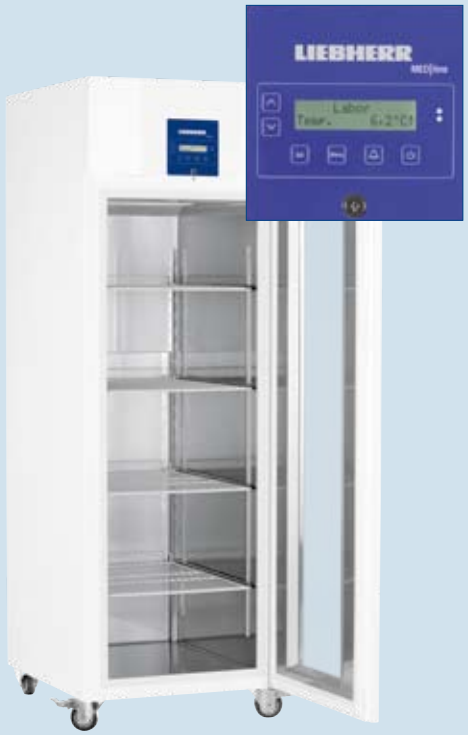
Laboratory technical sales manual

LIEBHERR

LKPv and LGPv laboratory appliances with Profi-Controller



Alarm, memory and safety functions

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Internal system alarms
Internal memory functions
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LK(U)v, LCv, LK(U)exv and LG(U)ex laboratory appliances with Comfort-Controller

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Safety feature table

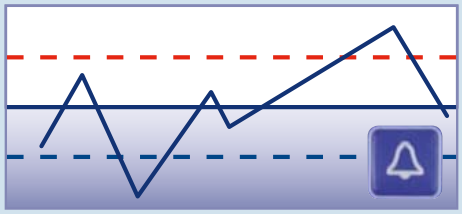
Alarm, memory and safety functions

Liebherr Mediline refrigerators and freezers with Profi-Controller help to protect your inventory. These cabinets offer a variety of alarm, memory and safety features designed to greatly reduce the risk of loss of contents.

Temperature, door-open and power failure alarms

High and low temperature alarms

All LKPv and LGPv modells have integrated high and low internal air temperature alarms with both audio and visual signals. The factory settings for the alarm limits are +3/–2 K in relation to the set temperature. If the set temperature is altered to meet a specific storage temperature requirement then the alarm settings move in parallel and do not need to be adjusted separately. There is a 30 minute delay to avoid unwanted alarms due to e.g. door opening.



Door-open alarm

All LKPv and LGPv modells register when doors are left open or ajar and have an integrated audio and visual door-open alarm. This alarm has a 1 minute delay which can be adjusted.

Power failure alarm

All LKPv and LGPv modells have a battery back-up which operates an audio and visual alarm immediately upon power failure. Both the integrated temperature data logger and the optional external temperature monitoring via the RS 485 interface continue to function during power failure for up to 72 hrs.

Internal system alarms

The following alarms are related to internal self-checks of the refrigeration system and the electronic controller probes. While these might not be immediately relevant to the everyday operation of the cabinets they do provide added security by warning probably before the air temperature probe registers an alarm condition. They also provide a service engineer with valuable information thus allowing quicker intervention.

High condenser temperature alarm

This integrated audio and visual alarm warns of excessive condenser temperatures possibly caused by e.g. high ambient temperatures or blocked air-flow to or from the refrigeration system.

Low evaporator temperature alarm

This integrated audio and visual alarm warns of low evaporator temperatures possibly caused by e.g. defective air-circulation fan or blocked internal air-flow. This alarm will possibly warn much sooner than the high or low temperature alarm.

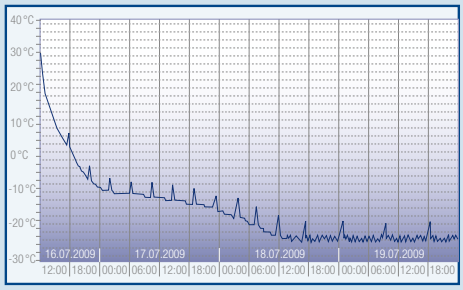
Probe failure alarm

As a self-control system, defective probes are registered and the controller cause an audio and visual alarm signal. In case of an air-probe error the controller has pre-defined operating modes to maintain the internal temperature at +5 °C.

Internal memory functions

Internal alarm memory

This function stores to memory details of the last 30 alarms: time and date of the start and the end of the alarm condition, the type of the alarm condition and the maximum and minimum internal air temperatures measured during this alarm condition period are registered.



Internal temperature memory

This function stores to the memory the internal temperature profile at 4-minute intervals. 2800 temperature logs are stored to memory, which corresponds to approximately a 7-day logging period.

Special safety functions

Solid-state relay for maximum reliability

The LKPv and LGPv models all have a solid-state relay guaranteed to > 1 billion compressor start cycles. As well as allowing very accurate temperature control this feature practically excludes the possibility of burnt relay contacts as a cause for extreme internal temperatures.

Double fan cooling

All LKPv and LGPv modells have a double internal fan arrangement so that in case of one defective fan the cooling system continues to function at reduced capacity. The highly reliable fans Liebherr uses are guaranteed to 80 000 hrs operating time.

Temperature and alarm documentation

Liebherr Mediline refrigerators and freezers with Profi-Controller help to protect your inventory. These cabinets offer a variety of features and options designed both for external monitoring of the internal temperatures, the product temperatures and alarm conditions to greatly reduce the risk of loss of contents.

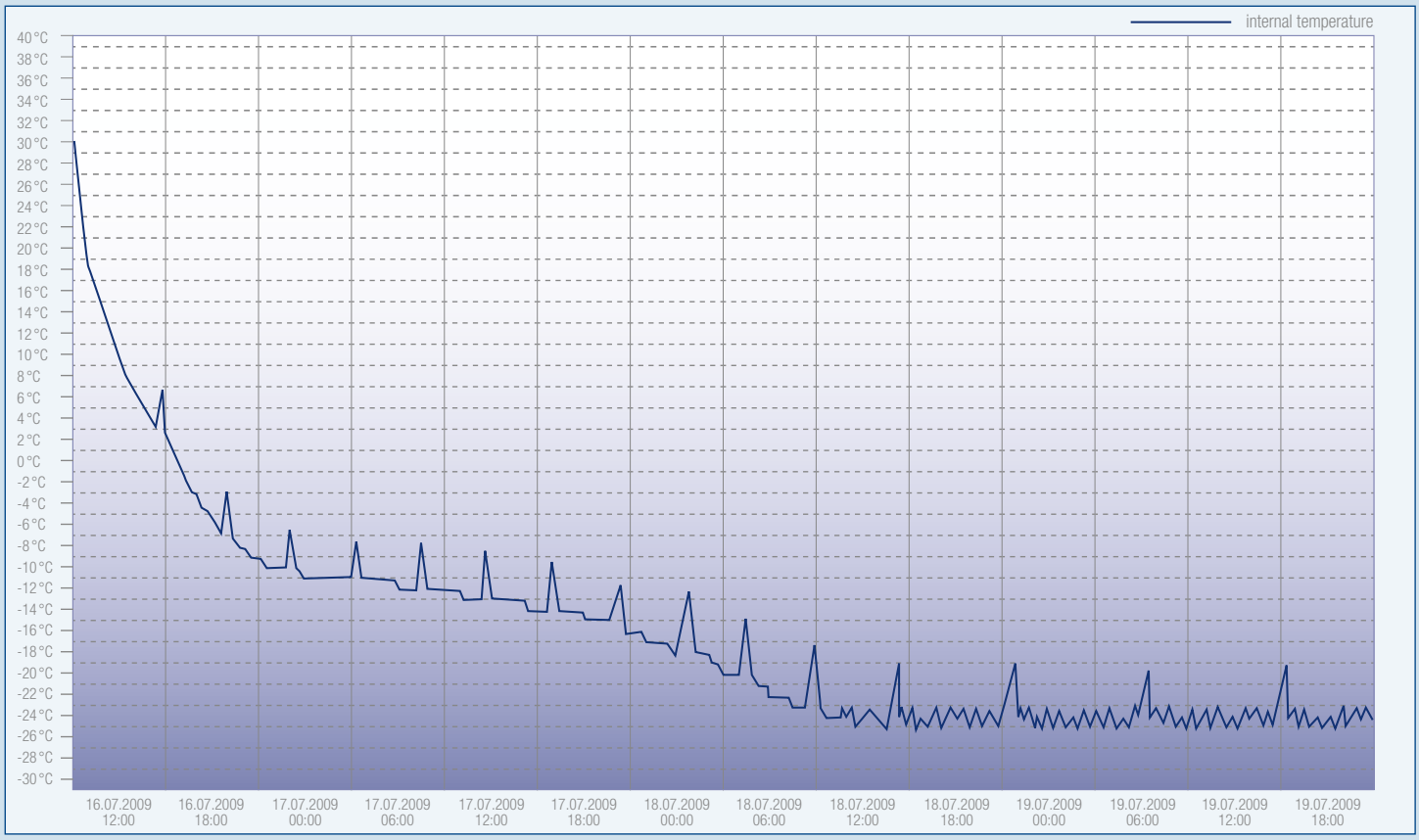
External temperature and alarm monitoring connections

Infrared interface and optional infrared key

All LKPv and LGPv models have an integrated temperature data logger which stores up to 2800 air-probe temperature values recorded at 4 minute intervals = 7,7 days. In order to use this data an infrared device ("key") is available as an optional extra. The data is transferred from the infrared interface on the cabinet to the "infrared key". This "key" is then connected by cable to a PC or laptop and the data is transferred onto the dedicated software on the PC. Only one set of data i.e. from one cabinet, can be transferred at one time.

The optional kit includes all the necessary components: key, cable and software including manual. The software allows visualisation and analysis of the temperature data in various formats including a graph. The data can also be exported to Excel, Word and other standard formats for storage or further analysis.

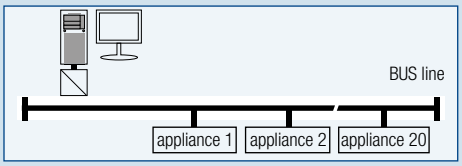
Example visualisation of temperature data



RS 485 interface and optional signal converter

All LKPv and LGPv models have an RS 485 interface. If an RS 485 monitoring system is not already in place, a converter kit is available as an optional extra to convert the RS 485 signal to an RS 232 signal and allow connection to a PC or laptop.

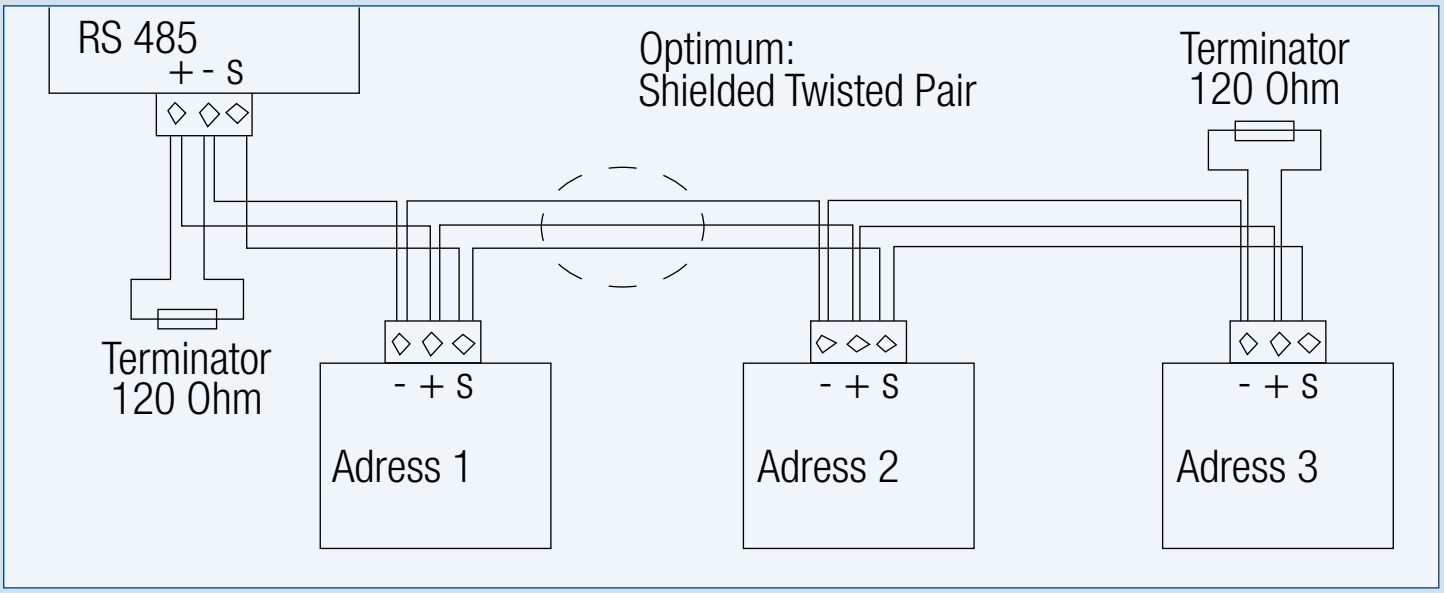
The RS 485 bus connection is made using standard shielded data cables, e.g. type LiYCY 2 x 0,14 mm². The maximum possible length of the data lines depends on the quality of the components used. The maximum range is 500 m. A maximum of 20 appliances can be wired in series.



Dedicated software is provided in the accessory package allowing visualisation, analysis and export to other formats for storage. The software reads the air-probe temperature at 2 minute intervals and records alarm conditions. When an alarm condition is registered the software will warn on the PC on which the software is running. If this PC is not supervised (e.g. at night or over weekends) then the alarm signal might not be recognised.

Both laboratory appliances with Profi-Controller as well as laboratory appliances with Comfort-Controller can be networked using the same Liebherr accessory package “RS 485 interface converter including temperature monitoring software”.

Example RS 485 network



External alarm contact connection

Volt-free contact

All LKPv and LGPv models have an integrated volt-free contact. The relay contact can be wired into a warning system in the building which would advise e.g. security personnel or a janitor outside of working hours. Warning systems with audio or visual alarms are possible.

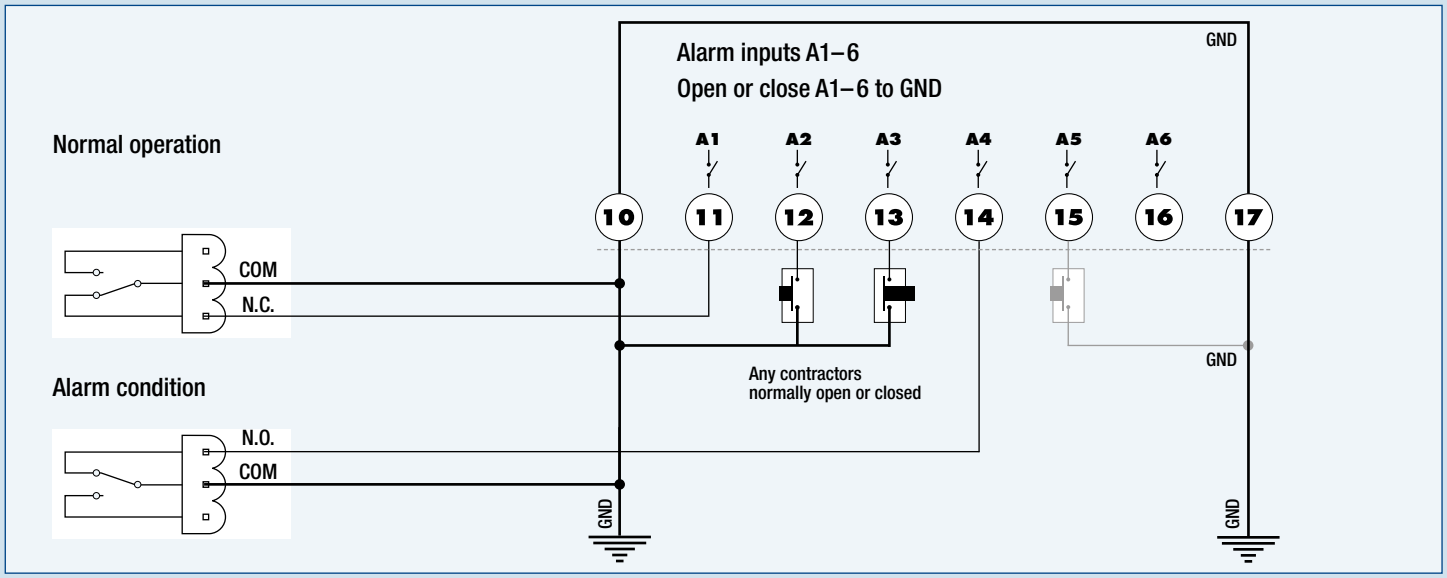
The following example shows a circuit with a visual alarm. Either normal operation or alarm condition or both can be indicated. Either AC or DC circuits are possible, max AC 230 V / 5 Amp.

Example visual alarm system using volt free alarm contact

Alternatively, if no internal warning system is in place and additional wiring inside the building is problematical, the volt-free contact can be used in conjunction with e.g. a GSM alarm dialler. There are many different versions of GSM alarm dialers available on the market which either call a telephone number and/or send a text message in case of an alarm. Depending on the specification of the alarm dialler, potentially many appliances can be connected to one dialler. Being GSM appliances, only a SIM card and a power supply are required.

The following example shows a circuit with a GSM dialler: A change in relay setting activates the alarm function of the dialler and thus initiates either a telephone call or an SMS to pre-defined numbers with a pre-recorded message. The dialler in the example has 6 addressed alarm inputs. This could be 6 individual appliances or 6 rooms, each with several appliances wired in series.

Example GSM dialler alarm system using volt free alarm contact



In spite of all efforts to produce appliances of unequalled reliability, Liebherr strongly recommends that the volt-free contact is wired into some kind of independent and external warning system. Please take a few moments to consider the value of the contents of the refrigerators and freezers under your supervision. The cost of such a warning system is often negligible in comparison to the value of the contents.

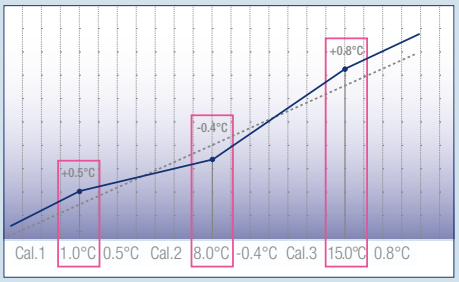
Product temperature monitoring connection

Interface for optional NTC product temperature probe

All LKPv and LGPv models have an integrated interface for connecting an optional available NTC product temperature probe to the Profi-controller. The controller can be set to display either the internal air temperature, as registered by the air probe or the temperature registered by the product probe or both. Also the temperature alarm limits as well as the temperature alarm delay for the product temperature probe can be adjusted by the user to suit individual requirements. In addition the product temperature can be monitored on an external documentation system via the RS 485 interface.

Whereas the air probe is in a fixed position, the product probe will be located by the user, e.g. in a phial or in a measurement package in order to simulate a product temperature.

Due to possible tolerances of the product temperature probe the temperature displayed can differ from the product probe temperature. Using the calibration function, the temperature displayed can be aligned with the product probe temperature at as many as three temperature points. The correction value for the compensation of the differences can be adjusted in 0,1 °C steps.



Safety feature table

Laboratory appliances with Profi-Controller	LKPv 6520	LKPv 6522	LKPv 1420	LKPv 1422	LGPv 6520	LGPv 1420
Spark-free interior	No	No	No	No	No	No
High / Low temperature alarm, audio and visual	Yes	Yes	Yes	Yes	Yes	Yes
Door-open alarm, audio and visual	Yes	Yes	Yes	Yes	Yes	Yes
Power failure alarm through battery backup for 72h, audio and visual	Yes	Yes	Yes	Yes	Yes	Yes
Volt-free contact for external alarm signal	Yes	Yes	Yes	Yes	Yes	Yes
RS 485 data transfer interface	Yes	Yes	Yes	Yes	Yes	Yes
Infrared data transfer interface	Yes	Yes	Yes	Yes	Yes	Yes
Infrared data transfer key with data monitoring software	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory
RS 485 / RS 232 converter with data monitoring software	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory
NTC product temperature probe	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory
Internal alarm memory	Yes	Yes	Yes	Yes	Yes	Yes
Min. / Max. temperature memory	Yes	Yes	Yes	Yes	Yes	Yes
Access port for e.g. PT 100 probe	Yes	Yes	Yes	Yes	Yes	Yes
Probe failure alarm	Yes	Yes	Yes	Yes	Yes	Yes
Condenser and evaporator temperature alarms	Yes	Yes	Yes	Yes	Yes	Yes

Alarm, memory and safety functions

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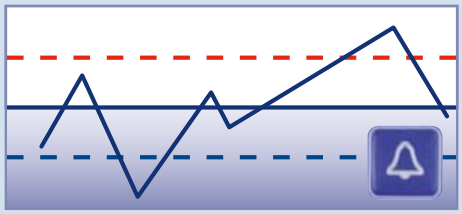
Temperature, door-open and power failure alarms

High and low temperature alarms

All LK(U)v, LCv, LK(U)exv and LG(U)ex models have integrated high and low internal air temperature alarms with both audio and visual signals. The factory settings for the alarm limits are +1/–1K in relation to the set temperature: If the set temperature is altered to meet a specific storage temperature requirement then the alarm settings move in parallel and do not need to be adjusted separately. There is a 60 minute delay to avoid unwanted alarms due to e.g. door opening. The alarm parameters can however be adjusted by the user to suit individual requirements.



Door-open alarm

All LK(U)v, LCv, LK(U)exv and LG(U)ex models register when doors are left open or ajar and have an integrated audio and visual door-open alarm. This alarm has a 1 minute delay.

Power failure alarm

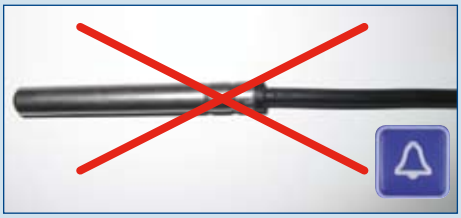
All LK(U)v, LCv, LK(U)exv and LG(U)ex models indicates a visual power failure alarm after the return of the power supply. The power failure alarm remains until it is manually reset.

Internal system alarm

The following alarm is related to internal self-checks of the electronic controller probes. While this might not be immediately relevant to the every-day operation of the cabinets it does provide added security by warning probably before the air temperature probe registers an alarm condition.

Probe failure alarm

As a self-control system, defective probes are registered and the controller cause an audio and visual alarm signal. In case of an air-probe error the controller has pre-defined operating modes to maintain the internal temperature at + 5 °C.



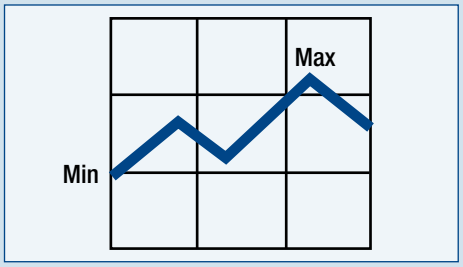
Internal memory functions

Internal alarm memory

This function stores to memory details of the last three temperature and power failure alarms. Time and date of the start and the duration of the alarm conditions are registered.

Min./max. temperature memory

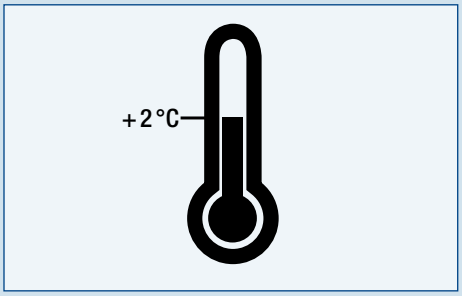
After reaching the set temperature for the first time, the Comfort controller begins continuously to store to memory the highest and lowest internal temperatures registered. These minimum and maximum temperatures can be read out from the memory. After reading the min/max memory, the values can either be reset or left in the memory. Normally the values would be noted by the user and the memory reset in order to define the next period to be registered. The controller also registers the time elapsed since the last reset up to a period of ~ 40 days.



Special safety function

Electro-mechanical + 2 °C safety thermostat for laboratory refrigerators with Comfort-Controller

In order to ensure maximum reliability, the Comfort-Controller has a heavy-duty compressor relay thus reducing the possibility of burned relay contacts. Should however a defect occur, an additional safety thermostat backs up the controller to prevent the product temperature from dropping below +2 °C.



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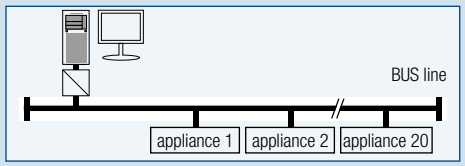
External temperature and alarm monitoring connection

RS 485 interface and optional signal converter

All LK(U)v, LCv, LK(U)exv and LG(U)ex models have an integrated RS 485 interface. If an RS 485 monitoring system is not already in place, a converter kit is available as an optional extra to convert the RS 485 signal to an RS 232 signal and allow connection to a PC or laptop.

The RS 485 bus connection is made using standard shielded data cables, e.g. type LiYCY 2 x 0,14 mm². The maximum possible length of the data lines depends on the quality of the components used. The maximum range is 500m. A maximum of 20 appliances can be wired in series.



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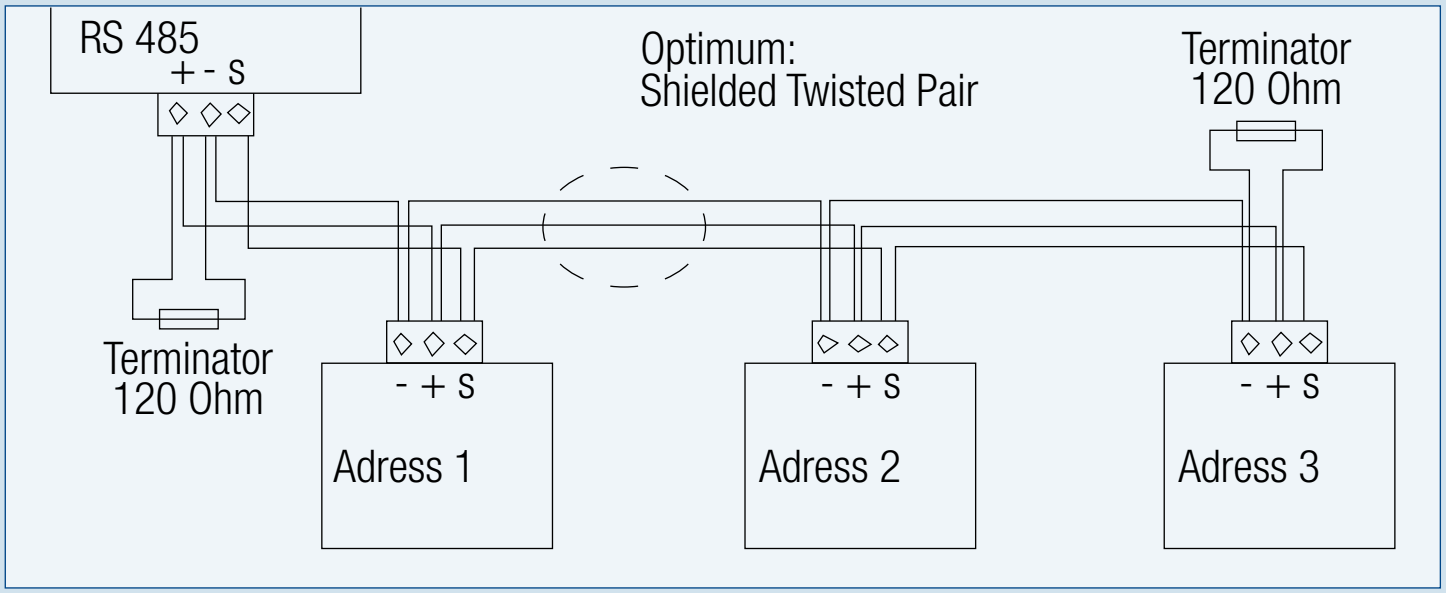

External alarm contact connection

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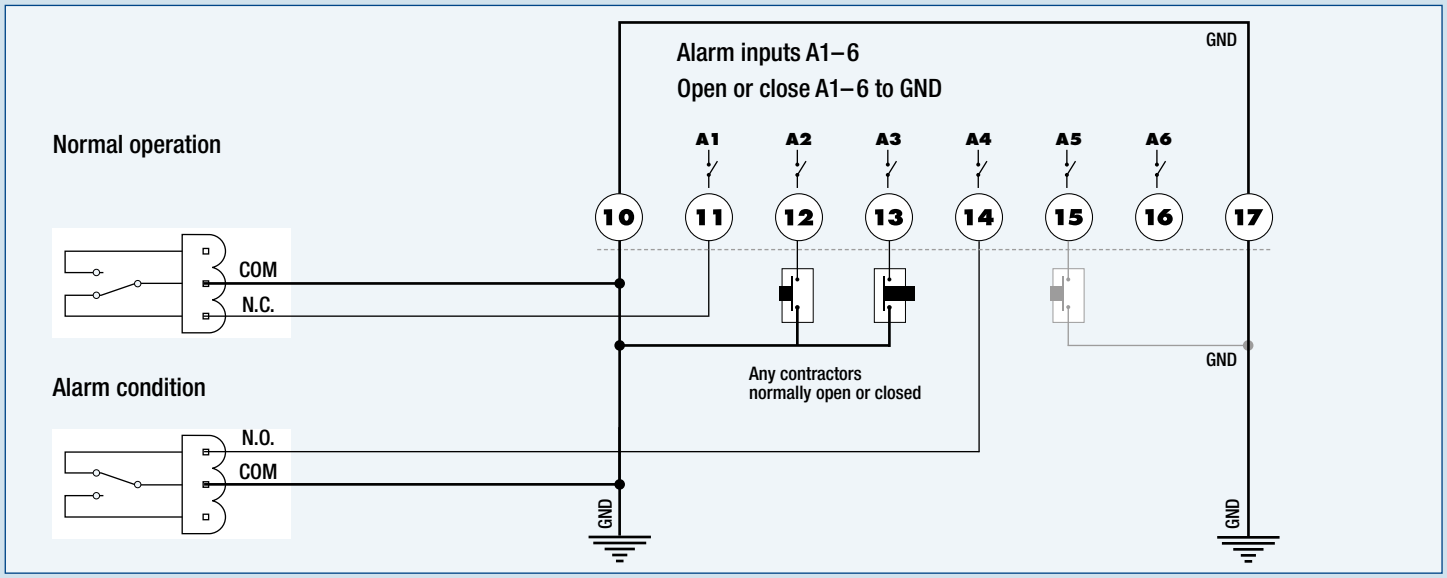
Example GSM dialer alarm system using volt free alarm contact



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Product temperature monitoring connection

Interface for optional NTC product temperature probe

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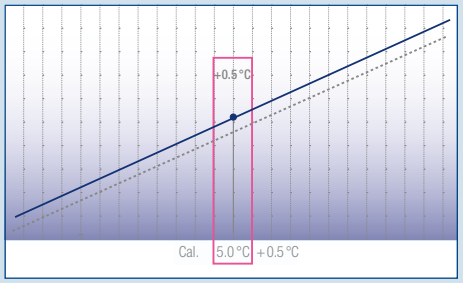
Whereas the air probe is in a fixed position, the product probe will be located by the user, e.g. in a phial or in a measurement package in order to simulate a product temperature.

Due to possible tolerances of the product temperature probe the temperature displayed can differ from the product probe temperature. Using the calibration function, the temperature displayed can be aligned with the product probe temperature. The correction value for the compensation of the differences can be adjusted in 0,1 °C steps.



Safety feature table

Laboratory appliances with Comfort-Controller	LKUv 1610	LKUv 1612	LKUexv 1610	LGUex 1500	LKv 3910	LKv 3912	LKexv 3910	LGex 3410	LCv 4010
Spark-free interior	No	No	Yes	Yes	No	No	Yes	Yes	No
High / Low temperature alarm, audio and visual	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Door-open alarm, audio and visual	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power failure warning after power supply is returned, visual	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Volt-free contact for external alarm signal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RS 485 data transfer interface	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RS 485 / RS 232 converter with data monitoring software	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory
NTC product temperature probe	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory	Accessory
Internal alarm memory	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Min. / Max. temperature memory	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
+2°C safety thermostat	Yes	Yes	Yes	No	Yes	Yes	Yes	No	For refrigerator compartement
Access port for e.g. PT 100 probe	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Probe failure alarm	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes