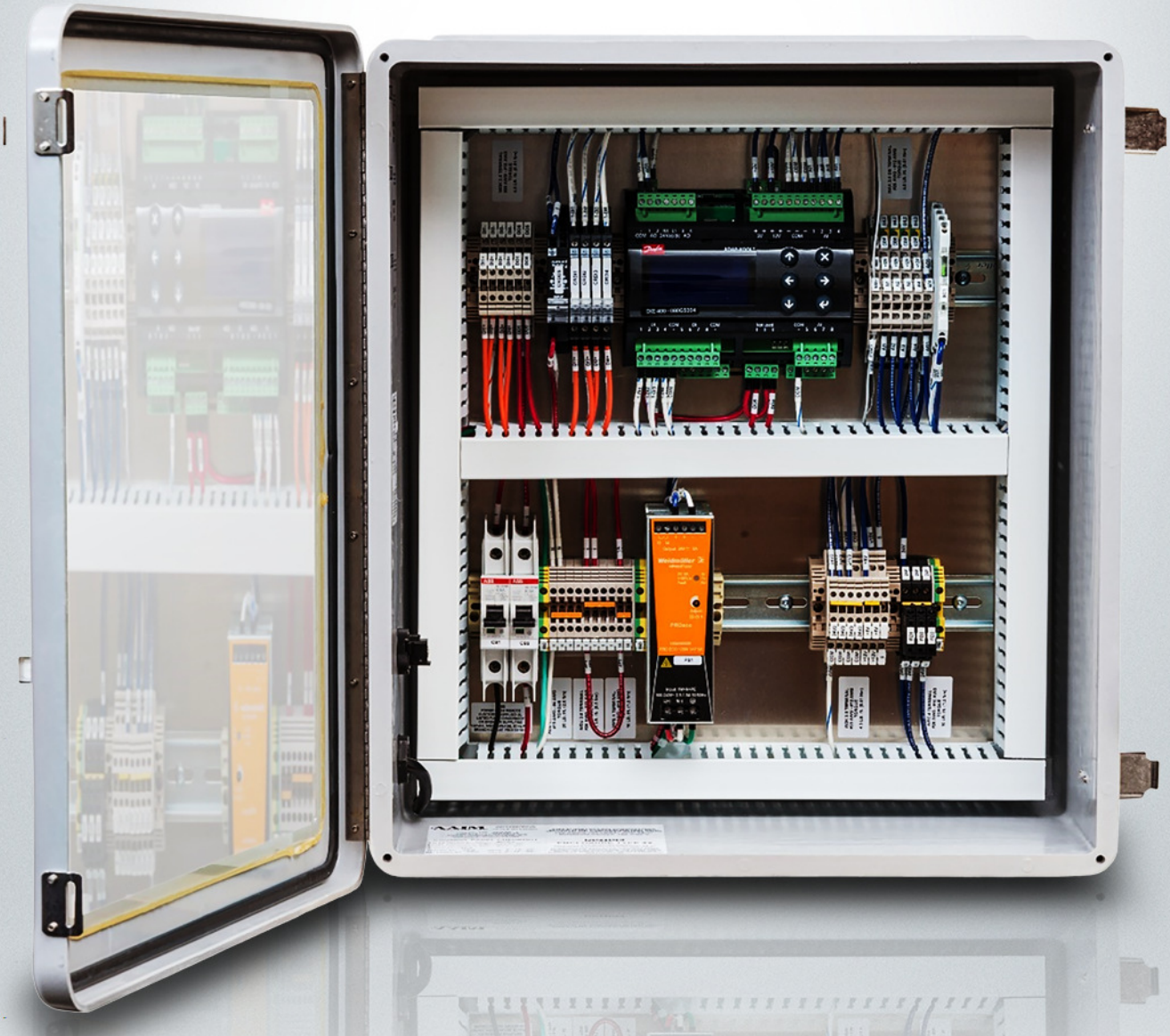
ENGINEERING
TOMORROW

Application Guide

Evaporator control
Industrial Refrigeration Evaporator Control Panels

Designed ready-to-mount-and-connect supply power, sensors, solenoid, and actuator wiring needed for all standard industrial refrigeration evaporator control applications



Contents

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Product specification

Technical data and dimension

Table 1: Technical data

Standards	UL/cUL listed	Units
Class of protection	Type 3R rated with front door display. Type 4 rated without front door display.	
Short circuit current rating	10 kA	kA
Ue Supply voltage	1 x 120 + N + PE	V AC
Ue Control voltage	120	V AC
Frequency	60	Hz
Dimensions (Height x Width x Depth)	1 Evap 20(H) x 20(W) x 8(D) 2 Evap 30(H) x 30(W) x 8(D) 3 Evap 30(H) x 36(W) x 8(D) 4 Evap 30(H) x 42(W) x 8(D)	inches
Panel color – Painted steel	Painted ANSI 61 Gray outside. Painted white inside	
Temperature range ambient	-4 to +104	°F
Communication protocol	Modbus RTU for PLC integration CANbus for front door display communication Danfoss SM-800 interoperable	
User interface	Optional LCD front door display Controller LCD setup wizard	
Number of evaporators controlled	1 to 4	

Ordering

Description	Front-door display	Code
Standard 1 Evaporator Control Panel – Painted Steel (Type 4)		**128S0001**
Standard 1 Evaporator Control Panel – Painted Steel (Type 1)	■	**128S0002**
Standard 1 Evaporator Control Panel – Stainless Steel (Type 4)		**128S0003**
Standard 1 Evaporator Control Panel – Stainless Steel (Type 1)	■	**128S0004**
Standard 2 Evaporator Control Panel – Painted Steel (Type 4)		**128S0005**
Standard 2 Evaporator Control Panel – Painted Steel (Type 1)	■	**128S0006**
Standard 2 Evaporator Control Panel – Stainless Steel (Type 4)		**128S0007**
Standard 2 Evaporator Control Panel – Stainless Steel (Type 1)	■	**128S0008**
Standard 3 Evaporator Control Panel – Painted Steel (Type 4)		**128S0009**
Standard 3 Evaporator Control Panel – Painted Steel (Type 1)	■	**128S0010**
Standard 3 Evaporator Control Panel – Stainless Steel (Type 4)		**128S0011**
Standard 3 Evaporator Control Panel – Stainless Steel (Type 1)	■	**128S0012**
Standard 4 Evaporator Control Panel – Painted Steel (Type 4)		**128S0013**
Standard 4 Evaporator Control Panel – Painted Steel (Type 1)	■	**128S0014**
Standard 4 Evaporator Control Panel – Stainless Steel (Type 4)		**128S0015**
Standard 4 Evaporator Control Panel – Stainless Steel (Type 1)	■	**128S0016**

Table 2: Accessory/Spare parts

Accessory/Spare parts	Accessory	Code
Stepper motor driver, EKF 1A (for 1 valve)	■	**080G5030**
Stepper motor driver, EKF 2A (for 2 valves)	■	**080G5053**
0–10 V to 0–20 mA signal converter	■	**128G1079**

NOTE:
This IOM document is dedicated to STANDARD Evaporator Control Panels only.

Please contact a Danfoss Sales representative for more information on customized versions.

Introduction

STANDARD Evaporator Control Panel

The Danfoss Standard Evaporator Control Panel are distributed control logic panels designed specifically for industrial refrigeration evaporator control applications. The panels can control up to 4 separate evaporators and their corresponding valve stations. There are 200+ control application options for each evaporator that cover most industrial refrigeration evaporator control requirements. Each evaporator application is configured separately and may be either duplicated of take completely different configurations to the other connected evaporators. Application-specific, energy-efficient control algorithms in each panel, achieve optimal space-cooling and defrost sequences for safe, efficient, trouble-free evaporator operation. Furthermore, all IIAR1 safety recommendations for hot gas defrost are complied with. Please note that evaporator power components such as motor starter protection, drives and contactors are not components contained within the STANDARD panels.

Non-standard customized panels may be purchased. Please contact your Danfoss Sales representative for more details.

Each evaporator application is setup and configured on your laptop via a free downloadable user-friendly graphical interface (CoolConfig) or via the panel's display navigation hardware.

Features

- Designed ready-to-mount-and-connect supply power, sensors, solenoid, and actuator wiring needed for all standard industrial refrigeration evaporator control applications
- High quality standardized panel electrical components
- Rigorously tested control sequences and algorithms
- Well laid-out Type 4 rated panels (Type 1 when front door display used)
- Modbus RTU communication
- Standardized documentation

Application principles: General

The Danfoss Standard Evaporator Control Panels have many different application choices available that are designed for Industrial Refrigeration applications. It is possible to assign different control applications to each of the evaporators, if required. Some of the control possibilities offered are as follows:

- Flooded ammonia/CO_2 /HCFC/HFC
- Direct expansion (DX) ammonia/CO_2/HCFC/HFC
- Superheat Control by:
  - Fixed Superheat reference
  - Load defined reference
  - Minimum Stable Superheat
- Modulating or simple ON/OFF room temperature control
- Media temperature control of suction line valve with motorized valve
- Media temperature control of suction line valve with servo valve
- Pressure control of suction line valve with motorized valve
- Pressure control of suction line valve with servo valve
- Modulating room temperature control by modulating the valve in the liquid line of flooded systems
- Supports Multiple Defrost methods:
  - by pressure
  - by liquid drain
  - by water or brine
  - individual defrost schedules by single weekdays, Saturdays, and Sundays
- Defrost starts:
  - via Modbus or DI start by time interval (time since last defrost start)
  - according to accumulated cooling time
  - via defrost schedules and Real Time Clock
  - forced manual defrost via the HMI or Modbus
- Defrost stops:
  - on time duration
  - on temperature
- Separate Drip tray Hot Gas control separate from main Hot Gas valve
- Emergency cooling - failsafe operation
- Safe startup procedure after power failure
- Additional product temperature alarm option

Panel Terminal Overview For Field Wiring for 1 Evaporator

Table 3: Overview For Field Wiring for 1 Evaporator

Terminal	Description	Comment
CB1	Power supply: 120 V AC/60HZ/1-PH Source	H & N. Ground terminal
CR1-DI1	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
CR2-DI2	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
CR3-DI3	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
CR4-DI4	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
CR5-DI5	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
CR6-DI6	Evaporator 1 Customer configurable DI to application needs.	120 V AC relay
CR7-DI7	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
CR8-DI8	Evaporator 1 Customer configurable DI to application needs	120 V AC relay
DO1	Evaporator 1 Customer configurable DO to application needs	N.O. contact. 10 A 250 V AC for resistive load. 3.5 A 230 V AC for inductive load.
DO2	Evaporator 1 Customer configurable DO to application needs	N.O. contact. 10 A 250 V AC for resistive load. 3.5 A 230 V AC for inductive load.
DO3	Evaporator 1 Customer configurable DO to application needs	Changeover contact. 6 A 250 V AC for resistive load. 4 A 230 V AC for inductive load.
DO4	Evaporator 1 Customer configurable DO to application needs	Changeover contact. 6 A 250 V AC for resistive load. 4 A 230 V AC for inductive load.
DO5	Evaporator 1 Customer configurable DO to application needs	Solid state relay for PWM valve. AC only. Imax = 0.5 A. Imin = 50 mA
DO6	Evaporator 1 Customer configurable DO to application needs	Solid state relay for PWM valve. AC only. Imax = 0.5 A. Imin = 50 mA
DO7	Evaporator 1 Customer configurable DO to application needs	Changeover contact. 6 A 250 V AC for resistive load. 4 A 230 V AC for inductive load.
DO8	Evaporator 1 Customer configurable DO to application needs	Changeover contact. 6 A 250 V AC for resistive load. 4 A 230 V AC for inductive load.
AI1	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter 1–5 V pressure transmitter 0–20 mA/4–20 mA pressure transmitter PT1000 temperature sensor NTC temperature sensor
AI2	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter 1–5 V pressure transmitter 0–20 mA/4–20 mA pressure transmitter PT1000 temperature sensor NTC temperature sensor
AI3	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter 1–5 V pressure transmitter 0–20 mA/4–20 mA pressure transmitter PT1000 temperature sensor NTC temperature sensor
AI4	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter 1–5 V pressure transmitter 0–20 mA/4–20 mA pressure transmitter PT1000 temperature sensor NTC temperature sensor
AI5	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter PT1000 temperature sensor NTC temperature sensor

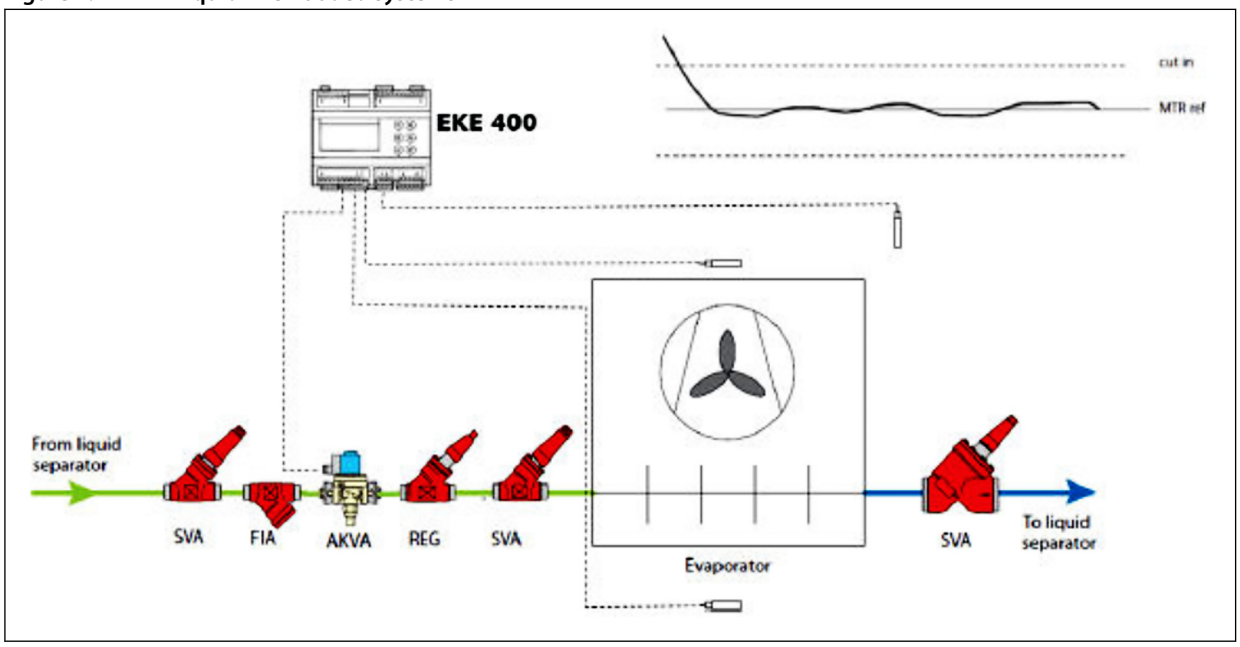
Terminal	Description	Comment
AI6	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter PT1000 temperature sensor NTC temperature sensor
AI7	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter PT1000 temperature sensor NTC temperature sensor
AI8	Evaporator 1 Customer configurable AI to application needs	Example Ratiometric pressure transmitter PT1000 temperature sensor NTC temperature sensor
AO1	Evaporator 1 Customer configurable AO to application needs	0–10 V signal output (optional 4–20 mA signal output on request)
AO2	Evaporator 1 Customer configurable AO to application needs	0–10 V signal output (optional 4–20 mA signal output on request)
AO3	Evaporator 1 Customer configurable AO to application needs	0–10 V signal output (optional 4–20 mA signal output on request)
AO4	Evaporator 1 Customer configurable AO to application needs	0–10 V signal output (optional 4–20 mA signal output on request)
FD3	Evaporator 1 Modulating valve power if required	24 V DC 3 A max DC power supply limited to installed power supply
FD4	Evaporator 1 Modulating valve power if required	24 V DC 3 A max DC power supply limited to installed power supply

General Operation Principals

MTR (Modulating Thermostat) in Liquid Line Flooded systems

As in DX systems, the evaporator control panel has an adapted function of MTR also for flooded systems. Selecting this function, the evaporator control panel will be able to control the room temperature much more accurate than a traditional ON/OFF temperature control. The evaporator control panel will also equalize the load on the system to get better operating conditions. MTR requires PWM (Pulse Width Modulating) valves like Danfoss type AKV or AKVA in the liquid line. Typical industrial applications with the refrigerant Ammonia or CO_2 is in scope

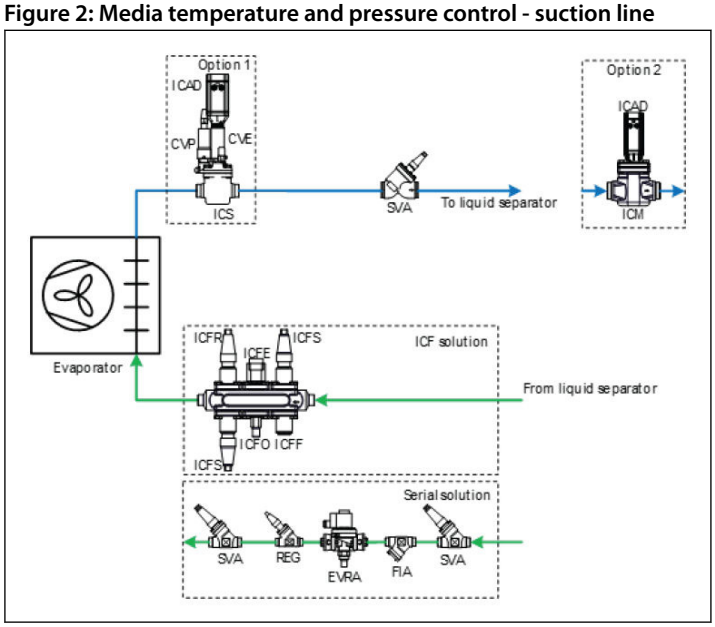
Figure 1: MTR in Liquid line flooded systems



Media temperature and pressure control - suction line

Media temperature and pressure control - suction line the evaporator control panel will be able to control valves in the wet suction return line. The control mode can be either temperature or pressure. Support of Danfoss Industrial Refrigeration Valves like ICM with ICAD and ICS/CVE/ICAD can be combined with multiple defrost methods, including Hot Gas.

Figure 2: Media temperature and pressure control - suction line



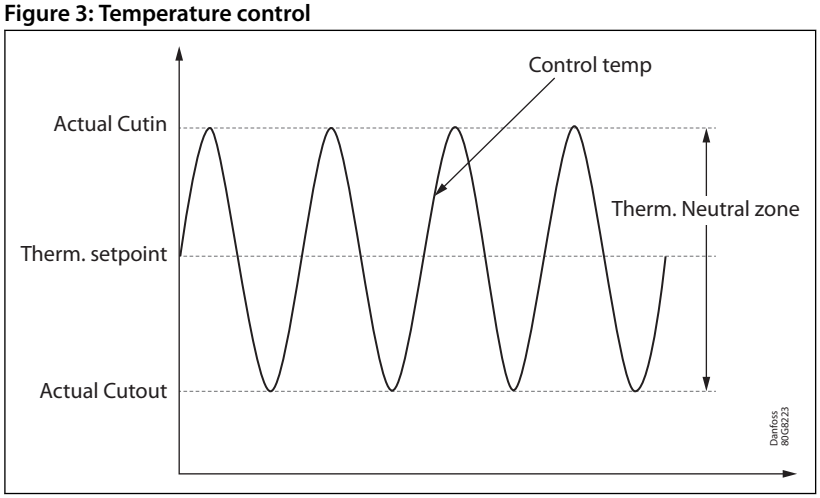
Temperature control

For ON/OFF thermostat and Flooded and DX application One, two or three temperatures sensors, normally located in the cool room, can be connected to 1 evaporator controller in the evaporator control panel.

The number of sensors depends normally on the size of the room.If more than one temperature sensor have been selected, then the thermostat function can be selected to control temperature from the average or the highest temperature from the temperature sensors.

A Temperature setpoint (T04) and a Neutral zone(T05) are entered in evaporator controller. Neutral zone divided by 2 will give Cut-in and Cut-out temperature of the thermostat, normally the liquid line valve ON/OFF.

Figure 3: Temperature control



Modulating thermostat (MTR) – DX only

Observe: The MTR function must not be enabled in a system containing only 1 evaporator

Modulating thermostat (MTR regulation maintains a more constant temperature and also equalize the load on the system to get better operating conditions:

- Each of the individual evaporator sections is controlled individually using a modulating thermostat function
- A Temperature setpoint (T04) and a Neutral zone(T05) must be set as with an ON/OFF thermostat

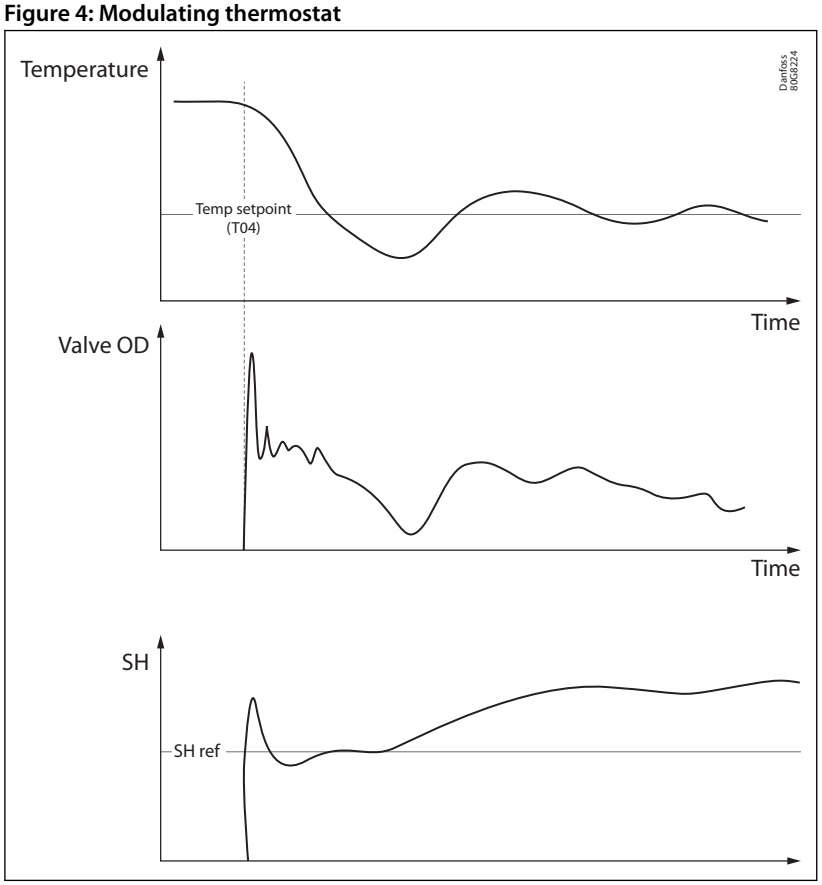
MTR is modulating the cooling capacity to match the cooling demand.

In the pull-down phase then the temperature is well above the MTR set point cooling capacity is at maximum and superheat is controlled to be on superheat reference.

When temperature is getting close to the MTR reference (typical 4 K) the cooling capacity gradually reduce so that the temperature can be stable on the MTR reference.

The MTR reference is defined by Temperature setpoint (T04).

Figure 4: Modulating thermostat



Superheat reference calculation methods

In superheat mode the EKE400 controller will control the superheat to be stable and closer to the superheat reference. This will give the optimal utilization of heat exchanger and thereby maximum cooling capacity. If superheat is too low, the flow in the expansion is decreased and superheat will be higher.

P can be displayed in [Bar] or [psi]. It a refrigerant has been entered in parameter “r20,Refrigerant“ then the calculated evaporating temperature, converted from the pressure transmitter, is called T0 (or Te).

Figure 5: Superheat reference

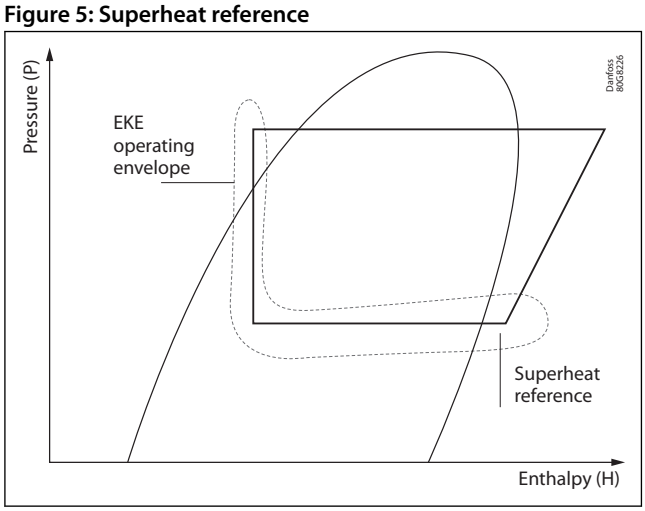
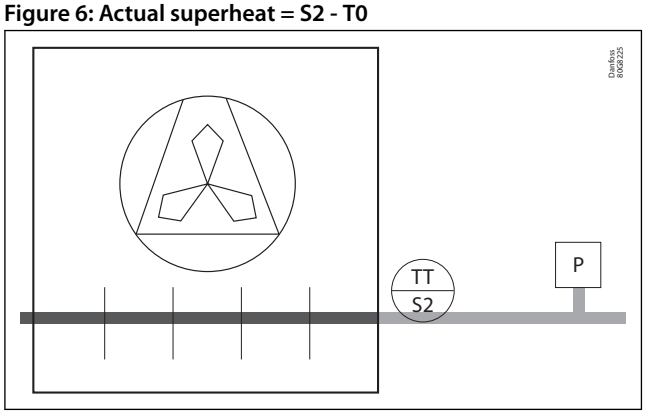


Figure 6: Actual superheat = S2 - T0

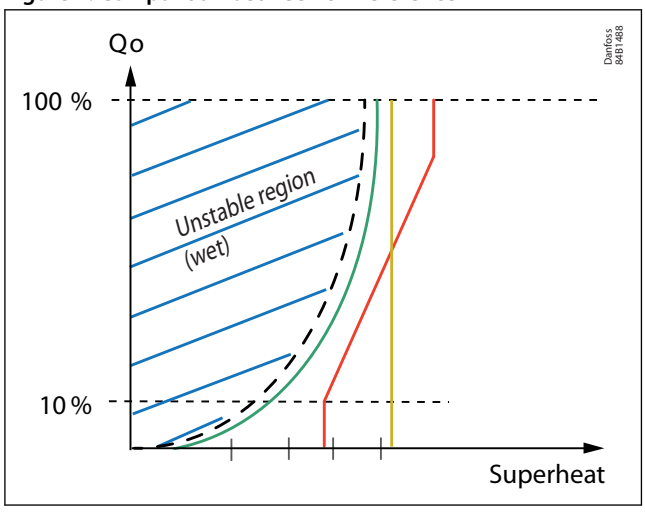


TT, S2	Pt1000 temperature sensor
P	Pressure transmitter

Superheat reference can be calculated based on following 3 different methods:

1. MSS (Minimum Stable Superheat)
2. LoadAP Superheat
3. Fixed Superheat

Figure 7: Comparison between SH reference



—	Danfoss MSS
—	Danfoss LoadAP
—	Fixed SH, 3rd party SH control

These 3 methods are covered in the next chapters.

MSS (Minimum Stable Superheat)

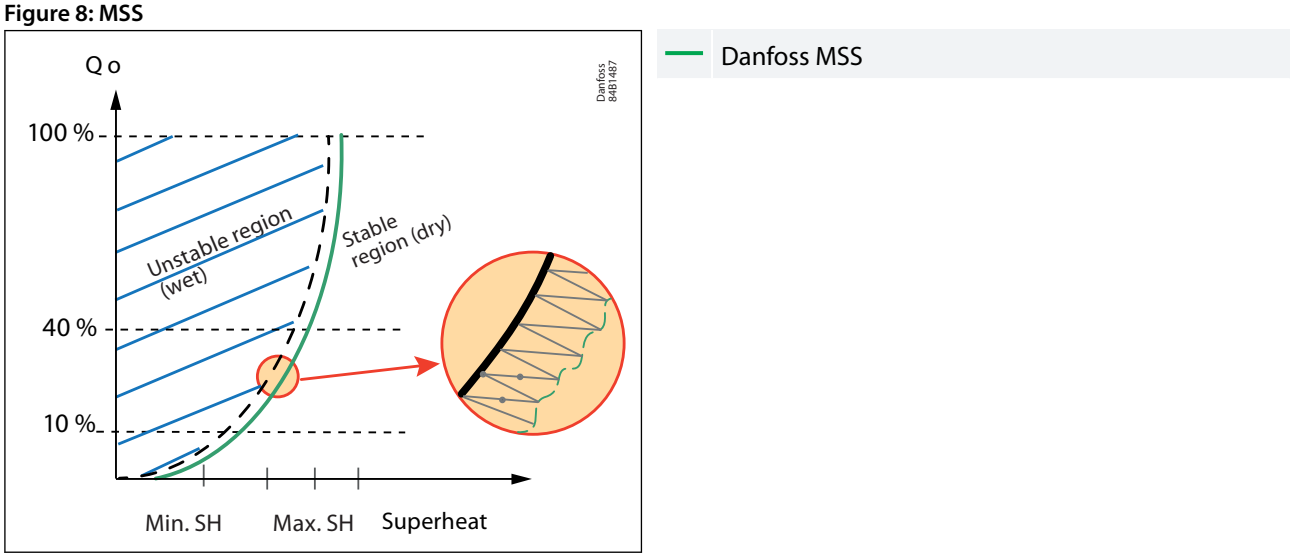
The superheat control algorithm will attempt to regulate the superheat down to the lowest stable value between the minimum superheat setting, “Min SH” and the maximum superheat setting, “Max. SH”. The controller will search for the minimum stable superheat between an upper and lower boundary. If the superheat has been stable for a period, the superheat reference is decreased. If the superheat becomes unstable. the reference is raised again. This process continues as long as the superheat is within the limits set by the user. The purpose of this is to search for the lowest possible superheat that can be obtained while still maintaining a stable system. MSS PI controller is made up of 3 parts:

- a stability set point
- the variant from the Te signal
- actual superheat reference

The stability set point is given from the user. The variants from the T0 signal is used to allow for increased instability if the T0 signal is unstable. Finally the part from the actual superheat allows for more instability at higher superheat references than at lower references. The superheat reference SH ref is adaptive and adjusted. When using this form of control, there are three settings that have major effect on this mode of control. These are Min. SH, Max. SH and SH close parameters.

MSS is beneficial for systems with a long runtime and slow changing conditions like cold rooms, display cases and chillers. Short cycling and system with fast changing operation condition will not benefit from MSS as this feature will take time to find the optimal reference. Adaption to a new set point is approx. 15 min.

Figure 8: MSS



LoadAP Superheat
LoadAP is an abbreviation of "load defined reference". LoadAP will adjust reference to be higher if the load is higher. Load is indicated by the OD of the valve. LoadAP is a type of pre-programmed MSS curve. This method will give a robust SH reference and may, in many cases, be the best fit for systems.

Fixed Superheat
This feature is used in a systemwhere a stable fixed superheat is required.

Reheat function

Reheat controller parameters:

1. RH0, Reheat enable
2. RH1, Setpoint RH%

Reheat function explanation

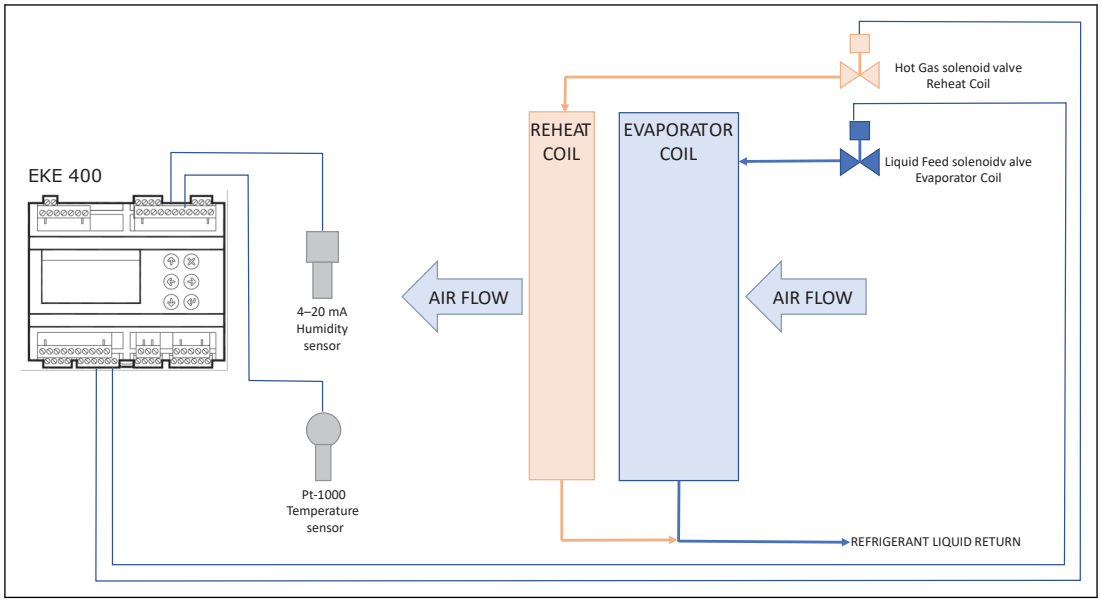
- The evaporator will continue to dehumidify the air and the re-heat coil will heat the air to keep the room from getting too cold while trying to reduce humidity
- The evaporator coil will operate in thermostat cut-in/cut-out mode
- The re-heat coil is always off when evaporator coil is off, that is, if cooling is off due to cut-out, any alarm, forced closing, etc., the re-heat coil will be off
- When cooling is on, if the room humidity is above the humidity set-point and the room temperature is below the temperature set-point, the re-heat coil will be on
- If the room humidity falls below the humidity set-point, the re-heat coil will be off
- If the room temperature rises above the temperature set-point, whatever the room humidity is, the re-heat coil will be off
- To avoid frequently switch on/off the re-heat coil, hysteresis is necessary
  - +1 degree for temperature setpoint
  - -5%RH for humidity setpoint

NOTE:

Reheat function is not possible in the following modes:

- DX – MTR mode
- Flooded – PWM mode
- Flooded – WR ctrl. Mode

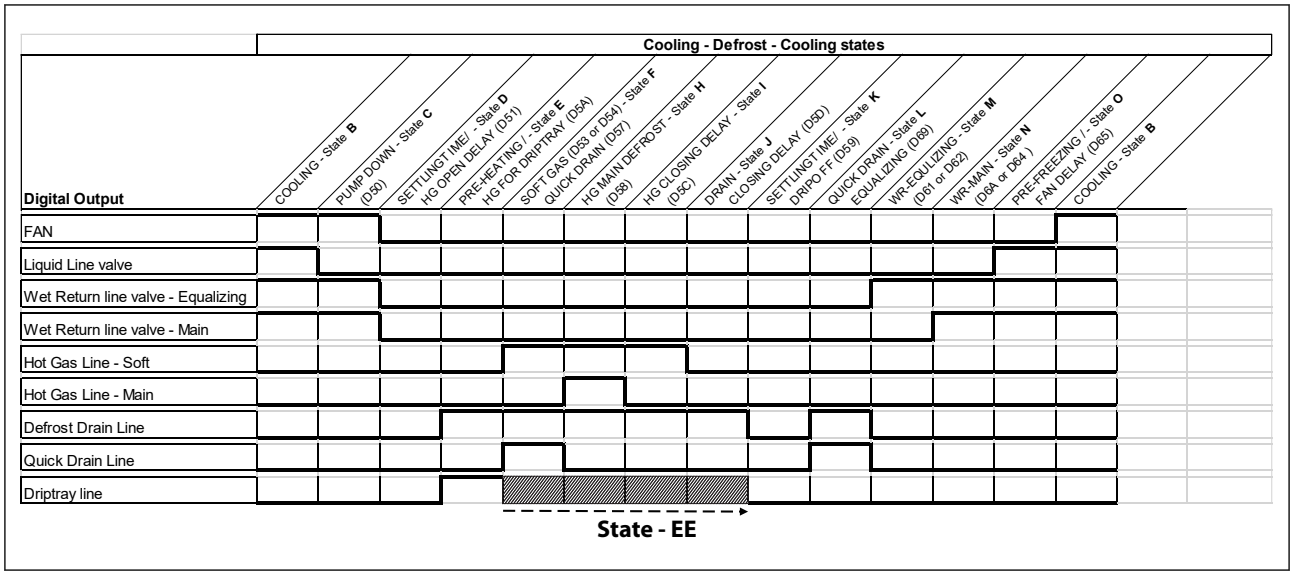
Figure 9: Reheat function



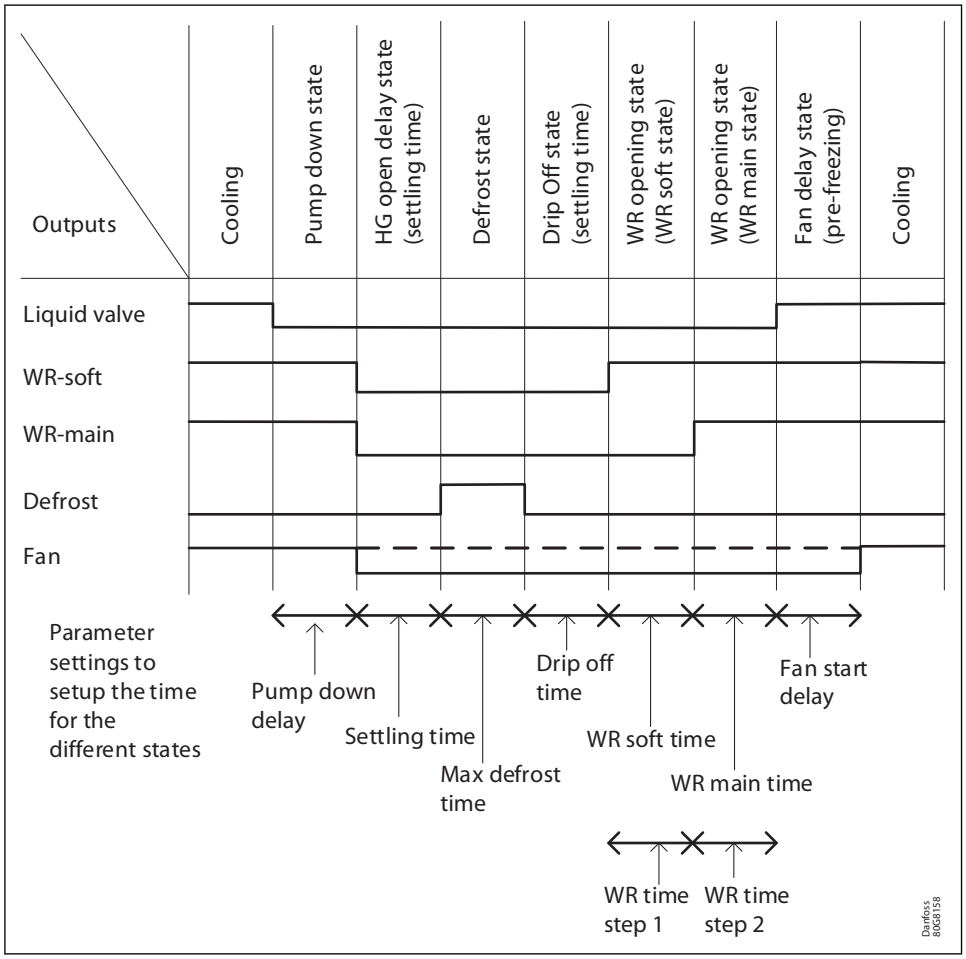
Defrost sequences

Hot gas defrost

Figure 10: Defrost sequence



Electrical, water and brine defrost

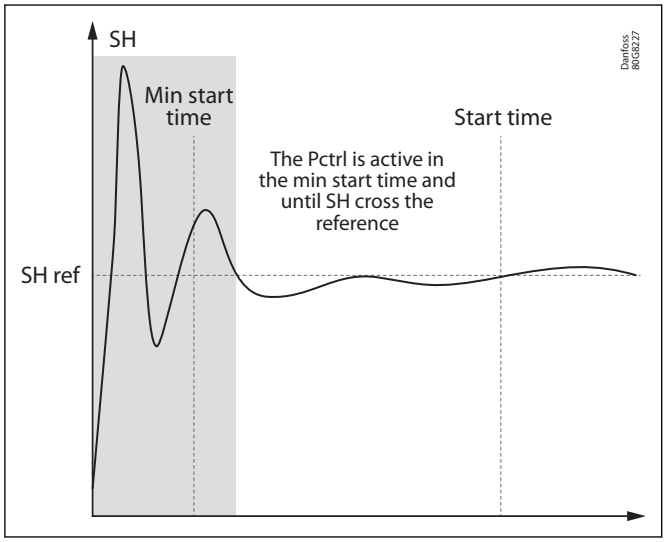


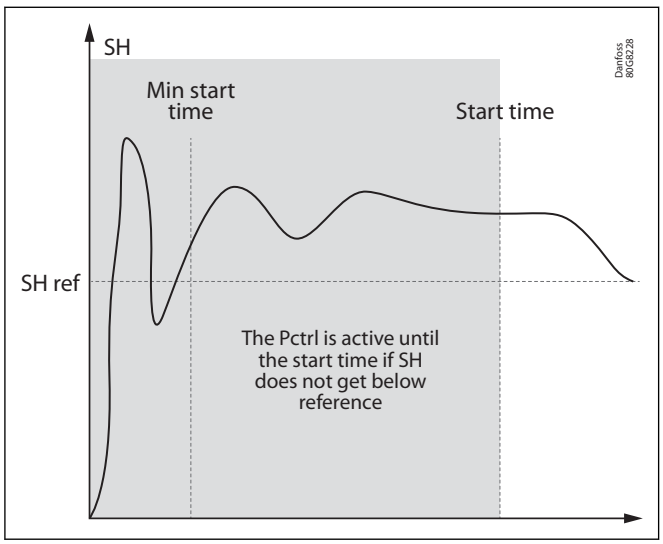
System Startup Tips

Sometimes in one to one applications. the valve does not open sufficiently on start-up and troublesome low pressure trips happen. The following features allows the valve to open faster as well as to reach the optimal operating conditions quickly.

1. Proportional (P) control N20, Startup Mode=0

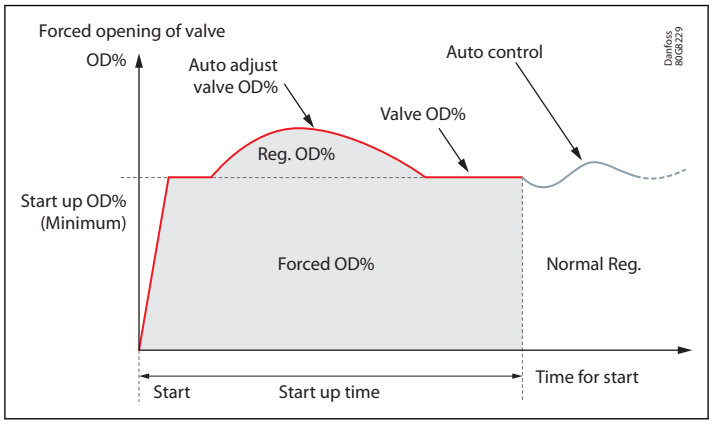
P-control function quickly stabilize the system's superheat by reaching optimal operating conditions in shorter period of time. The controller is programmed for auto proportional control that will quickly change the opening degree based on evaporating temperature and superheat of the system.





2. Predefined OD with protection N20, Startup Mode=1

After startup, this function will provide a start opening degree during a set time period. If the limiters, the valve will do the auto adjustment based on the operating conditions and the set limitations.

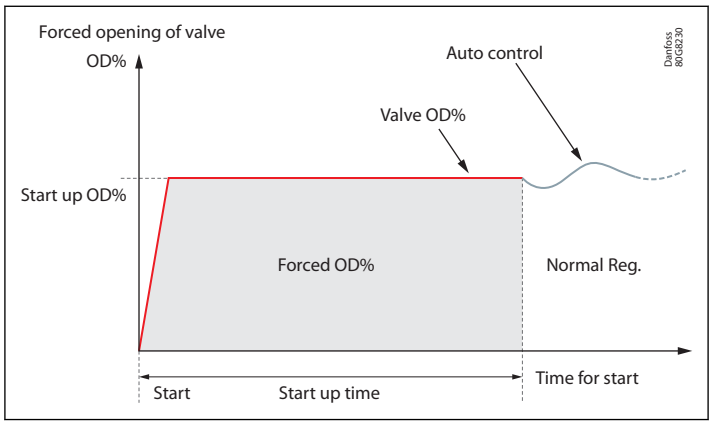


NOTE:

At start up. if the valve is opened too much, it could result in flow of liquid in the compressor or could trigger the HP switch which will stop the system. Whereas if you start the system with too low opening degree. it could also stop the system because of the low-pressure switch cut in. It will be safe to start the system with approximately 50% OD of the valve at start up if P-control is not being used.

3. Predefined OD without protection N20, Startup Mode=2

After startup, this function will provide a constant opening degree during a set time period regardless of the superheat value. No limiters are taken in consideration during this time.

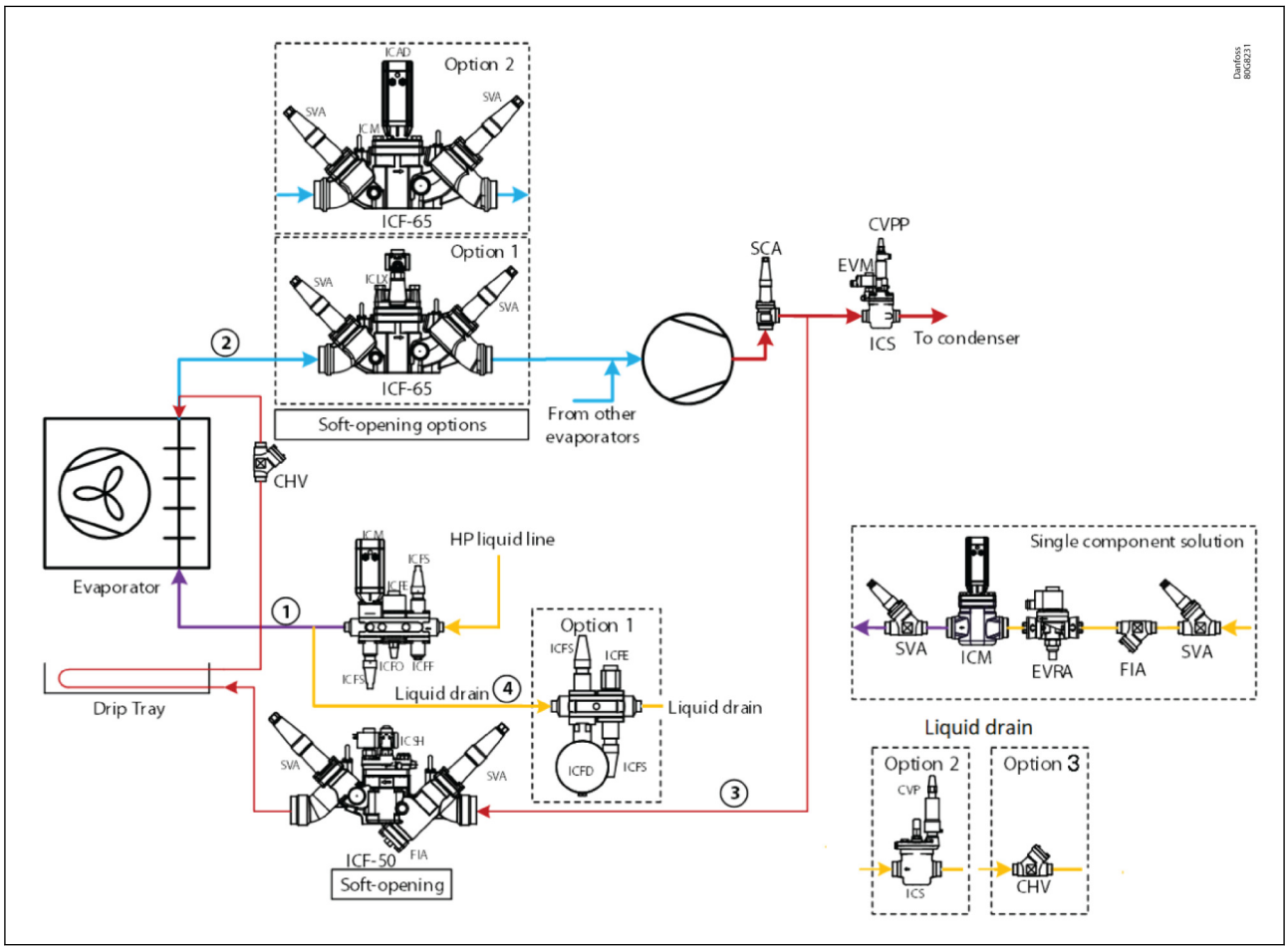


DX with defrost by Hot Gas, and the Defrost Drain Line connected to the receiver

In a DX application, with Hot Gas defrost and the Defrost Drain Line connected to the receiver, the panel controller can provide a function to manage the valve in the main Hot Gas line. See below.

If the Defrost Drain Line is connected to the Liquid receiver it is possible to control the valve in the main HG line from the evaporator panel. The purpose of the valve in the main Hot Gas line (e.g. Danfoss type ICS with EVM (SI-port) and a CVPP (P-port)) is to build up pressure in the Hot Gas line to the receiver during defrost. I.e. once the EVM is energized then pressure is built up in the Hot Gas line to the receiver via the CVPP.

The EVM can be controlled from the evaporator panel. See sketch below: The parameter: D08, Def. seq. status on DO, must be set to: **Yes** .The assigned DO (DO1 to DO8) must be connected to the EVM on the ICS with CVPP in the main Hot Gas line.



Standard Evaporator Control Panel Application Examples

Application example 1:

Flooded evaporator with hot gas defrost by liquid drain. Motorized valve control on the wet return line.

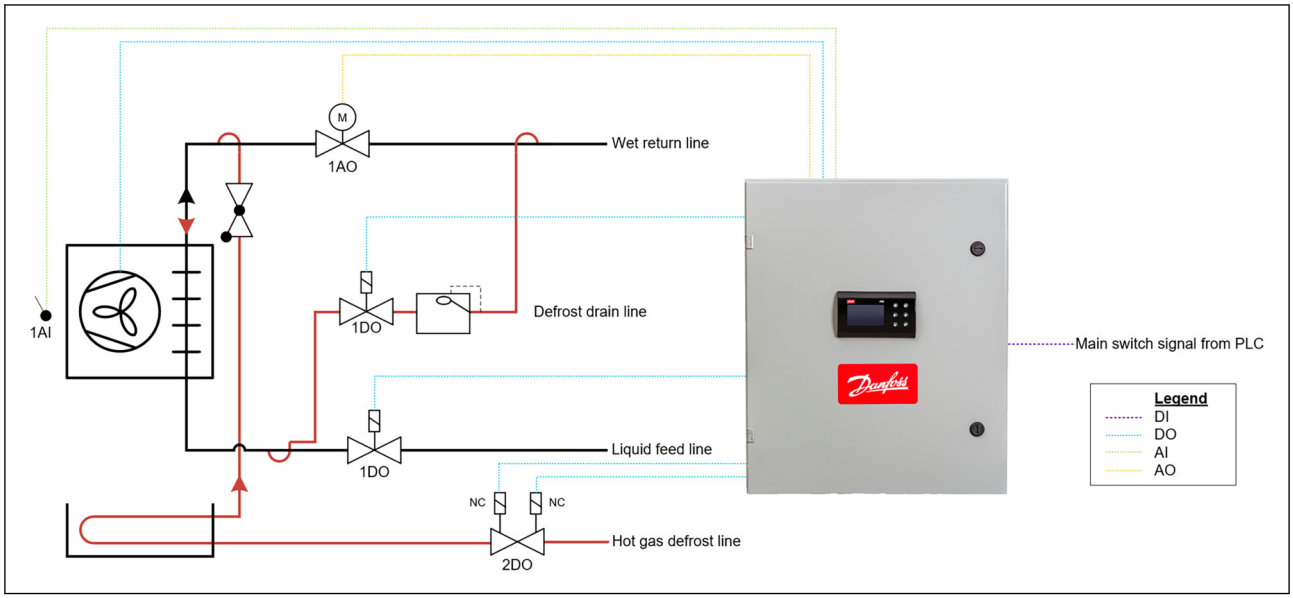


Table 4: Flooded evaporator with hot gas defrost by liquid drain

Panel terminal	Description
DI01	Main switch signal from PLC
DO1	Liquid feed solenoid
DO2	Hot gas soft opening stage 1
DO3	Hot gas soft opening stage 2
DO4	Defrost drain solenoid
DO5	Output to fan on/off
AO1	Wet return motorized valve. Slow opening.
AI1	Off-coil air temperature

Application example 2:

Flooded evaporator with PWM liquid line control and hot gas defrost with pressure. Separate drip tray line control. Reheat based on humidity. Extra DI from PLC.

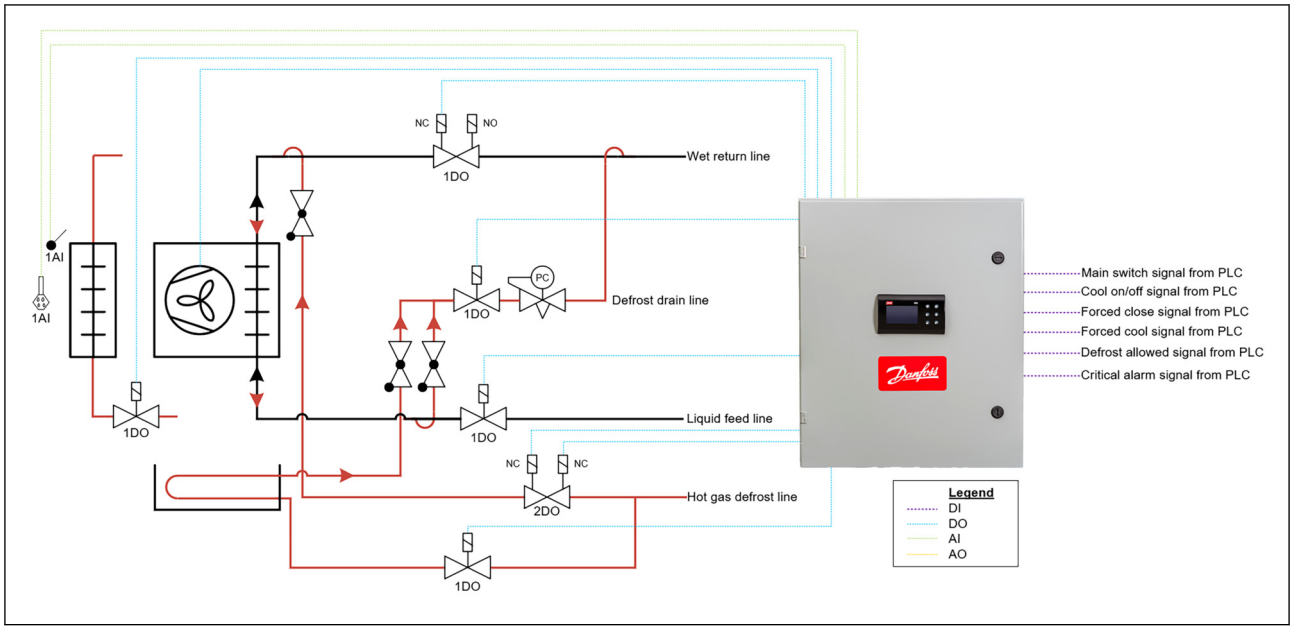


Table 5: Flooded evaporator with PWM liquid line control

Panel terminal	Description
DO1	Liquid feed solenoid
DO2	Hot gas soft opening stage 1
DO3	Hot gas soft opening stage 2
DO4	Defrost drain solenoid
DO5	Wet return solenoid
DO6	Hot gas drip tray solenoid
DO7	Output to fan on/off
DO8	Reheat solenoid
DI1	Main switch input from PLC
DI2	Cooling on/off switch input from PLC/external
DI3	Forced close on/off switch input from PLC/external
DI4	Forced cooling on/off switch input from PLC/external
DI5	Defrost allowed switch input from PLC/external
DI6	Critical alarm input from PLC/external
AI1	Off-coil air temperature
AI2	Humidity sensor input

Application example 3:

DX with PWM liquid line control. Reheat based on humidity. Extra DI/DO to/from PLC. Electrical defrost.

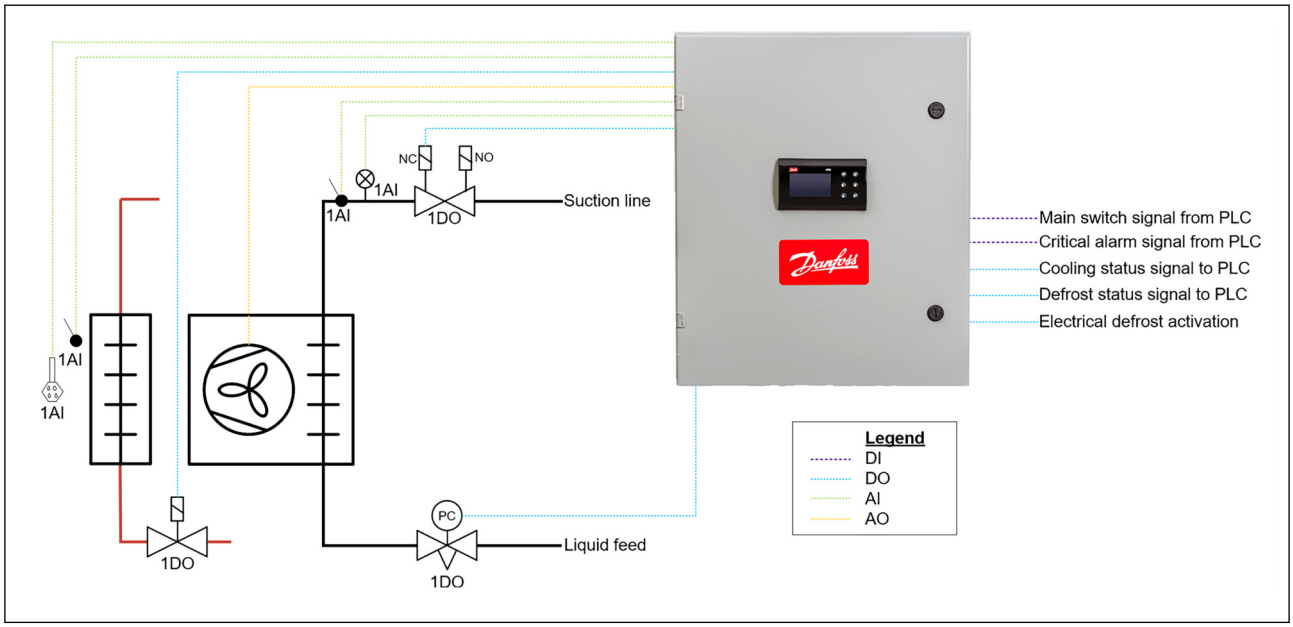


Table 6: DX with PWM liquid line control

Panel terminal	Description
DO1	Suction line solenoid
DO2	Cooling status out to PLC
DO3	Electrical defrost activation
DO4	Reheat solenoid
DO5	Liquid feed PWM signal
DI1	Main switch input from PLC
DI2	Critical alarm input from PLC/external
AI1	Off-coil air temperature
AI2	Evaporator pressure
AI3	Suction pipe temperature
AI4	Humidity sensor input
AO1	0–10 V signal for modulating fan control

General control status read-outs available

Table 7: Control status read-outs available

Control state number	Message text	Comments
1	Main switch is OFF	Regulation is Off - controller in standby
2	Manual control	One or more of the outputs are overruled by manual control
3	Pump down	Defrost sequence: Pump down state
4	HG open delay	Defrost sequence: Hot gas delay
5	HG Drip tray	Defrost sequence: Hot gas to drip tray
6	HG soft opening	Defrost sequence: Soft open valve
7	Defrosting	Defrost sequence: Defrosting
8	HG close delay	Defrost sequence: Hot gas close delay
9	Drain close delay	Defrost sequence: Drain close delay
10	Drip off time	Defrost sequence: Drip off time
11	WR opening state	Defrost sequence: Equalizing pressure time
12	Fan start delay	Defrost sequence: Fan start delay
13	Not used	
14	Forced closing	Forced stop of cooling (close liquid line valve)
15	Forced cooling	Forced cooling (typically to secure enough hot gas)
16	Emergency control	One or more sensor error
17	Modulating WR. control	Modulating valve in Wet Return line
18	MTR control	Modulation Thermostat control
19	Cooling	Cooling/refrigeration is active (thermostat cut-in)
20	Cooling stopped	No cooling/refrigeration
21	Refrig. not selected	No refrigerant selected
22	Power up state	Start up after a power cycle
23	Critical Alarm	Critical Alarm detected
24	PWM modulation	Modulating Thermostat (MTR) in Liquid Line (Pulse Width Modulating valve on DO5 or DO6)

Alarms

General alarms available

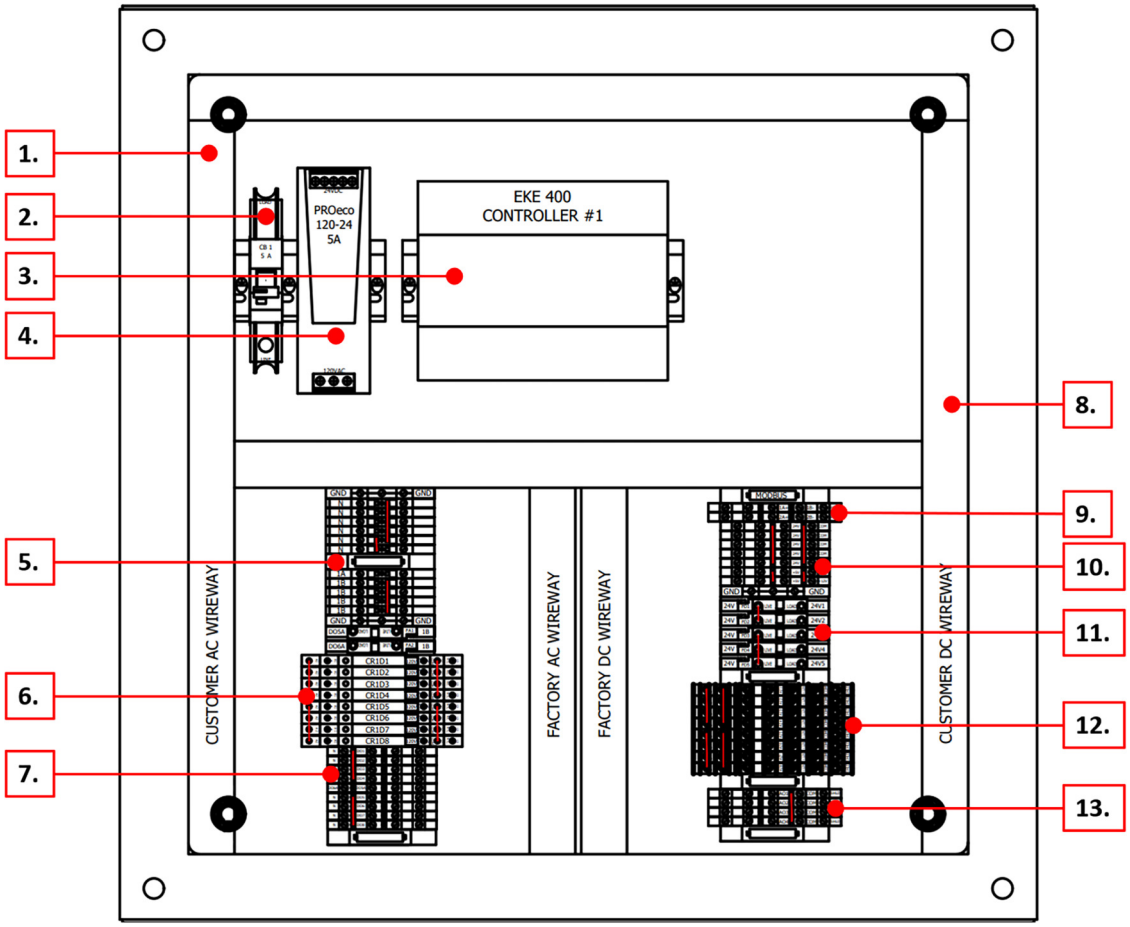
- If a sensor is enabled, a loss of signal from sensor will activate an alarm
- Room temperature high/low alarms
- Product temperature high/low alarms
- Allowable defrost times exceeded alarms
- Manual mode alarms
- Critical DI activation alarm
- ICAD motorized valve alarms for liquid, suction and hot gas lines
- Fan DI input alarms

Alarm messages available

- External reference input defect
- Thermostat sensor is defect
- Air alarm sensor is defect
- Defrost sensor is defect
- Product sensor is defect
- Evaporator inlet sensor is defect
- Evaporator outlet sensor is defect
- Evaporator air outlet sensor is defect
- Alarm when control is stopped by internal or external Main Switch (DI input)
- Alarm if no refrigerant has been selected
- The room temperature is too high
- The room temperature is too low
- The product temperature is too high
- The product temperature is too low
- The max allowed defrost time is exceeded
- An output is set in manual mode
- Not all inputs and output functions have been assigned to hardware inputs or output
- Critical Alarm by digital input, need a manual reset to remove it
- Gas sensor is defect
- S2 sensor error is defect
- S3 sensor error is defect
- High Pressure evap. Alarm
- External reference input for SH defect
- Liquid line valve alarm by DI
- Wet return/suction line valve alarm by DI
- Hot Gas line valve alarm by DI
- Input for ICAD in error (out of scale)
- Sensor for Humidity in error
- External reference input for T0 defect
- Fan DI Alarm

Standard 1 Evaporator Control Panel Component layout

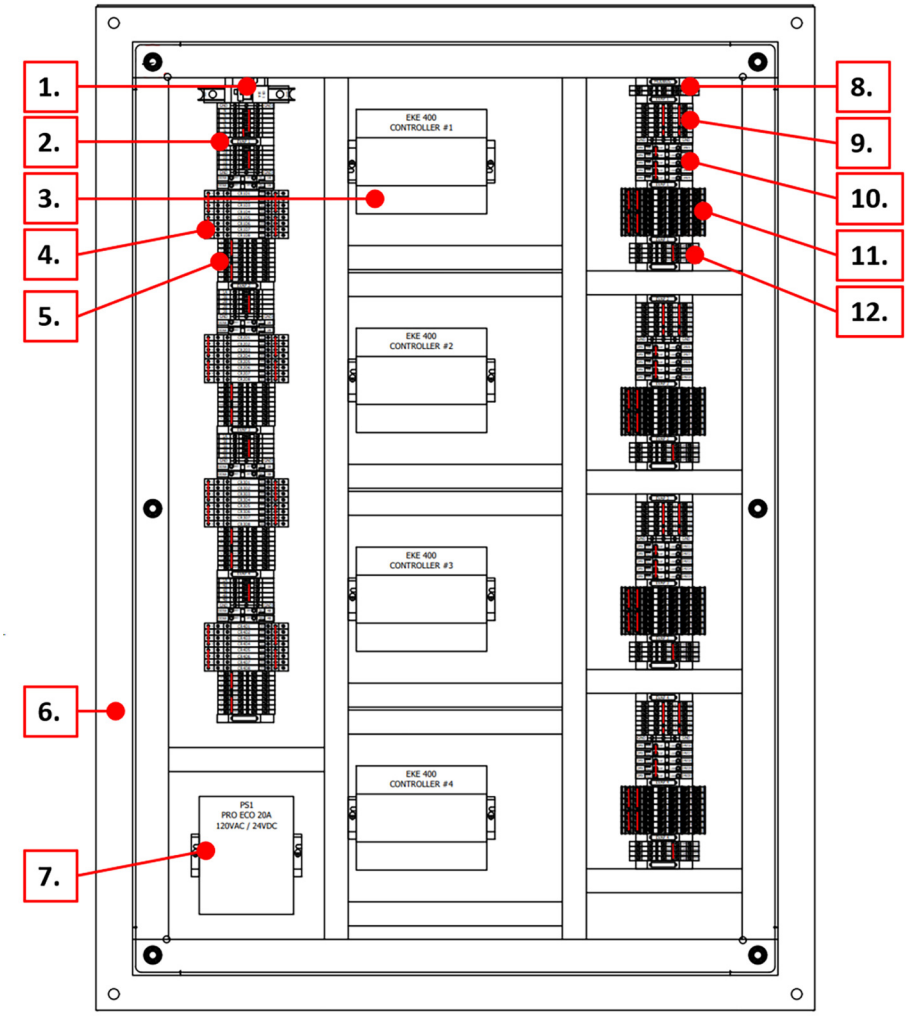
For comprehensive wiring details please refer to the detailed wiring diagram that is delivered complete with the Standard Evaporator Control Panels.



1	Customer wireway
2	Miniature circuit breaker
3	Configurable controller
4	Power supply
5	DI terminals
6	#26 - #12 AWG 120 V contact relays (DI)
7	DO dry contacts for customer connections
8	Customer wireway
9	#26 - #12 AWG Modbus terminals
10	#26 - #12 AWG 24VDC terminals
11	Fuses
12	#26 - #12 AWG AI terminals
13	#26 - #12 AWG AO terminals

Standard 4 Evaporator Control Panel Component layout

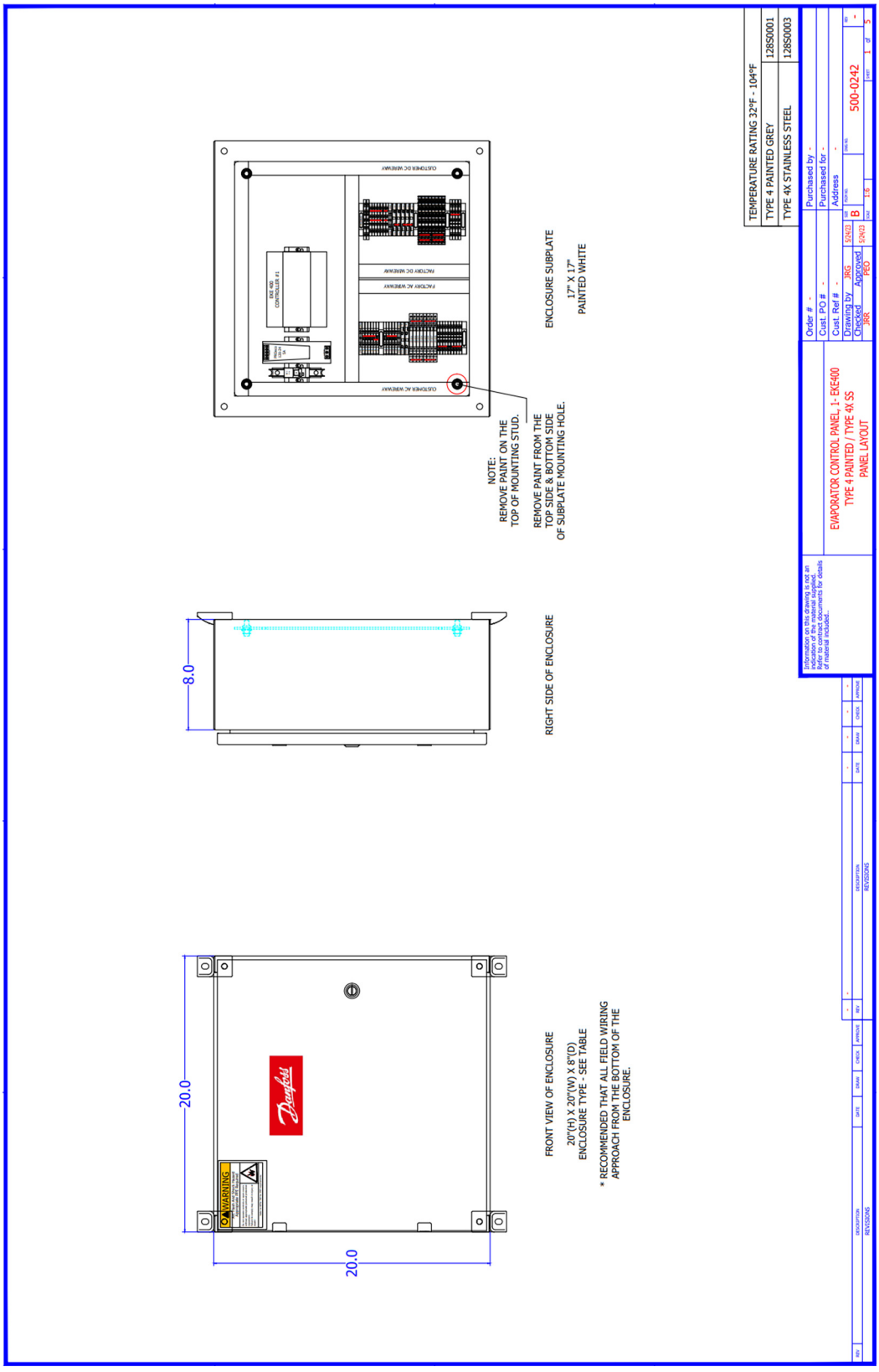
For comprehensive wiring details please refer to the detailed wiring diagram that is delivered complete with the Standard 4 Evaporator Control Panel



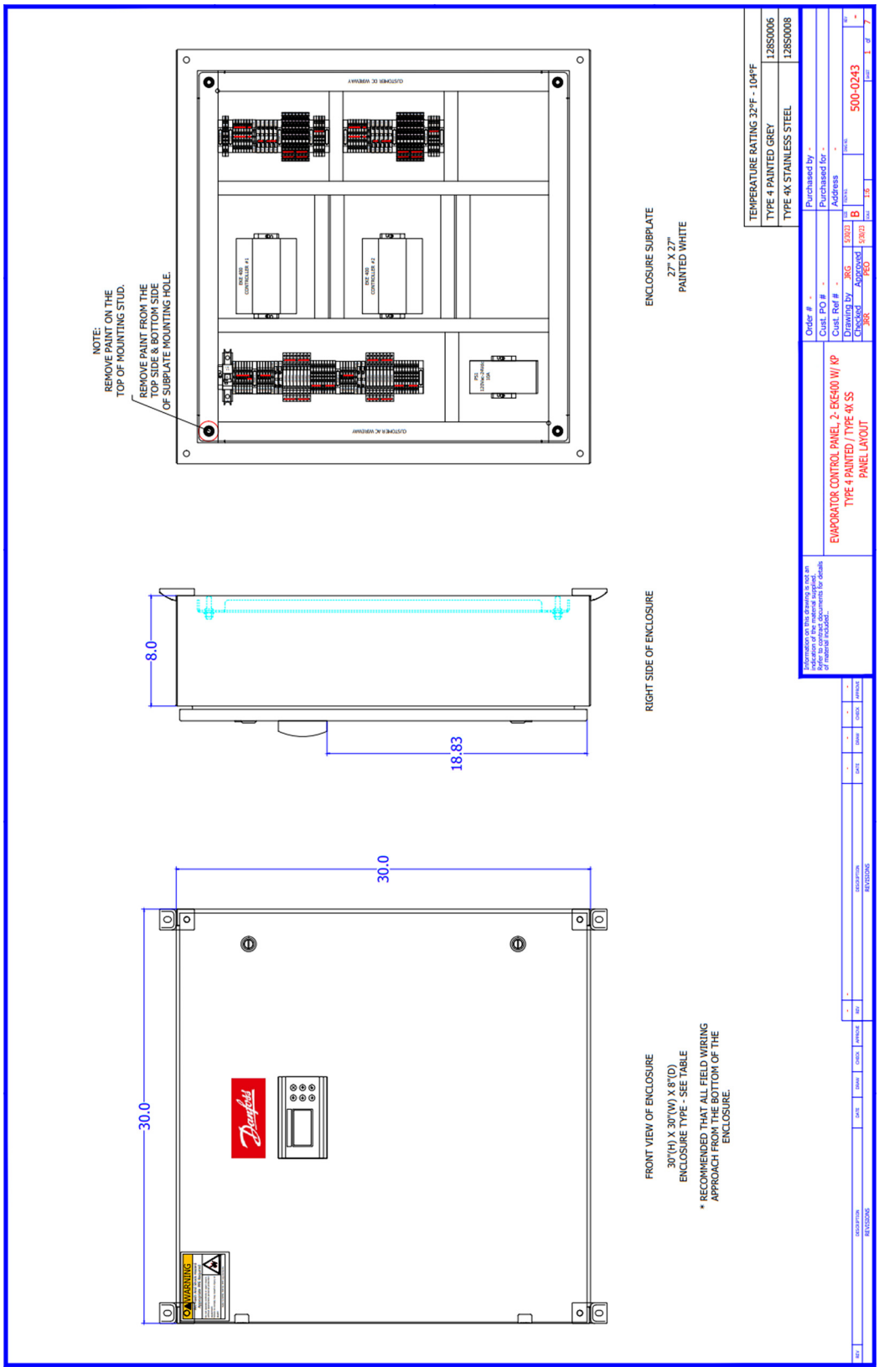
1	Miniature circuit breaker
2	DI terminals
3	Configurable controller
4	#26 - #12 AWG 120 V contact relays (DI)
5	DO dry contacts for customer connections
6	Customer wireway
7	Power supply
8	#26 - #12 AWG Modbus terminals
9	#26 - #12 AWG 24 V DC terminals
10	Fuses
11	#26 - #12 AWG AI terminals
12	#26 - #12 AWG AO terminals

Mounting Instructions

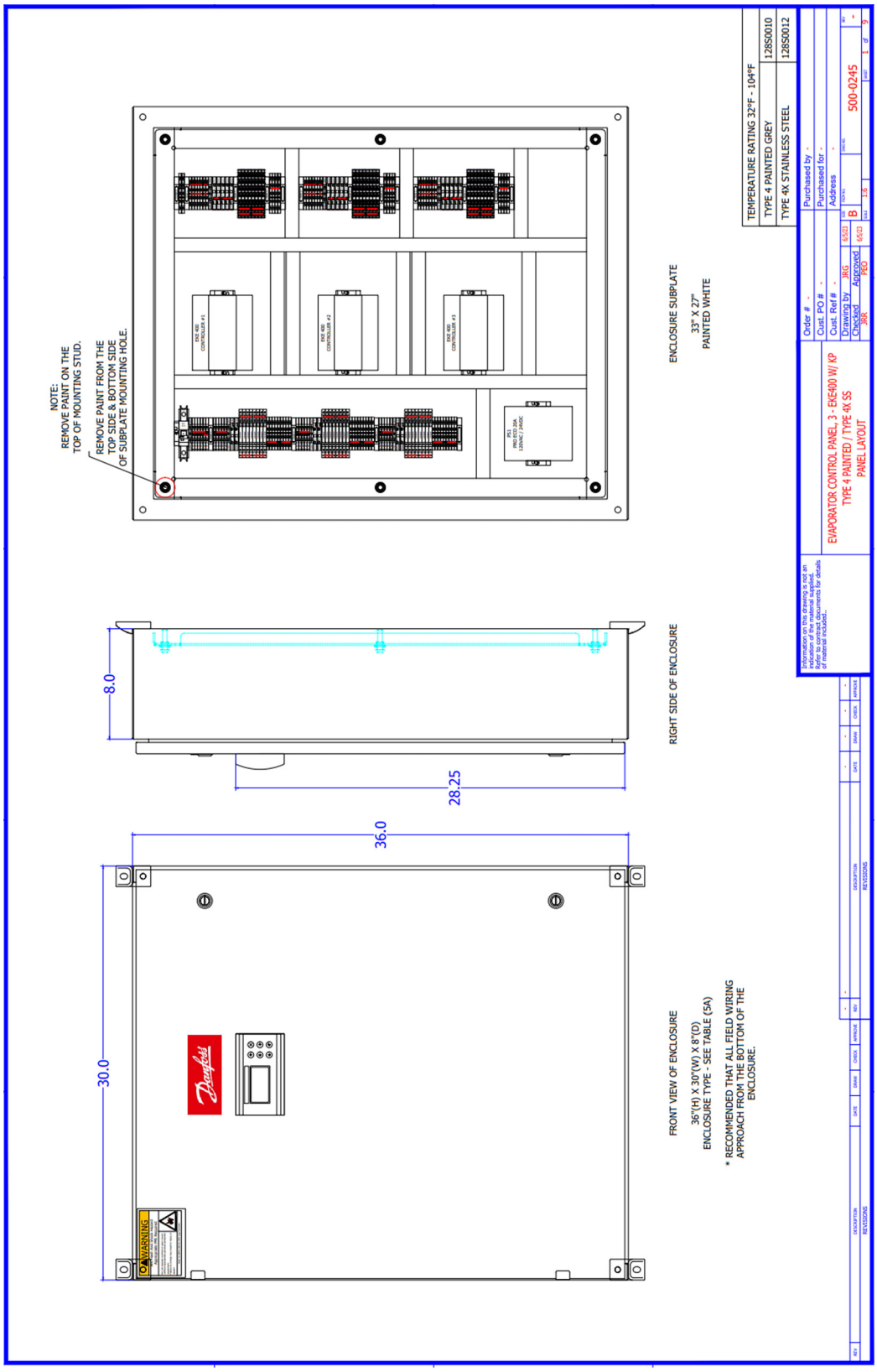
Standard 1 Evaporator Control Panel Mounting Instruction



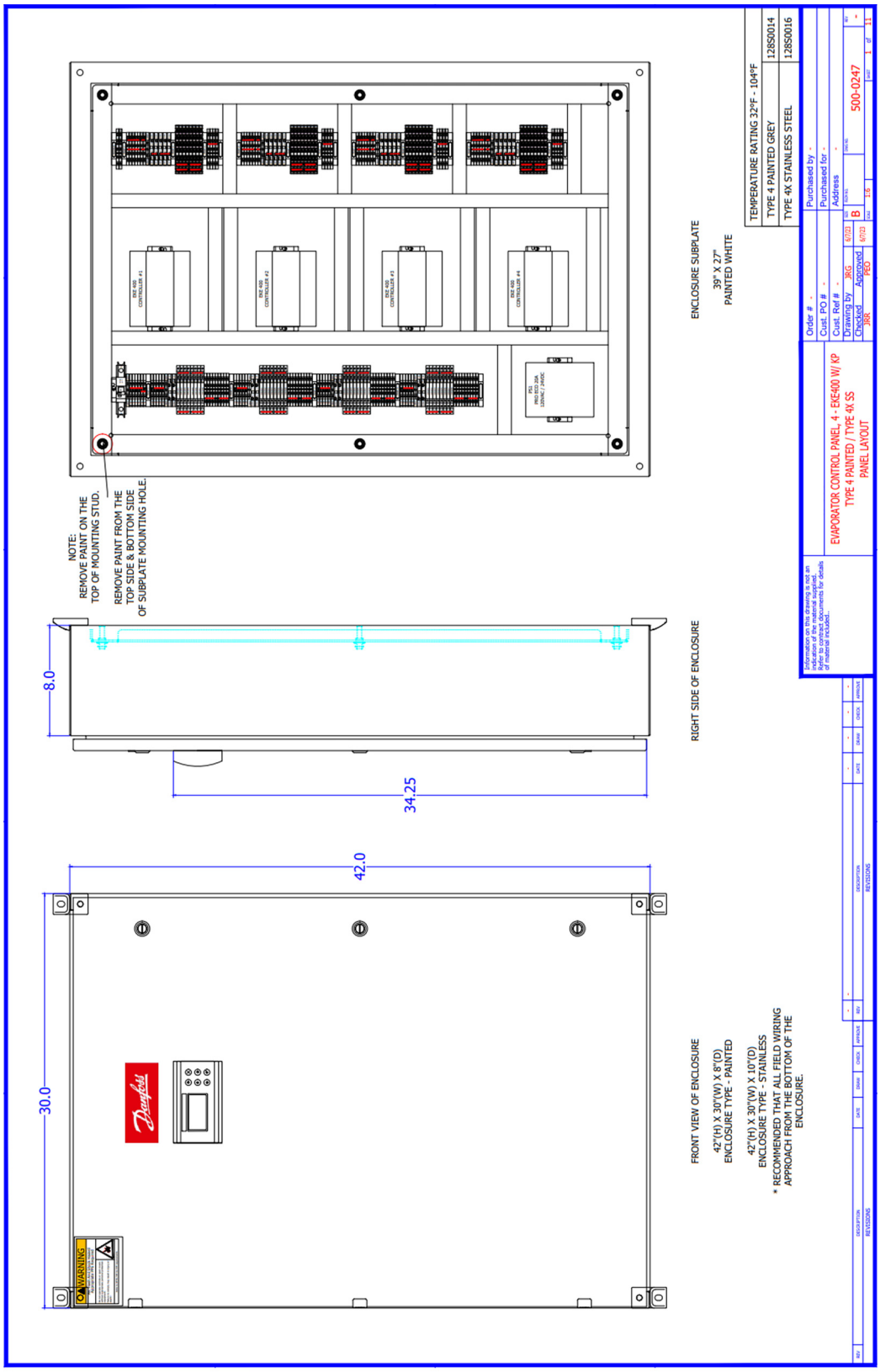
Standard 2 Evaporator Control Panel Mounting Instructions



Standard 3 Evaporator Control Panel Mounting Instructions



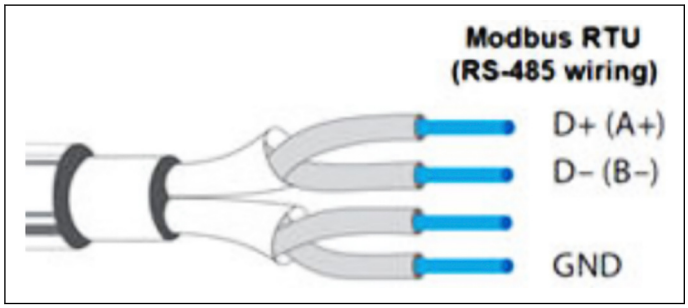
Standard 4 Evaporator Control Panel Mounting Instructions



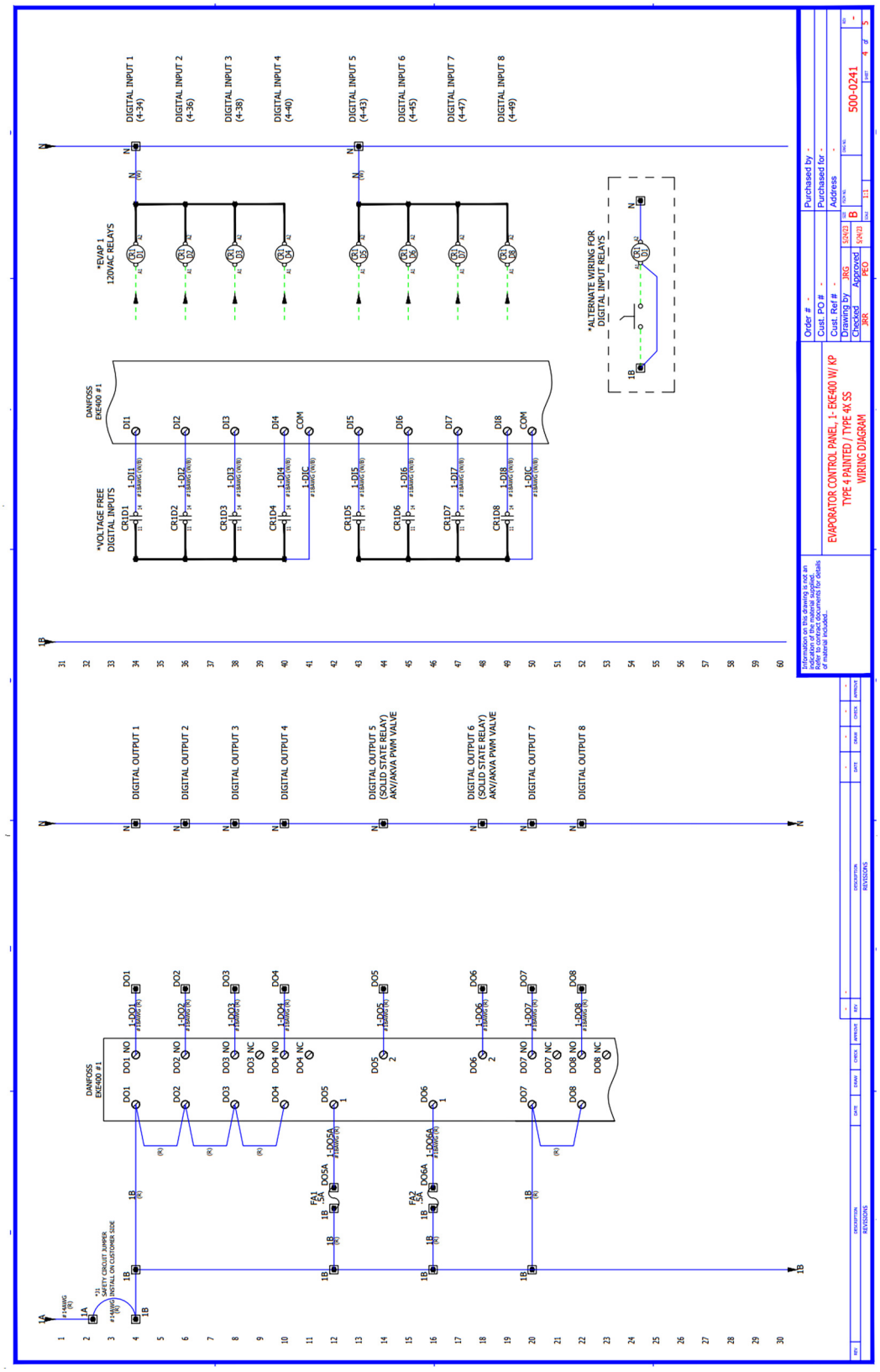
Standard Evaporator Control Panel: External wiring considerations: Signal wiring and Fieldbus

- The wiring of Modbus RTU (RS485) must be carried out in accordance with the standard ANSI/TIA/EIA-485-A-1998. Galvanic separation shall be provided for segments crossing buildings. Common ground shall be used for all devices on the same network inclusive router, gateways etc. All bus connections in the cables are made with twisted pair wires. The recommended cable type for this is AWG 22/0.32 mm^2
- If the cable length exceeds 1200 meters (1312 yards) a repeater must be inserted. One repeater must be added for every 32 controllers
- If the data communication cable runs through an electrically noisy environment which impairs the data signal, one or more repeaters must be added to stabilize the signal
- When configuring Modbus devices on the control bus, the highest device address that can be used is 120 (max 120 Modbus control devices in total)
- The wires are looped from device to device and must observe polarity. A is connected to A and B is connected to B
- The shield must be connected and complete a path from the device, all controllers, and any repeaters. The shield must not be connected to earth ground
- Remember to terminate the RS485 network following the last physical device

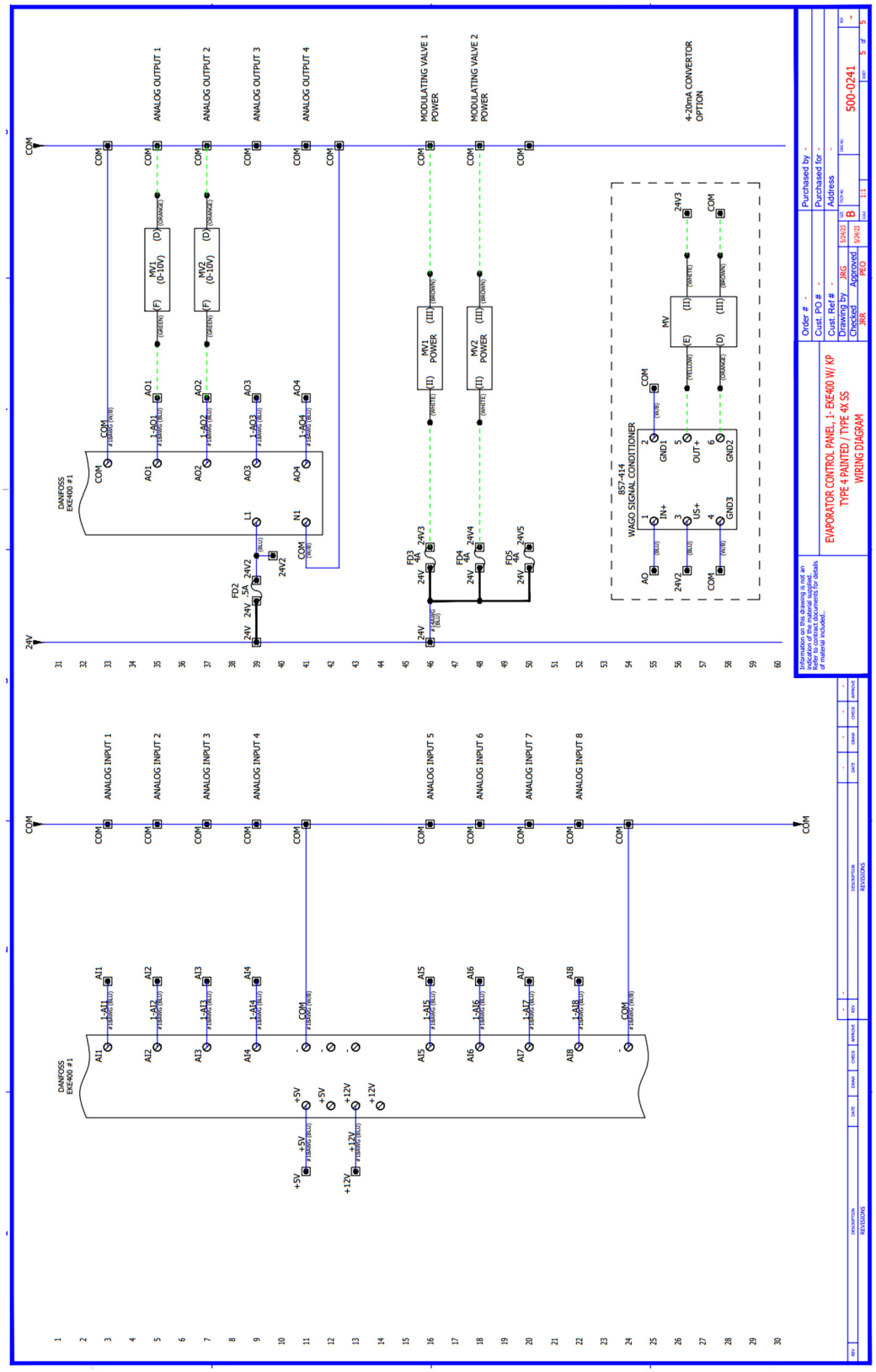
Figure 11: Signal wiring and Fieldbus



Standard 1 Evaporator Control Panel: Wiring Diagram – DO and DI



Standard 1 Evaporator Control Panel: Wiring Diagram – AO and AI

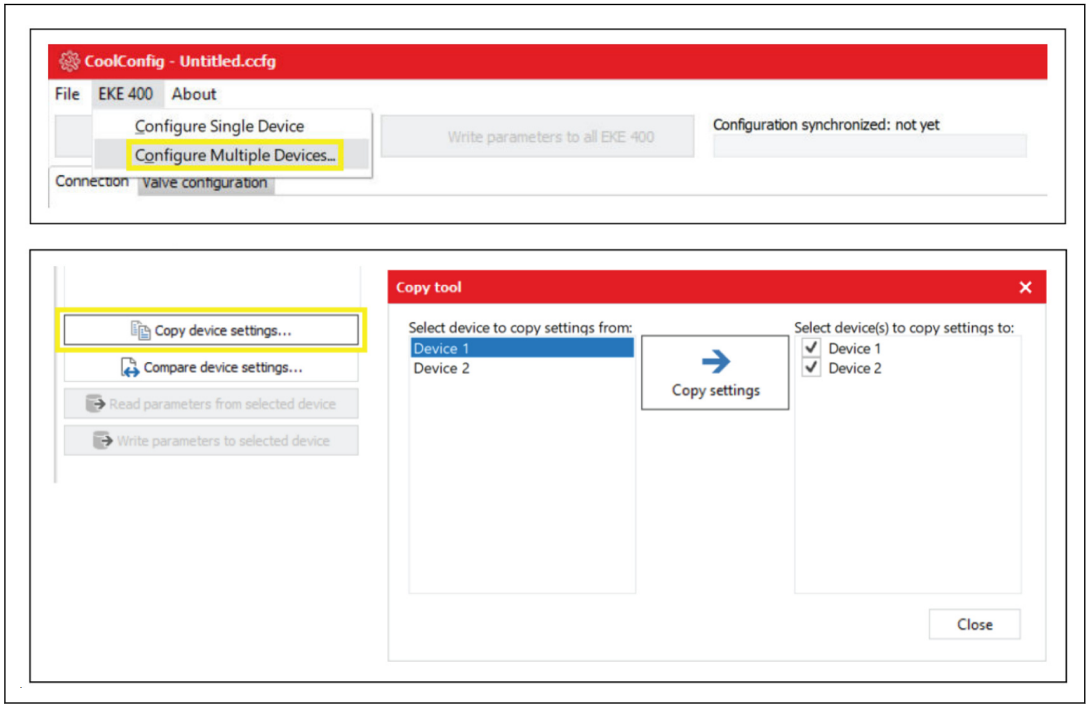


Controller Quick Startup with CoolConfig Software Tool

What you will need:
CoolConfig software. USB to RS-485 cable. Power to your control panel.

Step 01: Virtually configuring multiple controllers
Ensure the latest version of CoolConfig is installed on your PC. We recommend that you start CoolConfig and virtually configure your evaporator controls before connecting to the controllers. In CoolConfig click on the **EKE400** menu and choose **CONFIGURE MULTIPLE DEVICES**. Choose device to configure from the **MULTIPLE DEVICES** list on the right hand side and then choose the **VALVE CONFIGURATION** tab. Other tabs and applications drawings will appear, and you can start your application control configuration. Each controller may be virtually configured individually, or a configuration may easily be copied to other controllers (See images below).

Figure 12: Controller virtual configuration



Step 02: Power up and connect
After power up, connect your RS485-USB cable from your PC to the RS485 terminal. For panels controlling multiple evaporators, the controllers are RS485 pre-wired in series.

Step 03: Establish communication
In the **CONNECTION** tab navigate through each controller device and assign slave IDs to each according to the factory settings in the table below.
NOTE: *Slave IDs for each device may be changed later to suit overall PLC network requirements.*

Controller	Modbus Slave ID
1	1
2	2
3	3
4	4

NOTE:
It is a good idea to ensure the CoolConfig settings are aligned with the controller settings before moving onto the next step. This is done by choosing the **CONNECTIONDETAILS** button in the **CONNECTION** tab. The default Modbus serial communication settings on all the controllers from the factory are as in the table below:

Baud rate	38,400
Parity	even
Data bits	8
Stop bit	1
Start bit	1

Step 04: Writing virtual configuration to the controllers
Once satisfied with your controller configuration, you may write the configuration to the controllers by choosing the **WRITEPARAMETERSTO ALL EKE400** button at the top of the software window. Remember to save the different configurations if required or export to Excel using the **FILE** dropdown menu in the top left corner of the software window.

NOTE:
The Modbus slave IDs can be changed as explained below in the section *Changing the controller Slave IDs*.

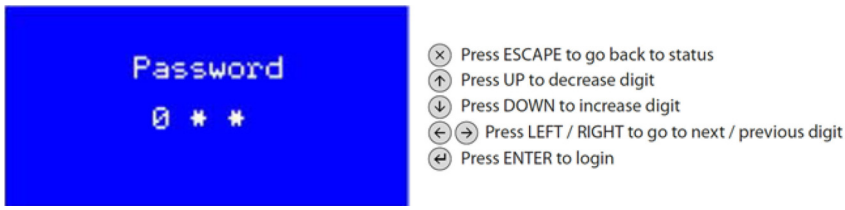
The CoolConfig software allows you to activate the IO for commissioning purposes which you may find useful. See the I/O CONFIGURATION and ACTION tabs of CoolConfig.

If the controller shows that incorrect configurations were made, it is often easier to make a factory reset and reconfigure from the start again. It is also the case when making configuration changes to programs in operation, it is often easier to make a factory reset before reconfiguring. Present configuration may be saved and/or exported beforehand for check-comparison purposes.

Changing the controller Slave IDs via the LCD display

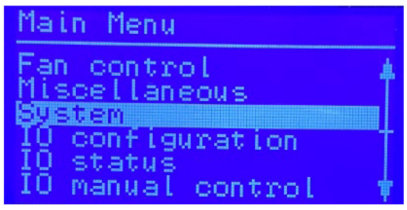
The CANbus/Modbus address ID can be set on each EKE400 by following these instructions with the panel powered.

Step 01
Go to the first EKE400 in the panel, press and hold the "ENTER" ↵ button for 2-3 seconds to access the PASSWORD screen.

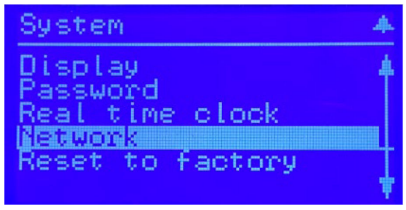


Step 02
Enter the password "300" and press the ENTER button to login and enable commissioning tasks.

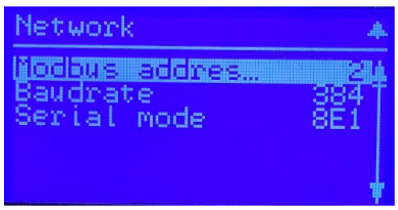
Step 03
Scroll down and highlight the "SYSTEM" menu item and press ENTER on the keypad



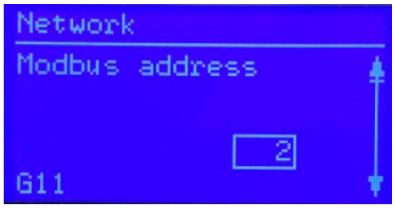
Step 04
Next, scroll down and highlight the "NETWORK" menu item and press ENTER on the keypad



Step 05
Finally, scroll down and highlight the "MODBUS ADDRESS" menu item and press ENTER on the keypad



Step 06
Set the address according to the tables above by pressing ENTER and using the up/down arrow buttons. Press ENTER again on the keypad to set address.



Step 07
Repeat the instructions for the remaining EKE400's in the panel.

General: Navigating the front door display

After powering up the panel navigating to the different controllers can be done via the front door display called the MMI. The MMI display is an access point via CAN bus (separate from and not affecting the Modbus RTU network) to the main status values of each evaporator controller. Follow these steps to access information in the desired controllers:

Step 01
From the "MAIN" screen the "BIOS" screen must be accessed. This is done by holding both the **X** and return ↵ buttons simultaneously for 4-5 seconds.

Step 02
Wait until the BIOS menu (see below) is shown on the screen and release the buttons. The current MCX (controller) selection will be displayed in the upper right.

Step 03
Highlight and select (return ↵ button) "MCX SELECTION"

Step 04
Next, highlight and select (return ↵ button) "MAN SELECTION"

Step 05
Highlight and select, then scroll up and down to select CAN ID address number and press return.

NOTE:
The CAN ID will be the same as the Modbus Slave ID.

Further information about using the MMI can be found in the MMI instruction guide: AK-MMI Instruction guide

Further information about functionality and using the menus can be found in the EKE 400 datasheet: EKE 400 Data sheet

Modbus Table

Observe that many of the individual parameters listed below, will only be visible, if other parameters have been set. Hereby irrelevant parameters are filtered out, during setup of EKE 400.

NOTE:
1. See Label ID, G07, G08, G09.
2. All Modbus parameters is type: WORD (signed 16 bit).

Start \ Stop

Table 8: Start / Stop

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
M01	Main switch	**Release the controller for operation or force EKE 400 out of operation** OFF: the controller is forced out of opera-tion. Observe if "M02, Ext. Main switch" is ON, this DI will also when OFF, forced the controller out of operation ON: the controller released for operation. Observe if "M02, Ext. Main switch" is ON, this DI must also be ON to release the controller for operation	0=OFF	1=ON	0=OFF	0	No	Pass-word level 1,2,3	2	3001	RW	Yes	3, 4 & 16
M02	Ext. Main switch	**Status of the external main switch (DI)**	0=OFF	1=ON	-	0	Yes	Pass-word level 1,2,3	Can nev-er be changed	3002	RO	Yes	3

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Evaporator control \ Evaporator control mode

Table 9: Evaporator control \ Evaporator control mode

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
R01	Evap. ctrl mode	**Evaporator control mode:** -1: None 0: Flood. evap. ON/OFF	-1	0	0=Flood. evap. On/Off;	0	Yes	Pass-word level 1,2,3	3	3020	RW	Yes	3, 4 & 16
R2A	Liq. feed line valve	**Select Liquid feed line valve** 1: Solenoid (ICFE): ON/OFF Solenoid ICF 20 Valve station 2: Solenoid (ICS): ON/OFF Solenoid ICS with EVM pilot 3: Solenoid (ICM): Motorized ICM, as ON/OF valve. Occupy 1 DO	1	3	1	0	Yes	Pass-word level 1,2,3	3	3021	RW	Yes	3, 4 & 16
R2B	Liq. line valve for DX	**Select Liquid feed line valve for DX** 4: AKV: AKV or AKVA. Occupy 1 DO. DO5 or DO6 must be assigned 5: AKV + Solenoid: AKV or AKVA (Occupy 1 DO. DO5 or DO6 must be assigned) + Solenoid (Occupy 1 DO) 6: Mod ICM; Modulating motorized ICM. Occupy 1 AO 7: Mod ICM + solenoid: Modulating motorized ICM (Occupy 1 AO) + Solenoid (Occupy 1 DO) 8: 2 AKV: AKV or AKVA. Occupy 2 DO. DO5 or DO6 must be assigned 9: 2 AKV + Solenoid: AKV or AKVA. Occupy 2 DO, where DO5 or DO6 must be assigned, and 1 usual DO for solenoid valve in up stream	4	7	9	0	Yes	Pass-word level 1,2,3	3	3384	RW	Yes	3, 4 & 16
R2C	Liq. feed line valve PWM	**Select Liquid feed line valve for Modulating Thermostat (MTR) Flooded systems** 4: AKV: AKV or AKVA. Occupy 1 DO. DO5 or DO6 must be assigned 5: AKV + Solenoid: AKV or AKVA (Occupy 1 DO. DO5 or DO6 must be assigned) + Solenoid (Occupy 1 DO) 8: 2 AKV: AKV or AKVA. Occupy 2 DO. DO5 or DO6 must be assigned 9: 2 AKV + Solenoid: AKV or AKVA. Occupy 2 DO, where DO5 or DO6 must be assigned, and 1 usual DO for solenoid valve in up stream	4	9	4	0	Yes	Pass-word level 1,2,3	3	3380	RW	Yes	3, 4 & 16
R10	LL valve AI feedback	**Liquid Line feedback from ICAD on ICM valve** In IO configuration \ Analog inputs the Analog input type can be selected. 0-10 V;0-20 mA;4-20 mA;2-10 V No: ICAD not connected to EKE 400 Yes: ICAD connected to EKE 400	No	Yes	No	0	Yes	Pass-word level 1,2,3	3	3446	RW	Yes	3, 4 & 16
R05	Cool On/Off by DI	**Cooling demand from external equipment (e.g. PLC) to EKE 400, via DI**	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3024	RW	Yes	3, 4 & 16
R06	Forced closing	**Forced stop cooling via MODBUS (e.g. PLC) or local from EKE 400** If a PLC controls cooling ON/OFF, "R06,Forced closing" can be used to stop cooling OFF: Function disabled ON: Forced stop cooling, regardless of cooling request. Observe. Will automatically after 15 min go back to OFF	0=OFF	1=ON	0=OFF	0	No	Pass-word level 1,2,3	2	3025	RW	No	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
R07	Forced cooling	**Forced cooling via MODBUS (e.g. PLC) or local from EKE 400** The function is typical used to secure enough hot gas to defrost other evapora-tors If a PLC controls cooling ON/OFF, "R07,Forced cooling" can be used to start cooling OFF: Function disabled ON: Forced cooling, regardless of cooling request. Observe. Will automatically after 15 min go back to OFF	0=OFF	1=ON	0=OFF	0	No	Pass-word level 1,2,3	2	3026	RW	No	3, 4 & 16
R08	Forced close by DI	**Forced stop cooling via external equip-ment (e.g. PLC) to EKE 400, via DI** If a PLC controls cooling ON/OFF, DI can be used to stop cooling No: Function disabled Yes: Forced stop cooling, regardless of cooling request. To assign DI, go to I/O configuration in Main menu and select an available DI	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3027	RW	Yes	3, 4 & 16
R09	Forced cool by DI	**Forced cooling via external equipment (e.g. PLC) to EKE 400, via DI** If a PLC controls cooling ON/OFF, DI can be used to start cooling No: Function disabled Yes: Forced cooling, regardless of cooling request. To assign DI, go to I/O configura-tion in Main menu and select an available DI	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3028	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Evaporator control \ Pressure configuration

Table 10: Evaporator control \ Pressure configuration

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
R20	Refrigerant	**Select Refrigerant** 0: not used;1: R12;2: R22;3: R134a;4: etc. 0: not used;1: R12;2: R22;3: R134a;4: R502;5: R717;6: R13;7: R13B1;8: R23;9: R500;10: R503;11: R114;12: R142b;13: User;14:R32;15:R227ea;16: R401A;17: R507A;18: R402A;19: R404A;20: R407C;21: R407A;22: R407B;23: R410A;24: R170;25: R290;26: R600;27: R600a;28: R744;29: R1270;30: R417A;31: R422A;32: R413A;33: R422D;34: R427A;35: R438A;36: R513A;37: R407F;38: R1234zeE;39: R1234yf;40: R448A;41: R449A;42: R452A;43: R450A;44: R452B;45: R454B;46:R1233zdE;47: R1234zeZ;48: R449B;49: R407H	0	49	0	0	Yes	Password level 1,2,3	3	3029	RW	Yes	3, 4 & 16
R23	Refrig fact. A1	**User defined refrigerant** When R20=13 (User defined refrigerant) Enter the Refrigerant factor A1 constants for the Antoine Equation for the actual refrigerant	8.000	13.000	10.400	3	Yes	Password level 1,2,3	3	3032	RW	Yes	3, 4 & 16
R24	Refrig fact. A2	**User defined refrigerant** When R20=13 (User defined refrigerant) Enter the Refrigerant factor A2 constants for the Antoine Equation for the actual refrigerant	-3200.0	-1200.0	-2255.0	1	Yes	Password level 1,2,3	3	3033	RW	Yes	3, 4 & 16
R25	Refrig fact. A3	**User defined refrigerant** When R20=13 (User defined refrigerant) Enter the Refrigerant factor A3 constants for the Antoine Equation for the actual refrigerant	220.0	320.0	254.2	1	Yes	Password level 1,2,3	3	3034	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Evaporator control mode \ Evaporator DX control

Table 11: Evaporator control mode \ Evaporator DX control

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
N01	SH ref. mode	**Select Superheat reference mode:** 0: Fixed SH ref. Used when a stable fixed superheat is required 1: Load defined ctrl: LoadAp mode. Reference set in dependence of actual load (Opening Degree) Useful in applications with rapidly changing load conditions and at very short cut-in perios. 2: Adaptive SH ctrl: MSS (Minimum Stable Superheat) The superheat control algorithm will constantly lower the superheat reference, until some instability is registrated	0	2	1= Load defined ctrl	0	x	Pass-word level 1,2,3	3	3003	RW	Yes	3, 4 & 16
N02	SH Fixed setpoint	**Superheat fixed setpoint** The superheat reference is fixed to this set point under all operating conditions	0.5	40.0	8.0	1		Pass-word level 1,2,3	3	3004	RW	Yes	3, 4 & 16
N03	SH max	**Superheat maximum** Maximum limitation of superheat reference	0.5	40.0	10.0	1	No	Pass-word level 1,2,3	2	3005	RW	Yes	3, 4 & 16
N04	SH min	**Superheat minimum** Minimum limitation of superheat reference *Unit: °C / °F*	0.5	10.0	4.0	1	No	Pass-word level 1,2,3	2	3006	RW	Yes	3, 4 & 16
N05	SH Tn	**Superheat Integration time** Integration time (Tn) in PI controller *Unit: °C / °F*	20	900	90	0	No	Pass-word level 1,2,3	3	3007	RW	Yes	3, 4 & 16
N06	SH Kp min	**Superheat minimum Proportional gain constant** Minimum proportional gain in Superheat PI controller *Unit: °C / °F*	0.1	1.0	0.6	1	No	Pass-word level 1,2,3	3	3008	RW	Yes	3, 4 & 16
N07	SH Kp	**Superheat Proportional gain constant** Proportional gain in Superheat PI controller *Unit: sec*	0.1	20.0	1.5	1	No	Pass-word level 1,2,3	3	3009	RW	Yes	3, 4 & 16
N08	SH KpTe	**Superheat Pressure feedback gain** Proportional gain constant on saturated temperature	0	20.0	3.0	1	No	Pass-word level 1,2,3	3	3010	RW	Yes	3, 4 & 16
N09	SH close function	**Superheat close function** No: Funtion Disabled Yes: Function Enabled	0=No	1=Yes	1=Yes	0	Yes	Pass-word level 1,2,3	2	3011	RW	Yes	3, 4 & 16
N10	SH close setpoint	**Superheat close limit** If the superheat is below this value the valve in the liquid line is forced to close	-5.0	20.0	2.0	1	No	Pass-word level 1,2,3	3	3012	RW	Yes	3, 4 & 16
N11	SH close Tn divide	**Advanced parameter setting** For Danfoss only	1	5	3	0	No	Pass-word level 1,2,3	3	3013	RW	Yes	3, 4 & 16
N12	SH close Kp factor	**Advanced parameter setting** For Danfoss only *Unit: °C / °F*	0.5	10	1.5	0	No	Pass-word level 1,2,3	3	3014	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
N13	MOP func-tion	**Maximum Operating Pressure** MOPfunction will limit the valve opening degree such that the saturated evapora-tion temperature Te is kept below the "N14,MOP" set point. MOP prevents over-loading the compressor during start-up, by reducing suction pressure No: Funtion Disabled Yes: Function Enabled	No	Yes	0=No	0	Yes	Pass-word level 1,2,3	2	3015	RW	Yes	3, 4 & 16
N14	MOP set-point	**Maximum Operating Pressure setpoint** Active if "N13, MOP function" is set to Yes The actual MOP Evaporator pressure Set-point in [C] / [F]	-70.0	50.0	0.0	1	No	Pass-word level 1,2,3	2	3016	RW	Yes	3, 4 & 16
N15	MTR Tn	**Advanced parameter** Integration time for the MTR algorithm	20	3600	1800	0	No	Pass-word level 1,2,3	3	3017	RW	Yes	3, 4 & 16
N16	MTR Kp	**Advanced parameter** Proportional factor for the MTR algorithm *Unit: °C / °F*	20	3600	1800	0	No	Pass-word level 1,2,3	3	3018	RW	Yes	3, 4 & 16
N17	AKV period	**AKV or AKVA period time** Period time of AKV or AKVA Example: "N17, AKV Period" is set to 6 sec., the Opening Degree is calculated to 40 %, then AKV or AKVA is open in 2,4 sec., and closed in 3, 6 sec	3	6	6	0	Yes	Pass-word level 1,2,3	2	3019	RW	Yes	3, 4 & 16
N18	MSS stabili-ty	**Minimum Stable Superheat stability** Stability factor for regulation of super-heat, only relevant for MSS. With a higher value the control function will allow a greater fluctuation of the superheat be-fore the reference is changed.	0.0	10.0	5.0	1	Yes	Pass-word level 1,2,3	3	3397	RW	Yes	3, 4 & 16
N19	MSS T0 sta-bility factor	**Minimum Stable Superheat stability T0 factor** Only relevant for MSS. T0 stability factor defines if variation in suction pressure will influence superheat reference. The SH reference change can be adjusted in the range frome 0.0 to 1.0 A value of 1.0 will give max T0 influence and S2. A value of 0.0 will give influence on S2 only. With often change in suction pressure due to compressor start/stop, some T0 (and S2) influence on MSS is recommen-ded.	0.0	1.0	0.0	1	Yes	Pass-word level 1,2,3	3	3390	RW	Yes	3, 4 & 16
N20	Startup Mode	**Startup Mode (See section Start Up)** After startup, this function will provide a constant opening degree during a set time period regardless of the superheat value. No limiters are taken in considera-tion during this time. 0: Prop.Ctrl: Proprotional (P) control 1: Fix OD w prot: Predefined OD (parame-ter "N23, Startup OD") with protection 2: Fix OD wo prot: Predefined OD (param-eter "N23, Startup OD") without protec-tion	0	2	0	0	Yes	Pass-word level 1,2,3	3	3393	RW	Yes	3, 4 & 16
N21	Startup time	**"Startup time (See section Start Up)** This parameter is related to "N20, Startup Mode" *Unit: sec*	1	600	90	0	Yes	Pass-word level 1,2,3	3	3394	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
N22	Min.startup time	**Min.startup time (See section Start Up)** This parameter is related to "N20, Startup Mode" *Unit: sec*	1	240	15	0	Yes	Pass-word level 1,2,3	3	3395	RW	Yes	3, 4 & 16
N23	Startup OD	**Startup Opening Degree (See section Start Up)** This parameter is related to "N20, Startup Mode" *Unit: %*	1	100	32	0	Yes	Pass-word level 1,2,3	3	3396	RW	Yes	3, 4 & 16
N24	Minimum OD	**Minimum Opening Degree** When required, the valve minimum OD can be set to a required minimum open-ing position, such feature is helpful where the system always requires some minimum flow. The minimum OD limit has effect in injec-tion control mode only *Unit: %*	0	100	0	0	Yes	Pass-word level 1,2,3	3	3398	RW	Yes	3, 4 & 16
N25	Maximum OD	**Maximum Opening Degree** This is useful feature to limit the maxi-mum OD of a oversized valve used in the system. By default the maximum OD of a valve is set at 100 OD%. This maximum OD % can be set to lower value if required. The maximum OD limit has effect in in-jection control mode only *Unit: %*	0	100	100	0	Yes	Pass-word level 1,2,3	3	3399	RW	Yes	3, 4 & 16
N26	Limit Kp	**Limit Kp - Superheat configuration Ad-vance** Proportional gain	1.0	20.0	5.0	1	Yes	Pass-word level 1,2,3	3	3400	RW	Yes	3, 4 & 16
N27	Limit Tn	**Limit Tn - Superheat configuration Ad-vance** Integration time *Unit: sec*	20	900	45	0	Yes	Pass-word level 1,2,3	3	3401	RW	Yes	3, 4 & 16
N36	S3 air in.temp.AI?	**Air temperature sensor (S3) installed?** Used for MTR 0: No not installed 1: Yes installed To assign AI, go to I/O configuration in Main menu and select an available AI	0	1	0	0	Yes	Pass-word level 1,2,3	3	3405	RW	Yes	3, 4 & 16
N28	Ext.Ref.DX config	**External reference DX configuration Select the signal used to change the Superheat reference.** 0: Not used 1: Displace by current: - define the AI in-put range via the following settings: "N31,Ref.Current SH High": 4 to 20 mA, default = 20 "N32,Ref.Current SH Low": 0 to 20 mA, default = 4 To assign AI, go to I/O configuration in Main menu and select an available AO 2: Displace by voltage: - define the AI in-put range via the following settings: "N33,Ref.Voltage SH High": 0 to10 Volt, default = 10 "N34,Ref.Voltage SH Low": 0 to 10 Volt, default = 0 To assign AI, go to I/O configuration in Main menu and select an available AI. 3: Displace by MODBUS 4: Displace by DI	0	4	0	0	Yes	Pass-word level 1,2,3	3	3402	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
N29	Ref.Offset SH Max	**Reference offset Superheat maximum** Scaling of range for superheat displace-ment - Maximum value. See "N28, Ext.Ref.DX config" *Unit: K*	0.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3410	RW	Yes	3, 4 & 16
N30	Ref.Offset SH Min	**Reference offset Superheat minimum** Scaling of range for temperature dis-placement - Minimum value See "N28, Ext.Ref.DX config" *Unit: K*	-50.0	0.0	0.0	1	No	Pass-word level 1,2,3	3	3409	RW	Yes	3, 4 & 16
N31	Ref.Current SH High	**Reference current Superheat high** Scaling of range for AI current - high val-ue See "N28, Ext.Ref.DX config" *Unit: mA*	N32	20.0	20.0	1	No	Pass-word level 1,2,3	3	3354	RW	Yes	3, 4 & 16
N32	Ref.Current SH Low	Reference current Superheat low Scaling of range for AI current - low value See "N28, Ext.Ref.DX config" Unit: mA	0.0	N31	4.0	1	No	Pass-word level 1,2,3	3	3355	RW	Yes	3, 4 & 16
N33	Ref.Voltage SH High	**Reference voltage Superheat high** Scaling of range for AI voltage - high val-ue See "N28, Ext.Ref.DX config" *Unit: V*	N34	10.0	10.0	1	No	Pass-word level 1,2,3	3	3356	RW	Yes	3, 4 & 16
N34	Ref.Voltage SH Low	**Reference voltage Superheat low** Scaling of range for AI voltage - low value See "N28, Ext.Ref.DX config" *Unit: V*	0.0	N33	0.0	1	No	Pass-word level 1,2,3	3	3357	RW	Yes	3, 4 & 16
N35	Re.Offset SH Modbus	**Reference offset Superheat by MOD-BUS** Offset value via MODBUS (e.g. PLC) add-ed to current SH reference. *Unit: K*	-50.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3358	RW	Yes	3, 4 & 16
N38	Ref. Offset SH by DI	**Reference Offset Superheat when DI is open, 0 K if closed** If P10, Ext ref. config.=Displace by DI, then if the assigned DI: OFF: No offset added ON: Value entered here will be added to SuperHeat reference *Unit: K*	-70.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3470	RW	Yes	3, 4 & 16
N37	Tn SH track-ing	**Tn SH tracking** *Unit: sec*	3	600	200	0	No	Pass-word level 1,2,3	3	3413	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Evaporator control \ Valve configuration

Table 12: Evaporator control \ Valve configuration

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
R2A	Liq. feed line valve	**Select type of valves in Liquid feed line** 1:Solenoid (ICFE): ON/OFF Solenoid ICF 20 Valve station 2:Solenoid (ICS): ON/OFF Solenoid ICS with EVM pilot 3:Solenoid (ICM): Motorized ICM, as slow opening/closing ON/OF valve. Occupy 1 DO	1	3	1	0	Yes	Password level 1,2,3	3	3021	RW	Yes	3, 4 & 16
R2B	Liq. line valve for DX	**Select Liquid feed line valve for DX** 4: AKV: AKV or AKVA. Occupy 1 DO. DO5 or DO6 must be assigned 5: AKV + Solenoid: AKV or AKVA (Occupy 1 DO. DO5 or DO6 must be assigned) + Solenoid (Occupy 1 DO) 6: Mod ICM; Modulating motorized ICM. Occupy 1 AO 7: Mod ICM + solenoid: Modulating motorized ICM (Occupy 1 AO) + Solenoid (Occupy 1 DO) 8: 2 AKV: AKV or AKVA. Occupy 2 DO. DO5 or DO6 must be assigned 9: 2 AKV + Solenoid: AKV or AKVA. Occupy 2 DO, where DO5 or DO6 must be assigned, and 1 usual DO for solenoid valve in up stream	4	7	9	0	Yes	Password level 1,2,3	3	3384	RW	Yes	3, 4 & 16
R2C	Liq. feed line valve PWM	**Select Liquid feed line valve for Modulating Thermostat (MTR) Flooded systems** 4: AKV: AKV or AKVA. Occupy 1 DO. DO5 or DO6 must be assigned 5: AKV + Solenoid: AKV or AKVA (Occupy 1 DO. DO5 or DO6 must be assigned) + Solenoid (Occupy 1 DO) 8: 2 AKV: AKV or AKVA. Occupy 2 DO. DO5 or DO6 must be assigned 9: 2 AKV + Solenoid: AKV or AKVA. Occupy 2 DO, where DO5 or DO6 must be assigned, and 1 usual DO for solenoid valve in up stream	4	9	4	0	Yes	Password level 1,2,3	3	3380	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
D3A	WR/SL valve	**Select type of valves in Wet Return Suction Line** 0: No Valve 1: Soft (ICS+EVRST): Dual position individual solenoid valves. Occupy 2 DO 2: Soft (ICSH): Dual position solenoid valve. Occupy 2 DO 3: Soft (ICLX): 2-step gas powered solenoid valve. Occupy 1 DO 4: Solenoid (ICS):ON/OFF Solenoid ICS with EVM pilot 5: Solenoid (ICM):Motorized ICM, as slow opening/closing ON/OF valve. Occupy 1 DO 6: Slow (ICM): Motorized ICM, as slow opening/closing modulating valve. Occupy 1 AO	0	6	3	0	Yes	Password level 1,2,3	3	3253	RW	Yes	3, 4 & 16
D03	WR/SL valve	**Select type of valves in Wet Return Suction Line** 7: Mod (ICM): Modulating motorized ICM. Occupy 1 AO 8: Mod+PE (ICM+EVRST): Modulating motorized ICM, occupy 1 AO and Solenoid for pressure pressure equalization at opening, occupy 1 DO 9: Mod (CVE): Electronic pressure pilot. Occupy 1 AO 10: Mod+PE (CVE+ EVRST): Electronic pressure pilot. Occupy 1 AO and Solenoid for pressure pressure equalization at opening, occupy 1 DO 11: Mod+PE(CVE+EVM +EVRST): Electronic pressure pilot. Occupy 1 AO and two solenoid , occupy 2 DO. When installed in a ICS 3 topcover. SI port: EVM, to secure valve closed during defrost. SII port:CVE. P port: Blocked. EVRST: For pressure pressure equalization at opening	7	11	7	0	Yes	Password level 1,2,3	3	3388	RW	Yes	3, 4 & 16
D3A	WR/SL valve	**Valve in wet return/ suction line** 0: No valve 1: Soft (ICS+EVRST) 2: Soft (ICSH) 3: Soft (ICLX) 4: Solenoid (ICS) 5: Solenoid (ICM) 6: Slow (ICM)	0	6	3	0	Yes	Password level 1,2,3	3	3253	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
D2A	Hot gas line valve	**Select type of valves in Hot gas defrost line** 0: No Valve 1: Soft (ICS+EVRST): Dual position individual solenoid valves. Occupy 2 DO 2: Soft (ICSH): Dual position solenoid valve. Occupy 2 DO 3: Solenoid (ICFE): ON/OFF Solenoid ICF 20 Valve station 4: Solenoid (ICS):ON/OFF Solenoid ICS with EVM pilot 5: Solenoid (ICM):Motorized ICM, as slow opening/closing ON/OF valve. Occupy 1 DO 6: Slow (ICM): Motorized ICM, as slow opening/closing modulating valve. Occupy 1 AO	0	6	2	0	Yes	Password level 1,2,3	3	3247	RW	Yes	3, 4 & 16
D2C	HG valve AI feedback	**Hotgas Line feedback from ICAD on ICM valve** In IO configuration \ Analog inputs the Analog input type can be selected. 0-10 V;0-20 mA;4-20 mA;2-10 V No: ICAD not connected to EKE 400 Yes: ICAD connected to EKE 400	No	Yes	No	0	Yes	Password level 1,2,3	3	3451	RW	Yes	3, 4 & 16
D1B	HG Drain valve	**Select type of valves in defrost drain line** 0:Pressure (ICS+CVP): Pressure control valve during hot gas defrost. CVP pilot have adjustable pressure setting 1: Pressure (OFV): Pressure control valve during hot gas defrost. OFV have adjustable pressure setting 2: Liquid drain (ICFD): Liquid drain during defrost	0	2	1	0	Yes	Password level 1,2,3	3	3245	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Air temperature control \ Thermostat function

Table 13: Air temperature control \ Thermostat function

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
T26	Evap.Pres.Control	**Evaporation pressure control** Enter mode 0: Yes 1: No	No	Yes	No	0	No	Password level 1,2,3	3	3517	RW	Yes	3, 4 & 16
T1A	Ther. mode	**Select thermostat control mode** 0: None 1: Individual On/Off 2: Common On/Off 5: PWM liquid control	0	5	1	0	Yes	Password level 1,2,3	3	3037	RW	Yes	3, 4 & 16
T1B	Ther. mode	**Thermostat control mode for DX regulation** 0: None 1: Individual On/Off 2: Common On/Off 4: MTR: Modulating:Thermostat (MTR) in Liquid Line. Flooded systems	0	4	1	0	Yes	Password level 1,2,3	2	3386	RW	Yes	3, 4 & 16
T1C	Ther. mode	**Thermostat control mode when + Evaporation pressure control by Pressure** If Evaporation pressure control selected (T26,Evap.Pres.Control=Yes) 0: None 1: Individual On/Off 2: Common On/Off ;	0	2	0	0	Yes	Password level 1,2,3	3	3500	RW	Yes	3, 4 & 16
T1D	Ther. mode	**Thermostat control mode when + Evaporation pressure control by Temperature** If Evaporation pressure control selected (T26,Evap.Pres.Control=Yes) 0: None 1: Individual On/Off	0	1	0	0	Yes	Password level 1,2,3	3	3501	RW	Yes	3, 4 & 16
R04	Evap.Pres.Ctrl by	**Evaporation pressure controlled by** 0: Room temperature 1: Evaporation pressure	0	1	0		Yes	Password level 1,2,3	3	3022	RW	Yes	3, 4 & 16
T02	No. of ther. sensor	**Number of temperature sensors connected to EKE 400** It is possible to connect up to 3 room thermostat sensors to the same controller. Typically, only one thermostat sensor is connected, but sometimes more sensors are connected to avoid "hot spots" in a room. 0: No thermostat sensor connected 1: One thermostat sensor connected 2: Two thermostat sensors connected 3: Three thermostat sensors connected	0	3	1	0	Yes	Password level 1,2,3	2	3038	RW	Yes	3, 4 & 16
T03	Ctrl temp. method	**Control method** The control method shall be selected if common thermostat is selected or if more thermostat sensors are connected to EKE 400. The temperatures used of thermostat is selected by setting of "T03, Ctrl temp. method": 0:Ctrl highest temp: 1:Ctrl average temp.:	0	1	0	0		Password level 1,2,3	2	3039	RW	Yes	3, 4 & 16
T04	Ther. setpoint	**Thermostat set point temperature** *Unit: °C / °F*	-70.0	160.0	2.0	1		Password level 1,2,3	2	3040	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus func-tion
T05	Ther. neutral zone	**Thermostat neutral zone** Start/Stop limit around the "T03 Ther. Setpoint" *Unit: K*	0.1	20.0	2.0	1		Pass-word level 1,2,3	2	3041	RW	Yes	3, 4 & 16
T06	Day/night control	**Day/Night control** Function that allow to add an offset value to "T03 Ther. Setpoint" No: Function disabled Yes: Function enabled. Night status visible in Status Screen 1 See "T08,Night offset"	No	Yes	No	0		Pass-word level 1,2,3	3	3042	RW	Yes	3, 4 & 16
T07	Night operation	**Night Operation** Enable function to offsett "T04,Ther. Setpoint", typical via MODBUS (e.g. PLC) No: Day operation : No offset - not active Yes: Night operation. If "T06, Day/night control" is Yes, then add "T08, Night offset" to "T04,Ther. Setpoint"	No	Yes	No	0		Pass-word level 1,2,3	2	3043	RW	Yes	3, 4 & 16
T08	Night offset	**Night offset** Enter the Offset value to thermostat set point temperature. See "T07, Night operation" *Unit: K*	-20.0	20.0	-2.0	1	No	Pass-word level 1,2,3	2	3044	RW	Yes	3, 4 & 16
T09	Cool. status DO	**Cooling status DO** Select status if Evapartor is in cooling mode and read out to Digital OutputActual cooling status to be read on a DO. No:Funtion Disabled Yes:Function Enabled. If Evapartor is in cooling mode then DO is ON, otherwise DO is OFF. To assign DO, go to I/O configuration in Main menu and select an available DO.	No	Yes	No	0	Yes	Pass-word level 1,2,3	3	3045	RW	Yes	3, 4 & 16
T22	Min.Cooling OD	**Minimum Cooling Opening Degree limit** A limit can be defined to manage: - Text in HMI: "Cooling Status" to display "OFF" or "ON" - Cooling status DO, parameter "T09, Cool. status DO", when set to "Yes" If OD > ("T22,Min.Cooling OD") then "Cooling Status" will display ON Assigned DO related to "T09, Cool. status DO" is ON If OD = 0% then "Cooling Status" will display OFF Assigned DO related to "T09, Cool. status DO" is OFF *Unit: %*	0	20	5	0	Yes	Pass-word level 1,2,3	3	3437	RW	Yes	3, 4 & 16
T10	Pwm mod.period	**Modulating Thermostat (MTR) in Liquid Line. Flooded systems - period time** Expert setting - The value should only be changed by specially trained staff *Unit: sec*	30	900	300	0	Yes	Pass-word level 1,2,3	3	3374	RW	Yes	3, 4 & 16
T11	Pwm Max OD	**Modulating Thermostat (MTR) in Liquid Line. Flooded systems - Max OD** Maximum opening degree of the AKV or AKVA in the liquid line *Unit: %*	10	100	100	0	Yes	Pass-word level 1,2,3	3	3375	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus func-tion
T12	Pwm Min OD	**Modulating Thermostat (MTR) in Liq-uid Line. Flooded systems - Min OD** Minimum opening degree of the AKV or AKVA in the liquid line *Unit: %*	0	100	0	0	Yes	Pass-word level 1,2,3	3	3376	RW	Yes	3, 4 & 16
T13	Pwm Kp	**Modulating Thermostat (MTR) in Liq-uid Line. Flooded systems - Amplifi-cation factor** Expert setting - The value should only be changed by specially trained staff	0.5	10.0	4.0	1	Yes	Pass-word level 1,2,3	3	3377	RW	Yes	3, 4 & 16
T14	Pwm Tn	**Modulating Thermostat (MTR) in Liq-uid Line. Flooded systems - Integra-tion time** Expert setting - The value should only be changed by specially trained staff *Unit: sec*	60	1800	300	0	Yes	Pass-word level 1,2,3	3	3378	RW	Yes	3, 4 & 16
T15	Desynch. Pwm	**Desynchronization of Modulating Thermostat (MTR) in Liquid Line. Flooded systems** Pwm duty to avoid simultaneousness with other control	No	Yes	No	0	Yes	Pass-word level 1,2,3	3	3412	RW	Yes	3, 4 & 16
T17	Evap.Pres. SP To	**Evaporator pressure Setpoint in [C] / [F]** Setpoint coming from pressure conver-ted in temperature depending from se-lected refrigerant *Unit: °C / °F*	-70.0	50.0	0	1	No	Pass-word level 1,2,3	2	3415	RW	Yes	3, 4 & 16
T18	Evap.Pres. Kp	**Proportional gain for Evaporation pressure control** Proportional factor	0.5	50.0	3.0	1	No	Pass-word level 1,2,3	3	3418	RW	Yes	3, 4 & 16
T19	Evap.Pres. Tn	**Integration time for Evaporation pressure control** Integration time *Unit: sec*	60	600	240	0	No	Pass-word level 1,2,3	3	3419	RW	Yes	3, 4 & 16
T20	Evap.Pres. Td	**Derivative time for Evaporation pressure control** Differential time *Unit: sec*	0	60	10	0	No	Pass-word level 1,2,3	3	3420	RW	Yes	3, 4 & 16
T21	Evap.Pres. mode	**Evaporation pressure control mode** Select between: 0: Normal 1: Min underswing 2: No underswing	0	2	2	0	Yes	Pass-word level 1,2,3	3	3421	RW	Yes	3, 4 & 16
T24	Limit LL	**Close Liquid Line valve in DX mode** Select function When OD is below T25, OD Limit LL then close Liquid Line valve 0: No 1: Yes	No	Yes	No	0	No	Pass-word level 1,2,3	0	3507	RW	Yes	3, 4 & 16
T25	OD Limit LL	**Opening Degree Limit in percentage** See T24, OD Limit LL	0.0	100.0	0.0	1	No	Pass-word level 1,2,3	0	3508	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Air temperature control \ Air temp. Alarm

Table 14: Air temperature control \ Air temp. Alarm

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
B01	Air temp. alarm	**Select which temperature sensor shall be connected to temperature alarms.** 0:None: No temperature alarms active 1:Seperate sensor: A separate sensor for the alarm function 2:Thermostat temp: The Thermostat temperature sensot is used for the alarm function	0	2	2=Thermostat temp.	0	Yes	Password level 1,2,3	3	3046	RW	Yes	3, 4 & 16
B02	High alarm limit	**High alarm limit** High alarm for the room temperature alarm function. Entered as absolute value *Unit: °C / °F*	-100.0	200.0	6.0	1	No	Password level 1,2,3	2	3047	RW	Yes	3, 4 & 16
B03	Low alarm limit	**Low alarm limit** Low alarm for the room temperature alarm function. Entered as absolute value. *Unit: °C / °F*	-100.0	200.0	-30.0	1	No	Password level 1,2,3	2	3048	RW	Yes	3, 4 & 16
B04	Alarm delay	**Alarm delay** Alarm delay time during normal control used for both high- and low temperature alarms *Unit: min*	0	240	120	0	No	Password level 1,2,3	2	3049	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Air temperature control \ Product temperature alarm function

Table 15: Air temperature control \ Product temperature alarm function

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
B05	Product alarm function	**Product temperature alarm** The air temperature is not always representative for the temperature of the products. A product sensor to measure the actual temperature in between the products. This sensor is used for monitoring purposes only including alarm handling. No: Function disabled Yes: Function enabled. Product alarms active. "Product temp." can be seen in Status Screen 1	0=No	1=Yes	0=No	0	Yes	Password level 1,2,3	3	3050	RW	Yes	3, 4 & 16
B06	Prod. high alarm limit	**Product High alarm** High alarm limit for the product temperature alarm function. Entered as absolute value *Unit: °C / °F*	-100.0	200.0	6.0	1	No	Password level 1,2,3	2	3051	RW	Yes	3, 4 & 16
B07	Prod. low alarm limit	**Product Low alarm** Low alarm limit for the product temperature *Unit: °C / °F*	-100.0	200.0	-30.0	1	No	Password level 1,2,3	2	3052	RW	Yes	3, 4 & 16
B08	Prod. alarm delay	**Product Alarm delay** Alarm delay time used for both high and low product temperature alarm function *Unit: min*	0	240	120	0	No	Password level 1,2,3	2	3053	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Defrost function \ Defrost method

Table 16: Defrost function \ Defrost method

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D1A	Defrost method	**Select the defrost method** 0:No defrost: No defrost function 1:Hot gas: Defrost done by Hot gas If air defrost is (used in rooms with temperature higher than 0° C (32 °F) 2:Electrical, water or air defrost (air defrost in rooms with temperature higher than 0° C (32 °F))	0	1	1=Hot gas	0	Yes	Pass-word level 1,2,3	3	3244	RW	Yes	3, 4 & 16
D1B	HG Drain valve	**Select type of valves in defrost drain line** 0: Pressure (ICS+CVP): Pressure control valve during hot gas defrost. CVP pilot have ajustable pressure setting 1: Pressure (OFV): Pressure control valve during hot gas defrost. OFV have ajustable pressure setting 2: Liquid drain (ICFD): Liquid drain during defrost	0	2	1= Pres-sure (ICS + CVP)	0	Yes	Pass-word level 1,2,3	3	3245	RW	Yes	3, 4 & 16
D2A	Hot gas line valve	**Select type of valves in Hot gas defrost line** 0: No Valve 1: Soft (ICS+EVRST): Dual position individual solenoid valves. Occupy 2 DO 2: Soft (ICSH): Dual position solenoid valve. Occupy 2 DO 3: Solenoid (ICFE): ON/OFF Solenoid ICF 20 Valve station 4: Solenoid (ICS):ON/OFF Solenoid ICS with EVM pilot 5: Solenoid (ICM):Motorized ICM, as slow opening/closing ON/OF valve. Occupy 1 DO 6: Slow (ICM): Motorized ICM, as slow opening/closing modulating valve. Occupy 1 AO	0	6	2=Soft (ICSH)	0	Yes	Pass-word level 1,2,3	3	3247	RW	Yes	3, 4 & 16
D2B	HG Drip tray DO	**Select possible DO hot gas valve for drip tray line** No: No Drip tray valve/function Yes: Drip tray valve and function active	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3255	RW	Yes	3, 4 & 16
D3A	WR/SL valve	**Select type of valves in Wet Return Suction Line** 0: No Valve 1: Soft (ICS+EVRST): Dual position individual solenoid valves. Occupy 2 DO 2: Soft (ICSH): Dual position solenoid valve. Occupy 2 DO 3: Soft (ICLX): 2-step gas powered solenoid valve. Occupy 1 DO 4: Solenoid (ICS):ON/OFF Solenoid ICS with EVM pilot 5: Solenoid (ICM):Motorized ICM, as slow opening/closing ON/OF valve. Occupy 1 DO 6: Slow (ICM): Motorized ICM, as slow opening/closing modulating valve. Occupy 1 AO	0	6	3	0	Yes	Pass-word level 1,2,3	3	3253	RW	Yes	3, 4 & 16
D03	WR/SL valve	**Valve in wet return/suction line** 7: Mod (ICM) 8: Mod+PE (ICM+EVRST) 9: Mod (CVE) 10: Mod+PE (CVE+EVRST) 11: Mod+PE (CVE+EVM+EVRST)	7	11	7	0	Yes	Pass-word level 1,2,3	3	3388	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D20	EPC ICM OD min	**Min OD for ICM in Evaporation pres-sure control** *Unit: %*	0	100	0	0	Yes	Pass-word level 1,2,3	3	3381	RW	Yes	3, 4 & 16
D21	EPC ICM OD max	**Max OD for ICM in Evaporation pres-sure control** *Unit: %*	0	100	100	0	Yes	Pass-word level 1,2,3	3	3382	RW	Yes	3, 4 & 16
D22	EPC CVE OD min	**Min Opening Degree for CVE in Evapo-ration pressure control**	0	90	0	0	Yes	Pass-word level 1,2,3	3	3416	RW	Yes	3, 4 & 16
D23	EPC CVE OD max	**Max Opening Degree for CVE in Evapo-ration pressure control**	0	90	90	0	Yes	Pass-word level 1,2,3	3	3417	RW	Yes	3, 4 & 16
D3B	WR/SL at Cool. stop-ped	**Status of Wet Return/Suction Line valve during cooling stopped** Closed: WR/SL valve closed during Cool-ing **OBSERVE - assess risk of trapped liquid when WR/SL valve is closed during Cooling stopped** Open: WR/SL valve open during Cooling	0= closed	1= Open	1=Open	0	Yes	Pass-word level 1,2,3	3	3323	RW	Yes	3, 4 & 16
D3D	WR/SL at Cool. stop-ped	**Status of Wet Return/Suction Line valve for WR/SL ctrl during cooling stopped** 0: Closed; Selected Valve in WR/SL valve;closed 1: Open; Selected Valve in WR/SL valve;open 2: user defined: Different options de-pending if ICM or CVE valve has been se-lected as valve in WR/SL. See parameters D3E,CVEsafe OD at stop D3FSuc.Pres.SP T at stop D3G,ICMsafe OD at stop	0	2	1	0	Yes	Pass-word level 1,2,3	3	3447	RW	Yes	3, 4 & 16
D3E	CVEsafe OD at stop	**CVE OD when cooling is stopped** Enter OD % of the CVE valve in the Wet Return valve, when in cooling stopped *Unit: %*	23	90	90	0	Yes	Pass-word level 1,2,3	3	3440	RW	Yes	3, 4 & 16
D3F	Suc.Pres.SP T at stop	**Suction Pressure Setpoint in °C (°F) when cooling is stopped** Suction pressure converted in saturation temperature with a motorized ICM valve in Wet Return line, controlling pressure, when cooling is Stopped *Unit: °C / °F*	-90.0	60.0	-90.0	1	Yes	Pass-word level 1,2,3	3	3441	RW	Yes	3, 4 & 16
D3G	ICMsafe OD at stop	**ICM OD when cooling is stopped** Enter ICM OD % of the ICM valve in the Wet Return valve, when in cooling stop-ped *Unit: %*	0	100	100	0	Yes	Pass-word level 1,2,3	3	3458	RW	Yes	3, 4 & 16
D3H	WR/SL valve AI feedback	**Wet Return/Suction Line valve feed-back from ICAD on ICM valve In IO con-figuration** In IO configuration \ Analog inputs the Analog input type can be selected. 0-10 V;0-20 mA;4-20 mA;2-10 V No: ICAD not connected to EKE 400 Yes: ICAD connected to EKE 400	No	Yes	No	0	Yes	Pass-word level 1,2,3	3	3452	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D4A	Drain sole-noid?	**Decide if drain solenoid in defrost drain line is installed** No Yes	0=No	1=Yes	1=Yes	0	Yes	Pass-word level 1,2,3	3	3252	RW	Yes	3, 4 & 16
D4B	Quick Drain?	**Decide if drain valve is installed to drain liquid quikly out before hot gas enter evaporator** No Yes	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3254	RW	Yes	3, 4 & 16
D05	Cool at HG defrost	**Cool at Hot Gas defrost** Typical when no PLC connected to coor-dinate defrost. If defrost start is coordinated locally by EKE 400,it is possible to configure if EKE 400 shall go into forced cooling, when another EKE 400 in the same group is de-frosting. Each EKE 400 in a group will broadcast the signal "Defrost sequence status" over CAN bus No: Function disable Yes: Function enabled	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3082	RW	Yes	3, 4 & 16
D06	Defrost al-lowed	**Defrost allowed** Typical with PLC connected via MODBUS, but defrost is handled by EKE 400. PLC to allow defrost to take place, typical only if Hot gas is available No: Defrost not allowed from PLC (no Hot gas available) Yes: Defrost allowed from PLC (Hot gas is available)	0=No	1=Yes	1=Yes	0	No	Pass-word level 1,2,3	2	3083	RW	Yes	3, 4 & 16
D07	Defrost al-lowed via DI	**Defrost allowed via DI** Typical with PLC connected via DI, but defrost is handled by EKE 400. PLC to al-low defrost to take place, typical only if Hot gas is available. No: Function disable Yes: Function enabled OBSERVE require that "D07,Defrost al-lowed"="Yes" To assign DI, go to I/O configuration in Main menu and select an available DI. Set this DI to "Defrost allowed via DI"	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3084	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D08	Def. seq. status on DO	**Def. seq. status on DO** Select if an DO shall be synchronized with defrost seq. status (ON/OFF). The DO is set ON at defrost start and is set OFF when the complete defrost sequence is completed. No: Disabled Yes: Enabled To assign DO, go to I/O configuration in Main menu and select an available DO. Set this DO to "Def. seq. status on DO" DO=OFF: Defrost completed DO=ON: Defrost is underway	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3085	RW	Yes	3, 4 & 16
D09	Water valve?	**Decide if Water valve is used** This function adds control of a valve that enables water spray on the evaporator during hot gas defrosting. Helps to loos-en ice on evaporator during defrost, by means of water (spay) No: Disabled Yes: Function enabled To assign DO, go to I/O configuration in Main menu and se-lect an available DO. The water valve opens when the follow-ing two criteria are meet: The hot gas main valve is ON and the “D67, Water valve delay” limited has expired. When the Water valve is opened a timer starts defined in "D68,Water valve time". The Water valve closes when the timer rea-ches "D68,Water valve time" or when en-tering "D59, Drip off time". (See Figure 10: Defrost sequence).	0=No	1=Yes	0=No	0	Yes	Pass-word level 1,2,3	3	3325	RW	Yes	3, 4 & 16
D24	WR/SL soft at cooling	**WR/SL soft valve (EVRST) after WR/SL opening phase** 0: Closed 1: Open	0	1	1	0	Yes	Pass-word level 1,2,3	3	3463	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Defrost function \ Defrost start methods

Table 17: Defrost function \ Defrost start methods

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Unit	Decimals	Locke by Main switcl Yes/N	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
D10	Man. def. start	**Manual defrost start** A manual defrost start can be done (Forced defrost) - Can also be used from a PLC connected via MODBUS OFF: No forced defrost ON: Forced manual defrost	0=OFF	1=ON	0=OFF		0	No	Password level 1,2,3	2	3054	RW	No	3, 4 & 16
D11	Def. time interval	**Defrost start by time interval** Fail safe function if another configured defrost start, has failed. A defrost will be started when the interval counter (real time) exceeds the 'Defrost time interval' setting. The interval counter is start counting from zero when the defrost is started. The interval counter will be reset at every defrost start. The interval counter shall be in standby (not counting) at "Main switch is OFF". Can be seen in Status Sceen 1. If "D11,Def. time interval" is 0 (zero) the function is disabled" *Unit: hours*	0	240	0	hour	0	No	Password level 1,2,3	2	3075	RW	Yes	3, 4 & 16
D12	Def. start acc. cool time	**Defrost start by accumulated cooling time** Can also be used as a fail safe function if another configured defrost start, has failed. A defrost will be started when the accumulated cooling time exceeds "D12,Def. start acc. cool time" setting. The accumulated cooling time will be reset at every defrost start. *Unit: hours*	0	240	0	hour	0	No	Password level 1,2,3	2	3076	RW	Yes	3, 4 & 16
D13	Time staggering	**Time staggered defrost** Defrost will only be staggered after: - After power cut. - Start according to "D11,Def. time interval" - This means Start defrost after ["D11,Def. time interval" + "D13,Time staggering"] - Start according to "D12,Def. start acc. cool time" - This means Start defrost after ["D12,Def. start acc. cool time" + "D13,Time staggering"] Successive defrosts will be started when the time interval Defrost time interval or accumulated cooling time has elapsed" *Unit: min*	0	240	0	min	0	No	Password level 1,2,3	2	3077	RW	Yes	3, 4 & 16
D14	Def. start by DI	**Defrost start by DI** Option to start defrost via DI. Typical external dignal from PLC or a push bottom. If function is enabled, a defrost is started when the DI changes from OFF to ON. Successive change of the DI during the defrost period are ignored. No: Function disable Yes: Function enabled	0=No	1=Yes	0=No		0	Yes	Password level 1,2,3	3	3055	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Unit	Deci-mals	Locke by Main switcl Yes/N	Read	Pass-word level to change/ write	Mod-bus ad-dress	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus func-tion
D15	Def. start schedule	**Defrost start schedule** Option to run defrost according to lo-cal time scedules in EKE 400. Three schcdules possible (weekdays, satur-days and sunday) with 6 defrost start time each. No: Function disable Yes: Function enabled	0=No	1=Yes	0=No		0	No	Pass-word level 1,2,3	3	3056	RW	Yes	3, 4 & 16
DA1	Def. 1 sch.MON-DAY	Defrost start time for MONDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3277	RW	Yes	3, 4 & 16
DA2	Def. 2 sch.MON-DAY	Defrost start time for MONDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3278	RW	Yes	3, 4 & 16
DA3	Def. 3 sch.MON-DAY	Defrost start time for MONDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3279	RW	Yes	3, 4 & 16
DA4	Def. 4 sch.MON-DAY	Defrost start time for MONDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3280	RW	Yes	3, 4 & 16
DA5	Def. 5 sch.MON-DAY	Defrost start time for MONDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3281	RW	Yes	3, 4 & 16
DA6	Def. 6 sch.MON-DAY	Defrost start time for MONDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3282	RW	Yes	3, 4 & 16
DX1	Copy MONDAY to:	**Copy MONDAY schedules** Copy MONDAY to other day or week days or all days: 0 = MONDAY 1 = TUESDAY 2 = WEDNESDAY 3 = THURSDAY 4 = FRIDAY 5 = SATURDAY 6 = SUNDAY 7 = week days 8 = all days	0	8	0=MON-DAY		0	No	Pass-word level 1,2,3	2	3324	RW	Yes	3, 4 & 16
DB1	Def. 1 sch.TUES-DAY	Defrost start time for TUESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3283	RW	Yes	3, 4 & 16
DB2	Def. 2 sch.TUES-DAY	Defrost start time for TUESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3284	RW	Yes	3, 4 & 16
DB3	Def. 3 sch.TUES-DAY	Defrost start time for TUESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3285	RW	Yes	3, 4 & 16
DB4	Def. 4 sch.TUES-DAY	Defrost start time for TUESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3286	RW	Yes	3, 4 & 16
DB5	Def. 5 sch.TUES-DAY	Defrost start time for TUESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3287	RW	Yes	3, 4 & 16
DB6	Def. 6 sch.TUES-DAY	Defrost start time for TUESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3288	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Unit	Deci-mals	Locke by Main switcl Yes/N	Read	Pass-word level to change/ write	Mod-bus ad-dress	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus func-tion
DC1	Def. 1 sch.WED-NESDAY	Defrost start time for WEDNESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3289	RW	Yes	3, 4 & 16
DC2	Def. 2 sch.WED-NESDAY	Defrost start time for WEDNESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3290	RW	Yes	3, 4 & 16
DC3	Def. 3 sch.WED-NESDAY	Defrost start time for WEDNESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3291	RW	Yes	3, 4 & 16
DC4	Def. 4 sch.WED-NESDAY	Defrost start time for WEDNESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3292	RW	Yes	3, 4 & 16
DC5	Def. 5 sch.WED-NESDAY	Defrost start time for WEDNESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3293	RW	Yes	3, 4 & 16
DC6	Def. 6 sch.WED-NESDAY	Defrost start time for WEDNESDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3294	RW	Yes	3, 4 & 16
DD1	Def. 1 sch. THURSDAY	Defrost start time for THURSDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3295	RW	Yes	3, 4 & 16
DD2	Def. 2 sch. THURSDAY	Defrost start time for THURSDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3296	RW	Yes	3, 4 & 16
DD3	Def. 3 sch. THURSDAY	Defrost start time for THURSDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3297	RW	Yes	3, 4 & 16
DD4	Def. 4 sch. THURSDAY	Defrost start time for THURSDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3298	RW	Yes	3, 4 & 16
DD5	Def. 5 sch. THURSDAY	Defrost start time for THURSDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3299	RW	Yes	3, 4 & 16
DD6	Def. 6 sch. THURSDAY	Defrost start time for THURSDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3300	RW	Yes	3, 4 & 16
DE1	Def. 1 sch.FRIDAY	Defrost start time for FRIDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3301	RW	Yes	3, 4 & 16
DE2	Def. 2 sch.FRIDAY	Defrost start time for FRIDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3302	RW	Yes	3, 4 & 16
DE3	Def. 3 sch.FRIDAY	Defrost start time for FRIDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3303	RW	Yes	3, 4 & 16
DE4	Def. 4 sch.FRIDAY	Defrost start time for FRIDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3304	RW	Yes	3, 4 & 16
DE5	Def. 5 sch.FRIDAY	Defrost start time for FRIDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3305	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Unit	Deci-mals	Locke by Main switcl Yes/N	Read	Pass-word level to change/ write	Mod-bus ad-dress	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus func-tion
DE6	Def. 6 sch.FRIDAY	Defrost start time for FRIDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3306	RW	Yes	3, 4 & 16
DF1	Def. 1 sch.SATUR-DAY	Defrost start time for SATURDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3307	RW	Yes	3, 4 & 16
DF2	Def. 2 sch.SATUR-DAY	Defrost start time for SATURDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3308	RW	Yes	3, 4 & 16
DF3	Def. 3 sch. SATURDAY	Defrost start time for SATURDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3309	RW	Yes	3, 4 & 16
DF4	Def. 4 sch. SATURDAY	Defrost start time for SATURDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3310	RW	Yes	3, 4 & 16
DF5	Def. 5 sch. SATURDAY	Defrost start time for SATURDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3311	RW	Yes	3, 4 & 16
DF6	Def. 6 sch. SATURDAY	Defrost start time for SATURDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3312	RW	Yes	3, 4 & 16
DG1	Def. 1 sch. SUNDAY	Defrost start time for SUNDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3313	RW	Yes	3, 4 & 16
DG2	Def. 2 sch.SUN-DAY	Defrost start time for SUNDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3314	RW	Yes	3, 4 & 16
DG3	Def. 3 sch.SUN-DAY	Defrost start time for SUNDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3315	RW	Yes	3, 4 & 16
DG4	Def. 4 sch.SUN-DAY	Defrost start time for SUNDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3316	RW	Yes	3, 4 & 16
DG5	Def. 5 sch.SUN-DAY	Defrost start time for SUNDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3317	RW	Yes	3, 4 & 16
DG6	Def. 6 sch.SUN-DAY	Defrost start time for SUNDAY	0= 00:00	1439= 23:59	0=00:00		0	No	Pass-word level 1,2,3	2	3318	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Defrost function \ Defrost stop methods

Table 18: Defrost function \ Defrost stop methods

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
D40	Defrost stop method	**Defrost stop method** Select method for stop of defrost 1:Stop on time: When the time delay "D58,Max defrost time" expires, the defrost is terminated 2:Stop on temp: When the defrost sensor temperature becomes greater than the set point "D43,Def. stop temp. limit", then the defrost is terminated. If the defrost time exceed "D58,Max defrost time", then the alarm 'Max defrost time' is send and the defrost is terminated. In case of sensor error, and the time 'Max defrost time' expires, the alarm 'Max defrost time' is send and the defrost is terminated. The alarm will automatically be reset after 5 minutes. To assign defrost sensor temperature, go to I/O configuration in Main menu and select an available AI.	1	2	1=Stop on time	0	Yes	Password level 1,2,3	3	3078	RW	Yes	3, 4 & 16
D41	Man. defrost stop	**Manual defrost stop** Option to, local on EKE 400, to stop defrost. Can also be used from a PLC connected via MODBUS No: Function disable Yes: Function enabled - Observe. All states (See Figure 10: Defrost sequence) before and after Defrost sequence state: "Defrost state" will be still be executed ("Defrost state" will be ignored/ surpressed). When defrost is completed, "D41, Man. defrost stop" will automatically be set back to "No".	0=No	1=Yes	0=No	0	No	Password level 1,2,3	2	3079	RW	No	3, 4 & 16
D42	Defrost stop via DI	**Defrost stop via DI** Forced stop defrost via external equipment (e.g. PLC) to EKE 400, via DI No: Function disable Yes: Function enabled- Observe. All states (See Figure 10: Defrost sequence) before and after Defrost sequence state: "Defrost state" will be still be executed ("Defrost state" will be ignored/surpressed) To assign DI, go to I/O configuration in Main menu and select an available DI"	0=No	1=Yes	0=No	0	Yes	Password level 1,2,3	3	3080	RW	Yes	3, 4 & 16
D43	Def. stop temp. limit	**Defrost stop temperature limit** See "D40, Defrost stop method" *Unit: °C / °F*	0	25	8	1	No	Password level 1,2,3	2	3081	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Defrost function \ Defrost sequence

Table 19: Defrost function \ Defrost sequence

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D50	Pump down delay	**Pump down delay** Draining the evaporator before defrost-ing. Always active The pump down state is used to empty the evaporator for liquid See Figure 10: Defrost sequence *Unit: min*	1	30	10	0	No	Pass-word level 1,2,3	2	3086	RW	Yes	3, 4 & 16
D51	HG open delay	**Hot Gas open delay** Time delay in minutes before opening the hot gas valve (delay for valve in the wet return line to close) See Figure 10: Defrost sequence *Unit: min*	1	10	5	0	No	Pass-word level 1,2,3	2	3087	RW	Yes	3, 4 & 16
D5A	Drip tray pre-heat	**Drip tray pre-heat** Pre-heating time for hot gas to drip tray See Figure 10: Defrost sequence *Unit: min*	0	20	5	0	No	Pass-word level 1,2,3	2	3256	RW	Yes	3, 4 & 16
D5B	Drip tray delay OFF	**Drip tray delay OFF** Continue drip tray heating some defined time See Figure 10: Defrost sequence *Unit: min*	0	120	30	0	No	Pass-word level 1,2,3	2	3257	RW	Yes	3, 4 & 16
D53	HG soft time	**Hot gas soft time** Time between step 1 and step 2 for opening the hot gas valve (2 DO used) See Figure 10: Defrost sequence *Unit: min*	1	30	3	0	No	Pass-word level 1,2,3	2	3098	RW	Yes	3, 4 & 16
D54	HG time step 1	**Hot Gas time step 1** ICM Motorvalve: Step 1 time controlled opening to "D55, HG OD step 1" See Figure 10: Defrost sequence *Unit: min*	0	30	3	0	No	Pass-word level 1,2,3	2	3099	RW	Yes	3, 4 & 16
D55	HG OD step 1	**Hot Gas valve Opening Degree step 1** ICM Motorvalve: Valve opening from 0% to "D55, HG OD step 1" inside "D54,HG time step 1" time. See Figure 10: Defrost sequence *Unit: %*	0	100	20	0	No	Pass-word level 1,2,3	2	3100	RW	Yes	3, 4 & 16
D56	HG time step 2	**Hot Gas time step 2** ICM Motorvalve: Controlled opening in step 2 See Figure 10: Defrost sequence *Unit: min*	1	30	2	0	No	Pass-word level 1,2,3	2	3101	RW	Yes	3, 4 & 16
D57	Quick drain time	**Quick drain time** Require that Quick Drain is selected. (D4B,Quick Drain?=Yes) Enter how long time the Quick Drain valve stays open. Quick Drain valve will start opening to-gether with Hot gas valve. See Figure 10: Defrost sequence *Unit: sec*	1	300	30	0	No	Pass-word level 1,2,3	2	3102	RW	Yes	3, 4 & 16
D58	Max defrost time	**Max defrost time** Max. allowed defrost duration in minutes *Unit: min*	1	120	30	0	No	Pass-word level 1,2,3	2	3089	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D5C	HG close delay	**Hot Gas close delay** Reguire a soft opening valve in the Hot Gas Line (D2A,Hot gas line valve=Soft (ICS+EVRST) or Soft (ICSH) or Slow (ICM)). Delay before closing the selected valves in the Hot gas line. See Figure 10: Defrost sequence *Unit: sec*	0	120	15	0	No	Pass-word level 1,2,3	2	3258	RW	Yes	3, 4 & 16
D5D	Drain close delay	**Drain close delay** Require that Drain Valve is selected (D4A, Drain solenoid?=Yes). Delay before the Drain valve is closed See Figure 10: Defrost sequence *Unit: min*	0	10	2	0	No	Pass-word level 1,2,3	2	3259	RW	Yes	3, 4 & 16
D59	Drip off time	**Drip off time** Allow water on the evaporator to drip off. See Figure 10: Defrost sequence *Unit: min*	1	15	5	0	No	Pass-word level 1,2,3	2	3090	RW	Yes	3, 4 & 16
D72	WR valve AI feedback	**Drain and Quick Drain equalizing time after Drip Off** If time is set to 0 (zero) , the Drain Equal-izing state is not in use and quick drain valve will stay closed See Figure 10: Defrost sequence *Unit: sec*	0	360	30	0	Yes	Pass-word level 1,2,3	2	3464	RW	Yes	3, 4 & 16
D61	WR/SL soft time	**Wet Return/Suction Line valve soft time** Time between step 1 and step 2 for opening the Wet Return/Suction Line valve ("Soft (ICS+EVRST)" or "Soft (ICSH). See Figure 10: Defrost sequence *Unit: min*	1	30	2	0	No	Pass-word level 1,2,3	2	3094	RW	Yes	3, 4 & 16
D6A	WR/SL main time	**Wet Return/Suction Line valve main time** After defrost and wet return valve has opened (main), enter delay before valve in liquid line to open. See Figure 10: Defrost sequence *Unit: min*	1	30	2	0	No	Pass-word level 1,2,3	2	3260	RW	Yes	3, 4 & 16
D62	WR/SL time step 1	**Wet Return/Suction Line valve time step 1** ICM Motorvalve: Step 1 controlled open-ing to D63, WR/SL OD step 1 See Figure 10: Defrost sequence *Unit: min*	0	30	3	0	No	Pass-word level 1,2,3	2	3095	RW	Yes	3, 4 & 16
D63	WR/SL OD step 1	**Wet Return/Suction Line valve Open-ing Degree step 1** ICM Motorvalve: Valve opening from 0% to "D63,WR/SL OD step 1" inside "D62,WR/SL time step 1" time See Figure 10: Defrost sequence *Unit: %*	0	100	20	0	No	Pass-word level 1,2,3	2	3096	RW	Yes	3, 4 & 16
D64	WR/SL time step 2	**Wet Return/Suction Line valve time step 2** ICM motorvalve opening step 2 time See Figure 10: Defrost sequence *Unit: min*	1	30	2	0	No	Pass-word level 1,2,3	2	3097	RW	Yes	3, 4 & 16
D70	Time avg CVE OD	**Time over to calcute the average value of CVE OD%** During the cooling, an average OD of CVE is calculated continuously. The time window of the average is defined by D70 *Unit: min*	0	120	30	0	Yes	Pass-word level 1,2,3	2	3438	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
D71	Time re-store CVE OD	**Time to maintain the CVE OD average value after defrost** When entering "Fan delay state", CVE keeps operating at the average OD for a period of time defined by D71 before the regulation starts *Unit: min*	0	120	10	0	Yes	Pass-word level 1,2,3	2	3439	RW	Yes	3, 4 & 16
D65	Fan start delay	**Fan start delay** Delay before start of fans. Liquid Line valve is ON, in this state. See Figure 10: Defrost sequence *Unit: min*	0	30	2	0	No	Pass-word level 1,2,3	2	3092	RW	Yes	3, 4 & 16
D66	Fan ctrl. at defrost	**Fan control at defrost** Define if fans shall run or be stopped dur-ing the defrost sequence. No: Fans are stopped Yes: Fans are running See Figure 10: Defrost sequence	0=No	1=Yes	0=No	0	No	Pass-word level 1,2,3	3	3093	RW	Yes	3, 4 & 16
D67	Water valve delay	**Delay before start of Water valve** See "D09, Water valve?" Description *Unit: min*	0	240	15	0	No	Pass-word level 1,2,3	2	3334	RW	Yes	3, 4 & 16
D68	Water valve time	**Time on of Water valve** See "D09, Water valve?" Description *Unit: min*	1	120	15	0	No	Pass-word level 1,2,3	2	3335	RW	Yes	3, 4 & 16
D69	WR/SL Pr. Equalising	**Wet Return/Suction Line Pressure Equalising time** Equalizing pressure in evaporator by soft opening wet return line valve. Carefully emptying the evaporator for hot gas via a little drain valve (by-pass valve) in the wet return line or soft opening of wet re-turn valve. *Unit: min*	1	10	5	0	X	Pass-word level 1,2,3	2	3414	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Fan control

Table 20: Fan control

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
F01	Fan control mode	**Fan control mode** 1: ON-OFF control: (1 DO) The fans are Off when cooling is stopped, and fans are On when cooling is ON 2: ON Control: Fans are ON, also when cooling is stopped. 3: Two step control: (2 DO): The two DO are controlled as below: Cooling Thermostat=ON DO1: ON DO2: OFF Cooling Thermostat=OFF DO1: ON DO2: ON 8: On-Off ctrl cycling. During cooling OFF, Fan switches between ON and OF, de-fined by parameter F06,Cycling OFF time and F07,Cycling ON time. Used when air circulation is required dur-ing OFF periods of the thermostat. In nor-mal cooling operation the fan is ON and should not follow the thermostat. 4: 0-10 V EC fan ctrl: (1 AO), Modulating control via AO See "F02,Fan speed high" and "F03,Fan speed low" 5: 0-10 V EC fan ctrl: (1 AO, 1 DO), Modu-lating control via AO and DO Same as "F01, Fan control mode =4 plus the DO should be ON when AO has to be larger than 0% and OFF whenever AO is zero (0%) 6: 0-10 VFD variable (1AO): The VFD speed control could follow proportional band, linked to four parameters F03, Fan speed low F02, Fan speed high F04, Offset speed low F05, Offset speed high 7: 0-10 VFD var.+DO (1AO + 1DO). Same (6:0-10 VFD variable (1AO)), but with an added DO assignment.The DO should be ON when AO > 0 and OFF whenever AO is 0 (zero) 0: No control: No control of fans	0	8	1=On-Off con-trol	0	Yes	Pass-word level 1,2,3	3	3103	RW	Yes	3, 4 & 16
F02	Fan speed high	**Fan speed high** Setting for Fan control via AO - High speed Enter Fan speed high in percent in Cooling mode. 100 % equals max. Speed / Maximum AO output of 10 V *Unit: %*	0	100	100	0	No	Pass-word level 1,2,3	2	3104	RW	Yes	3, 4 & 16
F03	Fan speed low	**Fan speed low** Setting for Fan control via AO - High speed Enter Fan speed low in percent when not in Cooling mode. 100 % equals max. Speed / Maximum AO output of 10 V *Unit: %*	0	100	50	0	No	Pass-word level 1,2,3	2	3105	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-im-als	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
F04	Offset speed low	**Offset speed low** Offset to roomtemperature setpoint at low speed. See F01, Fan control mode de-scription *Unit: K*	-20.0	20.0	0.0	1	No	Pass-word level 1,2,3	3	3459	RW	Yes	3, 4 & 16
F05	Offset speed high	**Offset speed high** Offset to roomtemperature setpoint at high speed. See F01, Fan control mode description *Unit: K*	-20.0	20.0	0.0	1	No	Pass-word level 1,2,3	3	3460	RW	Yes	3, 4 & 16
F06	Cycling OFF time	**Cycling OFF time** During cooling OFF, Fan switches be-tween ON and OFF, defined by parame-ters: F06, Cycling OFF time F07, Cycling ON time *Unit: min*	1	120	5	0	No	Pass-word level 1,2,3	3	3461	RW	Yes	3, 4 & 16
F07	Cycling ON time	**Cycling ON time** During cooling OFF, Fan switches be-tween ON and OFF, defined by parame-ters: F06, Cycling OFF time F07, Cycling ON time *Unit: min*	1	120	5	0	No	Pass-word level 1,2,3	3	3462	RW	Yes	3, 4 & 16
F08	Fan on when DI forced closed	**Set whether fan should be on when forced closed from DI is activated** 0: No 1: Yes	No	Yes	No	0	Yes	Pass-word level 1,2,3	3	3513	RW	Yes	3, 4 & 16
F09	Monitor fan DI alarm	**Monitor whether Fan is running** 0: No 1: Yes	No	Yes	No	0	Yes	Pass-word level 1,2,3	0	3515	RW	Yes	3, 4 & 16
F10	Fan DI sta-tus	**Status for Fan DI** If F09, Monitor fan DI alarm is selected	Off	On	Off	0	Yes	Pass-word level 1,2,3	0	3516	RO		3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Reheat

Table 21: Reheat

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
RH0	Reheat enable?	**Enable Reheat function** See Figure 9: Reheat function Reheat function can manage to control humidity in room. The evaporator will continue to dehumidify the air and the re-heat coil will heat the air to keep the room from getting too cold while trying to reduce humidity No: Disable Reheat Function Yes: Enable Reheat Function. This means that 1 DO and 2 AI is assigned. Go to In IO configuration \ Analog and Digital Output inputs to assign: DO:Assign a solenoid valve.Select "Reheat Sol" to an available DO AI: Assign a 4-20 mA Humidity sensor Select "Humidity sens." to an available AI	No	Yes	No	0	Yes	Password level 1,2,3	3	3465	RW	Yes	3, 4 & 16
RH1	Setpoint RH %	**Setpoint Humidity** If RH0, Reheat enable?=Yes, then enter the Humidity Setpoint *Unit: %*	0.0	100.0	50.0	1	Yes	Password level 1,2,3	3	3466	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Miscellaneous

Table 22: Miscellaneous

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
P01	Display unit	**Display unit** 0:MET: Metric units - Celsius (°C) and Kelvin (°K) 1:IMP: Imperial units - Fahrenheit (°F) and Rankine (°R)	0	1	0=MET	0	No	Password level 1,2,3	2	3115	RW	Yes	3, 4 & 16
P02	Alarm output	**Alarm output** An alarm relay output can be configured, which will be activated in the event of an alarm. Select the alarm priority that will activate the relay. See Alarm priorities in Main Menu 0: No relay 1: Critical alarms: - To assign DO, go to I/O configuration in Main menu and select an available DO 2: Severe alarms - To assign DO, go to I/O configuration in Main menu and select an available DO 3: All alarms - To assign DO, go to I/O configuration in Main menu and select an available DO	0	3	0=No relay	0	Yes	Password level 1,2,3	3	3116	RW	Yes	3, 4 & 16
cAB	Buzzer Management	**Buzzer Management** Select whic group af alarms that will activate the buzzer. 0: No buzzer 1: Critical alarms 2: Severe alarms 3: All alarms	0	3	0=No buzzer	0	Yes	Password level 1,2,3	3	3274	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
P03	Main switch via DI	**Mainswitch via DI** Release EKE 400 for operation or force EKE 400 out of operation via external equipment (e.g. PLC), via DI OFF: EKE 400 is forced out of operation. Observe if "M01,Main switch" is ON, this parameter will also when OFF, force EKE 400 out of operation ON: EKE 400 released for operation. Observe if "M01,Main switch" is ON, this parameter must also be ON, to release EKE 400 for operation	0=No	1=Yes	0=No	0	Yes	Password level 1,2,3	3	3117	RW	Yes	3, 4 & 16
P10	Ext ref. config.	**External reference configuration** Select the signal used to change the thermostat- or Media temp. reference. 0: Not used 1: Displace by current: - define the AI input range via the following settings: • "P13,Ref. current high": 4 to 20 mA, default = 20 • "P14,Ref. current low": 0 to 20 mA, default = 4 To assign AO, go to I/O configuration in Main menu and select an available AO. 2: Displace by voltage: - define the AI input range via the following settings: • "P15,Ref. voltage high": 0 to 10 Volt, default = 10 • "P16, Ref. voltage low": 0 to 10 Volt, default = 0 To assign AO, go to I/O configuration in Main menu and select an available AO. 3: Displace by modbus 4: Displace by DI	0	4	0=Not used	0	Yes	Password level 1,2,3	3	3118	RW	Yes	3, 4 & 16
P11	Ref. offset max	**Reference offset maximum** Scaling of range for temperature displacement - Maximum value See "P10, Ext ref. config." *Unit: °C / °F*	0.0	50.0	0.0	1	No	Password level 1,2,3	3	3119	RW	Yes	3, 4 & 16
P12	Ref. offset min	**Reference offset minimum** Scaling of range for temperature displacement - Minimum value See "P10,Ext ref. config." *Unit: °C / °F*	-70.0	0.0	0.0	1	No	Password level 1,2,3	3	3120	RW	Yes	3, 4 & 16
P13	Ref. current high	**Reference current high** Scaling of range for AI current - high value See "P10, Ext ref. config." *Unit: mA*	P14	20.0	20.0	1	No	Password level 1,2,3	3	3121	RW	Yes	3, 4 & 16
P14	Ref. current low	**Reference current low** Scaling of range for AI current - low value See "P10,Ext ref. config." *Unit: mA*	0.0	P13	4.0	1	No	Password level 1,2,3	3	3122	RW	Yes	3, 4 & 16
P15	Ref. voltage high	**Reference voltage high** Scaling of range for AI voltage - high value See "P10,Ext ref. config." *Unit: V*	P16	10.0	10.0	1	No	Password level 1,2,3	3	3123	RW	Yes	3, 4 & 16
P16	Ref. voltage low	**Reference voltage low** Scaling of range for AI voltage - low value See "P10,Ext ref. config." *Unit: V*	0.0	P15	0.0	1	No	Password level 1,2,3	3	3124	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
P17	Lowpass bandwidth	**Lowpass bandwidth** The analog input signal selected in "P10,Ext ref. config." can be filtered. Contact Danfoss for further information 0: None 1: 4 Hz 2: 2 Hz 3: 1 Hz 4: 0.5 Hz 5: 0.2 Hz *Unit: Hz*	0.0	5.0	5=0.2	0	No	Pass-word level 1,2,3	3	3125	RW	Yes	3, 4 & 16
P18	Ref. offset by modbus	**Reference offset by MODBUS** Offset value via MODBUS (e.g. PLC) added to "T04, Ther. setpoint" *Unit: °C / °F*	-70.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3126	RW	Yes	3, 4 & 16
P19	Ref. offset by DI	**Reference OFFset by DI** An offset can be added to the T04, Thermostat set point temperature if P10, Ext ref. config.=Displace by DI *Unit:K*	-70.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3469	RW	Yes	3, 4 & 16
P25	Gas Conc.tra. AI?	**Gas Concentration Analog Input**	No	Yes	No	0	Yes	Pass-word level 1,2,3	3	3326	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Miscellaneous (P22,P21,P2A,P23,P24 below all related to Emergency cooling sensor error)

Table 23: Emergency cooling sensor error

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
P20	Ther. sensor error	**Thermostat sensor error** If no thermostat sensor is available because of sensor faults, then emergency cooling takes over to maintain a reasonable level of cooling Select action at emergency cooling mode 0: Stop cooling 1: Fixed OD This means that the Evaporator will run in a ON/OFF cycle defined by a period of 1 hour and the setting of parameter "P22, Fixed OD emer. cool" E.g. "P22, Fixed OD emer. cool" = 40% Evaporator ON: 40% x 60 min=24 min Evaporator OFF: (100%-40%(x 60 min=36 min 2: Use average values	0	2	2=Use average values	0	Yes	Pass-word level 1,2,3	3	3127	RW	Yes	3, 4 & 16
P22	Fixed OD emer. cool	**Fixed valve Opening Degree emergency cooling** Fixed valve OD at emergency cooling of the Liquid line valve See "P20,Ther. sensor error" *Unit: %*	0	100	0	0	Yes	Pass-word level 1,2,3	3	3129	RW	Yes	3, 4 & 16
P21	SH sensor error	**Select how to operate emergency cooling** 0: Stop cooling 1: Fixed OD 2: Use average values	0	2	2	0	Yes	Pass-word level 1,2,3	3	3128	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
P23	Suct. ctrl at sensor error	**Evaporation pressure control at sensor error. Emergency cooling operation** 0:Stop cooling 1: Fixed value 2: Valve fully open	0	2	2	0	Yes	Pass-word level 1,2,3	3	3130	RW	Yes	3, 4 & 16
P2A / P24	Fix. value emer. Cool.	**Fixed OD value at emergency cooling** When P21, SH sensor error = Fixed OD, then a fixed OD for the liquid line valve can be entered Unit: %	0	100	0	0	Yes	Pass-word level 1,2,3	3	3404 / 3131	RW	Yes	3, 4 & 16
P26	Ext ref. T0 config.	**External displacement of Pressure set-point in Wet Return control** An offset can be added to the setpoint T17, Evap.Pres. SP To (in degrees) 0: Not used; 1: Displace by current: See scaling in P29,Ref. current T0 high and P30, Ref. current T0 low 2: Displace by voltage: See scaling in P31,Ref. voltage T0 high and P32, Ref. voltage T0 low 3: Displace by modbus: See P33, Ref. off-set T0 by modbus 4: Displace by DI: See P34,Ref. offset T0 by DI	0	4	0	0	Yes	Pass-word level 1,2,3	3	3486	RW	Yes	3, 4 & 16
P27	Ref. offset T0 max	**Temperature offset range - max value** Scaling of range, max value, proportional to Analog Input (mA or Voltage) *Unit: K*	0.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3487	RW	Yes	3, 4 & 16
P28	Ref. offset T0 min	**Temperature offset range - min value** Scaling of range, min value, proportional to Analog Input (mA or Voltage) *Unit: K*	-70.0	0.0	0.0	1	No	Pass-word level 1,2,3	3	3488	RW	Yes	3, 4 & 16
P29	Ref. current T0 high	**AI signal range - high mA value** Scaling of mA range, high value *Unit: mA*	0.0	20.0	20.0	1	No	Pass-word level 1,2,3	3	3489	RW	Yes	3, 4 & 16
P30	Ref. current T0 low	**AI signal range - low mA value** Scaling of mA range, low value *Unit: mA*	0.0	20.0	4.0	1	No	Pass-word level 1,2,3	3	3490	RW	Yes	3, 4 & 16
P31	Ref. voltage T0 high	**AI signal range - high voltage value** Scaling of voltage range, high value *Unit: V*	0.0	10.0	10.0	1	No	Pass-word level 1,2,3	3	3491	RW	Yes	3, 4 & 16
P32	Ref. voltage T0 low	**AI signal range - low voltage value** Scaling of voltage range, low value *Unit: V*	0.0	10.0	0.0	1	No	Pass-word level 1,2,3	3	3492	RW	Yes	3, 4 & 16
P33	Ref. offset T0 by mod-bus	**Offset value send via network** Enter value via MODBUS *Unit: K*	-70.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3493	RW	Yes	3, 4 & 16
P34	Ref. offset T0 by DI	**Reference Offset by DI** If P26, Ext ref. T0 config.=Displace by DI, then if the assigned DI: OFF: No offset added ON: Value entered here will be added T17, Evap.Pres. SP To (in degrees) *Unit: K*	-70.0	50.0	0.0	1	No	Pass-word level 1,2,3	3	3494	RW	Yes	3, 4 & 16
SS1	Tempera-ture sensor	**Extra temperature sensor** Select 0: No 1: Yes	No	Yes	No	0	No	Pass-word level 1,2,3	3	3509	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
SSt	Tempera-ture	**Temperature reading**	0	100	0	1	No	Pass-word level 1,2,3	0	3510	RO		3, 4 & 16
SP1	Pressure sensor	**Extra pressure sensor** Select 0: No 1: Yes	No	Yes	No	0	No	Pass-word level 1,2,3	3	3511	RW	Yes	3, 4 & 16
SPp	Pressure	**Pressure reading**	0	200	0	1	No	Pass-word level 1,2,3	0	3512	RO		3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

System \ Display

Table 24: System \ Display

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
G01	Language	0: English; 5: French;3:Italian; 4:German; 16: Dutch; 17: Japan; 13: Portoguese; 6: Spanish; 9:Russian; 14: Chinese; 18: Kore-an	0	13	0=Eng-lish	0	No	Pass-word level 1,2,3	2	3106	RW	Yes	3, 4 & 16
G02	Time for-mat	**Time format** 0:24-hour format 1:12-hour format	0	1	0=24-hour for-mat	0	No	Pass-word level 1,2,3	2	3107	RW	Yes	3, 4 & 16
G03	Screen sav-er time	**Screen saver time** If no push bottoms have been activated for the entered period, the backlight in the display will be weaker. Display back-light will revoked upon activation of any of the push bottoms Unit: min	1	60	2	0	No	Pass-word level 1,2,3	2	3189	RW	Yes	3, 4 & 16
G04	User logout time	**User logout time** If no push bottoms have been activated for the entered period, a logout will be carried out to Password level 0. Level 0 will only allow to see the screens: "Status screen 1", "Active alarms", "Alarm Reset" and "Controller info"A forced logout to Password level 0 can be made from screen: "Status screen 1" - Push the “Es-cape” button for 3 seconds Unit: min	1	60	2	0	No	Pass-word level 1,2,3	2	3191	RW	Yes	3, 4 & 16
G05	Display contrast	**Display contrast**	0	100	30	0	No	Pass-word level 1,2,3	2	3190	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET)..

System \ Password

Table 25: System \ Password

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
G07	Password level 1	**Password level 1** Enter password for level 1 acess. Level 1 will give acess to see all parameters and sub menues, but no settings can be changed. See Column "Read" and "Password level to change/write"	1	999	100	0	No	Password level 1,2,3	1	3108	RW	Yes	3, 4 & 16
G08	Password level 2	**Password level 2** Enter password for level 2 acess. Level 2 will give acess to see all parameters and sub menues. Some settings can changed. See Column "Read" and "Password level to change/write"	1	999	200	0	No	Password level 2,3	2	3109	RW	Yes	3, 4 & 16
G09	Password level 3	**Password level 3** Enter password for level 3 acess. Level 3 will give acess to see all parameters and sub menues. Alle settings can changed. See Column "Read" and "Password level to change/write"	1	999	300	0	No	Password level 3	3	3110	RW	Yes	3, 4 & 16
G15	For Danfoss only	**For Danfoss only**											

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

System \ Real time clock

Table 26: System \ Real time clock

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
G10	Real time clock	**Real time clock** Enter date (year, month and day) and time (hour and minute)					No	Password level 1,2,3	2	1807 (to read) 1809 (to set)	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

System \ Network

Table 27: System \ Network

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
G11	Modbus address	**Modbus address** Set the address of the controller here if it is connected to a system device via data communication.	1	125	1	0	Yes	Password level 1,2,3	3	3111	RW	Yes	3, 4 & 16
G12	Baudrate	**Baudrate** The system unit usually communicates with 38.400. 0:0 12:1200 24:2400 48:4800 96:9600 144:14400 192:19200 288:28800 384:38400	0	384	384= 38400	0	Yes	Password level 1,2,3	3	3112	RW	Yes	3, 4 & 16
G13	Serial mode	**Serial mode** Serial modbus mode. 8N1, 8E1 (8 bit, Even parity), 8N2.	8N1	8N2	8E1	0	Yes	Password level 1,2,3	3	3113	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

System \ Reset to factory

Table 28: System \ Reset to factory

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
G14	Reset to factory	**Reset to factory** No: Not active Yes: All parameters will be returned to factory default settings, and the alarm list will be cleared. The parameter will automatically be set back to 'No' when factory reset has finished (after a few seconds). OBSERVE below mention parameters will be left unchanged: "G01, Language" "G10, Real time clock" "G11, Modbus address" "G12, Baudrate" "G13,Serial mode"	0=No	1=Yes	0=No		Yes	Password level 3	3	3114	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Control status \ read-outs Control Status

Table 29: Control status / read-outs Control Status

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
See . OBSERVE some readouts are only visible under specific conditions													
S01	Control state	Read out of the actual state EKE will procees during cooling and defrost. See sheet "0-Tables" Table 19: Defrost function \ Defrost sequence in this document				0				3270	RO	No	3
S02	Cooling status	Status of EKE 400 in status cooling. OFF: No request for cooling. ON:Request for cooling. Can be used via MODBUS (e.g. PLC)				0				3165	RO	No	3

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
S03	Ther. temp.	Temperature used for the thermostat function *Unit: °C / °F*	-200.0	200.0	0.0	2				3166	RO	No	3
S04	Night status	Status of day/night operation On: Night operation				0				3167	RO	No	3
S05	Cut in limit	Thermostat cut in limit adjusted with night offset *Unit: °C / °F*				2				3168	RO	No	3
S06	Cut out lim-it	Thermostat cut out limit adjusted with night offset *Unit: °C / °F*				2				3169	RO	No	3
S07	Alarm air temp.	"Only visible if "B01,Air temp. alarm" dif-fer (≠) from "None" Room temperature used for the alarm function *Unit: °C / °F*				2				3163	RO	No	3
S08	Product temp.	"Only visible if "B05,Product alarm func-tion" = "Yes" Measured product sensor temperature *Unit: °C / °F*				2				3170	RO	No	3
S1A	Control State Trans-lated	**Control State Translated: Read-out of regulation condition / control state** 1: Main switch is OFF; 2: Manual control; 3:Pump down; 4: HG open delay; 5: HG Drip tray; 6: HG soft opening; 7: Defrost-ing; 8: HG close delay; 9: Drain close de-lay; 10: Drip off time; 11: WR opening state; 12: Fan start delay; 13: Not used; 14: Forced closing; 15: Forced cooling; 16: Emergency control; 17: Modulating WR. control; 18: MTR control; 19: Cooling; 20: Cooling stopped; 21: Refrig. not selected; 22: Power up state; 23: Critical Alarm; 24: PWM modulation **Not visible from HMI. Can be read via MODBUS**			1	0				3270	RO	No	
S2A	Merge Main Switch	**Status of Mainswitch parameters** "M01,Main switch" "M02,Ext. Main switch" Only if state of both "M01,Main switch" **AND** M02,Ext. Main switch" is ON then "S2A, Merge Main Switch" is 1, else 0. **Not visible from HMI. Can be read via MODBUS**	0	1		0				3271	RO	No	
S09	Defrosting time	The duration of the last executed defrost is shown *Unit: min*				0				3171	RO	No	3
S10	Def. sensor temp.	"Only visible if "D40,Defrost stop meth-od"="Stop on time" Defrost sensor tem-perature *Unit: °C / °F*				2				3172	RO	No	3
S11	Defrost state time	Actual active time delay shown in actual state *Unit: min*				0				3173	RO	No	3
S12	Act. state time	Actual remaining time left of "S11,Defrost state time *Unit: min*				0				3174	RO	No	3
S16	Evap. press Pe	Actual evaporating pressure Pe *Unit: Bar / psi*			0.0	2				3175	RO	No	
S17	Evap. temp. Te	Actual evaporating temperature Te con-verted from pressure *Unit: °C / °F*			0.0	2				3179	RO	No	
S18	S2 suction pipe	The gas temperature measured at evapo-rator outlet. *Unit: °C / °F*			0.0	2				3180	RO	No	3

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
S19	S3 air inlet temp	Actual air inlet temperature *Unit: °C / °F*			0.0	2				3181	RO	No	3
S20	Actual OD % for LL	Actual opening degree of Liquid valve in DX and PWM *Unit: %*				2				3182	RO	No	
S21	Superheat	Actual superheat (Gas temp. out - Evap.temp Te) *Unit: °C / °F*			0.0	1				3183	RO	No	3
S22	SH refer-ence	Reference used for the superheat control *Unit: °C / °F*			10.0	1				3184	RO	No	3
S23	Status Buz-zer	Status buzzer								3275	RO	No	3
S24	Hours from Defrost	Time in hours since last defrost *Unit: hours*				0				3319	RO	No	3
S26	Emergency control pe-riod	Emergency control period time in mi-nutes *Unit: min*				0				3321	RO	No	3
S27	Emergency control du-ty	Emergency control duty time in minutes *Unit: min*				0				3322	RO	No	3
S28	Gas Conc.tra.	Gas Concentration [ppm] *Unit: ppm*	0	50000		0				3330	RO	No	3
S32	Reference SP	Reference setpoint for Modulating WR ctrl								3434	RO	No	3

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

IO configuration

Table 30: IO configuration

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
IO configuration \ Digital outputs													
	DO1...DO8	When a function that needs to use an Digital Output (DO) is defined, it will be possible to assign this function to one of the available DO. Select the function to assign to the actual DO and if the func-tion is to be active when the DO is activa-ted or deactivated.											
IO configuration \ Digital inputs													
	DI1...DI8	When a function that needs to use an Digital Input (DI) is defined, it will be pos-sible to assign this function to one of the available DI. Select the function to assign to the actual DI.											
IO configuration \ Analog outputs - Voltage													
	AO1, AO2, AO3, AO4	When a function that needs to use an An-alog Output (DO) is defined, it will be possible to assign this function to one of the available AO. Select the function to assign to the actual AO and define volt-age range 0 – 1 V, 0 – 5 or 0 – 10 V											
IO configuration \ Analog inputs													
	AI1...AI8	When a temperaturefunction that needs to use an Analog Input (AI) is defined, it will be possible to assign this function to one of the available AI. Select the func-tion to assign to the actual AI. It is possi-ble to add an offset value to compensate for long cables under "Cal." parameter											

(1) Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

IO status

Table 31: IO status

Label ID(1)	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
IO status \ Digital outputs													
	DO1...DO8	Status (OFF/ON) if all DO. If a function is assigned the function name will be dis-played. DO not used, will display "--------"											
	DO1	Actual assigned parameter to DO								1003.8	RO		3
	DO2									1003.9	RO		3
	DO3									1003.1	RO		3
	DO4									1003.11	RO		3
	DO5									1003.12	RO		3
	DO6									1003.13	RO		3
	DO7									1003.14	RO		3
	DO8									1003.15	RO		3
IO status \ Digital inputs													
	DI1...DI8	Status (OFF/ON) if all DI. If a function is assigned the function name will be dis-played. DI not used, will display "--------"											
	DI1	Actual assigned parameter to DI								1001.8	RO		3
	DI2									1001.9	RO		3
	DI3									1001.1	RO		3
	DI4									1001.11	RO		3
	DI5									1001.12	RO		3
	DI6									1001.13	RO		3
	DI7									1001.14	RO		3
	DI8									1001.15	RO		3
IO status \ Analog outputs													
	AO1, AO2, AO3, AO4	Status of analogue outputs. Value in 0-100 % max. Output signal											
	AO1	Actual assigned parameter to AO								1037	RO		3
	AO2									1038	RO		3
	AO3									1039	RO		3
	AO4									1040	RO		3
IO status \ Analog inputs													
	AI1...AI8	Status of analogue temperature inputs. Temperature values (includes possible offset calibration values).											
	AI1	Actual assigned parameter to AI								1005	RO		3
	AI2									1006	RO		3
	AI3									1007	RO		3
	AI4									1008	RO		3
	AI5									1009	RO		3
	AI6									1010	RO		3
	AI7									1011	RO		3
	AI8									1012	RO		3
IO status \ IO summary													
	IO summa-ry	**Inputs and outputs overview. Display of maximum available and how many is actual being used.** OBSERVE: If too many have been defined, an exclamation mark (!) will appear.											

(1) Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

IO manual control

Table 32: IO manual control

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
IO manual control \ Digital outputs													
	DO1...DO8	**Manual overide control of a DO** AUTO: DO is controlled automatically by EKE 400 ON: DO is forced ON - an alarm is will be active "Output in manual mode" OFF: DO is forced OFF OBSERVE: Remember to switch back to "AUTO" when an overide have been made (OFF/ON)											
IO manual control \ Analog outputs													
	AO1, AO2, AO3, AO4	**Manual overide control of a AO** AUTO: AO is controlled automatically by EKE 400 MAN: If MAN is selected, A man-ual output value [0-100 %] of max. AO value can be entered in parameter "Man". - an alarm is will be active "Output in manual mode" OBSERVE: Remember to switch back to "AUTO" when an overide have been se-lected ("MAN")											

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Alarm setting

Table 33: Alarm setting

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
Alarm settings\ Alarm priorities													
		The controller will issue an alarm noti-fication if a specific incident occurs. Each incident is set to indicate the im-portance of each alarm, but it is possi-ble to modify the importance of each. Choose between the following priority levels: 0: Critical: Important alarms that require a high level of attention. 1: Severe: Alarms of intermediate impor-tance 2: Normal: No important alarms 3: Disable: Alarms set to this priority level will be cancelled.											
A48	Pressure sens.error	**Pressure sensor is defect**	0	3	2		No	Pass-word level 1,2,3	2	3506	RW	Yes	3, 4 & 16
A49	Ext.Ref.Conf.	External Reference input defect	0	3	2					3353	RW	Yes	
A50	Ther. air sensor error	Thermostat sensor is defect	0	3	2		No	Pass-word level 1,2,3	2	3132	RW	Yes	3, 4 & 16
A51	Ther. air 2 sensor error	Thermostat sensor 2 is defect	0	3	2		No	Pass-word level 1,2,3	2	3133	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
A52	Ther. air 3 sensor error	Thermostat sensor 3 is defect	0	3	2		No	Pass-word level 1,2,3	2	3134	RW	Yes	3, 4 & 16
A53	Air alarm sensor error	Air alarm sensor is defect	0	3	2		No	Pass-word level 1,2,3	2	3135	RW	Yes	3, 4 & 16
A54	Defrost sen-sor error	Defrost sensor is defect	0	3	2		No	Pass-word level 1,2,3	2	3136	RW	Yes	3, 4 & 16
A55	Product sensor error	Product sensor is defect	0	3	2		No	Pass-word level 1,2,3	2	3137	RW	Yes	3, 4 & 16
A59	Standby mode	Alarm when control is stopped by inter-nal or external Main Switch (DI input)	0	3	2		No	Pass-word level 1,2,3	2	3141	RW	Yes	3, 4 & 16
A60	Refrigerant not set	**Alarm if no refrigerant has been selec-ted**	0	3	3		No	Pass-word level 1,2,3	2	3142	RW	Yes	3, 4 & 16
A61	High temp. alarm	The room temperature is too high	0	3	0		No	Pass-word level 1,2,3	2	3143	RW	Yes	3, 4 & 16
A62	Low temp. alarm	The room temperature is too low	0	3	0		No	Pass-word level 1,2,3	2	3144	RW	Yes	3, 4 & 16
A63	High prod-uct temp. alarm	The product temperature is too high	0	3	1		No	Pass-word level 1,2,3	2	3145	RW	Yes	3, 4 & 16
A64	Low prod-uct temp. alarm	The product temperature is too low	0	3	1		No	Pass-word level 1,2,3	2	3146	RW	Yes	3, 4 & 16
A65	Max. de-frost time	The max allowed defrost time is excee-ded	0	3	2		No	Pass-word level 1,2,3	2	3147	RW	Yes	3, 4 & 16
A66	Output in MAN mode	An output is set in manual mode	0	3	2		No	Pass-word level 1,2,3	2	3148	RW	Yes	3, 4 & 16
A67	IO config. error	Not all inputs and output functions have been assigned to hardware Inputs or out-puts	0	3	-		No			3149	RW	Yes	3, 4 & 16
A68	Critical Alarm	Critical Alarm by DI	0	3	0		No	Pass-word level 1,2,3	2	3332	RW	Yes	3, 4 & 16
A69	Gas sensor err.	**Gas sensor is defect** 0: Critical 1: Severe 2: Normal 3: Disable	0	3	2		No	Pass-word level 1,2,3	2	3352	RW	Yes	3, 4 & 16
A76	S2 suction alarm	**Sensor S2 defect**	0	3	2		No	Pass-word level 1,2,3	2	3359	RW	Yes	3, 4 & 16
A77	S3 media inlet Alarm	**Sensor S3 defect**	0	3	2		No	Pass-word level 1,2,3	2	3360	RW	Yes	3, 4 & 16

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Dec-imals	Locked by Main switch Yes/No	Read	Pass-word level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persis-tent Yes/No	Modbus function
A78	High Pres-sure evap. Alarm	**High Pressure MOP in DX**	0	3	2		No	Pass-word level 1,2,3	2	3361	RW	Yes	3, 4 & 16
A79	Ext.Ref.SH Conf.al.	**External reference input for SH defect**	0	3	2		No	Pass-word level 1,2,3	2	3408	RW	Yes	3, 4 & 16
A83	LL valve DI alarm	**Liquid line valve alarm by DI** If A80,LL valve DI alarm=Yes Alarm Motorized Valve in Liquid Line	0	3	2		No	Pass-word level 1,2,3	2	3448	RW	Yes	3, 4 & 16
A84	WR/SL valve DI alarm	**Wet Return/Suction line valve alarm by DI** If A81,WR valve DI alarm=Yes Alarm Motorized Valve in Wet Return Line	0	3	2		No	Pass-word level 1,2,3	2	3449	RW	Yes	3, 4 & 16
A85	HG valve DI alarm	**Hot Gas line valve alarm by DI** If A82,HG valve DI alarm=Yes Alarm Motorized Valve in Hot Gas Line	0	3	2		No	Pass-word level 1,2,3	2	3450	RW	Yes	3, 4 & 16
A86	LL valve AI alarm	**Liquid line valve Analog Input Alarm** Analog input Alarm from Motorized Valve - out of scale	0	3	2		No	Pass-word level 1,2,3	2	3495	RW	Yes	3, 4 & 16
A87	WR/SL valve AI alarm	**Wet Return/Suction line valve Analog Input Alarm** Analog input Alarm from Motorized Valve - out of scale	0	3	2		No	Pass-word level 1,2,3	2	3496	RW	Yes	3, 4 & 16
A88	HG valve AI alarm	**Hot Gas line valve Analog Input Alarm** Analog input Alarm from Motorized Valve - out of scale	0	3	2		No	Pass-word level 1,2,3	2	3497	RW	Yes	3, 4 & 16
A89	Humidity sens.error	**Humidity sensor Analog input Alarm** Analog input Alarm from Humidity sen-sor - out of scale	0	3	2		No	Pass-word level 1,2,3	2	3498	RW	Yes	3, 4 & 16
A90	Ext.Ref.T0 Conf.al.	**External displacement of Pressure set-point in Wet Return control** Analog input Alarm from External dis-placement of Pressure setpoint - out of scale	0	3	2		No	Pass-word level 1,2,3	2	3499	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Alarm setting \ Critical Alarm

Table 34: Valve digital alarms

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
S70	Manual alarm reset	Manual alarm reset of Critical Alarm, selec YES to reset	No	Yes	No	0	No	Password level 1,2,3	3	3333	RW	Yes	3, 4 & 16
A70	Crit.alarm status	**Critical Alarm status** 0 = not active 1 = active	0	1	Yes	0	Yes			3329	RW	Yes	3, 4 & 16
A71	Crit.ext.alarr DI?	**Enable DI for Critical Alarm** **NOTE:** EKE 400 controller must never be primary safety.	No	Yes	No	0	Yes	Password level 1,2,3	3	3327	RW	Yes	3, 4 & 16
A72	WR/SL alarm mode	**Wet Return/Suction line status in Critical Alarm status**	OFF	ON	OFF	0	No	Password level 1,2,3	3	3328	RW	Yes	3, 4 & 16
A73	Fan alarm mode	**Fan status in Critical Alarm status**	OFF	ON	OFF	0	No	Password level 1,2,3	3	3331	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Valve digital alarms

Table 35: Valve digital alarms

Label ID[1]	Parameter name	Description and selection options	Min.	Max	Factory Setting	Decimals	Locked by Main switch Yes/No	Read	Password level to change/ write	Modbus address	Read only (RO) / Read Write (RW)	Persistent Yes/No	Modbus function
A80	LL valve DI alarm	**Liquid Line valve digital alarm from ICAD** Select if an DI Alarm from Liquid Line valve is present or not No: No DI from Liquid Line valve Yes: DI from Liquid Line valve present. An DI must be assigned under IO configuration \ Digital inputs	No	Yes	No		Yes	Password level 1,2,3	3	3443	RW	Yes	3, 4 & 16
A81	WR/SL valve DI alarm	**Wet Return/Suction line valve digital alarm from ICAD** Select if an DI Alarm from Liquid Line valve is present or not No: No DI from WR/SL valve Yes: DI from WR/SL valve present. An DI must be assigned under IO configuration \ Digital inputs	No	Yes	No		Yes	Password level 1,2,3	3	3444	RW	Yes	3, 4 & 16
A82	HG valve DI alarm	**Hot Gas Line valve digital alarm from ICAD** Select if an DI Alarm from Liquid Line valve is present or not No: No DI from Hot Gas Line valve Yes: DI from Hot Gas Line valve present. An DI must be assigned under IO configuration \ Digital inputs	No	Yes	No		Yes	Password level 1,2,3	3	3445	RW	Yes	3, 4 & 16

[1] Visibility depends on other parameter settings. Numbers are displayed in Metric units (P01, Temperature units=MET).

Alarm messages

Label ID	Parameter name	Description and selection options	Min.	Max	Factory setting	Deci-mals	Locked by Main switch Yes/No	Pass-word level to chang write	Modbus	Read on-ly (RO) / Read Write (RW)	Per-sis-tent Yes/Nc	Modbus function
E01	Sensor Fault	External reference input defect							1901.09	RO	No	3
A50	Ther. air sen-sor error	Thermostat sensor is defect							1901.11	RO	No	3
A51	Ther. air 2 sensor error	Thermostat sensor 2 is defect							1901.12	RO	No	3
A52	Ther. air 3 sensor error	Thermostat sensor 3 is defect							1901.13	RO	No	3
A53	Air alarm sensor error	Air alarm sensor is defect							1901.14	RO	No	3
A54	Defrost sen-sor error	Defrost sensor is defect							1901.15	RO	No	3
A55	Product sen-sor error	Product sensor is defect							1901.00	RO	No	3
A56	Evap. inlet sensor error	Evaporator inlet sensor is defect							1901.01	RO	No	3
A57	Evap. outlet sensor error	Evaporator outlet sensor is defect							1901.02	RO	No	3
A58	Evap. air out-let sensor er-ror	Evaporator air outlet sensor is defect							1901.03	RO	No	3
A59	Standby mode	Alarm when control is stopped by internal or external Main Switch (DI input)							1901.04	RO	No	3
A60	Refrigerant not set	Alarm if no refrigerant has been selected							1901.05	RO	No	3
A61	High temp. alarm	The room temperature is too high							1901.06	RO	No	3
A62	Low temp. alarm	The room temperature is too low							1901.07	RO	No	3
A63	High prod-uct temp. alarm	The product temperature is too high							1902.08	RO	No	3
A64	Low product temp. alarm	The product temperature is too low							1902.09	RO	No	3
A65	Max. defrost time	The max allowed defrost time is exceeded							1902.10	RO	No	3
A66	Output in MAN mode	An output is set in manual mode							1902.11	RO	No	3
A67	IO config. er-ror	Not all inputs and output functions have been assigned to hardware Inputs or out-puts							1902.12	RO	No	3
A68	Critical DI Alarm	Critical Alarm by digital input, need a man-ual reset to remove it							1902.13	RO	No	3
A69	Gas sensor err.	Gas sensor is defect							1902.14	RO	No	3
A76	S2 sensor er-ror	S2 sensor error is defect							1902.15	RO	No	3
A77	S3 sensor er-ror	S3 sensor error is defect							1902.00	RO	No	3
A78	High Pres-sure evap. Alarm	High Pressure evap. Alarm							1902.01	RO	No	3
A79	Sensor Fault SH	External reference input for SH defect							1902.02	RO	No	3
A83	LL valve DI alarm	Liquid line valve alarm by DI							1902.03	RO	No	3
A84	WR/SL valve DI alarm	Wet return/suction line valve alarm by DI							1902.04	RO	No	3
A85	HG valve DI alarm	Hot Gas line valve alarm by DI							1902.05	RO	No	3
A86	LL valve AI alarm	Input for Icad in error (out of scale)							1902.06	RO	No	3

Label ID	Parameter name	Description and selection options	Min.	Max	Factory setting	Deci-mals	Locked by Main switch Yes/No	Pass-word level to chang write	Modbus	Read on-ly (RO) / Read Write (RW)	Per-sis-tent Yes/Nc	Modbus function
A87	WR/SL valve AI alarm	Input for Icad in error (out of scale)							1902.07	RO	No	3
A88	HG valve AI alarm	Input for Icad in error (out of scale)							1903.08	RO	No	3
A89	Humidity sens.error	Sensor for Humidity in error							1903.09	RO	No	3
A90	Sensor Fault T0	External reference input for T0 defect							1903.10	RO	No	3
A91	Fan DI alarm	Fan DI Alarm							1903.11	RO	No	3

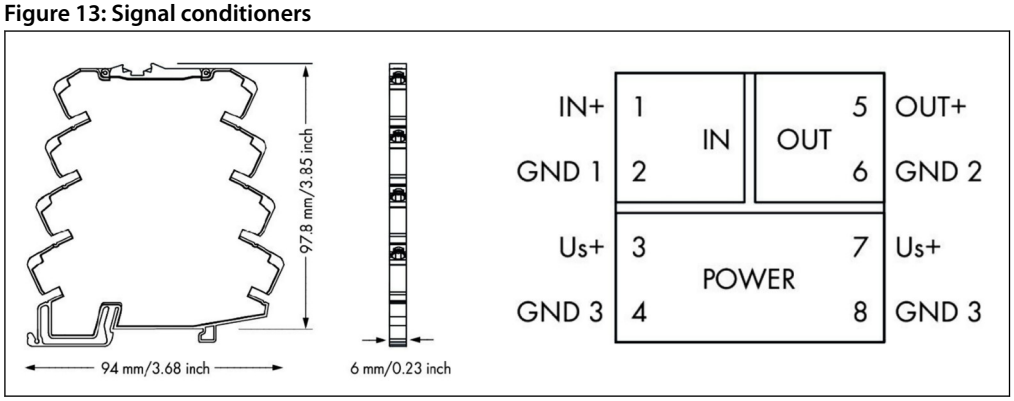
Accessories

Signal conditioners

The Standard Evaporator Control Panel analog output signals from its controllers are 0–10 V type from the factory. It is possible purchase signal conditioners as accessories from Danfoss that can be installed and wired by the customer (please contact a Danfoss sales representative). Signal conditioners change the analog output signal at the panel terminal from 0–10 V to 4–20 mA. The following is a quick overview as to how this may be done.

Wire the power terminal available (24 V and COM) in the panel to the signal conditioner power terminals and wire the correct AO terminals (AO1 through AO6 and COM) to the input side of the signal conditioner. Please read the signal conditioner instructions beforehand. The 4–20 mA device may now be wired to the output side of the signal conditioner.

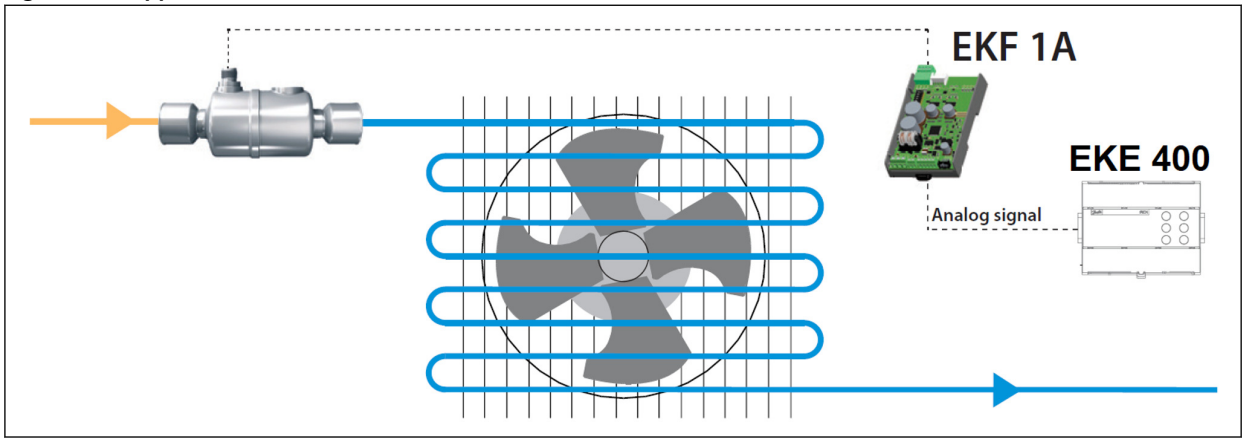
Figure 13: Signal conditioners



Stepper Motor Driver

The analog output signals from the controllers to evaporator controlling actuators are 0–10 V type from the factory. It is possible purchase Danfoss stepper motor drivers EKF 1A to drive 1 stepper motor valve and EKF 2A to drive 2 stepper motor valves as accessories that can be installed and wired by the customer. Stepper motor drivers change the analog output signal at the panel terminal from 0–10 V to a stepper motor signal that may be configured according to the stepper motor valve's specification.

Figure 14: Stepper Motor Driver



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