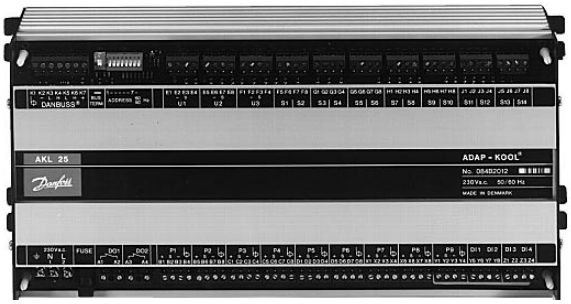
Technical brochure

ADAP-KOOL®

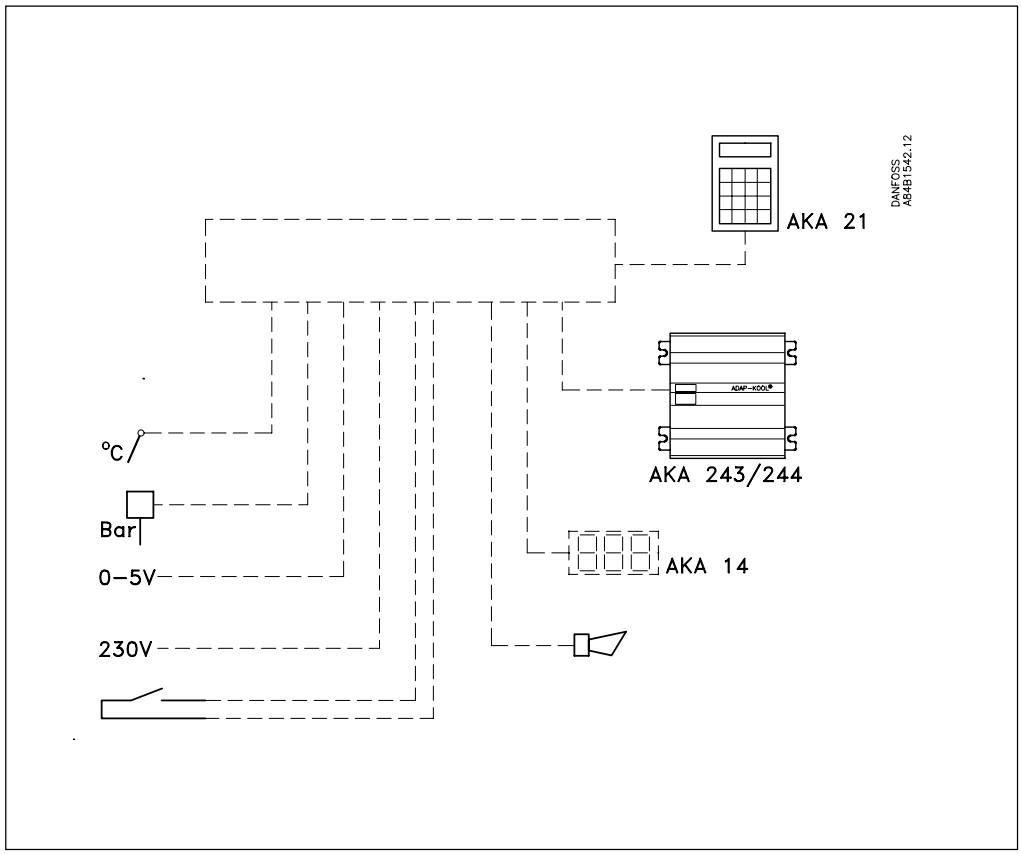


Monitoring units for refrigerating plant
AKL 111A and AKL 25

Introduction

Monitoring units types AKL 111A and AKL 25 are for registration of operating data on refrigeration plant where they can give alarm if the set limit values are exceeded.

As for the other controllers in the ADAP-KOOL® refrigeration control system, it is possible to connect data communication to the monitoring units. In this way the selected operating data can be continuously transmitted to a gateway type AKA 243/244, from which it can be collected or displayed on a PC, as required.



Application

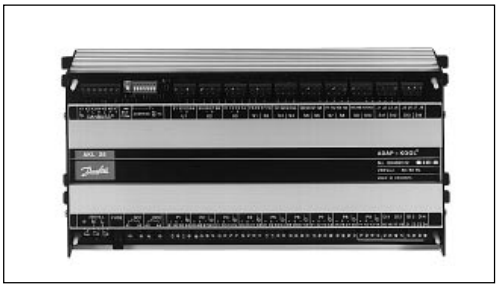
- Supermarkets
- Cold stores
- Compressors
- Water chillers

Advantages

- Operating data is constantly monitored.
  Alarm will be given, if the set values are exceeded.
  The cause of the alarm can be seen on the control unit.
- Connection to a PC allows central monitoring and data collection.
- Decentralised monitoring and data collection via modem.

Controller types

There are two types of monitoring units, AKL 111A and AKL 25. The most important difference between the two units is that AKL 111A has primarily been developed for use in supermarkets and AKL 25 for industrial applications.



List of functions

AKL 111A contains the following functions:

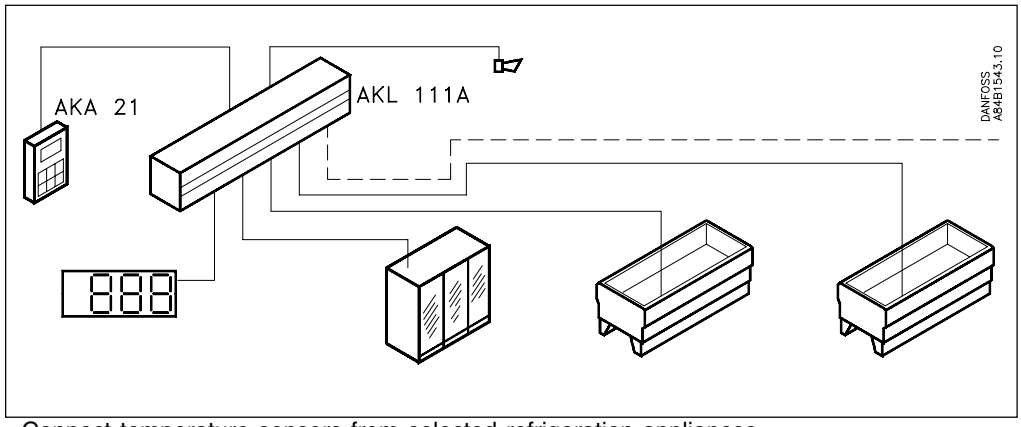
- Temperature sensor inputs
- ON / OFF inputs
- 230 V alarm inputs
- 230 V inputs for registration of a defrost
- 230 V alarm acknowledge input
- Connection to external display
- Connection of external switch for change-over between displays
- Hour counter
- Pulse counter
- Energy recording
- Access code
- Alarm function with alarm texts
- Alarm relay
- Time delay for alarms
- Longer time delays for alarms during defrost cycles
- Possibility of suppressing alarms when refrigeration appliance is switched off
- Data communication
- Possibility of PC operation with data collection
- Controller text in 7 languages

AKL 25 contains the following functions:

- Temperature sensor inputs
- ON / OFF inputs
- Pressure transmitter inputs
- 0-5 V voltage inputs
- Hour counter
- Pulse counter
- Alarm function with alarm text
- 2 Alarm relays
- Time delay for alarms
- Possiblility of PC operation with data collection
- Controller text in English

Application examples

Monitoring of refrigeration appliances

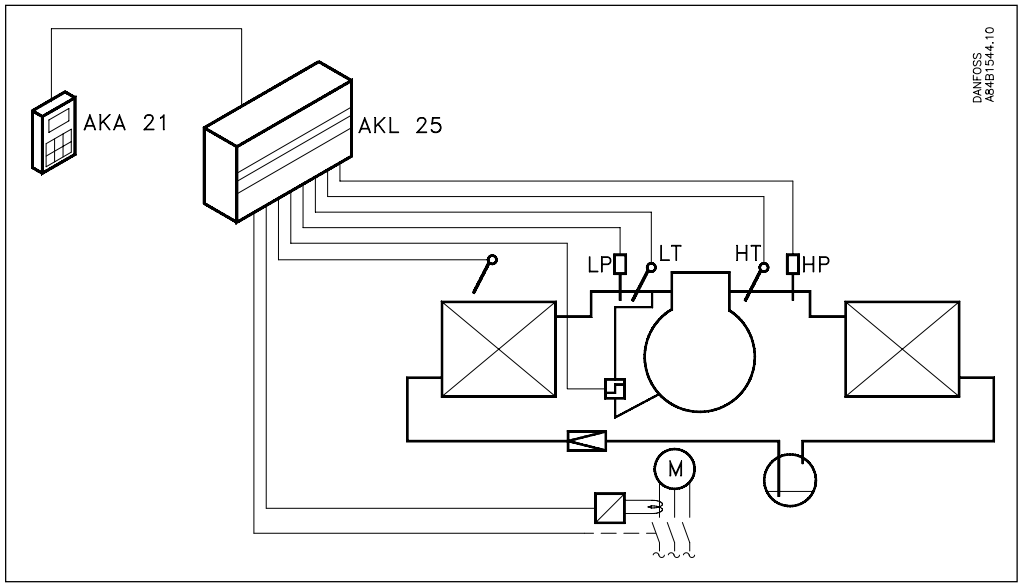


- Connect temperature sensors from selected refrigeration appliances
- Connect a display type AKA 14, so the different temperatures can be displayed
- Connect contact functions for registration of open doors in freezing rooms
- Set alarm limits and time delays for alarms

If the set limit values are exceeded, there will be an alarm. The cause of the alarm can subsequently be seen on control panel type AKA 21.

An alarm can also be suppressed so that it will not appear when the refrigeration has stopped.

Monitoring of compressor etc.

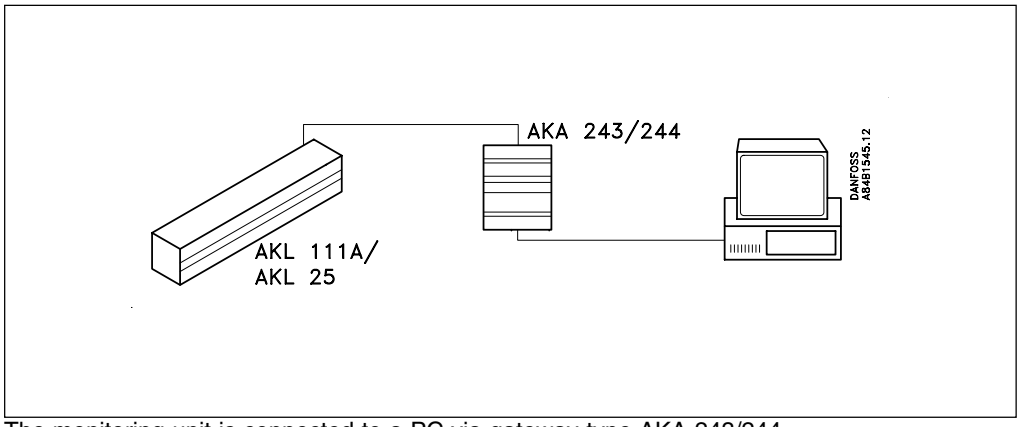


- Temperature sensors on high pressure, low pressure and room temperature
- Pressure transmitters on high pressure and low pressure
- ON/OFF signal from compressor relay (an hour counter registers the compressor's time of operation)
- ON/OFF signal from oil pressure differential
- Voltage signal from a kW-meter

If the set limit values are exceeded, there will be an alarm. The cause of the alarm can subsequently be seen on control panel type AKA 21. The following data can furthermore be displayed:
- actual energy consumption
- total energy consumption
- total time of operation

Data communication
Via the data communication, selected operating data can continuously be transmitted to a gateway type AKA 243/244. Here this data can be collected, and displayed on a PC at a later time.

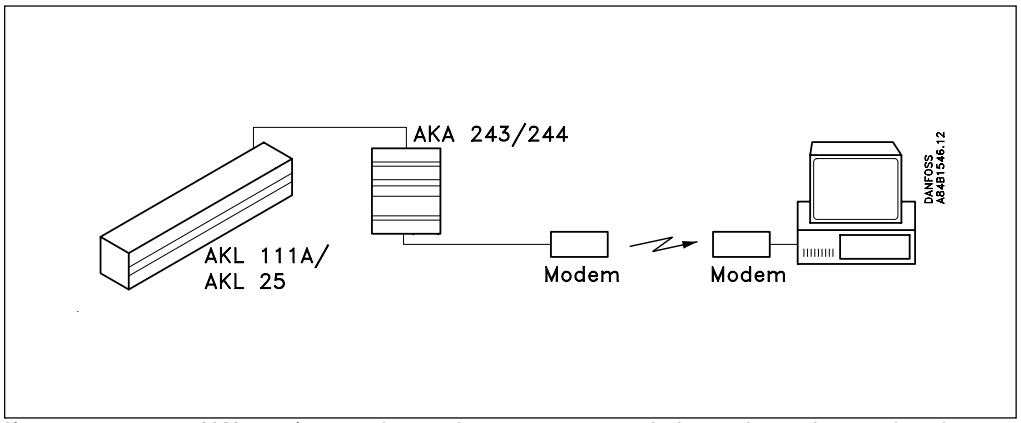
Local display



The monitoring unit is connected to a PC via gateway type AKA 243/244.
System software type AK Monitor is installed in the PC.

Operation and monitoring of the day-to-day operation can now be performed from this PC. All alarms can be received on the PC, or they may be retransmitted to a printer.

Remote display



If a gateway type AKA 243/244 and a modem are connected, the registered operating data can be transmitted to an externally placed PC via the telephone network.
Alarms can also be sent to this receiver. When an alarm occurs, AKA 243/244 will ring up the receiver and then deliver the alarm. The receiver can now ring up the installation and examine how critical the situation appears to be - is instant service required - or can it wait?

AKL 111A functions

Temperature inputs / (ON/OFF inputs)
The input can be used for one of the following two functions:

1) The input is connected to a Pt 1000 ohm temperature sensor.
   The received signal can be displaced by up to 10 degrees.
   Each temperature measurement can be assigned a high and a low alarm limit as well as a time delay in connection with the timing of the alarm (during defrost this time delay may be increased. Read the section “Change of time delay, when defrost is carried out”).
   An alarm can be defined in various ways, see below.

2) The inputs can also be used for registration of ON/OFF signals.
   The input is connected to a contact function, so that the input is in turn short-circuited or “open”.
   A display will show whether the connected contact function is ON or OFF (open contact function = OFF, and closed contact function = ON).
   If an alarm function is required, it must be defined. An alarm will then be given, when the input changes to position OFF and the time delay has expired.

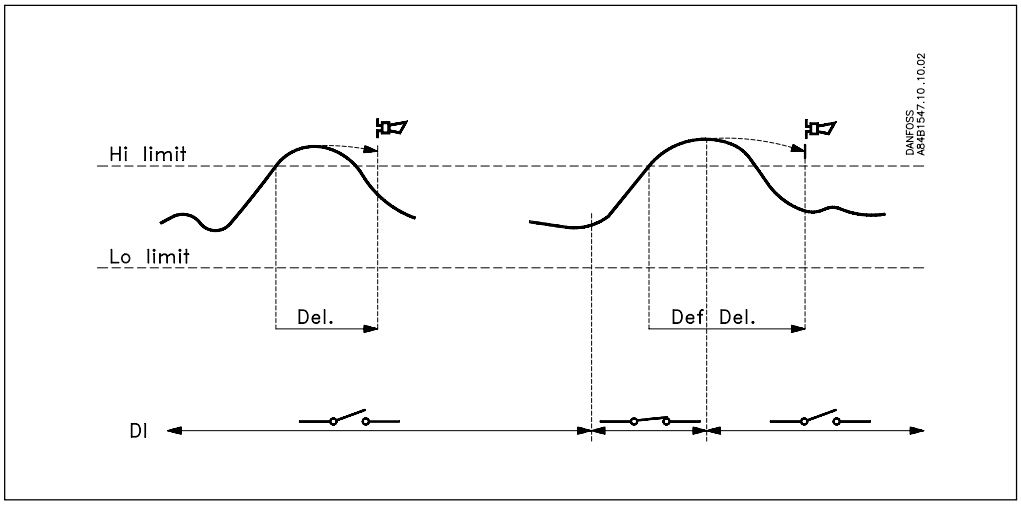
There are eight identical inputs. Separate values can be set for each input.

High voltage digital inputs
This input registers whether there is 230 V or 0 V on the input.
The input can be used for one of the following three functions:
1 Monitoring of alarms
   The normal situation is 230 V on the input. If this voltage drops out, the alarm will sound when the time delay has run out. An alarm can be defined in various ways, see below.
2 Registration of defrost
   The normal situation is 0 V on the input. When 230 V is received, this will mean that defrost has started. (Read also the following section “Change of time delay when defrost is carried out”).
3 Suppression of alarm
   The normal situation is 230 V on the input. When 0 V is registered, alarms, if any, will be suppressed, but only for the temperature inputs and ON/OFF inputs configured for same.

An internal counting function registers when there is a change-over from 0 V to 230 V.
This registration can be displayed in two ways: as the number of change-overs there has been (= pulse counter) and as the total number of hours there has been on the 230 V input (= hour counter).
It is a requirement that change-overs must not occur more frequently than every two seconds (a whole period = 4 seconds).

There are four identical inputs. Separate functions can be defined for each input.

Change of time delay when defrost is carried out
Each temperature input can be assigned a time delay in connection with the time of the alarm. To prevent unintended temperature alarms from occurring in connection with a defrost, it will often be necessary to have a longer time delay for defrosts than for normal operation.
Change-over to a longer time delay can be arranged by associating a high voltage digital input to the relevant temperature input. When a signal is now received by the high voltage digital input, it will signify that a defrost is in progress. An automatic change-over to the longer time delay will now follow.
A temperature input can be associated to any of the available four high voltage digital inputs, and several temperature inputs can be associated to the same high voltage digital input.



Alarm function

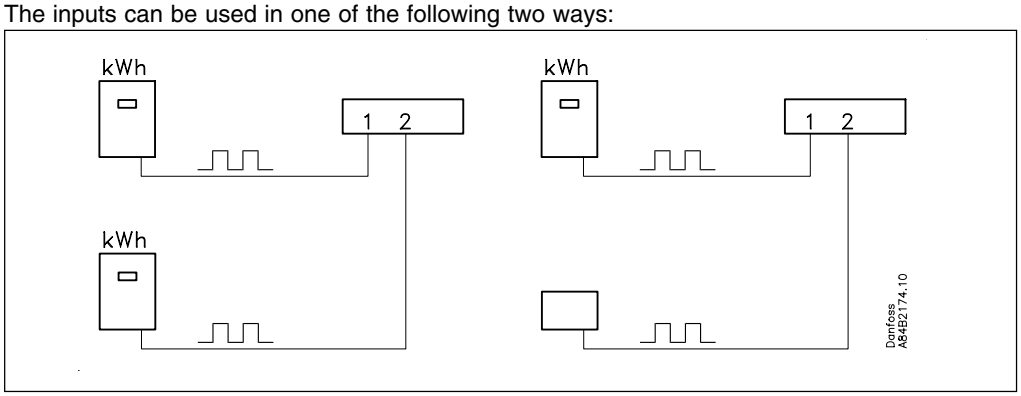
Alarm relay
The relay switch will be closed during normal operation and open when there is an alarm. If the supply voltage for the controller drops out, the relay switch will be open.

Acknowledgement of alarms
A 230 V input is used for acknowledging active alarms.
A pulse pressure with drop-out must be used.
When the input registers a 230 V signal, all active alarms will be acknowledged.

Alarm importance
An alarm occurring from an AKL 111A unit can be defined in various ways, depending on the importance attached to it. You may choose between the following:

Setting	Function
0	- No alarm
1	- Alarm relay switch on AKL 111A will open - A message will be transmitted on the data communication system - Alarm relay DO2 on any connected gateway will give alarm
2	- A message will be transmitted on the data communication system
3	- Alarm relay switch on AKL 111A will open - A message will be transmitted on the data communication system

Energy recording
The controller has two inputs which can be used for recording impulses from a kWh converter. The inputs can be used in one of the following two ways:



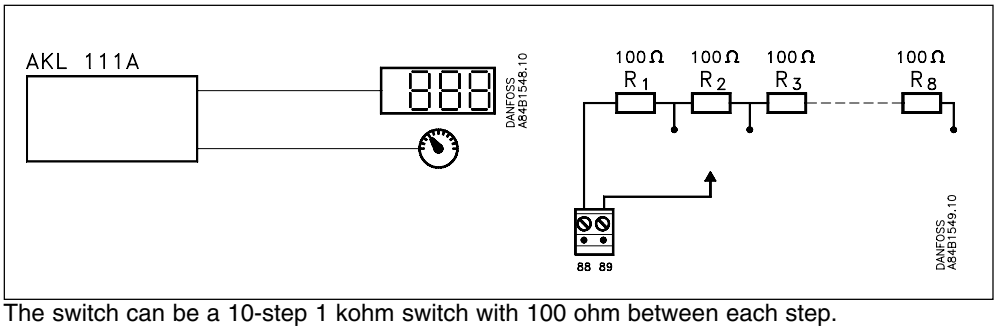
- The inputs can receive signals from their respective converter.
  - The received number of impulses can be read
  - The number of impulses corresponding to one kWh can be set
  - The kWh consumption can subsequently be read
  - Peak load. You can set a time period (say, 15 minutes) which will then form the basis of a reading of the load during this period

- The counter circuits can be zeroset
- the kWh consumption can be offset-adjusted
- the kWh consumption for the past 24 hours and for the past week can be read

• The inputs can receive signals from one kWh converter and from one synchronising unit
- The functions are the same as those described above, but the time period is now determined by the signal on input 2.

Connection of a separate display
A separate display can be connected to the controller, and this display will then show the signals received by inputs S1/DI1 to S8/DI8.
A temperature signal is shown in °C and a digital signal is shown with either ON or OFF, depending on whether the input is short-circuited or open. If a defrost is carried out and the input has been connected to a defrost signal, the display will be “def”.

A display can be determined in two ways:
1 Through a setting in the menu system - choose here the signal input to be displayed.
2 By mounting an external switch.



The switch can be a 10-step 1 kohm switch with 100 ohm between each step.
The following can now be displayed at the different steps:

1	(100 ohm)	Temperature signal or ON/OFF status of input S1/D1
2	(200 ohm)	Temperature signal or ON/OFF status of input S2/D2
3	(300 ohm)	Temperature signal or ON/OFF status of input S3/D3
4	(400 ohm)	Temperature signal or ON/OFF status of input S4/D4
5	(500 ohm)	Temperature signal or ON/OFF status of input S5/D5
6	(600 ohm)	Temperature signal or ON/OFF status of input S6/D6
7	(700 ohm)	Temperature signal or ON/OFF status of input S7/D7
8	(800 ohm)	Temperature signal or ON/OFF status of input S8/D8

If no switch (open input) is connected, the display will show the signal for input S1/D1.
If a resistance smaller than 50 ohm or a resistance between 850 and 1050 ohm is registered, the display will show lines (- - -). This display will also appear, if an input has not been defined.

The display must be of the type AKA 14.

If a temperature input is interrupted or short-circuited, the display will show “AL1”.

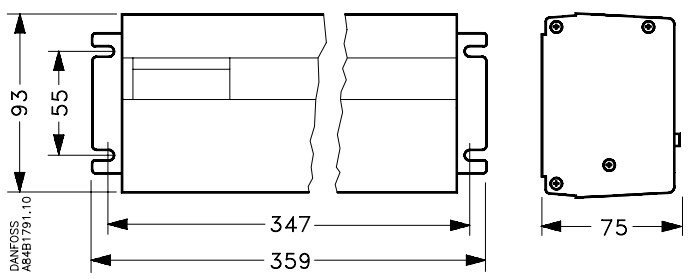
Access code
Access can be given to three user levels with the following types of operation:
1) Access without use of password
   See alarms. Read temperatures and see status of input signals
2) Access via password 1
   Start and stop controller. Display and reset counter functions
3) Access via password 2
   All settings in the menu system can be performed

If access code 2 is set at “0” (factory setting), there will be free access to the system without use of password.

Language
The menu text in the controller is in several languages. You may freely choose between the following languages: English, German, French, Danish, Spanish, Italian and Swedish.

Technical data

Supply voltage	230 V +10/-15%, 50/60 Hz		
Power consumption	5 VA		
Inputs	Temperature sensors / (ON/OFF) Number: 8	Pt 1000 ohm	
		Range	-70/+160°C
		Sensor type	AKS 21 or AKS 11
		ON/OFF:	
		Function	Short circ./opened
	Alarm inputs / Registration of defrost	Number	4
		Voltage	230 V a.c
	Acknowledgement of alarms	Number	1
		Voltage	230 V a.c.
	Resistance decade for AKA 14 display	Number	1
		Signal requirement	0 - 800 ohm
		Intervals	100 ohm
	Pulse counter	Number	2
		Signal (Short-circuit of inputs)	DIN 43864
Outputs	Alarm relay (SPST)	Number	1
		Voltage	12 to 253 V a.c.
		Imax. cont.	1.2 A
		Pmin.	1.2 W
		Imin.	100 mA at 12 V
			5 mA at 240 V
	External display	Number	1
		Type	AKA 14
Data communication	Hardware	RS 485	
	Software	DANBUSS	
Operation	Control panel	AKA 21	
	PC System software	AKM or AK Monitor	
Ambient temperature	During operation	-20 to +55°C	
	During transport	-50 to +70°C	
Enclosure	Material	Anodised aluminium	
	Density	IP 30 (32)	
	Weight	1.5 kg	
	Mounting	On wall or DIN rail	



AKL 25 functions

Temperature inputs (ON/OFF inputs)
The input can be used for one of the following two functions:

1) The input is connected to a Pt 1000 ohm temperature sensor.
   The received signal can be corrected (influenced) by two parameters:
   - a filter where the temperature fluctuations are damped by means of a built-in time delay
   - a correction value where the measured value is displaced by up to five degrees
   Each temperature measurement can be assigned a high and a low alarm limit as well as a time delay before the alarm may start functioning.
   An alarm can be defined in several ways, see below.

2) The inputs can also be used for indication of ON/OFF signals. The input is connected to a contact function, so that the input is in turn short-circuited or “open”.
   The function can be used for registering a relay status.
   A display will show whether the connected contact function is ON or OFF (open contact function = OFF and closed contact function = ON).
   If an alarm function is required, you must define whether the alarm is to be given at open or closed contact function. A time delay must also be set.
   An alarm can be defined in several ways, see below.

There are 14 identical inputs. Separate values can be set for each input.

Pressure transmitter inputs
The input is connected to a pressure transmitter type AKS 32 with output signal 1 - 5 V. The pressure range is set (fx from -1 to 6, 12, 20, 34 bar, respectively, or higher, if required).
The low value will correspond to 1 V and the high value to 5 V.
The received signal can be corrected (influenced) by two parameters:
- a filter where the pressure variations are damped by means of a built-in time delay
- a correction value where the measured value can be displaced by up to 9,99 bar.
  The correction value may for example be used, if a display of the absolute pressure rather than the gauge pressure is required.

Each pressure measurement can be assigned a high and a low alarm limit as well as a time delay in connection with the timing of the alarm.
An alarm can be defined in several ways, see below.

There are nine identical inputs. Separate values can be set for each input.

(The inputs can also be used for indicating the ON/OFF status of a contact function. Mount a 4.8 kohm resistance between “-” and “S”, a 10 kohm resistance between “+” and “S”, and connect the contact function to “-” and “S”. When the input is short-circuited, there will be an alarm. The alarm text transmitted via DANBUSS will be “Px error”. Or the inputs can register a signal from a hygrometer. Here you will simply set some other values for the “pressure range”).
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Voltage inputs
The input is connected to a voltage in the range between 0 and 5 V d.c. The received signal can be corrected (influenced) by three parameters:
- a filter where the voltage variations are damped by means of a built-in time delay
- a correction value (C1) by which the measured value is multiplied
- to this value can further be added a value (C2)
Display = (U x C1) + C2

AKL 25 can carry out an integration of a voltage signal. An integrated signal from a kW-meter will for example provide a direct display in kWh.

Each voltage measurement can be assigned a high and a low alarm limit as well as a time delay before the alarm may be triggered.
An alarm can be defined in several ways, see below.

There are three identical inputs. Separate values can be set for each input.

(The inputs can be used as ON/OFF inputs. The inputs can be used as pressure transmitter inputs (type AKS 32)).

Counter inputs
The input is connected to a contact function, so that the input is in turn short-circuited or "open".
The function can be used for registering a relay status, or it may be used as hour counter. (No alarm function is attached to it).

Pulse counter
The function registers the number of changes from ON to OFF. The value can be displayed and reset, as required. (It is a requirement that the duration of an ON/OFF sequence is more than two seconds).

Hour counter
The function registers the period of time during which the contact function is closed. The ON-time can be displayed in hours and reset, as required.

Relay status
A display will show whether the connected contact function is ON or OFF.

There are four identical inputs.

Alarm function

Alarm relay
There are two alarm outputs.
The relay switch will be closed during normal operation and open, when there is an alarm. If the supply voltage for the controller drops out, the relay switch will be open. You must define which relay output is used for which alarm.

Acknowledgement of alarm
Must be done with control panel type AKA 21 or system software type AKM.

Alarm importance
An alarm occurring from an AKL 25 unit can be defined in various ways, depending on the importance of it. You may choose between the following:

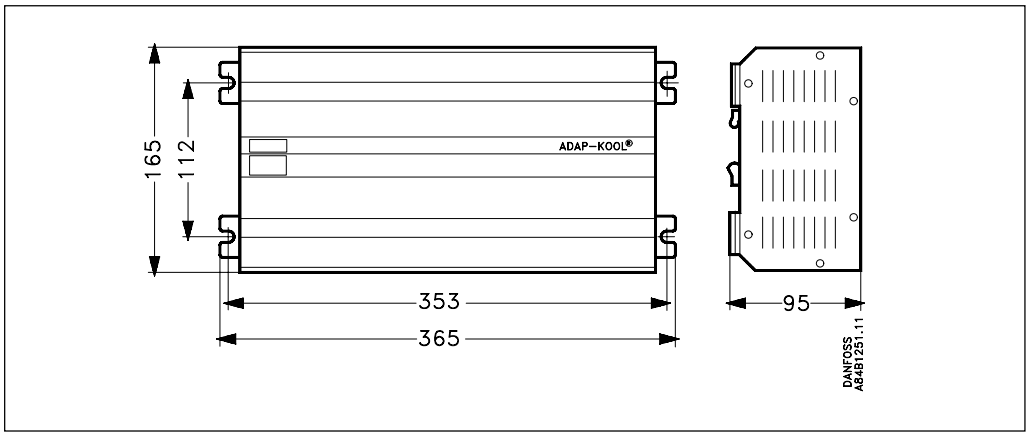
Setting	Function
0	- No alarm
1	- Relay switch DO1 on AKL 25 will open - A message will be transmitted on the data communication system - Alarm relay DO2 on any connected gateway will give alarm
2	- Relay switch DO2 on AKL 25 will open - A message will be transmitted on the data communication system
3	- A message will be transmitted on the data communication system

Language
The menu text in the controller is in the English language.

Service
All received signal values can be displayed, before any corrections.
The two alarm outputs can be controlled by force, so that the connected alarm functions can be checked before the plant is put into operation.

Technical data

Supply voltage	230 V +10/-15%, 50/60 Hz		
Power consumption	AKL 25	6 VA	
	AKS 32	< 0.1 VA/each	
Inputs	Temperature sensors / (ON/OFF) Number: 14	Pt 1000 ohm	
		Range	-70/+160°C
		Sensor type	AKS 21
		ON/OFF:	
		Function	Short circ./ opened
		Requirement to contacts	Gold-plated
	Pressure transmitter	AKS 32 (1-5 V)	9 transmitters
		Lower value	Adjustable to -1
		Upper value	Adjustable to 1200
	Voltage	d.c.	3 units
		Range	0 to 5 V
	ON/OFF	Number	4 units
		Function	Short circ./ opened
		Requirement to contacts	Gold-plated
Outputs	Alarm	Number	2
		Voltage	12 to 253 V a.c.
		Imax. kont.	1.2 A
		Pmin.	1.2 W
		Imin.	100 mA at 12 V
			5 mA at 240 V
	LED	Lit	Normal state
		Flashes	Alarm or error
Data communication	Hardware	RS 485	
	Software	DANBUSS	
Operation	Control panel	AKA 21	
	PC System software	AKM	
Ambient temperature	During operation	-20 to +55°C	
	During transport	-50 to +70°C	
Enclosure	Material	Anodised aluminium	
	Density	IP 10, VGB 4	
	Weight	2.6 kg	
	Mounting	On wall or DIN rail Fittings bypacked	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AKL 111A and AKL 25

Operation

All measurements and registrations can be displayed via the DANBUSS Data Communication System. The data can for example be transmitted to:

Control panel type AKA 21
The control panel is connected to the monitoring unit, and the different settings and displays can be arranged via the menu system.

System software type AKM
The DANBUSS Data Communication can be connected to a PC via a gateway type AKA 244.
The AKM software programme can be installed in the PC. All settings, displays and alarm receipts can now be handled from the PC.
This type of operation can also be carried out over the telephone network via modem.

Signal failure

The monitoring unit constantly monitors all the connected signals. If a signal drops out, there will immediately be an alarm.

Survey and ordering

	Type AKL 111A	Type AKL 25
Function	Monitoring unit	Monitoring unit
Temperature inputs / ON/OFF inputs	8	14
ON/OFF inputs		4
0 - 5 V voltage signals		3
230 V voltage inputs	4	
Pressure transmitter inputs (0 - 5 V)		9
Display output and external display option	1	
Alarm relay outputs	1	2
Separate acknowledgment of alarm	1	
Energy recording	2	
Code number	**084B6039**	**084B2012**

Accessories for AKL 111A

Fitting for DIN rail	Code No.	**084B6160**
Display type AKA 14	Code No.	**084B6040**

Literature

In addition to what is contained in this technical brochure, you may also find information in the below-mentioned documents:

Main Catalogue:	Temperature sensors type AKS	RK.00.H
	Pressure transmitters type AKS 32	RK.00.H
Technical Brochure:	Operation of ADAP-KOOL® Refrigeration controls	RC.0X.L
Menu operation via AKA 21:	Monitoring unit type AKL 111A	RC.1H.5
	Monitoring unit type AKL 25	RC.1J.K
Menu operation via AKM:	Monitoring unit type AKL 111A	RC.1H.6
	Monitoring unit type AKL 25	RC.1J.Q
Mounting instructions:	Monitoring unit type AKL 111A	RI.1M.S
	Monitoring unit type AKL 25	RI.1J.J
Installation instructions for data communication cable		RC.0X.A

AC-RDT