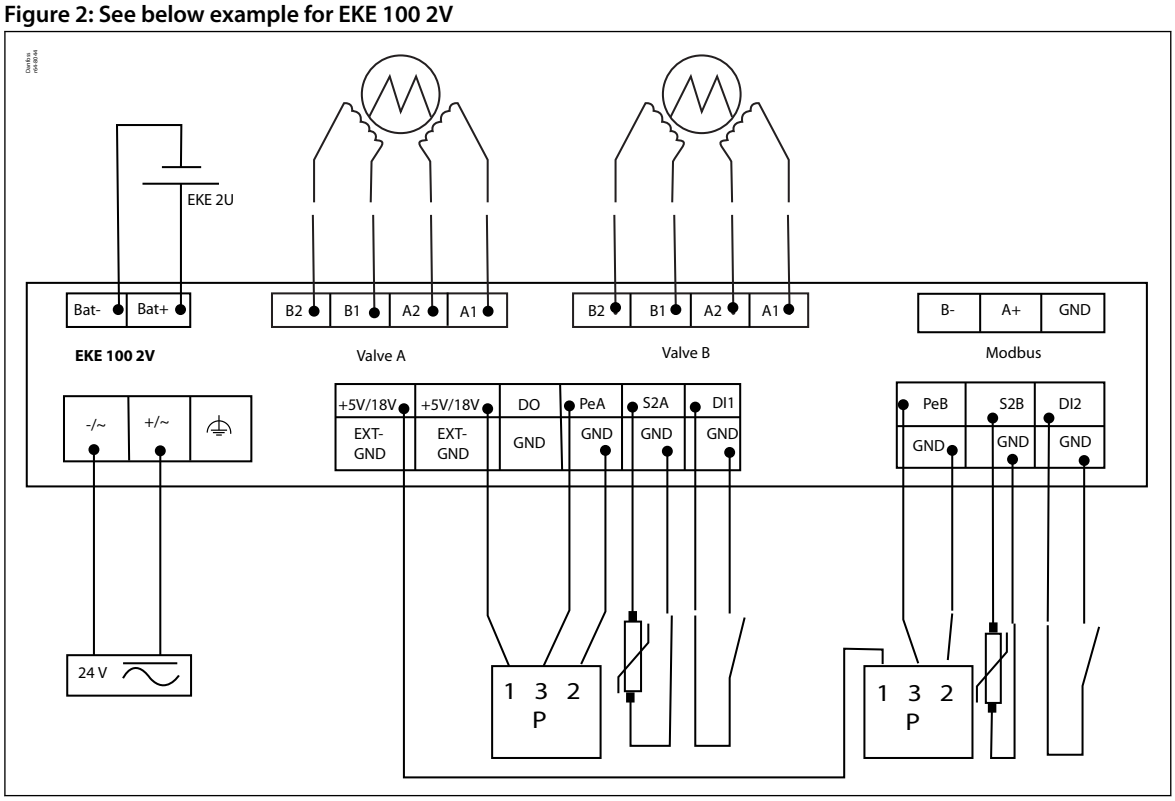


Figure 2: See below example for EKE 100 2V



NOTE:

DI is software configurable, by default it is start/stop function. This can be changed to Heat/Cool mode, Signal of health of Battery backup etc. Then in such cases it is important to use Modbus to communicate start/stop function to EKE 100.

If DI is not used, then it has to be configured in software as not used or short circuited physically.

Superheat controller with modbus

In this mode EKE 100 will control the superheat based on modbus inputs.

Table 5: Shows connections ports

Product Variant	Pressure sensor	Temperature sensor	Start/Stop
EKE 100 1V	PeA or Remote	S2A or Remote	DI1 or Remote
EKE 100 2V	PeA and PeB or Remote	S2A and S2B or Remote	DI1 and DI2 or Remote

Figure 3: See below example for EKE 100 1V

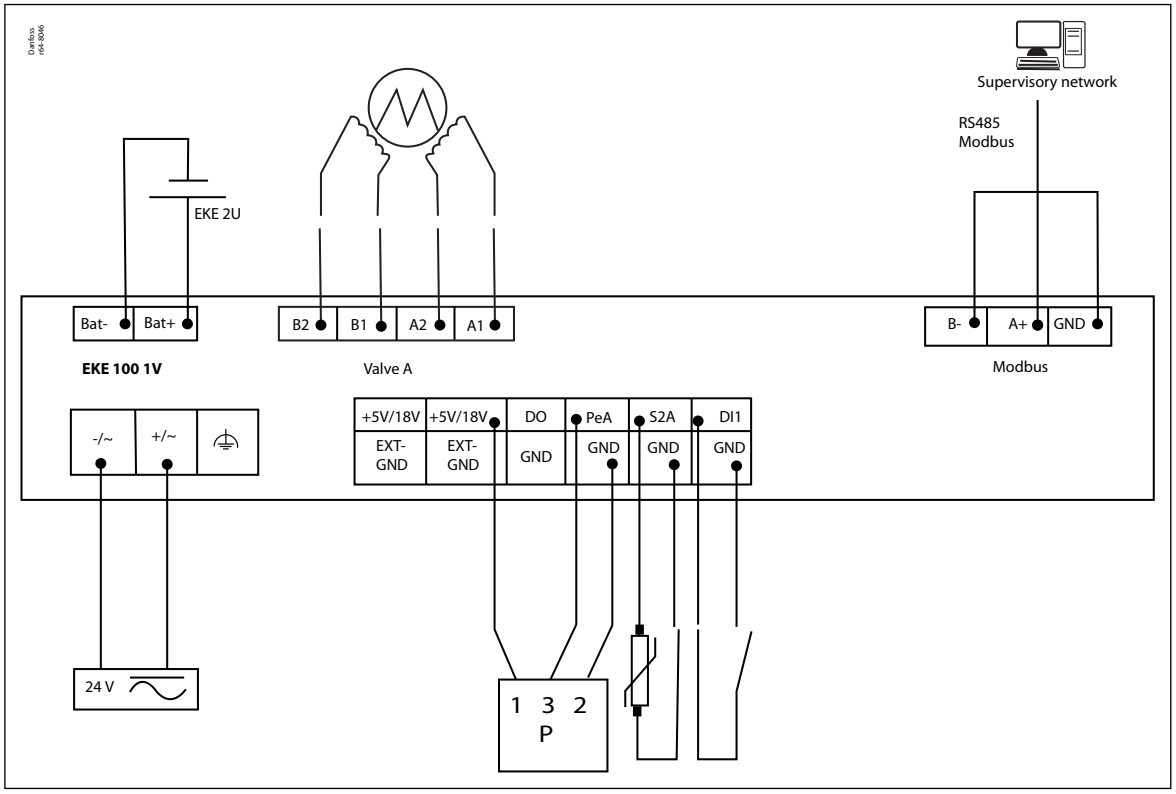
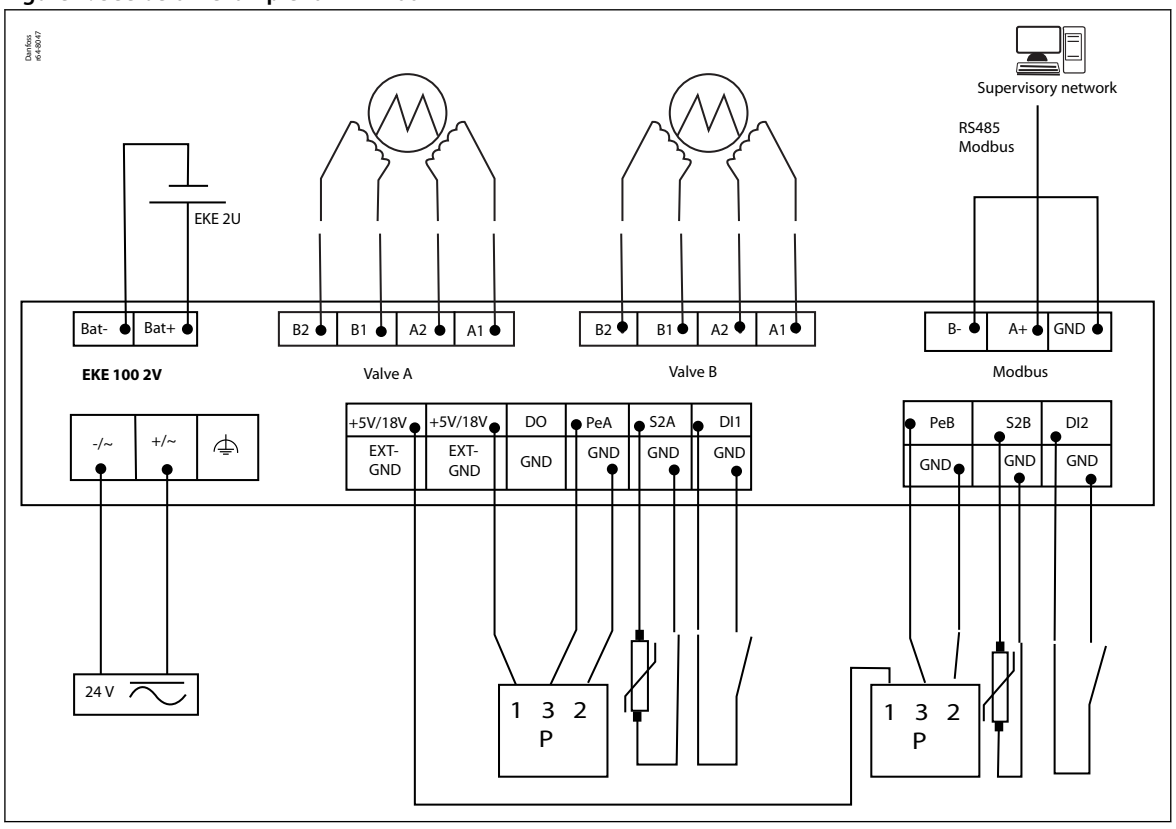


Figure 4: See below example for EKE 100 2V



NOTE:
EKE 100 must be configured as inputs to remote in software if not using physical signal.

Superheat mode with Thermostat

In this mode EKE 100 will control injection to evaporator based on cut-in/cut-off or Modulating thermostat regulation.

Table 6: Shows connections ports

Product Variant	Pressure sensor	Temperature sensor	Temperature sensor (S3 or S4)	Start/Stop
EKE 100 1V	PeA	S2A	Remote	DI 1 or remote
EKE 100 2V	PeA and PeB	S2A and S2B	Remote	DI 1 or remote
EKE 100 2V(*)	PeA	S2A	S2B	DI 1 or remote

(*) Only 1 valve output is available in this configuration.

Figure 5: See below example for EKE 100 2V with 2 valve output as thermostat

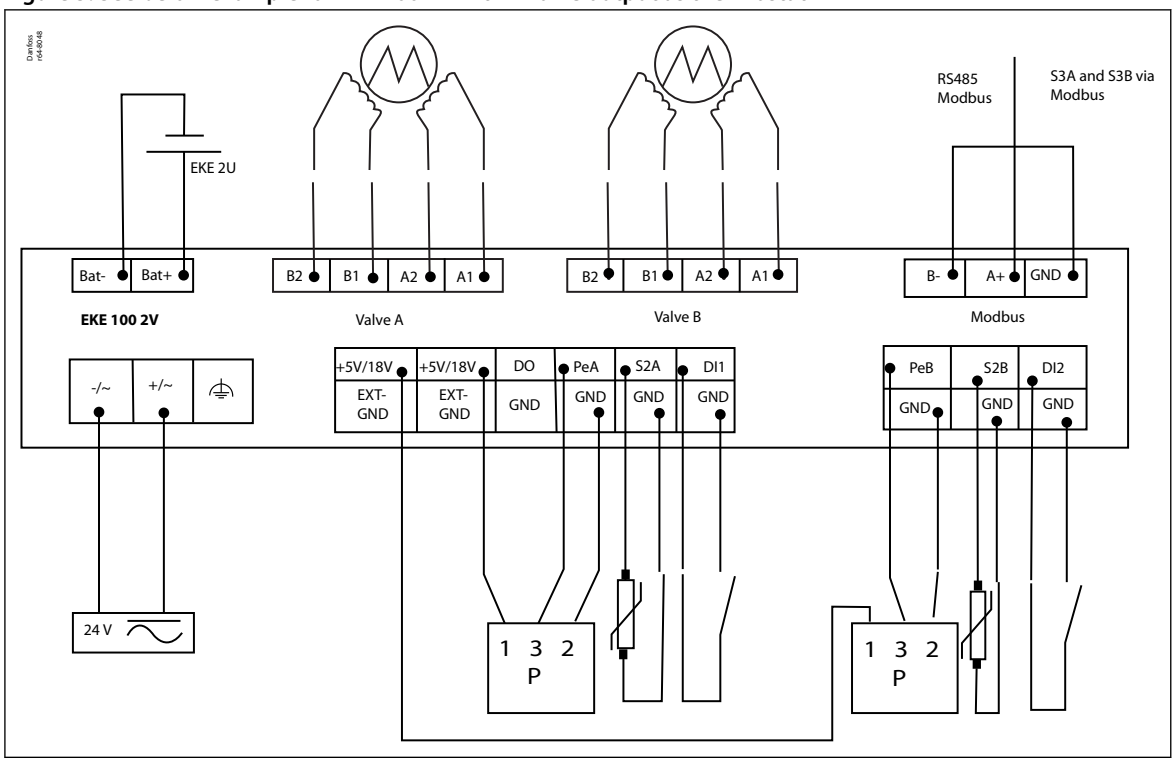
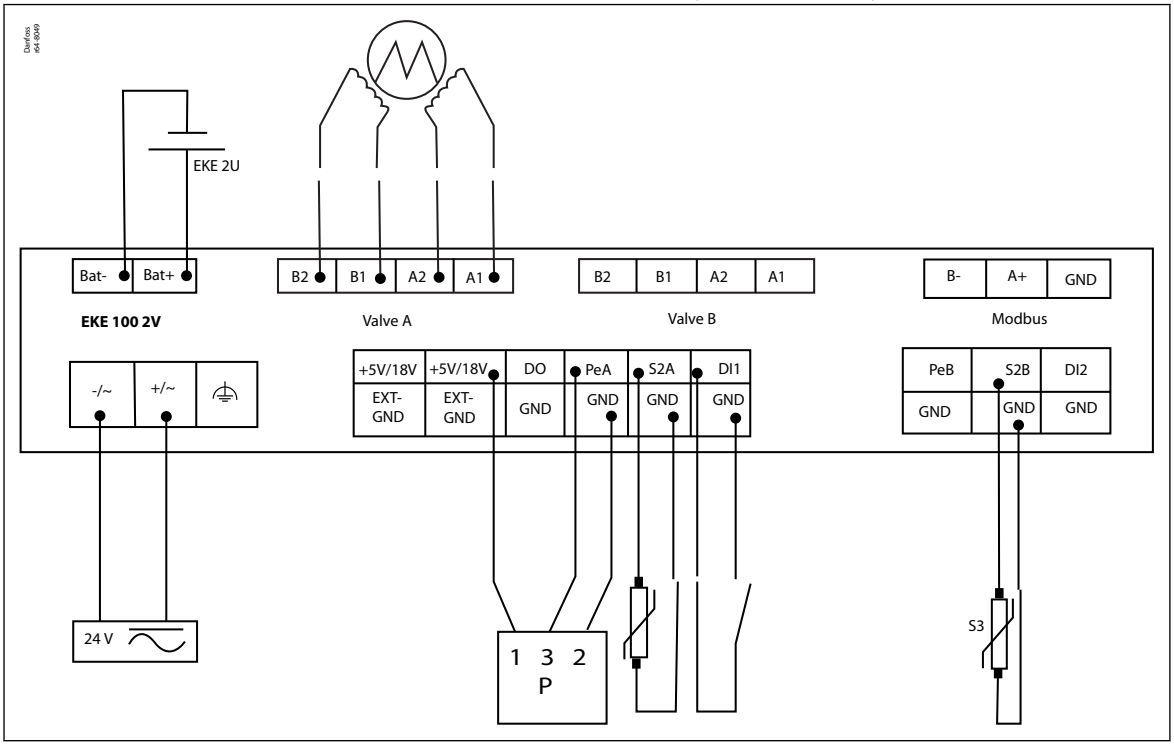


Figure 6: See below example for EKE 100 2V as thermostat using physical sensor (only 1 valve output possible)



3.2 Valve driver

In this mode EKE 100 acts as a valve driver based on external input (Analog or Modbus) from master controller

There are multiple configurations possible in driver mode:

- Driver mode with analog input
- Driver mode with Modbus

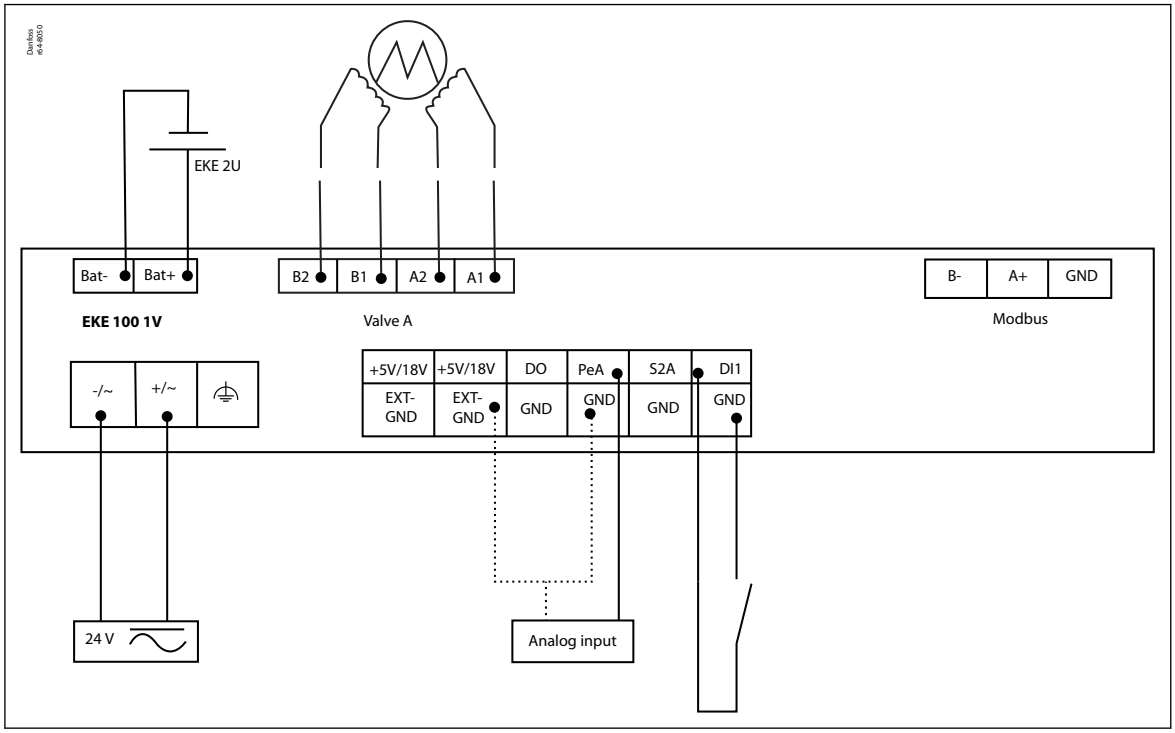
Driver mode with analog input

EKE 100 will drive the valve based on analog input from master controller. The analog input can be 0-10V or 0-20mA range.

Table 7: Shows use of connections ports for different configuration.

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 / Voltage B	GND + PeA	GND + PeB

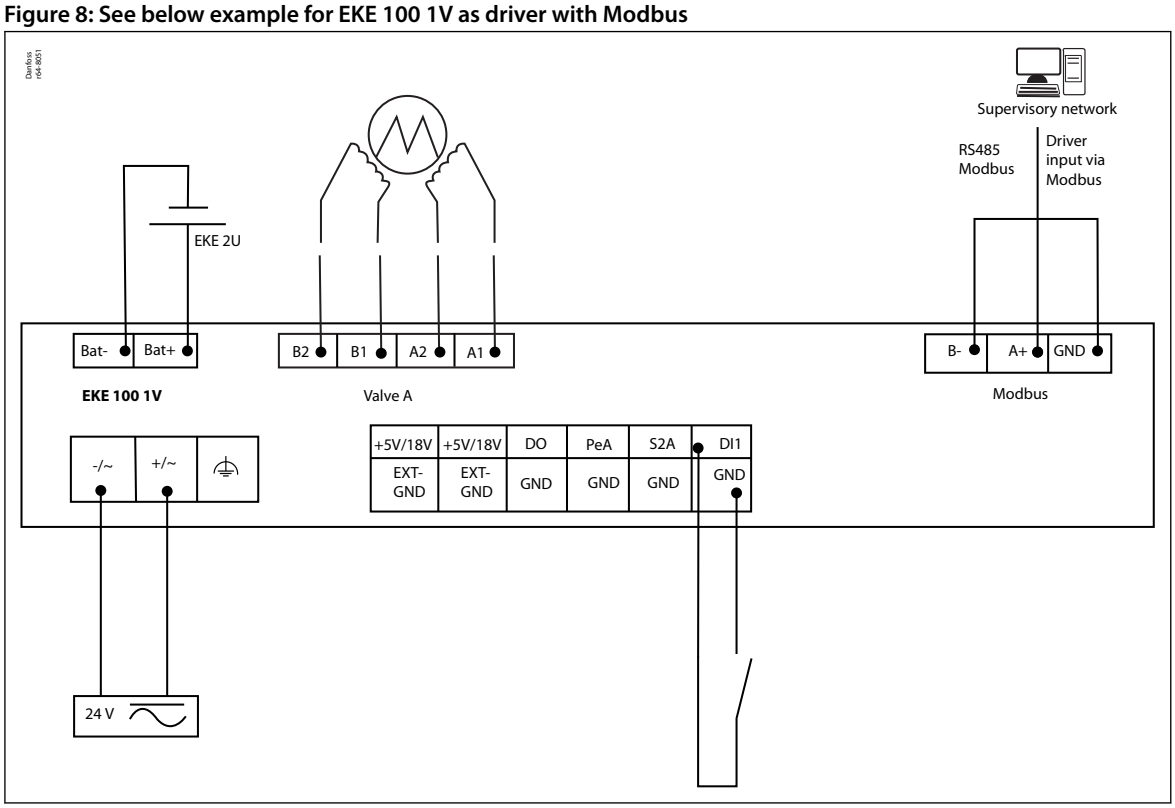
Figure 7: See below example for EKE 100 1V as driver with analog input



Driver mode with Modbus

EKE 100 will drive the valve based on input via Modbus from master controller. The opening degree of valve can be fed to EKE 100 using Modbus.

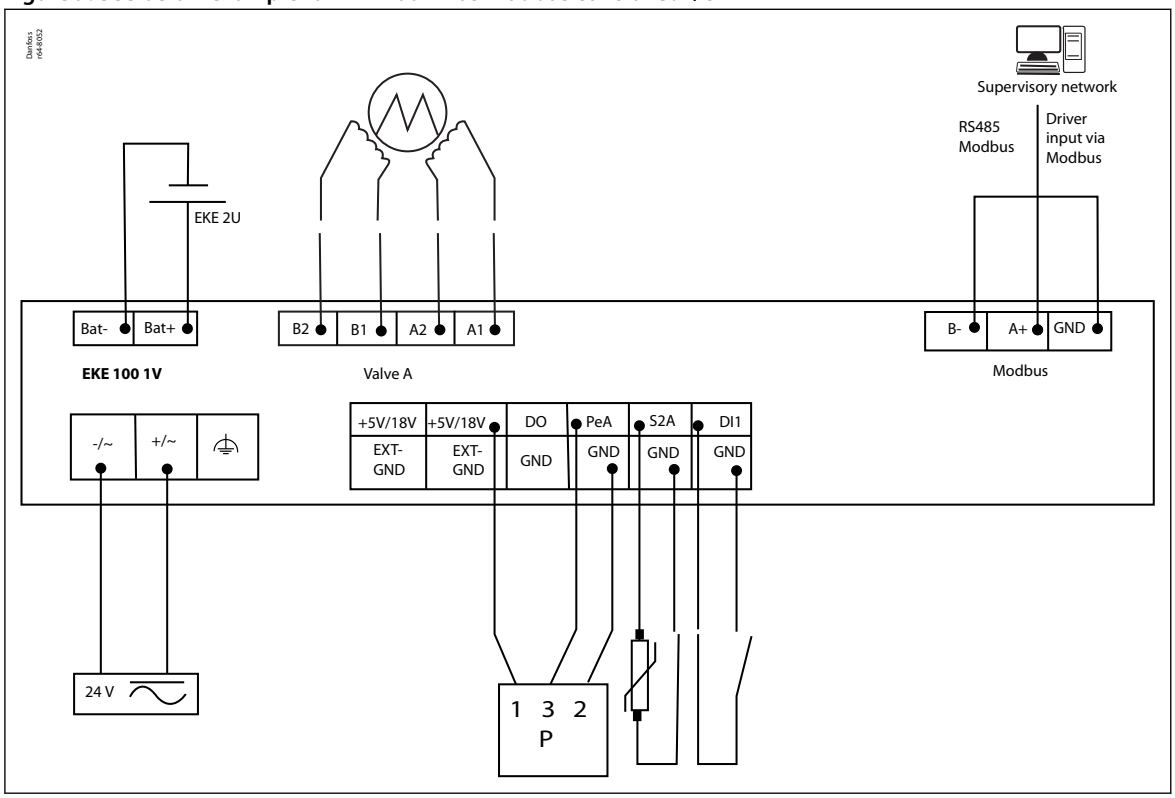
Figure 8: See below example for EKE 100 1V as driver with Modbus



3.3 Driver mode with Modbus and sensor (Modbus controlled I/O)

EKE 100 will act as valve driver, driving the valve based on input via Modbus from master controller. Pressure and temperature sensors can be connected to EKE 100. Master controller can read the pressure and temperature readings from EKE 100 via Modbus.

Figure 9: See below example for EKE 100 1V as Modbus controlled I/O



4 Configuration

AEKE 100 can be configured in below methods:

Offline programming

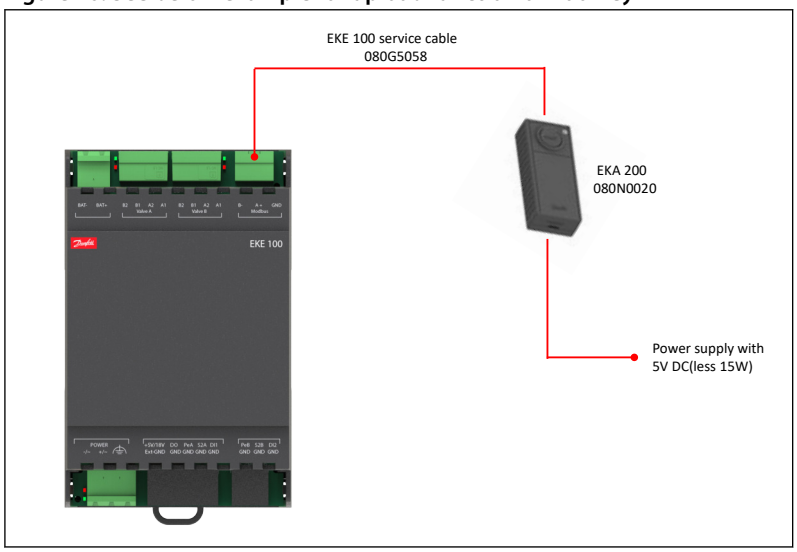
Tools required: KoolProg PC tool, KoolKey(EKA 200), EKE 100 service cable

User can create configuration file using KoolProg PC tool. The configuration file can then be saved from PC to KoolKey(EKA 200) and then uploaded to EKE 100 via EKE 100 service cable. A mobile power bank or power source with 5V(<15W) is required as power input for KoolKey(EKA 200)

To configure or program the EKE 100, a 24V power supply is required.

WARNING:
User must check the software version of EKE 100 and create configuration file in Koolprog for that version. Configuration made with the wrong software version should not be copied to the controller.

Figure 10: See below example for upload function of KoolKey



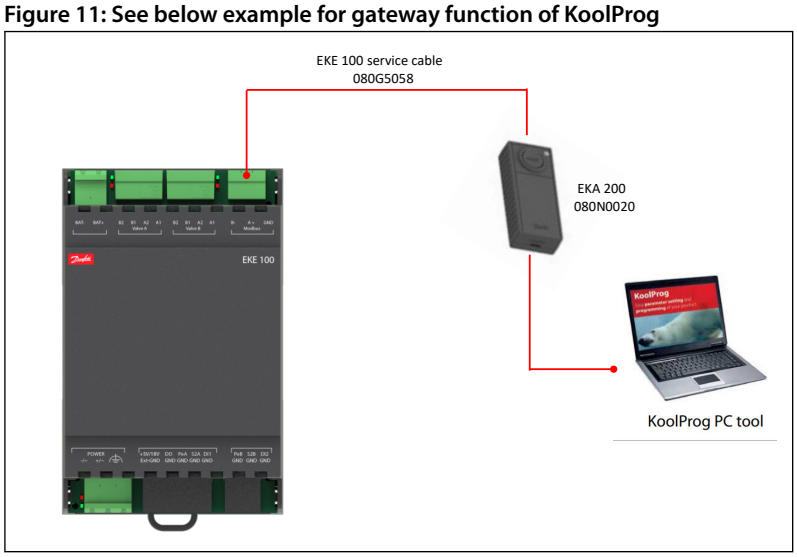
Online programming

Tools required: KoolProg PC tool, KoolKey(EKA 200), EKE 100 service cable

User can edit configuration of EKE 100 using KoolProg PC tool connected to EKE 100 with KoolKey(EKA 200) and EKE 100 service cable. The configuration can also be saved for future in PC. Help texts are available in KoolProg PC tool to help user in creating configurations.

To configure or program the EKE 100, a 24V power supply is required.

Figure 11: See below example for gateway function of KoolProg



This method of programming can also be used to read real time errors and warnings in the product and help in troubleshooting.

Using KoolProg PC tool

KoolProg is a software tool that can configure the EKE Controllers in fast and easy way. Detailed explanation of parameters and help text is provided while using KoolProg. Explanation on alarms and possible troubleshooting is also available for users. The main features of the KoolProg are listed as follows:

Table 8: Features and benefits

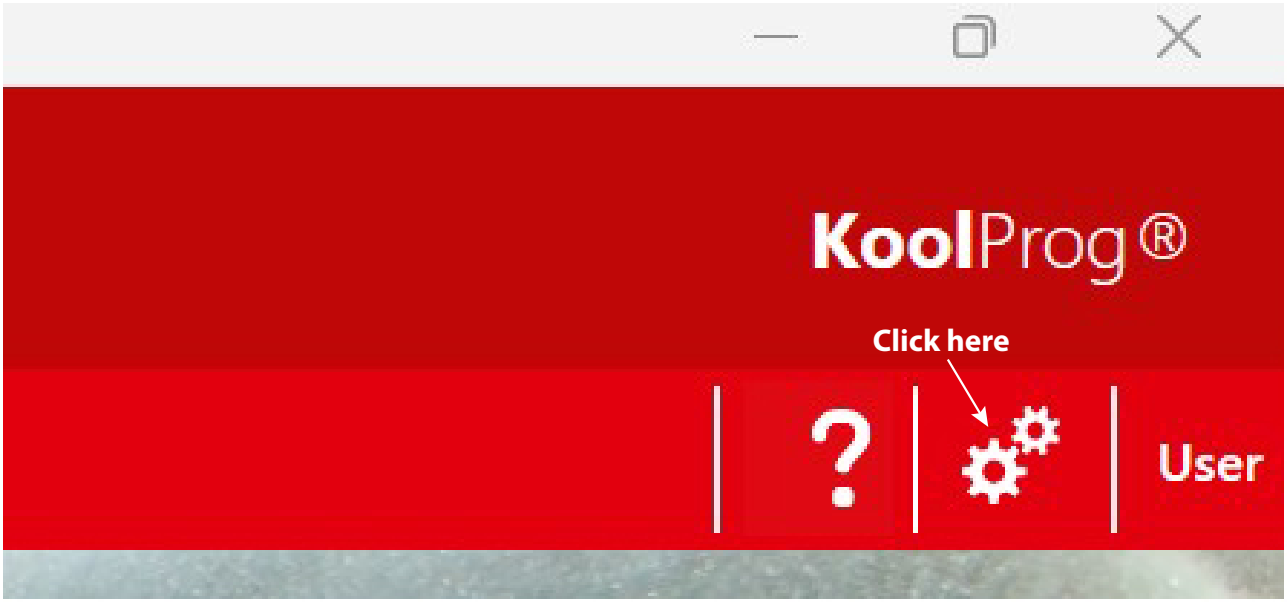
	Set parameters • Create your own configuration files on your PC without having to connect a controller. • Import a parameter configuration file to your PC from a connected controller. Save the file, and download it to other controllers of the same model. • Select the most frequently used parameters as your favorites.
	Copy to device • Quickly program one, or multiple controllers by using the progress and completion status indicators.
	On-line service • 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

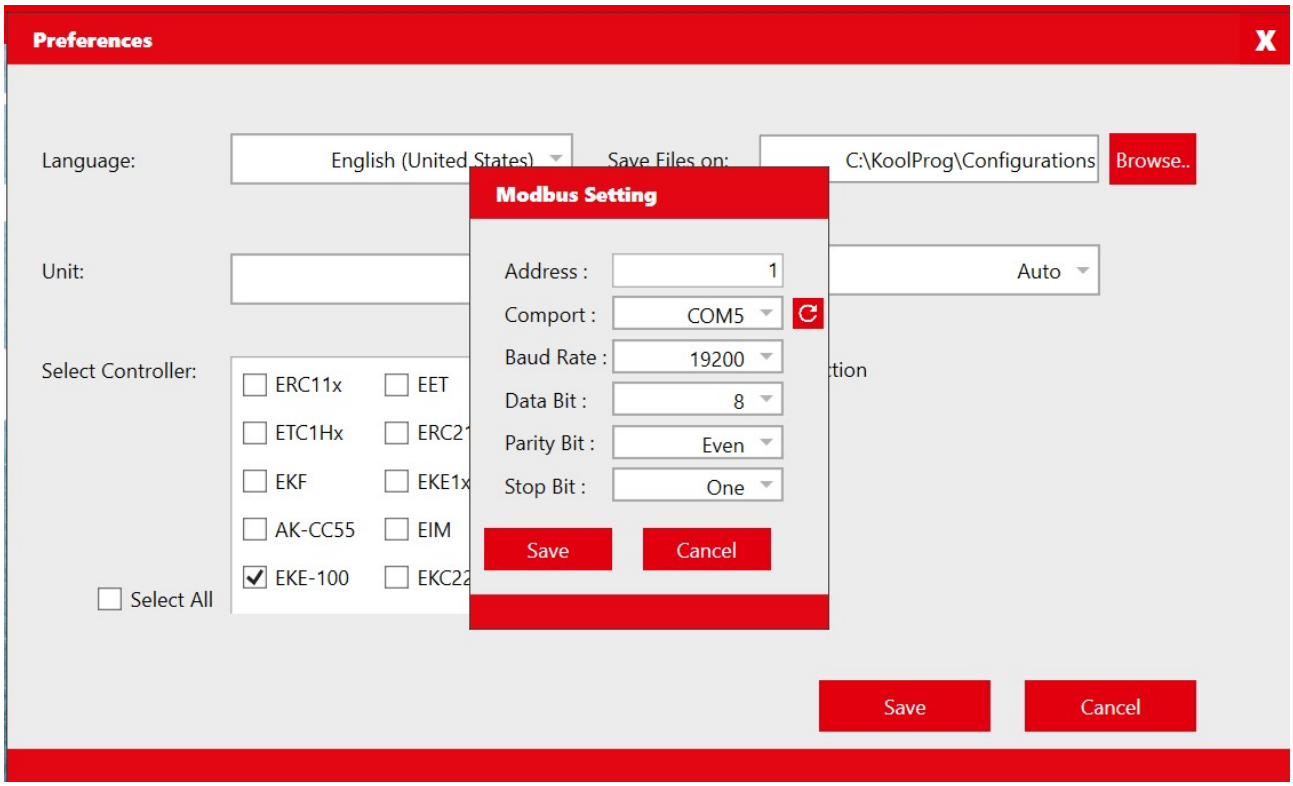
Programming of EKE 100 in KoolProg is divided into 3 main sections:

1. Basic settings
   - This section allows the user to create quick configuration. Most common used settings are available in this section.
2. Advanced settings
   - This section allows the user to create advanced settings. More configuration options and features are available while using this section.
3. Service
   - This section allows manual control of valve and factory reset. While using KoolProg in Online mode this section will allow readouts of EKE 100.

⚠ WARNING:
While connecting to KoolProg it is mandatory to define the Modbus address and port details in KoolProg PC tool. This can be done by selecting the top right setting icon in KoolProg PC tool.

Figure 12: See below example for Modbus setting in KoolPorg





The check box next to EKE 100 should be clicked inorder to access the pop up window for modbus settings.

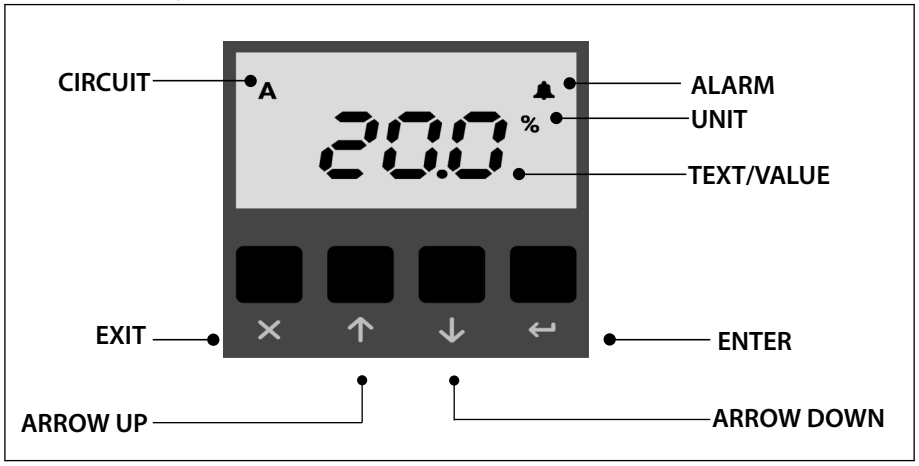
⚠ WARNING:
It is important to know the modbus address of EKE 100 especially during service. If the address is not known the below procedure can be done to factory reset EKE 100 to address 1

1. Ensure pressure transmitter settings is set to ratiometric type transmitter in 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 EKE 100 to power
5. Now Modbus communication options are reset to factory default (Address 1, 19200 baud, mode 8E1)

Programming using Display

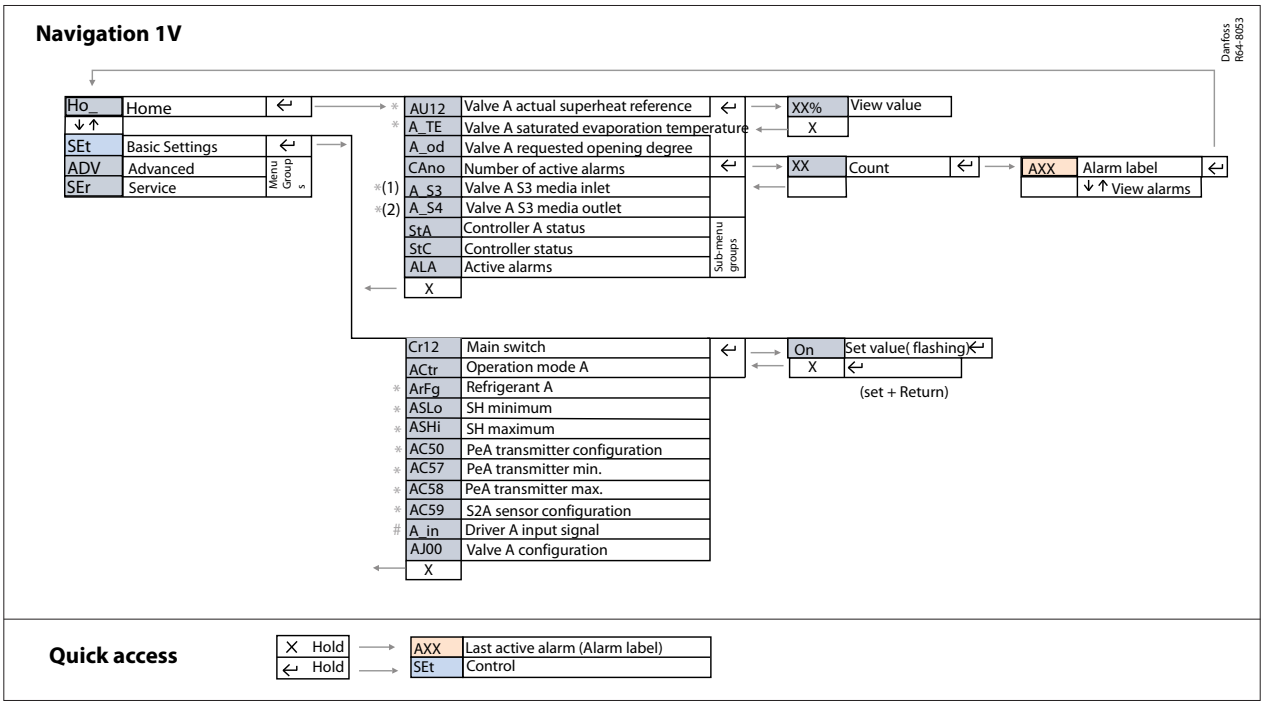
For users using EKE 100 with display the first setting of the controller can be done via display. The label data is available along with the modbus list.

Figure 13: Display interface



The below images shows the navigational structure of display based on variants.

Figure 14: EKE 100 1V Navigation structure



NOTE:
Parameters are shown when relevant to the current configuration

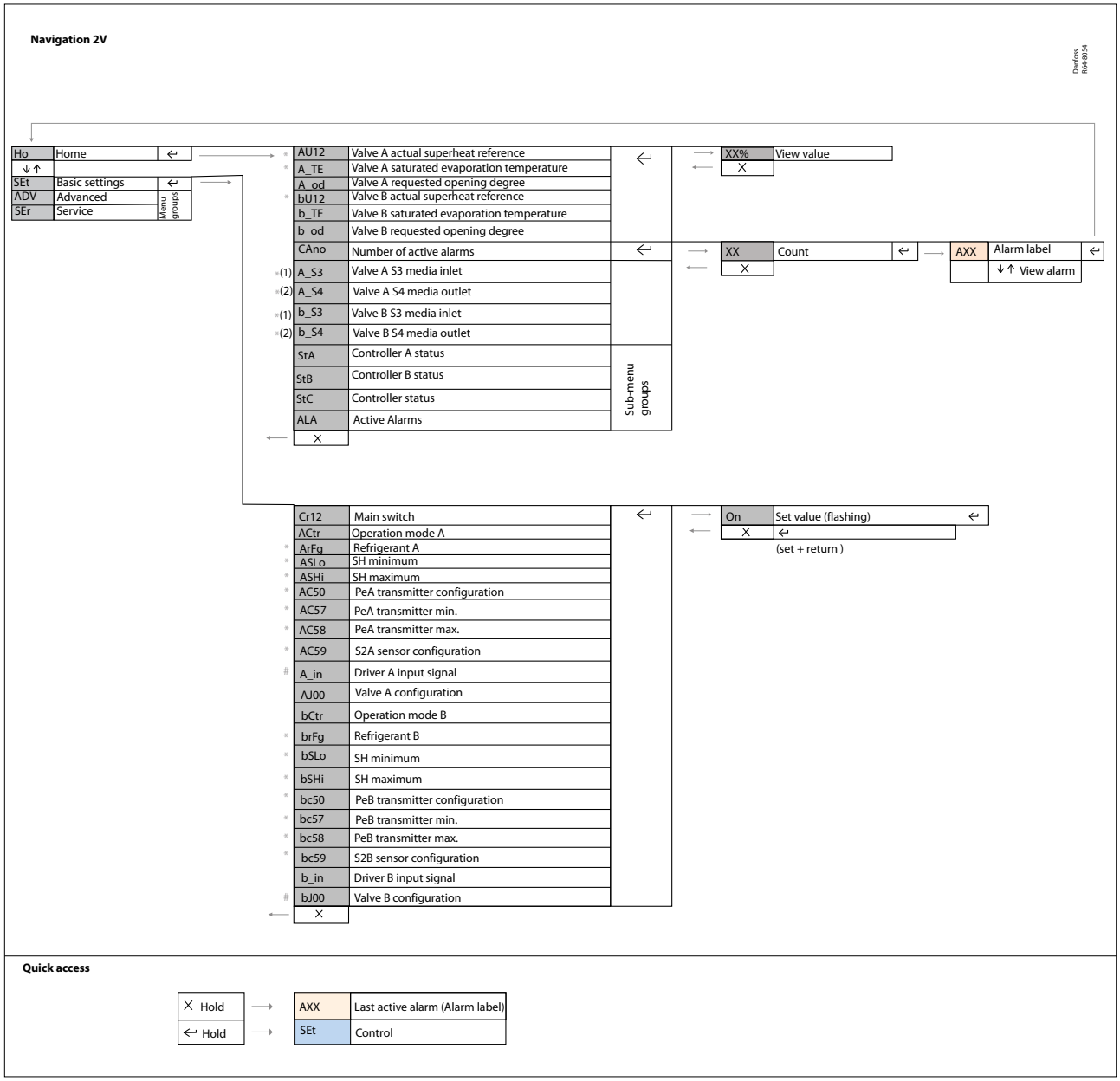
* Only when operation mode for the valve section is set to Superheat (ACtr=0)

(1) Reference mode is set to delta temperature (ArEF=3) and either thermostatic mode is enabled (Ar11>0) or no thermostatic sensor has been assigned (ArSn=0)

(2) Thermostatic mode is enabled (Ar11>0) and thermostatic sensor is set to S4 (ArSn=1)

Only when operation mode for the valve section is set to Driver (ACtr=1) or Modbus controlled IO (Actr=2)

Figure 15: EKE 100 2V Navigation structure



NOTE:
Parameters are shown when relevant to the current configuration

* Only when operation mode for the valve section is set to Superheat (ACtr=0) (bCtr=0)

(1) Reference mode is set to delta temperature (ArEF=3) (brEF=3) and either thermostatic mode is enabled (Ar11>0) (br11>0) or no thermostatic sensor has been assigned (ArSn=0) (brSn=0)

(2) Thermostatic mode is enabled (Ar11>0) (br11>0) and thermostatic sensor is set to S4 (ArSn=1) (brSn=1)

Only when operation mode for the valve section is set to Driver (ACtr=1) (bCtr=1) or Modbus controlled IO (Actr=2) (bCtr=2)

NOTE:
For instructions on installation procedures, product usage warnings and cabling requirements check Installation guide

For detailed information on parameter names, check modbus list section in this document.

5 Operation

5.1 Superheat control

In this section some important parameters for SH control mode and other sub modes are described.

For basic superheat control, one temperature sensor S2, and one pressure sensor Pe are needed. The actual superheat is calculated based on these two sensor readings, and the controller will adjust the OD of the valve to bring the superheat to the desired reference. If superheat is too low the flow in the expansion valve is decreased and superheat will be higher and vice versa

5.2 Thermostat control

EKE 100 has 2 methods of controlling the superheat while considering a second temperature sensor(Incoming media temperature or outgoing media temperature).

The 2 methods are:

- ON/OFF thermostat
- Modulating thermostat (MTR)

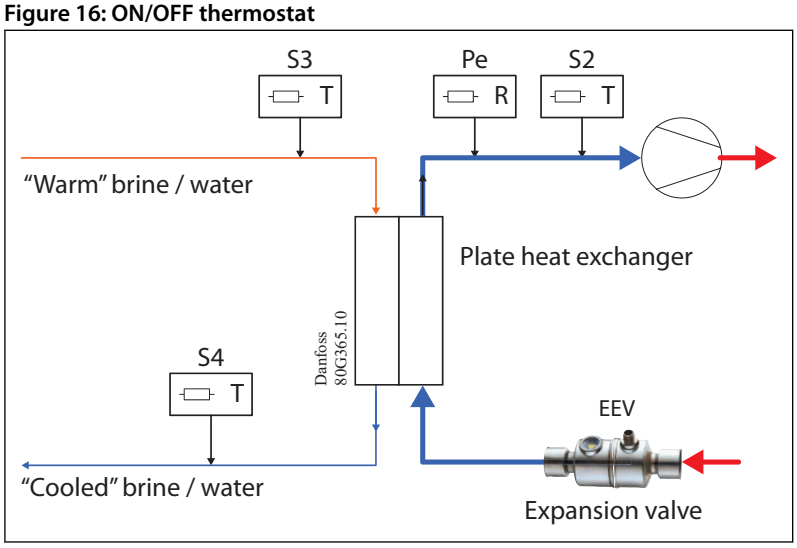
These modes require one extra temperature sensor S3 or S4, the user can select only one sensor not both.

NOTE:
Check application section to see how to use this function.

On/Off thermostat

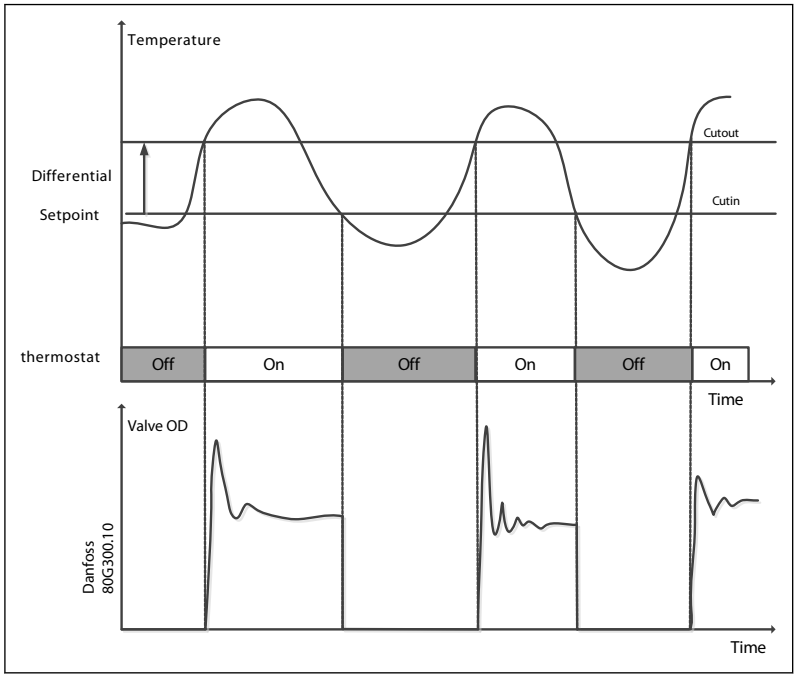
In this mode, if temperature is above the set point + differential cooling is started with maximum cooling capacity. In maximum capacity superheat is controlled to be on superheat set point. Cooling is active until the temperature is below set point. In a startup, cooling will be active if temperature is above temperature set point.

Figure 16: ON/OFF thermostat



WARNING:
Need for Defrosting During cooling is not considered. If defrosting is needed another system must ensure defrosting is done when needed.

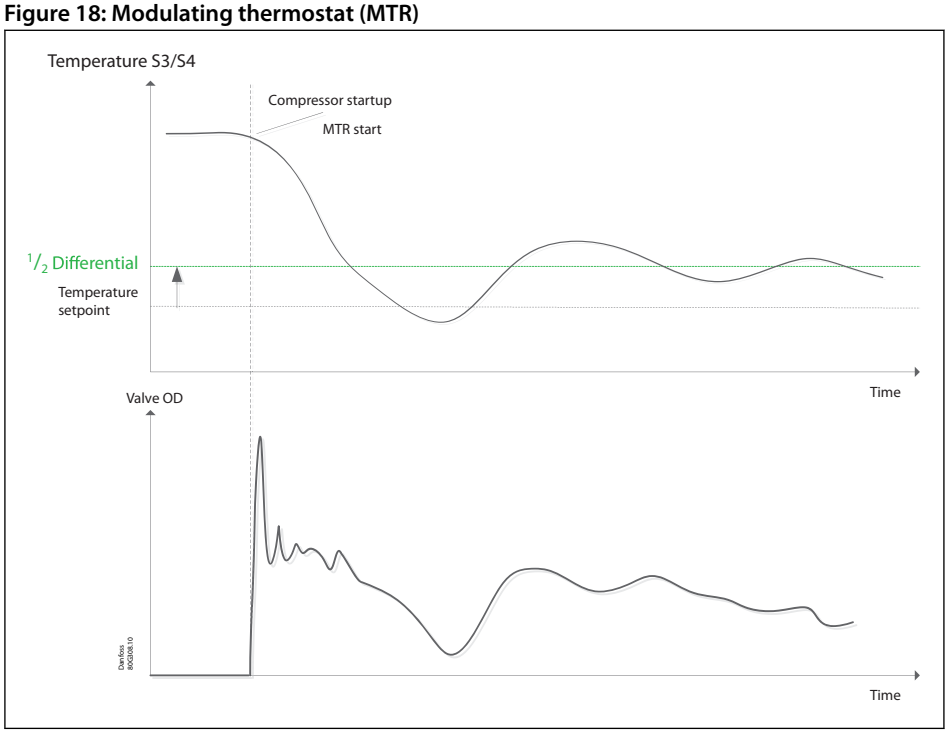
Figure 17: ON/OFF thermostat



Modulating thermostat (MTR)

When the temperature is well above the MTR set point (The MTR reference is defined by temperature set point + ½ differential) cooling capacity is at maximum and superheat is controlled to be on superheat reference. 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.

Figure 18: Modulating thermostat (MTR)



Offsetting Superheat, Opening degree and temperature via External signal

Table 9: The below table shows the various offsetting options available in EKE 100

Value	Signal	Description
SH	0-10V, 0/4-20mA Bus	Displacement of superheat reference with external signal
Max OD	0-10V, 0/4-20mA Bus	Maximum OD with external signal
Temp	0-10V, 0/4-20mA Bus	Displacement of temperature reference with external signal[AM1]

⚠ WARNING:
Offset can be done in positive and negative direction. Extra care must be taken while doing this setting.

SH reference is not allowed to offset the signal below SH min.

Compressor feed forward function

When a compressor speed changes, system dynamics change correspondingly. Hence, Compressor speed feed forward function changes the PI parameter values according to the actual compressor speed, which means the reactivity of the controller is changed.

For example, when the speed of the compressor is low, this feature increases the integration time which leads to a slower response of the PI controller.

To use this feature bus communication is needed and the master controller must send a feed-back about the compressor speed to the EKE controller

⚠ WARNING:
This function is basically used in one-to-one systems and requires a Modbus.

Startup modes

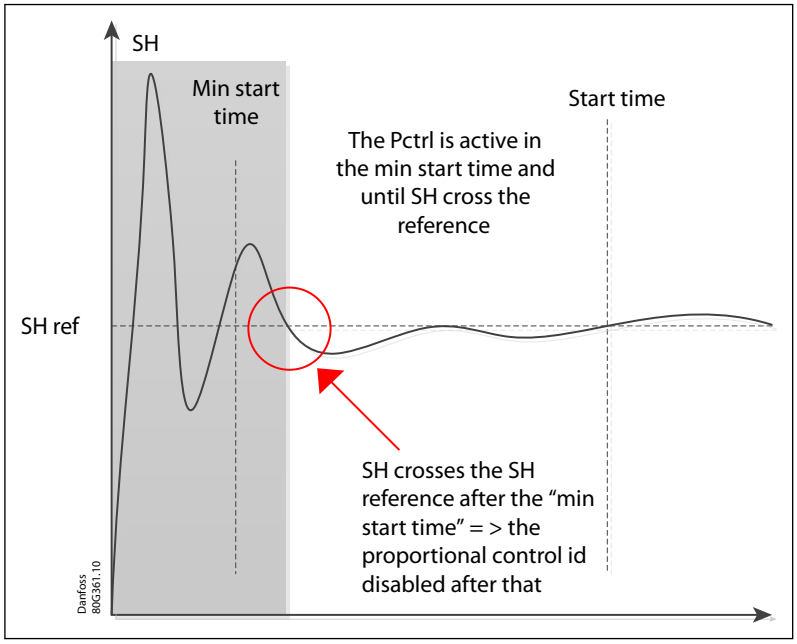
A Startup mode allows the valve to open faster on start-up to avoid any unwanted low-pressure situation. EKE controllers implements 3 different modes for startup, and one sequence for startup.

P-Control

The controller is programmed for auto proportional control that will quickly change the opening degree based on the superheat of the system. The proportional control is active during the Minimum start time set by the user, and until the Super heat crosses the reference.

⚠ WARNING:
If SH didn't cross the Superheat reference after the **minimum stop time**(N104), the Proportional control will stop after the **start time**(N105), set by the user.

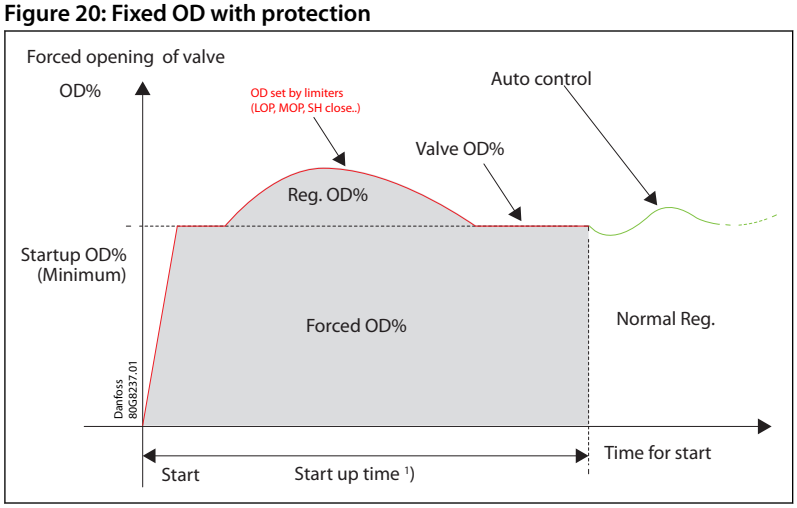
Figure 19: proportional control startup mode



Start OD with protection

This function will provide a start opening degree during a fixed start time. If the limiters such as LOP has been activated, the valve will do the auto adjustment-based set limitations.

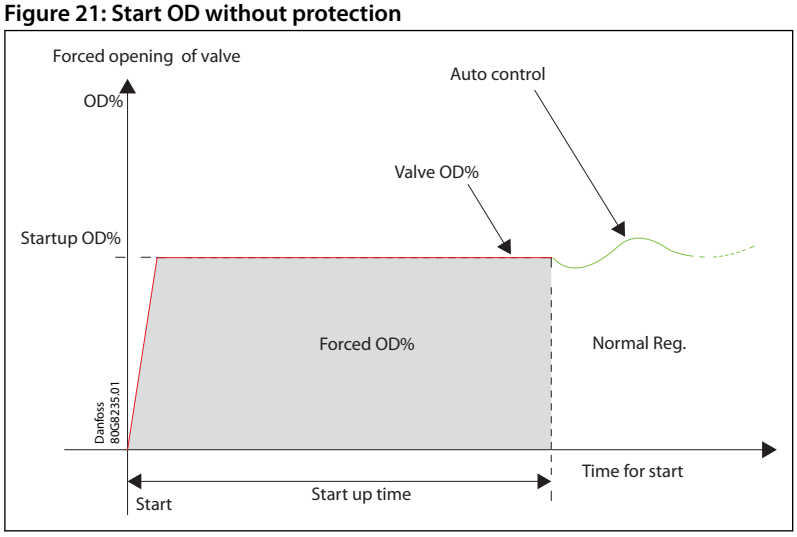
Figure 20: Fixed OD with protection



Start OD without protection

This function will provide a start opening degree during a set time. This function is not affected by the limiters such as LOP.

Figure 21: Start OD without protection

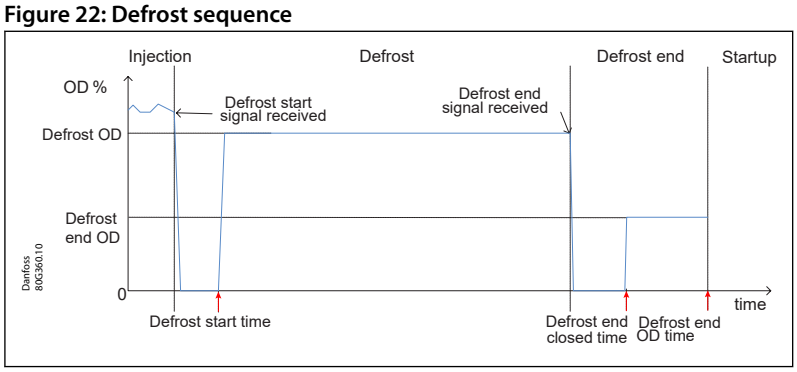


Defrost sequence

Defrost Sequence must be initiated by the master controller via DI or modbus. In a standalone configuration, the defrost mode is not possible.

To initiate defrost, the system mode is changed from Heat pump to A/C, hereby the outdoor unit will act as a condenser and the hot discharge gas from the compressor will defrost the coil. In some system electrical heaters are used instead of reversible system but defrost sequence can still be used.

Figure 22: Defrost sequence



Fail safe operation

When one or more signal fail, users can select a corresponding action based on their knowledge and experience on the applications

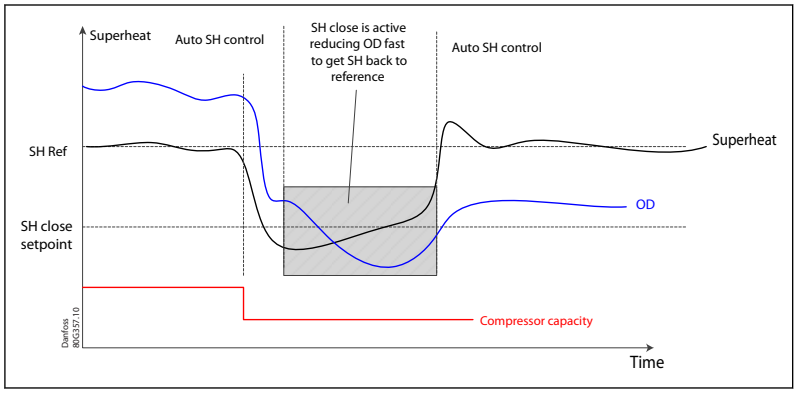
Table 10: When signals are faulting, user have options of different actions. The user must via [Operation status] be informed on fail

Configuration	Suggestions
SH control signal fails. SH control needs Pe and S2 signal, so if one of these signals fails, SH control based on the actual superheat is not possible • Stop:valve forced closed (default) • Fixed OD: valve at fixed position (Fail safe OD). • Use average: 1. No thermostat and MTR: valve at 70% of average OD 2. ON/OFF thermostat: valve at 3. 50% of average OD (thermostat function is not affected) If both Pe and S2 fails, then overrule above and stop SH control.	User can via parameter [SH control sensor error action] configure the relevant option
Thermostatic sensor error. Thermostatic operation needs the signal selected in [R015 Sensor select] to operate the thermostat function, if this signal fails operation based on actual temperature is not possible • Stop:valve forced closed (default) • Fixed OD: valve at fixed position (Fail safe OD). • Use Average: 1. MTR: valve at 70% of average OD 2. ON/OFF thermostat: average on and off time control cutin and cutout, Sh control run normally	User can via parameter [Thermostatic sensor error action] configure the relevant option
Thermostatic sensor and SH control sensor error, combination of the 2 above Stop: • Valve forced closed (default)	User has no option to change this

5.3 Superheat close

SH close ensures that superheat is on or above 'SH close set point to avoid liquid getting back to the compressor. If the media inlet temperature drops or if compressor goes down in capacity, the superheat may drop below the SH close setpoint, then the flow in the expansion valve is reduced to bring superheat up to SH close setpoint as shown in the figure below.

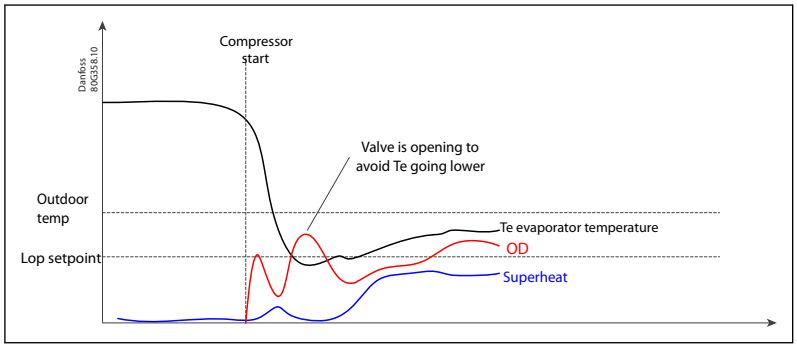
Figure 23: SH close operation



5.4 LOP (Low operating pressure)

Lowest Operating Pressure (LOP) will make sure that the evaporating pressure (Pe) is kept above LOP set point, this will prevent the compressor from stopping due to low suction pressure. If the pressure comes below this limit the controller will quickly open the valve.

Figure 24: Lowest Operating

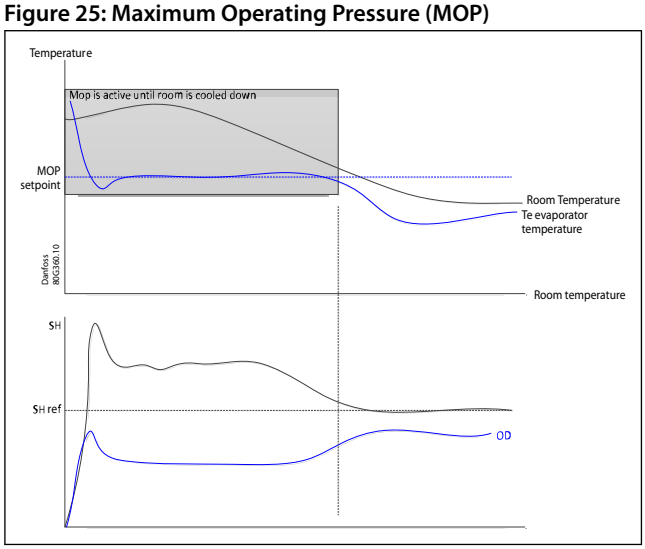


NOTE:
If the pressure is low and at the same time the superheat is low. LOP control would like to open the valve to raise the pressure. but SH close will decrease the flow to regain a safe superheat. In this case the LOP demand is overruled by SH close. So, in the end if the conflict still is active the mechanical low-pressure switch will need stop the compressor

5.5 MOP (Maximum operating pressure)

Maximum Operating Pressure (MOP) will make sure that the evaporating pressure (P0) is kept below the MOP setpoint set by the user. This is achieved by lowering the flow in the expansion valve. When this mode is active this Super heat reference will be higher, the controller will switch back to superheat control once the pressure Po is kept on the MOP setpoint.This feature is helpful especially during startup During startup and pulldown to avoid overload of the compressor.

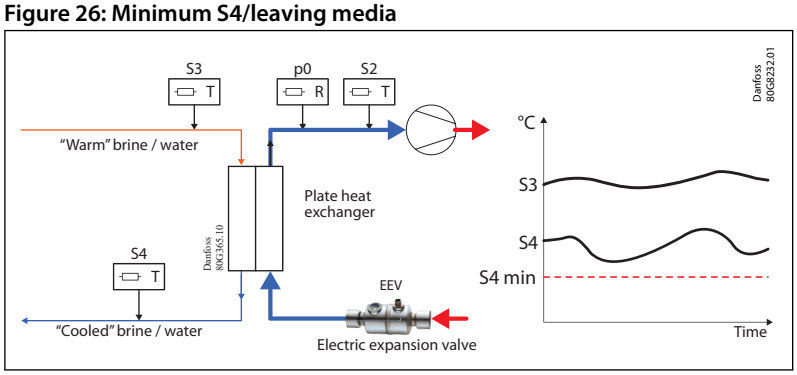
Figure 25: Maximum Operating Pressure (MOP)



5.6 Min S4(minimum S4 temperature)

This protection modes keeps the temperature of leaving media out of the evaporator (given by temperature sensor S4) on or above of minimum temperature set by the user. This is achieved by lowering the flow in the expansion valve. When this mode is active this Super heat reference will be higher, the controller will switch back to superheat control once the Temperature of leaving media goes above S4 min

Figure 26: Minimum S4/leaving media



Manual mode

- This mode is used for service purpose. The user can toggle the alarm and valve opening degree to confirm right operation.
- The alarm can be turned On and Off.
- If manual mode is set to On then user can define a period till which the service mode should be active and the user defined position for the valve.

NOTE:
If manual mode timeout is set to 0, controller will not exit this mode and start normal operation

5.7 Overdrive

EKE 100 will overdrive valves to calibrate the valve position to 0% opening degree. This will make sure that no step loss is present

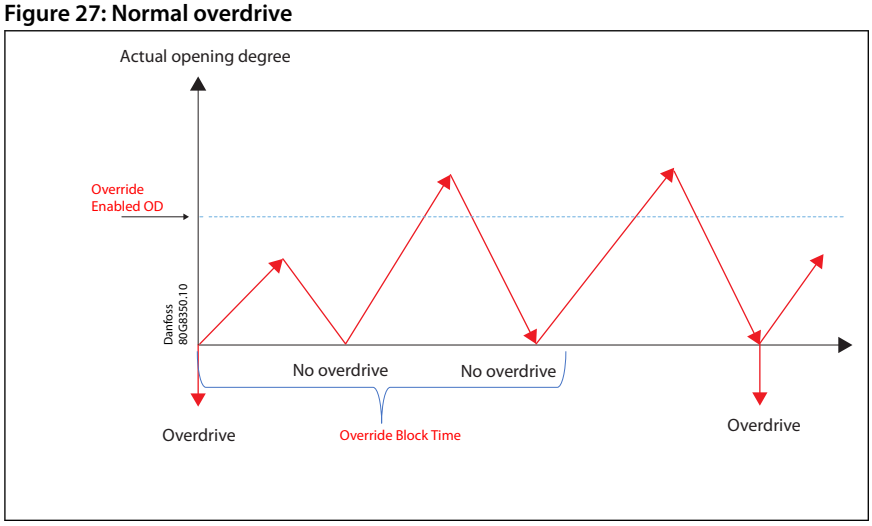
There are 2 modes of overdrive available in EKE:

1. Normal overdrive
2. Forced overdrive

Normal overdrive:

This overdrive checks if the valve has crossed a threshold opening degree (overdrive enabled OD), time period between consecutive overdrives (overdrive block time) and real-time position close to 0%. If the three criteria are met the valve will overdrive.

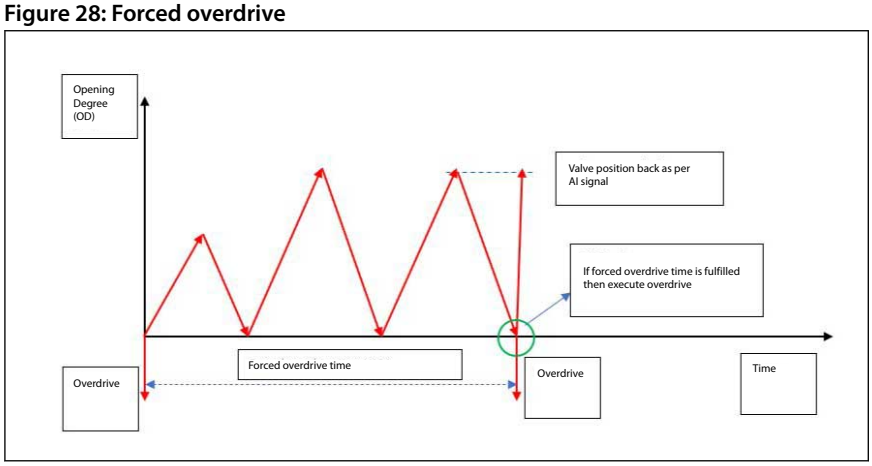
Figure 27: Normal overdrive



Forced overdrive

This overdrive is timer based. It will overdrive the valve based on a time interval and return the valve back to system required position. This mode is Off by default and the user can activate if required in advanced settings.

Figure 28: Forced overdrive



5.8 Valve selection

Danfoss valve is available as a preselection for user. If a Danfoss valve name is not present kindly ask a Danfoss representative for the setting value. If a third-party Bipolar valve is used, use user defined valve (User_def_)in the valve selection and define the parameters for the valve as per the valve technical details.

5.9 Refrigerant selection

Most of the common refrigerants are available as preselection in the controller. If a refrigerant is not found then select the value R-user and the refrigerant can be defined using the Antoine constants A1, A2 and A3.

5.10 Power sharing and using EKE 2U

EKE 2U can supply backup power to EKE 100 only for upto maximum 2 valves.

The below images shows possible configurations of EKE 100 with EKE 2U.

When Main supply is 24V AC.

Figure 29: EKE 100 1V with EKE 2U AC power source

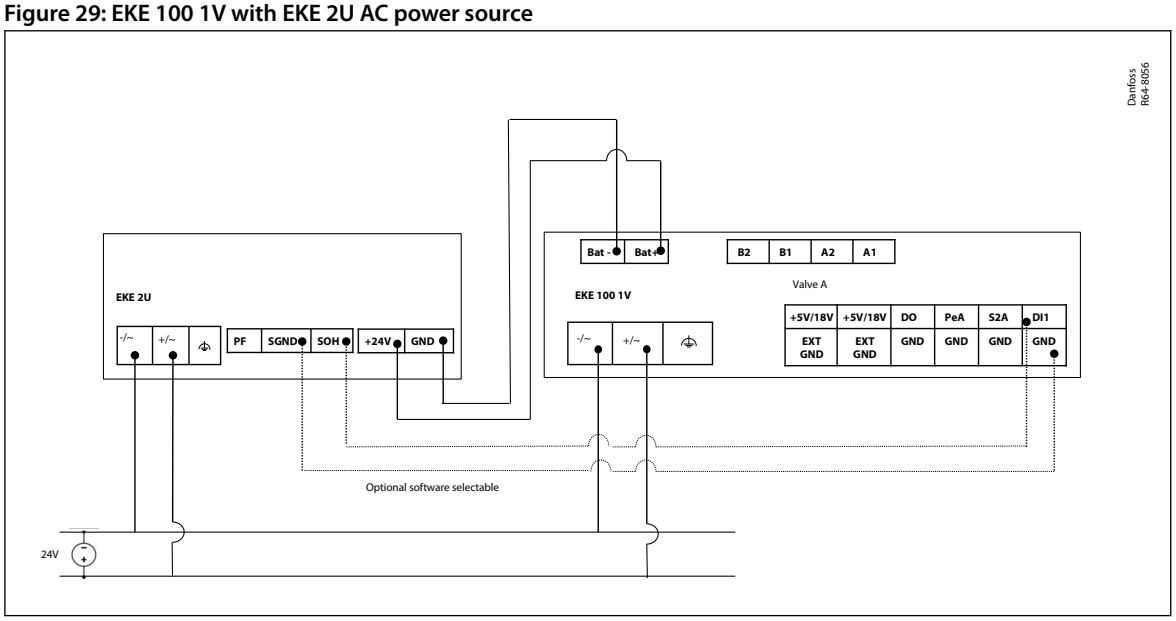
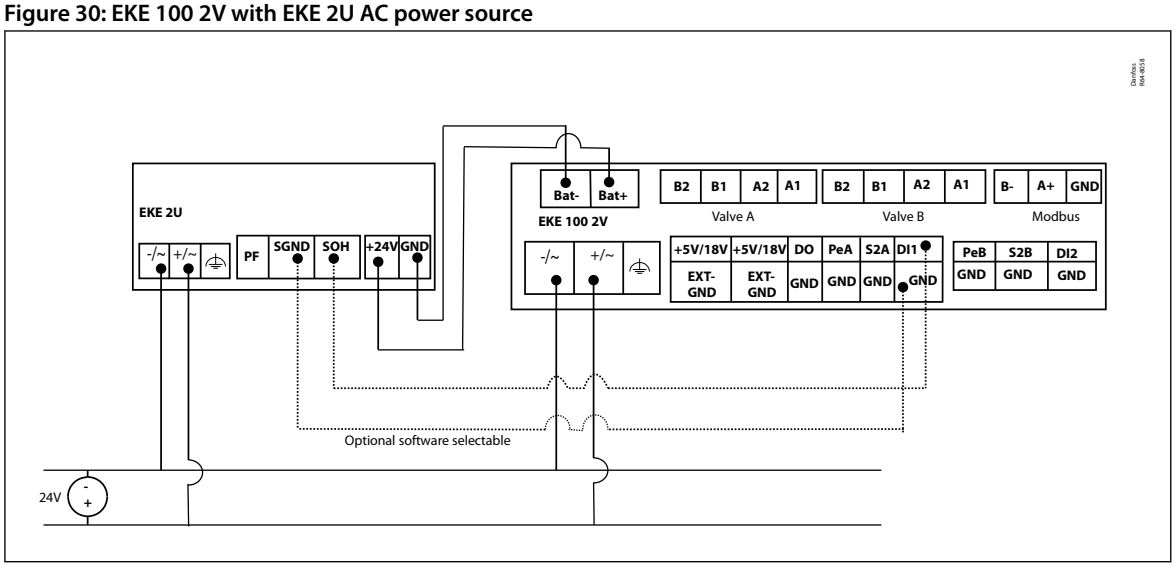


Figure 30: EKE 100 2V with EKE 2U AC power source



When Main supply is 24V DC.

Figure 31: EKE 100 1V with EKE 2U DC power source

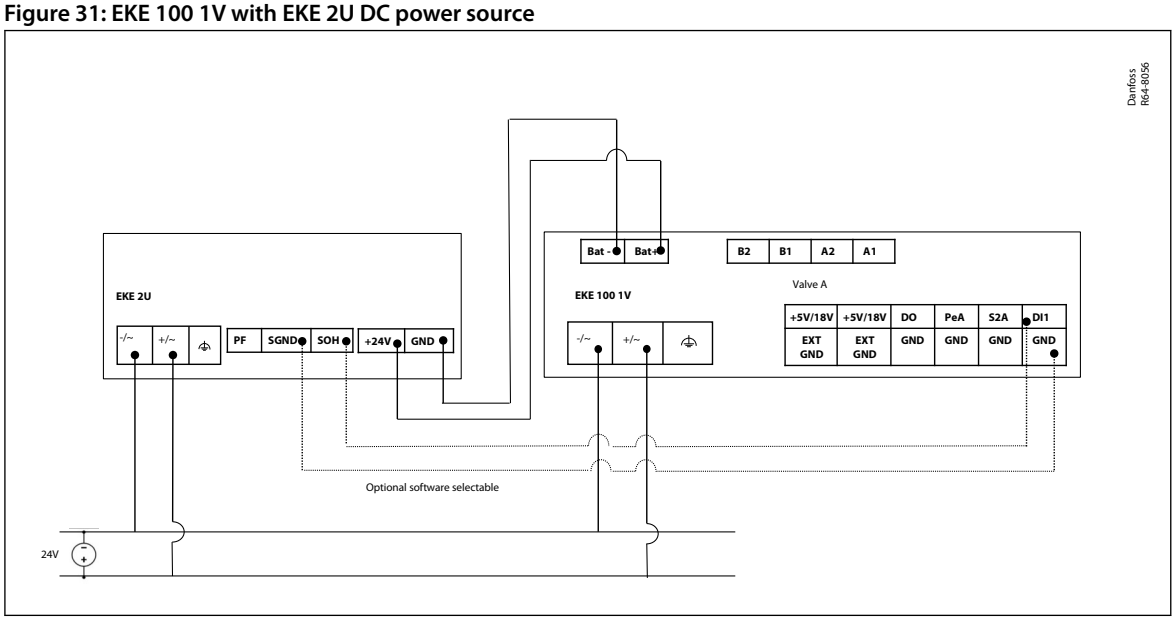


Figure 32: 2 EKE 100 1V with EKE 2U DC power source

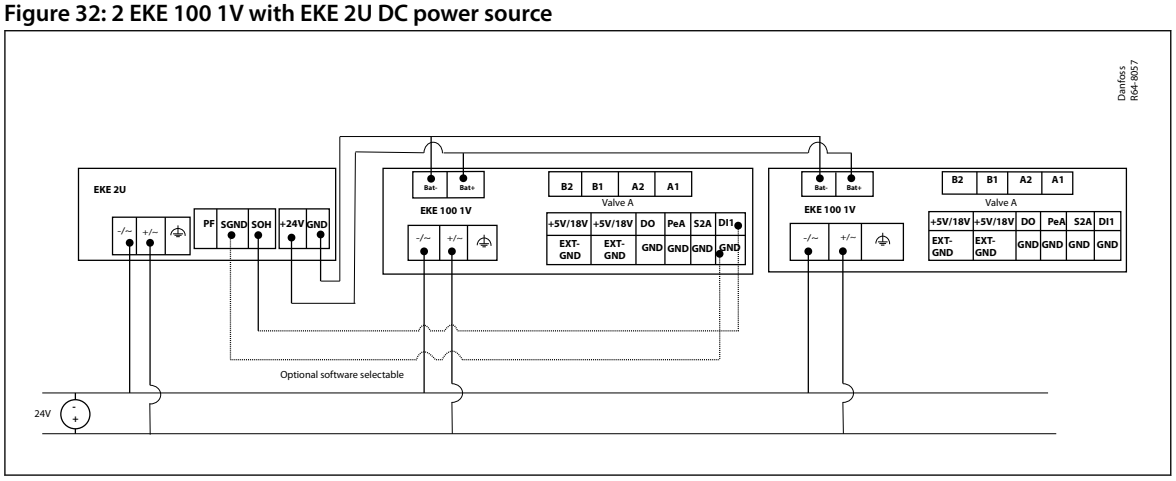
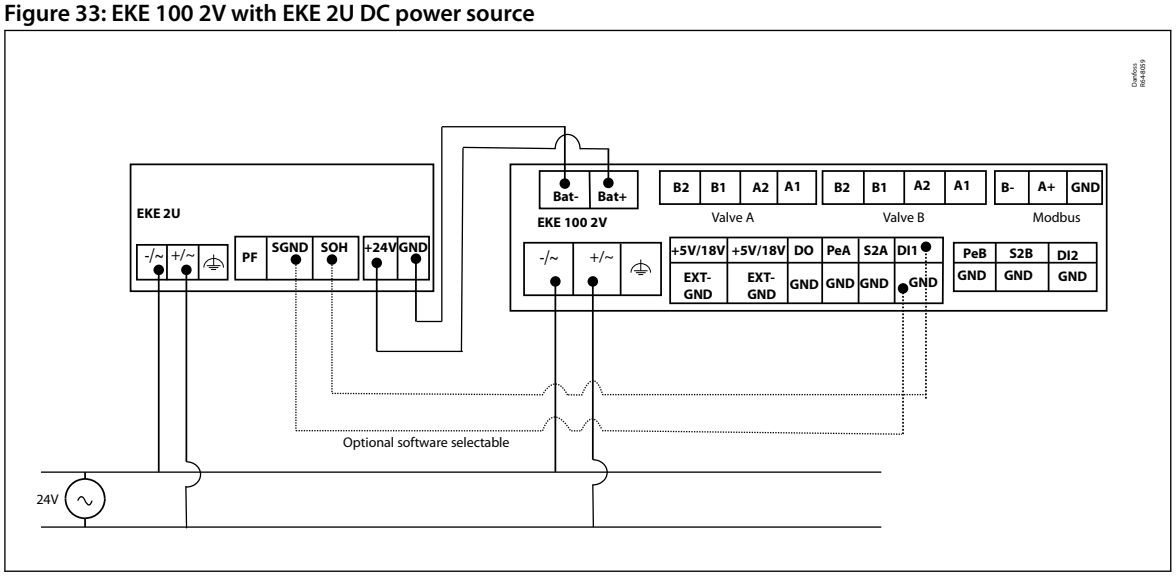


Figure 33: EKE 100 2V with EKE 2U DC power source



5.11 Using Digital Output

EKE 100 has 1 digital output and helps user to have physical identification of alarm occurrence. This can be connected to PLC or similar open collector solution.

Table 11: Technical specification of Digital output

Parameter	Condition
Output type	Similar to NPN, open collector solution
Load type	Resistive only
Maximum allowed current	10mA
Leakeage current, max	10uA
Maximum voltage (at open)	28V (allow 24Vdc + 15%)
Condition at alarm	No current at alarm (Alarm - **NO**) Current at alarm (Alarm - **NC**)

For users that require a relay module an external relay module can be installed either by utilizing the build in supply of the PLC or by having a dedicated DC supply to the relay.

6 Alarms and Troubleshooting

The below table shows different alarms available in EKE 100. Parameter cAno (no of active alarms) can be used to identify through Modbus or display to find how many alarms are present in EKE 100. For users using KoolProg detailed explanation of the alarms and possible troubleshooting options are present. The digital output DO) in EKE 100 will also trigger when the alarm turns On.

Table 12: Alarms

CODE	DESCRIPTION	EKE 100 Type	Valve	ADU
A00	Standby mode	1V/2V		1901 .08
A01	Replace PWR backup module	1V/2V		1901 .09
A02	PWR backup module failure	1V/2V		1901 .10
A03	AI configuration conflict	1V/2V		1901 .11
A04	DI configuration conflict	1V/2V		1901 .12
A05	Low Input Voltage	1V/2V		1901 .13
A06	Overload on 5V supply	1V/2V		1901 .14
A07	Degraded hardware	1V/2V		1901 .15
A10	Manual control A	1V	A	1901 .00
A11	No valve configured A	1V	A	1901 .01
A12	No refrigerant selected A	1V	A	1901 .02
A13	No transmitter configured for Pe A	1V	A	1901 .03
A14	No sensor configured for S2 A	1V	A	1901 .04
A15	No sensor configured for S3 A	1V	A	1901 .05
A16	No sensor configured for S4 A	1V	A	1901 .06
A17	Pe evaporator transmitter error A	1V	A	1901 .07
A18	S2 suction pipe sensor error A	1V	A	1902 .08
A19	S3 media inlet sensor error A	1V	A	1902 .09
A20	No external reference configured A	1V	A	1902 .10
A21	External reference error A	1V	A	1902 .11
A22	High evaporation pressure (MOP) A	1V	A	1902 .12
A23	Low evaporation pressure (LOP) A	1V	A	1902 .13
A24	High superheat A	1V	A	1902 .14
A25	Low superheat A	1V	A	1902 .15
A26	Lack of valve capacity A	1V	A	1902 .00
A27	SH control signal missing A	1V	A	1902 .01
A28	High temperature A	1V	A	1902 .02
A29	Low temperature A	1V	A	1902 .03
A30	Low S4 media outlet temperature A	1V	A	1902 .04
A34	SH reference too close to SH close setpoint A	1V	A	1903 .08
A35	LOP setpoint too close to MOP setpoint A	1V	A	1903 .09
A36	S4 media outlet sensor error A	1V	A	1903 .10
A37	Shared signal timeout A	1V	A	1903 .11
A38	Thermostatic control signal missing A	1V	A	1903 .12
A39	Open coil valve A	1V	A	1903 .13
A40	Valve A error	1V	A	1903 .14
A41	Dutycycle alarm valve A	1V	A	1903 .15
A50	Manual control B	1V/2V	B	1903 .00
A51	No valve configured B	1V/2V	B	1903 .01
A52	No refrigerant selected B	1V/2V	B	1903 .02
A53	No transmitter configured for Pe B	1V/2V	B	1903 .03
A54	No sensor configured for S2 B	1V/2V	B	1903 .04
A55	No sensor configured for S3 B	1V/2V	B	1903 .05

CODE	DESCRIPTION	EKE 100 Type	Valve	ADU
A56	No sensor configured for S4 B	1V/2V	B	1903 .06
A57	Pe evaporator transmitter error B	1V/2V	B	1903 .07
A58	S2 suction pipe sensor error B	1V/2V	B	1904 .08
A59	S3 media inlet sensor error B	1V/2V	B	1904 .09
A60	No external reference configured B	1V/2V	B	1904 .10
A61	External reference error B	1V/2V	B	1904 .11
A62	High evaporation pressure (MOP) B	1V/2V	B	1904 .12
A63	Low evaporation pressure (LOP) B	1V/2V	B	1904 .13
A64	High superheat B	1V/2V	B	1904 .14
A65	Low superheat B	1V/2V	B	1904 .15
A66	Lack of valve capacity B	1V/2V	B	1904 .00
A67	SH control signal missing B	1V/2V	B	1904 .01
A68	High temperature B	1V/2V	B	1904 .02
A69	Low temperature B	1V/2V	B	1904 .03
A70	Low S4 media outlet temperature B	1V/2V	B	1904 .04
A74	SH reference too close to SH close setpoint B	1V/2V	B	1905 .08
A75	LOP setpoint too close to MOP setpoint B	1V/2V	B	1905 .09
A76	S4 media outlet sensor error B	1V/2V	B	1905 .10
A77	Shared signal timeout B	1V/2V	B	1905 .11
A78	Thermostatic control signal missing B	1V/2V	B	1905 .12
A79	Open coil valve B	1V/2V	B	1905 .13
A80	Valve B error	1V/2V	B	1905 .14
A81	Dutycycle alarm valve B	1V/2V	B	1905 .15

Table 13: The below table shows explanations on alarms and possible troubleshooting options.

CODE	DESCRIPTION	ADU	Explanation
A00	Standby mode	1901 .08	Main switch is set off. Troubleshoot: Turn on (Cr12) when appropriate.
A01	Replace PWR backup module	1901 .09	EKE-2U reports time for replacement. Troubleshoot: Replace the EKE-2U.
A02	PWR backup module failure	1901 .10	EKE-2Ufailure or battery failure. Troubleshoot: Replace backup unit.
A03	AI configuration conflict	1901 .11	Analog input configuration problem. Troubleshoot: Check analog input configuration. Same input has been used more than once.
A04	DI configuration conflict	1901 .12	Digital input configuration problem. Troubleshoot: Check digital input configuration. Same input has been used more than once.
A05	Low Input Voltage	1901 .13	Too low supply voltage. Troubleshoot: Reestablish supply voltage with adequate power.
A06	Overload on 5V supply	1901 .14	5V output is shorted. Troubleshoot: Check 5V load.
A07	Degraded hardware	1901 .15	EEPROM read error. Troubleshoot: Replace hardware
A10	Manual control A	1901 .00	Controller section in manual mode. Troubleshoot: Move to Manual mode A to off when appropriate. Setpoint: (AU01)
A11	No valve configured A	1901 .01	Valve configuration not made. Troubleshoot: Configure valve A Setpoint: (AJ00)
A12	No refrigerant selected A	1901 .02	No refrigerant is selected, configure the correct refrigerant. Troubleshoot: Make a refrigerant A selection. Setpoint: (Arfg)

CODE	DESCRIPTION	ADU	Explanation
A13	No transmitter configured for Pe A	1901 .03	Selection of pressure transmitter type is needed. Troubleshoot: Select Pressure input and transmitter type and measuring. range. Setpoints: (AC00, AC50)
A14	No sensor configured for S2 A	1901 .04	A temperature sensor type selection is missing. Troubleshoot: Select correct temperature sensor input and type. Setpoints: (AC01, AC59)
A15	No sensor configured for S3 A	1901 .05	A temperature sensor type selection is missing. Troubleshoot: Select correct temperature sensor input and type. Setpoints: (AC02, AC60)
A16	No sensor configured for S4 A	1901 .06	A temperature sensor type selection is missing. Troubleshoot: Select correct temperature sensor input and type (AC03, AC61).
A17	Pe evaporator transmitter error A	1901 .07	Evaporator pressure transmitter signal is faulty or exceeds measuring range. Troubleshoot: Check transmitter.
A18	S2 suction pipe sensor error A	1902 .08	Temperature sensor have shorted or open wires. Troubleshoot: Correct the cabling.
A19	S3 media inlet sensor error A	1902 .09	Temperature sensor have shorted or open wires. Troubleshoot: Correct the cabling.
A20	No external reference configured A	1902 .10	Missing configuration for external reference. Troubleshoot: Setup input for external reference. Setpoints: (AC06, AC71).
A21	External reference error A	1902 .11	Driver signal out of range Troubleshoot: Ensure analog input signal is in range
A22	High evaporation pressure (MOP) A	1902 .12	Pe / Te is higher than alarm limit and alarm delay has expired. Injection active and MOP active and Te higher than MOP set point + MOP alarm differential and MOP alarm delay expired. Troubleshoot: Injection not active or MOP disabled or Te below MOP set point + MOP alarm differential. Setpoints: (Au10, Au11) Alarm: (AA00, AA01)
A23	Low evaporation pressure (LOP) A	1902 .13	Pe / Te is lower than alarm limit and alarm delay has expired. Injection active and LOP active and Te lower than LOP set point - LOP alarm differential. Troubleshoot: Options to considder: - Lack of refrigerant - Injection not active - LOP disabled Te above LOP set point + LOP alarm differential. Pe / Te is lower than alarm limit and alarm delay has expired. Setpoints: (Au12, Au13, Au14, Au15) Alarm: (AA02, AA03)
A24	High superheat A	1902 .14	Superheat is higher than alarm limit and alarm delay has expired. Troubleshoot: Options to considder: - Lack of refrigerant - Injection not active - SH below SH reference +High SH alarm differential. Setpoint: (ASHl) Alarm: (AA04, AA05)
A25	Low superheat A	1902 .15	Superheat is below alarm limit and alarm delay has expired. Troubleshoot: Injection not active or SH above SH reference - low SH alarm differential. Setpoint: (ASLo) Alarm: (AA06, AA07)
A26	Lack of valve capacity A	1902 .00	Valve is running close to full capacity for long time. Injection active and OD higher than max OD - 5% for more than 90 % of Lack of capacity alarm delay time. Troubleshoot: Injection not active or OD higher OD - 5% in less than 88 % or Lack of refrigerant capacity alarm delay time. Alarm: (AA08)
A27	SH control signal missing A	1902 .01	Pe or S2 signal missing. Troubleshoot: Get valid signal on both Pe and S2.

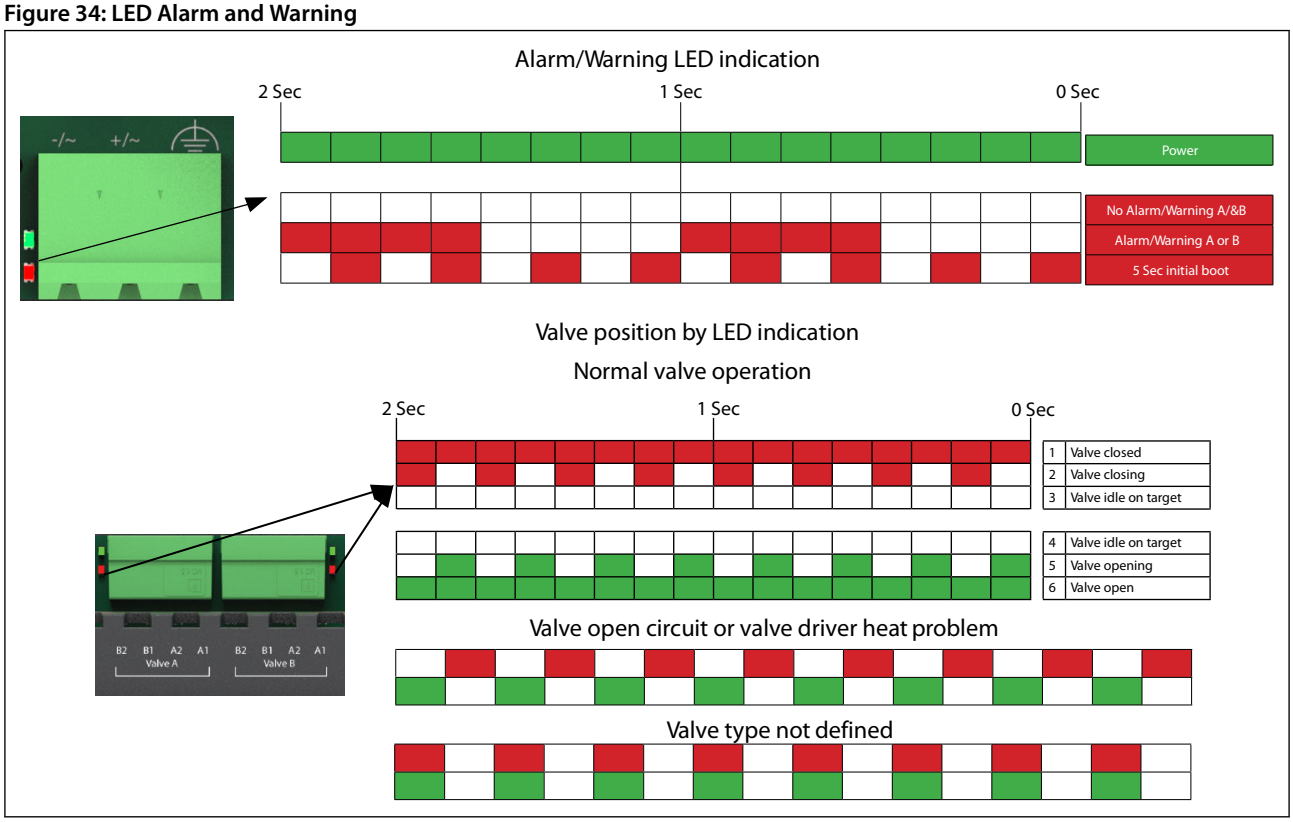
CODE	DESCRIPTION	ADU	Explanation
A28	High temperature A	1902 .02	Thermostat temperature exceed the upper limit, alarm delay has expired. Troubleshoot: Options to considder: - Defective compressor - Lack of refrigerant - Other issues Solve the control issue or adjust the temperature setpoint or the upper temperature alarm setpoint. Alarm delay might as well be adjusted. Setpoints: (AtSP, AA09, AA11)
A29	Low temperature A	1902 .03	Thermostat temperature exceed the lower limit, alarm delay has expired. Troubleshoot: Solve the control issue or adjust the temperature setpoint or the upper temperature alarm setpoint. Alarm delay might as well be adjusted. Setpoints: (AtSP, AA10, AA11)
A30	Low S4 media outlet temperature A	1902 .04	If S4 value is less than Min setpoint for a duration of time alarm will be activated. Troubleshoot: Solve the control issue or adjust the temperature setpoint or the upper temperature alarm setpoint. Alarm delay might as well be adjusted. Setpoints: (AtSP, AA10, AA11)
A34	SH reference too close to SH close setpoint A	1903 .08	SH close is used and SH close set pint is too close the actual reference/ reference minimum. D241 Troubleshoot: Disable SH close or correct the actual SH reference / reference minimum to have 0.5K difference to SH close set point. Setpoints: (Au00, Au01)
A35	LOP setpoint too close to MOP setpoint A	1903 .09	If MOP or LOP is used, MOP set point must > 5K bigger than LOB setpoint. The set point for the 2 pressure functions LOP and MOP is to close. Troubleshoot: Adjust the difference MOP-LOP, must be: MOP-LOPt >= 5K. Setpoints: (Au11, Au13)
A36	S4 media outlet sensor error A	1903 .10	Temperature sensor have shorted or open wires. Troubleshoot: Avoid application usage of S4 or get the local sensor inside signal range.
A37	Shared signal timeout A	1903 .11	One or more signals (S2, S3, S4, Po) are not updated within defined minimum update time. Troubleshoot: Signals must be updated within defined update interval defined by "Bus sharing minimum update interval". Setpoint: (C002)
A38	Thermostatic control signal missing A	1903 .12	Error on thermostat sensor signal. Troubleshoot: Check the thermostat sensor.
A39	Open coil valve A	1903 .13	open coil detected. Troubleshoot: Valve have an open circuit on stepper motor coils. Check valve wiring connection.
A40	Valve A error	1903 .14	Valve driver thermal overload. Troubleshoot: Valve driver chip overloaded. Check valve and wiring connection.
A41	Dutycycle alarm valve A	1903 .15	Actual valve duty cycle exceeds defined limits. Alarm autoresets after 60 sec. Troubleshoot: Minimize control instability.
A50	Manual control B	1903 .00	Controller section in manual mode. Troubleshoot: Move to Manual mode A to off when appropriate. Setpoint: (bU01)
A51	No valve configured B	1903 .01	Valve configuration not made. Troubleshoot: Configure valve A. Setpoint: (bJ00)
A52	No refrigerant selected B	1903 .02	No refrigerant is selected, configure the correct refrigerant. Troubleshoot: Make a refrigerant A selection. Setpoint: (brfg)
A53	No transmitter configured for Pe B	1903 .03	Selection of pressure transmitter type is needed Troubleshoot: Select Pressure input and transmitter type and measuring range. Setpoints: (bC00, bC50)

CODE	DESCRIPTION	ADU	Explanation
A54	No sensor configured for S2 B	1903 .04	A temperature sensor type selection is missing. Troubleshoot: Select correct temperature sensor input and type. Setpoints: (bC01, bC59)
A55	No sensor configured for S3 B	1903 .05	A temperature sensor type selection is missing. Troubleshoot: Select correct temperature sensor input and type. Setpoints: (bC02, bC60)
A56	No sensor configured for S4 B	1903 .06	A temperature sensor type selection is missing. Troubleshoot: Select correct temperature sensor input and type (bC03,bC61)
A57	Pe evaporator transmitter error B	1903 .07	Evaporator pressure transmitter signal is faulty or exceeds measuring range. Troubleshoot: Check transmitter.
A58	S2 suction pipe sensor error B	1904 .08	Temperature sensor have shorted or open wires. Troubleshoot: Correct the cabling.
A59	S3 media inlet sensor error B	1904 .09	Temperature sensor have shorted or open wires. Troubleshoot: Correct the cabling.
A60	No external reference configured B	1904 .10	Missing configuration for external reference. Troubleshoot: Setup input for external reference Setpoints: (bC06, bC71).
A61	External reference error B	1904 .11	Driver signal out of range Troubleshoot: Ensure analog input signal is in range
A62	High evaporation pressure (MOP) B	1904 .12	Pe / Te is higher than alarm limit and alarm delay has expired. Injection active and MOP active and Te higher than MOP set point + MOP alarm differential and MOP alarm delay expired. Troubleshoot: Injection not active or MOP disabled or Te below MOP set point + MOP alarm differential. Setpoints: (bu10, bu11) Alarm: (bA00, bA01)
A63	Low evaporation pressure (LOP) B	1904 .13	Pe / Te is lower than alarm limit and alarm delay has expired. Injection active and LOP active and Te lower than LOP set point. Troubleshoot: Options to consider: - Lack of refrigerant - Injection not active - LOP disabled Te above LOP set point + LOP alarm differential. Pe / Te is lower than alarm limit and alarm delay has expired. Setpoints: (Au12, Au13, Au14, Au15) Alarm: (AA02, AA03)
A64	High superheat B	1904 .14	Superheat is higher than alarm limit and alarm delay has expired. Troubleshoot: Options to considder: - Lack of refrigerant - Injection not active - SH below SH reference +High SH alarm differential. Setpoint: (ASHI) Alarm: (AA04, AA05)
A65	Low superheat B	1904 .15	Superheat is below alarm limit and alarm delay has expired. Troubleshoot: Injection not active or SH above SH reference - low SH alarm differential. Setpoint: (bSLo) Alarm: (bA06, bA07)
A66	Lack of valve capacity B	1904 .00	Valve is running close to full capacity for long time. Injection active and OD higher than max OD - 5% for more than 90 % of Lack of capacity alarm delay time. Troubleshoot: Injection not active or OD higher OD - 5% in less than 88 % or Lack of refrigerant capacity alarm delay time. Alarm: (AA08)
A67	SH control signal missing B	1904 .01	Pe or S2 signal missing. Troubleshoot: Get valid signal on both Pe and S2.
A68	High temperature B	1904 .02	Thermostat temperature exceed the upper limit, alarm delay has expired. Troubleshoot: Options to considder: - Defective compressor - Lack of refrigerant - Other issues Solve the control issue or adjust the temperature setpoint or the upper temperature alarm setpoint. Alarm delay might as well be adjusted. Setpoints: (AtSP, AA09, AA11)

CODE	DESCRIPTION	ADU	Explanation
A69	Low temperature B	1904 .03	Thermostat temperature exceed the lower limit, alarm delay has expired. Troubleshoot: Solve the control issue or adjust the temperature setpoint or the upper temperature alarm setpoint. Alarm delay might as well be adjusted. Setpoints: (btSP, bA10, bA11)
A70	Low S4 media outlet temperature B	1904 .04	If S4 value is less than Min setpoint for a duration of time alarm will be activated. Troubleshoot: Solve the control issue or adjust the temperature setpoint or the upper temperature alarm setpoint. Alarm delay might as well be adjusted. Setpoints: (btSP, bA10, bA11)
A74	SH reference too close to SH close set-point B	1905 .08	SH close is used and SH close set pint is too close the actual reference/ reference minimum. Troubleshoot: Disable SH close or correct the actual SH reference / reference minimum to have 0.5K difference to SH close set point. Setpoints: (bu00, bu01)
A75	LOP setpoint too close to MOP setpoint B	1905 .09	If MOP or LOP is used, MOP set point must > 5K bigger than LOB setpoint. The set point for the 2 pressure functions LOP and MOP is to close. Troubleshoot: Adjust the difference MOP-LOP, must be: MOP-LOPt >= 5K. Setpoints: (bu11, bu13)
A76	S4 media outlet sensor error B	1905 .10	Temperature sensor have shorted or open wires. Troubleshoot: Avoid application usage of S4 or get the local sensor inside signal range.
A77	Shared signal timeout B	1905 .11	One or more signals (S2, S3, S4, Po) are not updated within defined minimum update time. Troubleshoot: Signals must be updated within defined update interval defined by "Bus sharing minimum update interval". Setpoint: (C002)
A78	Thermostatic control signal missing B	1905 .12	Error on thermostat sensor signal. Troubleshoot: Check the thermostat sensor.
A79	Open coil valve B	1905 .13	open coil detected. Troubleshoot: Valve have an open circuit on stepper motor coils. Check valve wiring connection.
A80	Valve B error	1905 .14	Valve driver thermal overload. Troubleshoot: Valve driver chip overloaded. Check valve and wiring connection.
A81	Dutycycle alarm valve B	1905 .15	Actual valve duty cycle exceeds defined limits. Alarm autoresets after 60 sec. Troubleshoot: Minimize control instability.

The below shown table describes the different LED indication the controller provides to user. User can identify the status of the controller using the LED blinking and comparing it with the table below.

Figure 34: LED Alarm and Warning



7 Modbus list

The below table contains information on Modbus parameter list for EKE 100. A scaling factor should be applied where ever necessary, the number of decimals after , decides the scaling factor, if the number of decimal is 1 then scaling factor is 10. Eg: 100,0 has a scaling factor of 10 and 100,00 has a a scaling factor of 100. if text in Value shows Enum then check the enumeration table to find the different options available

7.1 Modbus lists

Table 14: Modbus lists

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
	PARAMETERS & STATUS VARIABLES							
Ho_	**Setup & service > Home**							
AU12	Actual SH reference	1V/2V	0,0	100,0	0.0	K	Read	3701
A_TE	Te saturated evaporation temperature	1V/2V	-100,0	200,0	0.0	°C	Read	3702
A_od	Valve A request OD	1V/2V	0,0	100,0	0.0	%	Read	3703
bU12	Actual SH reference	2V	0,0	100,0	0.0	K	Read	3704
b_TE	Te saturated evaporation temperature	2V	-100,0	200,0	0.0	°C	Read	3705
b_od	Valve B request OD	2V	0,0	100,0	0.0	%	Read	3706
CAno	Number of active alarms	1V/2V	0	32767	0		Read	3707
A_S3	S3 media inlet	1V/2V	-100,0	200,0	0.0	°C	Read	3708
A_S4	S4 media outlet	1V/2V	-100,0	200,0	0.0	°C	Read	3709
b_S3	S3 media inlet	2V	-100,0	200,0	0.0	°C	Read	3710
b_S4	S4 media outlet	2V	-100,0	200,0	0.0	°C	Read	3711
StA	**Home > Controller A status**							
AU00	Operation status	1V/2V	0	20	0 - Power_up	Enum 27	Read	3712
AU12	Actual SH reference	1V/2V	0,0	100,0	0.0	K	Read	3701
AU13	Actual superheat	1V/2V	0,0	100,0	0.0	K	Read	3713
AU24	Actual temperature reference	1V/2V	0,0	100,0	0.0	°C	Read	3714
A_od	Valve A request OD	1V/2V	0,0	100,0	0.0	%	Read	3703
A_PE	Pe evaporator	1V/2V	-1,00	200,00	0.00	barg	Read	3715
A_TE	Te saturated evaporation temperature	1V/2V	-100,0	200,0	0.0	°C	Read	3702
A_S2	S2 suction pipe	1V/2V	-100,0	200,0	0.0	°C	Read	3716
A_S3	S3 media inlet	1V/2V	-100,0	200,0	0.0	°C	Read	3708
A_S4	S4 media outlet	1V/2V	-100,0	200,0	0.0	°C	Read	3709
AU17	DI Enable A section	1V/2V	0	1	0 - Off	Enum 1	Read	3719
AU18	DI Heat	1V/2V	0	1	0 - Off	Enum 1	Read	3720
AU19	DI Preset OD	1V/2V	0	1	0 - Off	Enum 1	Read	3721
AU20	DI defrost start	1V/2V	0	1	0 - Off	Enum 1	Read	3722
AU26	AI Valve driver A	1V/2V	0,0	100,0	0.0	%	Read	3723
Stb	**Home > Controller B status**							
bU00	Operation status	2V	0	20	0 - Power_up	Enum 27	Read	3724
bU12	Actual SH reference	2V	0,0	100,0	0.0	K	Read	3704
bU13	Actual superheat	2V	0,0	100,0	0.0	K	Read	3725

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
bU24	Actual temperature reference	2V	0,0	100,0	0.0	°C	Read	3726
b_od	Valve B request OD	2V	0,0	100,0	0.0	%	Read	3706
b_PE	Pe evaporator	2V	-1,00	200,00	0.00	barg	Read	3727
b_TE	Te saturated evaporation temperature	2V	-100,0	200,0	0.0	°C	Read	3705
b_S2	S2 suction pipe	2V	-100,0	200,0	0.0	°C	Read	3728
b_S3	S3 media inlet	2V	-100,0	200,0	0.0	°C	Read	3710
b_S4	S4 media outlet	2V	-100,0	200,0	0.0	°C	Read	3711
bU17	DI Enable B section	2V	0	1	0 - Off	Enum 1	Read	3731
bU18	DI Heat	2V	0	1	0 - Off	Enum 1	Read	3732
bU19	DI Preset OD	2V	0	1	0 - Off	Enum 1	Read	3733
bU20	DI defrost start	2V	0	1	0 - Off	Enum 1	Read	3734
bU26	AI Valve driver B	2V	0,0	100,0	0.0	%	Read	3735
StC	**Home > Common controller status**							
CbtV	Actual battery voltage	1V/2V	0,0	30,0	0.0	V	Read	3736
CU02	Battery state	1V/2V	0	3	0 - Ready	Enum 48	Read	3737
CinV	Input Voltage	1V/2V	0,0	100,0	0.0	V	Read	3738
CU03	Alarm status	1V/2V	0	1	0 - Off	Enum 1	Read	3739
ALA	**Home > Active Alarms**							
I000	Active status	1V/2V	0	1	0 - No	Enum 5	Read	3740
CAno	Number of active alarms	1V/2V	0	32767	0		Read	3707
SEt	**Setup & service > Basic settings**							
Cr12	Main switch	1V/2V	0	1	0 - Off	Enum 1	RW	3001
ACtr	Operation mode A	1V/2V	0	2	0 - SH_control	Enum 14	RW	3002
ArFg	Refrigerant	1V/2V	0	53	0 - Undef	Enum 16	RW	3003
ASLo	SH minimum	1V/2V	2,0	ASHI	4.0	K	RW	3004
ASHI	SH maximum	1V/2V	ASLo	40,0	9.0	K	RW	3005
AC50	PeA transmitter configuration	1V/2V	0	18	0 - Not_defined	Enum 41	RW	3006
AC51	PeA voltage low	1V/2V	0,0	AC52	0.0	V	RW	3007
AC52	PeA voltage high	1V/2V	AC51	10,0	10.0	V	RW	3008
AC53	PeA current low	1V/2V	0,0	AC54	4.0	mA	RW	3009
AC54	PeA current high	1V/2V	AC53	20,0	20.0	mA	RW	3010
AC55	PeA ratio low	1V/2V	3	AC56	10	%	RW	3011
AC56	PeA ratio high	1V/2V	AC55	97	90	%	RW	3012
AC57	PeA transmitter min.	1V/2V	-1,0	AC58	-1.0	barg	RW	3013
AC58	PeA transmitter max.	1V/2V	AC57	200,0	12.0	barg	RW	3014
AC59	S2A sensor configuration	1V/2V	0	25	0 - Not_defined	Enum 42	RW	3015
A_in	Driver A input signal	1V/2V	0	5	0 - _0_10_V	Enum 52	RW	3016
AJ00	Valve configuration	1V/2V	0	51	0 - Select_type	Enum 8	RW	3017
bCtr	Operation mode B	2V	0	9	9 - Not_used	Enum 15	RW	3018
brFg	Refrigerant	2V	0	53	0 - Common	Enum 18	RW	3019
bSLo	SH minimum	2V	2,0	bSHI	4.0	K	RW	3020
bSHI	SH maximum	2V	bSLo	40,0	9.0	K	RW	3021
bC50	PeB transmitter configuration	2V	0	18	0 - Not_defined	Enum 41	RW	3022
bC51	PeB voltage low	2V	0,0	bC52	0.0	V	RW	3023
bC52	PeB voltage high	2V	bC51	10,0	10.0	V	RW	3024

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
bC53	PeB current low	2V	0,0	bC54	4.0	mA	RW	3025
bC54	PeB current high	2V	bC53	20,0	20.0	mA	RW	3026
bC55	PeB ratio low	2V	3	bC56	10	%	RW	3027
bC56	PeB ratio high	2V	bC55	97	90	%	RW	3028
bC57	PeB transmitter min.	2V	-1,0	bC58	-1.0	barg	RW	3029
bC58	PeB transmitter max.	2V	bC57	200,0	12.0	barg	RW	3030
bC59	S2B sensor configuration	2V	0	25	0 - Not_defined	Enum 42	RW	3031
b_in	Driver B input signal	2V	0	5	0 - _0_10_V	Enum 52	RW	3032
bJ00	Valve configuration	2V	0	51	0 - Select_type	Enum 11	RW	3033
bCA	**Control A > Basic control**							
AEnA	Enable A section	1V/2V	0	1	1 - On	Enum 1	RW	3034
ArFg	Refrigerant	1V/2V	0	53	0 - Undef	Enum 16	RW	3003
Ar01	Antoine constant A1	1V/2V	8,000	12,000	9.800		RW	3035
Ar02	Antoine constant A2	1V/2V	-3000,0	-1300,0	-2250.0		RW	3036
Ar03	Antoine constant A3	1V/2V	210,0	300,0	253.0		RW	3037
Ar04	Startup mode	1V/2V	0	2	0 - Prop__Ctrl	Enum 17	RW	3040
Ar05	Startup time	1V/2V	1	600	90	Sec	RW	3041
Ar06	Minimum start-up time	1V/2V	1	240	15	Sec	RW	3042
AodS	Startup OD	1V/2V	0	100	32	%	RW	3043
ArEf	SH reference mode	1V/2V	0	3	2 - MSS	Enum 19	RW	3044
AFSP	SH fixed setpoint	1V/2V	2,0	40,0	7.0	K	RW	3045
ASLo	SH minimum	1V/2V	2,0	ASHI	4.0	K	RW	3004
ASHI	SH maximum	1V/2V	ASLo	40,0	9.0	K	RW	3005
AdEL	SH reference delta temp. factor	1V/2V	20	100	65	%	RW	3046
Ar07	SH Tn	1V/2V	20	900	90	Sec	RW	3047
Ar08	SH Kp	1V/2V	0,1	20,0	1.5		RW	3048
Ar09	SH Kp Min.	1V/2V	0,1	1,0	0.6		RW	3049
Ar10	SH KpTe	1V/2V	0,0	20,0	3.0		RW	3050
AodL	Minimum OD	1V/2V	0	AodH	0	%	RW	3051
AodH	Maximum OD	1V/2V	AodL	100	100	%	RW	3052
Ar11	Thermostatic mode	1V/2V	0	2	0 - Not_used	Enum 25	RW	3053
ArSn	Thermostatic sensor	1V/2V	0	1	0 - S3	Enum 26	RW	3054
AtSP	Temperature setpoint	1V/2V	-70,0	70,0	3.0	°C	RW	3055
Atdt	Temperature differential	1V/2V	0,1	10,0	2.0	K	RW	3056
ECA	**Control A > Extended control**							
Au00	SH close function	1V/2V	0	1	1 - On	Enum 1	RW	3057
Au01	SH close setpoint	1V/2V	-5,0	20,0	2.0	K	RW	3058
Au02	SH close Tn divide	1V/2V	1	5	3		RW	3059
Au03	SH close Kp factor	1V/2V	0,5	10,0	1.5		RW	3060
Au04	Limit Kp	1V/2V	1,0	20,0	5.0		RW	3061
Au05	Limit Tn	1V/2V	20	900	45	Sec	RW	3062
Au06	Minimum S4 mode	1V/2V	0	1	0 - Off	Enum 1	RW	3063
Au07	Minimum S4 setpoint	1V/2V	-50,0	60,0	5.0	°C	RW	3064

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
Au08	MSS Stability	1V/2V	0,0	10,0	5.0		RW	3065
Au09	MSS T0 stability factor	1V/2V	0,0	1,0	0.0		RW	3066
Au10	MOP function	1V/2V	0	1	0 - Off	Enum 1	RW	3067
Au11	MOP setpoint	1V/2V	-70,0	60,0	0.0	°C	RW	3068
Au12	LOP function	1V/2V	0	1	0 - Off	Enum 1	RW	3069
Au13	LOP setpoint	1V/2V	-90,0	40,0	-40.0	°C	RW	3070
Au14	LOP priority mode	1V/2V	0	1	0 - Off	Enum 1	RW	3071
Au15	LOP maximum time	1V/2V	0	600	120	Sec	RW	3072
Au16	LOP oscillation detection	1V/2V	0	1	1 - On	Enum 1	RW	3073
Au19	Compressor speed feedforward function	1V/2V	0	1	0 - Off	Enum 1	RW	3076
Au20	FF low capacity turning point	1V/2V	0,0	100,0	25.0	%	RW	3077
Au21	FF maximum factor for Tn tuning	1V/2V	1	5	2		RW	3078
Au22	SH control sensor error action	1V/2V	0	2	0 - Stop	Enum 20	RW	3079
Au23	Thermostatic sensor error action	1V/2V	0	2	0 - Stop	Enum 20	RW	3080
Au24	Fixed OD during emergency cooling	1V/2V	0	100	0	%	RW	3081
Au25	MTR Tn	1V/2V	20	3600	1800	Sec	RW	3082
Au26	MTR Kp	1V/2V	0,2	20,0	3.0		RW	3083
SHA	**Control A > Heat control**							
AH00	Heat startup time	1V/2V	1	600	90	Sec	RW	3084
AH01	Heat minimum startup time	1V/2V	1	240	15	Sec	RW	3085
AH02	Heat startup OD	1V/2V	0	100	32	%	RW	3086
AH03	Heat SH fixed setpoint	1V/2V	2,0	40,0	7.0	K	RW	3087
AH04	Heat SH minimum	1V/2V	2,0	AH05	4.0	K	RW	3088
AH05	Heat SH maximum	1V/2V	AH04	40,0	9.0	K	RW	3089
AH06	Heat SH ref. delta temp. factor	1V/2V	20	100	65	%	RW	3090
AH07	Heat SH Tn	1V/2V	20	900	90	Sec	RW	3091
AH08	Heat SH Kp	1V/2V	0,1	20,0	1.5		RW	3092
AH09	Heat SH Kp minimum	1V/2V	0,1	1,0	0.6		RW	3093
AH10	Heat SH KpTe	1V/2V	0,0	20,0	3.0		RW	3094
AH11	Heat SH close setpoint	1V/2V	-5,0	20,0	2.0	K	RW	3095
AH12	Heat Limit Kp	1V/2V	1,0	20,0	5.0		RW	3096
AH13	Heat Limit Tn	1V/2V	20	900	45	Sec	RW	3097
DFA	**Control A > Defrost control**							
AD00	Defrost start time	1V/2V	0	600	0	Sec	RW	3098
AD01	Defrost start low pressure limit	1V/2V	0,1	20,0	1.0	barg	RW	3099
AD02	Defrost OD	1V/2V	0,0	100,0	0.0	%	RW	3100
AD03	Defrost end closed time	1V/2V	0	600	0	Sec	RW	3101
AD04	Defrost end OD time	1V/2V	0	600	0	Sec	RW	3102
AD05	Defrost end OD	1V/2V	0,0	100,0	50.0	%	RW	3103

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
ASA	**Control A > Alarm setup**							
AA00	MOP alarm delay	1V/2V	0	1200	60	Sec	RW	3104
AA01	MOP alarm differential	1V/2V	0,0	40,0	5.0	K	RW	3105
AA02	LOP alarm delay	1V/2V	0	1200	60	Sec	RW	3106
AA03	LOP alarm differential	1V/2V	0,0	40,0	5.0	K	RW	3107
AA04	High SH alarm delay	1V/2V	0	1800	600	Sec	RW	3108
AA05	High SH alarm differential	1V/2V	0,0	40,0	5.0	K	RW	3109
AA06	Low SH alarm delay	1V/2V	0	1200	60	Sec	RW	3110
AA07	Low SH alarm differential	1V/2V	0,0	40,0	3.0	K	RW	3111
AA08	Lack of capacity alarm delay	1V/2V	0	120	0	min	RW	3112
AA09	Upper temperature alarm	1V/2V	0,0	40,0	5.0	K	RW	3113
AA10	Lower temperature alarm	1V/2V	0,0	40,0	3.0	K	RW	3114
AA11	Temperature alarm delay	1V/2V	0	90	30	min	RW	3115
AA12	Minimum S4 band	1V/2V	0,0	30,0	2.0	K	RW	3116
AA13	Minimum S4 delay	1V/2V	0	1200	60	Sec	RW	3117
SSA	**Control A > Service**							
AU00	Operation status	1V/2V	0	20	0 - Power_up	Enum 27	Read	3712
AU01	Manual mode A	1V/2V	0	1	0 - Off	Enum 1	RW	3741
AU02	Manual mode timeout A	1V/2V	0	3600	60	Sec	RW	3120
AU03	Manual OD A	1V/2V	0,0	100,0	0.0	%	RW	3742
AU04	Manual homeing	1V/2V	0	1	0 - Off	Enum 1	Read	3743
A_PE	Pe evaporator	1V/2V	-1,00	200,00	0.00	barg	Read	3715
A_TE	Te saturated evaporation temperature	1V/2V	-100,0	200,0	0.0	°C	Read	3702
A_S2	S2 suction pipe	1V/2V	-100,0	200,0	0.0	°C	Read	3716
A_S3	S3 media inlet	1V/2V	-100,0	200,0	0.0	°C	Read	3708
A_S4	S4 media outlet	1V/2V	-100,0	200,0	0.0	°C	Read	3709
AU12	Actual SH reference	1V/2V	0,0	100,0	0.0	K	Read	3701
AU13	Actual superheat	1V/2V	0,0	100,0	0.0	K	Read	3713
AU14	Injection state	1V/2V	0	4	0 - Off	Enum 21	Read	3744
AU15	Injection details	1V/2V	0	12	0 - Off	Enum 22	Read	3745
AU16	Average OD	1V/2V	0,0	100,0	0.0	%	Read	3746
AU17	DI Enable A section	1V/2V	0	1	0 - Off	Enum 1	Read	3719
AU18	DI Heat	1V/2V	0	1	0 - Off	Enum 1	Read	3720
AU19	DI Preset OD	1V/2V	0	1	0 - Off	Enum 1	Read	3721
AU20	DI defrost start	1V/2V	0	1	0 - Off	Enum 1	Read	3722
AU21	Act. ext. ref. SH offset	1V/2V	-40,0	40,0	0.0	K	Read	3747
AU22	Act. ext. ref. temperature offset	1V/2V	-40,0	40,0	0.0	K	Read	3748
AU23	Act. ext. ref. maximum OD	1V/2V	0,0	100,0	0.0	%	Read	3749
AU24	Actual temperature reference	1V/2V	0,0	100,0	0.0	°C	Read	3714
AU25	Actual maximum OD	1V/2V	0,0	100,0	0.0	%	Read	3750
AU26	AI Valve driver A	1V/2V	0,0	100,0	0.0	%	Read	3723

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
A_od	Valve A request OD	1V/2V	0,0	100,0	0.0	%	Read	3703
AI05	Actual valve position A	1V/2V	0,0	100,0	0.0	%	Read	3777
Ax20	PeA Sensor	1V/2V	0,00	10,00	0.00	V	Read	3751
Ax20	PeA Sensor	1V/2V	0,00	20,00	0.00	A	Read	3752
Ax20	PeA Sensor	1V/2V	-1,00	200,00	0.00	barg	Read	3753
Ax21	S2A Sensor	1V/2V	-100,0	200,0	0.0	°C	Read	3754
bCb	**Control B > Basic control**							
bEnb	Enable B section	2V	0	1	1 - On	Enum 1	RW	3121
brFg	Refrigerant	2V	0	53	0 - Common	Enum 18	RW	3019
br01	Antoine constant A1	2V	8,000	12,000	9.800		RW	3122
br02	Antoine constant A2	2V	-3000,0	-1300,0	-2250.0		RW	3123
br03	Antoine constant A3	2V	210,0	300,0	253.0		RW	3124
br04	Startup mode	2V	0	2	0 - Prop__Ctrl	Enum 17	RW	3127
br05	Startup time	2V	1	600	90	Sec	RW	3128
br06	Minimum start-up time	2V	1	240	15	Sec	RW	3129
bodS	Startup OD	2V	0	100	32	%	RW	3130
brEF	SH reference mode	2V	0	3	2 - MSS	Enum 19	RW	3131
bFSP	SH fixed setpoint	2V	2,0	40,0	7.0	K	RW	3132
bSLo	SH minimum	2V	2,0	bSHI	4.0	K	RW	3020
bSHI	SH maximum	2V	bSLo	40,0	9.0	K	RW	3021
bdEL	SH reference delta temp. factor	2V	20	100	65	%	RW	3133
br07	SH Tn	2V	20	900	90	Sec	RW	3134
br08	SH Kp	2V	0,1	20,0	1.5		RW	3135
br09	SH Kp Min	2V	0,1	1,0	0.6		RW	3136
br10	SH KpTe	2V	0,0	20,0	3.0		RW	3137
bodL	Minimum OD	2V	0	bodH	0	%	RW	3138
bodH	Maximum OD	2V	bodL	100	100	%	RW	3139
br11	Thermostatic mode	2V	0	2	0 - Not_used	Enum 25	RW	3140
brSn	Thermostatic sensor	2V	0	1	0 - S3	Enum 26	RW	3141
btSP	Temperature setpoint	2V	-70,0	70,0	3.0	°C	RW	3142
btdt	Temperature differential	2V	0,1	10,0	2.0	K	RW	3143
ECb	**Control B > Extended control**							
bu00	SH close function	2V	0	1	1 - On	Enum 1	RW	3144
bu01	SH close setpoint	2V	-5,0	20,0	2.0	K	RW	3145
bu02	SH close Tn divide	2V	1	5	3		RW	3146
bu03	SH close Kp factor	2V	0,5	10,0	1.5		RW	3147
bu04	Limit Kp	2V	1,0	20,0	5.0		RW	3148
bu05	Limit Tn	2V	20	900	45	Sec	RW	3149
bu06	Minimum S4 mode	2V	0	1	0 - Off	Enum 1	RW	3150
bu07	Minimum S4 setpoint	2V	-50,0	60,0	5.0	°C	RW	3151
bu08	MSS Stability	2V	0,0	10,0	5.0		RW	3152
bu09	MSS T0 stability factor	2V	0,0	1,0	0.0		RW	3153
bu10	MOP function	2V	0	1	0 - Off	Enum 1	RW	3154
bu11	MOP setpoint	2V	-70,0	60,0	0.0	°C	RW	3155
bu12	LOP function	2V	0	1	0 - Off	Enum 1	RW	3156

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
bu13	LOP setpoint	2V	-90,0	40,0	-40.0	°C	RW	3157
bu14	LOP priority mode	2V	0	1	0 - Off	Enum 1	RW	3158
bu15	LOP maximum time	2V	0	600	120	Sec	RW	3159
bu16	LOP oscillation detection	2V	0	1	1 - On	Enum 1	RW	3160
bu19	Compressor speed feedforward function	2V	0	1	0 - Off	Enum 1	RW	3163
bu20	FF low capacity turning point	2V	0,0	100,0	25.0	%	RW	3164
bu21	FF maximum factor for Tn tuning	2V	1	5	2		RW	3165
bu22	SH control sensor error action	2V	0	2	0 - Stop	Enum 20	RW	3166
bu23	Thermostatic sensor error action	2V	0	2	0 - Stop	Enum 20	RW	3167
bu24	Fixed OD during emergency cooling	2V	0	100	0	%	RW	3168
bu25	MTR Tn	2V	20	3600	1800	Sec	RW	3169
bu26	MTR Kp	2V	0,2	20,0	3.0		RW	3170
SHb	**Control B > Heat control**							
bH00	Heat startup time	2V	1	600	90	Sec	RW	3171
bH01	Heat minimum startup time	2V	1	240	15	Sec	RW	3172
bH02	Heat startup OD	2V	0	100	32	%	RW	3173
bH03	Heat SH fixed setpoint	2V	2,0	40,0	7.0	K	RW	3174
bH04	Heat SH minimum	2V	2,0	bH05	4.0	K	RW	3175
bH05	Heat SH maximum	2V	bH04	40,0	9.0	K	RW	3176
bH06	Heat SH ref. delta temp. factor	2V	20	100	65	%	RW	3177
bH07	Heat SH Tn	2V	20	900	90	Sec	RW	3178
bH08	Heat SH Kp	2V	0,1	20,0	1.5		RW	3179
bH09	Heat SH Kp minimum	2V	0,1	1,0	0.6		RW	3180
bH10	Heat SH KpTe	2V	0,0	20,0	3.0		RW	3181
bH11	Heat SH close setpoint	2V	-5,0	20,0	2.0	K	RW	3182
bH12	Heat Limit Kp	2V	1,0	20,0	5.0		RW	3183
bH13	Heat Limit Tn	2V	20	900	45	Sec	RW	3184
DFb	**Control B > Defrost control**							
bD00	Defrost start time	2V	0	600	0	Sec	RW	3185
bD01	Defrost start low pressure limit	2V	0,1	20,0	1.0	barg	RW	3186
bD02	Defrost OD	2V	0,0	100,0	0.0	%	RW	3187
bD03	Defrost end closed time	2V	0	600	0	Sec	RW	3188
bD04	Defrost end OD time	2V	0	600	0	Sec	RW	3189
bD05	Defrost end OD	2V	0,0	100,0	50.0	%	RW	3190
ASb	**Control B > Alarm setup**							
bA00	MOP alarm delay	2V	0	1200	60	Sec	RW	3191
bA01	MOP alarm differential	2V	0,0	40,0	5.0	K	RW	3192
bA02	LOP alarm delay	2V	0	1200	60	Sec	RW	3193

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
bA03	LOP alarm differential	2V	0,0	40,0	5.0	K	RW	3194
bA04	High SH alarm delay	2V	0	1800	600	Sec	RW	3195
bA05	High SH alarm differential	2V	0,0	40,0	5.0	K	RW	3196
bA06	Low SH alarm delay	2V	0	1200	60	Sec	RW	3197
bA07	Low SH alarm differential	2V	0,0	40,0	3.0	K	RW	3198
bA08	Lack of capacity alarm delay	2V	0	120	0	min	RW	3199
bA09	Upper temperature alarm	2V	0,0	40,0	5.0	K	RW	3200
bA10	Lower temperature alarm	2V	0,0	40,0	3.0	K	RW	3201
bA11	Temperature alarm delay	2V	0	90	30	min	RW	3202
bA14	Minimum S4 band	2V	0,0	30,0	2.0	K	RW	3203
bA15	Minimum S4 delay	2V	0	1200	60	Sec	RW	3204
SSb	**Control B > Service**							
bU00	Operation status	2V	0	20	0 - Power_up	Enum 27	Read	3724
bU01	Manual mode B	2V	0	1	0 - Off	Enum 1	RW	3755
bU02	Manual mode timeout B	2V	0	3600	60	Sec	RW	3207
bU03	Manual OD B	2V	0,0	100,0	0.0	%	RW	3756
bU04	Manual homeing	2V	0	1	0 - Off	Enum 1	Read	3757
b_PE	Pe evaporator	2V	-1,00	200,00	0.00	barg	Read	3727
b_TE	Te saturated evaporation temperature	2V	-100,0	200,0	0.0	°C	Read	3705
b_S2	S2 suction pipe	2V	-100,0	200,0	0.0	°C	Read	3728
b_S3	S3 media inlet	2V	-100,0	200,0	0.0	°C	Read	3710
b_S4	S4 media outlet	2V	-100,0	200,0	0.0	°C	Read	3711
bU12	Actual SH reference	2V	0,0	100,0	0.0	K	Read	3704
bU13	Actual superheat	2V	0,0	100,0	0.0	K	Read	3725
bU14	Injection state	2V	0	4	0 - Off	Enum 21	Read	3758
bU15	Injection details	2V	0	12	0 - Off	Enum 22	Read	3759
bU16	Average OD	2V	0,0	100,0	0.0	%	Read	3760
bU17	DI Enable B section	2V	0	1	0 - Off	Enum 1	Read	3731
bU18	DI Heat	2V	0	1	0 - Off	Enum 1	Read	3732
bU19	DI Preset OD	2V	0	1	0 - Off	Enum 1	Read	3733
bU20	DI defrost start	2V	0	1	0 - Off	Enum 1	Read	3734
bU21	Act. ext. ref. SH offset	2V	-40,0	40,0	0.0	K	Read	3761
bU22	Act. ext. ref. temperature offset	2V	-40,0	40,0	0.0	K	Read	3762
bU23	Act. ext. ref. maximum OD	2V	0,0	100,0	0.0	%	Read	3763
bU24	Actual temperature reference	2V	0,0	100,0	0.0	°C	Read	3726
bU25	Actual maximum OD	2V	0,0	100,0	0.0	%	Read	3764
bU26	AI Valve driver B	2V	0,0	100,0	0.0	%	Read	3735
b_od	Valve B request OD	2V	0,0	100,0	0.0	%	Read	3706
bI05	Actual valve position B	2V	0,0	100,0	0.0	%	%	3778
bx18	PeB Sensor	2V	0,00	10,00	0.00	V	Read	3765
bx19	PeB Sensor	2V	0,00	20,00	0.00	A	Read	3766
bx20	PeB Sensor	2V	-1,00	200,00	0.00	barg	Read	3767

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
bx21	S2B sensor	2V	-100,0	200,0	0.0	°C	Read	3768
APP	**Configuration > Application config.**							
ACtr	Operation mode A	2V	0	2	0 - SH_control	Enum 14	RW	3002
bCtr	Operation mode B	1V/2V	0	9	9 - Not_used	Enum 15	RW	3018
CA11	Power backup alarm	1V/2V	0	1	0 - No	Enum 5	RW	3209
I-O	**Configuration > I/O configuration**							
AC00	PeA configuration	1V/2V	0	9	1 - inp_PeA	Enum 28	RW	3210
bC00	PeB configuration	2V	0	10	3 - inp_PeB	Enum 29	RW	3211
AC01	S2A configuration	1V/2V	0	9	2 - inp_S2A	Enum 30	RW	3212
bC01	S2B configuration	2V	0	10	4 - inp_S2B	Enum 31	RW	3213
AC02	S3A configuration	1V/2V	0	9	0 - Not used	Enum 32	RW	3214
bC02	S3B configuration	2V	0	10	0 - Not used	Enum 33	RW	3215
AC03	S4A configuration	1V/2V	0	9	0 - Not used	Enum 32	RW	3216
bC03	S4B configuration	2V	0	10	0 - Not used	Enum 34	RW	3217
AC05	ExtA configuration	1V/2V	0	9	0 - Not used	Enum 35	RW	3220
bC05	ExtB configuration	2V	0	9	0 - Not used	Enum 37	RW	3221
AC06	Driver reference A configuration	1V/2V	0	9	0 - Not used	Enum 28	RW	3222
bC06	Driver reference B configuration	2V	0	9	0 - Not used	Enum 35	RW	3223
AC07	DI1 NC/NO	1V/2V	0	1	1 - NO	Enum 50	RW	3224
bC07	DI2 NC/NO	1V/2V	0	1	1 - NO	Enum 50	RW	3225
P013	DO open collector	1V/2V	0	2	1 - Alarm___NO	Enum 49	RW	3226
P014	Voltage for output 5V/18V	1V/2V	0	3	3-Auto	Enum 53	RW	3342
AC08	Enable A configuration	1V/2V	0	3	1 - DI_1	Enum 38	RW	3227
bC08	Enable B configuration	2V	0	3	2 - DI_2	Enum 38	RW	3228
AC09	Heat cool selection A configuration	1V/2V	0	3	0 - Not used	Enum 39	RW	3229
bC09	Heat cool selection B configuration	2V	0	4	0 - Not used	Enum 40	RW	3230
AC10	Preset OD A configuration	1V/2V	0	3	0 - Not used	Enum 39	RW	3231
bC10	Preset OD B configuration	2V	0	4	0 - Not used	Enum 40	RW	3232
AC11	Defrost A configuration	1V/2V	0	3	0 - Not used	Enum 39	RW	3233
bC11	Defrost B configuration	2V	0	4	0 - Not used	Enum 40	RW	3234
P012	EKE 2U Signal Of Health	1V/2V	0	2	0 - Not_used	Enum 47	RW	3235
SEn	**Configuration > Sensor config.**							
AC50	PeA transmitter configuration	1V/2V	0	18	0 - Not_defined	Enum 41	RW	3006
AC51	PeA voltage low	1V/2V	0,0	AC52	0.0	V	RW	3007
AC52	PeA voltage high	1V/2V	AC51	10,0	10.0	V	RW	3008

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
AC53	PeA current low	1V/2V	0,0	AC54	4.0	mA	RW	3009
AC54	PeA current high	1V/2V	AC53	20,0	20.0	mA	RW	3010
AC55	PeA ratio low	1V/2V	3	AC56	10	%	RW	3011
AC56	PeA ratio high	1V/2V	AC55	97	90	%	RW	3012
AC57	PeA transmitter min.	1V/2V	-1,0	AC58	-1.0	barg	RW	3013
AC58	PeA transmitter max.	1V/2V	AC57	200,0	12.0	barg	RW	3014
bC50	PeB transmitter configuration	2V	0	18	0 - Not_defined	Enum 41	RW	3022
bC51	PeB voltage low	2V	0,0	bC52	0.0	V	RW	3023
bC52	PeB voltage high	2V	bC51	10,0	10.0	V	RW	3024
bC53	PeB current low	2V	0,0	bC54	4.0	mA	RW	3025
bC54	PeB current high	2V	bC53	20,0	20.0	mA	RW	3026
bC55	PeB ratio low	2V	3	bC56	10	%	RW	3027
bC56	PeB ratio high	2V	bC55	97	90	%	RW	3028
bC57	PeB transmitter min.	2V	-1,0	bC58	-1.0	barg	RW	3029
bC58	PeB transmitter max.	2V	bC57	200,0	12.0	barg	RW	3030
AC59	S2A sensor configuration	1V/2V	0	25	0 - Not_defined	Enum 42	RW	3015
bC59	S2B sensor configuration	2V	0	25	0 - Not_defined	Enum 42	RW	3031
AC60	S3A sensor configuration	1V/2V	0	25	0 - Not_defined	Enum 42	RW	3236
bC60	S3B sensor configuration	2V	0	25	0 - Not_defined	Enum 42	RW	3237
AC61	S4A sensor configuration	1V/2V	0	25	0 - Not_defined	Enum 42	RW	3238
bC61	S4B sensor configuration	2V	0	25	0 - Not_defined	Enum 42	RW	3239
AC71	ExtA ref. configuration	1V/2V	0	27	0 - Not_defined	Enum 43	RW	3258
AC72	ExtA ref. voltage low	1V/2V	0,0	AC73	0.0	V	RW	3259
AC73	ExtA ref. voltage high	1V/2V	AC72	10,0	10.0	V	RW	3260
AC74	ExtA ref. current low	1V/2V	0,0	AC75	4.0	mA	RW	3261
AC75	ExtA ref. current high	1V/2V	AC74	20,0	20.0	mA	RW	3262
bC71	ExtB ref. configuration	2V	0	27	0 - Not_defined	Enum 43	RW	3263
bC72	ExtB ref. voltage low	2V	0,0	bC73	0.0	V	RW	3264
bC73	ExtB ref. voltage high	2V	bC72	10,0	10.0	V	RW	3265
bC74	ExtB ref. current low	2V	0,0	bC75	4.0	mA	RW	3266
bC75	ExtB ref. current high	2V	bC74	20,0	20.0	mA	RW	3267
AC76	PeA Correction	1V/2V	-5,00	5,00	0.00	Bar	RW	3268
bC76	PeB Correction	2V	-5,00	5,00	0.00	Bar	RW	3269
AC77	S2A Correction	1V/2V	-10,0	10,0	0.0	K	RW	3270
bC77	S2B Correction	2V	-10,0	10,0	0.0	K	RW	3271
AC78	S3A Correction	1V/2V	-10,0	10,0	0.0	K	RW	3272
bC78	S3B Correction	2V	-10,0	10,0	0.0	K	RW	3273
AC79	S4A Correction	1V/2V	-10,0	10,0	0.0	K	RW	3274
bC79	S4B Correction	2V	-10,0	10,0	0.0	K	RW	3275
REA	**Configuration > Ext. ref. config. A**							
AE01	External reference function	1V/2V	0	2	0 - SH	Enum 24	RW	3278

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
AE02	External reference offset min.	1V/2V	-50,0	AE03	0.0	K	RW	3279
AE03	External reference offset max.	1V/2V	AE02	50,0	0.0	K	RW	3280
REb	**Configuration > Ext. ref. config. B**							
bE01	External reference function	2V	0	2	0 - SH	Enum 24	RW	3281
bE02	External reference offset min.	2V	-50,0	bE03	0.0	K	RW	3282
bE03	External reference offset max.	2V	bE02	50,0	0.0	K	RW	3283
VLA	**Configuration > Valve A**							
AJ00	Valve configuration	1V/2V	0	51	0 - Select_type	Enum 8	RW	3017
AJ02	Valve motor decay mode	1V/2V	0	2	0 - Fast	Enum 10	RW	3285
AJ03	Valve step mode	1V/2V	0	4	3 - _1_8	Enum 12	RW	3286
AJ04	Valve step positioning	1V/2V	0	2	0 - Fullstep	Enum 13	RW	3287
AJ05	Valve total steps	1V/2V	0	10000	0	stp	RW	3288
AJ06	Valve speed	1V/2V	10	400	10	pps	RW	3289
AJ07	Valve start speed	1V/2V	1	100	100	%	RW	3290
AJ08	Valve emengency speed	1V/2V	50	200	100	%	RW	3291
AJ09	Valve drive current	1V/2V	10	1000	10	mA	RW	3292
AJ10	Valve acceleration current	1V/2V	100	150	100	%	RW	3293
AJ11	Valve acceleration time	1V/2V	10	1000	10	ms	RW	3294
AJ12	Valve holding current	1V/2V	0	100	0	%	RW	3295
AJ13	Valve excitation time after stop	1V/2V	0	1000	10	ms	RW	3296
AJ14	Compensation backlash	1V/2V	0,0	10,0	0.0	%	RW	3297
AJ15	Valve duty cycle	1V/2V	5	100	100	%	RW	3298
AJ16	User defined overdrive	1V/2V	0	20	5	%	RW	3299
AJ17	Overdriver enable OD	1V/2V	0	100	10	%	RW	3300
AJ18	Overdrive block time	1V/2V	0	1440	10	min	RW	3301
AJ19	Valve neutral zone	1V/2V	0,0	5,0	0.5	%	RW	3302
AJ20	Preset OD	1V/2V	0,0	100,0	50.0	%	RW	3303
AJ22	Valve size reduction	1V/2V	0	80	0	%	RW	3305
AJ23	Forced overdrive time	1V/2V	0	9000	0	h	RW	3306
AJ24	Manifolded valves	1V/2V	0	1	0 - No	Enum 5	RW	3307
AJ25	Manifolded valve type	1V/2V	0	3	2 - Par	Enum 44	RW	3308
AJ26	Manifolded valve single move band	1V/2V	0,0	10,0	5.0	%	RW	3309
AJ27	Use open coil alarm	1V/2V	0	1	1 - Yes	Enum 5	RW	3310
VLb	**Configuration > Valve B**							
bJ00	Valve configuration	2V	0	51	0 - Select_type	Enum 11	RW	3033
bJ02	Valve motor decay mode	2V	0	2	0 - Fast	Enum 10	RW	3312

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
bJ03	Valve step mode	2V	0	4	3 - _1_8	Enum 12	RW	3313
bJ04	Valve step positioning	2V	0	2	0 - Fullstep	Enum 13	RW	3314
bJ05	Valve total steps	2V	0	10000	0	stp	RW	3315
bJ06	Valve speed	2V	10	400	10	pps	RW	3316
bJ07	Valve start speed	2V	1	100	100	%	RW	3317
bJ08	Valve emengency speed	2V	50	200	100	%	RW	3318
bJ09	Valve drive current	2V	10	1000	10	mA	RW	3319
bJ10	Valve acceleration current	2V	100	150	100	%	RW	3320
bJ11	Valve acceleration time	2V	10	1000	10	ms	RW	3321
bJ12	Valve holding current	2V	0	100	0	%	RW	3322
bJ13	Valve excitation time after stop	2V	0	1000	10	ms	RW	3323
bJ14	Compensation backlash	2V	0,0	10,0	0.0	%	RW	3324
bJ15	Valve duty cycle	2V	5	100	100	%	RW	3325
bJ16	User defined overdrive	2V	0	20	5	%	RW	3326
bJ17	Overdriver enable OD	2V	0	100	10	%	RW	3327
bJ18	Overdrive block time	2V	0	1440	10	min	RW	3328
bJ19	Valve neutral zone	2V	0,0	5,0	0.5	%	RW	3329
bJ20	Preset OD	2V	0,0	100,0	50.0	%	RW	3330
bJ22	Valve size reduction	2V	0	80	0	%	RW	3332
bJ23	Forced overdrive time	2V	0	9000	0	h	RW	3333
bJ24	Use open coil alarm	2V	0	1	1 - Yes	Enum 5	RW	3334
dSP	**Configuration > Display**							
D001	Display unit	1V/2V	0	1	0 - MET	Enum 2	RW	3335
D002	Display timeout	1V/2V	0	60	0 - No_timeout	Enum 51	RW	3336
buS	**Configuration > Modbus**							
CAdr	Controller address	1V/2V	1	127	1		RW	3337
C002	Bus sharing minimum update interval	1V/2V	0	60	5	Sec	RW	3341
C003	Modbus baudrate	1V/2V	1	8	6 - _19200	Enum 3	RW	3338
C004	Modbus mode	1V/2V	0	2	1 - _8E1	Enum 4	RW	3339
Out	**Service > Manual output**							
H007	Alarm relay	1V/2V	0	2	0 - Auto	Enum 46	Read	3769
AU01	Manual mode A	1V/2V	0	1	0 - Off	Enum 1	Read	3741
AU02	Manual mode timeout A	1V/2V	0	3600	60	Sec	RW	3120
AU03	Manual OD A	1V/2V	0,0	100,0	0.0	%	Read	3742
bU01	Manual mode B	2V	0	1	0 - Off	Enum 1	Read	3755
bU02	Manual mode timeout B	2V	0	3600	60	Sec	RW	3207
bU03	Manual OD B	2V	0,0	100,0	0.0	%	Read	3756
CSI	**Service > Controller service info.**							
H100	Sales number 080G5xxx	1V/2V	0	9999	0		Read	3770
SVEr	Software version	1V/2V	0,00	100,00	0.50		Read	3771

LABEL	DESCRIPTION	EKE 100 Type	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
RSt	**Service > Factory reset**							
H102	Factory reset	1V/2V	0	1	0 - None	Enum 6	RW	3340
buS	**Service > Modbus**							
C002	Bus sharing minimum update interval	1V/2V	0	60	5	Sec	RW	3341
AX00	Modbus enable A	1V/2V	0	1	0 - Off	Enum 1	RW	4001
bX00	Modbus enable B	2V	0	1	0 - Off	Enum 1	RW	4002
AX01	Modbus heat cool A	1V/2V	0	1	0 - Off	Enum 1	RW	4003
bX01	Modbus heat cool B	2V	0	1	0 - Off	Enum 1	RW	4004
AX02	Modbus preset OD A	1V/2V	0	1	0 - Off	Enum 1	RW	4005
bX03	Modbus preset OD B	2V	0	1	0 - Off	Enum 1	RW	4006
AX04	Modbus defrost A	1V/2V	0	1	0 - Off	Enum 1	RW	4007
bX04	Modbus defrost B	2V	0	1	0 - Off	Enum 1	RW	4008
AX05	Modbus Pe A	1V/2V	-1,00	200,00	0.00	barg	RW	4009
bX05	Modbus Pe B	2V	-1,00	200,00	0.00	barg	RW	4010
AX06	Modbus S2 A	1V/2V	-200,0	200,0	0.0	°C	RW	4011
bX06	Modbus S2 B	2V	-200,0	200,0	0.0	°C	RW	4012
AX07	Modbus S3 A	1V/2V	-200,0	200,0	0.0	°C	RW	4013
bX07	Modbus S3 B	2V	-200,0	200,0	0.0	°C	RW	4014
AX08	Modbus S4 A	1V/2V	-200,0	200,0	0.0	°C	RW	4015
bX08	Modbus S4 B	2V	-200,0	200,0	0.0	°C	RW	4016
AX09	Modbus external reference A	1V/2V	-100,0	100,0	0.0		RW	4017
bX09	Modbus external reference B	2V	-100,0	100,0	0.0		RW	4018
AX11	Modbus compressor % A	1V/2V	0,0	100,0	0.0	%	RW	4021
bX11	Modbus compressor % B	2V	0,0	100,0	0.0	%	RW	4022

7.2 Enumeration list

Table 15: The below table contains enumeration information for Modbus paramters.

Enum	Value	Description
Enum 1		(ENUM_OFF_ON)
	0	Off
	1	On
Enum 2	0	MET
	1	IMP
Enum 3		(ENUM_MODBUS_BAUDRATE)
	1	_1200
	2	_2400
	3	_4800
	4	_9600
	5	_14400
	6	_19200
	7	_28800
	8	_38400
Enum 4		(ENUM_MODBUS_MODE)
	0	_8N1
	1	_8E1
	2	_8N2

Enum	Value	Description
Enum 5		(ENUM_NO_YES)
	0	No
	1	Yes
Enum 6		(ENUM_APPLY_DEFAULTS)
	0	None
	1	Factory
Enum 7		(ENUM_CONTROLLER_STATES)
	0	Power_up
	1	Stop
	2	Operation
	3	Defrost
	4	Driver
	5	Manual
	6	Safe

Enum	Value	Description
Enum 8		(ENUM_VALVE_A_LIST)
	0	Select_type
	2	CCM_10
	3	CCM_20
	4	CCM_30
	5	CCM_40
	6	CCMT_3L
	7	CCMT_5L
	8	CCMT_8L
	9	CCMT_10L
	10	CCMT_2
	11	CCMT_4
	12	CCMT_8
	13	CCMT_16
	14	CCMT_24
	15	CCMT_30
	16	CCMT_42
	17	CTR_20
	20	ETS_6
	51	ETS_8M
	21	ETS_12
	23	ETS_25
	24	ETS_50
	25	ETS_100
	26	ETS_250
	33	ETS_400
	27	ETS_175L
	28	ETS_250L
	34	ETS_400L
	46	ETS_500L
	47	ETS_175L_OFHT
	48	ETS_250L_OFHT
	49	ETS_400L_OFHT
	50	ETS_500L_OFHT
	29	ETS_12C
	22	ETS_24C
	30	ETS_25C
	31	ETS_50C
	32	ETS_100C
	36	ETS_500P
	37	ETS_800P
	40	KVS_1C
	41	KVS_2C
	42	KVS_3C
	43	KVS_5C
	44	KVS_15
	45	KVS_42
	1	User_def_
Enum 10		(ENUM_DECAY_MODES)
	0	Fast
	1	Slow
	2	Mixed

Enum	Value	Description
Enum 11		(ENUM_VALVE_B_LIST)
	0	Select_type
	2	CCM_10
	3	CCM_20
	4	CCM_30
	5	CCM_40
	6	CCMT_3L
	7	CCMT_5L
	8	CCMT_8L
	9	CCMT_10L
	10	CCMT_2
	11	CCMT_4
	12	CCMT_8
	13	CCMT_16
	14	CCMT_24
	15	CCMT_30
	16	CCMT_42
	17	CTR_20
	20	ETS_6
	51	ETS_8M
	21	ETS_12
	23	ETS_25
	24	ETS_50
	25	ETS_100
	26	ETS_250
	33	ETS_400
	27	ETS_175L
	28	ETS_250L
	34	ETS_400L
	46	ETS_500L
	47	ETS_175L_OFHT
	48	ETS_250L_OFHT
	49	ETS_400L_OFHT
	50	ETS_500L_OFHT
	29	ETS_12C
	22	ETS_24C
	30	ETS_25C
	31	ETS_50C
	32	ETS_100C
	40	KVS_1C
	41	KVS_2C
	42	KVS_3C
	43	KVS_5C
	44	KVS_15
	45	KVS_42
	1	User_def_
Enum 12		(ENUM_STEP_MODES)
	0	Full
	1	Half
	2	_1_4
	3	_1_8
	4	_1_16
Enum 13		(ENUM_STEP_POSITIONING)
	0	Fullstep
	1	Halfstep
	2	Auto

Enum	Value	Description
Enum 14		(ENUM_OPERATION_MODES_A)
	0	SH_control
	1	Valve_driver
	2	Modbus_Controlled_I_O
Enum 15		(ENUM_OPERATION_MODES_B)
	0	SH_control
	1	Valve_driver
	2	Modbus_Controlled_I_O
	9	Not_used

Enum	Value	Description
Enum 16		(ENUM_REFRIGERANTS_A)
	0	Undef
	1	R12
	6	R13
	7	R13b1
	2	R22
	8	R23
	14	R32
	11	R114
	3	R134a
	12	R142b
	24	R170
	15	R227
	25	R290
	16	R401A
	18	R402A
	19	R404A
	21	R407A
	22	R407B
	20	R407C
	37	R407F
	49	R407H
	23	R410A
	32	R413A
	30	R417A
	31	R422A
	33	R422D
	34	R427A
	35	R438A
	40	R448A
	41	R449A
	48	R449B
	43	R450A
	42	R452A
	44	R452B
	50	R454A
	45	R454B
	51	R454C
	52	R455A
	9	R500
	4	R502
	10	R503
	17	R507
	36	R513A
	53	R516A
	26	R600
	27	R600a
	5	R717
	28	R744
	46	R1233zdE
	39	R1234yf
	38	R1234ze
	47	R1234zeZ
	29	R1270
	13	R_user
Enum 17		(ENUM_STARTUP_MODES)
	0	Prop__Ctrl
	1	Fix_OD_w_prot
	2	Fix_OD_wo_prot

Enum	Value	Description
Enum 18		(ENUM_REFRIGERANTS_B)
	0	Common
	1	R12
	6	R13
	7	R13b1
	2	R22
	8	R23
	14	R32
	11	R114
	3	R134a
	12	R142b
	24	R170
	15	R227
	25	R290
	16	R401A
	18	R402A
	19	R404A
	21	R407A
	22	R407B
	20	R407C
	37	R407F
	49	R407H
	23	R410A
	32	R413A
	30	R417A
	31	R422A
	33	R422D
	34	R427A
	35	R438A
	40	R448A
	41	R449A
	48	R449B
	43	R450A
	42	R452A
	44	R452B
	50	R454A
	45	R454B
	51	R454C
	52	R455A
	9	R500
	4	R502
	10	R503
	17	R507
	36	R513A
	53	R516A
	26	R600
	27	R600a
	5	R717
	28	R744
	46	R1233zdE
	39	R1234yf
	38	R1234ze
	47	R1234zeZ
	29	R1270
	13	R_user

Enum	Value	Description
Enum 19		(ENUM_SH_REF_MODES)
	0	Fixed_sp_
	1	Loadap
	2	MSS
	3	Delta_temp
Enum 20		(ENUM_SENSOR_ERROR_ACTIONS)
	0	Stop
	1	Fixed_OD
	2	Average
Enum 21		(ENUM_INJECTION_STATES)
	0	Off
	1	Startup
	2	Injection
	3	Error
	4	Ther__Cutout
Enum 22		(ENUM_INJECTION_DETAILS)
	0	Off
	1	SH_ctrl_normal
	2	SH_ctrl_MTR
	3	SH_ctrl_LOP
	4	SH_ctrl_MOP
	5	SH_ctrl_minPC
	6	SH_ctrl_maxPc
	7	SH_ctrl_SH_cl
	8	SH_ctrl_minS4
	9	Start_P_Control
	10	Start_Fixed
	11	Manual
	12	SH_ctrl_Tc
Enum 23		(ENUM_ON_OFF)
	1	Off
	0	On
Enum 24		(ENUM_EXT_REF_FUNCTIONS)
	0	SH
	1	Temp
	2	Max_OD
Enum 25		(ENUM_THERMOSTATIC_MODES)
	0	Not_used
	1	CutIn_CutOut
	2	MTR
Enum 26		(ENUM_THERMOSTATIC_SENSORS)
	0	S3
	1	S4

Enum	Value	Description
Enum 27		(ENUM_OPERATION_STATES)
	0	Power_up
	1	Stop
	2	Manual
	3	Service
	4	Safe_State
	5	Defrosting
	6	Valve_driver
	7	Ther__Cutout
	8	Emer__cooling
	9	SH_ctrl_err_
	10	SH_start_Pctrl
	11	SH_start_fix_OD
	12	SH_ctrl_normal
	13	SH_ctrl_MTR
	14	SH_ctrl_LOP
	15	SH_ctrl_minPC
	16	SH_ctrl_MOP
	17	SH_ctrl_maxPc
	18	SH_ctrl_SH_cl
	19	SH_ctrl_minS4
	20	SH_ctrl_Tc
Enum 28	0	Not used
	1	inp_PeA
	9	Modbus
Enum 29	0	Not used
	3	inp_PeB
	9	Modbus
	10	Common
Enum 30	0	Not used
	2	inp_S2A
	9	Modbus
Enum 31	0	Not used
	4	inp_S2B
	9	Modbus
	10	Common
Enum 32	0	Not used
	4	inp_S2B
	9	Modbus
Enum 33	0	Not used
	9	Modbus
	10	S3A
Enum 34	0	Not used
	9	Modbus
	10	S4A
Enum 35	0	Not used
	3	inp_PeB
	9	Modbus
Enum 36	0	Not used
	9	Modbus
	10	Common
Enum 37	0	Not used
	9	Modbus

Enum	Value	Description
Enum 38		(ENUM_EXT_CIRCUIT_ENABLE)
	0	No_external
	1	DI_1
	2	DI_2
	3	Bus_Enable
Enum 39	0	Not used
	1	DI1
	2	DI2
	3	Modbus
Enum 40	0	Not used
	1	DI1
	2	DI2
	3	Modbus
	4	Common
Enum 41		(ENUM_PRESSURE_TRANSMITTERS)
	0	Not_defined
	1	AKS_32R
	9	AKS_32_1_5V
	11	AKS_32_1_6V
	12	AKS_32_0_10V
	13	AKS_33
	5	AKS_2050
	17	AKS_3000
	2	ACCPBP_Ratio
	15	ACCPBP_Current
	6	DST_P110
	16	DST_P310_Current
	7	DST_P310_Ratio
	4	NSK
	14	XSK
	3	_112CP
	8	OEM_Ratio
	18	OEM_Current
	10	OEM_Voltage
Enum 42		(ENUM_TEMPERATURE_SENSORS)
	0	Not_defined
	24	PT1000
	20	NTC10K_3435
	19	EKS_221
	21	ACCPBT_NTC10K
	22	MBT_153_10K
	23	_112CP
	25	AKS
	28	NTC10K_ G
Enum 43		(ENUM_EXT_REF_SENSORS)
	0	Not_defined
	26	Voltage
	27	Current
Enum 44		(ENUM_MANIFOLDED_TYPES)
	2	Par
	0	Seq
	1	SeqEq
	3	Optim

Enum	Value	Description
Enum 45		(ENUM_APP_SELECT)
	0	Select
	1	_1
	2	_2
	3	_3
	4	_4
	5	_5
	6	_6
	7	_7
	8	_8
	9	_9
	10	_10
	11	_11
	12	_12
Enum 46		(ENUM_AUTO_ON_OFF)
	0	Auto
	1	ON
	2	OFF
Enum 47		(ENUM_DI_SEL_NO_1_2)
	0	Not_used
	1	DI_1
	2	DI_2
Enum 48		(ENUM_SOH_STATE)
	0	Ready
	1	Charge
	2	Repl_
	3	Fail
Enum 49		(ENUM_DO_ALARM)
	0	Not_used
	1	Alarm___NO
	2	Alarm___NC
Enum 50		(ENUM_NC)
	0	NC
	1	NO
Enum 51		(ENUM_DISPLAY_TIMEOUT)
	0	No_timeout
	1	_1_minute
	5	_5_minutes
	10	_10_minutes
	30	_30_minutes
	60	_60_minutes
Enum 52		(ENUM_DRIVER_SIGNALS)
	3	_0_20mA
	1	_4_20mA
	0	_0_10_V
	2	_0_5V
	5	Modbus
	4	User_defined
Enum 53	0	off
	1	5 V
	2	18 V
	3	Auto

7.3 Parameter description

Table 16: The below table shows explanations on parameters

LABEL	DESCRIPTION	ADU	Explanation
	PARAMETERS & STATUS VARIABLES		
Ho_	**Setup & service > Home**		
AU12	Actual SH reference	3701	Actual superheat reference
A_TE	Te saturated evaporation temperature	3702	Read saturated evaporating temperature measured by pressure transmitter at evaporator outlet
A_od	Valve A request OD	3703	Requested valve opening degree (0-100%)
bU12	Actual SH reference	3704	Actual superheat reference
b_TE	Te saturated evaporation temperature	3705	Read saturated evaporating temperature measured by pressure transmitter at evaporator outlet
b_od	Valve B request OD	3706	Requested valve opening degree (0-100%)
CAno	Number of active alarms	3707	Show actual count of alarms
A_S3	S3 media inlet	3708	Read temperature of the S3 sensor at the media inlet
A_S4	S4 media outlet	3709	Read temperature of the S4 sensor at the media outlet
b_S3	S3 media inlet	3710	Read temperature of the S3 sensor at the media inlet
b_S4	S4 media outlet	3711	Read temperature of the S4 sensor at the media outlet
StA	**Home > Controller A status**		
AU00	Operation status	3712	Read actual operation status 0 - Power_up 1 - Stop 2 - Manual 3 - Service 4 - Safe_State 5 - Defrosting 6 - Valve_driver 7 - Ther__Cutout 8 - Emer__cooling 9 - SH_ctrl_err_ 10 - SH_start_Pctrl 11 - SH_start_fix_O 12 - SH_ctrl_normal 13 - SH_ctrl_MTR 14 - SH_ctrl_LOP 15 - SH_ctrl_minPC 16 - SH_ctrl_MOP 17 - SH_ctrl_maxPc 18 - SH_ctrl_SH_cl 19 - SH_ctrl_minS4 20 - SH_ctrl_Tc
AU12	Actual SH reference	3701	Actual superheat reference
AU13	Actual superheat	3713	Read measured superheat at suction line
AU24	Actual temperature reference	3714	Read actual temperature reference (active setpoint + any contribution from external signal)
A_od	Valve A request OD	3703	Requested valve opening degree (0-100%)
AI05	Actual position valve A	3777	Valve opening degree
A_PE	Pe evaporator	3715	Read evaporating pressure measured by pressure transmitter at evaporator outlet
A_TE	Te saturated evaporation temperature	3702	Read saturated evaporating temperature measured by pressure transmitter at evaporator outlet
A_S2	S2 suction pipe	3716	Read the temperature of the S2 Suction line sensor measured at the evaporator outlet
A_S3	S3 media inlet	3708	Read temperature of the S3 sensor at the media inlet
A_S4	S4 media outlet	3709	Read temperature of the S4 sensor at the media outlet
AU17	DI Enable A section	3719	Read the status of DI enabling A section
AU18	DI Heat	3720	Read the status of DI heating signal
AU19	DI Preset OD	3721	Read the status of DI preset OD signal
AU20	DI defrost start	3722	Read the status of DI defrost start signal
AU26	AI Valve driver A	3723	Signal for driver request
Stb	**Home > Controller B status**		

LABEL	DESCRIPTION	ADU	Explanation
bU00	Operation status	3724	Read actual operation status 0 - Power_up 1 - Stop 2 - Manual 3 - Service 4 - Safe_State 5 - Defrosting 6 - Valve_driver 7 - Ther__Cutout 8 - Emer__cooling 9 - SH_ctrl_err_ 10 - SH_start_Pctrl 11 - SH_start_fix_O 12 - SH_ctrl_normal 13 - SH_ctrl_MTR 14 - SH_ctrl_LOP 15 - SH_ctrl_minPC 16 - SH_ctrl_MOP 17 - SH_ctrl_maxPc 18 - SH_ctrl_SH_cl 19 - SH_ctrl_minS4 20 - SH_ctrl_Tc
bU12	Actual SH reference	3704	Actual superheat reference
bU13	Actual superheat	3725	Read measured superheat at suction line
bU24	Actual temperature reference	3726	Read actual temperature reference (active setpoint + any contribution from external signal)
b_od	Valve B request OD	3706	Requested valve opening degree (0-100%)
b_PE	Pe evaporator	3727	Read evaporating pressure measured by pressure transmitter at evaporator outlet
b_TE	Te saturated evaporation temperature	3705	Read saturated evaporating temperature measured by pressure transmitter at evaporator outlet
b_S2	S2 suction pipe	3728	Read the temperature of the S2 Suction line sensor measured at the evaporator outlet
b_S3	S3 media inlet	3710	Read temperature of the S3 sensor at the media inlet
b_S4	S4 media outlet	3711	Read temperature of the S4 sensor at the media outlet
bU17	DI Enable B section	3731	Read the status of DI enabling B section
bU18	DI Heat	3732	Read the status of DI heating signal
bU19	DI Preset OD	3733	Read the status of DI preset OD signal
bU20	DI defrost start	3734	Read the status of DI defrost start signal
bU26	AI Valve driver B	3735	Signal for driver request
StC	**Home > Common controller status**		
CbtV	Actual battery voltage	3736	Battery backup - the voltage will close the stepper motor valves if the controller loses its supply voltage
CU02	Battery state	3737	Readout EKE2U battery state. 0: Ready 1: Charge 2: Replace 3: Fail
CinV	Input Voltage	3738	Measured input supply voltage
CU03	Alarm status	3739	0: No - no alarms, 1: Yes - one or more alarms
ALA	**Home > Active Alarms**		
I000	Active status	3740	Active alarm status 0: No - no alarms, 1: Yes - one or more alarms
CAno	Number of active alarms	3707	Show actual count of alarms
SEt	**Setup & service > Basic settings**		
Cr12	Main switch	3001	Start/stop of all circuits (refrigeration and driver). Start/stop of individual circuits can be accomplished with the Enable section parameter and related digital input
ACtr	Operation mode A	3002	EKE 100 can be used as superheat controller or as a driver. Select how you want to configure the controller in the system. 0: SH Control 1: Valve driver 2: Modbus Controlled I/O
ArFg	Refrigerant	3003	Select the type of refrigerant. If the required refrigerant is not part of the list, the user defined option can be used. Please contact Danfoss for detailed information Warning: Wrong selection of refrigerant may cause damage to the system.

LABEL	DESCRIPTION	ADU	Explanation
ASLo	SH minimum	3004	Min. value for the superheat reference when using adaptive control Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
ASHI	SH maximum	3005	Max. value for the superheat reference when using adaptive control
AC50	PeA transmitter configuration	3006	Pe is the Pressure Transmitter mounted at the evaporator outlet. This is the main Pressure transmitter used for superheat calculation. Define the type of Danfoss Pressure Transmitter / OEM Pressure Transmitter. Note: Available supply for transmitters: 5 Volt/50mA 0: Not_defined 1: AKS_32R 2: ACCPBP_Rati 3: _112CP 4: NSK 5: AKS_2050 6: DST_P110 (Standard) 7: DST_P310_Ra 16: DST_P310_Cu 9: AKS_32_1_5V 11: AKS_32_1_6V 12: AKS_32_0_10 13: AKS_33 14: XSK 15: ACCPBP_Curr 17: AKS_3000 (Ext. 10V supply) 8: OEM_Ratio 10: OEM_Voltage 18: OEM_Current
AC51	PeA voltage low	3007	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the lower voltage range for Pe pressure transmitter
AC52	PeA voltage high	3008	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the higher voltage range for Pe pressure transmitter
AC53	PeA current low	3009	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the lower current range for Pe pressure transmitter
AC54	PeA current high	3010	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the higher current range for Pe pressure transmitter
AC55	PeA ratio low	3011	Only relevant for "OEM Ratio". Define the ratio at minimum pressure
AC56	PeA ratio high	3012	Only relevant for "OEM Ratio". Define the ratio at maximum pressure
AC57	PeA transmitter min.	3013	Working range for pressure transmitter Depending on the application a pressure transmitter with a given working range is used. This working range (say, -1 to 12 bar g) must be set in the controller. The min. Gauge pressure value is set.
AC58	PeA transmitter max.	3014	The max. Gauge pressure value is set for the selected Pe pressure transmitter.
AC59	S2A sensor configuration	3015	S2 sensor configuration - sensor type: 0: Not defined 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
A_in	Driver A input signal	3016	Input to the valve driver signal, if user-defined is choose, the corresponding parameters should be set in Advaced setting menu. 0 : 0-10V 1 : 4-20mA 2 : 0-5V 3 : 0-20mA 4 : User defined 5 : Modbus

LABEL	DESCRIPTION	ADU	Explanation
AJ00	Valve configuration	3017	Select the type of Danfoss stepper motor valve from the list. ETS 6 (unipolar) Has by default "Open coil" alarm disabled, can be enabled by BJ27. If you want to correct a danfoss given valve profile, then first select the relevant valve and then select user def. For user defined: For non-Danfoss valve define "Valve configuration" =1 i.e. UserDef and set the motor parameters i.e BJ01, BJ09, BJ05, BJ06, BJ07... If previous valve selection is ETS_6 (unipolar), then Valve total steps is counted as half steps (480 half steps for ETS 6) 0: Select type 2: CCM_10 3: CCM_20 4: CCM_30 5: CCM_40 6: CCMT_3L 7: CCMT_5L 8: CCMT_8L 9: CCMT_10L 10: CCMT_2 11: CCMT_4 12: CCMT_8 13: CCMT_16 14: CCMT_24 15: CCMT_30 16: CCMT_42 17: CTR_20 20: ETS_6 (Unipolar) 51: ETS_8M (Bipolar) 21: ETS_12 23: ETS_25 24: ETS_50 25: ETS_100 26: ETS_250 27: ETS_175L 28: ETS_250L 29: ETS_12C 22: ETS_24C 30: ETS_25C 31: ETS_50C 32: ETS_100C 33: ETS_400 34: ETS_400L 35: ETS_550L 38: ETS_L_Oi 39: ETS_L_Hi 40: KVS_1C 41: KVS_2C 42: KVS_3C 43: KVS_5C 44: KVS_15 45: KVS_42 1: User def.
bCtr	Operation mode B	3018	EKE 100 can be used as superheat controller or as a driver. Select how you want to configure the controller in the system. 0: SH Control 1: Valve driver 2: Modbus Controlled I/O 9: Not used
brFg	Refrigerant	3019	Select the type of refrigerant. If the required refrigerant is not part of the list, the user defined option can be used. Please contact Danfoss for detailed information Warning: Wrong selection of refrigerant may cause damage to the system.
bSLo	SH minimum	3020	Min. value for the superheat reference when using adaptive control Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
bSHI	SH maximum	3021	Max. value for the superheat reference when using adaptive control
bC50	PeB transmitter configuration	3022	Pe is the Pressure Transmitter mounted at the evaporator outlet. This is the main Pressure transmitter used for superheat calculation. Define the type of Danfoss Pressure Transmitter / OEM Pressure Transmitter. Note: Available supply for transmitters: 5 Volt/50mA 0: Not_defined 1: AKS_32R 2: ACCPBP_Rati 3: _112CP 4: NSK 5: AKS_2050 6: DST_P110 (Standard) 7: DST_P310_Ra 16: DST_P310_Cu 9: AKS_32_1_5V 11: AKS_32_1_6V 12: AKS_32_0_10 13: AKS_33 14: XSK 15: ACCPBP_Curr 17: AKS_3000 (Ext. 10V supply) 8: OEM_Ratio 10: OEM_Voltage 18: OEM_Current
bC51	PeB voltage low	3023	USE only for non-Danfoss/ OEM ratiometric voltage pressure transmitter. Define the lower voltage range for Pe pressure transmitter
bC52	PeB voltage high	3024	USE only for non-Danfoss/ OEM ratiometric voltage pressure transmitter. Define the higher voltage range for Pe pressure transmitter
bC53	PeB current low	3025	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the lower current range for Pe pressure transmitter

LABEL	DESCRIPTION	ADU	Explanation
bC54	PeB current high	3026	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the higher current range for Pe pressure transmitter
bC55	PeB ratio low	3027	Only relevant for "OEM Ratio". Define the ratio at minimum pressure
bC56	PeB ratio high	3028	Only relevant for "OEM Ratio". Define the ratio at maximum pressure
bC57	PeB transmitter min.	3029	Working range for pressure transmitter Depending on the application a pressure transmitter with a given working range is used. This working range (say, -1 to 12 bar g) must be set in the controller. The min. Gauge pressure value is set.
bC58	PeB transmitter max.	3030	The max. Gauge pressure value is set for the selected Pe pressure transmitter.
bC59	S2B sensor configuration	3031	S2 sensor configuration: 0: Not defned 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
b_in	Driver B input signal	3032	Input to the valve driver signal, if user-defined is choose, the corresponding parameters should be set in Advaced setting menu. 0 : 0-10V 1 : 4-20mA 2 : 0-5V 3 : 0-20mA 4 : User defined 5 : Modbus
bJ00	Valve configuration	3033	Select the type of Danfoss stepper motor valve from the list. ETS 6 (unipolar) Has by default "Open coil" alarm disabled, can be enabled by BJ27. If you want to correct a danfoss given valve profile, then first select the relevant valve and then select user def. For user defined: For non-Danfoss valve define "Valve configuration" =1 i.e. UserDef and set the motor parameters i.e BJ01, BJ09, BJ05, BJ06, BJ07... If previous valve selection is ETS_6 (unipolar), then Valve total steps is counted as half steps (480 half steps for ETS 6) 0: Select type 2: CCM_10 3: CCM_20 4: CCM_30 5: CCM_40 6: CCMT_3L 7: CCMT_5L 8: CCMT_8L 9: CCMT_10L 10: CCMT_2 11: CCMT_4 12: CCMT_8 13: CCMT_16 14: CCMT_24 15: CCMT_30 16: CCMT_42 17: CTR_20 20: ETS_6 (Unipolar) 51: ETS_8M (Bipolar) 21: ETS_12 23: ETS_25 24: ETS_50 25: ETS_100 26: ETS_250 27: ETS_175L 28: ETS_250L 29: ETS_12C 22: ETS_24C 30: ETS_25C 31: ETS_50C 32: ETS_100C 33: ETS_400 34: ETS_400L 35: ETS_550L 38: ETS_L_Oi 39: ETS_L_Hi 40: KVS_1C 41: KVS_2C 42: KVS_3C 43: KVS_5C 44: KVS_15 45: KVS_42 1: User def.
bCA	**Control A > Basic control**		
AEnA	Enable A section	3034	Manuel Start/Stop of A section. Start/stop A section can also be accomplished with the external Digital input Enable A switch function. Usage could be a door switch to stop cooling Enable A section 0: OFF 1: ON
ArFg	Refrigerant	3003	Select the type of refrigerant. If the required refrigerant is not part of the list, the user defined option can be used. Please contact Danfoss for detailed information Warning: Wrong selection of refrigerant may cause damage to the system.
Ar01	Antoine constant A1	3035	Refrigerant factor for a custom refrigerant - please contact Danfoss for detailed information
Ar02	Antoine constant A2	3036	Refrigerant factor for a custom refrigerant - please contact Danfoss for detailed information

LABEL	DESCRIPTION	ADU	Explanation
Ar03	Antoine constant A3	3037	Refrigerant factor for a custom refrigerant - please contact Danfoss for detailed information
Ar04	Startup mode	3040	Selection of different startup modes. 0: Prop. Ctrl : The controller is programmed for automatic proportional control, opening degree will change fast based on Te and SH 1: Fix OD with protection: fixed defined valve opening degree (OD), where opening degree can be change due to low superheat, MOP, ETC. 2: Fixed defined: fixed defined valve opening degree (OD),which is unchanged during startup time. This feature is used when it is necessary to open the valve quickly when the compressor turns on, to prevent too low suction pressure
Ar05	Startup time	3041	Start-up time for superheat control. For startup mode with fixed OD the opening degree will be fixed during startup time. With proprotional startup, normal superheat control will start when superheat is down at reference or when start-up time is exceeded
Ar06	Minimum startup time	3042	For proportional startup this is the minimum startup time, used for to get stable signal on sensors
AodS	Startup OD	3043	Starting opening degree of valve. For startup mode this opening degree will be fixed during startup time, except for overrides by SH close, LOP, MOP. etc. With proprotional startup "Startup OD" is starting point for control. A higher value will lead to a more aggressive control
ArEf	SH reference mode	3044	Definition of superheat regulation 0 = Fixed SH.: fixed superheat setpoint defined by "SH fixed setpoint" 1 = Loadap: SH reference based on load (opening degree), Higher OD => higher SH reference. Limits set by SH min and SH max 2 = MSS: Adaptive regulation. Minimum Stable Superheat. Limits set by SH min and SH max. 3 = Delta temp: Superheat reference based on temperature difference between S3 media inlet and Te. Limits set by SH min and SH max
AFSP	SH fixed setpoint	3045	This feature can be used In those application where fixed superheat is needed at all time. SH fixed setpoint can be varied according to the need of the application Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
ASLo	SH minimum	3004	Min. value for the superheat reference when using adaptive control Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
ASHI	SH maximum	3005	Max. value for the superheat reference when using adaptive control
AdEL	SH reference delta temp. factor	3046	Only relevant for SH reference mode = Delta temp Superheat reference is set as ratio of the average difference from S3 to Te
Ar07	SH Tn	3047	Integration time Tn for superheat control If the Tn value is increased the regulation becomes slower. Lowering the value will create a faster superheat control. Too low value will create superheat fluctuation.

LABEL	DESCRIPTION	ADU	Explanation
Ar08	SH Kp	3048	Amplification factor Kp for superheat control. If the Kp value is reduced the regulation becomes slower. Increasing the Kp value will make faster regulation. Too high value will create superheat fluctuation.
Ar09	SH Kp Min.	3049	Damping of amplification near reference value. This setting damps the normal amplification Kp, but only just around the reference value. A setting of 0.5 will reduce the KP value by half. The value should only be changed by specially trained staff.
Ar10	SH KpTe	3050	Gain factor for feedback of evaporating temperature signal Te to the PI controller controlling the superheat (expert setting)
AodL	Minimum OD	3051	During superheat control opening degree can be set to have a minimum value. This can be useful to overcome a undefined open sequence
AodH	Maximum OD	3052	During superheat control opening degree can be set to have a minimum value. The value is set in %. This feature is beneficial specially for oversized valve
Ar11	Thermostatic mode	3053	Used to control media temperature 0 not used: No media temperature control, only the superheat is regulated 1 Cutin/Cutout: Media temperature control based on temperature setpoint and differential as well as regulation of superheat. 2 MTR: Modulating thermostat, active evaporator area is adjusted to match cooling demand, reference is temperature setpoint + ½ differential
ArSn	Thermostatic sensor	3054	Its optional to connect a media sensor. Media sensor will be used to measure media temperature (air or water). Depending on needs it is placed on inlet or outlet of evaporator 0: S3 media inlet 1: S4 media outlet
AtSP	Temperature setpoint	3055	This parameter is to be used if Thermostatic mode has been enabled. This is a reference value to maintain the temperature of the media to a desired temperature level.
Atdt	Temperature differential	3056	When the temperature is higher than the reference plus the set differential the super control will start. It will become deactivated when the temperature drops below the set reference.
ECA	**Control A > Extended control**		
Au00	SH close function	3057	This is a safety feature that prevents the flooding of the liquid into the compressor. When the measured superheat goes below the setpoint, the valve will close faster.
Au01	SH close setpoint	3058	It is recommended to set the SH close setpoint valve 2k below the Min Superheat. Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2 K.
Au02	SH close Tn divide	3059	When superheat is below setpoint a fast response is needed. Sh close Tn defined how much normal Tn is reduced
Au03	SH close Kp factor	3060	When superheat is below setpoint a fast respons is needed. Sh close Kp factor how much the normal Sh Kp is increased
Au04	Limit Kp	3061	LOP, MOP, S4 min, high condensing temperature protect share the same gain factor (Kp) review the limit settings when adjusting the general SH control

LABEL	DESCRIPTION	ADU	Explanation
Au05	Limit Tn	3062	LOP, MOP, S4 min,high condensing temperature protect share the same integration time (Tn) review the limit setings when adjusting the general SH control
Au06	Minimum S4 mode	3063	Minimum S4 (media outlet) protection function. If S4 get below setpoint the valve will close to reduce capacity 1 = On: Function is active
Au07	Minimum S4 setpoint	3064	Minimum S4 (media outlet) protection setpoint
Au08	MSS Stability	3065	Only relevant for MSS. Stability factor for regulation of superheat, only relevant for MSS With a higher value the control function will allow a greater fluctuation of the superheat before the reference is changed.
Au09	MSS T0 stability factor	3066	Only relevant for MSS. T0 stability factor define if variation in suction pressure will influence superheat reference. The Superheat reference change can be adjusted the value 0-1 (1= max Te influence and S2, 0 only S2). With often change in suction pressure due compressor start/stop some Te influence on MSS is recommended
Au10	MOP function	3067	To reduce the strain on the compressor, a maximum operating pressure can be set. This useful at compressor startup and during pulldown period. If the pressure comes to this limit the controller will control the valve to provide a lower pressure instead of a low superheat.
Au11	MOP setpoint	3068	MOP setpoint Setpoint unit is saturated temperature in evaporator. If the suction pressure reaches the set MOP limit, the valve will close faster irrespective of superheat.
Au12	LOP function	3069	Lowest Operating Pressure function will keep the pressure than LOP setpoint. In case of pressure below setpoint the valve will open faster On: function is active
Au13	LOP setpoint	3070	Lowest Operating Pressure setpoint Setpoint unit is saturated temperature in evaporator
Au14	LOP priority mode	3071	In case of conflict between low pressure and SH close, Lop function can be set to override SH close actions (could be needed a startup in low ambient temperature) On: Lop can override low superheat The value should only be changed by specially trained staff.
Au15	LOP maximum time	3072	Maximum time for LOP to override SH close
Au16	LOP oscillation detection	3073	Enable LOB stability detection 0: Off 1: On
Au19	Compressor speed feedforward function	3076	Compressor speed feed forward adapt superheat control reaction to compressor speed. In case of low-speed superheat control will react slower (greater integration time Tn). Information on compressor speed is feed via bus (0.0-100.0%). Off: Feed forward function is not active On: Feed forward function is active.
Au20	FF low capacity turning point	3077	Below this speed superheat control is slower
Au21	FF maximum factor for Tn tuning	3078	The maximum adds to the integration time. At 0 % the TN = normal Tn * Comp FF SH Tn factor

LABEL	DESCRIPTION	ADU	Explanation
Au22	SH control sensor error action	3079	If SH control sensor such as temperature sensor S2 and pressure transmitter Pe has an error, then an action can be set to position the valve OD to the desired level. 0 = Stop: close the valve and superheat control 1 = Fixed OD: Keep the refrigeration running with setting a fixed valve OD (Fixed OD during error emergency cooling) 2 = Average: Used the average OD (calculated as an average of the last hour) to set a reduced OD which will be fixed during error period. The value should only be changed by specially trained staff
Au23	Thermostatic sensor error action	3080	If Thermostatic sensor such as temperature sensor S3 or S4 has an error, then an action can be set to position the valve OD to the desired level. 0 = Stop: close the valve and superheat control & temperature control 1 = Fixed OD: Keep the refrigeration running (constant with setting a fixed valve opening degreed (Fixed OD during error emergency cooling) 2 = Average: for Cut-in/cut-out use average on and off time to continue cooling. For MTR use reduced opening degreed based average opening degreed The value should only be changed by specially trained staff
Au24	Fixed OD during emergency cooling	3081	Relevant if "Fixed OD" is selected as option during emergency cooling
Au25	MTR Tn	3082	Integration time for MTR. Use long integration time for S3 sensor and short for S4 sensor Expert setting for injection function The value should only be changed by specially trained staff.
Au26	MTR Kp	3083	Amplification factor for MTR Expert setting for injection function The value should only be changed by specially trained staff.
SHA	**Control A > Heat control**		
AH00	Heat startup time	3084	Start-up time for superheat control in heat mode For startup mode with "Fixed OD" the opening degree will be fixed during startup time. With proportional startup, normal superheat control will start when superheat is down at reference or when startup time is exceeded.
AH01	Heat minimum startup time	3085	For proportional startup in heat mode this is the minimum startup time, used for to get stable signal on sensors
AH02	Heat startup OD	3086	Starting opening degree of valve in heat mode. For startup mode this opening degree will be fixed during startup time, except for overrides by SH close, LOP, MOP. etc. With proportional startup "Startup OD" is starting point for control. A higher value will lead to a more aggressive control.
AH03	Heat SH fixed setpoint	3087	This feature can be used In those application where fixed superheat in heating mode is needed at all time. SH fixed setpoint can be varied according to the need of the application Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
AH04	Heat SH minimum	3088	Min. value for the superheat reference in heat mode when using adaptive control Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.

LABEL	DESCRIPTION	ADU	Explanation
AH05	Heat SH maximum	3089	Max. value for the superheat reference in heat mode when using adaptive control
AH06	Heat SH ref. delta temp. factor	3090	Only relevant for SH reference mode = Delta temp Superheat reference is set as ratio of the average difference from S3 to Te .
AH07	Heat SH Tn	3091	Integration time Tn for superheat control in heat mode If the Tn value is increased the regulation becomes slower. Lowering the value will create a faster superheat control. Too low value will create superheat fluctuation.
AH08	Heat SH Kp	3092	Amplification factor Kp for superheat control in heat mode If the Kp value is reduced the regulation becomes slower. Increasing the Kp value will make faster regulation. Too high value will create superheat fluctuation.
AH09	Heat SH Kp minimum	3093	Damping of amplification near reference value in heat mode This setting damps the normal amplification Kp, but only just around the reference value. A setting of 0.5 will reduce the KP value by half. The value should only be changed by specially trained staff.
AH10	Heat SH KpTe	3094	This setting determines the valve opening degree as a function of the change in evaporating pressure in heat mode. An increase of the evaporating pressure will result in a reduced opening degree. When there is a drop-out on the low-pressure thermostat during start-up the value must be raised a bit. If there is too much instability during start-up the value must be reduced a little. The value should only be changed by specially trained staff.
AH11	Heat SH close setpoint	3095	It is recommended to set the SH close setpoint valve 2k below the Min Superheat. Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2 K.
AH12	Heat Limit Kp	3096	LOP, MOP, S4 min, high condensing temperature protect share the same integration time (Tn) review the limit settings when adjusting the general SH control
AH13	Heat Limit Tn	3097	LOP, MOP, S4 min, high condensing temperature protect share the same gain factor (Kp). Review the limit settings when adjusting the general SH control
DFA	**Control A > Defrost control**		
AD00	Defrost start time	3098	Defrost start is used to empty the evaporator The defrost sequence start with closing the valve. The valve is kept closed until "Defrost start low pressure limit" is reached or "Defrost start time" is exceeded, then the defrost sequence will continue.
AD01	Defrost start low pressure limit	3099	Defrost start is used to empty the evaporator The defrost sequence start with closing the valve. The valve is kept closed until "Defrost start low pressure limit" is reached or "Defrost start time" is exceeded, then the defrost sequence will continue.
AD02	Defrost OD	3100	Defrost start is used to empty the evaporator The defrost sequence start with closing the valve. The valve is kept closed until "Defrost start low pressure limit" is reached or "Defrost start time" is exceeded, then the defrost sequence will continue.

LABEL	DESCRIPTION	ADU	Explanation
AD03	Defrost end closed time	3101	After defrosting a defrost start is performed. Valve opening is set by "Defrost OD" and this opening degree is kept until defrost stop signal.
AD04	Defrost end OD time	3102	After the defrost stop signal the is kept closed and kept closed during "Defrost end closed time". Useful during 4 way valve change over
AD05	Defrost end OD	3103	Before startup of SH control "Defrost end OD time" and "Defrost end OD" can be used overcome the dynamic in the 4way valve change over and rapid signal change which make normal SH control unsafe
ASA	**Control A > Alarm setup**		
AA00	MOP alarm delay	3104	Alarm delay on Maximum operation pressure (MOP)
AA01	MOP alarm differential	3105	Te signal must be above "MOP setpoint" + "MOP alarm differential" before an high pressure (MOP) alarm can be raised.
AA02	LOP alarm delay	3106	Alarm delay on Low operating pressure (LOP)
AA03	LOP alarm differential	3107	Te signal must below "LOP setpoint" - "LOP alarm differential" before a low pressure (LOP) alarm can be raised.
AA04	High SH alarm delay	3108	Alarm delay on high superheat
AA05	High SH alarm differential	3109	Superheat has to be above actual sh reference + High SH alarm differential before an low SH alarm can be raised
AA06	Low SH alarm delay	3110	Alarm delay on low superheat
AA07	Low SH alarm differential	3111	Superheat has to be below actual SH reference - low SH alarm differential before a low SH alarm can be raised
AA08	Lack of capacity alarm delay	3112	Alarm delay on lack of capacity Valve opening degree is monitored to observe if the valve capacity can control Sh to desired level. If opening degree is close to 100 % an Lack of capacity alarm raised.
AA09	Upper temperature alarm	3113	Alarm for too high thermostat temperature is set here. The value is set as offset in Kelvin. The alarm becomes active when the thermostat temperature exceeds setpoint + high alarm offset
AA10	Lower temperature alarm	3114	Alarm for too low thermostat temperature is set here The value is set in Kelvin. The value is set as offset in Kelvin. The alarm becomes active when the thermostat temperature exceeds setpoint - low alarm offset
AA11	Temperature alarm delay	3115	Alarm delay If one of the two limit values is exceeded, a timer function will commence. The alarm will not become active until the set time delay has been passed. The time delay is set in minutes.
AA12	Minimum S4 band	3116	Delay time for low min S4 alarm
AA13	Minimum S4 delay	3117	S4 has be to be below "Min S4 setpoint" - "Low min S4 band" before a low min S4 alarm can be raised.
SSA	**Control A > Service**		
AU00	Operation status	3712	Read actual operation status 0 - Power_up 1 - Stop 2 - Manual 3 - Service 4 - Safe_State 5 - Defrosting 6 - Valve_driver 7 - Ther__Cutout 8 - Emer__cooling 9 - SH_ctrl_err_ 10 - SH_start_Pctrl 11 - SH_start_fix_O 12 - SH_ctrl_normal 13 - SH_ctrl_MTR 14 - SH_ctrl_LOP 15 - SH_ctrl_minPC 16 - SH_ctrl_MOP 17 - SH_ctrl_maxPc 18 - SH_ctrl_SH_cl 19 - SH_ctrl_minS4 20 - SH_ctrl_Tc

LABEL	DESCRIPTION	ADU	Explanation
AU01	Manual mode A	3741	Manual control of outputs For service purposes the individual relay outputs and valve can be controlled. 0=OFF: No override 1=ON: valve relay can be controlled. Going into manual mode no output will change from the current position/opening degree.
AU02	Manual mode timeout A	3120	Manual mode time out and go to off when Manual mode timeout is exceeded. Setting to zero no timeout will happen.
AU03	Manual OD A	3742	This feature is basically use in a service mode to drive the stepper motor valve to the desired level. The desired valve opening degree is provided in OD%.
AU04	Manual homeing	3743	This feature is basically used in a service mode. On enabling Manual homing the valve will close to zero OD% and eventual overdrive it in the closing direction. 1=on: start the homing, when done the value will revert to off.
A_PE	Pe evaporator	3715	Read evaporating pressure measured by pressure transmitter at evaporator outlet
A_TE	Te saturated evaporation temperature	3702	Read saturated evaporating temperature measured by pressure transmitter at evaporator outlet
A_S2	S2 suction pipe	3716	Read the temperature of the S2 Suction line sensor measured at the evaporator outlet
A_S3	S3 media inlet	3708	Read temperature of the S3 sensor at the media inlet
A_S4	S4 media outlet	3709	Read temperature of the S4 sensor at the media outlet
AU12	Actual SH reference	3701	Actual superheat reference
AU13	Actual superheat	3713	Read measured superheat at suction line
AU14	Injection state	3744	Read state of injection operation 0 - Power_up 1 - Stop 2 - Manual 3 - Service 4 - Safe State 5 - Defrosting 6 - Valve driver 7 - Thermstat cutout 8 - Emergency cooling 9 - SH ctrl error_ 10 - SH start Pctrl 11 - SH start fixed OD 12 - SH ctrl normal 13 - SH ctrl MTR 14 - SH ctrl LOP 15 - SH ctrl minPC 16 - SH ctrl MOP 17 - SH ctrl maxPc 18 - SH ctrl SH_cl 19 - SH ctrl minS4 20 - SH ctrl Tc
AU15	Injection details	3745	Read detailed info on SH control including limitor functions.
AU16	Average OD	3746	Average valve opening degree, updated and saved every 3 hours. Expert readout - contact Danfoss for further information
AU17	DI Enable A section	3719	Read the status of DI enabling A section
AU18	DI Heat	3720	Read the status of DI heating signal
AU19	DI Preset OD	3721	Read the status of DI preset OD signal
AU20	DI defrost start	3722	Read the status of DI defrost start signal
AU21	Act. ext. ref. SH offset	3747	Read the external signal contribution to sh reference
AU22	Act. ext. ref. temperature offset	3748	Read the external signal contribution to temperature reference
AU23	Act. ext. ref. maximum OD	3749	Read the external offset signal for maximum valve opening degree
AU24	Actual temperature reference	3714	Read actual temperature reference (active setpoint + any contribution from external signal)
AU25	Actual maximum OD	3750	Read the maximum opening degree
AU26	AI Valve driver A	3723	Signal for driver request
A_od	Valve A request OD	3703	Requested valve opening degree (0-100%)

LABEL	DESCRIPTION	ADU	Explanation
Ax20	PeA Sensor	3751	Modbus readout of PeA pressure when modbus controlled IO is activated. Value will be shown in the format of xx.xx barg on the user interface Modbus value will be : pressure *100
Ax20	PeA Sensor	3752	Modbus readout of PeA pressure when modbus controlled IO is activated. Value will be shown in the format of xx.xx barg on the user interface Modbus value will be : pressure *100
Ax20	PeA Sensor	3753	Modbus readout of PeA pressure when modbus controlled IO is activated. Value will be shown in the format of xx.xx barg on the user interface Modbus value will be : pressure *100
Ax21	S2A Sensor	3754	Modbus readout of S2A sensor when modbus controlled IO is activated. Value will be shown in the format of xx.x °C on the user interface Modbus value will be : temperature * 10
bCb	**Control B > Basic control**		
bEnb	Enable B section	3121	Manuel Start/Stop of B section. Start/stop B section can also be accomplished with the external Digital input Enable B switch function. Usage could be a door switch to stop cooling Enable B section 0: OFF 1: ON
brFg	Refrigerant	3019	Select the type of refrigerant. If the required refrigerant is not part of the list, the user defined option can be used. Please contact Danfoss for detailed information Warning: Wrong selection of refrigerant may cause damage to the system.
br01	Antoine constant A1	3122	Refrigerant factor for a custom refrigerant - please contact Danfoss for detailed information
br02	Antoine constant A2	3123	Refrigerant factor for a custom refrigerant - please contact Danfoss for detailed information
br03	Antoine constant A3	3124	Refrigerant factor for a custom refrigerant - please contact Danfoss for detailed information
br04	Startup mode	3127	Selection of different startup modes. 0: Prop. Ctrl : The controller is programmed for automatic proportional control, opening degree will change fast based on Te and SH 1: Fix OD with protection: fixed defined valve opening degree (OD), where opening degree can be change due to low superheat, MOP, ETC. 2: Fixed defined: fixed defined valve opening degree (OD),which is unchanged during startup time. This feature is used when it is necessary to open the valve quickly when the compressor turns on, to prevent too low suction pressure
br05	Startup time	3128	Start-up time for superheat control. For startup mode with fixed OD the opening degree will be fixed during startup time. With proprotional startup, normal superheat control will start when superheat is down at reference or when start-up time is exceeded
br06	Minimum startup time	3129	For proportional startup this is the minimum startup time, used for to get stable signal on sensors
bodS	Startup OD	3130	Starting opening degree of valve. For startup mode this opening degree will be fixed during startup time, except for overrides by SH close, LOP, MOP. etc. With proprotional startup "Startup OD" is starting point for control. A higher value will lead to a more aggressive control

LABEL	DESCRIPTION	ADU	Explanation
brEF	SH reference mode	3131	Definition of superheat regulation 0 = Fixed SH.: fixed superheat setpoint defined by "SH fixed setpoint" 1 = Loadap: SH reference based on load (opening degree), Higher OD => higher SH reference. Limits set by SH min and SH max 2 = MSS: Adaptive regulation. Minimum Stable Superheat. Limits set by SH min and SH max. 3 = Delta temp: Superheat reference based on temperature difference between S3 media inlet and Te. Limits set by SH min and SH max
bFSP	SH fixed setpoint	3132	This feature can be used In those application where fixed superheat is needed at all time. SH fixed setpoint can be varied according to the need of the application Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
bSLo	SH minimum	3020	Min. value for the superheat reference when using adaptive control Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
bSHI	SH maximum	3021	Max. value for the superheat reference when using adaptive control
bdEL	SH reference delta temp. factor	3133	Only relevant for SH reference mode = Delta temp Superheat reference is set as ratio of the average difference from S3 to Te
br07	SH Tn	3134	Integration time Tn for superheat control If the Tn value is increased the regulation becomes slower. Lowering the value will create a faster superheat control. Too low value will create superheat fluctuation.
br08	SH Kp	3135	Amplification factor Kp for superheat control. If the Kp value is reduced the regulation becomes slower. Increasing the Kp value will make faster regulation. Too high value will create superheat fluctuation.
br09	SH Kp Min	3136	Damping of amplification near reference value. This setting damps the normal amplification Kp, but only just around the reference value. A setting of 0.5 will reduce the KP value by half. The value should only be changed by specially trained staff.
br10	SH KpTe	3137	Gain factor for feedback of evaporating temperature signal Te to the PI controller controlling the superheat (expert setting)
bodL	Minimum OD	3138	During superheat control opening degree can be set to have a minimum value. This can be useful to overcome a undefined open sequence
bodH	Maximum OD	3139	During superheat control opening degree can be set to have a minimum value. The value is set in %. This feature is beneficial specially for oversized valve
br11	Thermostatic mode	3140	Used to control media temperature 0 not used: No media temperature control, only the superheat is regulated 1 Cutin/Cutout: Media temperature control based on temperature setpoint and differential as well as regulation of superheat. 2 MTR: Modulating thermostat, active evaporator area is adjusted to match cooling demand, reference is temperature setpoint + ½ differential

LABEL	DESCRIPTION	ADU	Explanation
brSn	Thermostatic sensor	3141	Its optional to connect a media sensor. Media sensor will be used to measure media temperature (air or water). Depending on needs it is placed on inlet or outlet of evaporator 0: S3 media inlet 1: S4 media outlet
btSP	Temperature setpoint	3142	This parameter is to be used if Thermostatic mode has been enabled. This is a reference value to maintain the temperature of the media to a desired temperature level.
btdt	Temperature differential	3143	When the temperature is higher than the reference plus the set differential the super control will start. It will become deactivated when the temperature drops below the set reference.
ECb	**Control B > Extended control**		
bu00	SH close function	3144	This is a safety feature that prevents the flooding of the liquid into the compressor. When the measured superheat goes below the setpoint, the valve will close faster.
bu01	SH close setpoint	3145	It is recommended to set the SH close setpoint valve 2k below the Min Superheat. Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2 K.
bu02	SH close Tn divide	3146	When superheat is below setpoint a fast response is needed. Sh close Tn defined how much normal Tn is reduced
bu03	SH close Kp factor	3147	When superheat is below setpoint a fast respons is needed. Sh close Kp factor how much the normal Sh Kp is increased
bu04	Limit Kp	3148	LOP, MOP, S4 min, high condensing temperature protect share the same gain factor (Kp) review the limit settings when adjusting the general SH control
bu05	Limit Tn	3149	LOP, MOP, S4 min,high condensing temperature protect share the same integration time (Tn) review the limit setings when adjusting the general SH control
bu06	Minimum S4 mode	3150	Minimum S4 (media outlet) protection function. If S4 get below setpoint the valve will close to reduce capacity 1 = On: Function is active
bu07	Minimum S4 setpoint	3151	Minimum S4 (media outlet) protection setpoint
bu08	MSS Stability	3152	Only relevant for MSS. Stability factor for regulation of superheat, only relevant for MSS With a higher value the control function will allow a greater fluctuation of the superheat before the reference is changed.
bu09	MSS T0 stability factor	3153	Only relevant for MSS. T0 stability factor define if variation in suction pressure will influence superheat reference. The Superheat reference change can be adjusted the value 0-1 (1= max Te influence and S2, 0 only S2). With often change in suction pressure due compressor start/stop some Te influence on MSS is recommended
bu10	MOP function	3154	To reduce the strain on the compressor, a maximum operating pressure can be set. This useful at compressor startup and during pulldown period. If the pressure comes to this limit the controller will control the valve to provide a lower pressure instead of a low superheat.
bu11	MOP setpoint	3155	MOP setpoint Setpoint unit is saturated temperature in evaporator. If the suction pressure reaches the set MOP limit, the valve will close faster irrespective of superheat.

LABEL	DESCRIPTION	ADU	Explanation
bu12	LOP function	3156	Lowest Operating Pressure function will keep the pressure than LOP setpoint. In case of pressure below setpoint the valve will open faster On: function is active
bu13	LOP setpoint	3157	Lowest Operating Pressure setpoint Setpoint unit is saturated temperature in evaporator
bu14	LOP priority mode	3158	In case of conflict between low pressure and SH close, Lop function can be set to override SH close actions (could be needed a startup in low ambient temperature) On: Lop can override low superheat The value should only be changed by specially trained staff.
bu15	LOP maximum time	3159	Maximum time for LOP to override SH close
bu16	LOP oscillation detection	3160	Enable LOB stability detection 0: Off 1: On
bu19	Compressor speed feedforward function	3163	Compressor speed feed forward adapt superheat control reaction to compressor speed. In case of low-speed superheat control will react slower (greater integration time Tn). Information on compressor speed is feed via bus (0.0-100.0%). Off: Feed forward function is not active On: Feed forward function is active.
bu20	FF low capacity turning point	3164	Below this speed superheat control is slower
bu21	FF maximum factor for Tn tuning	3165	The maximum adds to the integration time. At 0 % the TN = normal Tn * Comp FF SH Tn factor
bu22	SH control sensor error action	3166	If SH control sensor such as temperature sensor S2 and pressure transmitter Pe has an error, then an action can be set to position the valve OD to the desired level. 0 = Stop: close the valve and superheat control 1 = Fixed OD: Keep the refrigeration running with setting a fixed valve OD (Fixed OD during error emergency cooling) 2 = Average: Used the average OD (calculated as an average of the last hour) to set a reduced OD which will be fixed during error period. The value should only be changed by specially trained staff
bu23	Thermostatic sensor error action	3167	If Thermostatic sensor such as temperature sensor S3 or S4 has an error, then an action can be set to position the valve OD to the desired level. 0 = Stop: close the valve and superheat control & temperature control 1 = Fixed OD: Keep the refrigeration running (constant with setting a fixed valve opening degreed (Fixed OD during error emergency cooling) 2 = Average: for Cut-in/cut-out use average on and off time to continue cooling. For MTR use reduced opening degreed based average opening degreed The value should only be changed by specially trained staff
bu24	Fixed OD during emergency cooling	3168	Relevant if "Fixed OD" is selected as option during emergency cooling
bu25	MTR Tn	3169	Integration time for MTR. Use long integration time for S3 sensor and short for S4 sensor Expert setting for injection function The value should only be changed by specially trained staff.
bu26	MTR Kp	3170	Amplification factor for MTR Expert setting for injection function The value should only be changed by specially trained staff.
SHb	**Control B > Heat control**		

LABEL	DESCRIPTION	ADU	Explanation
bH00	Heat startup time	3171	Start-up time for superheat control in heat mode For startup mode with "Fixed OD" the opening degree will be fixed during startup time. With proportional startup, normal superheat control will start when superheat is down at reference or when startup time is exceeded.
bH01	Heat minimum startup time	3172	For proportional startup in heat mode this is the minimum startup time, used for to get stable signal on sensors
bH02	Heat startup OD	3173	Starting opening degree of valve in heat mode. For startup mode this opening degree will be fixed during startup time, except for overrides by SH close, LOP, MOP. etc. With proportional startup "Startup OD" is starting point for control. A higher value will lead to a more aggressive control.
bH03	Heat SH fixed setpoint	3174	This feature can be used In those application where fixed superheat in heating mode is needed at all time. SH fixed setpoint can be varied according to the need of the application Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
bH04	Heat SH minimum	3175	Min. value for the superheat reference in heat mode when using adaptive control Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2-4 K. It is recommended to keep this value 2k above the SH closed value.
bH05	Heat SH maximum	3176	Max. value for the superheat reference in heat mode when using adaptive control
bH06	Heat SH ref. delta temp. factor	3177	Only relevant for SH reference mode = Delta temp Superheat reference is set as ratio of the average difference from S3 to Te .
bH07	Heat SH Tn	3178	Integration time Tn for superheat control in heat mode If the Tn value is increased the regulation becomes slower. Lowering the value will create a faster superheat control. Too low value will create superheat fluctuation.
bH08	Heat SH Kp	3179	Amplification factor Kp for superheat control in heat mode If the Kp value is reduced the regulation becomes slower. Increasing the Kp value will make faster regulation. Too high value will create superheat fluctuation.
bH09	Heat SH Kp minimum	3180	Damping of amplification near reference value in heat mode This setting damps the normal amplification Kp, but only just around the reference value. A setting of 0.5 will reduce the KP value by half. The value should only be changed by specially trained staff.
bH10	Heat SH KpTe	3181	This setting determines the valve opening degree as a function of the change in evaporating pressure in heat mode. An increase of the evaporating pressure will result in a reduced opening degree. When there is a drop-out on the low-pressure thermostat during start-up the value must be raised a bit. If there is too much instability during start-up the value must be reduced a little. The value should only be changed by specially trained staff.
bH11	Heat SH close setpoint	3182	It is recommended to set the SH close setpoint valve 2k below the Min Superheat. Warning! Due to the risk of liquid flow the setting should not be lower than approx. 2 K.

LABEL	DESCRIPTION	ADU	Explanation
bH12	Heat Limit Kp	3183	LOP, MOP, S4 min, high condensing temperature protect share the same integration time (Tn) review the limit settings when adjusting the general SH control
bH13	Heat Limit Tn	3184	LOP, MOP, S4 min, high condensing temperature protect share the same gain factor (Kp). Review the limit settings when adjusting the general SH control
DFb	**Control B > Defrost control**		
bD00	Defrost start time	3185	Defrost start is used to empty the evaporator The defrost sequence start with closing the valve. The valve is kept closed until "Defrost start low pressure limit" is reached or "Defrost start time" is exceeded, then the defrost sequence will continue.
bD01	Defrost start low pressure limit	3186	Defrost start is used to empty the evaporator The defrost sequence start with closing the valve. The valve is kept closed until "Defrost start low pressure limit" is reached or "Defrost start time" is exceeded, then the defrost sequence will continue.
bD02	Defrost OD	3187	Defrost start is used to empty the evaporator The defrost sequence start with closing the valve. The valve is kept closed until "Defrost start low pressure limit" is reached or "Defrost start time" is exceeded, then the defrost sequence will continue.
bD03	Defrost end closed time	3188	After defrosting a defrost start is performed. Valve opening is set by "Defrost OD" and this opening degree is kept until defrost stop signal.
bD04	Defrost end OD time	3189	After the defrost stop signal the is kept closed and kept closed during "Defrost end closed time". Useful during 4 way valve change over
bD05	Defrost end OD	3190	Before startup of SH control "Defrost end OD time" and "Defrost end OD" can be used overcome the dynamic in the 4way valve change over and rapid signal change which make normal SH control unsafe
ASb	**Control B > Alarm setup**		
bA00	MOP alarm delay	3191	Alarm delay on Maximum operation pressure (MOP)
bA01	MOP alarm differential	3192	Te signal must be above "MOP setpoint" + "MOP alarm differential" before an high pressure (MOP) alarm can be raised.
bA02	LOP alarm delay	3193	Alarm delay on Low operating pressure (LOP)
bA03	LOP alarm differential	3194	Te signal must below "LOP setpoint" - "LOP alarm differential" before a low pressure (LOP) alarm can be raised.
bA04	High SH alarm delay	3195	Alarm delay on high superheat
bA05	High SH alarm differential	3196	Superheat has to be above actual sh reference + High SH alarm differential before an low SH alarm can be raised
bA06	Low SH alarm delay	3197	Alarm delay on low superheat
bA07	Low SH alarm differential	3198	Superheat has to be below actual SH reference - low SH alarm differential before a low SH alarm can be raised
bA08	Lack of capacity alarm delay	3199	Alarm delay on lack of capacity Valve opening degree is monitored to observe if the valve capacity can control Sh to desired level. If opening degree is close to 100 % an Lack of capacity alarm raised.

LABEL	DESCRIPTION	ADU	Explanation
bA09	Upper temperature alarm	3200	Alarm for too high thermostat temperature is set here. The value is set as offset in Kelvin. The alarm becomes active when the thermostat temperature exceeds setpoint + high alarm offset
bA10	Lower temperature alarm	3201	Alarm for too low thermostat temperature is set here The value is set in Kelvin. The value is set as offset in Kelvin. The alarm becomes active when the thermostat temperature exceeds setpoint - low alarm offset
bA11	Temperature alarm delay	3202	Alarm delay If one of the two limit values is exceeded, a timer function will commence. The alarm will not become active until the set time delay has been passed. The time delay is set in minutes.
bA14	Minimum S4 band	3203	Delay time for low min S4 alarm
bA15	Minimum S4 delay	3204	S4 has be to be below "Min S4 setpoint" - "Low min S4 band" before a low min S4 alarm can be raised.
SSb	**Control B > Service**		
bU00	Operation status	3724	Read actual operation status 0 - Power_up 1 - Stop 2 - Manual 3 - Service 4 - Safe_State 5 - Defrosting 6 - Valve_driver 7 - Ther__Cutout 8 - Emer__cooling 9 - SH_ctrl_err_ 10 - SH_start_Pctrl 11 - SH_start_fix_O 12 - SH_ctrl_normal 13 - SH_ctrl_MTR 14 - SH_ctrl_LOP 15 - SH_ctrl_minPC 16 - SH_ctrl_MOP 17 - SH_ctrl_maxPc 18 - SH_ctrl_SH_cl 19 - SH_ctrl_minS4 20 - SH_ctrl_Tc
bU01	Manual mode B	3755	Manual control of outputs For service purposes the individual relay outputs and valve can be controlled. 0=OFF: No override 1=ON: valve relay can be controlled. Going into manual mode no output will change from the current position/opening degree.
bU02	Manual mode timeout B	3207	Manual mode time out and go to off when Manual mode timeout is exceeded. Setting to zero no timeout will happen.
bU03	Manual OD B	3756	This feature is basically use in a service mode to drive the stepper motor valve to the desired level. The desired valve opening degree is provided in OD%.
bU04	Manual homeing	3757	This feature is basically used in a service mode. On enabling Manual homing the valve will close to zero OD% and eventual overdrive it in the closing direction. 1=on: start the homing, when done the value will revert to off.
b_PE	Pe evaporator	3727	Read evaporating pressure measured by pressure transmitter at evaporator outlet
b_TE	Te saturated evaporation temperature	3705	Read saturated evaporating temperature measured by pressure transmitter at evaporator outlet
b_S2	S2 suction pipe	3728	Read the temperature of the S2 Suction line sensor measured at the evaporator outlet
b_S3	S3 media inlet	3710	Read temperature of the S3 sensor at the media inlet
b_S4	S4 media outlet	3711	Read temperature of the S4 sensor at the media outlet
bU12	Actual SH reference	3704	Actual superheat reference
bU13	Actual superheat	3725	Read measured superheat at suction line

LABEL	DESCRIPTION	ADU	Explanation
bU14	Injection state	3758	Read state of injection operation 0 - Power_up 1 - Stop 2 - Manual 3 - Service 4 - Safe State 5 - Defrosting 6 - Valve driver 7 - Thermstat cutout 8 - Emergency cooling 9 - SH ctrl error_ 10 - SH start Pctrl 11 - SH start fixed OD 12 - SH ctrl normal 13 - SH ctrl MTR 14 - SH ctrl LOP 15 - SH ctrl minPC 16 - SH ctrl MOP 17 - SH ctrl maxPc 18 - SH ctrl SH_cl 19 - SH ctrl minS4 20 - SH ctrl Tc
bU15	Injection details	3759	Read detailed info on SH control including limitor functions.
bU16	Average OD	3760	Average valve opening degree, updated and saved every 3 hours. Expert readout - contact Danfoss for further information
bU17	DI Enable B section	3731	Read the status of DI enabling B section
bU18	DI Heat	3732	Read the status of DI heating signal
bU19	DI Preset OD	3733	Read the status of DI preset OD signal
bU20	DI defrost start	3734	Read the status of DI defrost start signal
bU21	Act. ext. ref. SH offset	3761	Read the external signal contribution to sh reference
bU22	Act. ext. ref. temperature offset	3762	Read the external signal contribution to temperature reference
bU23	Act. ext. ref. maximum OD	3763	Read the external offset signal for maximum valve opening degree
bU24	Actual temperature reference	3726	Read actual temperature reference (active setpoint + any contribution from external signal)
bU25	Actual maximum OD	3764	Read the maximum opening degree
bU26	AI Valve driver B	3735	Signal for driver request
b_od	Valve B request OD	3706	Requested valve opening degree (0-100%)
bl05	Actual position valve B	3778	Valve opening degree
bx18	PeB Sensor	3765	Modbus readout of PeB pressure when modbus controlled IO is activated. Value will be shown in the format of xx.xx barg on the user interface Modbus value will be : pressure *100
bx19	PeB Sensor	3766	Modbus readout of PeB pressure when modbus controlled IO is activated. Value will be shown in the format of xx.xx barg on the user interface Modbus value will be : pressure *100
bx20	PeB Sensor	3767	Modbus readout of PeB pressure when modbus controlled IO is activated. Value will be shown in the format of xx.xx barg on the user interface Modbus value will be : pressure *100
bx21	S2B sensor	3768	Modbus readout of S2B sensor when modbus controlled IO is activated. Value will be shown in the format of xx.x °C on the user interface Modbus value will be : temperature * 10
APP	**Configuration > Application config.**		
ACtr	Operation mode A	3002	EKE 100 can be used as superheat controller or as a driver. Select how you want to configure the controller in the system. 0: SH Control 1: Valve driver 2: Modbus Controlled I/O
bCtr	Operation mode B	3018	EKE 100 can be used as superheat controller or as a driver. Select how you want to configure the controller in the system. 0: SH Control 1: Valve driver 2: Modbus Controlled I/O 9: Not used
CA11	Power backup alarm	3209	Configure Power backup alarm to be monitored and presented. 0: No 1: Yes
I-O	**Configuration > I/O configuration**		
AC00	PeA configuration	3210	PeB configuration 0: Not used, 3: inp_PeB, 9: Modbus
bC00	PeB configuration	3211	PeB configuration 0: Not used, 3: inp_PeB, 9: Modbus, 10: Common

LABEL	DESCRIPTION	ADU	Explanation
AC01	S2A configuration	3212	S2A configuration 0: Not used, 2: inp_S2A, 9: Modbus
bC01	S2B configuration	3213	S2B configuration 0: Not used, 4: inp_S2B, 9: Modbus, 10: Common
AC02	S3A configuration	3214	S3A configuration 0: Not used, 4: inp_S3A, 9: Modbus
bC02	S3B configuration	3215	S3B configuration 0: Not used, 9: Modbus, 10: S3A
AC03	S4A configuration	3216	S4A configuration 0: Not used, 4: inp_S2B, 9: Modbus, 10: Common
bC03	S4B configuration	3217	S4B configuration 0: Not used, 9: Modbus, 10: S4A
AC05	ExtA configuration	3220	ExtA configuration 0: Not used, 3: inp_PeB, 9: Modbus
bC05	ExtB configuration	3221	ExtB configuration 0: Not used, 9: Modbus
AC06	Driver reference A configuration	3222	Driver reference A configuration 0: Not used, 1: inp_PeA, 9: Modbus
bC06	Driver reference B configuration	3223	Driver reference B configuration 0: Not used, 3: inp_PeB, 9: Modbus
AC07	DI1 NC/NO	3224	DI1 active at NC/NO mode 0: NC, 1: NO
bC07	DI2 NC/NO	3225	DI2 active at NC/NO mode 0: NC, 1: NO
P013	DO open collector	3226	DO open collector configuration 0: Not used, 1: Alarm - NO, 2: Alarm - NC
PO14	Voltage for output 5V/18V	3342	Pressure transmitters need supply The terminals 5V/18V can provide supply 5V or 18V, maximum 50mA. 0: Off 1: 5 volt 2: 18 volt 3: Auto (default) 3: Auto: 0 volt if no pressure transmitter selected 5 volt if minimum one ratiometric type is selected 18 volt if none of selections above is true
AC08	Enable A configuration	3227	Enable A configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus
bC08	Enable B configuration	3228	Enable B configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus
AC09	Heat cool selection A configuration	3229	Heat cool selection A configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus
bC09	Heat cool selection B configuration	3230	Heat cool selection B configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus, 4: Common
AC10	Preset OD A configuration	3231	Preset opening degree A configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus Define preset valve OD% by: Valve config, Valve A: "AJ20 Preset OD"
bC10	Preset OD B configuration	3232	Preset opening degree B configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus, 4: Common Define preset valve OD% by: Valve config, Valve B: "bJ20 Preset OD"
AC11	Defrost A configuration	3233	Defrost A configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus
bC11	Defrost B configuration	3234	Defrost B configuration 0: Not used 1: DI 1, 2: DI2, 3: Modbus, 4: Common
P012	EKE 2U Signal Of Health	3235	EKE 2U Signal Of Health configuration 0: Not used 1: DI 1 2: DI2
SEn	**Configuration > Sensor config.**		

LABEL	DESCRIPTION	ADU	Explanation
AC50	PeA transmitter configuration	3006	Pe is the Pressure Transmitter mounted at the evaporator outlet. This is the main Pressure transmitter used for superheat calculation. Define the type of Danfoss Pressure Transmitter / OEM Pressure Transmitter. Note: Available supply for transmitters: 5 Volt/50mA 0: Not_defined 1: AKS_32R 2: ACCPBP_Rati 3: _112CP 4: NSK 5: AKS_2050 6: DST_P110 (Standard) 7: DST_P310_Ra 16: DST_P310_Cu 9: AKS_32_1_5V 11: AKS_32_1_6V 12: AKS_32_0_10 13: AKS_33 14: XSK 15: ACCPBP_Curr 17: AKS_3000 (Ext. 10V supply) 8: OEM_Ratio 10: OEM_Voltage 18: OEM_Current
AC51	PeA voltage low	3007	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the lower voltage range for Pe pressure transmitter
AC52	PeA voltage high	3008	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the higher voltage range for Pe pressure transmitter
AC53	PeA current low	3009	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the lower current range for Pe pressure transmitter
AC54	PeA current high	3010	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the higher current range for Pe pressure transmitter
AC55	PeA ratio low	3011	Only relevant for "OEM Ratio". Define the ratio at minimum pressure
AC56	PeA ratio high	3012	Only relevant for "OEM Ratio". Define the ratio at maximum pressure
AC57	PeA transmitter min.	3013	Working range for pressure transmitter Depending on the application a pressure transmitter with a given working range is used. This working range (say, -1 to 12 bar g) must be set in the controller. The min. Gauge pressure value is set.
AC58	PeA transmitter max.	3014	The max. Gauge pressure value is set for the selected Pe pressure transmitter.
bC50	PeB transmitter configuration	3022	Pe is the Pressure Transmitter mounted at the evaporator outlet. This is the main Pressure transmitter used for superheat calculation. Define the type of Danfoss Pressure Transmitter / OEM Pressure Transmitter. Note: Available supply for transmitters: 5 Volt/50mA 0: Not_defined 1: AKS_32R 2: ACCPBP_Rati 3: _112CP 4: NSK 5: AKS_2050 6: DST_P110 (Standard) 7: DST_P310_Ra 16: DST_P310_Cu 9: AKS_32_1_5V 11: AKS_32_1_6V 12: AKS_32_0_10 13: AKS_33 14: XSK 15: ACCPBP_Curr 17: AKS_3000 (Ext. 10V supply) 8: OEM_Ratio 10: OEM_Voltage 18: OEM_Current
bC51	PeB voltage low	3023	USE only for non-Danfoss/ OEM ratiometric voltage pressure transmitter. Define the lower voltage range for Pe pressure transmitter
bC52	PeB voltage high	3024	USE only for non-Danfoss/ OEM ratiometric voltage pressure transmitter. Define the higher voltage range for Pe pressure transmitter
bC53	PeB current low	3025	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the lower current range for Pe pressure transmitter
bC54	PeB current high	3026	USE only for non-Danfoss/ OEM current signal pressure transmitter. Define the higher current range for Pe pressure transmitter

LABEL	DESCRIPTION	ADU	Explanation
bC55	PeB ratio low	3027	Only relevant for "OEM Ratio". Define the ratio at minimum pressure
bC56	PeB ratio high	3028	Only relevant for "OEM Ratio". Define the ratio at maximum pressure
bC57	PeB transmitter min.	3029	Working range for pressure transmitter Depending on the application a pressure transmitter with a given working range is used. This working range (say, -1 to 12 bar g) must be set in the controller. The min. Gauge pressure value is set.
bC58	PeB transmitter max.	3030	The max. Gauge pressure value is set for the selected Pe pressure transmitter.
AC59	S2A sensor configuration	3015	S2 sensor configuration - sensor type: 0: Not defined 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
bC59	S2B sensor configuration	3031	S2 sensor configuration: 0: Not defned 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
AC60	S3A sensor configuration	3236	S3 sensor configuration: 0: Not defined 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
bC60	S3B sensor configuration	3237	S3 sensor configuration: 0: Not defined 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
AC61	S4A sensor configuration	3238	S4 sensor configuration: 0: Not defined 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
bC61	S4B sensor configuration	3239	S4 sensor configuration: 0: Not defined 24: PT 1000 20: NTC10K 3435 19: EKS 221 21: ACCPBT NTC10K 22: MBT 153 10K 23: 112CP 25: AKS
AC71	ExtA ref. configuration	3258	External reference input type 0: Not defined 26: Voltage 27: Current
AC72	ExtA ref. voltage low	3259	Define the external minimum reference voltage used as analogue signal
AC73	ExtA ref. voltage high	3260	Define the external maximum reference voltage used as analogue signal
AC74	ExtA ref. current low	3261	Define the external minimum reference current used as analogue signal
AC75	ExtA ref. current high	3262	Define the external maximum reference current used as analogue signal
bC71	ExtB ref. configuration	3263	External reference input type 0: Not defined 26: Voltage 27: Current
bC72	ExtB ref. voltage low	3264	Define the external minimum reference voltage used as analogue signal
bC73	ExtB ref. voltage high	3265	Define the external maximum reference voltage used as analogue signal
bC74	ExtB ref. current low	3266	Define the external minimum reference current used as analogue signal
bC75	ExtB ref. current high	3267	Define the external maximum reference current used as analogue signal
AC76	PeA Correction	3268	Input offset calibration
bC76	PeB Correction	3269	Input offset calibration
AC77	S2A Correction	3270	Input offset calibration
bC77	S2B Correction	3271	Input offset calibration
AC78	S3A Correction	3272	Input offset calibration
bC78	S3B Correction	3273	Input offset calibration
AC79	S4A Correction	3274	Input offset calibration
bC79	S4B Correction	3275	Input offset calibration
REA	**Configuration > Ext. ref. config. A**		

LABEL	DESCRIPTION	ADU	Explanation
AE01	External reference function	3278	Define how the external reference signal is used: 0: SH: External current signal offset superheat reference 1: Temp: External current signal offset temperature reference 2: Max OD: External current signal offset opening degree reference
AE02	External reference offset min.	3279	External contribution to the reference This setting determines how large a contribution is to be added to the set setpoint when the input signal is min.
AE03	External reference offset max.	3280	External contribution to the reference This setting determines how large a contribution is to be added to the set setpoint when the input signal is max.
REb	**Configuration > Ext. ref. config. B**		
bE01	External reference function	3281	Define how the external reference signal is used: 0: SH: External current signal offset superheat reference 1: Temp: External current signal offset temperature reference 2: Max OD: External current signal offset opening degree reference
bE02	External reference offset min.	3282	External contribution to the reference This setting determines how large a contribution is to be added to the set setpoint when the input signal is min.
bE03	External reference offset max.	3283	External contribution to the reference This setting determines how large a contribution is to be added to the set setpoint when the input signal is max.
VLA	**Configuration > Valve A**		
AJ00	Valve configuration	3017	Select the type of Danfoss stepper motor valve from the list. ETS 6 (unipolar) Has by default "Open coil" alarm disabled, can be enabled by BJ27. If you want to correct a danfoss given valve profile, then first select the relevant valve and then select user def. For user defined: For non-Danfoss valve define "Valve configuration" =1 i.e. UserDef and set the motor parameters i.e BJ01, BJ09, BJ05, BJ06, BJ07... If previous valve selection is ETS_6 (unipolar), then Valve total steps is counted as half steps (480 half steps for ETS 6) 0: Select type 2: CCM_10 3: CCM_20 4: CCM_30 5: CCM_40 6: CCMT_3L 7: CCMT_5L 8: CCMT_8L 9: CCMT_10L 10: CCMT_2 11: CCMT_4 12: CCMT_8 13: CCMT_16 14: CCMT_24 15: CCMT_30 16: CCMT_42 17: CTR_20 20: ETS_6 (Unipolar) 51: ETS_8M (Bipolar) 21: ETS_12 23: ETS_25 24: ETS_50 25: ETS_100 26: ETS_250 27: ETS_175L 28: ETS_250L 29: ETS_12C 22: ETS_24C 30: ETS_25C 31: ETS_50C 32: ETS_100C 33: ETS_400 34: ETS_400L 35: ETS_550L 38: ETS_L_Oi 39: ETS_L_Hi 40: KVS_1C 41: KVS_2C 42: KVS_3C 43: KVS_5C 44: KVS_15 45: KVS_42 1: User def.
AJ02	Valve motor decay mode	3285	Only consider changing to slow decay if the cable distance between the controller and the valve is longer i.e 30m and issue with step loss because of EMC
AJ03	Valve step mode	3286	Valve stepper mode define the resolution of current through use of micro stepping. For Bipolar motors 1/8 is recommend having smooth and powerful operation 0 = Full: only 1 current level pr step 1 = Half: 2 current levels (micro steps) pr full step 2 = 1/4: 4 current levels (micro steps) pr full step 3 = 1/8: 8 current levels (micro steps) pr full step 4 = 1/16: 16 current levels (micro steps) pr full step

LABEL	DESCRIPTION	ADU	Explanation
AJ04	Valve step positioning	3287	Only for non-Danfoss stepper motor valve. Define the valve step positioning. In general, Unipolar valve are position in halfstep whereas bipolar are position at Full step.
AJ05	Valve total steps	3288	Only for non-Danfoss stepper motor valve. Define the total number of steps. Remember to set if the valve should position in Half or Full step in parameter bJ05 Valve step positioning
AJ06	Valve speed	3289	The valve will be driven with high, low or balanced speed as set in this parameter. Note: higher speed will provide low torque to the motor, on the other hand low speed will provide the higher torque. There should be balance between speed and torque depending on the application. Unit is Pulses per second, a pulse is either a full or a half step as defined in "Valve step positioning"
AJ07	Valve start speed	3290	This feature is useful with high valve speeds. The first will be taken with a lower speed than normal to avoid too big acceleration of the motor. Make sure to select a start speed which is recommended for the valve Unit is % taken from normal speed
AJ08	Valve emengency speed	3291	In case of emergency i.e. power loss valve can be driven with high or low speed. Unit is % taken from normal speed
AJ09	Valve drive current	3292	Only for non-Danfoss stepper motor valve. Set the current requirement of the motor in mA Peak. Note: 1mA RMS = 1.41 mA peak
AJ10	Valve acceleration current	3293	Define current during acceleration in % of nominal current
AJ11	Valve acceleration time	3294	Define acceleration time
AJ12	Valve holding current	3295	Only for non-Danfoss stepper motor valve. Holding current is too secure the actual position. Not all valve designs require holding current. heck with the valve manufacturer if not mentioned on their literature.
AJ13	Valve excitation time after stop	3296	After last step before going into holding mode full current is kept for some time
AJ14	Compensation backlash	3297	Then the valve change direction compensation backlash is used to overcome turning play. In the direction more step is added. Unit is in % of the full stroke Note: setting this value to Zero means disabling the feature.
AJ15	Valve duty cycle	3298	Valve duty cycle limit the valve travel time. If the limited duty cycle is violated, then a pause of minimum 5 sec. is made. A valve forced close will always be allowed.
AJ16	User defined overdrive	3299	Extra steps for zero calibrating valve position, scaled as a percentage of the full opening.
AJ17	Overdriver enable OD	3300	To do a overdrive OD has to be higher than Overdrive enable OD during operation. This is use full avoid not needed overdrive if the valve is only slightly open
AJ18	Overdrive block time	3301	Next valve over drive will be suppressed until valve opening degree has been bigger than "Overdrive enable OD". This is use full avoid not needed overdrive if the valve is only slightly open

LABEL	DESCRIPTION	ADU	Explanation
AJ19	Valve neutral zone	3302	The feature is useful to prevent the unnecessary movement of the valve because of fluctuating signal from control signal. This feature will maintain the lifetime of the valve. In the neutral zone there is no valve movement. The valve will only move if the signal from the controller is outside the neutral zone.
AJ20	Preset OD	3303	The DI can be used to force the valve to go to this opening degree.
AJ22	Valve size reduction	3305	This parameter can help reduce oversized valves in an application. Examples: 0% means no valve size reduction 20% means that the valve size is reduced from 100% to 80%, and that maximum number of steps are reduced by 20%
AJ23	Forced overdrive time	3306	0 hours = Not used Timer based overdrive. If no valve overdrive has been performed within this period, then a valve close is done (forced valve overdrive). Be care full and consider eventual problems by using the function
AJ24	Manifolded valves	3307	Selection of use of manifold valves: 0: No, 1: Yes
AJ25	Manifolded valve type	3308	Selection of modes for manifolded valves: 0: Seq: Valve A 0-50% - Valve B 50-100% (Valve A then Valve B) 1: SeqEq: Valve A/B 0-50% - Valve B/A 50-100% Valve A and Valve B must alternately start from zero opening degree. 2: Par: Both valves are receiving same valve opening signal (running in parallel) 3: Optim: Drive valve in an optimized sequence, mainly one valve per control loop.
AJ26	Manifolded valve single move band	3309	Used with "Manifolded valve type" = 3: "Optim". Defines a band where only one of the two valves will move.
AJ27	Use open coil alarm	3310	Enable monitoring of open coil alarm on valve. 0: No 1: Yes
VLb	**Configuration > Valve B**		
bJ00	Valve configuration	3033	Select the type of Danfoss stepper motor valve from the list. ETS 6 (unipolar) Has by default "Open coil" alarm disabled, can be enabled by BJ27. If you want to correct a danfoss given valve profile, then first select the relevant valve and then select user def. For user defined: For non-Danfoss valve define "Valve configuration" =1 i.e. UserDef and set the motor parameters i.e BJ01, BJ09, BJ05, BJ06, BJ07... If previous valve selection is ETS_6 (unipolar), then Valve total steps is counted as half steps (480 half steps for ETS 6) 0: Select type 2: CCM_10 3: CCM_20 4: CCM_30 5: CCM_40 6: CCMT_3L 7: CCMT_5L 8: CCMT_8L 9: CCMT_10L 10: CCMT_2 11: CCMT_4 12: CCMT_8 13: CCMT_16 14: CCMT_24 15: CCMT_30 16: CCMT_42 17: CTR_20 20: ETS_6 (Unipolar) 51: ETS_8M (Bipolar) 21: ETS_12 23: ETS_25 24: ETS_50 25: ETS_100 26: ETS_250 27: ETS_175L 28: ETS_250L 29: ETS_12C 22: ETS_24C 30: ETS_25C 31: ETS_50C 32: ETS_100C 33: ETS_400 34: ETS_400L 35: ETS_550L 38: ETS_L_Oi 39: ETS_L_Hi 40: KVS_1C 41: KVS_2C 42: KVS_3C 43: KVS_5C 44: KVS_15 45: KVS_42 1: User def.
bJ02	Valve motor decay mode	3312	Only consider changing to slow decay if the cable distance between the controller and the valve is longer i.e 30m and issue with step loss because of EMC

LABEL	DESCRIPTION	ADU	Explanation
bJ03	Valve step mode	3313	Valve stepper mode define the resolution of current through use of micro stepping. For Bipolar motors 1/8 is recommend having smooth and powerful operation 0 = Full: only 1 current level pr step 1 = Half: 2 current levels (micro steps) pr full step 2 = 1/4: 4 current levels (micro steps) pr full step 3 = 1/8: 8 current levels (micro steps) pr full step 4 = 1/16: 16 current levels (micro steps) pr full step
bJ04	Valve step positioning	3314	Only for non-Danfoss stepper motor valve. Define the valve step positioning. In general, Unipolar valve are position in halfstep whereas bipolar are position at Full step.
bJ05	Valve total steps	3315	Only for non-Danfoss stepper motor valve. Define the total number of steps. Remember to set if the valve should position in Half or Full step in parameter bJ05 Valve step positioning
bJ06	Valve speed	3316	The valve will be driven with high, low or balanced speed as set in this parameter. Note: higher speed will provide low torque to the motor, on the other hand low speed will provide the higher torque. There should be balance between speed and torque depending on the application. Unit is Pulses per second, a pulse is either a full or a half step as defined in "Valve step positioning"
bJ07	Valve start speed	3317	This feature is useful with high valve speeds. The first will be taken with a lower speed than normal to avoid too big acceleration of the motor. Make sure to select a start speed which is recommended for the valve Unit is % taken from normal speed
bJ08	Valve emengency speed	3318	In case of emergency i.e. power loss valve can be driven with high or low speed. Unit is % taken from normal speed
bJ09	Valve drive current	3319	Only for non-Danfoss stepper motor valve. Set the current requirement of the motor in mA Peak. Note: 1mA RMS = 1.41 mA peak
bJ10	Valve acceleration current	3320	Define current during acceleration in % of nominal current
bJ11	Valve acceleration time	3321	Define acceleration time
bJ12	Valve holding current	3322	Only for non-Danfoss stepper motor valve. Holding current is too secure the actual position. Not all valve designs require holding current. heck with the valve manufacturer if not mentioned on their literature.
bJ13	Valve excitation time after stop	3323	After last step before going into holding mode full current is kept for some time
bJ14	Compensation backlash	3324	Then the valve change direction compensation backlash is used to overcome turning play. In the direction more step is added. Unit is in % of the full stroke Note: setting this value to Zero means disabling the feature.
bJ15	Valve duty cycle	3325	Valve duty cycle limit the valve travel time. If the limited duty cycle is violated, then a pause of minimum 5 sec. is made. A valve forced close will always be allowed.
bJ16	User defined overdrive	3326	Extra steps for zero calibrating valve position, scaled as a percentage of the full opening.
bJ17	Overdriver enable OD	3327	To do a overdrive OD has to be higher than Overdrive enable OD during operation. This is use full avoid not needed overdrive if the valve is only slightly open

LABEL	DESCRIPTION	ADU	Explanation
bJ18	Overdrive block time	3328	Next valve over drive will be suppressed until valve opening degree has been bigger than "Overdrive enable OD". This is use full avoid not needed overdrive if the valve is only slightly open
bJ19	Valve neutral zone	3329	The feature is useful to prevent the unnecessary movement of the valve because of fluctuating signal from control signal. This feature will maintain the lifetime of the valve. In the neutral zone there is no valve movement. The valve will only move if the signal from the controller is outside the neutral zone.
bJ20	Preset OD	3330	The DI can be used to force the valve to go to this opening degree.
bJ22	Valve size reduction	3332	This parameter can help reduce oversized valves in an application. Examples: 0% means no valve size reduction 20% means that the valve size is reduced from 100% to 80%, and that maximum number of steps are reduced by 20%
bJ23	Forced overdrive time	3333	0 hours = Not used Timer based overdrive. If no valve overdrive has been performed within this period, then a valve close is done (forced valve overdrive). Be care full and consider eventual problems by using the function
bJ24	Use open coil alarm	3334	Enable monitoring of open coil alarm on valve. 0: No 1: Yes
dSP	**Configuration > Display**		
D001	Display unit	3335	Change of the unit of measurement 0= MET temperature unit in display °C and pressure unit is bar, barg, 1= IMP temperature unit in display °F pressure unit in display psia, psig Note: The unit used in Modbus are °C and bar g
D002	Display timeout	3336	Display will time out and goes to home menu after the choosen value 0: No timeout 1: 1 minute 5: 5 minutes 10: 10 minute 30: 30 minutes 60: 60 minutes
buS	**Configuration > Modbus**		
CAdr	Controller address	3337	The unique Modbus device address of the controller. Device address is used when multiple controllers are used in a Modbus network. Optional: reset Modbus device address to 1 by applying 5 Volt on +Bat. input (use +5V from controller)
C002	Bus sharing minimum update interval	3341	EKE 100 will generate an alarm minimum update interval is violated (not updated within set time)
C003	Modbus baudrate	3338	Set the required Modbus RS 485 RTU baud rate (all units on bus most have same baud rate)
C004	Modbus mode	3339	Set the required Modbus RS 485 RTU data bit (all units on bus most have same mode)
Out	**Service > Manual output**		
H007	Alarm relay	3769	Read the status of alarm relay
AU01	Manual mode A	3741	Manual control of outputs For service purposes the individual relay outputs and valve can be controlled. 0=OFF: No override 1=ON: valve relay can be controlled. Going into manual mode no output will change from the current position/opening degree.
AU02	Manual mode timeout A	3120	Manual mode time out and go to off when Manual mode timeout is exceeded. Setting to zero no timeout will happen.
AU03	Manual OD A	3742	This feature is basically use in a service mode to drive the stepper motor valve to the desired level. The desired valve opening degree is provided in OD%.

LABEL	DESCRIPTION	ADU	Explanation
bU01	Manual mode B	3755	Manual control of outputs For service purposes the individual relay outputs and valve can be controlled. 0=OFF: No override 1=ON: valve relay can be controlled. Going into manual mode no output will change from the current position/opening degree.
bU02	Manual mode timeout B	3207	Manual mode time out and go to off when Manual mode timeout is exceeded. Setting to zero no timeout will happen.
bU03	Manual OD B	3756	This feature is basically use in a service mode to drive the stepper motor valve to the desired level. The desired valve opening degree is provided in OD%.
CSI	**Service > Controller service info.**		
H100	Sales number 080G5xxx	3770	Last 3 digits in sales number
SVEr	Software version	3771	Application software version
RSt	**Service > Factory reset**		
H102	Factory reset	3340	Reset to parameters to factory default
buS	**Service > Modbus**		
C002	Bus sharing minimum update interval	3341	EKE 100 will generate an alarm minimum update interval is violated (not updated within set time)
AX00	Modbus enable A	4001	Modbus signal, updated from Modbus
bX00	Modbus enable B	4002	Modbus signal, updated from Modbus
AX01	Modbus heat cool A	4003	Modbus signal, updated from Modbus
bX01	Modbus heat cool B	4004	Modbus signal, updated from Modbus
AX02	Modbus preset OD A	4005	Modbus signal, updated from Modbus
bX03	Modbus preset OD B	4006	Modbus signal, updated from Modbus
AX04	Modbus defrost A	4007	Modbus signal, updated from Modbus
bX04	Modbus defrost B	4008	Modbus signal, updated from Modbus
AX05	Modbus Pe A	4009	Modbus signal, updated from Modbus
bX05	Modbus Pe B	4010	Modbus signal, updated from Modbus
AX06	Modbus S2 A	4011	Modbus signal, updated from Modbus
bX06	Modbus S2 B	4012	Modbus signal, updated from Modbus
AX07	Modbus S3 A	4013	Modbus signal, updated from Modbus
bX07	Modbus S3 B	4014	Modbus signal, updated from Modbus
AX08	Modbus S4 A	4015	Modbus signal, updated from Modbus
bX08	Modbus S4 B	4016	Modbus signal, updated from Modbus
AX09	Modbus external reference A	4017	Modbus signal, updated from Modbus
bX09	Modbus external reference B	4018	Modbus signal, updated from Modbus
AX11	Modbus compressor % A	4021	Modbus signal, updated from Modbus
bX11	Modbus compressor % B	4022	Modbus signal, updated from Modbus

8 Online support

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