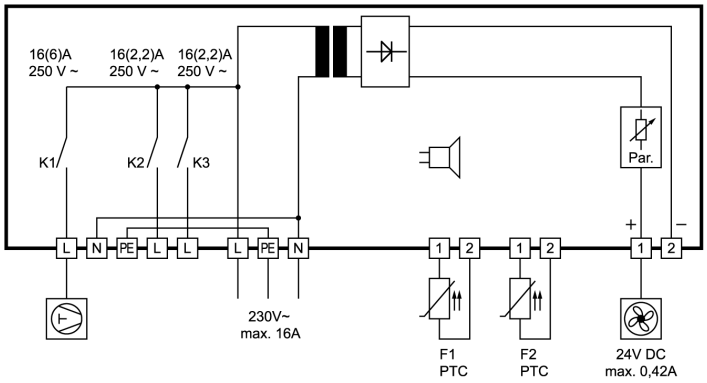
ST181-VL4KA.12

Controller for cooling applications

Order number 900223.015
Old Id.Nr.: 377416

Wiring diagram



Product description

The cooling controller ST181-VL4KA.12 is a control unit specifically designed for 24V DC ventilation adjustment. The maximum ventilation power is 10W. The number of revolutions can be decreased to 20% and thus create a minimum air speed. Due to the galvanic separation of the ST181-controller the low-voltage ventilator can also be safely operated in a wet environment.
The three switching outputs with our proven 16A relay allow complete operation of the cooling circle as well as further additional features, as for example the lighting and many other functions.The timer allows a 1-week time management for the defrosting periods as well as for setting the cooling chamber temperature at night or on the weekend. With regard to the parameter level, programming of this timer is easy and user-friendly. The actual time can be re-set simply directly on the operator surface.

Sensor: PTC
Range: -55...130°C
Front size: 180mm x 52mm
Panel cut-out: 159mm x 45mm

Tightness: front IP65
Connector: Wieland terminal

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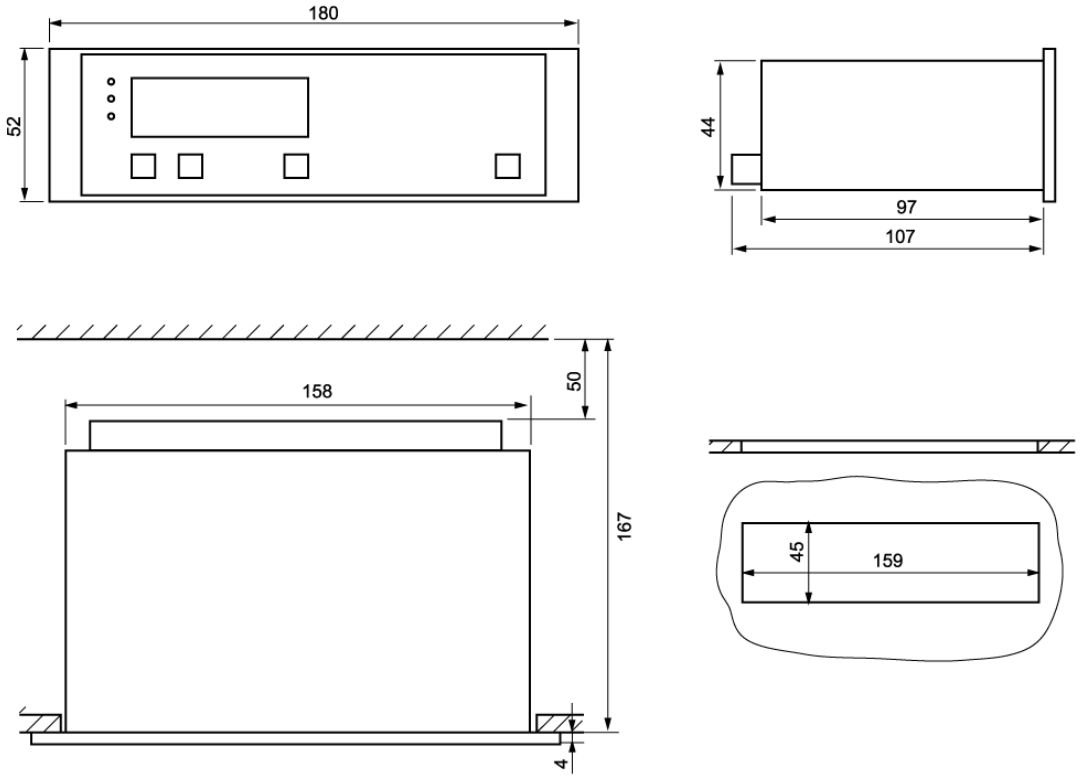

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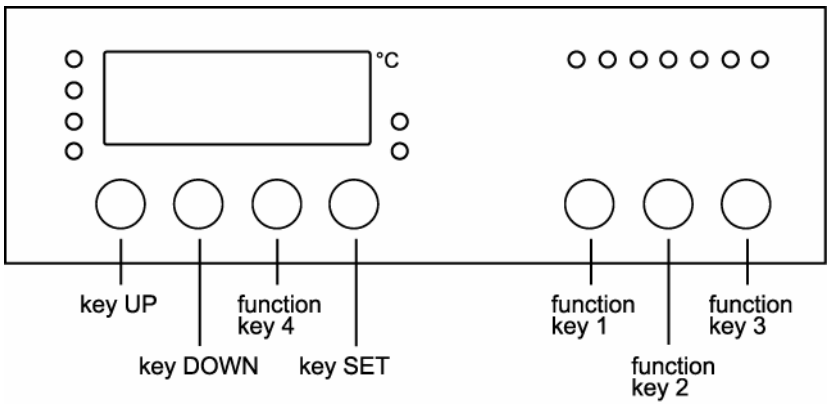

Adjustment options

Key UP
Defrosting can be started any time by pressing the UP-key for 3 seconds. During the process of defrosting the respective LED is illuminated. The LED flashes if defrosting is requested, but may not be started yet due to interlock conditions.

Key DOWN
The DOWN key, among other functions, can acknowledge an alarm. The internal buzzer is then switched off.
Press this key more than 5 seconds to switch the display to permanent time indication. Press the SET key to switch back to temperature indication.

Function key 4 (time)
By pressing this key the actual time of the internal real time clock is indicated in the display. The colon of the time display flashes. Pressing also the UP or DOWN key at the same time the clock can be adjusted. With the first adjustment the flashing stops and after releasing the key the new value is saved. For precise adjustment, hold the key pressed until a specific time and release it to start.
Pressing the key for 5 seconds the switch-over to data record 2 is deactivated for the actual day. This is indicated by a flashing point on the right side of the display.
The data record switch-over can be deactivated permanently by parameter H0.

Key SET
While SET key is pressed, the setpoint is indicated.
In addition, the SET key is used for setting parameters.

Function key 1 (if available)
Different functions are assigned to this key by help of parameters, see parameter b1.
It is pre-set for data record switch-over (together with key UP or DOWN).

Function key 2
Different functions are assigned to this key by help of parameters, see parameter b2. (Direct switching of a contact, setpoint indication thermostat 2). The key must be pressed for at least half a second.

Function key 3 (standby)
With this key the controller is switched to standby mode. Pressing the key a second time, restarts the unit. The key can be deactivated by setting the respective parameter, see parameter b3.

First control level:

Parameter setting for the main setpoint.
If none of the keys is pressed, the display indicates the actual value of the temperature. Pressing the SET key, the setpoint shows on the display.
If the setpoint is to be changed, the SET key is to be kept pressed while adjusting the setpoint with the keys UP and DOWN.
Please note that the setpoint can only be changed within the set setpoint limits.

General reference
Note that the value is transferred to the captive memory and is safe also after power failure.

Para-meter	Function	Adjustment range	Standard setting	Customer setting
S1	Setpoint for refrigerating chamber, data record 1	r1...r2	0.0°C	
S2	Setpoint for refrigerating chamber, data record 2	r1...r2	0.0°C	

Second control level:

Setting of control parameters
The parameters can also be set in standby mode. Simultaneously pressing the UP and DOWN key for at least 4 seconds opens a parameter list containing frequently used parameters (the complete list of all parameters is to be found on the third control level).
With the UP and DOWN keys the list can be scrolled in both directions.
Pressing the SET key will give you the value of the respective parameter. Pressing also the UP or DOWN key at the same time the value can be adjusted.
Return to the initial position takes place automatically, if no key is pressed for 45 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Para-meter	Function	Adjustment range	Standard setting	Customer setting
r0	Hysteresis for the compressor contact	1...15 K	2 K	
P2	Indication actual value of sensor F2 (only available if P4≠0)	-		
Y1	Setpoint thermostat 2 (only available if P4=2)	-50...+150°C	10°K	
Y2	Hysteresis for thermostat 2 (only available if P4=2)	0,5...15 K	2 K	
H0	Activation of data record 2	0: not active 1: active depending on switching time	0	
H2	Display manual reset at data record 2	0: flashing point if key pressed 1: flashing point until end of day	0	

Para-meter	Function	Adjustment range	Standard setting	Customer setting
H11	Time to switch to data record 2, Monday	0:00...23:59	0:00	
H12	Time to switch to data record 1, Monday	0:00...23:59	0:00	
H21	see H11, Tuesday	0:00...23:59	0:00	
H22	see H12, Tuesday	0:00...23:59	0:00	
H21	see H11, Wednesday	0:00...23:59	0:00	
H22	see H12, Wednesday	0:00...23:59	0:00	
H21	see H11, Thursday	0:00...23:59	0:00	
H22	see H12, Thursday	0:00...23:59	0:00	
H21	see H11, Friday	0:00...23:59	0:00	
H22	see H12, Friday	0:00...23:59	0:00	
H21	see H11, Saturday	0:00...23:59	0:00	
H22	see H12, Saturday	0:00...23:59	0:00	
H21	see H11, Sunday	0:00...23:59	0:00	
H22	see H12, Sunday	0:00...23:59	0:00	
H81	Starting time 1. defrost, daily	0:00...23:59	0:00	
H82	Starting time 2. defrost, daily	0:00...23:59	0:00	
H83	Starting time 3. defrost, daily	0:00...23:59	0:00	
H84	Starting time 4. defrost, daily	0:00...23:59	0:00	
H85	Starting time 5. defrost, daily	0:00...23:59	0:00	
PA	Access to parameters of third control level Password: "-19"	-99...+99		

Programming cycle for switching times

Selection and adjustment:
By pressing the function key 4 after selection of the parameter to be adjusted, the respective switch-time is indicated and can be set by additionally pressing the UP or DOWN key. Releasing all keys, the new value is saved long term.

The parameters with odd numbers always determine the switch-over to data record 2, the following parameters with even numbers determine the switch-back to data record 1. The leading number of the parameter symbolizes the weekday, staring with “1” for Monday.
Within the group Defrost (H81 – H85) one can adjust five start times valid for all days. This groups is symbolized by the leading number “8” in the parameter number.

The programming is analogue to a mechanic timer switch, where a marker for switch-on and one for switch-off times can be set daily. Note that there is no switching if the adjusted switch-on and switch-off times of an output are the same on the same day. A cross-over of the time values of a contact is possible, but the respective times then are ineffective.

Between 23:59 and 0:00 there is the special position “----“. With this setting the respective time is deactivated and has no more influence on the according switching output. This setting is used to allow outputs to be switched on for several days.

Third control level (all parameters):

Setting of control parameters
Access to the third control level is granted when selecting parameter PA on the second control level. Parameter PA is to be set at '**-19**'. Then the key UP and DOWN have to be simultaneously pressed for approx. 4 seconds which will give access to the third control level, beginning with parameter P0. With the keys UP and DOWN you can scroll the list in both directions. Pressing the SET key will give you the value of the respective parameter. By pressing the UP or DOWN key at the same time the value can be adjusted.
Return to the initial position takes place automatically, if no key is pressed for 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Para-meter	Function	Adjustment range	Standard setting	Customer setting
P0	Indication of actual value of sensor F1			
P1	Calibration sensor F1, actual value correction	-99...+99 K	0.0 K	
P2	Indication of actual value of sensor F2 (only available if P4≠0)			
P3	Calibration sensor F2, actual value correction (only available if P4≠0)	-99...+99 K	0.0 K	
P4	Evaluation of sensor F2	0: not evaluated 1: evaluated as evaporator sensor 2: evaluated as actual value thermostat 2	1	
P5	Indication mode	0: integrals 1: accuracy 0,5 °C 2: accuracy 0,1 °C	1	
P6	Display unit, indication in standby mode	0: Fahrenheit (“AUS”) 1: Celsius (“AUS”) 2: Fahrenheit (“OFF”) 3: Celsius (“OFF”)	1	
P7	Sensor type (applies to both sensors)	11: Pt100 2-wire 21: PTC 2-wire 22: PT1000 2-wire	21	
P8	Software filter (applies to both sensors)	1: not active 2…32: average value with 2…32 measuring values	8	
P9	Weighing factor measuring value (data record 1)	0..100 [%]	100	
P9	Weighing factor measuring value (data record 2)	0..100 [%]	100	
r0	Hysteresis for the compressor contact	1...15 K	2 K	
r1	Setpoint limitation (minimum)	-50 °C...r2	-50 °C	
r2	Setpoint limitation (maximum)	r1...+150 °C	50 °C	
c0	Start protection of the compressor after "cooling on"	0...240 min.	0 min.	
c1	Start protection after compressor start	0...240 min.	5 min.	

Para-meter	Function	Adjustment range	Standard setting	Customer setting
c2	Start protection after compressor stop	0...240 min.	3 min.	
c3	Function in the case of error of sensor F1	0: relay off 1: relay on 2: emergency operation	0	
d0	Defrosting interval	0 = inactive, no defrosting 1...99 h	8 h	
d1	Defrosting mode	0: electrical 1: with hot gas	0	
d2	Defrosting temperature	-50...+150 °C	10 °C	
d3	Defrosting time limit	1...99 min.	30 min.	
d6	Indication of the refrigerating chamber temperature during defrosting	0: actual temperature 1: temperature determined just before the start of defrosting	1	
d7	Drainage time	0...15 min.	2 min.	
A0	Hysteresis for alarm	1...15 K	2 K	
A1	Minimum limit value	-99.0 ... -0.1 K 0 = inactive	-10 K	
A2	Maximum limit value	+0.1...+99.0 K 0 = inactive	10 K	
A3	Alarm suppression time after “cooling on”	0...240 min.	120 min.	
A6	Alarm suppression time after temperature alarm	0...240 min.	2 min.	
A7	Alarm suppression time after defrosting	0...240 min	15 min.	
A9	Switching sense alarm contact	0: relay on 1: relay off	1	
F4	Defrosting behaviour	0: ventilator off during defrosting 1: ventilator on during defrosting	1	
F5	Ventilator delay after defrosting	0...240 min.	2 min.	
F7	Ventilator function at cooling operation	1: always on 2: on or off together with the compressor 3: on whenever the compressor is on and sensor F2 < sensor F1	2	
F8	Ventilator revolution number (data record 1) at normal cooling operation	0..100%	80	
F9	Ventilator revolution number (data record 1) at defrosting	0..100%	80	
F10	Kick-start	0..60s	0	
F11	Ventilator revolution number (data record 2) at normal cooling operation	0..100%	80	
F12	Ventilator revolution number (data record 2) at defrosting	0..100%	80	
Y0	Indication mode of the actual value of sensor F2	0: with parameter P2 1: with DOWN key	0	
Y1	Setpoint thermostat 2 (only available if P4=2)	-50...+150°C	10°C	

Para-meter	Function	Adjustment range	Standard setting	Customer setting
Y2	Hysteresis for thermostat 2 (only available if P4=2)	0,5...15 K	2 K	
Y3	Setpoint limitation (minimum) thermostat 2	-50°C...Y4	-50 °C	
Y4	Setpoint limitation (maximum) thermostat 2	Y3...150°C	+50 °C	
Y5	Switch mode thermostat 2	0: heating contact 1: cooling contact	1	
Y6	Function in case of error of sensor F2	0: relay off 1: relay on	1	
Y7	Defrosting interval thermostat 2	0: inactive, no defrosting 1...99 h	0	
Y8	Defrosting time limit thermostat 2	1...99 min 0: inactive	30 min.	
b1	Function key 1 (if available)	0: no function 1: controller on/off (standby) 2: Setpoint ventilator revolution number (F8/F11) 3: relay directly, switched off in standby mode 4: relay directly, regardless of standby mode 5: actual value sensor F2 6: switching data record 1 and 2; after power-on data record 1 is active 7: like 6, after power-on last data record is active 8: Setpoint Y1	6	
b2	Function key 2	see b1	0	
b3	Function key 3 (standby)	0: no function 1: controller on/off (standby)	1	
b4	Function key 4 (if available)	TIME-key (in case of controllers with RTC) or else like b1		
b11	Function switching input E1 (if available)	0: no function 1: controller on/off (standby) 2: starting defrost 3: relay directly, switched off in standby mode 4: relay directly, regardless of standby mode	0	
b12	Function switching input E2 (if available)	see b11	0	
b13	Function switching input E3 (if available)	see b11	0	
b14	Function switching input E4 (if available)	see b11	0	

Para-meter	Function	Adjustment range	Standard setting	Customer setting
U1	Exit connection K1	0: no connection 1: connection to compressor 2: connection to defrost 3: connection to ventilator 4: connection to alarm 5: connection to thermostat 2 6: connection to function key 1, E1 or E3 7: connection to function key 2, E2 or E4 8: connection to buzzer 9: on, if controller on 10: on, if data record 2 is activated (operates as timer switch)	1	
U2	Exit connection K2	see U1	2	
U3	Exit connection K3 (or internal buzzer, if available)	see U1	3	
U4	Exit connection K4 (if available)	see U1	4	
L0	Individual address	0 = inactive for Bus 1...255	0	
L1	Amount of slaves (if value > 0 the controller is set as master automatically)	0...254	0	
L2	Address of the first slave (only relevant if L1>0)	2...255	2	
Pro	Program version			

Parameter description:

The following values can change the equipment characteristics and are therefore to be set with utmost care.

P0: Indication actual value of sensor F1
The here indicated temperature presents the sum of actual measured value of feeler F1 and the actual value correction according to parameter P1.

P1: Calibration sensor F1, actual value correction
This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P2: Indication actual value of sensor F2
The here indicated temperature presents the sum of actual measured value of sensor F2 and the actual value correction according parameter P3.

P3: Calibration sensor F2, actual value correction
This parameter allows the correction of actual value deviations caused for example by sensor tolerances or extremely long sensor lines. The regulation measure value is increased or decreased by the here adjusted value.

P4: Evaluation of sensor F2
Sensor F2 can be used for the determination of the evaporator temperature (P4=1) or for the second thermostat (P4=2).
If, in simpler refrigerant plants only the refrigerating chamber sensor is used, the feeler entrance for sensor F2 as well as its data recording (P4=0) can be deactivated here. Among other, parameter d2 has no meaning in the deactivated condition.

P5: Indication mode
The actual value can be indicated with different accuracy.
Actual values and parameter values are always set for highest accuracy.

P6: Display unit, indication in standby mode
This parameter allows display settings (°F or °C) and ("AUS" or "OFF") in standby mode.

P7: Sensor type
This parameter makes it is possible to adjust the feeler type of both sensors. Depending on the hardware not all sensor settings are possible.

P8: Filter
This parameter can determine by how many measured values an average value is to be formed.

P9: Weighing factor for measuring value of refrigerating chamber sensor F1 (data record 1)
P10: Weighing factor for measuring value of refrigerating chamber sensor F1 (data record 2)
The actual value of the respective data record can be submitted to weighing. In this case the actual value is formed by a mixing ratio of the measuring values of sensor F1 and F2. (new function of the sensors as supply-air and exhaust-air sensor).
At standard setting [P9 = 100%] the actual value corresponds to the refrigerating chamber sensor.
As soon as parameter P9 differs from 100% the measuring values are submitted to weighing.
The actual value then is formed as followed:

Actual value = (P9 * measuring value F1 + (100 – P9) * measuring value F2) / 100%
F1 = refrigerating chamber sensor / supply air
F2 = evaporator sensor / exhaust air

The weighing is only effective, if the sensor F2 is evaluated as evaporator sensor with parameter P4. For the defrost control the not weighed value of sensor F2 is effective.

r0: Hysteresis for the compressor contact
Parameter r0 sets the temperature margin between switching off and switching on of the compressor. A small hysteresis permits a more exact regulation, however also leads to more frequent switching of the compressor. The hysteresis is set one-sided above the setpoint.

r1: Setpoint limitation (minimum)
r2: Setpoint limitation (maximum)
These parameters limit the adjustment range of the setpoint S1, in order to avoid that the end user sets inadmissible values for the plant.
The entire adjustment range is equivalent to the maximum operating range of a PTC sensor.

c0: Start protection of the compressor after "cooling on"
After cooling is switched on (e.g. by switching on the mains voltage) the start of the compressor is retarded until the protection running time is over. This secures e.g. that several cooling units do not start at the same time and load the electricity supply net.

c1: Start protection of the compressor after compressor start
This time protection starts when the compressor is switched on. After switching the compressor off, a renewed switching on is impossible until this protection time runs out. This prevents from too frequent switching-on of the compressor and thus increases its life span.

c2: Start protection of the compressor after compressor stop
This time protection starts when the compressor is switched off. After switching the compressor off, a renewed switching on is impossible until this protection time runs out.

c3: Function in the case of error of refrigerating chamber sensor F1
Here is determined whether the compressor keeps running or not in the case of an error of the refrigerating chamber feeler F1. When deep-freezing, the compressor should normally continue running, in order to prevent de-frosting of the goods. At the normal cooling range above 0 °C, a continuation, however, could lead to frost damages.
In the operation mode "emergency operation" the compressor is switched on and off in 5 minute intervals. This results in a clock operation with 50 % cooling performance.

d0: Defrosting interval
The defrosting interval defines the time, after which a defrosting process is started. With the beginning of the defrosting process, the defrosting interval starts anew, which results in periodic defrosting in firm intervals.
Defrosting can also be started by pressing the key "manual defrosting" for at least 3 seconds. This automatically restarts the defrosting interval.
After switching-on cooling, the controller immediately initiates cooling and starts the first defrosting process after this interval.

d1: Defrosting mode
This parameter determines whether defrosting is effected by an electrical heating coil (d1=0) or by means of hot gas (d1=1).

d2: Defrosting temperature
The defrosting process is terminated when the evaporator has reached the adjusted temperature. (Always provide good thermal contact between evaporator sensors and lamellas).
In case that defrosting takes too long, the time limit set in "d3" will come into effect.

d3: Defrosting time limit
Here the maximal defrosting time can be adjusted. According to this time frame, defrosting is terminated even if the evaporator is not warm enough to be ice-free.

d6: Indication of the refrigerating chamber temperature during defrosting
It is to be assumed that the refrigerating chamber temperature slightly rises during the defrosting process. d6=0 indicates the actual refrigerating chamber temperature during the defrosting process. d6=1 indicates the temperature determined just before the start of defrosting until the setpoint of the refrigerating chamber is reached again after the defrosting process is completed. Thus, an irritation of the operator during defrosting can be avoided. In the case of emergency, the display flashes and the actual temperature of the refrigerating chamber is indicated.

d7: Drainage time
Completed defrosting is immediately followed by a drainage period, in order to let the evaporator drip off. During drainage time, the exits compressor and ventilator are switched off.

A0: Switching hysteresis for alarm
The hysteresis of the alarm contact is asymmetrically, set downward at the maximum alarm value upward at the minimum alarm value.

A1/A2: Minimum/maximum limit values
The limit values serve for monitoring of the refrigerating chamber temperature. They are relative, i.e. going along with the setpoint S1 of the refrigerating chamber. Alarm is released when exceeding maximum limit value or when falling below the minimum limit value:
The actual value display flashes, the buzzer (if available) goes off intermittently and the actual temperature of sensor F1 is indicated (if there is no sensor error).
At A1=0 or A2=0 the respective limit value alarm is inactive.
The buzzer can be turned off with the DOWN key, the display continues flashing until the alarm is turned off.

A3: Alarm suppression time after “cooling on” or data record switch-over
After switching cooling on or a data record switch-over, an alarm is suppressed for the adjusted time, i.e. the refrigerant plant can get to work temperature without releasing alarm.

A6: Alarm suppression time after temperature alarm
If the refrigerating chamber temperature exceeds the limit values adjusted at A1, A2, normally a temperature alarm should be released.
With the suppression time set at A6 the alarm release can be delayed.

A7: Alarm suppression time after defrosting
Temperature alarm is avoided for the adjusted time after defrosting, in order to enable the plant to get back to the normal operating conditions (see A1, A2).

A9: Switching sense alarm exit
Depending on application, the alarm exit requires a normally-closed or a normally-open contact. At setting A9=1 the relay tightens in normal operation and opens in the case of emergency. That way also a voltage failure of the controller can be detected (relay dead = alarm) for an external alarm chain.

F4: Defrosting behaviour
At F4=0 the ventilator is switched off during defrosting.
At F4=1 the ventilator continues to run also during defrosting (normal cooling range above 0°C).

F5: Ventilator delay after defrosting
Following drainage time d7, start of the ventilator can be delayed until the evaporator has sufficiently cold air again. If the ventilator started immediately, the warm air resulting from the

defrosting process would probably be blown into the refrigerating chamber. The ventilator delay is ineffective if the ventilator is on during defrosting and the drainage time is set to “0”.

F7: Ventilator function at cooling operation
At F7=1 the ventilator is always on (except for a defrosting process possibly, see parameter F4).
At F7=2 the ventilator is always on or off together with the compressor.
At F7=3 the ventilator is switched on whenever the compressor is on and the evaporator temperature (sensor F2) is below the refrigerating chamber temperature (sensor F1). The ventilator is switched off whenever the compressor is switched off, whereas parameter F5 is not active. In the case of sensor error the ventilator reacts as in the setting F7=2.

F8: Ventilator revolution number (data record 1) at normal cooling operation
Variable 1 for ventilator revolution number at normal cooling operation.

F9: Ventilator revolution number (data record 1) at defrosting
Variable 1 for ventilator revolution number at defrosting.

F10: Kick-start (in seconds)
If necessary, this is an option to set a time during which the ventilator starts with the max. number of revolutions for stable operation. This parameter is only efficient, if the ventilator is newly started.

F11: Ventilator revolution number (data record 2) at normal cooling operation
Variable 2 for ventilator revolution number at normal cooling operation.

F12: Ventilator revolution number (data record 2) at defrosting
Variable 2 for ventilator revolution number at defrosting.

Y0: Indication mode of the actual value of sensor F2
At Y0=0 the actual value of sensor F1 is always indicated. The actual value of sensor P2 can be indicated with parameter P2 (second control level).
At Y0=1 the actual value of sensor F2 is indicated when pressing the DOWN key.

Y1: Setpoint thermostat 2
In case that sensor 2 is not used as evaporator sensor, but as actual value for a second independent thermostat, Y1 has the function of setting the setpoint for the latter. If parameters of a function key are set appropriately (parameter bx=2), the setpoint can also be adjusted directly with the respective function key.

Y2: Hysteresis thermostat 2
The hysteresis is set asymmetrically at the desired value. At cooling contact the hysteresis works on one-sided upward and at heating contact one-sided downward.

Y3/Y4: Setpoint limitation (maximum/minimum) thermostat 2
These parameters limit the adjustment range of the desired value Y1, in order to avoid that the end user sets inadmissible values for the plant. The entire adjustment range is equivalent to the maximum work range of the PTC sensor.

Y5: Switch mode for the exit of thermostat 2
Heating function means that the contact falls when the pre-set desired value is reached, i.e. power interruption. In cooling functions the contact only tightens if the actual value is above the pre-set setpoint.

Y6: Function at error of sensor F2
Here is determined whether the respective output contact drops or tightens in case of a sensor F2 error.

Y7: Defrosting interval thermostat 2
The defrosting interval defines the time, after which each defrosting process starts. With the beginning of the defrosting process, the defrosting interval starts anew, which results in the periodic defrosting in firm intervals.

Y8: Defrosting time limit thermostat 2
Here the maximal defrosting time can be set.

b1: Function key 1 (if available)
b2: Function key 2
b4: Function key 4 (if available and not foreseen as TIME key)
At setting = 0 the respective key has no function.
At setting = 1 the controller is switched to standby mode
At setting = 2 the key is linked with the function of parameter F8 or F11 (depending on active data record). If defrosting has started it is linked with parameters F9 or F12.
At setting = 3 a relay (indicated with parameter Ux) can be switched on or off directly with the key. In standby mode the key is locked and the corresponding relay switched off. After restarting the corresponding relay remains switched off.
At setting = 4 a relay (indicated with parameter Ux) is switched despite of the standby mode. The condition of the exit is maintained until the key is pressed again or until it is changed by an external switching entrance. After net interruption, the condition before power failure is re-installed.
At setting = 5 the actual value of sensor 2 can be indicated. At setting P4=0 the key has no function.
At setting = 6 the control is switched to data record 1 by additionally pressing the UP key and switched to data record 2 with the DOWN key. The data record switches the following parameters:

Description	Data record 1	Data record 2
Setpoint	S1	S2
Revolution number cooling operation	F8	F11
Revolution number defrosting	F9	F12

The actual setpoint can be displayed and adjusted by pressing the SET key. If only the ventilator revolution number has to be adjusted both data records must have the same setpoint.
Setting =7 corresponds to setting=6 but when switching the controller on the previous selected data record is active. *Exception:* If the controller is equipped with a real time clock, the clock sets the active data record after switching on (if H0=1 and parameters H11…H72 activated).

b3: Function key 3 (standby)
At setting b3=0 the function of the key can be deactivated.

b11: Function external entrance E1
b12: Function external entrance E2
b13: Function external entrance E3
b14: Function external entrance E4
Depending on existing hardware there are no or not all external entrances.
At setting = 1 the controller is switched to the standby mode.
At setting = 2 defrosting of both controllers is started.
At setting = 3 a relay (indicated with parameter Ux) is switched on or off directly. In standby mode it is locked and the relay is switched off.
At setting = 4 a relay is switched directly (indicated with parameter Ux) regardless of the standby mode. After net interruption the condition before power failure is re-installed.

U1: Exit connection K1
U2: Exit connection K2
U3: Exit connection K3
U4: Exit connection K4
Depending on existing hardware there may not be all output relays. This parameter assigns the respective relay to the internal controller exits, to function key 1 or 2, to one external entrance or the buzzer.
At setting =6 or =7 the relay is switched manually. It changes its condition with each pressure of the key and adopts the condition of the respective switching entrance whenever the latter changes. If the corresponding key or switching entrance has not been released for this function (see parameters b1, b2 and b11 to b14), the relay remains switched off.
The buzzer connection in its function is comparable to the alarm connection. The buzzer, however, can be switched off with the DOWN key.

L0: Individual address
L1: Amount of slaves
L2: Address of the first slave (if L1>0)
Parameters of the interface. If L1>0 the controller is set as master automatically. The slaves react to the instructions of the master (defrosting, switching data record 1/2, status messages).

Pro: Program version
This parameter shows the program version.

Additional notes for adjusting parameters
Some parameter adjustments are not effective at once. I.e. if the alarm suppression time is decreased from 120 to 10 minutes the new value is only effective at the following alarm. If the controller is shortly separated from the net the new values will be effective immediately.

Network behaviour
Via PC it is possible to read and write parameters from or to the controller. For this purpose the Gateway box of Störk-Tronic is required which converts the signal of the RS232 to RS485.

If defrosting is started by means of the RTC, a corresponding defrost command is sent to the network members.

The data record switch-over is sent each time.

Starting behaviour
If the controller is equipped with a real time clock the programmed times (H11-H72) will be checked and the respective data record will be set accordingly after switching on the unit.

To achieve this it is required that parameter H0=1 and that the times make sense, i.e. they are not deactivated (display indicates "---") or all times are set to the same value (i.e. 00:00).

If the data record cannot be determined by means of the real time clock, parameters b1 and b2 control the starting behaviour. If b1=6 and b2=6 data record 1 is active. If b1=7 or b2=7 the previously selected data record is active.

Approx. 5 seconds after switching on the controller, the data record is submitted to other members via network, if parameter L1>0.

Status messages

Message	Cause	Error elimination
ON/OFF	Standby modus, no regulation	Switch on by key or switching input
Temperature indication flashes	Refrigerating chamber temperature beyond alarm limits (parameter A1, A2)	
E0 flashes	Refrigerating chamber sensor F1 error, break or short-circuit	Control sensor. Controller operates according to with parameter c3.
E1 flashes	Sensor F2 error, break or short-circuit	Control sensor. At setting [c3=1] the controller operates in timed defrosting modus (defrosting time as set in d3). At setting [c3=2] see parameter Y6.
"rC", flashing	Data loss real time clock	Adjustment of the clock
"rF", flashing	Error real time clock	If error cannot be eliminated by switching on/off, the controller must be repaired.
EP	Data loss at parameter memory (basic contact 1 and 2 are dead)	If error cannot be eliminated by switching on/off, the controller must be repaired.

Error message E0, E1, EP and rC change in the display with the actual value of sensor F1, unless the latter is defective. This happens independently from the selected indication mode. After the error is eliminated and confirmed with the DOWN key, the previously set indication mode becomes active again.

If there is a connection to the buzzer with parameters U1... U4, the buzzer can be switched off with the DOWN key.

Technical data of ST181-VL4KA.12

Measuring input
F1: Temperature sensor PTC, refrigerating chamber
F2: Temperature sensor PTC for defrosting, evaporator surface
Measuring range: PTC (KTY81-121) -50°C...+130°C
Measuring accuracy: ±0,5K ± 0,5 % at 25°C, without sensor
±1K ± 0,5 % of scale range (0 – +55°C), without sensor

Outputs
K1: Relay, 30(6)A 250V~, normally-open contact, function see U1
permanent current max. 16(6)A, limited by connectors and/or conductive strips
K2: Relay, 16(2,2)A 250V~, normally-open contact, function see U2
K3: Relay, 16(2,2)A 250V~, normally-open contact, function see U3
S1: Voltage output for DC-Fan: 0..24V, max. 420mA (corresponds 10W)

Additional buzzer, 85dB

Display
One 3-digit LED-display, 13 mm height, for temperature indication
Three LEDs for status of the outputs compressor, defrosting and fan
Two LEDs for indication of the active data record
7 LEDs for the week timer

Power supply
230 V 50/60 Hz, Power consumption max. 4 VA

Connectors
Wieland terminal

Ambient conditions
Storage temperature: –20°C...+70°C
Operating temperature: 0...55°C
Relative humidity: max. 75 %, without dew

Weight
ca. 520g, without sensor

Enclosure
Front IP65, IP00 back (unit is open on backside)

Installation data
The unit is foreseen to be installed in an instrument panel.
Front size: 180 x 52 mm
Panel cut-out: 159 x 45 mm
Installation depth: ca. 165mm with connectors