DECADE II
Electrochemical Detector

DECADE II upgrade kit
installation guide

Edition 4, 2005 171.7038

Symbols

The following symbol are used on the rear panel and oven compartment of the DECADE II:

Consult the manual for further safety instructions

Frame or chassis ground terminal

The following pictograms are used in the DECADE II manual:

Caution

Caution, risk of electric shock or other electrical hazard (high voltage)

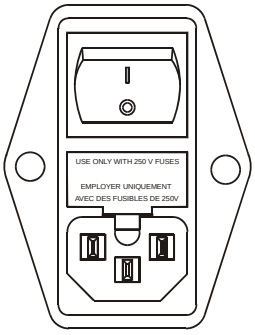
Safety practices

The following safety practices are intended to insure safe operation of the equipment.

Electrical hazards

The removal of protective panels on the instrument can result in exposure to potentially dangerous voltages. Therefore, disconnect the instrument from all power sources before disassembly. Untrained personnel should not open the instrument.

Replace blown fuses with fuses of proper type and rating as stipulated on the rear panel and specified in the installation section of this manual. The fuse holder is integrated in the mains connector. Ensure that the instrument is never put in operation with fuses of a different type. This could cause fire.



Connect the detector to a grounded AC power source, line voltage 100 – 240 VAC. The instrument should be connected to a protective earth via a ground socket. The power source should exhibit minimal power transients and fluctuations. Replace faulty or frayed power cords.

Place the detector on a flat and smooth surface. Do not block the fan located at the bottom of the detector. Blocking the fan will impair the cooling capability of the power supply.
Before starting the replacement of the EPROMS please read the following safety instructions carefully:

Take precautions against electrostatic discharge during installation/removal of boards, EPROM's or other electrical components at all time to prevent damage of the circuit boards.

Spare parts and service availability

Manufacturer provides operational spare parts of the instrument and current accessories for a period of five years after shipment of the final production run of the instrument. Spare parts will be available after this five years period on an ‘as available’ basis.
Manufacturer provides a variety of services to support her customers after warranty expiration. Repair service can be provided on a time and material basis. Contact your local supplier for servicing. Technical support and training can be provided by qualified chemists on both contractual or as-needed basis.

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C H A P T E R 1

DECADE II upgrade kit

Congratulations on your purchase of the DECADE II upgrade kit, p/n 171.0222. This kit enables you to upgrade your DECADE II for usage with firmware (FW) revision 3.20 or higher. The new FW 3.xx release has the following features:

- Dual flow cell support
- ADF (fc 0.005 - 0.001 Hz): stronger filter
- Ranges 5 nA - 200 pA have up to factor 2 improved noise spec.
- Improved temperature stability

Important notice

Your DECADE II is factory installed with a LM35 temperature sensor mounted in the heater compartment. The LM35 sensor has a cable with three wires (red/white/ black) and a 6-pin Molex KK connector (white) . This cable is originally not connected to any board and is fixed into the grey cable clamp on the left side panel of the DECADE II inside the housing.

Only a few DECADE II detectors on the market do not have the LM35 sensor pre-installed (first series s/n, < 171.00025).

If your DECADE II has a s/n < 17100025 DO NOT procede with the installation of the DECADE II upgrade kit, but please contact the manufacturer. The DECADE II should be upgraded at the factory.

C H A P T E R 2

Installation guide

Unpacking

Inspect the *transport box* for possible damage as it arrives. Immediately inform the transport company in case of damage, otherwise she may not accept any responsibility. Keep the transport box as it is designed for optimum protection during transport and it may be needed again. Carefully unpack the kit and inspect it for completeness and for possible damage. Contact your supplier in case of damage or if not all marked items on the checklist are included.
Prior to shipment, the parts of your upgrade kit have been inspected and tested to ensure the best possible performance.

Contents of kit

The DECADE II upgrade kit v3.xx (171.0222) consists of the following parts:

P/n	Description	Qty
171.0684	DECADE II temp control board	1
171.0690	Temp control board fixing conn.	1
171.0600	DECADE II control boot-EPROM	1
171.0605	DECADE II sensor boot-EPROM	1
	Software:	
171.9007	DECADE II Dialogue, demo version	1
	Documentation:	
171.0020	DECADE II service manual	1
171.7032	DECADE II FW upgrade user guide	1
171.7038	DECADE II upgrade kit install guide	1

Tools

The following tools are necessary for the installation of the dual sensor upgrade kit:

Service tools
[a] IC-puller and normal screw driver
[b] Hex key 3/16”
[c] Phillips screwdriver no.1 (long or normal shaft)

Figure 1. *IC-puller, screwdriver, hex key and Phillips screwdriver*

Test equipment
External dummy flow cell (p/n 250.0040)

Installation procedure

The installation procedure consists of the following steps:

1. Accessing the instrument
2. Removing sensor board
3. Replacement of boot EPROMS
4. Reconfiguration of connector 7 (heater)
5. Installation of the DECADE II temperature control board
6. Re-installation sensor board
7. Upload of firmware v3.xx
8. Check & calibration

Some steps of the installation and calibration procedure are described in the service manual (171.0020) which is provided with this upgrade kit (see references in this installation guide). The FW upgrade procedure is described in the FW upgrade user guide (171.7032). The standard dummy cell test is described in chapter 13 in the DECADE II user manual (171.0010). Please make sure that you have the user manual available during the upgrade procedure.

The whole upgrade procedure will take approximately 2 hours, 30 minutes to install hardware and 100 minutes to check and recalibrate the DECADE II.

1. Removing the rear panel

Both circuit boards are mounted on a separate metal frame, which are fixed on the rear panel of the detector. The circuit boards can be accessed by removal of the rear panel by means of the four M3 Phillips screws as depicted in figure 2. The screws are marked with red arrows and the letters A and B.

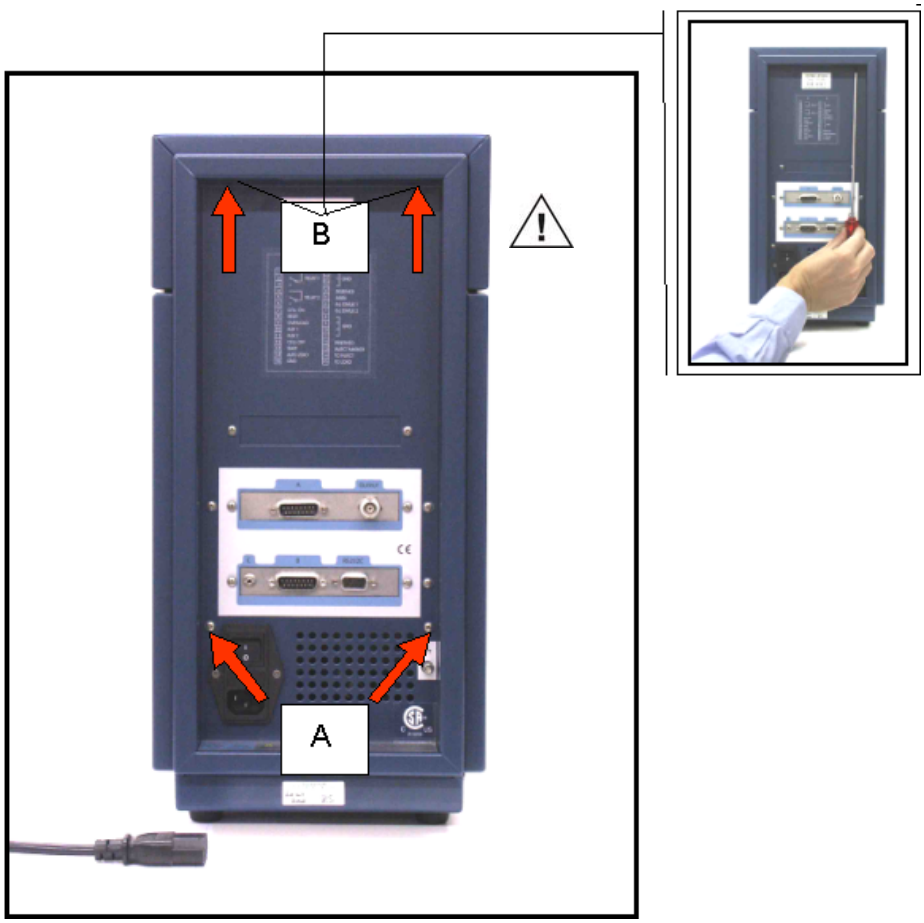


Figure 2. *Connector panel of the DECADE II.*

1. Remove the two screws located below (A) completely by means of a Phillips screwdriver. The screws in the top part (B) can be accessed via the two holes in the connector panel, see top-right picture in figure.

Do not remove the two screws in the top part completely. Just loosen the screws five turns to remove rear panel.

2. Subsequently, pull the rear panel backwards as far as depicted in figure 3. The rear panel is constrained by the length of the connected cables. The control board can rest on the isolated casing of the power supply compartment without any problem.

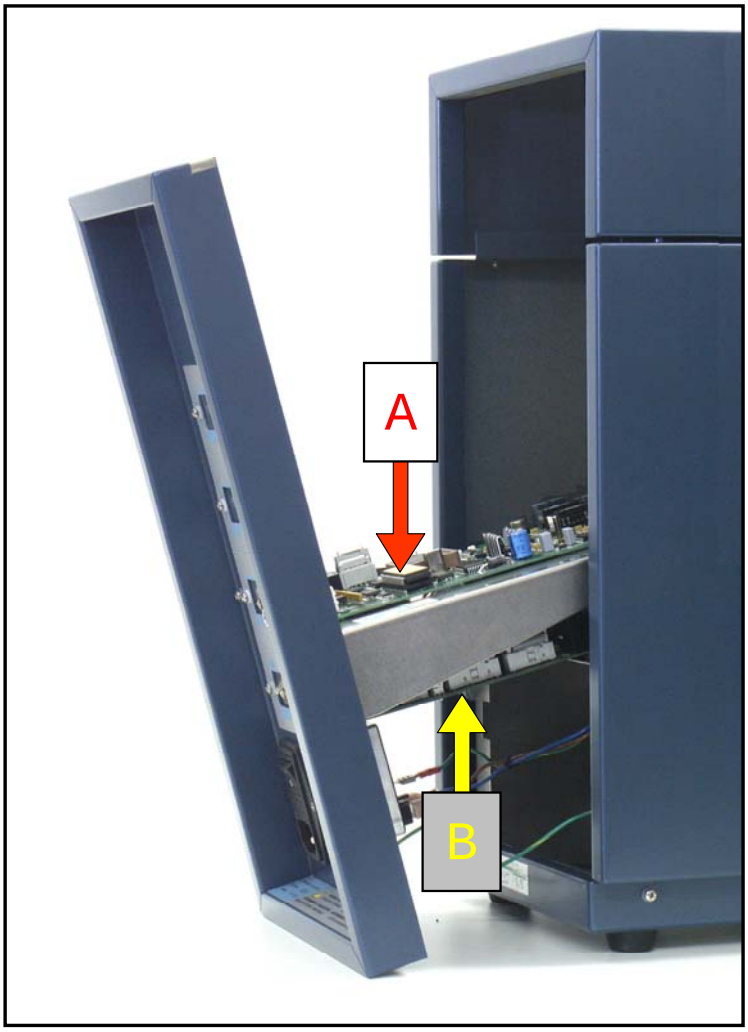


Figure 3. *Detector with rear panel pulled backwards. (A) sensor board and (B): control board.*

2. Removing sensor board

To access the control board it is necessary to remove the sensor board completely. This is done in the following manner:

- Disconnect the internal cell cable depicted in figure 4(B) and 5 This is a subD connector, which is fixed with two screws. Remove the screws with the hex key and remove the connector of the sensor board.

- Disconnect the I^2C/power cable depicted in figure 4 (C). This is a Molex kk connector, which can be removed by gentle pulling it in the upward direction.

- Remove the three M3 screws which secure the sensor board on the connector panel using a Phillips screwdriver. The screws are marked in figure 6 with red circles.

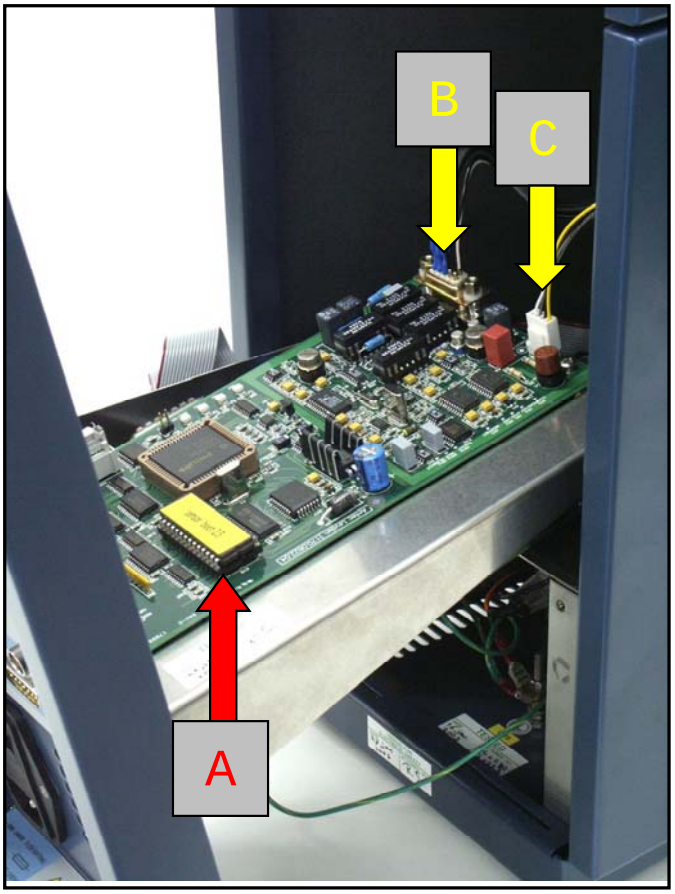


Figure 4. *Top view sensor board. (A) sensor board EPROM, (B): internal cell cable connector and (C): I^2C/power cable connector.*

Figure 5. *Removal of internal cell cable connector.*

Figure 6. *Removal of sensor board from the connector panel.*

3. Replacement of boot EPROMS

Remove both EPROM's on control and sensor board as described in the service manual in paragraph "Replacement of EPROM's". Replace the EPROM's with the EPROM's provided to you in the upgrade kit. The EPROM of the control board is located on the position (A) marked with the arrow in figure 7. For the location of the EPROM on the sensor board see figure 4 (A).

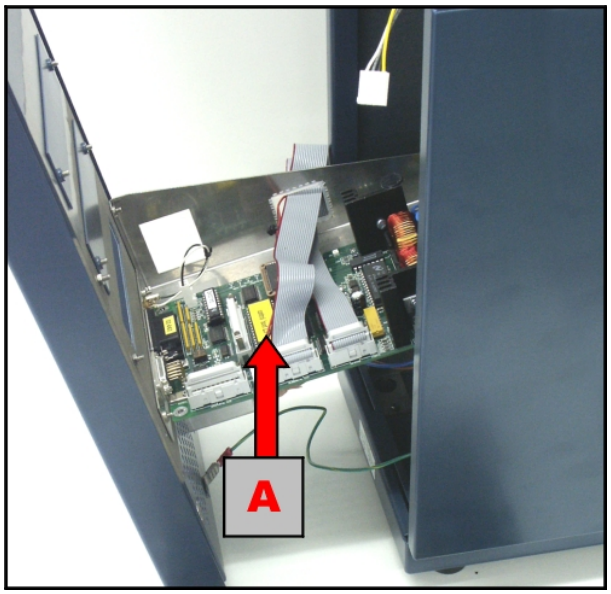


Figure 7 *Top view of control board. (A) control board EPROM.*

Take precautions against electrostatic discharge during installation/ removal of the EPROMS at all time.

Both EPROMS can be removed from the board using an IC-puller or alternatively a flat screwdriver. An IC-puller is the recommended tool. Clip the IC-puller around the EPROM (on end) and lift it gently out of its socket. Make sure that you don't bend the legs of the EPROM. In case of a screw driver, insert it between the EPROM and the socket and lift the EPROM gently bit-by-bit out of the socket. NOTE: avoid scratching the circuit board with the screwdriver.

4. Reconfiguration of connector 7 (heater)

In order to be able to drive the oven with the updated analog heater control it is necessary to rewire connector 7 on the control board. See figure 8. To remove connector 7 from the control board use a flat screw driver to release the connector from the socket. Insert the screw driver between the connector and the retaining clip on the socket. Push the retaining clip aside by means of the screw driver and firmly pull the connector from the socket.

The connector is fixed tightly in the socket and considerable force has to be used to remove it. To avoid damage of the control board PCB prevent it from bending by holding it in place with your hands.

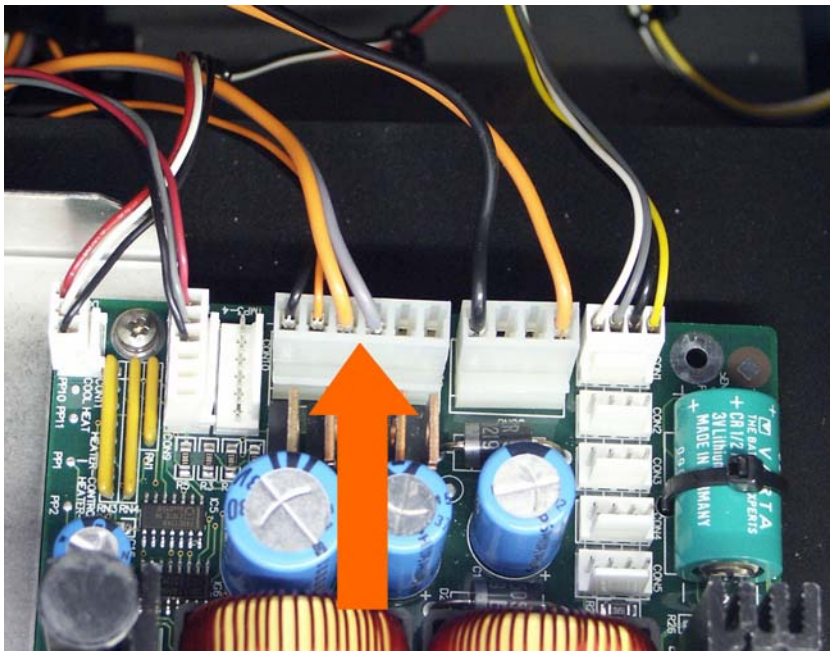


Figure 8. *Connector 7 on the DECADE II control board (conventional wiring).*

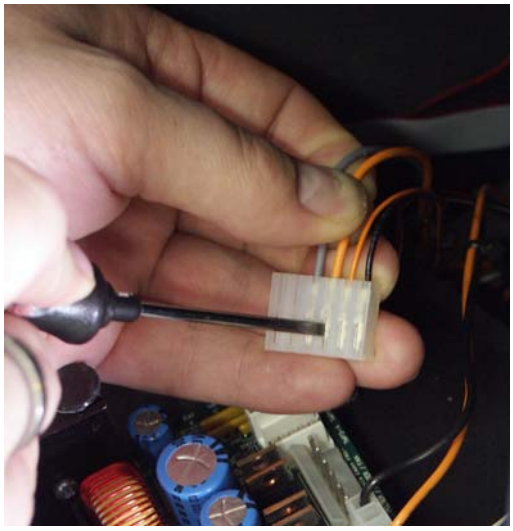
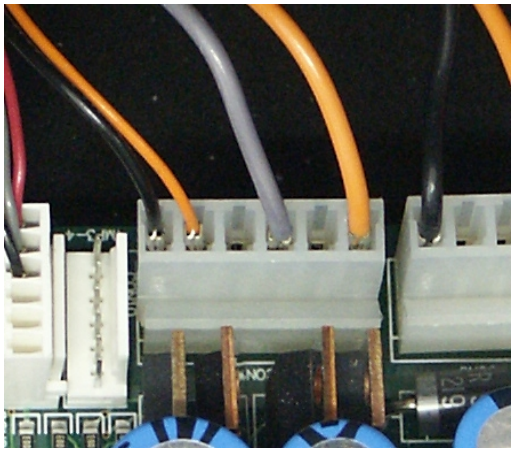


Figure 9. *Releasing contact 4 (with thick orange wire) from kk Molex connector 7 using a flat screw driver.*

Remove contact 4 attached to the thick orange wire as depicted in figure 9. Use a flat screwdriver to unlock the contact from the plastic housing. Unlocking is achieved by inserting the screw driver in the slit, and gentle pushing the metal contact while simultaneously pulling the wire out of the housing.



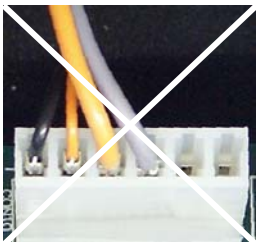


Figure 10. *Connector 7 with new wire configuration for analog heater control (left-side). For reference the old wire configuration is shown on the right-side.*

Subsequently insert the contact in position 1 of connector 7 as depicted in figure 10. Make sure that the contact is firmly locked into the plastic housing and insert the connector back into the corresponding socket on the control board.

5. Installation of the DECADE II TC-board

In order to be able to run a DECADE II with dual sensor boards it is necessary to install a new PC board for the measurement of the oven temperature via a LM35 temperature sensor. The board is shown in figure 11.

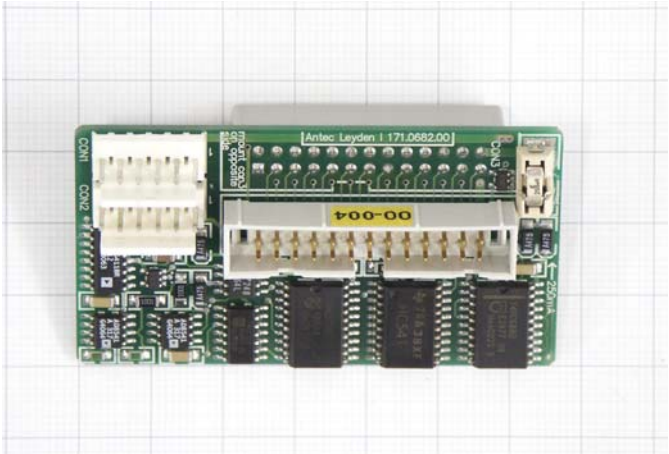


Figure 11. *DECADE II temperature control board (TC-board).*

Install the temperature control board (from here on abbreviated as TC-board) on connector 15 of the main control board as depicted in figure 12 and 13. Make sure that the board is pressed firmly in the socket to ensure good contact.

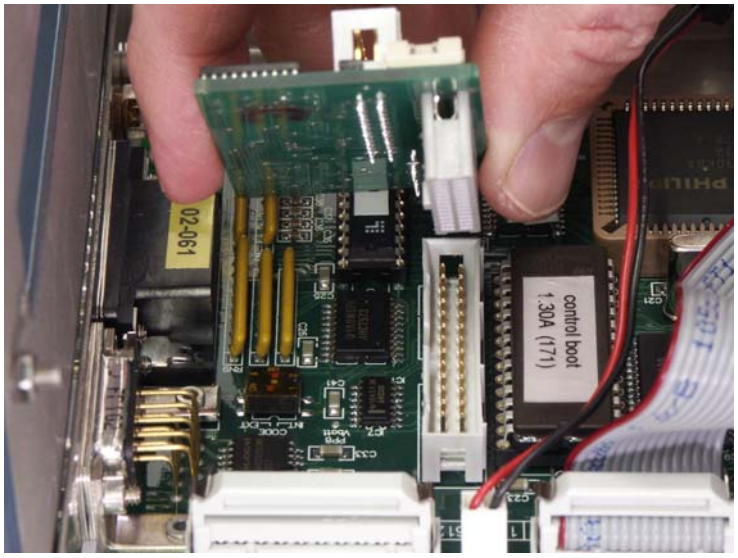


Figure 12. *Installation of TC-board on control board.*

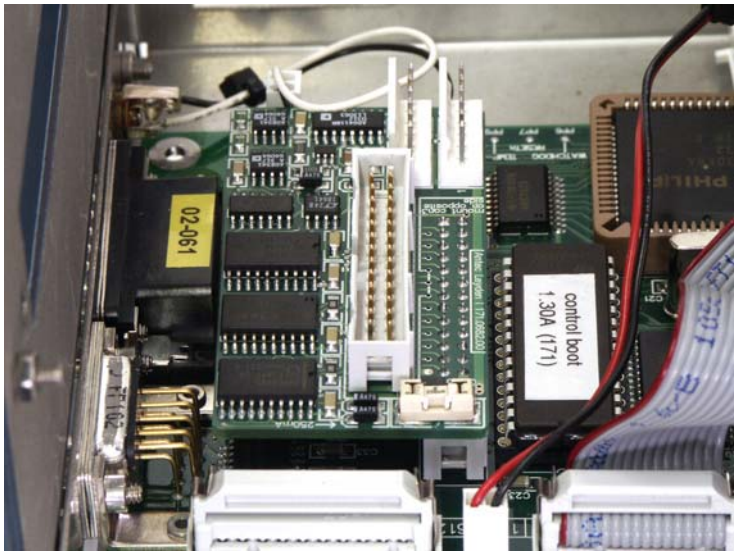


Figure 13. *TC-board fixed on control board.*

Your DECADE II is factory installed with an extra LM35 temperature sensor mounted in the heater compartment. The LM35 signal cable consists of three wires (red/white/black) with a 6-pin Molex KK connector (white) to connect it to the TC-board. This cable is originally not connected to any board and is fixed in the grey cable clamp located on the left side panel inside the DECADE II housing.

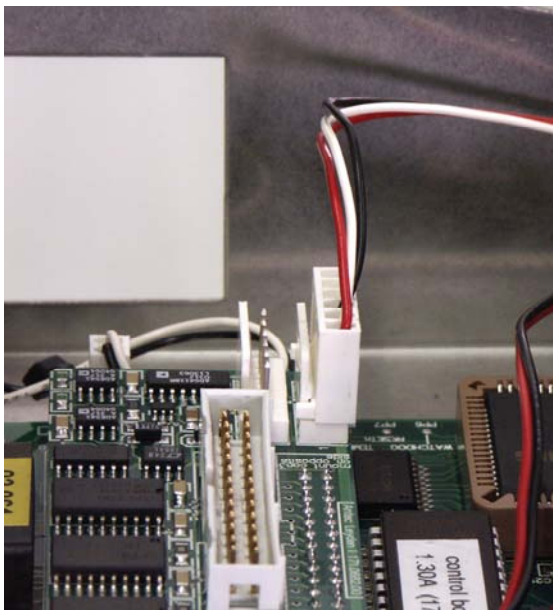


Figure 14. *LM35 cable connected to CON1 on TC-board.*

Only a few DECADE II detectors on the market do not have this additional LM35 sensor preinstalled (first series s/n, < 171.00025).

If your DECADE II does not have a pre-installed LM35 sensor, do not procede with the installation and contact the manufacturer. The DECADE II should be upgraded at the factory.

Fix the LM 35 connector on the socket, designated CON1, on the TC-board as shown in figure 14.

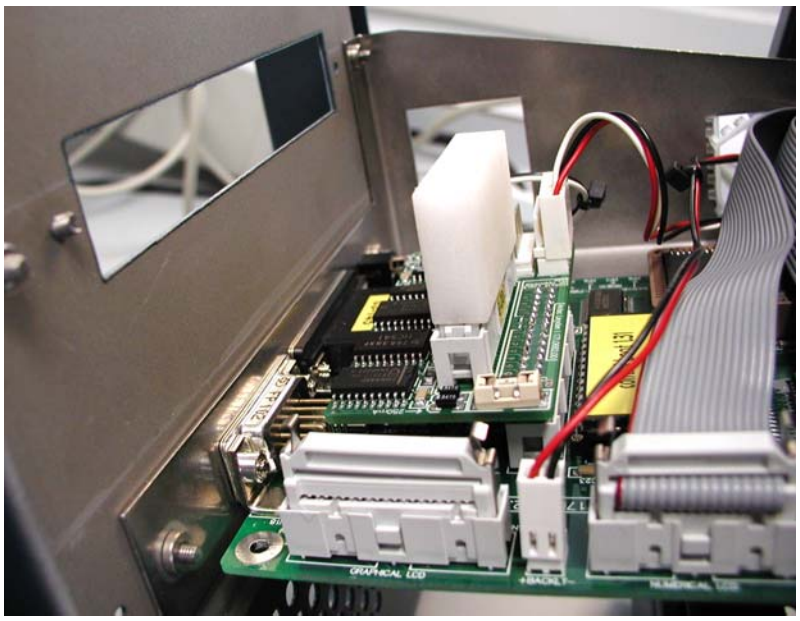


Figure 15. *TC board with mounted TC-board fixing connector.*

Use gentle force when installing the TC-board fixing connector (p/n 171.0690) on the TC-board. Prevent bending of the TC-board by holding in place with your hands. during installation.

Place the TC-board fixing connector (p/n 171.0690) on top of connector 4 on the TC-board as shown in figure 15. This connector fixes the TC-board between control and sensor board to ensure that the board will not detach of the DECADE II control board.

6. Re-installation of sensor board

- Mount sensor board 1 to rear panel.
- Connect the corresponding internal cell cable and power cable on sensor board 1.
- Fix rear panel on the DECADE II (see figure 2).

7. Upload of firmware v3.xx

Upgrade the firmware of the DECADE II with an FW version which supports dual sensor board control and data acquisition (FW > 3.20) as described in the in the FW upgrade user manual (171.7032). A CD-ROM is provided in the kit with DECADE II dialogue and DECADE II firmware release 3.20 >. Please check for new releases on the Antec support site: http://www.antecleyden.com/support/. If a newer version of the FW is available please install this version on your DECADE II. Always use the latest version of DECADE II Dialogue.

If something goes wrong during the installation or upload procedure the detector will start up with one of the error messages listed in chapter 4 “Error messages” of the service manual.

In case of an error message, follow the corresponding instruction in the table with error messages in the service manual.

8. Check & calibration of the DECADE II

1. Check FW version

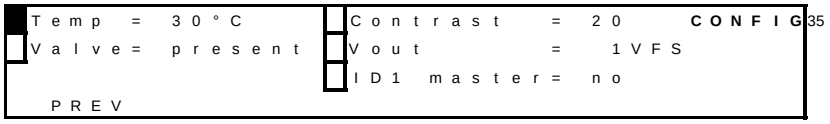
After upload of the dual sensor FW restart detector and check if the FW version displayed in the MAIN screen corresponds with the version number of the uploaded anl file.

2. Initialization

After upload of the new dual sensor FW the DECADE II should be reset to a defined state by executing the following steps:

a. *Clear existing time files:* A power-up of the detector while depressing the F5 button will clear the existing time files in SRAM memory (so hold F5 button and switch on detector)

b. *Reset to factory settings:* this action will reset all non-volatile parameters to their default values. To execute a factory reset go to the CONFIG screen by pressing F1 in the MAIN menu:

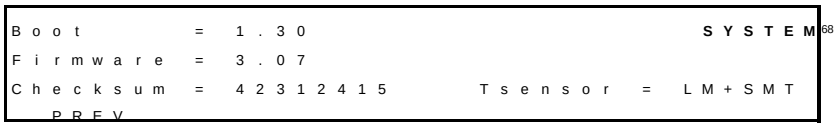


Subsequently hold the <ENTER> button for 4 seconds. After a factory reset please re-adjust the LCD contrast in the CONFIG screen to an appropriate level (~9).

The DECADE II will malfunction if the reset procedures described in point (a) and (b) are not executed. (embedded software can freeze or detector remains in a reboot loop after power-up)

3. Check detection of the TC-board board by the DECADE II firmware

The LM 35 board is recognized by the software during start up of the DECADE II. To check if the installation was successful start up the detector and enter the DIAG mode from the MAIN menu. Subsequently, enter the SYSTEM menu by pushing F5. In the SYSTEM menu, "Tsensor = LM + SMT", should be displ ayed.

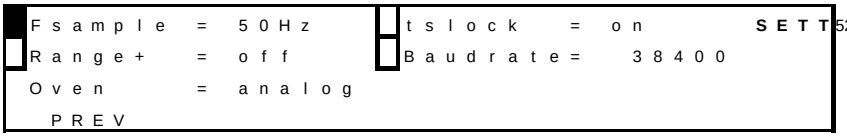


If "Tsensor = SMT" is displayed, please restart the detector again.

If the TC-board is not correctly recognized, please re-check if the TC-board and LM35 sensor cable are firmly fixed in their sockets.

4. Setting heater control to "analog"

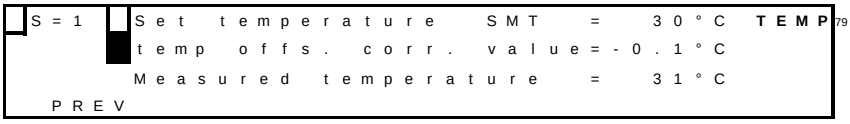
Go to the SERVICE mode by holding the <ENTER> button for 4 seconds in the MAIN screen. Enter the SETT screen and set the oven to ANALOG.



If "oven = digital" is selected the heater will NOT work.

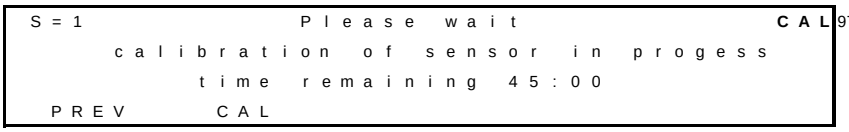
5. Calibration of the LM35 temperature sensor

Go to the SERVICE mode by holding the <ENTER> button for 4 seconds in the MAIN screen. Enter the Adjustments screen (F4) and subsequently go to TEMP adjustment screen (F5):



- Check if “LM” is displayed in the first line of the LCD screen. If “SMT” is displayed instead re-check if the TC-board is fixed firmly in its socket on the control board and if the LM35 cable is connected properly. If problem persists please contact supplier.

- Press “CAL” button= (F2). By pressing the “CAL” button an auto-calibration routine will start. Internally the oven temperature is set to 45 ^{o}C and the detector is allowed to stabilise for 45 minutes. During that period the detector will display a 45 minute countdown timer to indicate the progress of the calibration routine.



Do not open the oven compartment during the calibration procedure because this will result in an erratic calibration of the temperature sensor and subsequently in deviations in the set and actual oven temperature

6. Check the calibration of the IE convertor

After the temperature sensor calibration, the residual currents of the IE convertor circuitry of the sensor board should be checked.

- Switch cel off and disconnect cell cable.
- Set the oven temperature at Toven = 35 ^{o}C. Allow the detector to stabilize for 30 minutes.
- Go to the SERVICE mode by holding the <ENTER> button for 4 seconds in the MAIN screen. Enter the Adjustments screen (F4) and subsequently go to ZER.IE adjustment screen (F2) of sensor board 1.
- Follow the instructions in chapter 5 on page 24 of the service manual.

Only re-adjust the I/E convertor using the AUTO function if the residual currents for the different resistors is higher than the values specified in table VIII of the service manual.

- After the IE convertor calibration, leave the service mode and enter the DC mode. Make sure that no cell cable is connected and scroll through all current ranges. Check if the cell current approaches 0 in all ranges which gives an indication that the calibration procedure was completed successfully.

8. Dummy cell test

Perform a dummy cell test for both sensor boards as described in chapter 15 on page 55 of the DECADE II user manual (171.0010).

After completion of this installation & calibration procedure the DECADE II with FW 3.20 > is ready for use!