



Front view



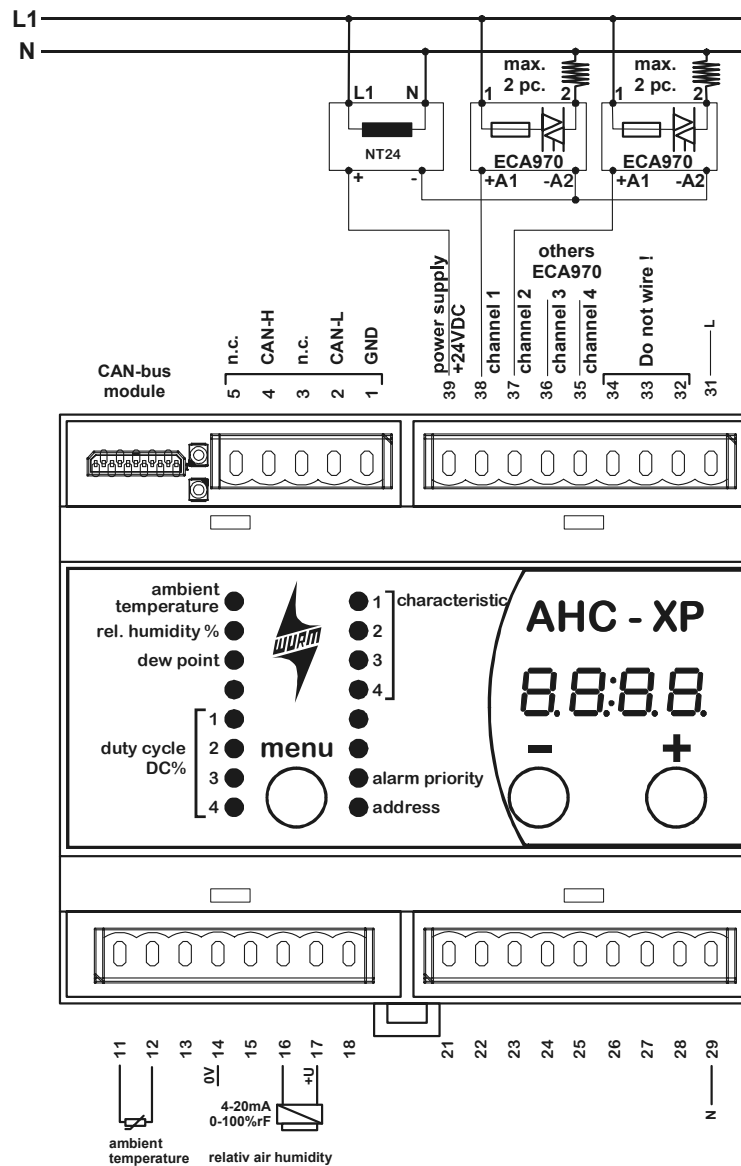
Characteristics

- Dew point-guided power controller for cost-optimized operation of glass and handrail heaters
- Digital display of market temperature, relative humidity, dew point and duty cycle
- Four phase-delayed outputs for every two solid state relays ECA970
- Equal distribution of current loads
- Eight different control characteristics per channel for all of the current refrigerator types
- Adjustable minimum duty cycle per channel
- Good temperature consistency through 72 switchings per hour
- Saving of extensive statistical functions for data evaluation
- Graphic representation of power consumption of the FRIGODATA XP
- Simple parameter changes via clear text menu and direct operation
- Outlet for CAN interface for remote data transmission
- Fast installation by snapping onto profile rail
- Plug-in connection terminals

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1 Connection diagram AHC-XP with ECA970





2 Principle of function

The technical data for refrigerators must be determined in accordance with EN441 in climatic rooms, where the climate classes for a room temperature of 25°C and a relative air humidity of 60% must be adhered to. Climatic conditions, in which the air is very moist and warm, can only be found on a few days out of the year in Northern Europe, however.

Despite this fact, the refrigerators – and therefore the anti-condensation heaters of glass and handrails – are designed for this unfavourable situation. For the few remaining days where the air is cooler or drier, the capacity of these heaters is then too high.

The operating costs can be reduced by up to 70% by means of dew point-dependent capacity control.

The possible level of capacity reduction (down to zero) is determined by the AHC-XP controller and relayed to solid state relays ECA970 by the respective control commands. The heaters thereby periodically switch off for several seconds without making contact and thus wear-free – just as long as possible, so that the dew point on the refrigerator surfaces is not fallen short of.

3 Operation

The controller has a 4-digit digital display, two buttons for adjusting the set values and a menu display with menu button to change the menu position.

After the unit is switched on, all LEDs are illuminated briefly as a function control. Then the standard menu “Temperature Tu” is indicated by the corresponding menu LED. The current temperature is displayed on the digital display.

The menu button must be pressed briefly for each menu change. The menus are called up in order from top to bottom, first the left and then the right column. Each menu selected is indicated via a menu LED. In standard mode it is not possible to adjust the values shown in the display.

Some parameters are on the so-called 2nd operating level. To change to this level, the menu button must be pressed and held down for 5 seconds. This can be done for each currently selected menu position. The 2nd operating level is indicated by slowly flashing menu LEDs (approx. 1 Hz).

Not all positions on the 2nd operating level contain information that can be requested. For this reason, menus without content are skipped when scrolling with the menu button.

If no other button is pressed within two minutes of last actuating a button, the display will automatically revert to the standard menu on the first operating level. For the AHC-XP, the standard menu is the display of the temperature Tu. It is also possible to return to the 1st operating level by pressing the menu button again for 5 seconds.

To adjust the set values, it is necessary to activate access. To do this regardless of the menu selected, the menu, plus and minus buttons must all three be pressed simultaneously for 5 seconds. Activated access is signalled by means of rapidly flashing menu LEDs (approx. 8 Hz). In the 2nd operating level, the rapid flashing is overridden by slow flashing. In this case the LED flashes briefly 3 times followed by a longer pause.



The set values may be adjusted using the plus or minus button. Briefly pressing this button adjusts the value by just one step at a time. If one of the buttons is pressed for a longer period of time, the values are changed at increasingly short intervals (dynamic autorepeat function). This makes it possible to adjust the values more quickly.

When the menu or menu levels are changed, access need not be cleared again to be able to adjust other set values.

Actual values are displayed only and cannot be adjusted in this way, even when the corresponding menu LED is flashing.

Automatic reversion to the standard menu after the time out period of 2 minutes also blocks access again. The menu LED is again constantly illuminated. If other values are to be adjusted, access must again be activated as described above. Access can also be blocked again by again pressing the three buttons menu, plus and minus simultaneously for 5 seconds.

When in the position 'Duty cycle DC%' of the respective channel, manual operation is activated by pressing the Plus button for more than 5 seconds. In this way, the corresponding heater will be controlled for two hours with 100% DC. After these two hours have passed, the channel reverts back to normal control.

4 Individual parameters per channel

The assigning of parameters to the menu positions is described in section 10.

Characteristics curve

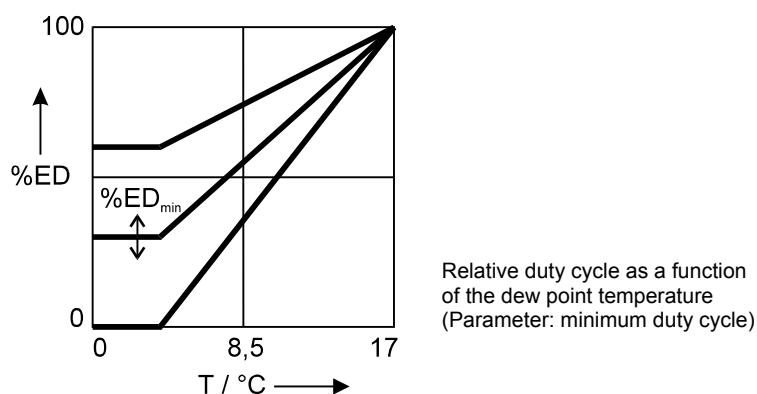
The temperatures of the glass and metal surfaces of refrigerators must always be higher than the current dew point. Since the cooling of surfaces by the refrigerator itself has different levels of effect and depends on the temperature of the goods, the characteristics curve of the controller channel must be adjusted to the type of refrigerator.

In order to significantly reduce the amount of time necessary for the refrigerator installer to spend on testing out the setting values "Increase" and "Zero offset", we have investigated typical refrigerators and saved the characteristics curves in the controller.

	Cold location / Function
0	No control of outputs
1	TK glass door cabinets for ice cream (-22/-24 °C)
2	TK glass door cabinets – normal (-18/-20 °C)
3	Glass enclosed TK islands for ice cream (-22/-24 °C)
4	Glass enclosed TK islands - normal (-18/-20 °C)
5	TK islands, not glass enclosed, for ice cream (-22/-24 °C)
6	TK islands, not glass enclosed, normal (-18/-20 °C)
7	Wall shelves and service counters (+0 /+ 2 °C)
8	Wall shelves and service counters (+4 /+6 °C)
9	Continuous operation 100% duty cycle

Minimum duty cycle (Min %DC)

Since the heating powers of glass and/or handrail heaters have recently been reduced somewhat by the refrigerator manufacturers, an adjustable minimum duty cycle for each channel is provided here. By changing the minimum duty cycle (range: 0...90%), the refrigerator installer can adjust the steepness of the set dew point characteristics curves to the changed conditions.



5 Actual values

The assigning of parameters to the menu positions is described in section 9.

Temperature Tamb.

Provides the current reading of the temperature probe.

Rel. humidity

The current reading of the relative air humidity in %.

Dew point

The dew point temperature calculated from the temperature and humidity. This value is the reference value for determining the channel-specific duty cycle.

Duty cycle %DC

The current duty cycle of each channel is shown in positions 4-8 of the operating level. The display is in % of DC.

6 Interface for remote data transmission

The AHC-XP controller can as an option be equipped with a CAN BUS interface. To do so, a BUS CAN plug is plugged into the outlet for the interface. To communicate and record values with a master system then requires a gateway and FRIGODATA-XP software.

The AHC-XP device records the market temperature, the relative humidity, the calculated dew point and the duty cycle of each channel. Using the FRIGODATA XP software package, this data can be read and displayed.



All operating parameters can be displayed and remotely adjusted.

Two green light-emitting diodes on the bus connection signal the data transfer of the device.

To participate in the data transfer on the CAN Bus, a unique address between 1 and 120 must be assigned to the device. If the address assignment is '0', bus communication is switched off.

7 Monitoring

If there is a fault, the display flashes, showing the code given in the following table and the value of the menu to be displayed.

Error	Monitoring function
F 1	Probe faults Short circuit/break of temperature probe. The controller is in emergency operation.
F 2	Probe faults Short circuit/break of moisture probe. The controller is in emergency operation.
COLL	Collision Address collision on the bus, Another device with the same device address has been found.
Uhr	Clock fault The internal software clock has not yet been reset after the re-start of the device. Communication to the Gateway is defective.
bus	Bus fault, general communication fault
EE	Data loss, A power surge may destroy the set values. Remedy: Enter all storage locations again; switch controller without current

8 Start-up

The entire wiring must be checked before start-up.

First, the displayed values for room temperature and humidity must be checked and if needed, the installation location and wiring of the sensors must be checked.

Following this, the respective characteristics curve (see section 4) must be selected for each control channel.

If nothing is known about this at the time of the control cabinet inspection, characteristics curve 1 should be entered for all channels. Using a control lamp (not a glow lamp or multimeter!), the cycling of the glass and handrail heaters can subsequently be checked. To do so, the control lamp is connected parallel to the consumer load.

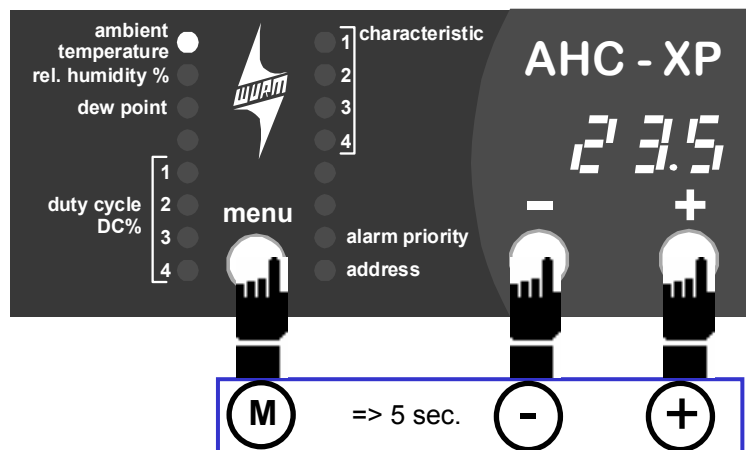
To test the heaters, while still in the position 'Duty cycle %DC' of the respective channel, manual operation can be activated by pressing the plus button for more than 5 seconds. In this way, the corresponding heater will be controlled for two hours with 100% DC. After these two hours have passed, the channel reverts back to normal control.

Data communication should still be checked following this by means of remote data transfer.



9 Menu format

Setting parameters of the 1st operating level



Activating the adjustment
LED flashes fast (approx. 8Hz)

After all 3 buttons are pressed simultaneously for 5 seconds, set values can be set in the 1st operating level.

Setting the parameters



Select the parameter



Change value



The controller automatically reverts back into the initial position Temperature Tamb. after 2 minutes if no adjustment is made.

1. Operating level (standard)

Menu	Description	Min	Max	Ex Factory
left column				
Temperature Tamb.	Ambient temperature			
Rel. humidity %	relative air humidity			
Dew point	calculated dew point			
-	-			
Duty cycle DC% 1	Current duty cycle channel 1	Manual operation: Select channel <+> Press 5 sec. => 2-hours continuous operation		
Duty cycle DC% 2	Current duty cycle channel 2			
Duty cycle DC% 3	Current duty cycle channel 3			
Duty cycle DC% 4	Current duty cycle channel 4			
right column				
Characteristics curve 1	Refrigerator characteristics curve channel 1	0	9	1
Characteristics curve 2	Refrigerator characteristics curve channel 2	0	9	1
Characteristics curve 3	Refrigerator characteristics curve channel 3	0	9	1
Characteristics curve 4	Refrigerator characteristics curve channel 4	0	9	1
-	-			
Time	System time			
Alarm priority	Alarm priority of device	0	3	3
Address	Device address on the CAN-Bus	0	120	0

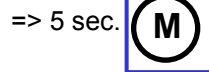


Setting parameters of the 2nd operating level



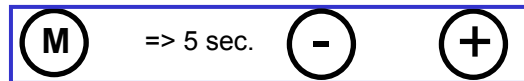
Switchover to the 2nd operating level

LED flashes slowly (approx. 1Hz)



Activating the adjustment

LED flashes slowly and overrides fast (approx. 1Hz + 8 Hz)



After all 3 buttons are pressed simultaneously for 5 seconds, set values can be set in the 2nd operating level.

Setting the parameters



Select the parameter

Change value



The controller automatically reverts back into the initial position Temperature Tamb. after 2 minutes if no adjustment is made.

2. Operating level

Imprint on front plate	Menu	Description	Min	Max	Ex Factory
left column					
Temperature Tamb.	Plot cycle	Time slot pattern for storing the measured values in minutes	1	15	15
Rel. humidity %	-				
Dew point	-				
-	-				
Duty cycle DC% 1	Min. DC % 1	Minimum duty cycle channel 1	0	90	0
Duty cycle DC% 2	Min. DC % 2	Minimum duty cycle channel 2	0	90	0
Duty cycle DC% 3	Min. DC % 3	Minimum duty cycle channel 3	0	90	0
Duty cycle DC% 4	Min. DC % 4	Minimum duty cycle channel 4	0	90	0
right column					
Characteristics curve 1	-				
Characteristics curve 2	-				
Characteristics curve 3	-				
Characteristics curve 4	-				
-	-				
Time	-				
Alarm priority	Outputs	Status of control outputs			
Address	Version	installed software version			

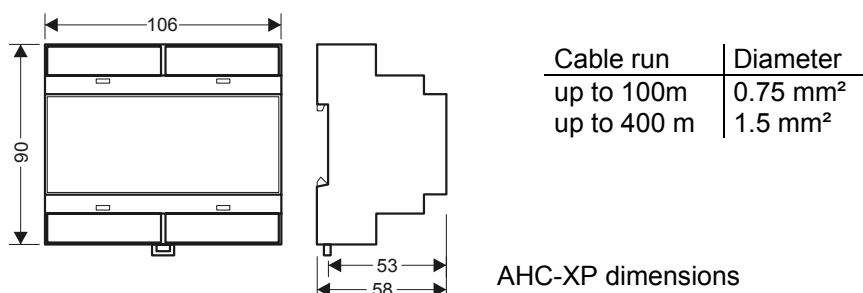


The setting values have another function in the 2nd operating level than the texts printed on the front plate!

10 Installation

The AHC-XP device is designed for profile rail mounting. The housing is a standard size and is also suitable for installation in fuse boxes. It can be positioned immediately next to another without gaps.

Standard 2x2x0.8 \emptyset telephone cable is recommended for wiring data lines up to 100 m in length. The protective shield must be grounded in the control cabinet. For cable runs between 100 m and 400 m, sheathed cable with braided sheathing should be used. For probe extensions, it is recommended that the following sheathed cable be laid.



11 Technical data

Supply voltage	230VAC +10% / -20%
Power draw	approx. 5 VA
Fusing	max. 6A
Temperature probe	Type TRK277PLUS
Moisture probe	Type RHS950
Switch outputs	Optocoupler output for controlling every two solid state relays ECA970
Low-voltage protection	The device is not suitable for low-voltage protection.
Central processing unit	Single-chip microcomputer, data memory
Monitoring system	Monitoring of connected probes Self-monitoring of data memory and microcomputer
Communication	Optional CAN-bus interface
Internal time	Measuring system time from the Gateway (only for application in the BUS system) Without power reserve in case of power failure.
Dimensions	(WxHxD) 106 x 90 x 58 mm ³ , DIN 43880
Mounting	Mounting rail DIN EN 50022 35x15
Ambient temperature	0...+45 °C
Weight	approx. 450 g
Low-voltage protection	The device and the outputs are not suitable for low-voltage protection (SELV).
EC Conformity Declaration	As defined by EC Directive on Electromagnetic Compatibility 89/336/EEC

This document will automatically become invalid when superseded by a new technical description of the device.