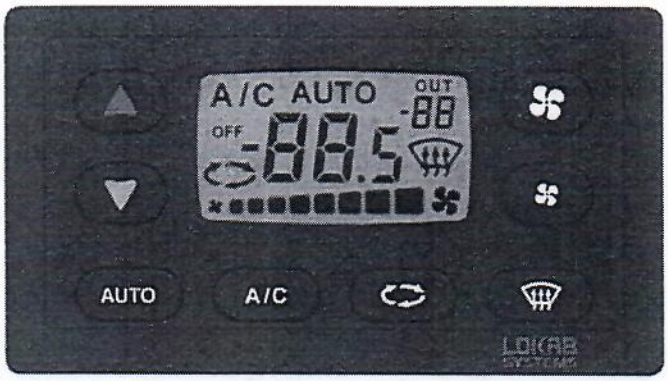
LOKAB SYSTEMS

Electronic Climate System

2009-06-03

Manual

8002153 & 8002158



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1. Introduction

The control unit controls:

- water valve
- blower speed
- AC compressor
- recirculation actuator

in according to:

- selected temperature
- internal temperature
- external temperature

The automatic control algorithm used needs the following temperature sensors:

- one mixed air temperature sensor representing the input air in the driver compartment
- one or two internal air temperature sensor
- one external air temperature sensor

Normally on the display are visualized the selected temperature and the external temperature.

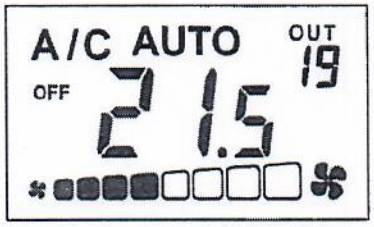
2. Functions associated at push buttons

The functions associated to the push buttons are the following:

AUTO By pressing this pushbutton all the functions are controlled automatically.
The control unit will reach and maintain the selected temperature in the vehicle compartment
by control of the water valve, the compressor, the blower speed and the recirculation actuator, depending on selected temperature, internal and external temperature.

▲ ▼ The temperature increment and decrement push buttons will select the desired temperature into the vehicle .
This value is visualized on the display.
At each pressure a variation of 0.5°C will be obtained.

When the selected temperature is lower than 18°C or higher than 28°C the display will indicate **LO** or **HI** respectively.
In these conditions the **AUTO** symbol is switched off and the control unit will give maximum cold or maximum warm.



In case of failure of temperature sensors the error codes will be visualized on the display and by pressing ▲ ▼ push buttons, the user can change manually the temperature of the air incoming into vehicle compartment.

These push buttons are used to modify manually the air quantity incoming into vehicle compartment.
Modifying manually the air quantity, the control unit will work in the automatic mode except for the selection made manually (the **AUTO** symbol is switched off).

There are 8 manual blower speed and 12 automatic blower speed.

Pressing the push button when the blower speed is equal to 0, the control unit goes into **OFF** condition; on the display appear the **OFF** symbol and all the functions are disable.

To exit from the **OFF** condition it is sufficient press AUTO or push button.

A/C This push button will activated and deactivated the AC compressor.

When the **A/C** symbol is lit, the compressor is activated, while when the **A/C** symbol is switched off, the compressor is deactivated.

Modifying manually the compressor state, the control unit will work in the automatic mode except for the selection made manually (the **AUTO** symbol is switched off).

When the external temperature is less than 5°C, the compressor is automatically deactivated

By pressing this push button the recirculation state will be changed.
When the symbol is lit, the control unit will force the recirculation air condition, while when this symbol is off the control unit will force the fresh air condition.

Modifying manually the recirculation state, the control unit will work in the automatic mode except for the selection made manually (the **AUTO** symbol is switched off).

By pressing this push button less then 2 seconds, the control unit goes into defrost mode and on the display the symbol is switched on.

During the defroster function the only push button enabled is the **AUTO** push button to return in normal operating mode and stop the defroster function.

By pressing the push button more then 2 seconds, the internal temperature values will be shown for 8 seconds.

3. Operating mode

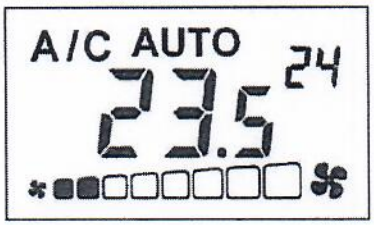
The operating modes of the control unit are the following:

- Display internal temperature mode
- Sensor failure mode
- Pre-heater function
- Diagnostic mode

3.1 Display internal temperature mode

By pressing the push button push button more then 2 seconds, the internal temperature values will be shown for 8 seconds.

The main internal temperature value (Tint1) will be shown instead the selected temperature.
The optional internal temperature value (Tint2) will be shown instead the external temperature.



See the following table for a complete combination between the values displayed and the error codes.

Internal temperature sensor n°1 (Tint1)	Internal temperature sensor n°2 (Tint2)	Central display	Right corner display	Pressing push button more then 2 seconds	Central display	Right corner display
Connected	Not connected or open	Tsel	Text	→	Tint1 value	blank
Short circuit	Not connected or open	E4	Text	→	E4	E7
Not connected or open	Connected	Tsel	Text	→	blank	Tint2 value
Not connected or open	Short circuit	E3	Text	→	E3	E8
Connected	Connected	Tsel	Text	→	Tint1 value	Tint2 value
Connected	Short circuit	Tsel	Text	→	Tint1 value	E8
Short circuit	Connected	Tsel	Text	→	E4	Tint2 value
Short circuit	Short circuit	E4	Text	→	E4	E8
Not connected or open	Not connected or open	E3	Text	→	E3	E7

Text = external temperature
Tsel = selected temperature

3.2 Sensor failure mode

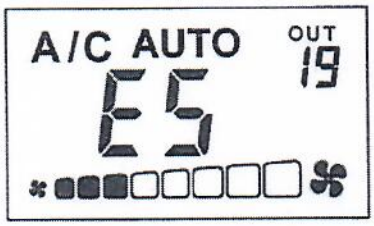
In case of failure of temperature sensors the following error codes will be visualized on the display:

External temperature sensor	Central display
Not connected or open	**E1**
Short circuit	**E2**

Internal temperature sensor n°1 (Tint1)	Internal temperature sensor n°2 (Tint2)	Central display
Not connected or open	Short circuit	**E3**
	Not connected or open	**E3**
Short circuit	Short circuit	**E4**
	Not connected or open	**E4**

Mixed air temperature sensor	Central display
Not connected or open	**E5**
Short circuit	**E6**

For example:

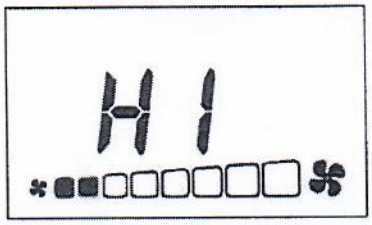


In these cases, by pressing ▲ ▼ push buttons, the user can change manually the temperature of the air incoming into vehicle compartment.

3.3 Pre-heater function

When the control unit is switched off (ignition key signal absent) and the pre-heater send the enable signal (high voltage level), the control unit forces the following conditions:

- water valve fully open
- 2nd blower speed
- AC compressor off
- external air



None push button are enable.

3.4 Diagnostic mode

The control unit is provided with a diagnostic procedure which verifies the elements of the a/c system.

Pressing the AUTO push button, while the control unit is turned on activates the diagnostic mode.
The push button should be released when on display will appear the information regarding the type of the control unit (**LO**) and the version (**27**), two values reserved, the value of the mixed air and the external temperature sensors.

3.4.1 Water valve and mixed air temperature sensor control

By pressing selected temperature push-buttons ▲ ▼ the water valve that controls mixed air into vehicle will be directly controlled.
By pressing the temperature increment push-button the mixed air temperature incoming into vehicle compartment will be increased until the **maximum warm** condition is reached, while by pressing the decrement push-button the mixed air temperature incoming into vehicle will be reduced until the **maximum cold** condition is reached.

While one of this push-button is pressed on display appear the opening rate of water valve (from 0% to 99%).

The temperature value of the **mixed air** introduced into the vehicle interior will be shown on the central display.

In case of malfunction of this sensor, instead of the temperature the following error codes will be visualized :

E 5 if the mixed air temperature sensor is cut off
E 6 if the mixed air temperature sensor is short-circuited

3.4.2 External temperature sensor control

The temperature value of the **external air** will be shown on the right corner display. When is show the external temperature value the **OUT** symbol is lit.

In case of malfunction of these sensors, instead of the temperature value, the following error codes will be visualized:

E 1 if the external temperature sensor is cut off
E 2 if the external temperature sensor is short-circuited

3.4.3 Internal temperature sensors control

By pressing the  push button push less then 2 seconds, the average value of the **internal temperature** will be shown on the central display.

In case of malfunction of both internal temperature sensors, instead of the temperature value, the following error codes will be visualized:

E 3 if the internal temperature sensor is cut off
E 4 if the internal temperature sensor is short-circuited

By pressing the  push button push button more then 2 seconds, the internal temperature values will be shown for 8 seconds.

The **internal n°1 temperature value** will be shown on the central display.

In case of malfunction of this sensor, instead of the temperature value, the following error codes will be visualized:

E 3 if the internal n° 1 temperature sensor is cut off
E 4 if the internal n° 1 temperature sensor is short-circuited

The **internal n°2 temperature value** will be shown on the right corner display.

In case of malfunction of this sensor, instead of the temperature value, the following error codes will be visualized:

E 7 if the internal n° 2 temperature sensor is cut off
E 8 if the internal n° 2 temperature sensor is short-circuited

See the following table for a complete combination between the values displayed and the error codes.

Internal temperature sensor n°1 (Tint1)	Internal temperature sensor n°2 (Tint2)	Central display	Right corner display	Pressing push button more then 2 seconds	Central display	Right corner display
Connected	Not connected or open	Tmix	Text	→	Tint1 value	E7
Short circuit	Not connected or open	Tmix	Text	→	E4	E7
Not connected or open	Connected	Tmix	Text	→	E3	Tint2 value
Not connected or open	Short circuit	Tmix	Text	→	E3	E8
Connected	Connected	Tmix	Text	→	Tint1 value	Tint2 value
Connected	Short circuit	Tmix	Text	→	Tint1 value	E8
Short circuit	Connected	Tmix	Text	→	E4	Tint2 value
Short circuit	Short circuit	Tmix	Text	→	E4	E8
Not connected or open	Not connected or open	Tmix	Text	→	E3	E7

Internal temperature sensor n°1 (Tint1)	Internal temperature sensor n°2 (Tint2)	Central display	Right corner display	Pressing push button less then 2 seconds	Central display	Right corner display
Connected	Not connected or open	Tmix	Text	→	Tint1 value	blank
Short circuit	Not connected or open	Tmix	Text	→	E4	blank
Not connected or open	Connected	Tmix	Text	→	Tint2 value	blank
Not connected or open	Short circuit	Tmix	Text	→	E3	blank
Connected	Connected	Tmix	Text	→	Tint value	blank
Connected	Short circuit	Tmix	Text	→	Tint1 value	blank
Short circuit	Connected	Tmix	Text	→	Tint2 value	blank
Short circuit	Short circuit	Tmix	Text	→	E4	blank
Not connected or open	Not connected or open	Tmix	Text	→	E3	blank

Text = external temperature
Tsel = selected temperature
Tmix = mixed air temperature
Tint = (Tint1 + Tint2) / 2

3.4.4 Compressor control

By pressing the A/C push button the compressor state will be changed.
When the **A/C** symbol is lit, the compressor is activated, while when the **A/C** symbol is switched off, the compressor is deactivated.

3.4.5 Blower speed control

By pressing these blower speed push buttons the blower speed will be modified increasing / decreasing air quantity into vehicle interior.
The bar graph will show air quantity.

3.4.6 Recirculation control

By pressing the push button the recirculation state will be changed.
When the symbol is lit, the control unit will force the recirculation air condition, while when this symbol is switched off the control unit will force the external air condition.

3.4.7 Diagnostic procedure end

By pressing the AUTO push button the control unit goes in the normal operating mode