



ST710-KNOVL.34

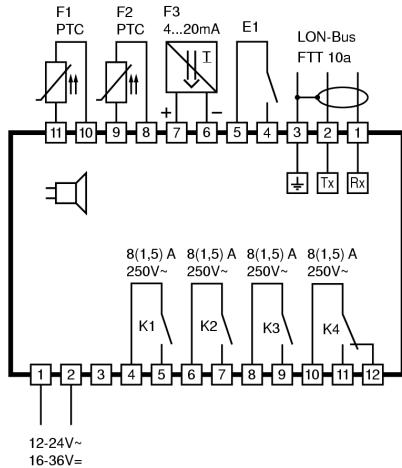
Controller for cooling applications

Order number 900214.002

Old Id.Nr.: 228189



Wiring diagram



Product description

The cooling controller ST710-KNOVL.34 has an interface for LON networks (FTT10A). Besides PTC, the two sensor entrances are applicable also for Pt1000 resistance, which clearly increases the measuring range. A third analogue input for 4-20mA together with the adjustable function of the switching outputs permits the installation of another control circuit. This guarantees a high functionality especially of the LON-network.

Sensor: PTC/Pt1000

Range: -50...150°C

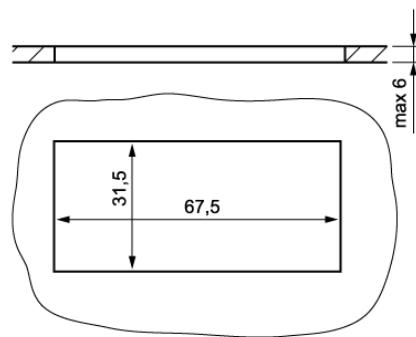
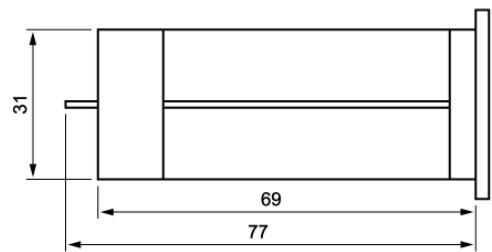
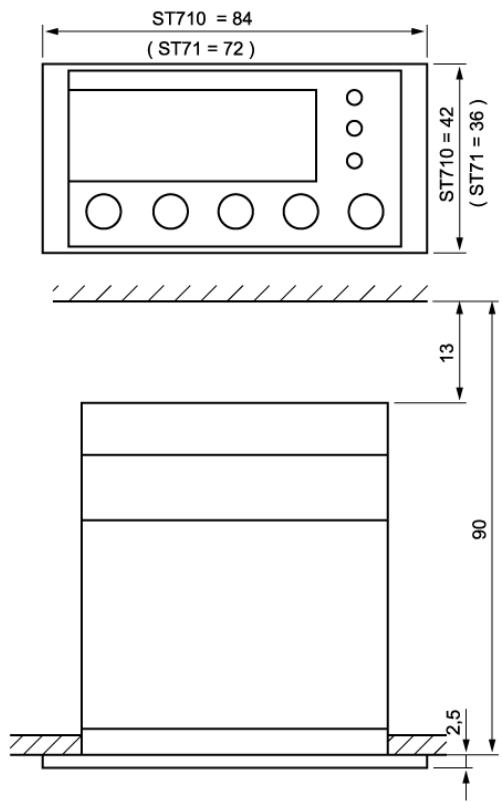
Front size: 84mm x 42mm

Panel cut-out: 67,5mm x 31,5mm

Tightness: front IP65

Connector: plug and socket

ST 710 (715)... / ST71...



SOFTWARE .34

Adjustment options



Key UP:

Pressing this key you can increase the parameter or parameter value or scroll the parameter list. 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:

Pressing this key you can decrease the parameter or parameter value or scroll the parameter list. At alarm the buzzer function can be switched off with this key.



Special key:

With this key an assigned output can be switched on or off directly (if accordingly parametered). The output can be switched on even if the controller is in standby mode. With the corresponding setting of Y10 the setpoint Y6 of the current input can be adjusted.



Key SET:

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



Key Standby:

With this key the controller is switched to standby mode. The key has to be pressed for at least half a second.

First control level:

Parameter setting for setpoint of the refrigerating chamber

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 refrigerating chamber S1	r1...r2	0.0°C	

The setpoint can also be set by the LON network. At any change of the setpoint via LON it will be checked if the new setpoint is within the setpoint limitations.

NOTE:

During night operation the setpoint can not be changed. The display indicates S1'=S1+H1.

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 60 seconds, or by simultaneously pressing the UP and DOWN key for approx. 4 seconds.

Para-meter	Function	Adjustment range	Standard setting	Customer setting
PA	Access to parameter list of the third control level Password: -19	-99...+99	0	
r0	Hysteresis for the compressor contact	0,1...15 K	2 K	
P0	Indication actual value of sensor F1 (refrigerating chamber)	-		
P2	Indication actual value of sensor F2 (evaporator)	-		
H1	Setpoint increase S1 at night operation	-50.0 ... 50.0K	2.0K	
Y0*	Indication actual value of current input F3	---		
Y6*	Setpoint	-3000 ... 3000	0.0	
YA*	Setpoint increase Y6 at night operation	-3000 ... 3000	0.0	

* Y-parameters only available if current input F3 is activated with parameter Y1.

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.

Parameters for controller specifications

Parameter	Function	Adjustment range	Standard setting	Customer setting
P0	Indication of actual value of sensor F1	--	--	
P1	Calibration sensor F1, actual value correction	-9.9 ... 9.9 K	0.0 K	
P2	Indication of actual value of sensor F2 (evaporator)	--	--	
P3	Calibration sensor F2, actual value correction	-9.9 ... 9.9 K	0.0 K	
P4	Sensor type F1	1: KTY 2: PT1000	1	
P5	Sensor type F2	0: inactive 1: KTY 2: PT1000	1	
P6	Display mode	0: without decimals 1: with decimals	1	

Parameters for the cooling controller

Parameter	Function	Adjustment range	Standard setting	Customer setting
r0	Hysteresis for the compressor contact	0.1...15 K	2 K	
r1	Setpoint limitation (minimum)	-99...r2°C	-50°C	
r2	Setpoint limitation (maximum)	r1...+99°C	50°C	
r3	Switch mode compressor	0: use as refrigerating machine 1: use as heating machine	0	

Parameters for the protection of the compressor

Parameter	Function	Adjustment range	Standard setting	Customer setting
c0	Start protection of the compressor after "cooling on"	0...15 min.	0 min.	
c1	Start protection after compressor start	0...15 min.	5 min.	
c2	Start protection after compressor stop	0...15 min.	3 min.	
c3	Function in the case of error of sensor F1	0: compressor off 1: compressor on 2: compressor according c5	0	
c4	Switching delay compressor relay	0: no delay 1: 3 sec. delay	0	
c5	Time for "compressor on" at sensor error (Time for "compressor off" is 15 min.)	0...99 min.	15	

Parameters for night operation

Parameter	Function	Adjustment range	Standard setting	Customer setting
H1	Setpoint increase at night operation	-50.0 ... 50.0K	2.0K	

Parameter for defrosting

Parameter	Function	Adjustment range	Standard setting	Customer setting
d0	Defrosting interval	0...99 Std. 0 = inactive, no defrosting	8	
d1	Defrosting mode	0: electrical 1: with hot gas	0	
d2	Defrosting temperature	-55...+99°C	10°C	
d3	Defrosting time limit	1...99 min.	30 min.	
d4	Function after "cooling on"	0: immediate cooling, no defrost 1: first defrosting, then cooling	0	
d5	Defrost delay after "cooling on"	0...30 min.	0 min.	
d6	Indication of the refrigerating chamber temperature during defrosting	0: actual temperature 1: temperature determined just before the start of defrosting	0	
d7	Drainage time	0...15 min 0: no drainage	2 min.	
d8	Alarm suppression time after defrosting	0...15 h	1 h	
d9	Execution of defrost demand	0: dependent execution 1: immediate execution 2: temperature decrease before defrosting	1	

Para-meter	Function	Adjustment range	Standard setting	Customer setting
db	Time base defrost cycle	0: standard time basis 1: reduced time basis	0	
dC	Temperature decrease before defrosting	-20...10K	0	
dF	Time limitation for temperature decrease	0...999 Min	60	
dU	Manual defrosting	0: no defrost 1: manual start	0	

Parameters for alarm- and error conditions

Para-meter	Function	Adjustment range	Standard setting	Customer setting
A0	Hysteresis for alarm contact	1...15 K	2 K	
A1	Minimum limit value	-55...0 K 0= inactive	-10 K	
A2	Maximum limit value	0...+99 K 0= inactive	10 K	
A3	Alarm suppression time after "cooling on"	0...15 h	2 h	
A4	Effect of external alarm input	0: regulation remains active 1: regulation deactivated	0	
A5	Alarm suppression time after temperature alarm	0...60 Min.	10 Min.	
A6	Alarm limits	0: relative to the setpoint 1: absolute	0	

Parameters for the ventilator

Para-meter	Function	Adjustment range	Standard setting	Customer setting
F0	Ventilator control	0: dependent on temperature 1: continuous on	0	
F1	Ventilator setpoint	-99...+99°C	-1°C	
F2	Switching hysteresis ventilator	2...15 K	2 K	
F3	Behaviour at compressor stop	0: ventilator independent of compressor 1: ventilator off together with compressor	1	
F4	Behaviour at defrosting	0: ventilator independent of defrosting 1: ventilator off together with defrosting 2: ventilator on together with defrosting	1	
F5	Ventilator delay time after defrosting	0...15 min.	2 min.	
F6	Ventilator control	0: absolute control 1: dynamic control	0	
FA	Ventilator mode	0: „Evaporator“ 1: „Liquefier“ (heat pump mode)	0	

Parameters for the configuration of the inputs and outputs

Parameter	Function	Adjustment range	Standard setting	Customer setting
b0	Function of input E1	0: no function 1: start defrosting 2: alarm relay on 3: output "light" 4: light and compressor on 5: light on, compressor and evaporator-fan off 6: light on, evaporator-fan off 7: night time reduction 8: On/Off	0	
b1	Switch mode of input E1	0: normally-open contact 1: normally-closed contact	0	
b2	Number of alarms per unit of time at input 2 until the controller is switched off	0...15 (0 = ineffective)	0	
b3	Unit of time for parameter b2	0...240 Min	60 Min	
b4	Switch mode of input E2	0: normally-open contact 1: normally-closed contact	0	
U1	Function of output K1	0: compressor 1: defrosting 2: ventilator 3: alarm 4: additional key „light“ 5: additional key „On/Off“ 6: control circuit with F3	0	
U2	Function of output K2	0...6 (see U1)	1	
U3	Function of output K3	0...6 (see U1)	2	
U4	Function of output K4	0...6 (see U1)	3	

The following Y-parameters are only available if current input F3 exists and is activated with parameter Y1!

Y0	Indication of the measuring value of current input F3	N/A	N/A	
Y1	Characteristic curve	0: not activated 1: 0-20mA 2: 4-20mA 3: PTC 4: PT1000	0 <i>Please note hardware execution!</i>	

Parameter	Function	Adjustment range	Standard setting	Customer setting
Y2	Heating/Cooling	0: heating 1: cooling 2: heating, off when defrosting 3: cooling, off when defrosting 4: heating, off during night time reduction 5: cooling, off during night time reduction 6: heating, off during defrosting and night time reduction 7: cooling, off during defrosting and night time reduction	2	
Y3	Hysteresis	0.1 ... 99.9	1	
Y4	Indication value for lower value linear analogue input	-3000...3000	0	
Y5	Indication value for upper value linear analogue input	-3000...3000	100	
Y6	Setpoint F3	-3000...3000	0	
Y7	Lower alarm limit	-3000...3000	0	
Y8	Upper alarm limit	-3000...3000	100	
Y9	Alarm mode	0: boundary alarm 1: range alarm	0	
Y10	Setpoint adjustment via additional key	0: switching function 1: setpoint adjustment	0	
YA	Y6 setpoint increase (night)	-3000...3000	0,0	

Parameters for serial interface

Parameter	Function	Adjustment range	Standard setting	Customer setting
L0	Individual address (Node)	0...126	1	
L1	Individual address (Subnet)	1..255	1	
Lr	Reset parameters	0: no reset 1: reset parameters, including Lr	0	

Parameter description:**P0: Indication of refrigerating chamber temperature (F1)****P2: Indication of evaporator temperature (F2)**

The here indicated temperatures present the sum of the respective actual measured value of feeler F1/F2 and the actual value correction according to parameter P1/P3.

P1: Calibration sensor F1**P3: Calibration sensor F2 (evaporator)**

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: Sensor type F1**P5: Sensor type F2**

This parameter permits selection of the sensor type, if the needed hardware prerequisites are available. If the evaporator sensor F2 is disabled (P5=0) the parameters d2, F0, F1 and F2 become ineffective.

P6: Display mode

The value can be indicated in integrals or with decimals. In general, all parameter indications are presented with decimals.

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.

r3: Use as refrigerating or heating machine

If used as heat pump the compressor switches with inverted hysteresis if the temperature falls below the setpoint. Note (*) at the end of the parameter list!

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.

c3: Function in the case of error of sensor F1

The compressor can either be permanently on or with a ratio of "on-time" and off-time" set with parameter c5. The "off-time" is 15 minutes and not adjustable.

c4: Switching delay compressor relay

The compressor can switch immediately on demand or with a time delay.

c5: Time for "compressor on" at sensor error

see c3

H1: Setpoint increase at night operation

During night time operation the value set with H1 will be added up to the main setpoint S1. This results either in an increase or a decrease of the temperature. With return to day time operation the control returns to the main setpoint.

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 with the clock or by pressing the key "manual defrosting" for at least 3 seconds. This automatically restarts the defrosting interval. If defrosting is only started with the clock the defrosting interval can be deactivated.

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.

d4: Function after "cooling on"

After "cooling on" cooling can start immediately and defrosting starts after the defrost interval or defrosting can start immediately and then the defrost interval is started.

For deep-freezing applications the immediate defrosting is recommended since a defrost cycle might be skipped in case of a power failure and therefore the evaporator might be iced up.

d5: Defrost delay after "cooling on"

After "mains on" the defrosting starts after the here adjusted delay (only effective if d4=1).

Among other things this is to prevent energy peaks.

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.

d8: Alarm suppression time after defrosting

A temperature alarm caused by the warming up of the refrigerating chamber during defrosting will be suppressed for this time period after defrosting has finished.

d9: Execution of defrost demand

With d9 = 0 the defrost demand will be prevented as long as the locking conditions of parameters c0, c1 and c2 apply. With d9 = 1 defrosting starts independently of these parameters.

During defrosting there is an increase of the refrigerating chamber temperature. This can be specially noticed if there is a high temperature when starting defrosting. With d9=2 a cooling cycle takes place before defrosting for the temperature difference to the setpoint set with dC.

If cooling takes too long the time limit set with dF applies.

db: Time base defrost cycle

This parameter changes the time base for the defrosting cycle. With parameter set to "1" hours become minutes and minute become seconds. This allows a quick control and monitoring of the refrigeration plant during installation and maintenance.

dC: Temperature decrease before defrosting

only effective if d9=2

dF: Time limitation for temperature decrease

see d9 and dC.

dU: start manual defrosting (only required in combination with data logger)

With dU = 1 the defrost interval is started prematurely. The following automatic defrost takes place after the time period d0 (synchronisation of the defrosting)

A0: Hysteresis for alarm contact

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

A1: Minimum limit value**A2: Maximum limit value**

The limit values serve for monitoring of the refrigerating chamber temperature. They can be relative, i.e. going along with the setpoint S1 or absolute. 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"

After switching cooling on, an alarm is suppressed for the adjusted time, i.e. the refrigerant plant can get to work temperature without releasing alarm.

A4: Effect of external alarm input

Parameter ineffective in this unit execution.

A5: 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 A5 the alarm release can be delayed

A6: Type of alarm limits

see A1, A2

Note:

The ventilator is supposed to be installed at the evaporator and therefore the corresponding temperature values are determined by the evaporator sensor.

F0: Ventilator control

At setting "0" the control is dependent of temperature with the ventilator setpoint F1 or according to the setting F6=1 (dynamic control).

At setting "1" the ventilator is permanently on assumed that it is not stopped bye the setting F3=1 (off at compressor stop) or F4=1 (off at defrosting).

F1: Ventilator setpoint

As soon as the evaporator temperature falls below the ventilator setpoint (with hysteresis) the ventilator is switched on and vice versa. Above the setpoint the ventilator is off.

F2: Switching hysteresis ventilator

The hysteresis is set one-sided and below the ventilator setpoint.

F3: Behaviour at compressor stop

With F3=0 the ventilator operation is independent of the compressor (standard refrigeration range above 0°C).

With F3=1 the fan is switched of if the compressor is switched off.

F4: Behaviour at defrosting

With F4=0 the ventilator continues to run during defrost (standard refrigeration range above 0°C).

With F4=1 the ventilator is stopped during defrost (deep-frying range).

With F4=2 the ventilator is on together with defrosting (suitable, if there is no active defrosting device).

F5: Ventilator delay time 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

F6: Ventilator control

With F6=0 the ventilator is controlled depending on ventilator setpoint F1

With F6=1 the ventilator control is dynamic.

In this case the absolute setpoint adjusted with F1 is no more effective but the ventilator setpoint depends directly on actual value of the refrigerating chamber. The ventilator setpoint results of the refrigerating chamber temperature minus the relative evaluated temperature set in F1.

Example: settings F1 = 5, F2 = 2, F6 = 1

The ventilator setpoint is always 5K below the refrigerating chamber temperature. If the refrigerating chamber temperature is 10°C the ventilator will switch off if the evaporator temperature is above 5°C and the ventilator will switch on if the evaporator temperature falls below 3°C. If the refrigerating chamber temperature is 9°C the ventilator will switch off if the evaporator temperature is above 4°C and the ventilator will switch on if the evaporator temperature falls below 2°C.

This variant makes it possible to switch the ventilators delayed dependent on temperature at each temperature start (start-up relief) or to switch them off delayed after compressor stop (usage of the refrigerating capacity of the evaporator).

FA: Ventilator mode

See note (*) at the end of the parameter list.

b0: Function of input E1

The switching input E1 can be used for various purposes:

- 0: no function
- 1: start defrosting
- 2: alarm relay switched on
- 3: output "light": at each condition change of the input the respective output is switched to this condition. If the additional key is released for the function "light" the condition of the output can be changed with an impulse. The output is switched either by the key or the input. Only if there is a condition change at the switching input it will be submitted to the output:

Time	1	2	3	4	5	6	7
Input	0	1	1	1	0	1	0
Key	0	0	Impulse	Impulse	0	0	0
Output	0	1	0	1	0	1	0

- 4: Light and compressor on: function „light“ like (3), compressor is requested (locking conditions apply).
- 5: Light on, compressor and evaporator ventilator off: function „light“ like (3)
- 6: Light on, evaporator ventilator off.
- 7: Activate night time increase for setpoint.
- 8: Controller is switched On/Off via switching input.

The setting [b0=4] is used i.e. at systems with two cooling units. While one unit defrosts, the other can cool.

The setting [b0=5] is used i.e. if there is a door contact. When opening the door the ventilator is stopped in order to avoid the cold air being blown out.

b1: Switch mode of input E1

b2: Number of alarms per unit of time at input E2 until the controller is switched off

b3: Unit of time for parameter b2

An alarm at E2 (normally-closed contact) switches off the compressor immediately (alarm relay closed).

If there is a larger number of alarms per unit of time (b3) as defined with parameter b2 the controller will switch off all outputs (error message "E3"). To restart the controller it must be switched back to standby mode or shortly switched off.

U1-U4: Function of outputs K1-K4

With the setting [U1=4] the respective output is switched with the additional key independently whether the controller is in standby mode or not (typical function: „light“).

With the setting [U1=5] the respective output is switched with the additional key only if cooling is switched on.

**The following Y-parameters are only available if
current input F3 exists and is activated with parameter Y1.!**

The control for this output is only effective if cooling is activated and no defrosting is in process.

Y0: Indication of the measuring value of current input F3

The actual value is indicated according to parameters Y4 and Y5.

Y1: Characteristic curve

There are four operation modes to choose from: 0...20mA, 4...20mA, PTC und PT1000.
All modes can be selected but it depends on hardware execution of the controller whether if the current or the resistance mode is workable.

Y2: Heating/Cooling

In operation mode "heating" the output relay is activated if the temperature falls below the setpoint.
in operation mode "cooling" it is just the reverse. The control circuit is deactivated during defrosting if Y2=2, 3, 6 or 7. The control circuit is deactivated during night time reduction if Y2=4, 5, 6 or 7.

Y3: Hysteresis

The hysteresis is set one-sided below (heating) or above (cooling) the setpoint.

Y4: Indication value for lower value at linear analogue input

Y5: Indication value for upper value at linear analogue input

These parameters assign the indication range to the measuring range.

Y6: Setpoint F3

Y7: Lower alarm limit

Y8: Upper alarm limit

Y9: Alarm mode

At boundary alarm mode the alarm is triggered if the range [Y7,Y8] is leaved, at range alarm mode if the range [Y7,Y8] is accessed.

Y10: Setpoint adjustment via additional key

Adjustment of the function of the special key: this key either serves for direct switching (see U1-U4) or to adjust the setpoint (Y6) of the current input.

YA: Y6 setpoint increase (night time)

L0: Individual address (Node)

L1: Individual address (Subnet)

STOERK TRONIC devices can be hooked with "self installation". In this case, however, each participant has to be assigned a clear address. This address corresponds to the knot address and subnet address with Domain=0.

The address of the knot can only be changed, if the knot was not tied externally (SNVT "nciNetConfig" = CFG_LOCAL), otherwise the changed value is not saved (after releasing the set key the old value is reset).

Lr Parameter Reset

This parameter is special as it can reset all parameters to the condition ex works. At setting Lr = 1 reset takes place, and Lr itself is reset to zero again. Note that customised values will become effective if these were adjusted prior to delivery.

(*) Use as heat pump control:

Compressor:

The „switch mode“ of the compressor has to be adjusted ($r3=1$). The compressor always starts if the temperature falls below the setpoint (minus hysteresis) and is switched off if the setpoint is reached again.

Ventilator:

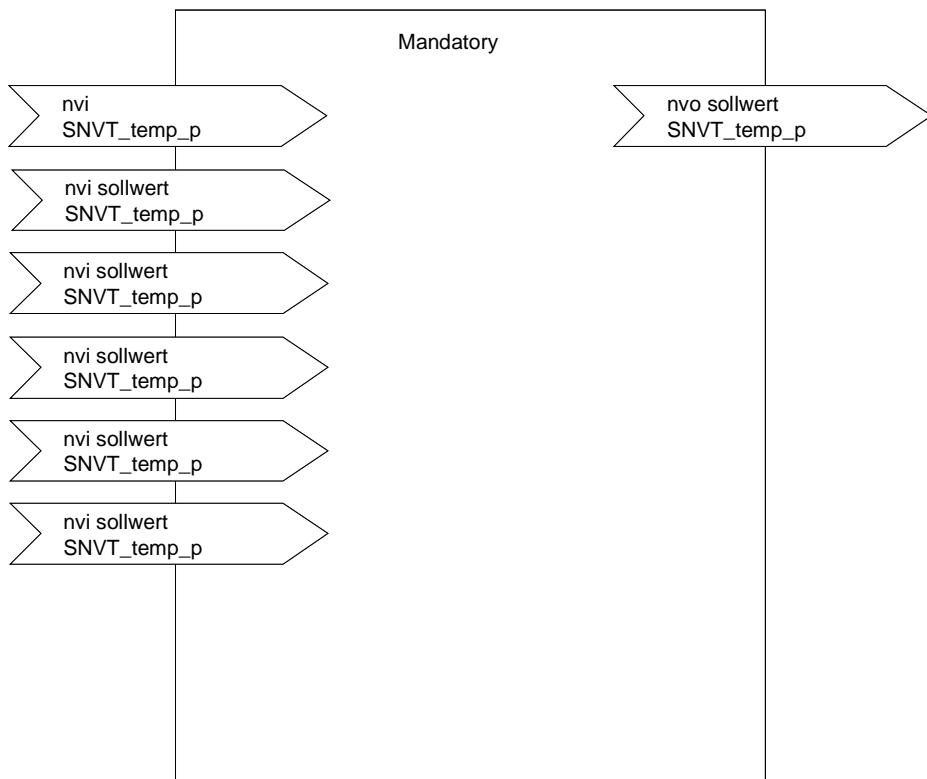
If up to now the ventilator and the sensor F2 is connected to the controller at the evaporator side the parameter settings can be maintained. The ventilator can be operated dependent on temperature and is activated if the temperature of sensor F2 (evaporator) is below (minus hysteresis) the one of sensor F1.

If the ventilator and sensor F2 is operated on the liquefier side parameter FA is to be set to “1”. In this case the ventilator is activated if the temperature of sensor F2 (liquefier) is above (plus hysteresis) the one of sensor F1.

If sensor F2 is used like this the temperature dependent defrosting can not be used (defrosting temperature d2 is to be set to “99”). The defrosting is terminated after the time period “d3”.

The parameter settings of the other dependences of the compressor (F3/F4) remain effective.

LON-Bus, serial communication



Definition of the standard network variables (SNVT und SCPT)

The standard network variables correspond to the type „Refrigerated Display Case Controller“ (with extras) and the control object „0“ (minimal requirements with extras).

Thermostat object (Refrigerated Display Case Controller)				
Name of variable	Type	Input/Output	Values	Description
nvoThermState	SNVT_state	Output	Bit 0: ON Bit 1: cooling Bit 2: OFF Bit 3: night reduct.	Status thermostat: cooling and night time reduction
nvoAirTemp	SNVT_temp_p	Output	-100...+150°C 0x7fff: Fühlerfehler	room temperature
nvoDischargeTemp	SNVT_temp_p	Output	-100...+150°C 0x7fff: Fühlerfehler	evaporator temperature
nvoCutoutTemp	SNVT_temp_p	Output	-100...+150°C	setpoint output
nvoDefrostState	SNVT_defr_state	Output	DF_STANDBY DF_DEFROST DF_DRAINDOWN	defrost condition
nvoActState*	SNVT_state	Output	Bit 0: compressor Bit 1: ventilator Bit 2: defrost Bit 3: alarm	switching conditions
nviDayNight ¹	SNVT_lev_disc	Input	ST_OFF/ST_ON	external night time reduction
nviCutoutTemp*	SNVT_temp_p	Input	-100...+150°C	setpoint
nviDefrostState	SNVT_defr_state	Input	DF_STANDBY	defrost demand

Thermostat object (Refrigerated Display Case Controller)				
Name of variable	Type	Input/Output	Values	Description
			DF_DEFROST	
nciMaxSendTime	SNVT_time_sec	Input	0...32000s	max. time to update variables
„Object 0“				
nvoStatus	SNVT_obj_status	Output	-> SNVT Liste invalid_id invalid_request	Object status (min. requirements.)
nciNetConfig	SNVT_config_src	Input	CFG_EXTERNAL CFG_LOCAL	Node configured extern or intern
nviRequest	SNVT_obj_reque st	Input	-> SNVT Liste	Object Request

* SNVTs, which are added to the corresponding standard object.

¹ night time reduction prepared, not yet implemented

Adjustments of the input variables will be applied to the controller immediately and cause an EEPROM write access. Keep in mind the limited amount of save cycles.

Automatic update of variables

At each adjustment of the values in the controller the corresponding output variables are updated. If there are no condition changes the values will be updated every "nciMaxSendTime" seconds. If "nciMaxSendTime" is less than 1.0 sec. the values are no more updated in intervals but only if there is any change.

(Therefore the following can occur: a master controller determines the setpoint of a slave controller. The setpoint of the slave controller will be updated immediately if there is a change at the master controller. If the setpoint is changed at the slave controller the "correct" value will be send to the slave after "nciMaxSendTime" seconds.)

Connection information

Simultaneously pressing all keys sends a „Service-Pin“ message (the program version of the software is indicated in the display).

The controller responds to a "wave" command with a display flashing 3 times.

Note that if a data logger is used the node number will change at connection (the domain must remain "0". After a controller reset the new address can be queried with parameter "L0" and "L1". These parameters may not be changed after connection (ensured by "nciNetConfig").

Connection to data logger

General note

The following listed measuring values as well as the inputs and outputs are available for the data logger TRL1 via LON interface. In general the setpoints and parameters all are accessible.

Data logger protocol

Parameter values (read/write)		
Adjustable parameters:	P1,P3,P4,P5,P6,r0,r1,r2,r3,c0,c1,c2,c3,c4,c5,d0,d1,d2,d3,d4,d5,d6,d7,d8,d9,dB,dC,dF,dU,A0,A1,A2,A3,A4,A5,A6,F0,F1,F2,F3,F4,F5,F6,FA,B0,B1,B2,B3,B4,U1,U2,U3,U4,Y0,Y1,Y2,Y3,Y4,Y5,Y6,Y7,Y8,Y9,Y10,L0,L1,LR	
Adjustable setpoints	S1	
Actual values (only read)		memory address
Actual value temperature refrigerating chamber	A1	0
Actual value temperature evaporator	A2	1
Actual value current input	A3	2
Controller status (only read)	D1 Bit 0: control "On/Off" Bit 1: defrosting active Bit 2: night time reduction Bit 3: Bit 4: Bit 5: Bit 6: internal switching condition "light" (additional key) Bit 7: -- "On/Off" (additional key) see "U1" Bit 8: -- "compressor" Bit 9: -- "ventilator" Bit 10: -- "F3" (current input dependent of Y6) Bit 11: -- "digital input 1" (switch mode "b1" considered) Bit 12: -- "digital input 2" (switch mode "b4" considered) Bit 15: -- "alarm active"	3
Relay status/digital inputs (only read)	D2 Bit 0: output K1 Bit 1: output K2 Bit 2: output K3 Bit 3: output K4 Bit 8: digital input E1 Bit 9: digital input E2	4
Status (adjustable)		
Controller status	Bit 0: "cooling ON" ("1" if "On") Bit 1: "Defrosting" ("1" for demanding) Bit 2: "Night time reduction" ("1" at reduction) Bit 6: "Light" ("1" at "light") Bit 7: "On/Off" ("1" at "On")	0

Status messages

Message	Cause	Error elimination
E0	Sensor error F1, open or short circuit	Check sensor Controller operates according to parameter c5
E1	Sensor error F2, open or short circuit	Check sensor Controller operates in timed defrosting modus
E2	Current input (range exceeded)	
E3	Maximal number of alarms at input E2 exceeded	The controller switches off the cooling unit. Restart only by switching Off/On (either mains switch or standby)
E4	Alarm current input	Check limit values Y7,Y8
In2	Status display: input IN2 activated	remove external alarm
display flashes	Temperature alarm at too high or too low temperature (if activated) see A31	
EP	Data loss at parameter memory	
F90	Network error, serial interface	The buzzer can be switched off with the DOWN key. Check connection wires. Check address L0.

In case of an error or an alarm the display flashes. The installed buzzer is activated and can be switched off by pressing the DOWN key for 3 seconds.

Technical data of ST710-KNOVL.34

Input

E1: external potential-free contact, function determined by parameter

Measuring input

F1: Resistance thermometer, 2-wire, for refrigerating chamber

F2: Resistance thermometer, 2-wire, for evaporator

Measuring range: Sensor type PTC (KTY81-121) -50...+150 °C or
 Sensor type Pt1000 -200...+830 °C

Measuring accuracy of the controller: +/-0.5% of the measuring range, max. +/-1K

F3: linear current input 0...20mA or 4...20mA, 2-wire

(beyond the range of -1...21mA, or 3mA...21mA an alarm will be released)

Outputs

K1: Relay, 8A ($\cos\phi=1$) 250V, permanent current max. 4A, normally-open contact, function see parameter U1

K2: Relay, 8A ($\cos\phi=1$) 250V, permanent current max. 4A, normally-open contact, function see parameter U2

K3: Relay, 8A ($\cos\phi=1$) 250V, permanent current max. 4A, normally-open contact, function see parameter U3

K4: Relay, 8A ($\cos\phi=1$) 250V, permanent current max. 4A, change-over contact, function see parameter U4

Installed buzzer, ca. 85dB

Display

One 4-digit LED-Display, height 13mm, for temperature display, colour red

Three LEDs, diameter 3mm, for status display of the outputs and defrost condition (a flashing LED stands for an output requested by the controller which can not yet be activated due to a locking condition.)

Power supply

16-36V DC or 12-24V AC +/-10%, (50/60Hz)

power consumption max. 3VA

LON communication interface

shielded 2-wire line, Twisted Pair, 78kBaud, not polar, maximum cable length 100m

Interface driver: FTT10A, galvanically separated.

The network can be installed in arbitrary topology.

Connectors

plug and socket

Terminal A: 12-polig, spacing 5.0 mm, for cable up to 2.5 mm²

Terminal B: 11-polig, spacing 3.5 mm, for cable up to 1.5 mm²

Ambient conditions:

Storage temperature: -20...+70°C

Operating temperature: 0...+55°C

Relative humidity: max. 75% without dew

Weight

ca. 130g

**Enclosure**

Front IP65, IP00 from behind

Installation data

Unit is to be installed in an instrument panel.

Front size 84 x 42 mm

Panel cut-out 67.2 x 31.2 mm

Installation depth ca. 90 mm

Mounting by fixing strap.