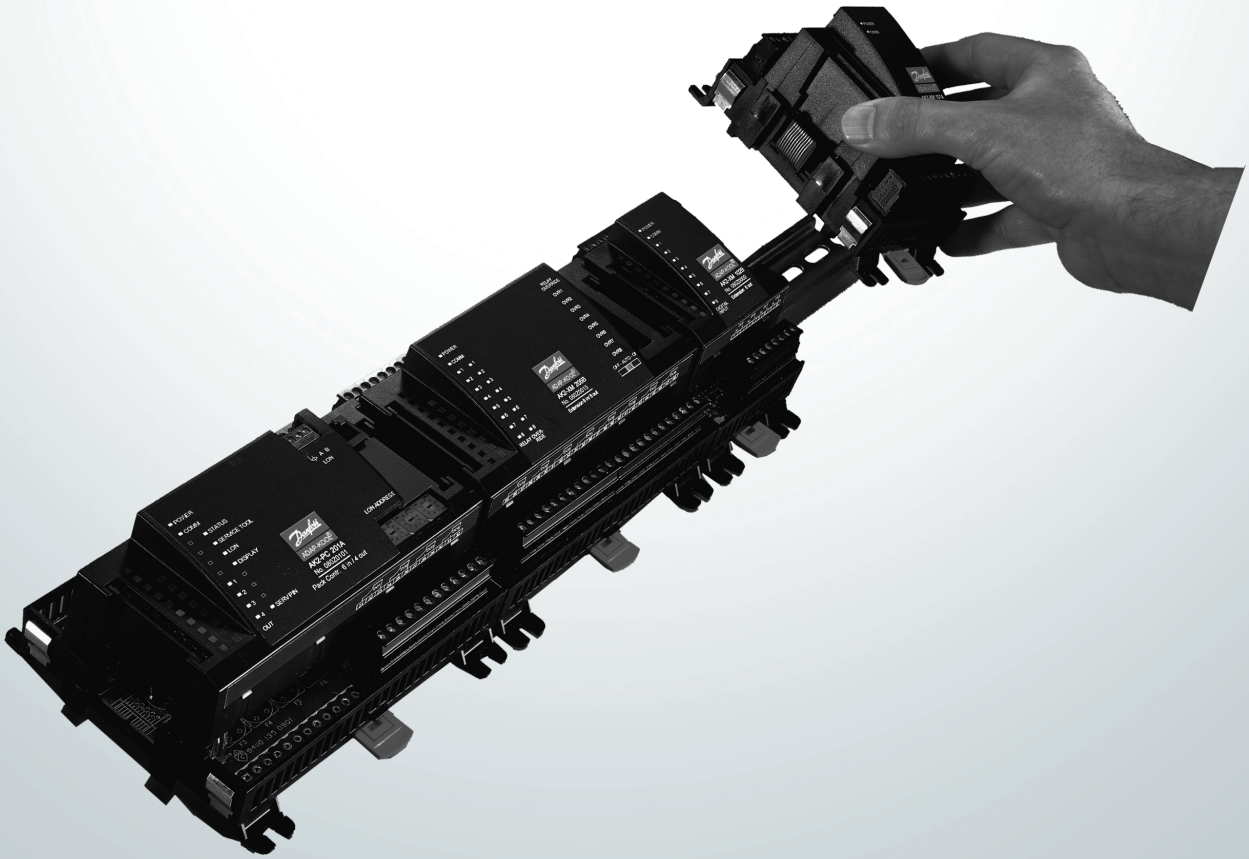
ENGINEERING
TOMORROW

User Guide

Controller for evaporator control
AK-CC 750

ADAP-KOOL® Refrigeration control systems



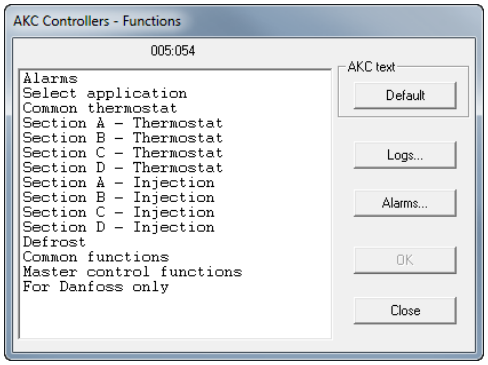
Menu list

This menu function can be used together with system software type AKM. The description is divided up into function groups that can be displayed on the PC screen. Within each group it is now possible to show the measured values, or settings. Regarding the use of AKM, reference is made to the AKM Manual.

Validity

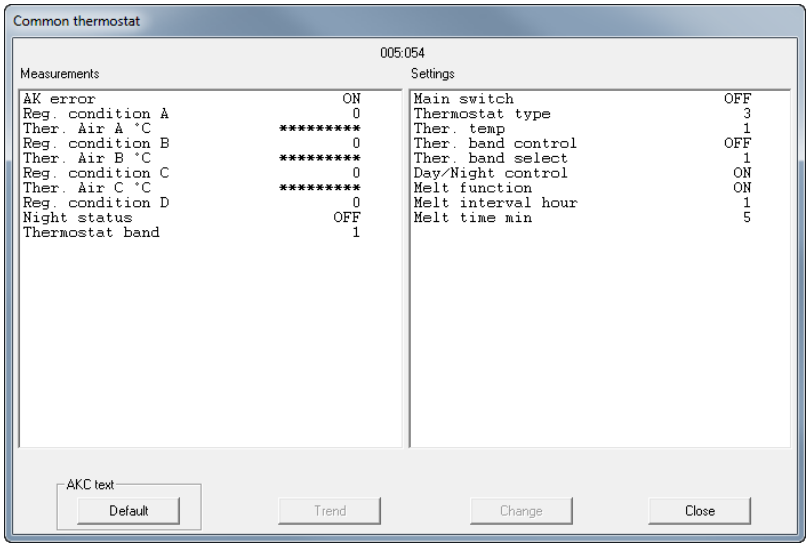
This menu operation (from May 2015) applies to controller type AK-CC 750, code Nos 080Z0125 with programme version 6.5x.

Function groups



The operation is divided up into several function groups. When a selection has been made, push "OK", and you may continue to the next display. By way of example, "Common thermostat" has been selected here.

From the measure line the different values can be read. The values are constantly updated.
In the list of settings the set values can be seen. If a setting has to be changed, select the parameter and proceed via "OK".



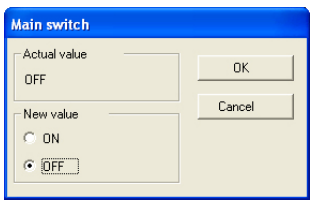
Measurements

The various measurements can be read directly. If a graphic display of the measurements is required, up to eight of them can be shown. Select the required measurements and push "Trend".

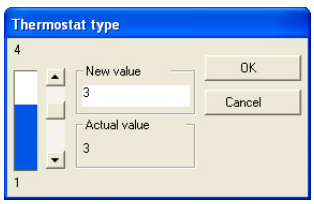
Settings

Settings can only be made for the daily operation. Configuration settings cannot be seen, changed or written out. They can only be made from the Service Tool programme.

There are four kinds of settings, ON/OFF settings, settings with a variable value, time settings and "reset alarms".



Set the required value and push "OK"



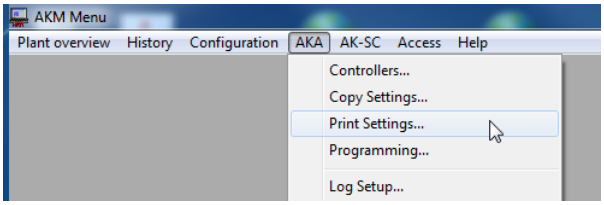
Enter the new value or move the sliding scale up or down. The new value will apply, when "OK" is pushed.

Go through the individual functions one by one and make the required settings. When settings have been made for one controller, the set values may be used as basis in the other controllers of the same type and with the same software version. Copy the settings by using the copy settings function in the AKM programme, and adjust subsequently any settings where there are deviations.

NB! If a list is required for noting down the individual settings, a printout can be made of it with a function in the AKM programme. Read the next section, "Documentation".

Documentation

Documentation of the settings of the individual controllers can be made with the print function in the AKM programme. Select the controller for which documentation of the settings is required and select the "Print Settings" function (cf. also the AKM Manual).



Functions

Shown below are function groups with corresponding measurements and settings. A printout of the given settings can be made using the AKM function "Print Settings" (see above).

Select application

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3= Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	No. of evaporators	Readout number of evaporators
	Valve type	Readout of selected valve type 0 = Valve type not selected, 1= AKV, 2 = Solenoid valve 3 = Stepper (ETS) 4 = Analog output 5 = CCMT
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	Configuration lock	Locking configuration To implement changes of certain parameters, the configuration lock must be "open". Note: "Main switch" must be turned OFF to open configuration 0: Open 1: Locked
	Pre-configured Appl.	0: Not selected 1: Group 1. See manual 2: Group 2. See manual
	Appl. selection	Selection of predefined configurations. When this is selected, all the controller settings and the definitions of input and output will be adjusted to fit the selected application. See manual.
	Refrigerant	Refrigerant selection 0= not selected, 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 defined.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(XP10). 37=R407F. 38=R1234ze. 39=R1234yf.

Common thermostat

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3 = Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	Night status	Status of night setback function ON: Thermostat cutout value to be raised by "Night setoff" setting OFF: Normal situation (day)
	Thermostat band	Actual thermostat band: 1= Band 1 and 2=Band 2
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	Thermostat type	Select thermostat type: 1: One common valve for all evaporators / Common ON/OFF Here, only one valve is used for all evaporators. The temperature is controlled by an ON/OFF thermostat based on the settings in section A. 2: One valve per evaporator / common ON/OFF Here, one valve is used per evaporator. The temperature in all of the evaporator sections is controlled by an ON/OFF thermostat based on the settings in section A. 3: One valve per evaporator / individual ON/OFF Here, one valve is used per evaporator. The temperature is individually controlled by ON/OFF in each evaporator section. 4: One valve per evaporator / individually modulating Here, one valve per evaporator is used. The temperature is controlled individually in each evaporator section based on modulating principle.
	Ther. temp.	Selection of thermostat sensors when common thermostat in section A is applied 1 = Weighted value between S3 and S4 sensors in section A 2 = Minimum value of all S3 sensors 3 = Average value of all S3 sensors 4 = Maximum value of all S3 sensors 5 = Minimum value of all S4 sensors 6 = Average value of all S4 sensors 7 = Maximum value of all S4 sensors
	Ther. band control	Select thermostat band function active
	Ther. band select	Select thermostat band: 1 = Thermostat band 1 is active, 2 = Thermostat band 2 is active
	Day/Night control	Select day/night function (yes/no)
	Melt function	Select melt function (yes /no)
	Melt interval hour	Set time interval between melt functions
	Melt time min	Set melt time

Section A - Thermostat

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3 = Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	Actual Cutin A °C	Actual cutin value for thermostat in section A
	Actual Cutout A °C	Actual cutout value for thermostat in section A
	Alarm Air A °C	Actual air temperature for alarm thermostat
	S3A °C	Temperature at S3 sensor in section A
	S4A °C	Temperature at S4 sensor in section A
	Ther. runtime A min	Duration of latest or ongoing thermostat cutin time
	Product temp. A °C	Actual air temperature for product sensor
	LLSV open degree A	Opening degree for solenoid valve in liquid line (PWM control only)
	Duty cycle 24h A %	Percentage of time during the latest 24 hour period where thermostat has been cut in
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	Ther. air S4% Day	Thermostat setting. S4 weighting by day. S3 is automatically weighted.
	Ther. Air S4% Night	Thermostat setting. S4 weighting by day. S4 is automatically weighted
	Cutout °C	Setting of thermostat cutout value Section A
	Diff. K	Setting of thermostat differential Section A
	Night setback K	Night setback value section A
	Alarm thermostat	Select alarm thermostat
	Alarm Air S4%	Alarm thermostat setting. Weighting of S4. S3 is automatically weighted.
	High limit °C	Set high alarm limit for alarm thermostat
	High delay min	Time delay for high temperature alarm during normal regulation
	High del. pulld. min	Time delay for high temperature alarm after startup or during defrost
	Low limit °C	Set low alarm limit for alarm thermostat
	Low delay min	Time delay for alarm when too low temperature is registered

Section B - Thermostat

Same settings as above for section B

Section C - Thermostat

Same settings as above for section C

Section D - Thermostat

Same settings as above for section D.

Section A - Injection

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3= Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	Opening A %	AKV (ETS) valves opening degree (%)
	Te temp. °C	Evaporating temperature measured in °C
	S2A °C	Gas outlet temperature on evaporator
	Superheat A K	Superheat
	Superheat Ref. A	Reference for superheat in section A
	AFident	Registered evaporator characteristic (Learning factor)
	Tc temp °C	Condensing pressure in °C. Receives from system manager
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	AKV Injection Ctrl.	Injection function (OFF = no injcection)
	Superheat min. K	Min. superheat measured in K
	Superheat max. K	Max. superheat measured in K
	Superheat close K	Superheat value where the valve is completely closed. The value must be set at a minimum of 1K lower than "Superheat min K".
	MOP control	MOP function
	MOP temperature °C	Setting of MOP temperature in °C
	Expert settings for AKV valve control – only for trained personnel:	
	SH Kp min	Amplification factor Kp when relevant superheat is close to reference
	SH Kp Max	Amplification factor Kp when relevant superheat is far from reference
	SH Tn	Integration time for superheat control
	SH Band	Defines superheat band for amplification factor above and below reference
	P – gain	P factor when superheat is close to reference
	To – gain	Kp factor for Pe pressure feedback compensation
	AFident Force	Manual preset evaporator characteristic (Learning factor)
	MTR Kp	Amplification factor for PI regulation for modulating temperature regulation
	MTR Tn	Integration time for modulating temperature regulation
	Expert settings for modulating temperature control with solenoid valves:	
	PWM period	Period for pulse width modulation
	PWM Max OD	Maximum duty cycle for solenoid valves as percentage of time
	PWM Min OD	Minimum duty cycle for solenoid valves as percentage of time
	PWM Kp	Amplification factor for PI regulation
	PWM Tn sec	Integration time for PI regulation

Section B - Injection

Same settings as above for section B

Section C - Injection

Same settings as above for section C

Section D - Injection

Same settings as above for section D

Defrost

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3= Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	Defrost condition A	Defrost condition for section A 0: no defrost 1: Pump down 2: Delay 3: Defrost 4: Wait after defrost 5: Drip-off 6: Drain delay 7: Fan delay 8: Defrost (special)
	Defrost condition B	Defrost condition for section B. Same settings as for Defrost Condition A
	Defrost condition C	Defrost condition for section C. Same settings as for Defrost Condition A
	Defrost condition D	Defrost condition for section D. Same settings as for Defrost Condition A
	Defrost temp. A	Temperature at defrost sensor in section A
	Defrost temp. B	Temperature at defrost sensor in section B
	Defrost temp. C	Temperature at defrost sensor in section C
	Defrost temp. D	Temperature at defrost sensor in section D
	AD status A	Status on adaptive defrost 0: Signal error 1: Tuning 2: OFF 3: No ice build-up 4: A little ice build-up 5: Medium ice build-up (start of defrost) 6: Heavy ice build-up
	AD status B	Status on adaptive defrost. Same setting as for Adaptive defrost status A

	AD status C	Status on adaptive defrost. Same setting as for Adaptive defrost status A
	AD status D	Status on adaptive defrost. Same setting as for Adaptive defrost status A
	Defrost time A min	Actual defrost cutin time or duration of the latest finished defrosting period in section A
	Defrost time B min	Actual defrost cutin time or duration of the latest finished defrosting period in section B
	Defrost time C min	Actual defrost cutin time or duration of the latest finished defrosting period in section C
	Defrost time D min	Actual defrost cutin time or duration of the latest finished defrosting period in section D
	No. of defrost	Accumulated number of defrosts
	No. of saved defrost	Accumulated number of defrosts skipped as a result of adaptive defrost function
	Suction valve	Status on suction line valve (hot gas)
	Drain valve	Status on drain valve (hot gas)
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	Defrost control	Select defrost. Yes/no
	Defrost type	Select defrost type 1: Electric defrost 2: Naturally defrost 3: Hot gas 4: Warm brine
	Manuel start defrost	Start of manual defrost. Activated by ON.
	Manuel stop defrost	Stop of manual defrost.
	Defrost schedule	Select defrost start schedule: 1 = Local: The internal defrost start schedule is applied 2 = Network: Defrost start via network system unit schedule
	Max defrost interval	Maximum time between two defrosts. In the case of the application of defrost schedule, set interval time to a higher value than the longest time between two defrost in the schedule. .
	Fan run during def.	Setting of fan operation during defrost.
	Defrost stop method	Select whether defrost is to be stopped by time or temperature 1 = Defrost stopped by time 2 = Defrost stopped by temperature with time as security (individual outputs) 3 = Defrost stopped by temperature with time as security (shared output)
	Defrost stop sensor	Select defrost stop sensor 1: Stop on time 2: Stop on S2 3: Stop on S3 4: Stop on S4 5: Stop on S5-1 6: Stop on S5-1 and S5-2 (when both sensors has reached the stop temperature)
	Defrost stop temp. A	Set defrost stop temperature for section A
	Defrost stop temp. B	Set defrost stop temperature for section B
	Defrost stop temp. C	Set defrost stop temperature for section C
	Defrost stop temp. D	Set defrost stop temperature for section D
	Max. Defr. time min.	Max. Permissible defrost time in minutes. (security time on tempeature stop)
	Pump down delay min	Time delay before start of defrost. The valve is closed and the evaporator is emptied of refrigerant.
	Drip delay min	Time delay after defrost where drops of water run off the evaporator.
	Drain delay	Drain delay where drain valve is open to ensure equalizing after defrost. Only apply for hot gas defrost.
	Fan delay min	Max. time delay from injection start and until the fans start (freezing of water drops)
	Drip tray heater del.	Set how long the drip tray heating element is to remain active after defrost is stopped by time or temperature.
	Fan start temp. °C	Setting of S5 temperature for start of fans
	Max. hold time min	Max. time delay for start of refrigeration when the controller's defrost is coordinated with other controllers via the data communication
	AD mode	Setting of adaptive defrost 0: No adaptive defrost function 1: Monitor. This function is applied solely to monitor the ice formation on the evaporator 2: Skip during the day. This function is applied to skip unnecessary defrost during the day and when a night blinds is used for the specific appliance. 3: Skip both day/night. This function skips unnecessary defrost and can be applied to cold storage rooms and frost rooms and refrigeration appliance where night blinds cannot be used 4: Fully adaptive defrost. This function starts a defrost if a medium ice formation is detected (does not skip defrost). This setup can advantageously be applied to cold storage rooms and freezer rooms where the time of defrost is not important.

Common functions

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3= Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	Fan status	Status on fan
	Rail heat status	Status on rail heat
	Actual dew point	Actual dew point received from the network system unit
	Light status	Status on light
	Blinds status	Status on night blinds (ON = Night blinds open)
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	Pulse fans mode	Select fan pulsation 0: no pulse 1: Pulse in thermostats cut out period 2: Pulse in thermostats cutout period during night
	Fan ON %	Setting of the fans ON period in percentage of the time.
	Fan duty cycle	Period time for total ON/OFF time
	Rail heat control	Select method for rail heat control 0 = No rail heat control 1 = Rail heat control according to day/night 2 = Rail heat control according to actual dew point received from network system unit
	Rail ON Day %	During day operation: Setting of rail heat ON-period in percentage of the time.
	Rail ON Night %	During night operation: Setting of rail heat ON-period in percentage of the time.
	Rail duty cycle min	Period time for total ON/OFF time
	Dew point max lim	Maximum dew point limit with rail heat 100% ON
	Dew point min lim	Minimum dew point limit – under this limit the rail heat will operate with a period defined in "Rail Min ON"
	Rail Min ON%	Period for rail heat with a dew point lower than "Dew point min lim"
	Light mode	Select light control function 0: No light function 1: Light controlled according to day/night function (light ON during the day) 2: Light controlled via network signal 3: Light controlled via door switch
	Door switch mode	Door contact function 0: no door contact 1: Door alarm function 2: Door alarm as well as stop of injections and fans
	Cooling restart min	If the door has not been closed by the expiry of this time delay refrigeration will be restarted (only if "Door switch mode" is set at 2)

	Door alarm delay	Delay on door alarm
	Case shutdown mode	Select how the case shall shut down, when the signal receives 0: Function not used 1: Fans continues. Light follows the normal sequence 2: Fans stops immediately. Light turn off immediately 3: Fans stops at expire of delay. Light follows the normal sequence 4: Fans stops at expire of delay. Light turn off at expire of delay
	Fan/Light del shtdw	Delay times for shut down. Setting 3 and 4.

Master control

Measurements	AK error	When "ON", the controller is in alarm condition.
	Reg. condition A	Regulation condition for section A 0 = Main switch interrupted 1 = Startup 2 = Adaptive regulation 3= Fill evaporator 4 = Defrost 5 = Startup after defrost 6 = Forced closing 7 = Injection problem 8 = Emergency cooling (sensor error) 9 = Modulating thermostat regulation 10 = Melt function active 11 = Door open 12 = Appliance cleaning 13 = Cutout thermostat 14 = Forced cooling 15 = Case shut down/stop
	Ther. Air A °C	Actual air temperature for thermostat in section A
	Reg. condition B	Regulation condition for section B. Same as for Reg. condition A
	Ther. Air B °C	Actual air temperature for thermostat in section B
	Reg. condition C	Regulation condition for section C. Same as for Reg. condition A
	Ther. Air C °C	Actual air temperature for thermostat in section C
	Reg. condition D	Regulation condition for section D. Same as for Reg. condition A
	Ther. Air D °C	Actual air temperature for thermostat in section D
	MC Defrost relays	This readout is used for coordination of defrost via data communication
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	MC Night signal	This setting is used for control of day/night function via data communication
	MC Light signal	This setting is used for control of light via data communication
	MC Forced Close	This setting is used for forced closing of injection valve via data communication
	MC Defrost start	This setting is used for start of defrost via data communication
	MC Defrost hold	This setting is used for coordination of defrost via data communication
	MC Forced cooling	This setting is used for forced cooling via data communication
	MC Case Shutdown	This setting is used for case shut down via data communication
	MC Dewpoint	The signal can not be delivered from a AKA gateway.

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