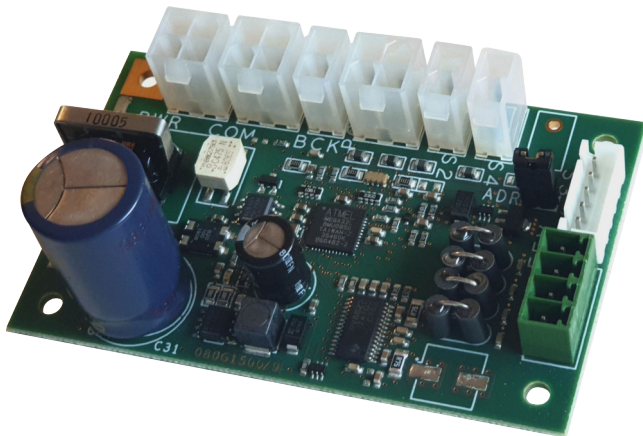


Data Sheet

# Superheat controller Type **EIM 365 (PV01)**

For commercial air conditioning and refrigeration applications



EIM 365 is a superheat controller that can be used to control the superheat of the evaporator by adjusting the opening degree of a valve. It is used in applications such as air conditioning, heat pumps and refrigeration. The controller can also be used as stepper valve driver by setting the valve opening degree manually via communication Bus.

**Benefits:**

The evaporator is charged optimally for various load and suction pressure variations. Increase Energy Efficiency by ensuring optimum utilization of the Evaporator. It controls EEV in microsteps providing a smooth superheat curve and less noise.

**Features:**


- Superheat regulation
- Maximum Operating Pressure function (MOP)
- Defrost
- Compressor protection functions
- Manual control via Modbus Communication
- Loss of Charge indication (LOC).

**Portfolio overview**

**Table 1: Portfolio overview**

Features	Specifications
Supply voltage	24 V AC / DC (+ 15%), 50 / 60 Hz, 15 VA / 8 W, Class II isolation
Power Consumption	Idle: Max. 20 mA @ 24 V DC Operating: Max. 900 mA RMS @ 24 V DC
Backup battery	Yes (EKE 2U recommended)
Number of temperature sensors	2
Temperature sensor inputs	<ul style="list-style-type: none"> <li>S2: PT1000</li> <li>S4: PT1000 or Digital input from external contact</li> </ul>
Number of Pressure sensor	1
Pressure Transmitter types	Ratiometric 0.5 – 4.5 V
Sensor Signal Sharing via ModBus	No
Valve Support	ETS 12.5, 25, 50, 100, 250, 400; ETS 6, CCMT 16-42; CTR; ETS Colibri 12-100C and User defined
Superheat Reference Mode	<ul style="list-style-type: none"> <li>MSS</li> <li>LoadAp</li> </ul>
Startup mode	<ul style="list-style-type: none"> <li>Fixed OD</li> <li>P-Control</li> </ul>
Operation	<ul style="list-style-type: none"> <li>Standalone</li> <li>Modbus RS485 (not terminated internally)</li> </ul>
User interface	Modbus to supervisor
Display	None

**Table 2: Related products**

Pressure transducer	Temperature sensor	Electric Expansion valve	M12 Angle Cables
DST P110, AKS 32R, NSK BExx	AKS 21, AKS 11	ETS 6, ETS 12.5-400, ETS Colibri	Various lengths of standard M12 cable are available for connecting stepper motor valves.
			

## Functions

### Acronyms and abbreviations

LOC	Loss of charge indication	Pe (Po)	Evaporator pressure
SH	Superheat	S2	Evaporator refrigerant outlet temperature
MOP	Maximum operating pressure	S4	Evaporator medium outlet temperature
MSS	Minimum stable superheat	OD	Opening degree
Te	Saturated suction temperature	PNU	Parameter number - is equivalent to the modbus register no. (modbus adress + 1)

### Functions

**Table 3: Functions**

Control Modes	<ul style="list-style-type: none"> <li>• <b>Superheat:</b> In superheat mode the controller will control the superheat to be stable and close to the superheat reference.</li> <li>• <b>Manual Control:</b> The valve can be controlled manually by setting the desired opening degree via Modbus.</li> <li>• <b>Evaporator temperature (Te) control for de-humidifying:</b> A function is provided to control on the evaporator temperature instead of the superheat. This can be used to de-humidify the air flowing through the evaporator. By lowering the evaporators surface temperature, the water vapor in the air is condensed.</li> </ul>
Superheat Reference Calculation	<ul style="list-style-type: none"> <li>• <b>Minimum Stable Superheat (MSS):</b> 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".</li> <li>• <b>LoadAP Superheat:</b> LoadAP is a kind of preprogrammed MSS curve. In Load ap application, SH reference follows a defined curve as shown in the diagram. This two-point curve is defined by SH max and SH min, this method will give a robust SH reference and can in many cases be the best fit for systems.</li> </ul>
Protection Features	<ul style="list-style-type: none"> <li>• <b>Superheat close:</b> When the superheat is below a set minimum value, the valve will close faster to protect the compressor from the risk of getting liquid in the suction line and bring the superheat back to superheat reference.</li> <li>• <b>Maximum Operating Pressure (MOP):</b> To reduce the strain on the compressor, a maximum operating pressure is set. If the pressure comes above this limit the controller will control the valve to provide a lower pressure instead of a low superheat.</li> </ul>
Startup Mode	<ul style="list-style-type: none"> <li>• <b>Fixed OD:</b> This function will provide a start opening degree during a fixed start time selected by the user.</li> <li>• <b>P-control:</b> The controller is programmed for auto proportional control that will quickly Change the opening degree based on the superheat of the system. The proportional control is active during the Minimum start time set by the user and until the Super heat crosses the reference.</li> </ul>
Other Functions	<ul style="list-style-type: none"> <li>• <b>Start/stop of regulation:</b> The start or stop of the regulation can be controlled by setting the software main switch, which is accessible via Modbus. It is however also possible to use a digital input from an external Regulation control On / Off switch.</li> <li>• <b>Standalone function:</b> instead of controlling the EIM via Modbus. It is possible to use it in a standalone mode with no external control, except a digital input from the Regulation control on / Off switch. In this configuration some of the other functions will not be available.</li> <li>• <b>Defrost sequence:</b> The controller does not itself handle defrost of the evaporator. It is however possible to enter a special defrost sequence, which will overrule the normal control of the valve.</li> <li>• <b>Loss of Charge indication (LOC):</b> A function is provided to indicate loss of refrigerant charge. This is only indicated by setting an alarm flag which can be accessed via Modbus. No special action is performed by the controller.</li> <li>• <b>Forced opening during off:</b> This can be done by setting a fixed opening degree. When normal control is switched off with the main switch, the valve will keep this opening degree.</li> </ul>

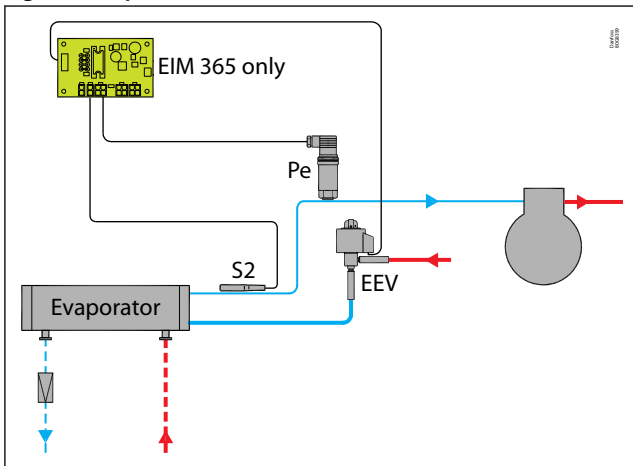
**Applications**

**Superheat control**

For superheat control, EIM implements a PI controller. The actual superheat is calculated based on temperature sensor S2 and pressure sensor Pe values, and the controller will adjust the OD of the valve to bring the superheat to the desired reference. If superheat is too low the flow in the expansion is decreased and superheat will be higher and vice versa.

The EIM 365 controller is designed to be operated via Modbus and to rely on a constant connection to the master controller of the system it is located within. In this configuration the master controller reads the readout registers from the EIM 365 and uses the parameters to change the control behavior of the EIM 365 (see parameter list).

Figure 1: Superheat control



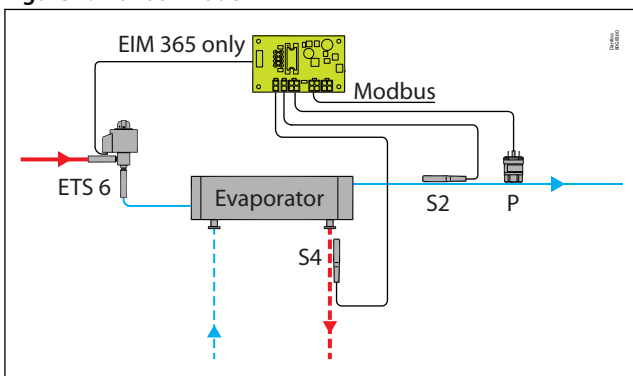
**Evaporator temperature (Te) control for de-humidifying**

For applications with a need to de-humidify the evaporator, it is possible to control on the saturated evaporator temperature instead of the normal control signal.

**Manual control (Stepper driver via Modbus)**

In this application, the EIM 365 is a stepper motor driver, where the valve can be controlled manually by setting the desired opening degree via Modbus.

Figure 2: Manual mode



## Operation

### Operation modes

#### Controller configuration with Modbus

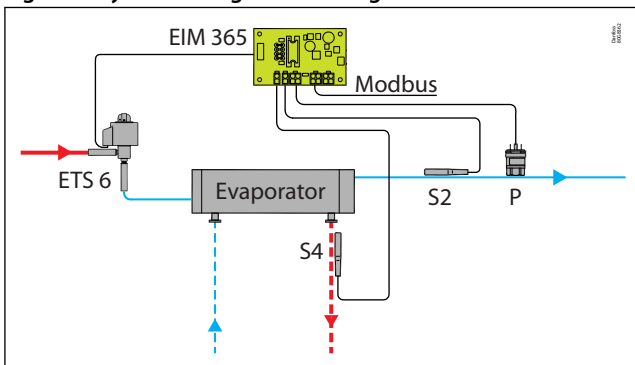
The EIM 365 controller is designed to be operated via Modbus and to rely on a constant connection to the master controller of the system it is located within.

In this configuration the master controller reads the readout registers from the EIM 365 and uses the parameters to change the control behavior of the EIM 365 (check user guide for parameter list).

The following control modes are available:

- MSS/LoadAP superheat control with MSS as default
- Manual control via Modbus
- Defrost
- Maximum Operating Pressure control (MOP)
- Te control (De-humidifying)

Figure 3: System configuration using Modbus

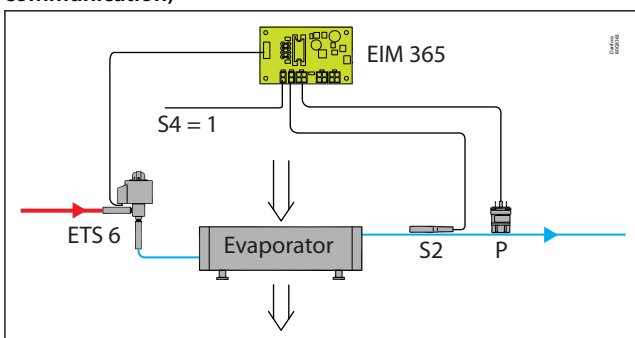


#### Standalone configuration (no Modbus communication)

It is possible to use it as a standalone controller by setting the “HWMainSwitch” to 1. This will setup the S4 input to be used as a digital input main switch. When the main switch is OFF, the valve opening degree will be 0%, when it is ON the opening degree is controlled with the settings in the registers, and the sensor inputs. In this configuration, the following modes are not available:

- Manual control
- Defrost
- Te control (De-humidifying)

Figure 4: Standalone configuration (no Modbus communication)



## **Quick guide for parameter selection**

### **A. Setting controller in Superheat control mode**

Make sure that r12 = 0 (OFF) (ADU 11) and change the settings. The setting will depend on the system requirement.

#### **Enabling Regulation control ON / Off switch (optional)**

HwMainSwitch = 1 (default is 0, i.e., S4 sensor). For standalone configuration it is recommended to enable Regulation control ON / Off switch to control start/stop regulation when needed, otherwise the controller will start regulating when controller is powered up.

#### **Select Refrigerant**

o30 = 1 – 49 (ADU 64)

If a refrigerant is not predefined in list you can select user defined ref and put Antoine constants for the refrigerant.

#### **Select valve setting**

For EIM 365, first select Danfoss valve type (ADU 110). If valve is not preset use user defined and set additional parameters for valve accordingly. See some examples of parameters below.

n37 = 384 x 10 micro step (3840 micro steps = 480 half steps) (ADU 76)

n38 = Max. steps / sec (ADU 77)

#### **Define pressure sensor range in bar absolute (x10)**

o20 = Min. Transducer pressure (ADU 62)

o21 = Max. Transducer pressure (ADU 63)

#### **Define min/max superheat**

**Define SH control type:** SH Mode: 1 = MSS, 2= LoadAP (ADU 118)

n10 = min. superheat reference (ADU 20)

n09 = max. superheat reference (ADU 19)

For fixed superheat define n09 = n10

#### **Define MOP (optional)**

n11 = maximum operating pressure (ADU 23)

#### **Set Startup mode**

For EIM 365, startup mode is always P control. By default this is set to a start up time of 15 secs.

Minimum startup time can be changed using ADU 64324.

#### **To start the superheat control**

Set r12= ON (ADU 11)

### **B. Setting controller in valve driver mode using MODBUS signal**

Make sure that main switch = 0 (OFF) and change the settings so they fit to application:

#### **Select Application mode**

o18 (ADU 36) = 1

i.e., Manual control

First select Danfoss valve type (ADU 110).

#### **Select manual opening degree**

Select if control is in OD or steps (ADU 102), by default EIM 265 is set to OD.

Provide value to o45 Manual OD % (ADU 18)

0 = fully closed, 100 = fully open

If ADU 102 is selected to be in steps then use number of steps as input to ADU 18.

By changing parameter o45 Manual OD, the valve will move accordingly regardless of r12 parameter value.

**Product specification**

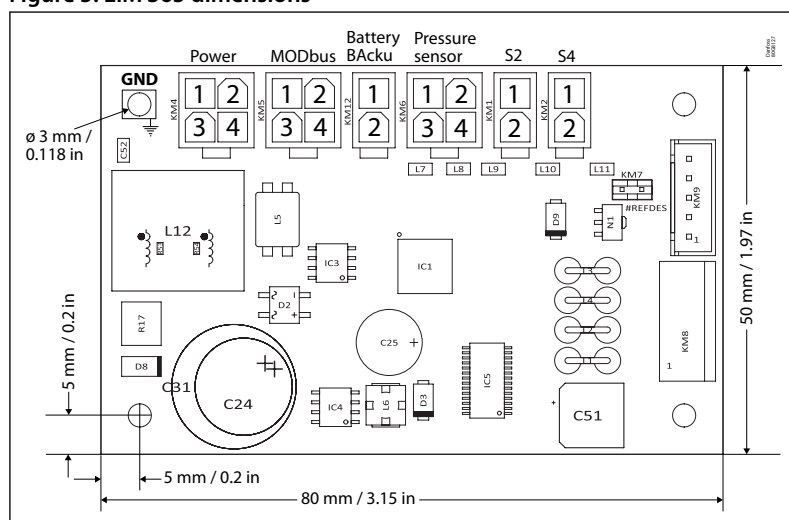
**Technical specification**

**Table 4: Technical specification**

Features	Description
Supply voltage	24 V AC / DC (± 15%), 50 / 60 HZ Galvanically Isolated
Power consumption	Idle: Max. 20 mA @ 24 V DC Operating: Max. 900 mA RMS @ 24 V DC
Input signals	Po AKS 32R (or similar Ratiometric pressure transmitter)
	S2 Measuring range: -60 – +120 °C / -76 – 248 °F
	S4 PT1000 or Digital input from external contact.
EEV Driver	Max. current 900mA RMS Supported valves: ETS 12.5, 25, 50, 100, 250, 400; ETS 6, CCMT 16-42; CTR; ETS Colibri 12-100C and User defined
Data communication	Type RS485 – Modbus RTU (Not terminated internally)
	Baud rate 19200
	Address settings Selectable via Software (default 164)
	Connector Pluggable
	Internal Termination No
	Galvanic isolation No
Environmental conditions	Storage -34 °C to 71 °C / -30 °F to 160 °F
	Operating -25 °C to 60 °C / -13 °F to 140 °F
	Humidity <95% RH, non-condensing
Dimensions	25 × 50 × 80 mm / 0.98 × 1.97 × 3.15 inch
Battery backup	18 – 28 V DC, > 49 VmAh (Recommend using Danfoss EKE 2U)
Operation	Standalone or via MODBUS data communication
Connector type	4 way Mini fit receptacle Molex 39-01-2040 or similar 2 way Mini fit receptacle Molex 39-01-2020 or similar Crimp: 24- 18 AWG Molex 39-020-0039 or similar.
Gateway	Standard RS485 to USB convertor. (eg: ADAM-4561, ICP DAS I-7561U-G) <b>Note:</b> check compatibility of gateway tool with PC operating system
Display	None
PC suite	None (EIM 365 is to be connected and configured using supervisor systems).

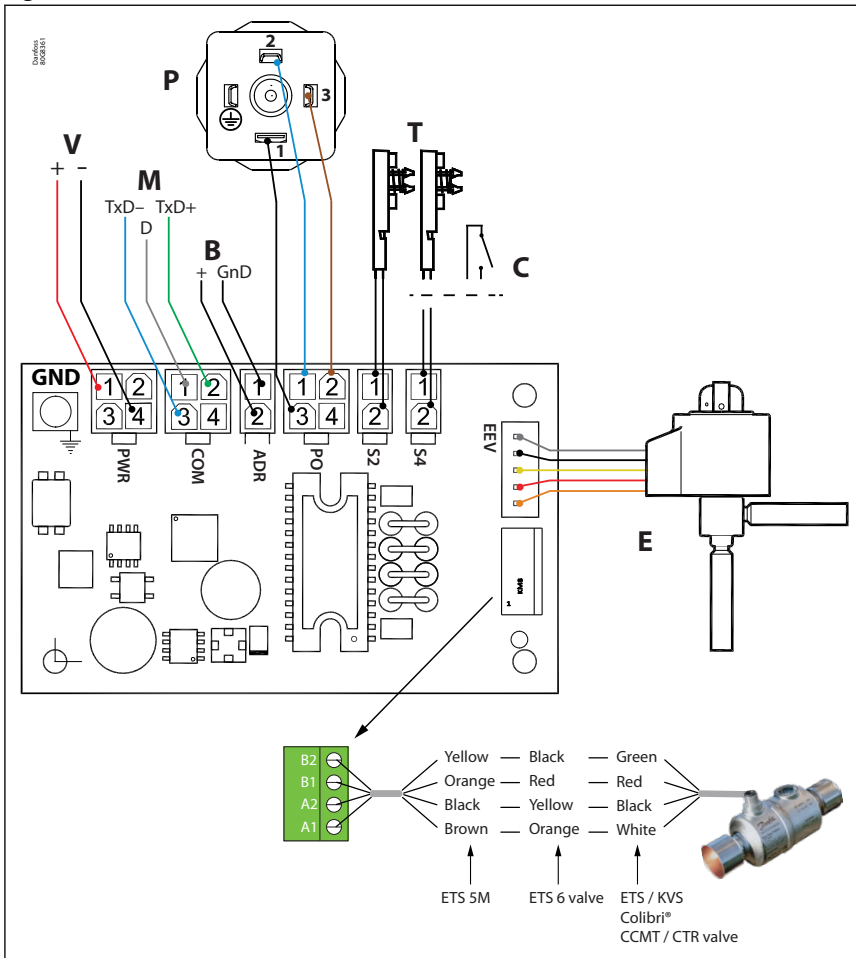
**Dimensions**

**Figure 5: EIM 365 dimensions**



## Connections

Figure 6: EIM 365 connections

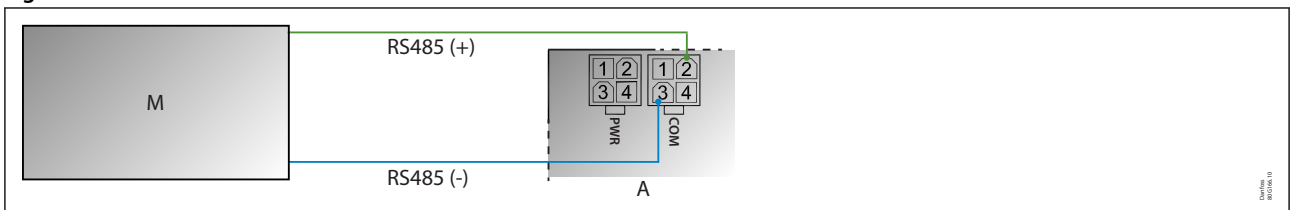


V	Power Supply 24 V AC or DC
P	Pressure transmitter Ratiometric 0.5 – 4.5 V i.e. AKS 32R
M	Modbus to master controller
B	Battery backup
T	Temperature sensors PT 1000 i.e. AKS 11
C	Regulation control On/Off switch (enable parameter HW Main Switch to 1)
E	ETS 12.5, 25, 50, 100, 250, 400; ETS 6, CCMT 16-42; CTR; ETS Colibri 12-100C and user defined

### IMPORTANT:

- The supply voltage is not galvanically separated from the input and output signals, hence it is not recommended to use shared power supply.
- No voltage should be supplied externally, if S4 terminal is setup as a Regulation on/off switch.
- Do not reverse the polarity of the power connection cables or Modbus signal cable else it could damage the terminals.
- EIM should be grounded and measures must be taken during installation to connect the board to a grounding point.

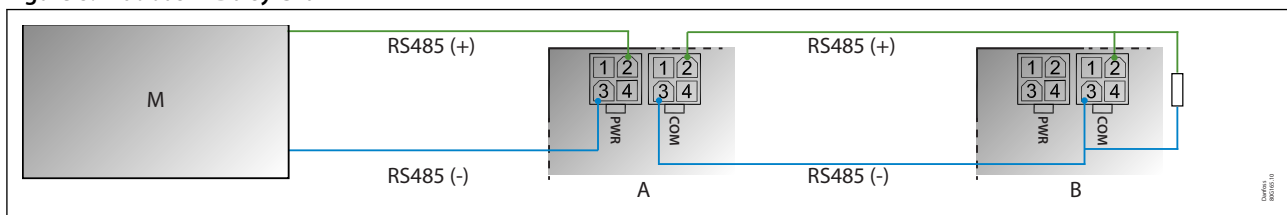
Figure 7: Modbus one to one connection





## Superheat controller, type EIM 365 (PV01)

Figure 8: Modbus in Daisy Chain



<b>M</b>	Master controller	<b>B</b>	EIM slave 2
<b>A</b>	EIM slave 1	<b>R</b>	120 Ohm min. 0.25 Watt termination

**NOTE:**

- Modbus transmission lines usually require termination resistors, especially for longer cable lengths.
- If two EIMs are connected remember to remove the addressing jumper on one of the EIMs. This will change the address of EIM or else change the address of second unit using Modbus.

## Parameters

### Main Menu

Table 5: Main Menu → Control

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>REG Main Menu → Control</b>								
r12	Main switch	0	1	0 - OFF	Enum 1	RW	11	Start/stop of regulation. With this setting the regulation can be started and stopped. This can also be accomplished with the external hardware main switch.
o18	Manual control	0	1	0		RW	36	0 = Superheat control, 1= Manual control
o45	Manual OD %	0	100	0	%	RW	18	Manual opening degree for manual control . Used when the o18 Manual Control is set to 1. 0%/0 step = fully closed, 100%/480 step = fully open. % is chosen by default. See ADU 64309 for changing to step.
n21	SH mode	1	2	1		RW	108	1=MSS, 2=LoadAP
n15	Startup time	1	600	90	s	RW	58	Time for startup state (in seconds)
n17	Startup OD	0	100	32	%	RW	59	Opening degree during startup state
OOD	OD while OFF	0	100	0	%	RW	60	Opening degree during Off state
RAL	Reset alarm	0	1	0		RW	75	1 = clear alarm

### Regulation

Table 6: Regulation → SH control

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>SHC Regulation → SH control</b>								
n09	Max superheat	2,0	50,0	50.0	K	RW	19	Maximum superheat reference setting.
n10	Min superheat	1,0	50,0	4.0	K	RW	20	Minimum superheat reference setting.
n20	KpT0	-1,0	20,0	-1.0		RW	35	Pressure feedback gain. Automatic = -1, OFF = 0 , Fixed = 1 and above
n22	SH close	0,0	16,0	2.0	K	RW	21	Superheat close level. If the superheat goes below
TSH	Tn SH	10	1800	90		RW	22	this value, the valve will close faster
SHL	SH Low	3,0	50,0	6.0	K	RW	24	Superheat close level. If the superheat goes below this value, the valve will close faster

Table 7: Regulation → MOP

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>MOP Regulation → MOP</b>								
n11	MOP	0,0	200,0	200.0	bar	RW	23	Maximum operation pressure. If Pe goes above this value, the controller will control on Pe, and not on superheat
KpM	Kp MOP	0,5	10,0	0.5		RW	31	Kp proportional gain while in MOP control mode
TnM	Tn MOP	30	600	180		RW	32	Tn integration time while in MOP control mode
DMO	Diff MOP	-20,0	0,0	0.0	bar	RW	16	Differential MOP. A remote offset that is added to the MOP. Needs to be written every 5 seconds, else the offset is set to 0.

Table 8: Regulation → Defrost

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>DEF Regulation → Defrost</b>								
DeA	Def Activate	0	1	0		RW	47	Defrost activating
DHO	Def Hold OD	0	100	30	%	RW	48	Defrost holding level
DH1	Def Hold Ti 1	0	32000	120	s	RW	49	Defrost holding timer 1
DH2	Def Hold Ti 2	0	32000	60	s	RW	50	Defrost holding timer 2

## Superheat controller, type EIM 365 (PV01)

**Table 9: Regulation → Te control**

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>TEC</b>	<b>Regulation → Te control</b>							
KpT	Kp Te	0,5	10,0	1.0		RW	33	Kp proportional gain while in Te control mode
TnT	Tn Te	30	600	60		RW	34	Tn integration time while in Te control mode
ter	Te Reference	-200,0	200,0	0.0	C	RW	12	Te reference while in Te control mode

**Table 10: Regulation → External sensors**

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>XSE</b>	<b>Regulation → External sensors</b>							
PEV	ext. EvapPress P0	0	32000	0		RW	14	External evaporator pressure. This value can be used instead of a sensor. This register must be written at least every 5 seconds, otherwise the sensor value will be used.
TS2	ext. S2 temp	-200,0	200,0	0.0	C	RW	15	External S2. This value can be used instead of a sensor. This register must be written at least every 5 seconds, otherwise the sensor value will be used.

**Table 11: Regulation → LOC**

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>LOC</b>	<b>Regulation → LOC</b>							
LTR	LOC Trig	0	100	95	%	RW	37	Trigger value for loss of charge
LRe	LOC Reset	0	100	85	%	RW	38	Reset value for loss of charge
LTm	LOC Timer	0	7200	3600	s	RW	39	Timer to trigger LOC alarm
LST	LOC SH Trig	0,0	50,0	20.0	K	RW	40	SH error trigger level for LOC alarm

## Setup

**Table 12: Setup → Modbus**

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>MBU</b>	<b>Setup → Modbus</b>							
o03	Unit Addr	1	240	165		RW	41	Primary unit address is used when jumper KM7 is mounted
UA2	Unit Addr 2	1	240	164		RW	42	Secondary unit address is used when the jumper KM7 is not mounted
MBa	MB Baud	0	2	1 - 19200	Enum 2	RW	43	Communication setting baud rate, 0=9600 , 1 = 19200, 2 = 38400
MPa	MB Parity	0	2	2 - Even parity	Enum 3	RW	44	Communication setting parity, 0 = no parity, 1 = odd parity, 2 = even
MSB	MB StopB	1	2	1 - 1 stop bit	Enum 4	RW	45	Communication setting stop bit, 1 = 1 stop bit, 2 = 2 stop bit

**Table 13: Setup → Valve**

Label	Description	Min.	Max.	Value/ Type	Unit	RW	ADU	Description
<b>VAL</b>	<b>Setup → Valve</b>							
n03	Valve type	0	17	16 - No valve selected	Enum 9	RW	110	Select the type of Danfoss stepper motor valve from the list. If you want to correct a Danfoss given valve profile. Then first select the relevant valve and then select USER DEFINE. 0 = ETS 12.5 or 25 1 = ETS 50 2 = ETS 100 3 = ETS 250 4 = ETS 400 5 = USER DEFINE 6 = Saginomiya UKV 7 = ETS 6 8 = CCMT 2 4 8 9 = CCMT16 10 = CCMT24 11 = CCMT30 12 = CCMT42 13 = CTR 14 = CCMT 0 15 = CCMT 1 16 = No valve selected 17 = ETS Colibri
n37	Max steps	100	8000	240		RW	76	Maximum number of steps (384 x 10 microsteps = 480 half steps)
n38	Max steps/sec	10	400	16		RW	77	Steps per second
n39	Start backlash	1	100	10	%	RW	78	Backlash (steps) to close in percent at startup (power on).
n40	Backlash	0	100	20	%	RW	79	Backlash (steps) for spindle play compensation. This is active during normal control

## Superheat controller, type EIM 365 (PV01)

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
n56	Motor current	0	900	0		RW	80	Motor current
h22	Holding current	0	100	20		RW	109	Holding current
dcM	Decay mode	0	2	0 - Fast	Enum 10	RW	111	0 = Fast, 1 = Slow, 2 = Mixed

**Table 14: Setup → Refrigerant**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>REF</b>	<b>Setup → Refrigerant</b>							
RFG	Refrigerant	0	49	0 - None	Enum 5	RW	64	Refrigerant setting. 0 = None, 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 = R227, 16 = R401A, 17 = R507, 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 = R452A, 45 = R454B, 46 = R1233zdE, 47 = R1234zeZ, 48 = R449B, 49 = R407H
RF1	Rfg. fac. A1	8000	12000	10428		RW	65	Adiabatic constant A1
RF2	Rfg. fac. A2	-4000	-1000	-2255		RW	66	Adiabatic constant A2
RF3	Rfg. fac. A3	2000	3000	2557		RW	67	Adiabatic constant A3

**Table 15: Setup → Sensors**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>SEN</b>	<b>Setup → Sensors</b>							
r09	Adjust S2	-10,0	10,0	0.0	K	RW	17	S2 Offset adjustment to correct the sensor signal due to long wires etc.
o20	Min transducer pressure	0,0	1,0	0.0	bar	RW	62	Maximum transducer pressure (in bar absolute * 10)
o21	Max transducer pressure	1,0	200,0	16.0	bar	RW	63	Minimum transducer pressure (in bar absolute * 10)

**Table 16: Setup → System**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>SYS</b>	<b>Setup → System</b>							
KT0	Avg KT0 Time	10	3600	180		RW	92	Average time for KT0 used as filtervalue for the average opening degree calculation when calculating the KT0
OD3	Avg OD 3hour	0,0	100,0	10.0		RW	93	Average OD, updated and saved every 3 hours. After power up the last saved average OD is used as starting average OD
HWM	HW main switch	0	1	0 - No DI main switch	Enum 6	RW	61	1 = S4 input is HW Main Switch
eMa	Manual OD as steps	0	1	0		RW	102	Enable the manual OD in o45 to be entered as halfsteps. Readouts are still in percent

## Service

**Table 17: Service → Alarm**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>ReA</b>	<b>Service → Alarm</b>							
eKe	EKC Error	0	1	0 - No alarm	Enum 7	Read	69	Common error flag. EKC Error is SET if any other Error Alarm is ON.
s2E	S2 Error	0	1	0 - No alarm	Enum 7	Read	70	S2 sensor error. If the sensor error occurs, the valve OD will be set to 80% of the Avg. opening (PNU 50021)

## Superheat controller, type EIM 365 (PV01)

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
PeE	Pe inp.error	0	1	0 - No alarm	Enum 7	Read	72	AKS 32R out of range. If the sensor error occurs, the valve OD will be set to 80% of the Avg. opening (PNU 50021)
RfE	No Rfg. Sel.	0	1	0 - No alarm	Enum 7	Read	73	Refrigerant not selected
LAL	LOC Alarm	0	1	0 - No alarm	Enum 7	Read	10	Loss of charge alarm. No action will be performed except setting the alarm.

**Table 18: Service → ReadOut**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>ReO</b>	<b>Service → ReadOut</b>							
u16	S4 air temp	-200,0	200,0	0.0	°C	Read	3	S4 temperature in °C measured with PT 1000 sensor connected to KM2
SHr	Superheat Ref	0,0	100,0	0.0	K	Read	7	Current superheat reference
u21	Superheat	0,0	100,0	0.0	K	Read	8	Current superheat (S2 - evaporator temperature)
u20	S2 Temp	-200,0	200,0	0.0	°C	Read	2	S2 temperature in °C measured with a PT 1000 sensor connected to KM1.
u24	Opening %	0	100	0	%	Read	9	Actual opening degree
u25	Evap Press Pe	-200,0	200,0	0.0	bar	Read	1	Evaporator pressure measured with ratiometric pressure transmitter at KM6.
u26	Evap Temp T	-200,0	200,0	0.0	°C	Read	6	Evaporator temperature (converted from evaporator pressure)
LTM	LOC Tmr	0	2000	0		Read	84	Loss Of Charge time
avo	Avg opening	0	2000	0	%	Read	85	Average opening degree. If it has never run before it will give the value of PNU 50021 at start up.

**Table 19: Service → Control status**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>Sta</b>	<b>Service → Control status</b>							
cst	Control State	0	5	0 - Close	Enum 8	Read	83	Current state of internal control state machine.
ctr	Ctrl Status	0	20000	0		Read	5	Bit mapped status register.

**Table 20: Service → Factory**

Label	Description	Min.	Max.	Value/Type	Unit	RW	ADU	Description
<b>U2F</b>	<b>Service → Factory</b>							
U2F	User to factory	0	1	0		RW	82	Controller will make the current settings to be its future factory default state.
F2U	Factory to user	0	1	0		RW	81	Apply defaults: On setting the original factory defaults values corresponds to its software version will be loaded. Warning: All the customized settings will be deleted and cannot be recovered on setting this value. The value will revert back to zero once the factory settings has been applied.

## Ordering

### **Product part numbers**

Table 21: Product part numbers

Description	Pack format	Code No.
EIM 365	Single pack	080G1003

### **Accessories**

Table 22: Accessories

Description	Pack format	Code No.
Connector kit for 5x EIM Controller	Single pack	080G1601
EKE 2U battery backup	Single pack	080G5555

## Certificates, declarations, and approvals

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

Some approvals may change over time. You can check the most current status at [danfoss.com](http://danfoss.com) or contact your local Danfoss representative if you have any questions.

Table 23: Approvals

		
---	---	---

## Online chapter

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

### The Danfoss Product Store



The Danfoss Product Store is your one-stop shop for everything product related—no matter where you are in the world or what area of the cooling industry you work in. Get quick access to essential information like product specs, code numbers, technical documentation, certifications, accessories, and more.

Start browsing at [store.danfoss.com](https://store.danfoss.com).

### Find technical documentation



Find the technical documentation you need to get your project up and running. Get direct access to our official collection of data sheets, certificates and declarations, manuals and guides, 3D models and drawings, case stories, brochures, and much more.

Start searching now at [www.danfoss.com/en/service-and-support/documentation](https://www.danfoss.com/en/service-and-support/documentation).

### Danfoss Learning



Danfoss Learning is a free online learning platform. It features courses and materials specifically designed to help engineers, installers, service technicians, and wholesalers better understand the products, applications, industry topics, and trends that will help you do your job better.

Create your Danfoss Learning account for free at [www.danfoss.com/en/service-and-support/learning](https://www.danfoss.com/en/service-and-support/learning).

### Get local information and support



Local Danfoss websites are the main sources for help and information about our company and products. Find product availability, get the latest regional news, or connect with a nearby expert—all in your own language.

Find your local Danfoss website here: [www.danfoss.com/en/choose-region](https://www.danfoss.com/en/choose-region).

---

#### Danfoss A/S

Climate Solutions • [danfoss.com](https://danfoss.com) • +45 7488 2222

Any information, including, but not limited to information on selection of product, its application or use, product design, weight, dimensions, capacity or any other technical data in product manuals, catalogues descriptions, advertisements, etc. and whether made available in writing, orally, electronically, online or via download, shall be considered informative, and is only binding if and to the extent, explicit reference is made in a quotation or order confirmation. Danfoss cannot accept any responsibility for possible errors in catalogues, brochures, videos and other material. Danfoss reserves the right to alter its products without notice. This also applies to products ordered but not delivered provided that such alterations can be made without changes to form, fit or function of the product.

All trademarks in this material are property of Danfoss A/S or Danfoss group companies. Danfoss and the Danfoss logo are trademarks of Danfoss A/S. All rights reserved.