

ENGINEERING  
TOMORROW

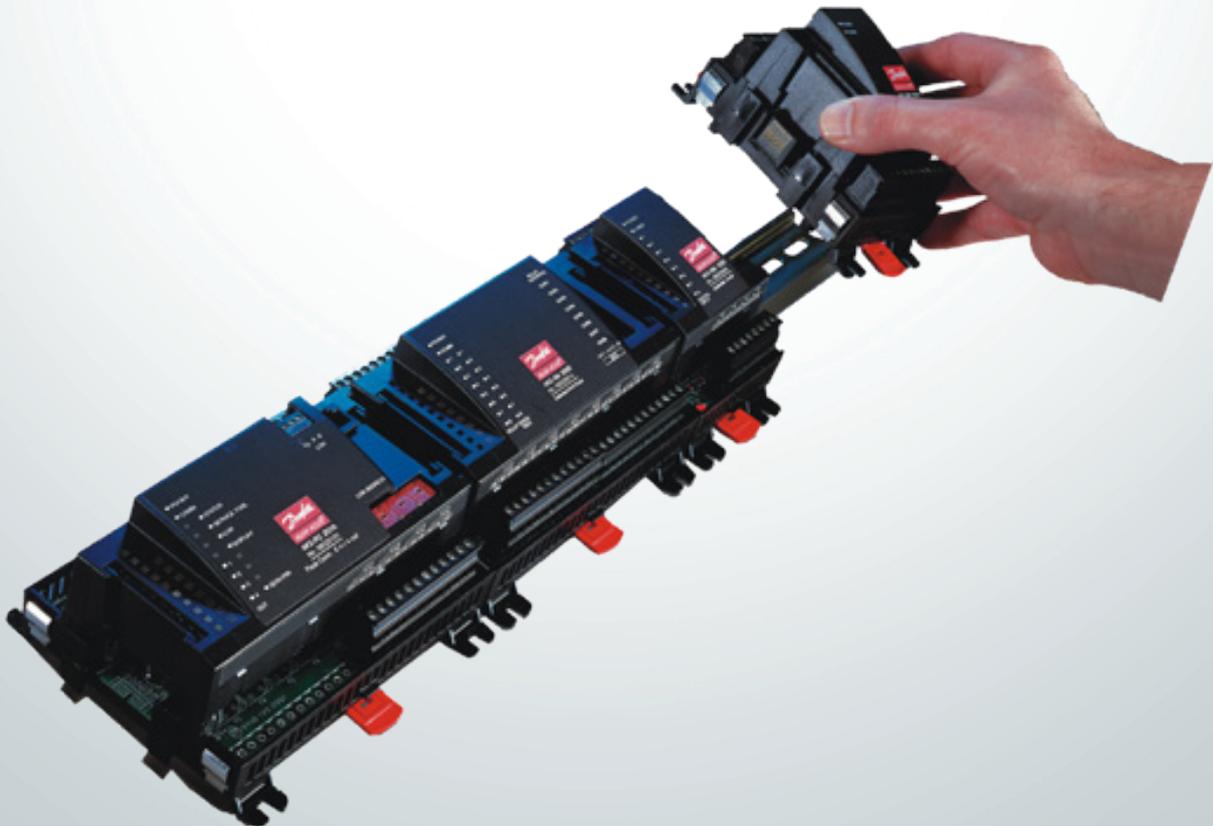
*Danfoss*

User Guide

# Capacity controller with heat recovery

## AK-PC 781

ADAP-KOOL® Refrigeration control systems



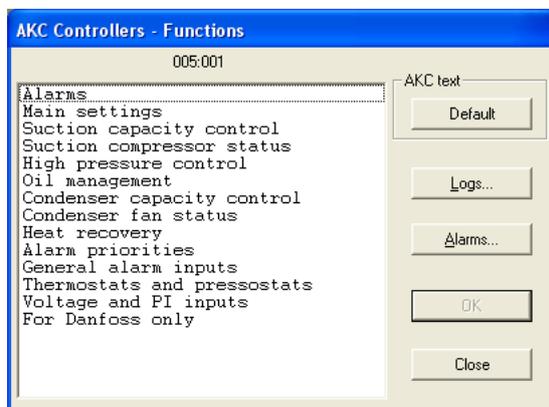
## Menu list

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 March 2013) applies to controller type AK-PC 781, code number 080Z0186 / 080Z0187 / 080Z0188 / 080Z0189 / 080Z0190 with programme version 4.1x.**

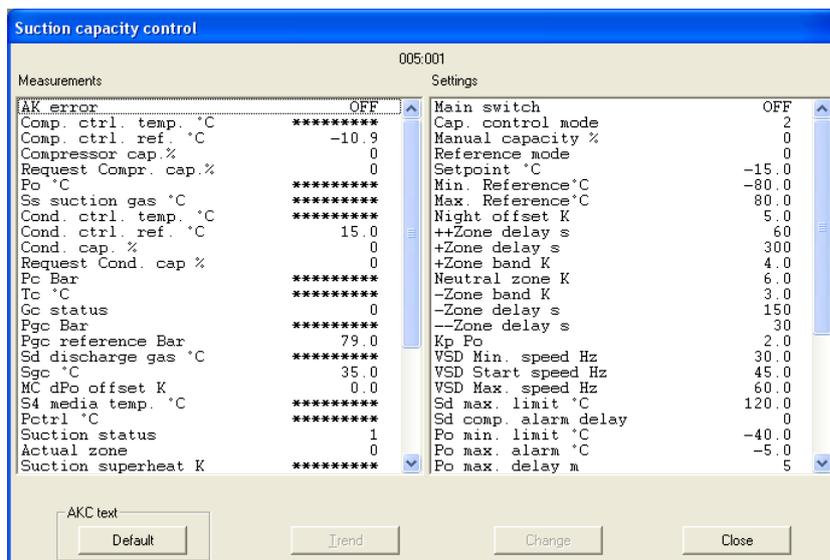
## Function groups



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, "Suction capacity control" 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".



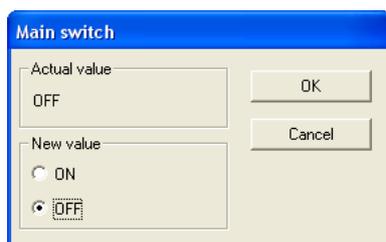
## Measurements

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".

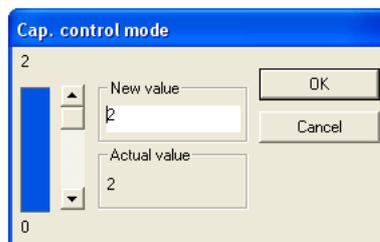
## Settings

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"



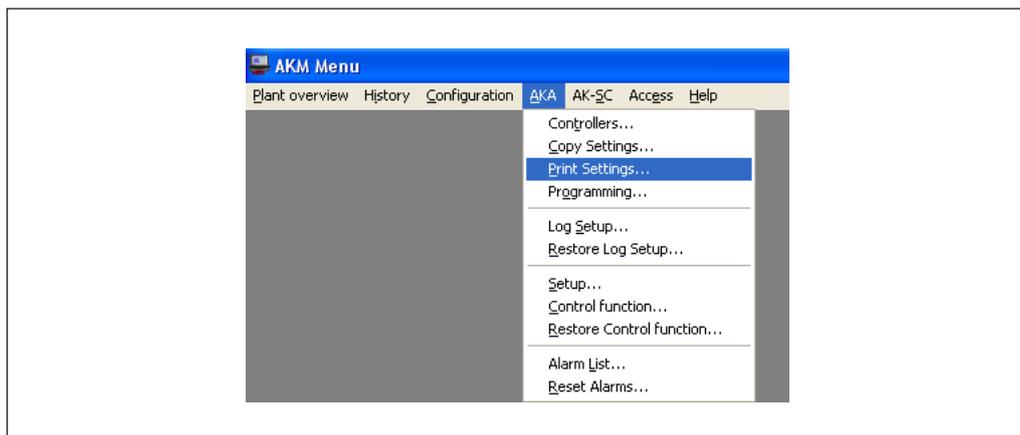
Enter the new value or move the sliding scale up or down. The new value will apply, when "OK" is pushed.

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).

### Note

It has been necessary to make selections among the many measurements and settings coming from the controller.  
 The operation from the AKM programme cannot contain them all.  
 If there is a need for access to all measurements and settings, you should make use of Service Tool type AK-ST 500.

## Main settings

Measurements	AK error	When "ON", the controller is in alarm condition.	
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)	
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)	
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)	
	Request Compr. Cap %	Reference for compressor capacity (deviations may be due to time delays)	
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)	
	Ss Suction gas °C	Actual suction gas temperature	
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)	
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)	
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)	
	Request Cond. cap %	Reference for condenser capacity	
	Pc Bar	Condensing pressure (measured with the pressure transmitter)	
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)	
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.	
	Pgc Bar	Actual gas cooler pressure	
	Pgc reference bar	Actual reference for gas cooler pressure	
	Sd discharge gas °C	Actual discharge gas temperature	
Sgc °C	Actual temperature at outlet from the gas cooler		
External Main Switch	Status of input "Extern Main Switch". In pos. "OFF" the regulation is stopped by force		
Settings	Main switch	Main switch:	ON: Regulation OFF: Controller stopped
	Configuration lock	Lock of configuration. In order to select quick setup or select refrigerant type, the configuration lock must be "open". Note: "Main switch" must be OFF in order to set configuration lock in "open" position 0: Open 1: Locked	
	Refrigerant type Po	Select refrigerant type 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=XP10. 37=R407F.	

## Suction capacity control

Measurements	AK error	When "ON", the controller is in alarm condition.	
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)	
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)	
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)	
	Request Compr. Cap %	Reference for compressor capacity (deviations may be due to time delays)	
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)	
	Ss Suction gas °C	Actual suction gas temperature	
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)	
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)	
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)	
	Request Cond. cap %	Reference for condenser capacity	
	Pc Bar	Condensing pressure (measured with the pressure transmitter)	
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)	
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.	
	Pgc Bar	Actual gas cooler pressure	
	Pgc reference Bar	Actual reference for gas cooler pressure	
	Sd discharge gas °C	Actual discharge gas temperature	
Sgc °C	Actual temperature at outlet from the gas cooler		
MC dP0 offset K	Actual displacement value for the suction pressure in connection with a "P0 Optimiser" function (Master control function in AKA gateway)		

	S4 media temp. °C	Actual media temperature measured at S4 sensor (Only used if S4 is selected as control sensor)
	Pctrl °C	Actual regulation pressure measured with Pctrl pressure transmitter (cascade pressure)
	Suction status	0: Power up Controller has been powered up (power supply re-connected) 1: Stopped Capacity control has been stopped ("Main switch" = OFF or "Control mode" = OFF) 2: Manual Capacity is controlled manually ("Control mode" = MAN) 3: Alarm Capacity control is in alarm condition (fx. alarm on Po Min or Pc Max) 4: Restart Capacity control is waiting for elapse of "Restart time" 5: Standby Capacity control is ready to start 6: State off timer 7-10: State on timer 11: Unloaded 12-14: Unload cutin 15: Full loaded All capacity cutin 16: Running Capacity control is running
	Actual Zone	Actual zone for capacity regulation: 0: P0-error 1: - - Zone 2: - Zone 3: NZ 4: + Zone 5: + + Zone
	Suction superheat K	Actual superheat
	Night Setback	Status of night setback function ON: Night (An increase of the evaporating pressure is permitted) OFF: Normal situation
	Load shed 1	Actual status on Load shed input 1
	Load shed 2	Actual status on Load shed input 2
	Injection ON	Status of the "Injection ON" function (earlier mentioned "AKC ON") 0: Forced closing of all AKV valves 1: Normal operation of AKC controllers
	MT release output	Actual status on "Comp. release" output signal from MT controller
	MT request input	Actual status on "Comp. request" input signal on MT controller
	LT request output	Actual status on "Comp. request" output signal from LT controller
	LT release input	Actual status on "Comp. release" input signal on LT controller
	No. of compressors	Defined number of compressors
	Comp. application	Select the compressor application required (see the manual for further details) 0: Single step only 1: 1xComp. w. unloaders + Single step 2: 2xComp. w. unloaders + Single step 3: Comp. w. unloaders only 4: 1xVariable speed + Single step 5: 1xVariable speed + Comp. w. unloaders 6: 2xVariable speed + Single step
	Step control mode	Selected coupling pattern for compressors Sequential: Compressors are cut in/out in strict accordance with compressor number Cyclic: Runtime equalisation between compressors Best fit: Compressors are cut in/out in order to make the best possible fit to actual load 0: Sequential 2: Cyclic 3: Best fit
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
	Cap. control mode	0: MAN (The compressor capacity will be controlled manually) 1: OFF (The capacity control will be stopped) 2: AUTO (The capacity is controlled by the PI controller)
	Manual capacity %	Manual setting of compressor capacity The value is in % of total capacity controlled by the controller
	Reference mode	Displacement of suction pressure as a function of external signals 0: Reference = set reference + night offset + offset from external 0-10V signal 1: Reference = set reference + offset from P0 optimization + night offset

Setpoint °C	Setting of required suction pressure in °C
Min.Reference °C	Min. permissible suction pressure reference
Max.Reference °C	Max. permissible suction pressure reference
Night offset K	Displacement value for suction pressure in connection with an active night setback signal (set in Kelvin)
++Zone delay s	Time delay between step cut-ins in the regulation band over the "+Zone band" Set in seconds
+Zone delay s	Time delay between step cut-ins in the regulation band over the neutral zone Set in seconds
+Zone band K	Regulation band over the neutral zone
Neutral zone K	Neutral zone for suction pressure
-Zone band K	Regulation band under the neutral zone
-Zone delay s	Time delay between step cut-outs in the regulation band under the neutral zone Set in seconds
--Zone delay s	Time delay between step cut-outs in the regulation band under the "-Zone band" Set in seconds.
Kp Po	Amplification factor for P0 regulation
VSD Min. speed Hz	Minimum allowed speed before stop of Variable Speed drive (Low load condition)
VSD Start speed Hz	Minimum speed for start of Variable speed drive (Must be set higher than "VSD Min. Speed Hz")
VSD Max. speed Hz	Highest permissible speed for the compressor motor
Sd max. limit °C	Alarm at too high Sd
Sd comp. alarm delay	Time delay for Sd alarm
P0 min. limit °C	Alarm at too low P0
P0 max. alarm °C	Alarm at too high P0
P0 max. delay m	Time delay for P0 alarm
SH min. alarm K	Alarm at too low superheat
SH max. alarm K	Alarm at too high superheat
SH alarm delay m	Time delay for SH alarm
Load shed limit 1	Set max capacity limit for load shed input 1
Load shed limit 2	Set max capacity limit for load shed input 2
MT release delay s	Time delay on output signal "Comp. release" on MT controller
MT request delay s	Time delay on input signal for "Comp. request" on MT controller
LT request delay s	Time delay on output signal "Comp. request" on LT controller
LT release delay s	Time delay on input signal for "Comp. release" on LT controller
Po pump down	Select if a pump down function on the last compressor is requested
Po pump down limit °C	Set the actual pump down limit for the last compressor
Initial start time	The time after start-up where the cut-in capacity is limited to the first compressor step.
Safety restart time	Time delay before restart of compressors

## Suction compressor status

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Comp. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc Bar	Actual gas cooler pressure

Pgc reference Bar	Actual reference for gas cooler pressure
Sd discharge gas °C	Actual discharge gas temperature
Sgc °C	Actual temperature at outlet from the gas cooler
VSD 1 safety	Status on safety input for variable speed controller on compressor 1 ON: Alarm OFF: No alarm
VSD 2 safety	Status on safety input for variable speed controller on compressor 2 ON: Alarm OFF: No alarm
VSD Speed %	The present speed of the compressor motor controlled by the frequency converter
Comp. 1 Status	0: Power up      Controller has been powered up/Compressor is not used 1: Stopped      Compressor hat been stopped 2: Manual      Compressor capacity is controlled manually 3: Alarm      Compressor is in alarm condition (cut out on safety) 4: Restart      Compressor is waiting for elapse of "Recycle time" 5: Standby      Compressor is ready to start 6-10: Status_RUN_Timer 11: unloaded 12-14: Unloads cutin 15: Full loaded    All capacity cutin 16: Running      Capacity control is running
Comp 2 ... Status	As above for compressor no. 2 to 8
Comp 1 capacity %	Actual cut-in capacity on this compressor
Comp 2 ...capacity %	As above for compressor no. 2 to 8
Comp 1 Cycles / 24 h	Number of compressor starts during the past 24 hours
Comp 2 ...Cycles / 24 h	As above for compressor no. 2 to 8
Settings	
Main switch	Main switch:      ON: Regulation OFF: Controller stopped
1 Min. ON-time m	Minimum duration of ON period
2 ...Min. ON-time m	As above for compressor no. 2 to 8
1 Min. OFF-time m	Minimum duration of OFF period
2 ...Min. OFF-time m	As above for compressor no. 2 to 8
1 Recycle time m	Minimum period of time between two successive starts.
2 ...Recycle time m	As above for compressor no. 2 to 8
1 runtime h	Compressor's total run time in hours
2 ...runtime h	As above for compressor no. 2 to 8

## High pressure control

Measurements		
AK error		When "ON", the controller is in alarm condition.
Comp. ctrl. temp °C		Actual temperature for control sensor (Po or S4)
Comp. ctrl. ref. °C		Actual reference temp. for compressor capacity (incl. external reference signal, if any)
Compressor cap. %		Cut-in compressor capacity in % (of total capacity)
Request Comp. Cap %		Reference for compressor capacity (deviations may be due to time delays)
P0 °C		Suction pressure in °C. (Measured with the pressure transmitter)
Ss Suction gas °C		Actual suction gas temperature
Cond. ctrl. temp °C		Actual temperature for control sensor (Pc or S7)
Cond. ctrl. ref. °C		Actual reference temp. for condenser capacity (incl. external contributions, if any)
Cond. cap. %		Cut-in condenser capacity in % (of total capacity)
Request Cond. cap %		Reference for condenser capacity
Pc Bar		Condensing pressure (measured with the pressure transmitter)
Tc °C		Condensing pressure in °C. (measured with the pressure transmitter)
Gc status		Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
Pgc Bar		Actual gas cooler pressure
Pgc reference Bar		Actual reference for gas cooler pressure
Sd discharge gas °C		Actual discharge gas temperature
Sgc °C		Actual temperature at outlet from the gas cooler
Shp °C		Read temperature at high pressure valve
Vhp OD%		Read opening degree of high pressure valve

	Rec. Status	0: Off 1: Standby 2: Normal 3: Emergency operation 4: Manual
	Prec Bar	Read pressure of receiver
	Vrec OD%	Read opening degree of receiver valve
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
	HP control ManAut	Control of high pressure valve: 1=automatic, 2=manual override
	Vhp manual OD%	Manual setting of opening degree of high pressure valve
	Pgc min. Bar	Setting of gas coolers min. pressure
	Pgc max. Bar	Setting of gas coolers max. pressure
	Extra capacity offs	Set requested pressure increase if the "extra cooling capacity" is activated
	dT Subcool K	Set requested sub cooling in the sub critical range
	Rec. Control ManAut	Control of receiver valve: 1=automatic, 2=manual override
	Rec. Manual OD%	Manual setting of opening degree of the receiver valve
	Prec setpoint Bar	Set requested receiver pressure

## Oil management

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Comp. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc Bar	Actual gas cooler pressure
	Pgc reference Bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
	Rec. pressure	Actual pressure in receiver
	Rec. pres. buildup	Status of oil separator
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
	Interval time	Time between breaks. (Simple oil equalisation)
	Equalisation time	Duration of oil equalisation (Simple oil equalisation)
	Rec. pres. cutin Bar	Receiver pressure, which to cutin for the oil
	Rec.pres.cutout Bar	Receiver pressure, which to cutout for the oil
	High alarm limit Bar	Alarm limit high
	Low alarm limit Bar	Alarm limit low
	High alarm delay m	Delay time for high pressure alarm
	Low alarm delay m	Delay time for low pressure alarm
	Lvl. alarm delay s	Delay time for Level alarm

## Condenser capacity control

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)

	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Comp. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc Bar	Actual gas cooler pressure
	Pgc reference Bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
	Tc max. limit °C	Readout limit value for max condenser pressure
	S7 brine temp °C	Actual media temperature measured at S7 sensor (Only used if S7 is selected as control sensor)
	Condenser status	0: Power up Controller has been powered up (power supply re-connected) 1: Stopped Capacity control has been stopped ("Main switch" = OFF or "Control mode" = OFF) 2: Manual Capacity is controlled manually ("Control mode" = MAN) 3: Alarm Capacity control is in alarm condition (f.ex. Pc Max or Sd Max) 4: Restart Capacity control is waiting for elapse of "Restart time" 5: Standby Capacity control is ready to start 6: Unloaded 7-9 Part loaded 10: Full loaded All capacity cutin 11: Running Capacity control is running
	Air flow status	0: No RFG. selectNo refrigerant has been selected (monitoring of air flow can not start) 1: Tuning Monitoring function adapts to the condenser in question 2: OFF Monitoring function is switched OFF 3: OK Air flow is OK 4: Little dirt The amount of dirt decreases the performance of the condenser, clean when possible 5: Dirty The amount of dirt leads to considerable air flow problems, clean as soon as possible 6: Blocking The amount of dirt might lead to high pressure problems, clean now
	Sc3 Air on °C	Outdoor temperature in °C measured with Sc3 temperature sensor
	No. of fans	Defined number of fans
	VSD Speed %	Status of analogue output signal "AO" for variable speed drive (in percent of full scale f.ex. 0 -10 V d.c.)
	VSD safety	Status of safety monitoring input for Variable Speed Drive ON: Alarm on VSD A safety monitoring input OFF: No alarm on VSD A safety monitoring input
Settings	Main switch	Main switch: ON: Regulation OFF: Controller stopped
	Condenser ctrl mode	0: MAN (The condenser capacity will be controlled manually) 1: OFF (The capacity control will be stopped) 2: AUTO (The capacity is controlled by the PI controller)
	Manual capacity %	Manual setting of condenser capacity The value is in % of total capacity controlled by the controller
	Pc Ref. mode	0: Set point Reference = "PcA setpoint °C" 1: Floating Reference is changed as a function of the outdoor temperature measured by the "Sc3 air on" sensor, the set "Dimensioning tm K" and the actual compressor load.
	Cond. Setpoint °C	Setting of required discharge pressure in °C
	Dimensioning tm K	Dimensioning mean temperature differential between air- and condensing temperature at full load for the condenser in question (Typical 8 – 15K).

Min. tm k	tm value at minimum load.
Min. Reference °C	Min. permissible condensing pressure reference
Max. Reference °C	Max. permissible condensing pressure reference
Capacity Lim. night %	Capacity limitation during night operation
Kp	Amplification factor P/PI controller
Tn s	Integration time for PI controller
VSD Min. speed %	Minimum allowed speed before stop of Variable Speed drive (Low load condition)
VSD Start speed %	Minimum speed for start of Variable speed drive (Must be set higher than "VSD Min. Speed %")
Pc max limit Bar	Max. limit for condensing pressure
Pc max alarm delay m	Time delay for "Pc max alarm"

## Condenser fan status

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Compr. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc bar	Actual gas cooler pressure
	Pgc reference bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
	Fan1/VSD status	Status of the Fan 1 ON: Fan is running OFF: Fan is not running
	Fan2.... status	As above for fan 2 to 8
Settings	Main switch	Main switch:      ON: Regulation OFF: Controller stopped

## Heat recovery

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Compr. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.

	Pgc Bar	Actual gas cooler pressure
	Pgc reference Bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
	Shr2 °C	(ONLY at CO2). Temperature at sensor Shr2
	Stw2 °C	(ONLY at CO2). Temperature at sensor Stw2
	Status heat circuit	(ONLY at CO2). 0=off. 1=waiting. 2=started. 3=standard. 4=variable offset 5=max recovery. 6=stopped. 7=error.
	Tw Stw8 °C	(ONLY at CO2). Temperature at sensor Stw8. Tap water
	Tw Status	(ONLY at CO2). 0=off. 1=waiting. 2=started. 3=hot tap water. 5=manual. 6= stopped. 7=error. 8=Flow error. 9=sensor error. 10=boiling. (ONLY at CO2). Readout about tap water circuit can be activated automatically
	Tw enable	(ONLY at CO2). Readout about tap water circuit can be activated automatically
	Hr Shr8 °C	(ONLY at CO2). Temperature at sensor Shr8. Heat circuit
	Hr Status	(ONLY at CO2). 0=off. 1=waiting. 2=started. 3=heat circuit. 5=manual. 6= stopped. 7=error. 8=Flow error. 9=sensor error. 10=boiling. (ONLY at CO2). Readout about heat circuit can be activated automatically
	Hr enable	(ONLY at CO2). Readout about heat circuit can be activated automatically
	HR thermostat temp °C	(Not at CO2). Actual temperature at sensor for heat recovery function
	Heat recovery status	(Not at CO2). Status on heat recovery function (on/off)
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
	Tw setpoint °C	(ONLY at CO2). Set point for tap water temperature
	Hr setpoint °C	(ONLY at CO2). Set point for heat circuit temperature
	Pgc HR max. offset	(ONLY at CO2). Displacement pressure of max. signal
	Pgc HR min. Bar	(ONLY at CO2). Set point at min. signal
	Heat recovery SP °C	(Not at CO2). Reference for condenser pressure when heat recovery is on
	HR temp. cutin °C	(Not at CO2). Temperature value when thermostat switch to heat recovery
	HR temp. cutout °C	(Not at CO2). Temperature value when thermostat switch off the heat recovery

## Alarm priorities

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Comp. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc Bar	Actual gas cooler pressure
	Pgc reference Bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
		The alarm priority of the following alarms can be changed: High priority is defined with setting = 1 Medium priority is defined with setting = 2 Low priority is defined with setting = 3 Log only = 4 Overriding the alarms is defined with setting = 0
	Main Switch	0/1/2/3/4
	Low P0	0/1/2/3/4

High P0	0/1/2/3/4
High Pc/Sd	0/1/2/3/4
Hpcontrol / Receive	0/1/2/3/4
Superheat Min/Max	0/1/2/3/4
Load shedding	0/1/2/3/4
P0/S4/Pctrl error	0/1/2/3/4
Misc. sensors	0/1/2/3/4
Comp. common safety	0/1/2/3/4
Comp. VSD safety	0/1/2/3/4
Comp. 1 safety	0/1/2/3/4
Comp. 2 safety	0/1/2/3/4
Comp. 3 safety	0/1/2/3/4
Comp. 4 safety	0/1/2/3/4
Comp. 5 safety	0/1/2/3/4
Comp. 6 safety	0/1/2/3/4
Comp. 7 safety	0/1/2/3/4
Comp. 8 safety	0/1/2/3/4
Pc/S7 sensor error	0/1/2/3/4
Blocked air flow	0/1/2/3/4
Fan safety	0/1/2/3/4
Comp. Low Oil lvl	0/1/2/3/4
Comp. High Oil lvl	0/1/2/3/4
Oil Separator alarm	0/1/2/3/4
Oil Receiver alarm	0/1/2/3/4
Oil Recv High press	0/1/2/3/4
Oil Recv. Low press	0/1/2/3/4
Tw boiling alarm	0/1/2/3/4
Hr boiling alarm	0/1/2/3/4

## General alarm inputs

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Compr. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc Bar	Actual gas cooler pressure
	Pgc reference Bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
	DI 1 input	Alarm status on the function defined as a DI1 alarm ON: Alarm is activ OFF: No alarm, normal situation
	DI 2.... Input	As above, but for the alarm functions 2 to 6
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
	DI 1 Alarm delay m	Time delay for the alarm "DI 1 Alarm"
	DI 2.... Alarm delay m	As above, but for the alarm functions 2 to 6

## Thermostat/pressostats

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Comp. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity
	Pc Bar	Condensing pressure (measured with the pressure transmitter)
	Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
	Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
	Pgc Bar	Actual gas cooler pressure
	Pgc reference Bar	Actual reference for gas cooler pressure
	Sd discharge gas °C	Actual discharge gas temperature
	Sgc °C	Actual temperature at outlet from the gas cooler
	Thermostat 1 °C	Temperature measurement of function defined in Thermostat 1.
	Thermostat 2 °C	Temperature measurement of function defined in Thermostat 2.
	Thermostat 3 °C	Temperature measurement of function defined in Thermostat 3.
	Pressostat 1 Bar	Pressure measurement of function defined in Pressostat 1
	Pressostat 2 Bar	As above but for Pressostat 2
Pressostat 3 Bar	As above but for Pressostat 3	
Settings	Main switch	Main switch:           ON: Regulation OFF: Controller stopped
	T1 Cutin °C	Cutin value for function defined in "Thermostat 1".
	T1 Cutout °C	Cutout value for function defined in "Thermostat 1".
	T1 High Alarm °C	High alarm limit "Thermostat 1"
	T1 Low Alarm °C	Low alarm limit "Thermostat 1"
	T1 High Al delay m	Time delay for high alarm "Thermostat 1"
	T1 Low Al delay m	Time delay for low alarm "Thermostat 1"
	P1 Cutin press Bar	Cutin value for function defined in "Pressostat 1".
	P1 Cutout press Bar	Cutout value for function defined in "Pressostat 1".
	P1 High Al limit Bar	High alarm limit "Pressostat 1"
	P1 Low Al limit Bar	Low alarm limit "Pressostat 1"
	P1 High Al delay m	Time delay for high alarm "Pressostat 1"
	P1 Low Al delay m	Time delay for low alarm "Pressostat 1"

(Use Service Tool if data concerning thermostats 2 to 5 or from Pressostat 2 to 5 have to be downloaded).

## Voltage and PI inputs

Measurements	AK error	When "ON", the controller is in alarm condition.
	Comp. ctrl. temp °C	Actual temperature for control sensor (Po or S4)
	Comp. ctrl. ref. °C	Actual reference temp. for compressor capacity (incl. external reference signal, if any)
	Compressor cap. %	Cut-in compressor capacity in % (of total capacity)
	Request Comp. Cap %	Reference for compressor capacity (deviations may be due to time delays)
	P0 °C	Suction pressure in °C. (Measured with the pressure transmitter)
	Ss Suction gas °C	Actual suction gas temperature
	Cond. ctrl. temp °C	Actual temperature for control sensor (Pc or S7)
	Cond. ctrl. ref. °C	Actual reference temp. for condenser capacity (incl. external contributions, if any)
	Cond. cap. %	Cut-in condenser capacity in % (of total capacity)
	Request Cond. cap %	Reference for condenser capacity

Pc bar	Condensing pressure (measured with the pressure transmitter)
Tc °C	Condensing pressure in °C. (measured with the pressure transmitter)
Gc status	Actual gas cooler operation: 0=Off. 1=Standby. 2=Max COP operation. 3=Heat recovery. 4=Extra capacity. 5=Manual control.
Pgc Bar	Actual gas cooler pressure
Pgc reference Bar	Actual reference for gas cooler pressure
Sd discharge gas °C	Actual discharge gas temperature
Sgc °C	Actual temperature at outlet from the gas cooler
V1 Actual input	Voltage measurement on the function defined in Volt 1.
V2 Actual input	Voltage measurement on the function defined in Volt 2.
V3 Actual input	Voltage measurement on the function defined in Volt 3.
PI1 State	PI function state
PI1 Alarm state	PI function alarm condition
PI1 Input	Input signal
PI1 Reference	Reference
PI1 Output value	Output value
PI1 Output type	Output type: PWM. Stepper. Voltage
Settings	Main switch
	Main switch: ON: Regulation OFF: Controller stopped
	V1 Cutin
	The value where the relay is to cut in
	V1 Cutout
	The value where the relay is to cut out
	V1 Cutin delay m
	Time delay for cutin of relay
	V1 Cutout delay m
	Time delay for cutout of relay
	V1 High AI Limit
	The value for the high alarm limit
	V1 Low AI Limit
	The value for the low alarm limit
	V1 High AI delay m
	Time delay for high alarm
	V1 Low AI delay m
	Time delay for low alarm
	PI1 Off Aut Man
	Control of PI function. 0: Off, 1: Automatic, 2: Manual
	PI1 Manual OD
	Manual setting of opening degree for PI function

(Use Service Tool if data concerning Volt 2, 3, 4, 5 and PI2 /PI3 are to be downloaded).

## AKM menu: "For DANFOSS only"

This menu contains data and setting values for special internal controller functions.

**Do not change the stated values.**