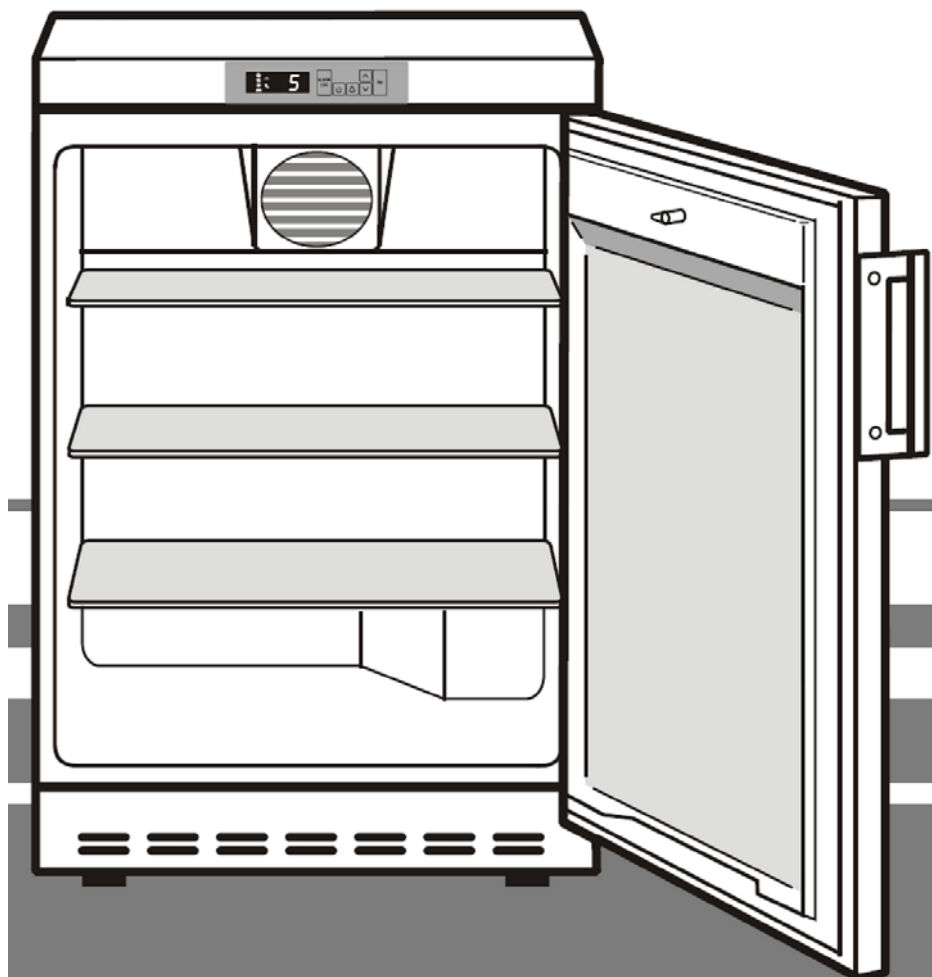


Appliance Documentation

LKv 1800 / LKEXv 1800

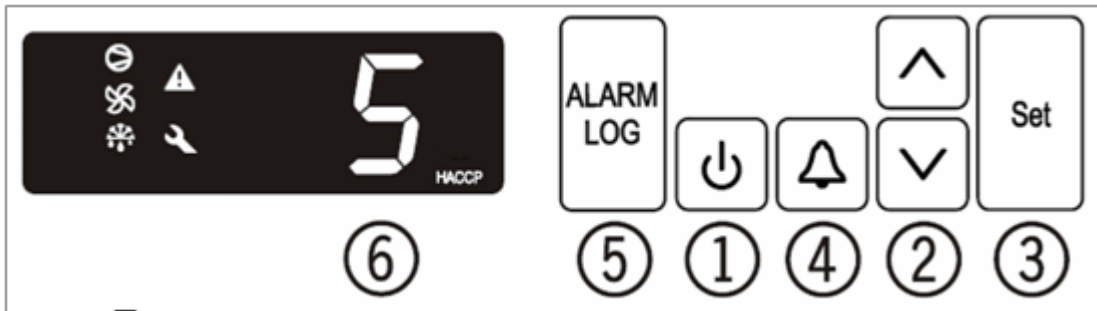
Laboratory refrigerator ventilated (LKEXv 1800 with explosion-protected interior)



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1.0 Operating and control elements



- 1 : **ON/OFF** button (to switch appliance ON and OFF)
- 2 : Temperature setting buttons
- 3 : **SET** button (Enter)
- 4 : **Alarm OFF** button
- 5 : Button for accessing saved alert states
- 6 : Temperature display

1.1 Meaning of the control elements



- 1 : **LED shines:** compressor is running.
- 1 : **LED flashes:** compressor switch-on delay is active
- 2 : **LED shines:** fan is running.
- 3 : **LED shines:** defrosting phase is active.
- 4 : **LED shines:** alarm (e.g. temperature too warm)
- 5 : **LED shines:** fault (e.g. defective sensor).
- 6 : **LED shines:** **HACCP** (Hazard Analysis Critical Control Point) function is active. Power supply and inside temperature are monitored.
- 6 : **LED flashes:** there was a power failure or the inside temperature was in an inadmissible range.

2.0 Functions at a glance

Control:	Electronic
Temperature display:	Digital
Temperature range:	+3°C to +8°C
Temperature alarm:	Visual and audible
Door alarm:	Not present
Floating alarm contact:	Present
HACCP:	Present
Interface:	RS 485 (however usable only with adapter)
Fan:	Present
Defrosting:	Automatic
Interior light:	Not present
Service menu:	Not present
Compressor:	Standard

3.0 Description of the appliance

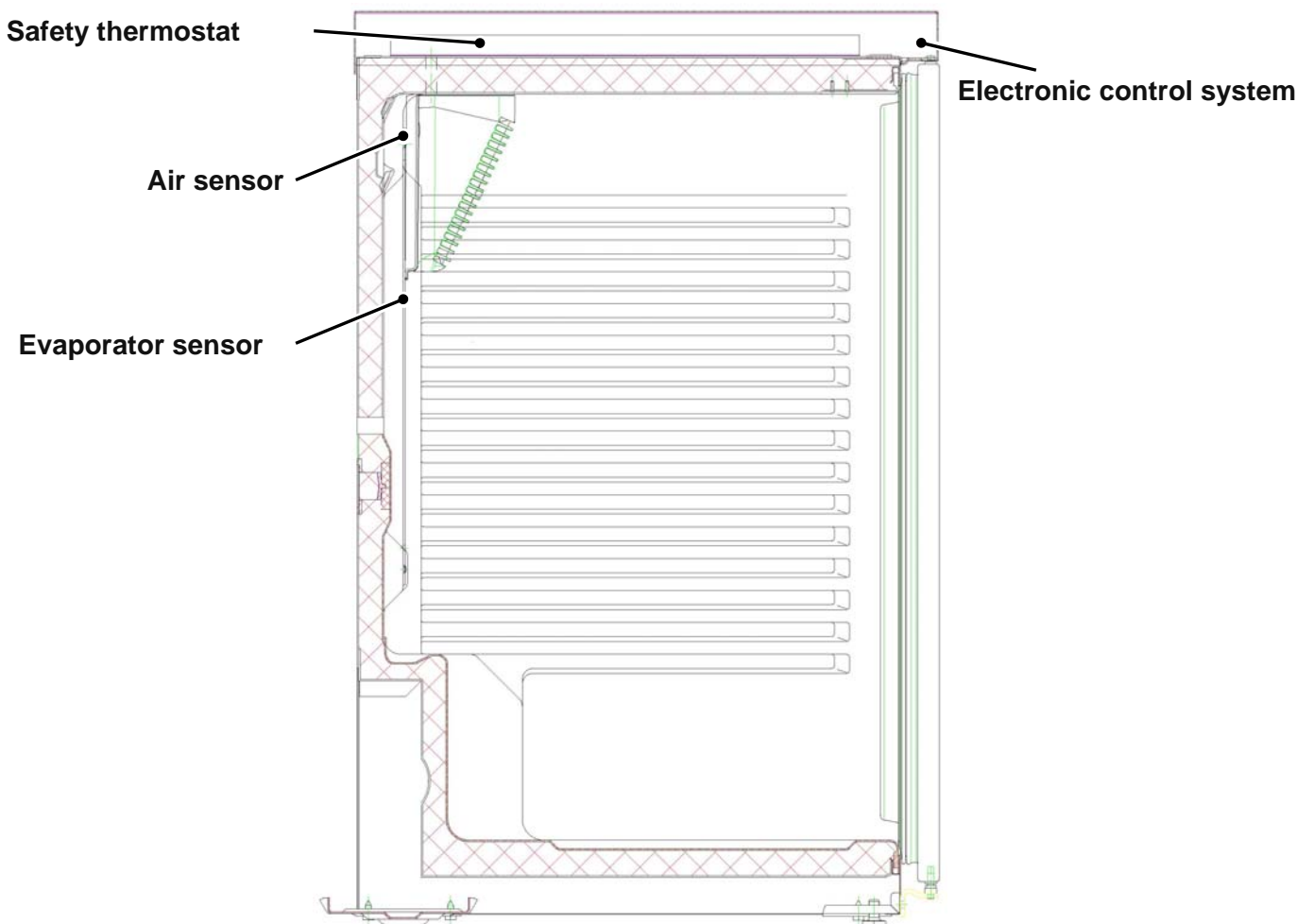
Heat energy is withdrawn from the interior by means of a freely suspended rear wall evaporator.

The fan in the interior runs permanently and sees to an even distribution of temperature and more rapid cooling in the interior.

Defrosting takes place automatically at defined intervals. **At the LKEXv 1800** the defrost water is collected in a tray due to the explosion-protected interior, which has to be emptied regularly.

The temperature is controlled by an air sensor. In the event of the electronic control system being defective, a safety thermostat prevents the inside temperature from dropping below +2°C.

3.1 Sensor positions, schematic diagram



4.0 Main components and their functions

4.1 Electrical components and functions

Electronic control system	
Type:	Electronic microprocessor controller from CAREL with digital display The final parameter input is attended to by LIEBHERR
Components:	Electronic control system casing
Setting range:	+3°C to +8°C (adjustable in 1/10°C steps)
Display range:	-50°C to +90°C (from -19.9 to +19.9°C in 1/10°C)
Functions	
Temperature alarm:	<p>When: As soon as the temperature is 1K below or 1.5K above the setpoint value</p> <p>Audible: Intermittent beep (suppressed during start-up)</p> <p>Visual: The alarm symbol shines and either the code "HI" (too warm) or "LO" (too cold) appears in the display.</p> <p>To avoid unnecessary warnings (e.g. door opening), the temperature has to be above/below the threshold value for at least 20 minutes.</p> <p>After the defrosting phase is over, the alarm remains inactive for one hour.</p>
HACCP:	<p>When:</p> <ul style="list-style-type: none"> - In case of power failure for longer than 1 minute. - In case of a temperature alarm lasting longer than 25 minutes. <p>Audible: Intermittent beep</p> <p>Visual: "HACCP" flashes in the display.</p> <p>Function: Date and time of the last three power failures and the last three temperature alarms are displayed.</p> <p>Special feature: The warmest inside temperature can be accessed via another function (see section 7.2)</p>
Floating alarm contact:	<p>The floating contact takes the form of a changeover contact and can be integrated into a central monitoring system if necessary.</p> <p>In the normal condition the contact is switched and it reverts to the idle state in the event of an alarm (is parameterized accordingly).</p>
Defrosting:	<p>Activation:</p> <ul style="list-style-type: none"> - Automatic, every 8 hours. - Manual, if the "Down" button is depressed for 5 seconds. <p>Function: The compressor switches off, the evaporator fan however continues running and blows the "warm" air over the evaporator. The ice melts as a result. The defrost water is collected in the tray, which has to be regularly emptied.</p> <p>End: The defrosting phase is ended as a rule by way of the evaporator sensor at +8.5°C. Should the defrosting phase not be ended thermally, it is discontinued after 15 minutes, The compressor starts directly after the defrosting phase has ended.</p> <p>Display: During the defrosting phase, the defrosting symbol shines.</p> <p>During the defrosting phase the last value displayed before the defrosting started is retained. The display is reactivated as soon as the setpoint value is reached for the first time after the end of the defrosting phase, in any event within the alarm delay. (The temperature alarm is deactivated for one hour after the end of the phase).</p>

Sensors

Air sensor:	Position:	At the top back right-hand corner inside.
	Function:	Supplies the switching values for the electronic control system and - generates the display value. The " <i>Update display</i> " parameter was set to the highest value → therefore damped response! - Switches the compressor ON/OFF. The hysteresis is 1 K. (Example: given a setpoint value of 8°C, the compressor switches ON at +9°C and OFF at 8°C) The " <i>Measuring stability</i> " parameter was set to the highest value → therefore sluggish in response! In the event of a fault (interruption or short circuit), the fault symbol shines and the code E0 appears in the display. → The appliance goes into the emergency mode (10 minutes ON/15 minutes OFF)

Evaporator sensor:	Position:	In the interior, centre right, behind the evaporator
	Function:	Ends the defrosting phase at +8.5°C In the event of a fault (interruption or short circuit) the fault symbol shines and the code E1 appears in the display. → The appliance continues to operate in the normal mode – the defrosting is however ended by way of the time limit.

Switch

Safety thermostat:	Position:	Under the metal cover.
	Function:	In the event of an electronic defect (permanent operation) it prevents the inside temperature from becoming colder than +2°C.

Loads

Evaporator fan:	Position:	Above the evaporator
	Function:	- Runs permanently (even when the door is open) - Takes in the air and blows it over the evaporator.

Compressor:	Function:	ON: Air sensor switch-on value. Off: Air sensor switch-off value.
	Special feature:	The on-delay of the compressor is 5 minutes. Should the compressor be addressed during this time, the compressor symbol flashes (compressor start request). As soon as the compressor runs, this LED shines
	Type:	Standard

4.2 Refrigeration components and functions

4.2.1 Components

Compressor:	Standard	
Evaporator:	Design:	Plate evaporator.
	Type of installation:	In the interior, on the rear wall
	Injection point:	Bottom
	Flow sequence:	From bottom to top
Condenser:	Design:	Wire tube condenser
	Type of installation:	Fitted on the back of the appliance
Refrigerant:	R600a	

4.3 Defrost water collecting tray (with LKEXv 1800)

The tray is fitted underneath the evaporator and has to be emptied regularly. A further collecting vessel can be placed under the overflow.



Fig. 4.3 / 1

5.0 Assembly instructions / replacement of parts

5.1 Electronic control system

Metal cover: Remove screws at the back, lift the cover, shift and raise it.



Fig. 5.1 / 1



Fig. 5.1 / 2

Electronic control system: - Detach connectors from the electronic control system.
ATTENTION: No coding – possibly mark beforehand
 - Remove both nuts and take out the electronic control system.

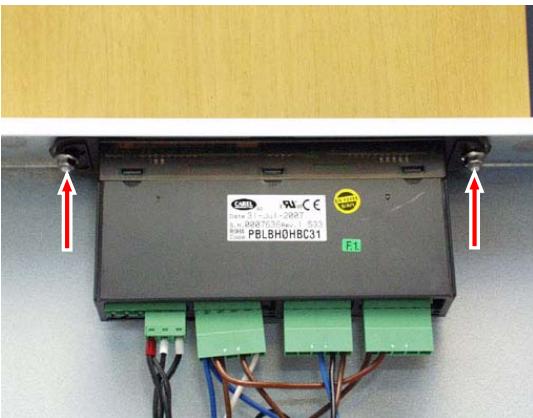


Fig. 5.1 / 3

5.2 Air sensor and evaporator sensor

Cable feedthrough:

- Remove metal cover.
- Disconnect sensor from the electronic control unit.
- Remove putty from the cable feedthrough.

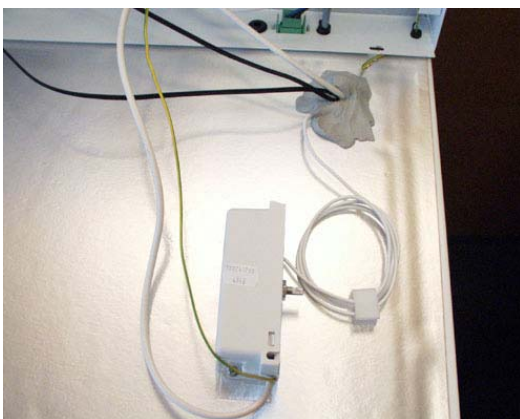


Fig. 5.2 / 1

Position of sensors:

- The air sensor is fitted to the side wall on the right.
- The evaporator sensor is fitted to the rear wall.
- Release the fan cover and swing it away.
- Unclip the sensor and draw it through the feedthrough in the ceiling of the appliance.
- After assembly, re-seal the feedthrough with putty from the top.

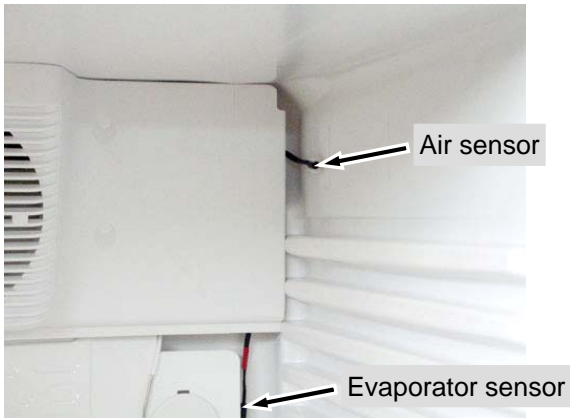


Fig. 5.2 / 2



Fig. 5.2 / 3

5.3 Safety thermostat

Thermostat housing:

- Remove the metal cover and putty for the feedthrough.
- Unclip the thermostat holder.

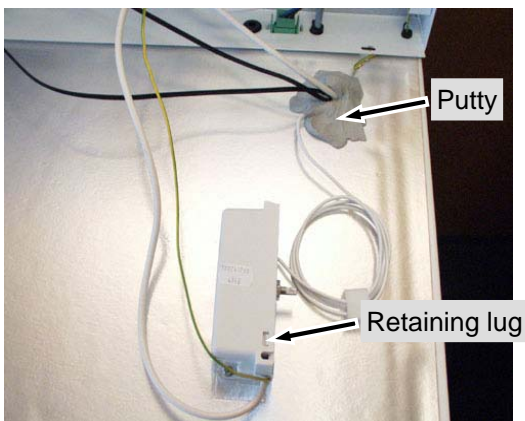


Fig. 5.3 / 1

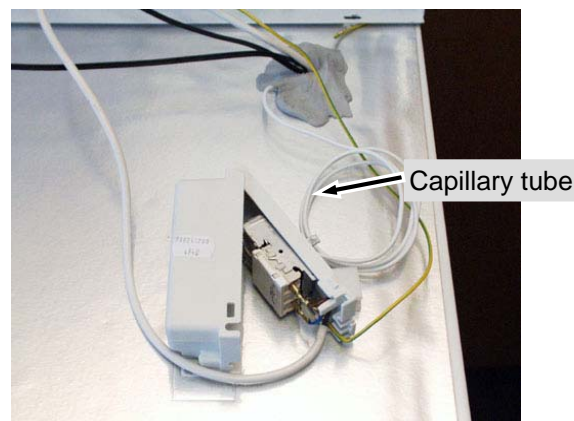


Fig. 5.3 / 2

Capillary tube:

- Remove the securing clamp on the evaporator and release the capillary tube.
- Remove the fan cover and extract the capillary tube through the feedthrough.

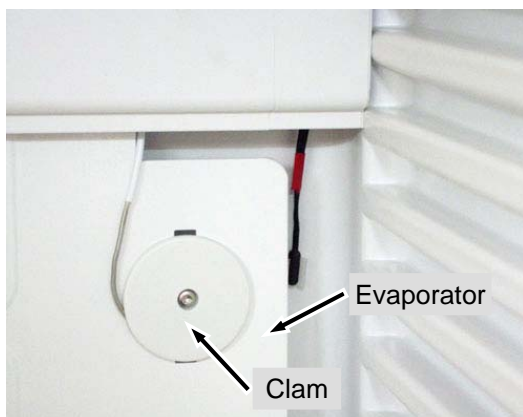


Fig. 5.3 / 3

5.4 Interior fan

- Fan:
- Remove stoppers and screws.
 - Remove fan cover.

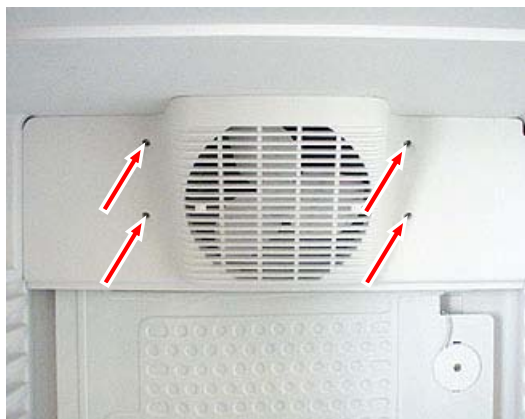


Fig. 5.4 / 1

6.0 Technical data

Evaporator fan:	Wattage:	approx. 29 watts
	Speed:	2200 rpm.
	Voltage:	220 volts

Sensor values:

Temperature °C	Resistance value kOhm
+50	approx. 4
+45	approx. 4.9
+40	approx. 5.8
+35	approx. 6.9
+30	approx. 8.3
+25	approx. 10
+20	approx. 12
+15	approx. 14.7
+10	approx. 18
+5	approx. 22
0	approx. 27
-5	approx. 33.9
-10	approx. 42.3
-15	approx. 53.4
-20	approx. 67
-25	approx. 86,4
-30	approx. 111.3
-35	approx. 144
-40	approx. 185

7.0 Messages and error codes

7.1 Checking the evaporator temperature

- You reach the first parameter level by pressing the "Alarm" button (5 seconds).
- Press the "down" button the number of times needed until the "d/1" parameter is displayed.
- After the "Set" button has been pressed, the current **temperature of the evaporator** is displayed.

7.2 Accessing the min. and max. inside temperature

- You reach the first parameter level by pressing the "Alarm" button (5 seconds).
- Press the "down" button the number of times needed until the "rt" parameter is displayed.
 - After the "Set" button has been pressed, the **period** in which the inside temperature was measured is displayed.
 - Return to the first parameter level by pressing the "Set" button.
- Press the "down" button the number of times needed until the "rL" parameter is displayed.
 - After the "Set" button has been pressed, the **coldest inside temperature** within the period is displayed.
 - Return to the first parameter level by pressing the "Set" button.
- Press the "down" button the number of times needed until the "rH" parameter is displayed.
 - After the "Set" button has been pressed, the **warmest inside temperature** within the period is displayed.
 - Return to the first parameter level by pressing the "Set" button.

To delete the stored values:

- You reach the first parameter level by pressing the "Alarm" button (5 seconds).
- Press the "down" button the number of times needed until the "rt" parameter is displayed.
 - After the "Set" button has been pressed, the period in which the inside temperature was measured is displayed.
- Keep the "Down" button depressed for five seconds → rES appears in the display.

To quit the parameter level → return to normal status display:

Hold down the "Alarm" button for 5 seconds.

If no button is pressed for 60 seconds, the electronic control system automatically assumes the normal mode without, however, saving the changes.

7.3 Error codes

Error code	Defective component	Audible alarm/alarm contact	Emergency mode
E0	Air sensor	ON/ON	10 minutes ON, 15 minutes OFF
E1	Evaporator sensor	ON/ON	Normal mode
EE	Electronics defective (operating parameters)	ON/ON	All OFF
EF	Electronics defective (control parameters)	ON/ON	All OFF

7.4 Status messages

Message	Status	Audible alarm/alarm contact
HI	Overtemperature alarm	ON/ON
LO	Undertemperature alarm	ON/ON
Ed1	Defrosting phase ended by time	ON/ON
dFb	Defrosting manually started	
dFE	Defrosting manually ended	
ON	Appliance switched ON	
OFF	Appliance switched OFF	
HF	Power failure alarm	ON/ON
HA	Temperature alarm	ON/ON