MICROPROCESSOR BASED CONTROLLER

FrontAIRE II

SERVICE MANUAL

Electronic Controller for Bus HVAC Front Box Units
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1. General Information

1.1 About this guide

This document describes how to test and use the FrontAIRE II controller and how to test the HVAC bus front box units with this controller.

1.2 Restriction

This document is determined for the Thermo King service usage only.

1.3 Updates

All documentation becomes dated and this manual is no exception. This service manual is constantly evolving to meet customer needs. Some program dialogs and/or tool descriptions may be differ from those in this document. Please refer to our web site to obtain the latest available documentation.

1.4 Download of new documents and software

http://www.thermoking.com/iservice/infocentral

These www pages are protected against unauthorized access.
2. Introduction

2.1 General

The FrontAIRE II control system is the total solution for the control of bus drivers HVAC front boxes and the floor heating. The individual program can be set for each type of the unit. This microprocessor based controller allows drivers to control the air conditioning in the full automatic, semi-automatic or in the manual mode. The system is controlled by internal and external sensors. The FrontAIRE II can control the front box inlet and outlet dampers, the heat valve, the blowers, the condenser fans and the compressor, or the liquid solenoid valve, the floor heat valves and floor heat blowers. More features are the pre-heater control with the timer, the real time clock, integrated Defrost, Smog and also the diagnostic functions. The FrontAIRE II is equipped with large orange 4-digit display with brightness control, 7 buttons and 2 knobs. The controller is designed to fit to the standard ISO norm car radio bracket.

2.2 Basic functions

- Full Auto / Manual operation – cool, heat, ventilation, auto
- System dependent on main HVAC unit
- Stand-alone A/C system with condenser
- Stepless blower speed control
- Stepless front box heat valve control
- Stepless floor heat valve control
- Stepless air distribution damper control
- Fresh air damper ON / OFF control
- Compressor control with protection and diagnostic
- Condenser fans control
- Pre-heater control with timer
- Defrost function
- Smog function
- A/C coil freeze protection
- Real time clock
- Hour meter
- Alarms
- Display and LED’s brightness control
- Diagnostic and communication through PC (RS232 port)
2.3 **Specification**

Application - control of HVAC front box unit and floor heating.

- **Set Up temperature range**: default 18°C - 27°C (64.6°F - 80.6°F)  
  range 15°C - 30°C (59°F - 86°F)
- **Operating temperature range**: -30°C - 80°C (-22°F - 176°F)
- **Operating voltage range**: 22 – 30 VDC
- **Current consumption**: 60 mA max.
- **Connection**: Molex 39-01-2140 and 39-01-2180
- **Installation**: Standard ISO Frame

**Inputs**

- **Return Air Temperature Sensor (RTS)** range -35°C - 75°C (-31°F - 167°F)
- **Coil Temperature Sensor (CTS)** range -35°C - 75°C (-31°F - 167°F)
- **Ambient Temperature Sensor (ATS)** range -35°C - 75°C (-31°F - 167°F)
- **Floor Temperature Sensor (FTS)** range -35°C - 75°C (-31°F - 167°F)
- **Duct Temperature Sensor (DTS)** range -35°C - 75°C (-31°F - 167°F)
- **Servomotor feedback - 4 inputs (FBW, FBT, FBB, FBH)**
- **Analog universal - 3 inputs (D+, DARK, AN)** 0 – 24 VDC
- **Digital universal - 2 inputs (PWR, PHOUT)** 0 / 24 VDC

**Outputs**

- **Servomotor supply voltage (F1, F2, F3, F4, F5, F6)** Hex 4 motors
- **Blower output (SC)** PWM 24 VDC, 20 kHz, 0 – 100%
- **Compressor clutch output (36C)** Hi 24 VDC / 2 A
- **Condenser fan output (MS)** Hi / Lo 24 VDC / 0,5 A
- **Floor heating fans – 2 outputs (HS, LS)** Hi / Lo 24 VDC / 0,5 A each
- **Alarm output (ALARM)** Hi / Lo 24 VDC / 0,5 A
- **Pre-heater output (PHOUT)** Hi / Lo 24 VDC / 0,5 A
- **Universal output (OUT)** Hi / Lo 24 VDC / 0,5 A
- **Servomotor feedback voltage (+5V)** 5 VDC

**Note**

- Hex = Hex bridge output
- PWM = Pulse Width Modulation
- Hi = High side output
- Lo = Low side output
- Hi / Lo = programmable output
- LPCO and HPCO Alarms are diagnosed by the voltage of the compressor clutch output (36C)
2.4 Application diagram

Connector layout (back view)
### Pin layout

<table>
<thead>
<tr>
<th>P1</th>
<th>P2</th>
<th>RS232</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>36C</td>
<td>1 FBT</td>
</tr>
<tr>
<td>2</td>
<td>PHOUT</td>
<td>2 FBW</td>
</tr>
<tr>
<td>3</td>
<td>HS</td>
<td>3 DARK</td>
</tr>
<tr>
<td>4</td>
<td>LS</td>
<td>4 FTS</td>
</tr>
<tr>
<td>5</td>
<td>F1</td>
<td>5 RTS</td>
</tr>
<tr>
<td>6</td>
<td>F3</td>
<td>6 CTS</td>
</tr>
<tr>
<td>7</td>
<td>F5</td>
<td>7 ATS</td>
</tr>
<tr>
<td>8</td>
<td>SC</td>
<td>8 FBB</td>
</tr>
<tr>
<td>9</td>
<td>+5V</td>
<td>9 FBH</td>
</tr>
<tr>
<td>10</td>
<td>+24V (SUPPLY +24V)</td>
<td>10 AN</td>
</tr>
<tr>
<td>11</td>
<td>ALARM</td>
<td>11 D+</td>
</tr>
<tr>
<td>12</td>
<td>MS</td>
<td>12 DTS</td>
</tr>
<tr>
<td>13</td>
<td>OUT</td>
<td>13 GND (SENSORS)</td>
</tr>
<tr>
<td>14</td>
<td>F2</td>
<td>14 PHIN</td>
</tr>
<tr>
<td>15</td>
<td>F4</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>F6</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>PWR</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>CH (SUPPLY GND)</td>
<td></td>
</tr>
</tbody>
</table>

### Dimensions

2.5 **Dimensions**

- **Width**: 187 mm (7.36”)
- **Height**: 57 mm (2.24”)
- **Depth**: 60 mm (2.36”)

![Dimensions Diagram]
2.6 Installation

Cut on dashboard for installation

Frame of FrontAIRE II
3. Description

3.1 Controls description

**ON/OFF Key**
Press the key to turn the unit ON.
Press the key again to turn the unit OFF.

**DOWN Key**
Press the key to decrease the desired set point.
For permanent ventilation set LO on the display.
For permanent cooling set LO on the display and press the A/C key,
LED A/C is ON.

**UP Key**
Press the key to increase the desired set point.
For permanent heating set HI on the display.

**AUTO Key**
Press the key to automatically control the blower speed according to the
desired set point and compartment conditions. LED AUTO is ON.
Auto mode: The unit will heat or ventilate the drivers compartment
automatically according to the desired set point and compartment conditions.
LED A/C is OFF.
Reheat/Auto mode: Press A/C key. The unit will cool or heat the drive compartment automatically according to the desired set point and compartment conditions. LED A/C is ON.

The AUTO key is used as the ESC key in the menu selection.

**A/C Key**

Press the key to start A/C. The unit will operate in the cool or in the reheat mode. LED A/C is ON.

**SMOG Key**

Press the key to close the fresh air damper and to start the smog function. The fresh air damper will be closed for 10 minutes. LED SMOG is ON. After 10 minutes it will return to the previous function. The parameter Smog Time “St” can be set in the Set Up mode. For manual control only, set the parameter “St” to 00.

**DEFROST Key**

Press the key to start Defrost/Demist mode. The unit will defrost or demist the windshield. LED DEFROST is ON. This function has the highest priority. Keys AUTO and A/C, SPEED and AIR DISTRIBUTION potentiometers are not active. The SMOG function is cancelled by the active DEFROST function. To activate the SMOG function, press the SMOG key again. The change of the desired set point will affect the water valve and the compressor clutch functions.

The DEFROST key is used as the ENTER key in the menu selection.

**SPEED Knob**

Manual control of the stepless blower speed. Turn the knob to the left to decrease the blower speed. Turn the knob to the right to increase the blower speed. Turning of the knob will cancel AUTO mode. LED AUTO is OFF. The minimum blower speed to set is 20% of the maximum blower speed.

**AIR DISTRIBUTION Knob**

Manual control of the stepless air distribution damper.

Turn the knob to the left to distribute air to the driver.

Turn the knob to the middle to distribute air to the driver and to the windshield.

Turn the knob to the right to distribute air to the windshield.
DISPLAY

The display shows the real time when the system is OFF.
The display shows the required set point when the system is ON.
The brightness of the display and LED’s are controlled automatically according to external light conditions.

Attention

For the correct function of the unit the right program must be set in the “Pr” menu in the Set Up mode.

3.2 Controller start

The controller shows “init” on the display after each connecting of the power supply (battery) to set correct positions of dampers and water valves on the system. Than the unit will start the standard operation. In the case of the PWR pin connected to +24 VDC, the display is ON, in the case of the not connected PWR pin, the display is OFF.

3.3 Freeze protection

The coil temperature sensor CTS is connected to the evaporator suction line. If the sensor reads the temperature –3,0°C (26,6°F) or less for more than 30 seconds, the compressor clutch and the condenser fans or the liquid solenoid valve are switched OFF. When the temperature rises to +2,0°C (35,6°F) for more than 1 minute, the compressor clutch and the condenser fans or the liquid solenoid valve are switched ON again. The parameter Evaporator Freeze Switch Point “Fr” can be set in the Set Up mode.

3.3 Compressor protection

The compressor clutch and the condenser fans or the liquid solenoid valve will not be switched ON when the ambient temperature is below “Ab” value. The parameter Ambient Switch Point “Ab” can be set in the Set Up mode.

3.4 Heat control

The heating will not be switched ON when the ambient temperature is above “AbH” value. The parameter Ambient Heat Switch Point “AbH” can be set in the Set Up mode. The blower speed in the AUTO mode is controlled automatically according to the duct temperature and the parameter “dtS”. The blower speed will be controlled automatically to keep the desired set point. The parameter Duct Temperature Set Point “dtS” can be set in the Set Up mode.
3.5 **Manual heat control**

Press UP and DOWN keys simultaneously to activate the manual control of the water valve and the blower speed. The display shows the opening of the water valve as the % value. Press UP or DOWN key to change this value, each step is 20%; turn the SPEED knob to set the blower speed.
Press AUTO key to cancel this function.

3.6 **Manual control**

For the permanent ventilation set “Lo” on the display.
For the permanent cooling set “Lo” on the display and press the A/C key, LED A/C is ON.
For the permanent heating set “Hi” on the display.
For the permanent reheat set “Hi” on the display and press the A/C key, LED A/C is ON.

3.7 **Floor heating control**

The floor heating is controlled automatically according to the floor heating set point and compartment conditions.
Two options of the floor heating are available:
- with the fixed set point for the independent unit, the parameter “Fh” is 01
- with the set point offset for the dependent unit, the parameter “Fh” is 00
The parameters Floor Heating Fixed Set Point disable/enable “Fh”, Floor Heating Offset “Fho” and Floor Heating Set Point “Ft” can be set in the Set Up mode.
The floor heating will not be switched ON when the ambient temperature is above “AbH” value.
The parameter Ambient Heating Switch Point “AbH” can be set in the Set Up mode.

3.8 **Pre-heater control**

An external signal from the pre-heater can switch ON the controller. The water valve, dampers and the blowers are operating. The controller shows “HEAt” on the display. When the external signal to the PHIN input is OFF or the power supply PWR is switched ON the pre-heater function is cancelled.

The controller can be switch ON by the internal timer. At the same time it can switch ON a pre-heater through the PHOUT output. To enable this pre-heater function set the pre-heater parameter “P-On” to 01 in the Pre-heater Set mode. The start time of the pre-heater must be set in the Time mode. The work time period is pre-set for 30 minutes. The pre-heater work time period “P-ti” can be set in the Pre-heater Set mode. When the work time period is completed or the power supply PWR is switched ON the pre-heater function is cancelled.
4. Diagnostic

4.1 General

The controller has a Test mode to perform the manual test of the all controller inputs and outputs to the A/C system.

The controller also continuous tests external temperature sensors and the clutch output. The dual level alarm system informs about any problem by the Yellow Alarm symbol (WARNING) and the Red Alarm symbol (ALARM). Up to 40 alarms can be stored in the controller memory. The alarm codes can be read and deleted in the Alarm mode. In case of any alarm (Red or Yellow symbol shines) the ALARM output is ON at the same time.

4.2 Alarms list

<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPCO open</td>
<td>4</td>
<td>Red</td>
</tr>
<tr>
<td>HPCO open</td>
<td>5</td>
<td>Red</td>
</tr>
<tr>
<td>RTS low value</td>
<td>7</td>
<td>Yellow</td>
</tr>
<tr>
<td>RTS high value</td>
<td>8</td>
<td>Yellow</td>
</tr>
<tr>
<td>CTS low value</td>
<td>9</td>
<td>Yellow</td>
</tr>
<tr>
<td>CTS high value</td>
<td>10</td>
<td>Yellow</td>
</tr>
<tr>
<td>ATS low value</td>
<td>11</td>
<td>Yellow</td>
</tr>
<tr>
<td>ATS high value</td>
<td>12</td>
<td>Yellow</td>
</tr>
<tr>
<td>FTS low value</td>
<td>13</td>
<td>Yellow</td>
</tr>
<tr>
<td>FTS high value</td>
<td>14</td>
<td>Yellow</td>
</tr>
<tr>
<td>DTS low value</td>
<td>15</td>
<td>Yellow</td>
</tr>
<tr>
<td>DTS high value</td>
<td>16</td>
<td>Yellow</td>
</tr>
<tr>
<td>Undervoltage</td>
<td>17</td>
<td>Not used</td>
</tr>
<tr>
<td>Clutch output – missing load</td>
<td>18</td>
<td>Red</td>
</tr>
<tr>
<td>Clutch output – overcurrent</td>
<td>19</td>
<td>Red</td>
</tr>
</tbody>
</table>

4.3 Alarms description

The Red Alarm symbol (LED) will be ON in the case of:

- LPCO switch is open longer than 10 minutes
- HPCO switch is open
- Harness or clutch short circuit
- Harness or the clutch open circuit

Any Red alarm will switch the unit to the VENTILATION mode. The compressor and condenser fans are stopped.
**Attention**
Standard Thermo King LPCO and HPCO pressure switches with the internal resistor must be used.

The Yellow Alarm symbol (LED) will be ON in the case of:

- **Low value of any temperature sensor:**
  - temperature sensor defect
  - short circuit of the harness to sensors
  - temperature is lower than -35°C (-31°F) – resistance of the sensor or of the total circuit is lower than 1,25 kOhm.

- **High value of any temperature sensor:**
  - temperature sensor defect
  - open circuit of the harness to sensors
  - temperature is higher than 75°C (167°F) – resistance of the sensor or of the total circuit is higher than 2,9 kOhm.

With any Yellow alarm the unit will work with the wrong data from the sensor.

To restart the unit, press twice the key ON/OFF to switch the unit OFF and ON again. The alarm will be stored in the controller.

**Attention**

If the alarm comes up again, do not restart the unit, see your nearest dealer for service.

### 4.4 Alarms reading through display

Alarms can be read in the Alarm mode in the Main menu. The controller shows codes of all stored alarms on the display. Each code of stored alarms is shown for 1 second on the display. After all stored alarms been displayed, the display will show “del”. Press the ENTER key to delete alarms from the controller memory, the display will show “00”. To save all alarms in the controller memory, press the ESC key. In case of no alarm in the memory, the controller will show “nonE” on the display.

### 4.5 Alarms reading through PC

Last 40 alarms are stored in the controller and can be read via PC. Read the alarm code history.
5. Controller set up

5.1 Test menu

The controller must be ON. To start the main Test menu press and hold AUTO key for 3 seconds. The controller will show “tEST” on the display. For the menu map see the appendix 4. For the confirmation press the ENTER key, for the menu selection use the UP and DOWN keys, to return to the normal operation mode press the ESC key.

5.2 Test mode

The menu allows the manual testing of all controller outputs. Set “tEST” on the display. Press the ENTER key to start the TEST mode. Each output can be activated, the output code will be shown on the display “XXXX”.

- “Sped” Test of the blower speed. To change, use the SPEED knob.
- “CL” Test of the clutch or the liquid solenoid valve output. This option will switch ON the output.
- “ALAr” Test of the Alarm output. The output is ON, when any alarm comes in the work mode. This option will switch ON the output.
- “HS” Test of the HS output. The output is ON, when the high speed of the floor blower is required. This option will switch ON the output.
- “MS” Test of the MS output. The output is ON, when the condenser fan operation is required. This option will switch ON the output.
- “LS” Test of the LS output. The output is ON, when the low speed of the floor blower is required. This option will switch ON the output.
- “Out1” Test of the Out1 output. The output is ON, when the air-condition mode is required (IDLE-UP). This option will switch ON the output.
- “Pout” Test of the POut output. The output is ON, when the internal pre-heater timer wakes up the controller. This option will switch ON the output.
- “H1-O” Test of the heat water valve servomotor output. This option will open the heat water valve.
- “H1-C” Test of the heat water valve servomotor output. This option will close the heat water valve.
- “Ad-r” Test of the air distribution damper servomotor output. This option will turn the air distribution damper to the right.
- “Ad-L” Test of the air distribution damper servomotor output. This option will turn the air distribution damper to the left.
- “FA-r” Test of the fresh air damper servomotor output. This option will turn the fresh air damper to the right.
- “FA-L” Test of the fresh air damper servomotor output. This option will turn the fresh air damper to the left.
- “H2-O” Test of the floor heat water valve servomotor output. This option will open the floor heat water valve.
• “H2-C” Test of the floor heat water valve servomotor output. This option will close the floor heat water valve.

5.3 Program selection mode

The menu allows the setting of the correct program of the controller. Select Program selection mode, “Pr” shown on the display. Press the ENTER key to show the uploaded firmware and the program number. The sequence is: X.X.XX for the firmware and XX for the program number. To change the program, use the UP or DOWN key. When the correct program number is set, press ENTER key to confirm the program number. To select the program, see the table - appendix 1.

Attention

For the correct function of the unit the right program must be set.

5.4 Set up mode

The menu allows the change of the controller parameters. Set “SEtu” on the display. Press the ENTER key to start the SET UP mode.

- “Ab” 14°C (57,2°F) Ambient switch point, range 0°C – 15°C (32°F – 59°F)
  For the compressor protection only. The compressor clutch and the condenser fans or the liquid solenoid valve will be switched OFF, when the ambient temperature is below “Ab”.

- “AbH” 20°C (68°F) Ambient heating switch point, range 0°C – 30°C (32°F – 86°F)
  The heating and the floor heating will be switched OFF, when the ambient temperature is above “AbH”.

- “Fr” -3°C (26,6°F) Evaporator freeze switch point, range -5°C – 5°C (23°F – 41°F)
  When the temperature sensor CTS reads the temperature below “Fr” setting for more than 30 seconds, the compressor clutch and the condenser fans or the liquid solenoid valve are switched OFF. When the temperature rises about 5,0°C (9°F) over the “Fr” setting for more than 1 minute, the compressor clutch and the condenser fans or the liquid solenoid valve are switched ON again.

- “dtS” 26°C (78,8°F) Duct temperature set point, range 10°C – 72°C (50°F – 161,6°F)
  When the duct temperature is below the “dtS“, the blower speed in the AUTO mode will be set automatically to keep the constant duct temperature “dtS”. When the duct temperature is above “dtS”, the blower speed will be controlled automatically according to the thermostat sequence – see appendix 2.

- “LoS” 17°C (62,6°F) Minimum set point value, range 15°C – 29°C (59°F – 84,2°F)
  “LoS” value sets the lowest possible set point at the driver’s panel.
• “HiS” 28°C (82,4°F) Maximum set point value, range 16°C – 30°C (60,8°F – 86°F)
  “HiS” value sets the highest possible set point at the driver’s panel.
• “St” 10 minutes Smog time, range 00 – 30 minutes
  Period of the closed fresh air damper. For the manual control set “St” to 00.
• “Fh” 00 Floor heating fixed set point disable/enable, range 00 / 01
  Option 00 – the system works as dependent system on the controller set point with offset. Option 01 – the system works as independent system with its own fixed set point.
• “Fho” 4°C (39,2°F) Floor heating offset, range 1°C – 15°C (33,8°F – 59°F)
  The floor heating set point is the system set point + floor heating offset (Ft = Sp + Fho).
• “Ft” 18°C (64,4°F) Floor heating set point, range 10°C – 30°C (50°F – 86°F)
  The floor heating fixed set point is independent on the system set point.

Attention

When the difference between “LoS” and “HiS” is set 1°C only, the controller will operate in heating and cooling manual modes only. The thermostatic control will be disabled.
Not all parameters are visible in all programs.

5.5 Calibration mode

The menu allows the calibration or the verification of the controller sensor’s reading. This menu also allows the reading of internal or external inputs. Set “CAL” on the display. Press the ENTER key to start the Calibration mode.

Attention

The controller is calibrated in the factory, no adjustment in the field is required. The calibration does not fix a bad connection or a bad sensor.

- rtS  Return air temperature sensor
- AtS  Ambient air temperature sensor
- CtS  Evaporator coil temperature sensor
- dtS  Duct air temperature sensor
- FtS  Floor heating temperature sensor
- UbAt  Supply voltage, for the information only
- PCbt  Controller inside temperature, for the information only
- dPLu  D+ state, external analog input
- An  AN state, external analog input
- PHin  PHIN state, external digital input
5.6 Alarm reading mode

The menu allows the reading and deleting of stored alarms. Select “ALAr” on the display. Press the ENTER key to start the Alarm mode.

Up to 40 alarms can be stored in the controller memory. The controller shows codes of all stored alarms on the display. Each code of stored alarms is shown for 1 second on the display. After all stored alarms been displayed, the display will show “del”. Press the ENTER key to delete alarms from the controller memory, the display will show “00”. To save all alarms in the controller memory, press the ESC key. In case of no alarm in the memory, the controller will show “nonE” on the display.

5.7 Hour meter reading mode

The menu allows the reading of the unit/parts operating hours or cycles. Select “Hour” on the display. Press the ENTER key to start the Hour meter mode. The controller will automatically show operating hours or cycles.

The sequence is: XX XXX hours.

- **unit**  Evaporator blower operating hours
- **CL**    Compressor clutch operating hours
- **CL cY** Compressor clutch cycles
- **FrcY**  Evaporator freezing cycles

5.8 Time mode

The menu allows the reading and setting the real time and the pre-heater wake up time. Select “tiME” on the display. Press the ENTER key to start the Time mode. The display shows the real time HH:MM. Press the ENTER key again to start the Time set up mode.

- **H.H.:M.M.** Pre-heater wake up time. Blinking H.H. (with dots), set hours
- **H.H.:M.M.** Pre-heater wake up time. Blinking M.M. (with dots), set minutes.
- **HH:MM**    Real time. Blinking HH (without dots), set hours.
- **HH:MM**    Real time. Blinking MM (without dots), set minutes.
- **DD.:MM.**  Real time. Blinking DD, set date - day.
- **DD.:MM.**  Real time. Blinking MM, set date - month.
- **YYYY**    Real time. Blinking YYYY, set date - year.

The real time clock uses the backup capacitor to save the real time. In case of no power supply to the controller, the real time is stored approx. for 7 days.
5.9 Pre-heater set mode

The menu enables the using of the pre-heater timer. Select “PSEt” on the display. Press the ENTER key to start the Pre-heater set mode.

- “P-On” 00 default value, range 00 / 01
  Pre-heater function disabled – 00, pre-heater function enabled – 01.
- “P-ti” 10 minutes default value, range 01 – 60 minutes
  Pre-heater work time period.
6. Communication software

The FrontAIRE II communication software is intended for the uploading of the new firmware only. The installation package is on the Computer adapter kit CD.

6.1 Host computer system requirements, installation

For the detailed information about the computer system requirements and how to install the PC support software, see the Computer adapter kit CD.

6.2 FrontAIRE II computer adapter kit

The FrontAIRE II computer adapter kit is prepared for the communication between the FrontAIRE II controller and PC through the serial COM port RS232.

This kit contains:
- AC/DC adapter to power supply the controller
- RS232 9-pin extension cable
- CD with the communication software and the documentation

6.3 Firmware update

To update the firmware in FrontAIRE II, proceed the following process:

- Interconnect the controller and PC through the serial RS232 cable
- Connect the AC/DC adapter to the controller and mains
- Start the FrontAIRE II downloader from the WINDOWS Start menu
- Choose the right COM port
- Choose the right source firmware file by the “Search” button in the “HEX File” text box
• Push the button “Write” to start the process. The info box will show the text: “Try to restart controller by disconnect and connect power supply”
• Restart the controller by disconnecting and the connecting the power supply voltage. The data will be sent to the controller, the info box will show the texts: “Writing Program Data, please wait!” and “Writing EEPROM Config Data, please wait!”. After the success update the info box will show the text: “Upload was successfully completed”. The controller will be automatically restarted with the new firmware.

**Attention**

The program number is set to 00 up after the each update of the firmware. All parameters are set to the default value. For the correct function of the unit the right program and parameters must be set.

The update PC support software and firmware versions are available on:


These www pages are protected against unauthorized access.
7. Software revisions

7.1 FrontAIRE II firmware

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
<th>Date</th>
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<td>0.0.XX</td>
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<td>7.6. 2006</td>
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7.2 FrontAIRE II downloader

2.06 1st released version

7.3 FrontAIRE II monitor

1.0.8 1st released version
8. Service part numbers

8.1 FrontAIRE II controller, accessories

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<th>Note</th>
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<tr>
<td>1</td>
<td>FrontAIRE II controller</td>
<td>TK 45-2129</td>
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<tr>
<td>2</td>
<td>Temperature sensor</td>
<td>TK 41-4157</td>
<td></td>
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<tr>
<td>3</td>
<td>Installation frame (ISO panel), thorn</td>
<td>TK 92-1937</td>
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<td>Nameplate FrontAIRE II</td>
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<td>5</td>
<td>Nameplate, side black</td>
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<td>6</td>
<td>Corner, side plastic</td>
<td>TK 92-2924</td>
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<td>7</td>
<td>Knob</td>
<td>TK 92-2481</td>
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<td>8</td>
<td>Knob cover</td>
<td>TK 92-2482</td>
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<td>9</td>
<td>FrontAIRE II computer adapter kit</td>
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## Appendix 1 – Table of programs

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<tr>
<th>Configuration of FrontAIRE II Controller</th>
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</table>
Appendix 2 – Thermostat sequence ½
### Appendix 3 - Thermostat sequence 2/2

#### WORKING MODE
- **floor heating**

#### DEFROST
- **2.0°C**
  - Floor sensor step
  - Flow melt main close

#### SMOG
- **2.0°C**
  - Flow melt main close
  - Flow melt main open (cold)

<table>
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<tr>
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<th>Flow melt main close</th>
<th>Flow melt main open</th>
<th>Flow melt main close</th>
<th>Flow melt main open</th>
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<td>2.0°C</td>
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<tr>
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<td>-2.0°C</td>
<td>-2.0°C</td>
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</table>

**SP** = Flow melt main
- **FL** = Floor sensor
- **Flow melt main close** = close
- **Flow melt main open** = open

**Defrost function ON:**
- Water valve OPEN (10°C)
- Fan in summer OPEN (10°C)
- Control relay OPEN (10°C) to windows
- Blower speed 1250rpm
- Water temperature = 10°C limit
- Time = 10 min
- Clutch ON if A1 > A0

**SMOG function ON:**
- Water valve = HD (OFF)
- Fan in summer CLOSED (OFF)
- Control relay = HD (OFF)
- Blower speed = HD (OFF)
- Water temperature = 10°C limit
- Time = 10 min (parameter - possible to change)
- Clutch = HD (OFF)

---

**Notes:**
- A1 = Ambient temperature (sensor)
- A0 = 10°C outside value (possible to change)
Appendix 4 – Menu map