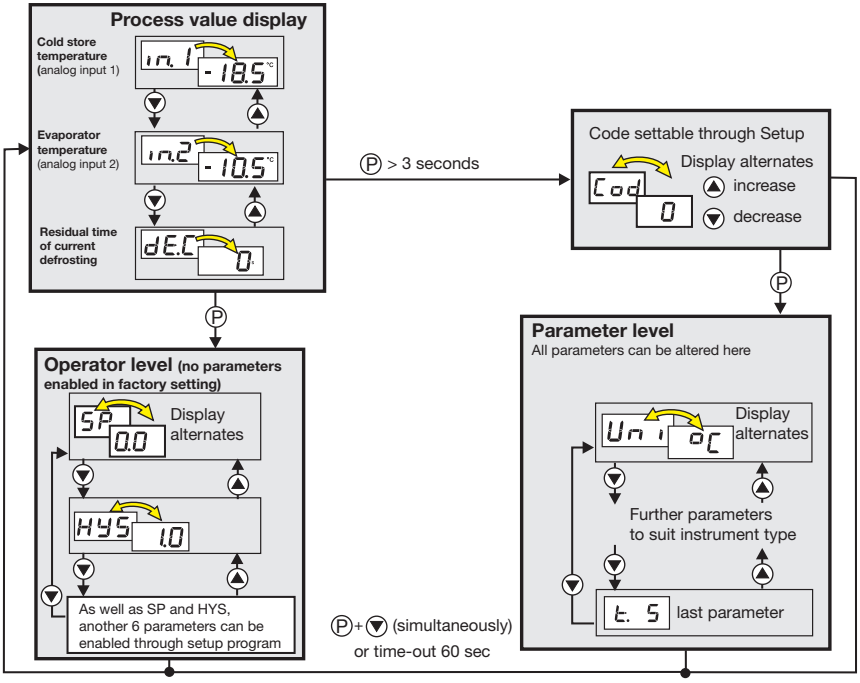
Electronic Refrigeration Controller

B 70.1061.0
Operating Instructions

2009-04-10

Overview of operation



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1 Identifying the instrument version

The nameplate is glued onto the housing top. The supply voltage must correspond to the voltage given on the nameplate.

All necessary settings are described in these operating instructions.
Any manipulations that are not described in the operating instructions (or even expressly forbidden) will endanger your rights under the instrument warranty !
If you have any problems, please contact the nearest subsidiary or the head office.

These operating Instructions are valid from device-Software-Version 213.01.05
(to display that on the device, push the keys (P) + (▲)).

Please read these operating instructions before commissioning the instrument.

Keep the manual in a place which is accessible to all users at all times.
Your comments could help us to improve these operating instructions.

Phone: +49 661 6003-0
Fax: +49 661 6003-607

Scope of delivery

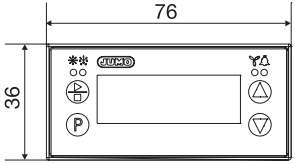
1 bezel seal
1 mounting frame
1 Operating Instructions 70.1061.0

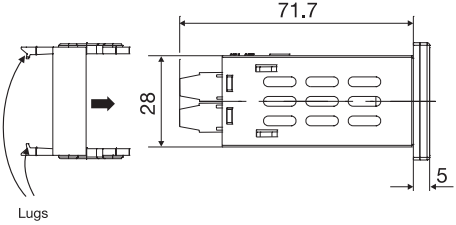
701061		**Basic version**
		with 2 analog inputs and 3 relay outputs
		Basic type extensions
8		factory-set, configurable
9		configuration to customer specification
		Option 1
0		not available
1		alarm buzzer
2		alarm contact, changeover (SPDT) 16A/250V
		Option 2
0		not available
1		RS485 interface
2		data logger, real-time clock and RS485 interface
		Supply voltage
32		12 — 24V AC/DC +15/-15 %, 48 — 63Hz
		Extra codes
000		no Pt100 push-in probe
236		2 Pt100 push-in probes (diameter: 6mm, fitting length: 50 mm, connecting cable: 1500 mm)

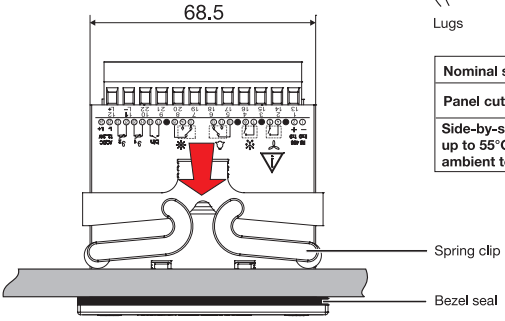
701061 / 8 0 0 - 32 / 000 **Order example**

factory-set

2 Mounting







Nominal size	76mm x 36mm
Panel cut-out	$69^{+2.5}_{-0}$ mm x 28.5^{+1}_{-0} mm
Side-by-side mounting, up to 55°C ambient temperature:	spacing of instruments: 10 mm horizontal 15 mm vertical

* Pull mounting frame off the instrument.
* Insert the instrument from the front into the panel cut-out. Make sure that the bezel seal is seated correctly.
* From the back, push the mounting frame onto the instrument housing, compressing the spring clips until the lugs have evenly snapped into place top and bottom.

3 Electrical connection

3.1 Installation notes

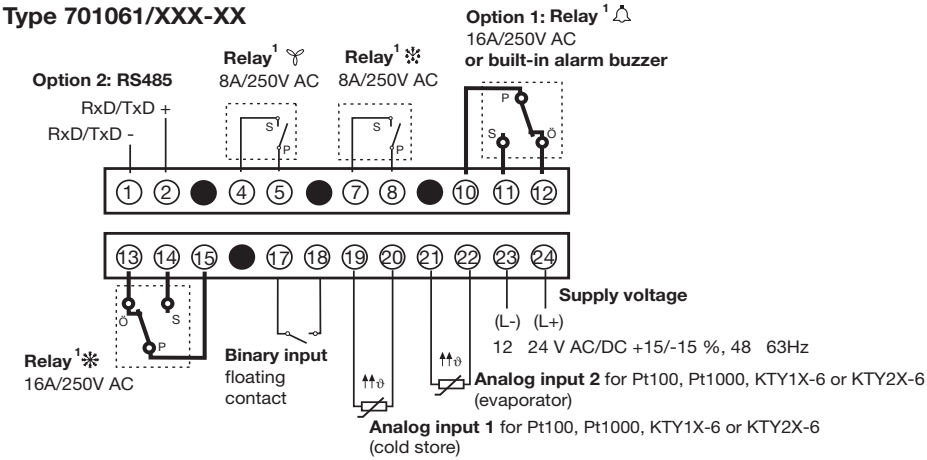
- ❑ The choice of cable, the installation, the fusing and the electrical connection must conform to the requirements of VDE 0100 “Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V” or the appropriate local regulations.
- ❑ The electrical connection must only be carried out by qualified personnel.
- ❑ Electromagnetic compatibility conforms to the standards and regulations cited in the technical data.
  ⇨ Chapter 7 “Technical data”
- ❑ The instrument is not suitable for installation in areas with an explosion hazard. It must be built into a housing that provides protection against fire and electrical hazards.
- ❑ Apart from faulty installation, incorrect settings on the instrument may also affect the proper functioning of the subsequent process or lead to damage. Safety devices should always be provided that are independent of the instrument (such as overpressure valves or temperature monitors/limiters) and only capable of adjustment by specialist personnel (lock the parameters for operation). Please observe the relevant safety regulations for such matters.
- ❑ The load circuit must be fused for the maximum relay current, in order to prevent the output relay contacts becoming welded in the event of a short circuit there.
- ❑ Do not connect any additional loads to the screw terminals for the supply of the instrument.
- ❑ The external fusing of the supply should not be below 1A, depending on the conductor cross-section.

3.2 Correct positioning of the probes

- ❑ The probe for the temperature of the cold store should be positioned in the air stream of the fan, in a place where the average temperature of the refrigerated goods can be acquired (not too close to the evaporator, and also not right at the bottom of the cold-storage room).
- ❑ Place the probe for the evaporator temperature there where it will be iced up longest !

3.3 Connection diagram

1. The electrical connection must only be carried out by qualified personnel.
2. For shock-hazard protection, the instrument must only be connected to extra-low voltages which comply with SELV or PELV definitions, because supply voltage and analog inputs are not electrically isolated from one another !



1. The switching positions of the instrument relays shown here (dotted line) represent the relay de-energized condition.

4 Commissioning the instrument

4.1 Displays and controls

LC display	3-character nine-segment display, 13 mm high, and symbols for the temperature unit, hr, min, and sec, with red background lighting. Once the supply is switched on, all the segments light up and stay on for 5 seconds.	-8:8.8. °C °F hr min
LED Cooling	The LED comes on when the corresponding relay is energized. The LED goes out when the corresponding relay is de-energized.	
LED Defrosting		
LED Fan		
LED Alarm		
Keys	For Start/Stop of manual defrosting, press for >3 sec for acknowledgement of alarms, press for <3 sec Programming Increase value/ subsequent parameter Decrease value/ previous parameter	JUMO eTRON M 100 - 8.5 °C
Setup interface	A PC interface and an adapter (4-pole socket) are used to connect the instrument to a PC. The RS485 interface must not be used during this time !	

* Apply the supply voltage, all segments light up five seconds long (for testing the segments).

When everything has been connected up correctly to the instrument, it will show the current temperature at analog input 1. With the **Dat**a logger option, dAt is shown briefly after switching on.

If an alarm/error message appears, see Chapter 8 “Alarm and error messages”.

4.2 Process value display (after switch-on)

The parameter di.P is used to set the process value to be displayed.

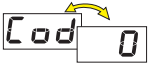
⇨ Chapter 5.7 “LC display”

If the process value will be changed by the keys ▲ and ▼ the device switches back automatically after timeout.

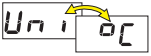
4.3 Changing over to the parameter level (inhibited by a code)

The instrument parameters are factory-set at the parameter level, and are inhibited by a code.

All parameters can be edited within the value range, as described in the table below.

* Press the Ⓟ key for 3 seconds,  will appear alternately.

* Use the ▲ and ▼ keys to set the code for the parameter level (factory-set: code 72, can be altered through the setup program). The longer the key is pressed, the faster the value will change.
* Acknowledge with Ⓟ

The first **parameter name** and **value** will appear alternately.  .

4.4 Selecting the parameter, editing (navigation principle)

* The ▲ and ▼ keys are used to select all parameters (upwards or downwards within the parameter table).

* Acknowledge with (P), the value blinks

, prompting your entry.

  Use the (▲) and (▼) keys to set the value within the specified range.
  The longer the key is pressed, the faster the value will change.

* Acknowledge the setting with (P), the new value is stored, and the display again switches between **parameter name** and **value**.

The subsequent parameter is set according to the same navigation principle.

⇨ see overview of operation on the first inside page.

4.5 Canceling editing

(P) + (▼) will cancel editing, the original value is retained.

4.6 Acknowledging alarms

Requirement: AL.q = on

* Press the (▶■) key briefly (for less than 3 sec)

4.7 Immediate start/stop of defrosting

Press the (▶■) key for more than 3sec

5 Parameter level

Where appropriate, the full parameter names have been added in brackets, to explain their abbreviated forms in the display.

All parameters for the maximum expansion level are listed in the table below.

Depending on the instrument version (see data sheet), parameters which are not required are switched out of display.

Parameter	Meaning	Value range from...**factory-set**...to
Un 1	**Temperature unit (Unit)** for the displayed temperatures ☝ When changing the temperature unit, all temperature values, such as the temperature of the cold store (in.1), evaporator temperature (in.2) and setpoint (SP) are converted correspondingly. Relative parameters, e.g. hysteresis (HyS) or offset (ot.1) are also affected.	**°C** or °F

5.1 Analog inputs

An. 1	**Probe at analog input 1**, in 2-wire circuit This measures the temperature in the cold store. tAb stands for customer-specific linearization, settable through a table of values in the setup program.	**Pt100:** PtH Pt1000: PtE KTY1X-6: ty1 KTY2X-6: ty2 or tAb
ot. 1	**Temperature offset, analog input 1 (offset temperature 1)** Process value offset	-50.0...**0.0**...50.0 °C or -90.0...**0.0**...90.0 °F

Parameter	Meaning	Value range from...**factory-set**...to
or. 1	**Lead compensation resistance, analog input 1 (offset resistance 1)** This value serves to compensate the resistance of the probe cable; it is dependent on the cable length. For an optimum temperature measurement, the resistance value of the probe cable must be entered here. ☝ A measurement error will occur if the total resistance at the analog input (probe resistance + selected value for **or.1**) exceeds the following values: Pt100: 314Ω, Pt1000: 3140Ω, KTY2x-6: 2235 Ω, KTY1x-6: 3400Ω.	0.0 ... **0.0** ... 99.9 Ω
An.2	**Probe at analog input 2**, in 2-wire circuit It measures the evaporator temperature. tAb stands for customer-specific linearization, settable through a table of values in the setup program.	switched off: no **Pt100:** PtH Pt1000: PtE KTY1X-6: tY1 KTY2X-6: tY2 or tAb
ot.2	**Temperature offset, analog input 2 (offset temperature 2)** Process value offset	-50.0...**0.0**...50.0 °C or -90.0...**0.0**...90.0 °F

Parameter	Meaning	Value range from...**factory-set**...to
or.2	**Lead compensation resistance, analog input 2 (offset resistance 2)** This value serves to compensate the resistance of the probe cable; it is dependent on the cable length. For an optimum temperature measurement, the resistance value of the probe cable must be entered here. ☝ A measurement error will occur if the total resistance at the analog input (probe resistance + selected value for **or.2**) exceeds the following values: Pt100: 314Ω, Pt1000: 3140Ω, KTY2x-6: 2235 Ω, KTY1x-6: 3400Ω.	0.0 ... **0.0** ... 99.9 Ω
dF	**Filter time constant (digital Filter)** To adapt the digital input filter. At a signal step, 63 % of the changes are acquired after the filter time constant. Value 0 means: filter switched off When the filter time constant is large: - high damping of disturbance signals - slow reaction of the process value display to changes in the process value	0 ... **0.8** ... 99.9 sec

5.2 Binary input

bi.F	**Function with closed/open binary input (binary input Function)** 0 : no function 1 : start / stop defrosting (keyed function) 2 : fan off / on (door contact) 3 : key inhibit active / inactive 4 : display switch-off active / inactive 5 : alarm acknowledgement (keyed function)	**0** ...5

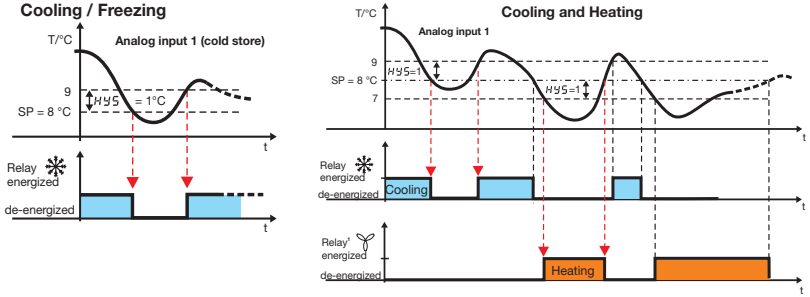
Parameter	Meaning		Value range from...**factory-set**...to

5.3 Controller

Ex-factory, the controller is set to "Cooling".
For the special “Cooling + Heating” function, the fan relay is used for heating.

tYP	**Contr. type (tyPe)**	**with above/below measured value (e.g. probe break)**	**0**, 1, 2
	0 : Cooling contr.	... switches the relay ❄ off.	
	1 : Freezing contr.	... switches the relay ❄ on.	
	2 : Cooling+Heating	... switches the relays ❄ and Y off.	
SP	**Setpoint** The process is controlled to this temperature.		SPL ... **0.0** ... SPH in °C or °F

Parameter	Meaning	Value range from...**factory-set**...to
HYS	**Hysteresis** For cooling and freezing, the hysteresis lies above the selected setpoint. For the “Cooling + Heating” function, the hysteresis is above or below the selected setpoint, like a window function.	0.0...**1.0**...50.0 °C or 0.0...**1.8**...90.0 °F



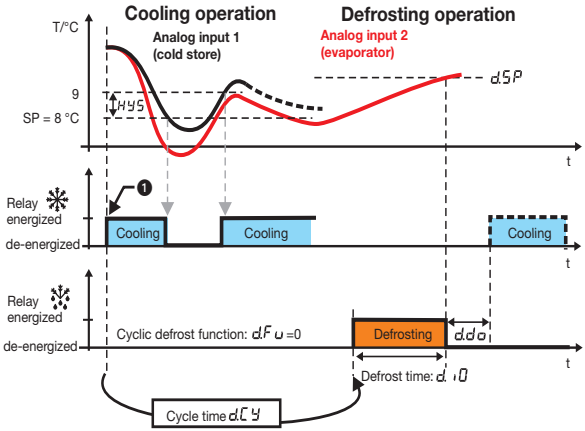
SPL	**Low setpoint limit (SetPoint Low)** SP can be set down to this low limit.	-200 ... **-50** ... SP.H-10 °C or -328 ... **-58** ... SP.H-18 °F
SPH	**High setpoint limit (SetPoint High)** SP can be set up to this high limit.	SPL+10 ... **50** ... +500 °C or SPL+18 ... **122** ... +932 °F

Parameter	Meaning		Value range from...**factory-set**...to
t.on	**Minimum switch-on time (time on)**	Here you can set the minimum time for which e. g. the cooling unit (relay ❄) must be switched on or remain switched off. Please refer to the manufacturer's specifications for the cooling unit that is used.	**0** ... 999 sec
t.oF	**Minimum switch-off time (time off)**		**0** ... 999 sec
P.On	**Response to power ON**: this depends on the controller type that is set.		0, **1**

	Cooling con.	Freezing con.	Heating+Cooling con.
0	Defrosting	Defrosting	Heating/Cooling Off
1	Cooling	Cooling	Heating/Cooling

Parameter	Meaning	Value range from...**factory-set**...to

5.4 Defrosting (cyclic)



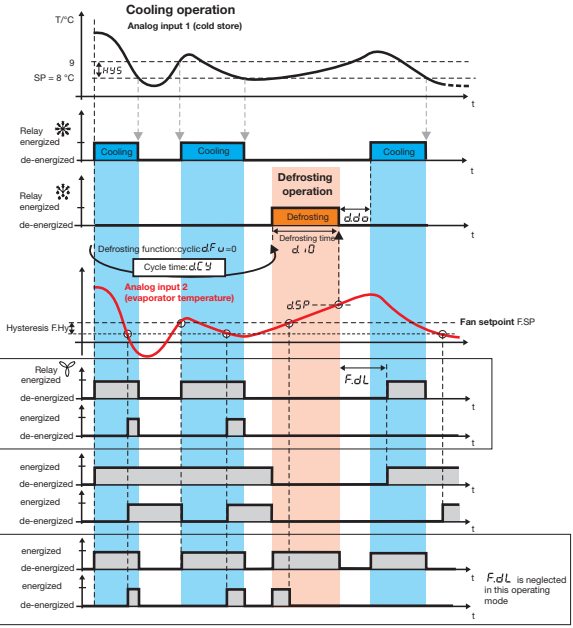
❶ The starting behavior after power ON depends on the **controller type** and the **Power on** parameter.
Here: tYP=1 (cooling controller)
P.On =1 (after power ON: cooling)

Parameter	Meaning		Value range from...**factory-set**...to
d.t y	**Defrosting type** **EL = electrical/circulating air:** The cooling relay is switched off, and the defrosting relay is energized to defrost the evaporator by means of heater bars or circulating warm air. **GAS = hot-gas defrosting:** In this case, the cooling relay remains switched on during defrosting. The defrosting relay is energized, and can be used to operate a bypass valve that passes a warm cryogen vapor through the heat-exchanger, instead of the “cold” cryogen.		**EL**, GAS
d.F u	**Defrosting function**	0: **Cyclic** repeat of defrosting, after the end of cycle time d.C y . 1: Start of defrosting daily at the **time** that was set under d.t 1 ... d.t 4. 2: To start defrosting, the **sum of all the active cooling-unit runtimes** is formed (i.e. the times in which the cooling relay was energized). As soon as this sum has reached the value for the selected cycle time d.C y, defrosting is started. 3: Defrosting can only be started/stopped **manually**, using the ⊕ key (>3 sec) or via the binary input.	**0**, 1, 2, 3
d.C y	**Cycle time (duration Cycle)** This time is used cyclically with d.Fu = 0, for the defrosting function. (e.g. defrosting every 24 hours) or, with d.Fu = 2, to form the **sum of all the active cooling-unit runtimes**.		1 ...**24**... 999 hours

Parameter	Meaning	Value range from...**factory-set**...to
d. i0	**Defrosting duration** The relay ❄ is energized during the defrosting time. Depending on the defrosting type d.tY that has been set, “electrical/circulating air” or “hot gas” is used for defrosting. Defrosting ends when the following has occurred: 1. The defrosting time has run down: The residual time for the current defrosting is shown under dEC in the process value display (see “Overview of operation” on the first inside page). **The display of time remaining (dEC) switches dynamically:** - over 24 hours, entire days are displayed, - below 24 hours, the small h appears, - below 60 minutes, the small „min“ and below 1000 seconds, the „s“ 2. If the value goes above the selected **defrosting limit** d.SP, the relay ❄ is de-energized. 3. Manual cancellation with the ▶ key (more than 3 sec) or via the binary input ⇨ Chapter 5.2 “Binary input”	0: no time limit 0 ...**30**... 999 minutes

Parameter	Meaning		Value range from...**factory-set**...to
d.t 1	**Time 1** **(defrosting time 1)**	Hours and minutes can be separated by a decimal point. The digit behind the decimal point represents a 10-minute step. **Example:** 23.5 signifies: 23:50 hrs 0.1 signifies: 00:10 hrs ☞ If a time has been entered, defrosting takes place on a daily base. If all times are set to **off**, then d.C y is effective again.	**switched off: off** 0.0... 23.5 hrs
d.t 2	**Time 2** **(defrosting time 2)**		
d.t 3	**Time 3** **(defrosting time 3)**		
d.t 4	**Time 4** **(defrosting time 4)**		
d.SP	**Defrosting limit (defrost SetPoint)** The present process value of the evaporator is acquired via analog input 2 and compared with the defrosting limit. If this is exceeded, defrosting is ended.		0.0…**10.0**...35.0 °C or 32.0…**50.0**...95.0 °F
d.dL	**Defrosting delay** After power ON, defrosting is started after a defrosting delay time has elapsed. Afterwards, the normal defrosting cycle is resumed. If defrosting delay=0, no defrosting is started after power ON.		0…**30**...99 minutes
d.do	**Drip-off time (defrost drip-off time)** After the end of defrosting, the evaporator can drip off within this time.		0…**3**...99 minutes

5.5 Switching behavior of the fan function



Fan function F.Fu	Run-up/ run-down behavior: F.ru
runs only during cooling 0	off
	on
runs always except defrosting 1	off
	on
runs during defrosting or cooling 2	off
	on

Parameter	Meaning	Value range from...**factory-set**...to
F.Fu	**Fan function (see picture above)** 0: fan runs with relay only 1: fan runs continuously except for defrosting (relay) 2: fan runs during cooling (relay) and also during defrosting (relay)	**0**, 1, 2
F.ru	**Run-up/run-down delay of fan (Fan running function)** has the hysteresis F.Hy, remains generally locked during drip-off time. off: no run-up/run-down delay (relay switches as set under F.Fu) on: run-up/run-down depends on the **evaporator temperature** **Run-up delay:** The fan only starts running when the **evaporator temperature** goes below **the fan setpoint F.SP** by more than the amount of the **hysteresis F.Hy** (see picture). **Run-down delay with F.Fu=2** The fan keeps on running until the **evaporator temperature** exceeds the **fan setpoint F.SP** .	**off,** on
F.SP	**Fan setpoint** Influences the running of the fan, depending on the evaporator temperature. If it is set low enough, this will prevent any unnecessary distribution of warm air and support the distribution of cold air in the cold store.	-100…**0**...100 °C or -148…**32**...212 °F
F.Hy	**Fan setpoint hysteresis** The hysteresis is below the selected fan setpoint and, consequently, influences the run-up/run-down behavior of the relay .	1.0 ... **3.0**... 50.0 °C or 1.8 ... **5.4**... 90.0 °F

Parameter	Meaning	Value range from...**factory-set**...to
F.dL	**Fan run-up delay after defrosting (Fan deLay)** After defrosting, the activity of the fan relay will be delayed for the time that was set. This has a higher priority than the **run-up delay** activated through F.ru=on, which would possibly switch the fan on earlier.	0 …**30**... 99 minutes

5.6 Alarms

Requirements for Alarm signaling:

After power ON, the temperature of the cold store must have been in the "OK range" at least once, before an alarm is signaled and output as a result of a temperature transition from the “OK range” to the “alarm range”.

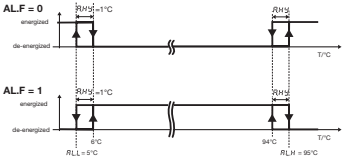
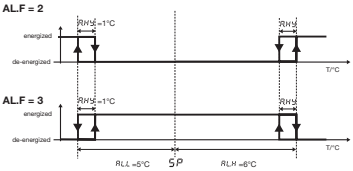
In the example for absolute alarm limits AL.F=0 (see next page), the temperature of the cold store after power ON would have to lie between 6°C and 94°C once, before an alarm message is output when the alarm limits are infringed (out-of-limit).

Probe break or probe short-circuit:

An alarm is also initiated when a probe break or a probe short-circuit is established at the input for the cold store temperature.

AL.Q and AL.d take effect here.

Alarm signaling is inactive during defrosting (Relay ❄ activated).

Parameter	Meaning	Value range from...**factory-set**...to
AL.F	**Alarm signaling (ALarm Function)** 0: Relay 🔔 is energized (alarm buzzer ON), with **absolute** alarm limits 1: Relay 🔔 is de-energized (alarm buzzer OFF), with **absolute** alarm limits **Absolute temperatures AL.L and AL.H**  2: Relay 🔔 is energized (alarm buzzer ON), with **relative** alarm limits 3: Relay 🔔 is de-energized (alarm buzzer OFF), with **relative** alarm limits **Relative temperatures (distance to setpoint)**  ☞ For the switching action shown in the diagram (distance from SP), values larger than 0 must be entered for AL.L and AL.H.	**0**, 1, 2, 3,

Parameter	Meaning	Value range from...**factory-set**...to
AL.L	**Low alarm limit (ALarm Low)** If the process value at the analog input 1 (in.1, cold store) goes below this limit: 1. the alarm message AL.L appears on the display, if d iA = on (factory-set). ⇨ Chapter 8 “Alarm and error messages” 2. if available (see Chapter 1 “Identifying the instrument version”) **Alarm signal** via relay 🔔 or **alarm buzzer**, as set under AL.F.	For AL.F = 0 and 1: -200 ... **-50** ... +500 °C For AL.F = 2 and 3: **0** ... +500 °C For AL.F = 0 and 1: -328 ... **-58** ... +932 °F For AL.F = 2 and 3: **0** ... +900 °F
AL.H	**High alarm limit (ALarm High)** If the process value from analog input 1 (in.1, cold store) goes above this limit: 1. the alarm message AL.H appears on the display, if d iA = on (factory-set). ⇨ Chapter 8 “Alarm and error messages” 2. if available (see Chapter 1 “Identifying the instrument version”) **Alarm signal** via relay 🔔 or **alarm buzzer**, as set under AL.F.	For AL.F = 0 and 1: -200 ... **50** ... +500 °C For AL.F = 2 and 3: **0** ... +500 °C For AL.F = 0 and 1: -328 ... **122** ... +932 °F For AL.F = 2 and 3: **0** ... +900 °F
A.HY	**Alarm hysteresis** The selected hysteresis is below AL.H or above AL.L.	0.0 ... **1.0** ... 50.0 °C or 0.0 ... **1.8** ... 90.0 °F

Parameter	Meaning	Value range from...**factory-set**...to
AL.d	**Alarm suppression time (ALarm delay time)** An alarm from AL.H or AL.L is suppressed in the display for this time, the relay 🔔 or the **alarm buzzer** is also inactive. If an alarm is present for longer than AL.d , then it is displayed and the relay 🔔 or the **alarm buzzer** is active.	0 ...**5**... 999 min
AL.9	**Alarm acknowledgement** off: no acknowledgment is necessary, the alam is ended automatically, as soon as the condition for the alarm is no longer present. on: acknowledgement is required, the alarm is set permanently, even if the condition for the alarm is no longer present. The alarm can be manually acknowledged with key (▶) (< 3 sec) or via the binary input ⇨ Chapter 5.2 “Binary input” Acknowledgement is also effective when the alarm condition is still present, to silence a connected alarm bell, for example. The alarm is only initiated again if the alarm codition re-occurs.	**off**, on

5.7 LC display

d i.c	**Decimal place of the temperature display** 0: no decimal place 1: one decimal place	0, **1**
d i.d	**Temperature display during defrosting** ❄ 0: no display 1: freeze temperature value during defrosting 2: update temperature value continuously 3: text “dEF”(defrost) appears in the display	0, 1, **2**

Parameter	Meaning	Value range from...**factory-set**...to
d i.H	**Temperature display after defrosting (display Hold)** Maintains display of temperature of cold store in.1, as set under di.d, for this time after defrosting. As soon as the temperature of the cold store falls below the setpoint again, there will be a switchover to the current cold-store temperature before the set time has elapsed.	**0**...999 min
d i.P	**Process value display (display Process value)** This value is shown after switch-on or from another level, after a time-out. in.1: process value, analog input 1 (cold store) in.2: process value, analog input 2 (evaporator) dE.C: remaining defrosting time (dE.C)	**in.1**, in.2, dE.C
d i.A	**Alarm display (display Alarm)** off: do not display alarms on: display alarms	off, **on**

5.8 Interface

⇨ B 70.1061.2 Interface description on CD und www.jumo.net

Adr	**Device address**	**1**...255
For	**Data format** 0 means: 8 data bits, 1 stop bit, no parity 1 means: 8 data bits, 1 stop bit, odd parity 2 means: 8 data bits, 1 stop bit, even parity 3 means: 8 data bits, 2 stop bits, no parity	**0**, 1, 2, 3

Parameter	Meaning	Value range from...**factory-set**...to
bdr	**Baud rate** 9.6 means: 9600 bps 19.2 means: 19200 bps 38.4 means: 38400 bps	**9.6**, 19.2, 38.4

5.9 Data logger

The data logger saves 11263 data sets to a ring memory which overwrites the oldest data with the most recent ones when the memory is full. The data can be read out and processed.

⇨ Chapter 7.1 “Setup program”

Delete all entries from the data logger:

✱ Press Ⓟ (> 3 seconds), enter code 822 and acknowledge with Ⓟ

rEC	**Recording interval for data logger** The most recent data are recorded every 5 minutes (ex-factory). Examples for a continuous recording, without overwriting the old data. If 0 minutes is set, the data logger is switched off.	0…**5**...120 minutes

rEC	Recording duration
1 min	7 days 19 hours
5 min	39 days (1 month, 9 days)
15 min	117 days (4 month)
60 min	469 days (1year 3 months)
120 min	938 days (2 years 6 months)

☞ The real time clock time is buffered without a power supply for approx. 20 days.

If this buffer time is exceeded, recording continues with the date 01.01.07 (ex factory).

Parameter	Meaning	Value range from...**factory-set**...to

5.10 Date and time

d.YE	**Date Year** Millennium and century are permanently set to 20. The last two digits of the year can be adjusted.	**7**...99
d.Mo	**Date Month**	**1**...12
d.dA	**Date Day**	**1**...31
d.hr	**Date Hour**	**0**...23
d.Mi	**Date Minute**	**0**...59
d.SE	**Date Seconds**	**0**...59

Parameter	Meaning	Value range from...**factory-set**...to

5.11 Servicing, operating hours counter

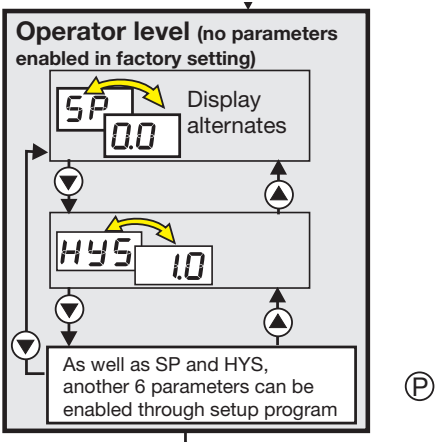
t.S 1	**Time between services (timer Service interval)** The time period after which the cooling unit is due for servicing (e.g. oil change or coolant test) is set here. The **sum of all the active cooling-unit runtimes** is saved here (i.e. the times in which the relay ❄ was energized). As soon as the current service counter t. S has completed this time, an alarm is output. ⇨ Chapter 8 “Alarm and error messages”	**0** ... 999 days
t. h	**Operating time counter of cooling relay (time active relay hours)** The **sum of all active cooling unit runtimes** is saved here (i.e. the times in which the relay ❄ was energized). This time can be used as a measure of how reliable or error-prone a cooling unit is within the system (in spite of regular servicing). ☞ No error messages are output. After 999 days (approx. 2.7 years) of cooling-unit runtime, the count starts again with 0. This counter can be reset manually.	**0** ... 999 days over 24 hrs, days are displayed: -0.0.1 °C °F h min below 24 hrs, hours are displayed and the small h appears: -0.23 °C °F h min

Parameter	Meaning	Value range from...**factory-set**...to
t. S	**Current service counter for the connected cooling unit (timer Service counter)** The **sum of all the active cooling-unit runtimes** is accumulated here (i.e. the times in which the cooling relay was energized) from those which have gone by since the last service. When the time count reaches the time interval t.S 1, an alarm message is output. After servicing the unit, this time count can be reset to 0 using the ▲ and ▼ keys. The alarm message now disappears until the time is accumulated once more and the next service is due. ⇨ Chapter 8 “Alarm and error messages”	**0** ... 999 days over 24 hrs, days are displayed: -0.0.0.1 °C °F h min below 24 hrs, hours are displayed and the small h appears: -0.2.3. h °C °F min

6 Operator level

This level covers all parameters that are accessible (not locked by a code) to the operating personnel, for instance.
Ex-factory, no parameters are available at this level.
In the picture below, the parameters SP and HYS are configured at the operator level.
Any parameter (up to eight 8) can be enabled at this level through the setup program.

✱ Press Ⓟ briefly



7 Technical data

Analog input 1 and 2	Designation	Measuring range	Tolerance in % of measuring range span, temperature effect	Detection of ...	
				probe short-circuit	probe break
RTDs	Pt100 EN 60751	-200 to +600 °C	0.05% (±0.4°C),100ppm/°C	yes	yes
	Pt1000 EN 60751	-200 to +600 °C	0.05% (±0.4°C),100ppm/°C	yes	yes
PTC	KTY1X-6	-50 to +100 °C	0.5% (±0.75°C),100ppm/°C	yes	yes
	KTY2X-6	-50 to +150 °C	0.5% (±1°C),100ppm/°C	yes	yes
	resistance 10 — 3500 Ω	customer table [1]	0.075% (±2.6Ω),100ppm/°C	yes	yes
Measuring current for Pt100: 2 mA, for Pt1000, KTY2X-6, KTY1X-6 and resistance: 0.2 mA					
Lead compensation is adjustable via the parameter Lead compensation resistance or. 1 and or.2. The total resistance at the analog input (probe resistance + selected value for **or.1** or **or.2**) must not exceed the following values: Pt100: 314Ω, Pt1000: 3140Ω, KTY2x-6: 2235 Ω and KTY1x-6: 3400Ω.					

Input resistance	$R_{IN} \geq 100k\Omega$
Sampling time	250 msec
Input filter	1st order digital filter; filter constant adjustable from 0.1 to 99.9 sec
Measuring current	with Pt100: 0.2mA, with Pt1000, KTY2X-6, KTY1X-6 and resistor: 0.02mA
Temperature offset	adjustable via the parameters ot. 1 and ot.2
Special features	temperature indication switchable to °F (Fahrenheit)

1.) A valid customer table must be entered through the setup program and switched over to tAb in the instrument.

Environmental influences

Ambient temperature range	0 to +55 °C
Storage temperature range	-40 to +70 °C
Climatic conditions	≤85 % rel. humidity, no condensation
Shock und vibration	DIN EN 60068-2-6 schedule C.2, Frequency-Range: 10 to 55 Hz Acceleration: 20 m/s^2 (2g)
Care of the front panel	The front panel can be cleaned with normal commercial washing, rinsing and cleaning agents. Do not use any solvents such as methylated spirits, white spirit, P1 or xylol.

Output

Relay for cooling, changeover (SPDT) contact Relay for alarm, changeover (SPDT) contact	70 000 operations at 250V/16A AC, 50Hz resistive load 60 000 operations at 250V/16A AC, 50Hz cos phi >0.6
Relay for defrosting, make (SPST-NO) contact Relay for fan, make (SPST-NO) contact	100 000 operations at 250V/8A AC, 50Hz resistive load 85 000 operations at 250V/8A AC, 50Hz cos phi >0.6

Supply voltage

Supply voltage	12 — 24V AC/DC +15/-15 %, 48 — 63Hz (for operation with SELV circuits only) (not electrically isolated from the analog inputs)
Power consumption	< 3W

Housing

Material	polycarbonate, silver gray RAL 7001
Mounting	in panel cut-out, with bezel seal
Operating position	unrestricted
Weight	approx. 160g
Enclosure protection	front IP65 / rear IP20
Flammability class	UL 94 VO

Electrical data

Data backup	The data sets of the data logger are saved to a flash memory. The adjustable parameters are stored in EEPROM. Data are preserved after a power interruption.
Connection circuit	screw terminals for wire cross-sections up to 4 mm^2, solid wire and up to 2.5 mm^2, stranded wire
Electromagnetic compatibility Interference emission Interference immunity	Product family standard: EN 61326 Class B to industrial requirements
Operating conditions	The instrument is designed as a panel-mounting unit.
Electrical safety	EN 60 730, Part 1, overvoltage category III, pollution degree 2
Accuracy of the real-time clock, buffering	at 25°C +15/- 15 sec per month, temperature effect -0.35 ppm/10°C within the ambient temperature range: +60/- 60 sec per month Gold Cap capacitor buffers the clock time without a supply voltage for about 20 days.
Technical and functional characteristics of temperature recording devices or thermometers	as per EN 12830 and EN 13485.
Approvals	UL approvals are only valid for mass-production units with the JUMO symbol

7.1 Setup program

This program and the interface with adapter can be supplied as accessories. They offer the user the following advantages:

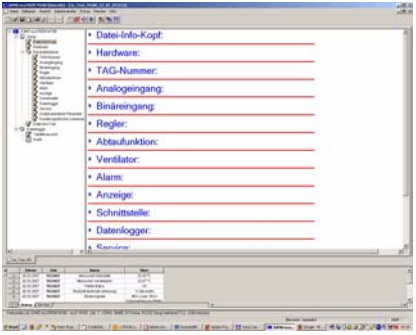
- easy and convenient parameterization and archiving from a PC
- simple duplication of parameters for instruments of the same type
- entry of a linearization table
- reading out data sets from the data logger.
  The data are saved together with the setup file.

7.2 Hardware and software requirements

- PC Pentium III or above
- 128 MB RAM, 16 MB free space on hard disk
- CD-ROM drive
- free USB interface, mouse
- Microsoft[1] Windows 2000/XP

✱ Connect USB cable of interface to the PC

✱ Connect PC interface with USB/TTL converter to the instrument via the adapter (4-pole socket)



7.3 Displaying the device software version

✱ Press the (P) and (▲) keys simultaneously, holding them down.

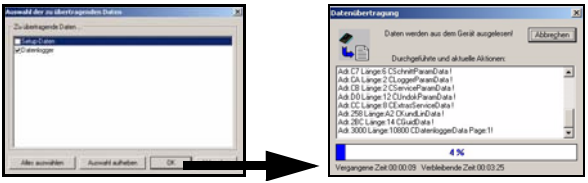
This version is also recognized by the setup program and shown under *Info ⟹ Info through Setup*.

1. Microsoft is a registered trademark of Microsoft Corporation

7.4 Transferring measurements from the data logger to the PC

The data logger saves 11263 data sets to a ring memory which overwrites the oldest data with the most recent ones when the memory is full.

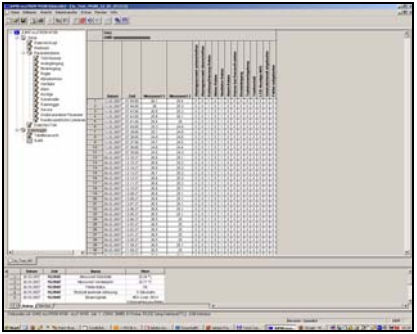
* Transfer data from device
* Choose data logger
* Click OK, the data will be read out

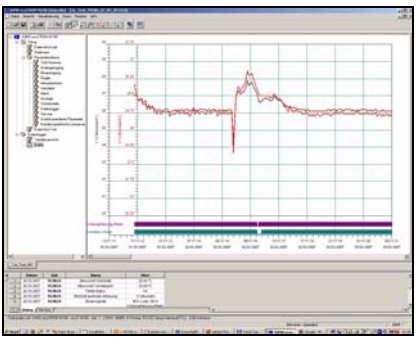


* Click table view, the table on the right will be shown

or

* Click Graphics, a graphics will be calculated
* Save setup file.

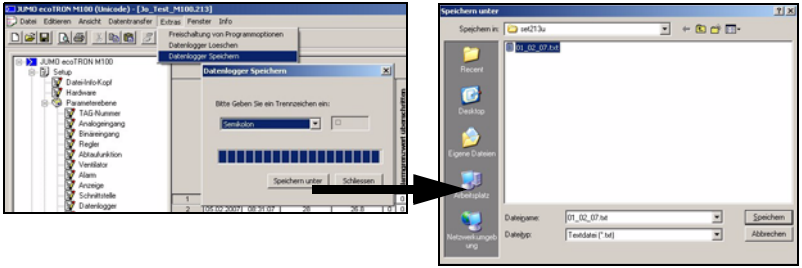




☞ A click with the right mouse button enables you to zoom in, make print-outs or set the properties for the graphics (e.g. colors or connecting lines).

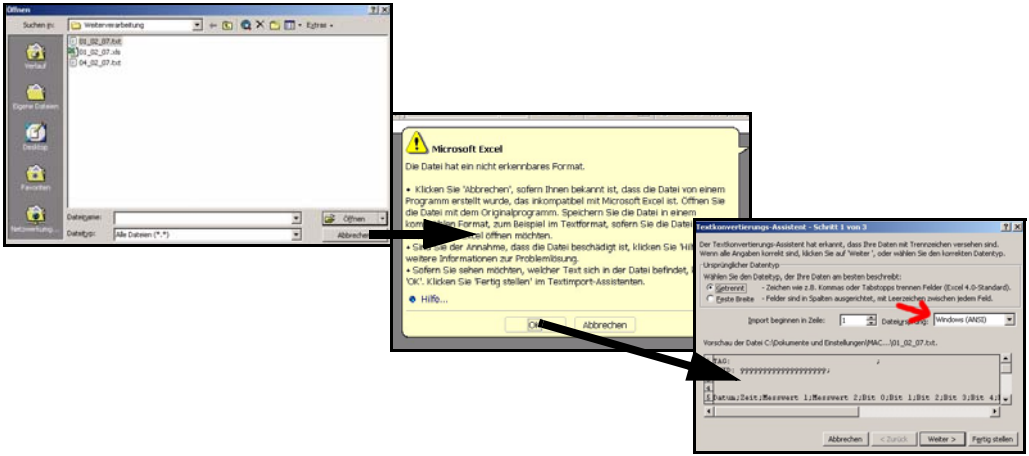
7.5 Processing measurements in Excel [1]

* Execute *Extras => data logger => Save* in menu bar
* Enter Semicolon as a separator
* Click Save as

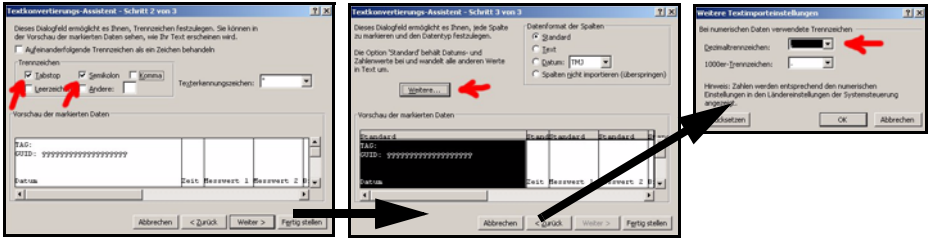


* Save as 01_02_07.txt
* Execute *File => Open* in the Excel menu bar
  Select all files, otherwise the txt file will not be shown in the selection window
* Select 01_02_07.txt
* Even if the wizard comes up with an error message, clicking OK will start the text conversion wizard.
* Keep *Windows-ANSI* open and click *Continue*

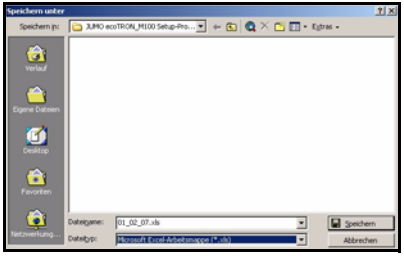
1. Excel is a registered trademark of the Microsoft Corporation

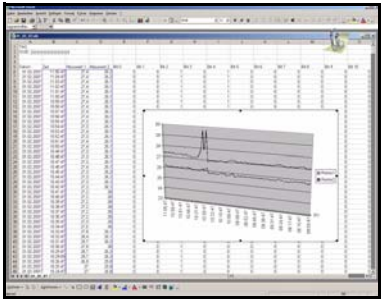


* Tab stop and semicolon must have a check mark
* Click *Continue* and enter a point as a separator, instead of the comma



✱ The table can now be processed in Excel and saved in the Excel file format (.xls).

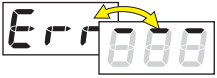
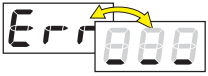




8 Alarm and error messages

The following alarm messages can be shown in alternation with the temperature display:

Alarm display	Cause	Remedy
t. 5 -10.5 °C	**Service interval** run down The selected time for the maintenance of a heating or cooling unit has run down	✱ Carry out service ✱ At the parameter level, reset t.5 , manually to 0 ⇨ Chapter 4 “Commissioning the instrument”
AL.L -10.5 °C	Gone below low **alarm limit**	✱ Depending on the controller type that was set, check whether the heating/cooling unit is still operating without errors. ✱ Check whether any relay fusing that may be installed is still functioning properly. ✱ Check whether the selected alarm limits have been set correctly. The alarm disappears as soon as the process value goes above/below the AL limits by the amount of the hysteresis or must be acknowledged (with the key < 3 sec). ⇨ Chapter 5.6 “Alarms”
AL.H 99.5 °C	Gone above high **alarm limit**	

Error message	Cause	Remedy
	**Gone above measured value** The measured value is too large, is outside the measurement range, or a probe break has occurred.	- Check probe and connecting cable for damage or short-circuit - Check whether the correct probe has been set or connected ⇨ Chapter 4 “Commissioning the instrument” ☞ These messages are only output in the process value display.
	**Gone below measured value** The measured value is too small, is outside the measurement range, or a probe short-circuit has occurred.	
	Display of measurement value 2 (-10.5°C) alternating with background information that measurement value 1 is faulty..	- Change over to the faulty measurement value and find the cause of the error (see above)
	.Display of measurement value 1 (-18.5°C) alternating with background information that measurement value 2 is faulty..	
	Measured value connot be displayed The measured value exceeds 999 or is below -999 and is thus outside the 3-digit display range.	- Analog input 2 must be activated and correctly configured. ⇨ Section 5.1 „Analog inputs“ - If necessary, use the setup program to re-transfer the configuration to the instrument!

	The flash memory of the data logger is faulty.	✱ The instrument must be returned to JUMO for repair.
	The chip for the real-time clock is faulty.	

8.1 Troubleshooting

What is happening?	Cause / Remedy	Information
Communication with the unit interrupted after setup data was transmitted.	Interface settings of the unit and PC do not match. ✱ Compare the interface settings made in the setup file with those of the unit.	⇨ Chapter 7.1 “Setup program” ⇨ Chapter 5.8 “Interface”

JUMO GmbH & Co. KG

Street adress:
Moritz-Juchheim-Straße 1
36039 Fulda, Germany
Delivery address:
Mackenrodtstraße 14
36039 Fulda, Germany
Postal address:
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
e-mail: mail@jumo.net
Internet: www.jumo.net

JUMO Instrument Co. Ltd.

JUMO House
Temple Bank, Riverway
Harlow, Essex CM20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.

8 Technology Boulevard
Canastota, NY 13032, USA
Phone: 315-697-JUMO
1-800-554-JUMO
Fax: 315-697-5867
e-mail: info@jumo.us
Internet: www.jumo.us