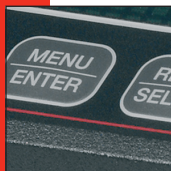


User manual  
**AmeTrim Adjustment Software**  
for Jofra Temperature Calibrators



User Manual

# Ametrim Adjustment Software

for JOFRA Temperature Calibrators

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# 1. Introduction

This manual contains operating instructions for:

JOFRA WINDOWS' ADJUSTMENT PROGRAM

**AMETRIM**

The program was developed by:

**AMETEK Denmark A/S**

Gydevang 32-34  
DK-3450 Allerød  
Denmark

Tel.: +45 48 16 80 00

Fax: +45 48 16 80 80

## 2. General information

You are advised to return the JOFRA instruments to AMETEK Denmark A/S or an accredited laboratory at least once a year for calibration.

Alternatively you can use the AmeTrim software to Adjust and Calibration the below listed JOFRA instruments.

The software comes on a USB memory stick with update downloads available from the AMETEK home page.

Knowledge of the JOFRA equipment and system to be tested is essential in order to obtain the maximum benefit from this program. Knowledge of Windows® programs in general is an advantage.

- **Warranty**  
Use of the product remains the full responsibility of the user, and AMETEK Denmark A/S offers no warranty and is under no obligation in relation to this product. In addition, AMETEK Denmark A/S cannot be held responsible for any damage, which may occur in connection with the use of this product, including loss of earnings, loss of profit, loss of data or recovery of lost data, loss of goodwill and other similar incidental or consequential damage or loss.
- **Technical assistance**  
Please contact the distributor, if you require technical assistance.

### 2.1 JOFRACAL instruments used with Ametrim

- RTC series
- PTC series
- ATC series
- DTI 100/1000
- ASM-80x B

## 2.2 PCs, minimum hardware requirements:

- Intel® Pentium® II 1.4 GHz processor.
- 128MB RAM (256MB recommended)
- 512MB free disk space on hard disk (1GB recommended) prior to installation
- Standard VGA (800x600, 256 colours). 1024x768 recommended.
- USB port.
- One or more free RS-232 serial and USB ports, if using devices requiring RS-232 communication.

## 2.3 PCs, minimum software requirements:

- Microsoft Windows® XP (32bit), Vista (32bit), Window 7(32bit& 64bit).
- System fonts: MS Sans Serif and Arial

## 2.4 Installing and running Ametrim

Ametrim can be run direct from the USB for the ATC, DTI and ASM instruments however the software requires **JOFRACAL** software supplied on the same USB memory stick, to be installed before Ametrim can be used together with **RTC or PTC** calibrators.



### **RTC/PTC instrument requirements.**

To run Ametrim on the RTC/PTC calibrators the software requires Microsoft .NET FRAMEWORK 3.5 SP1 and the RTC USB driver to be installed if not already found on the PC.

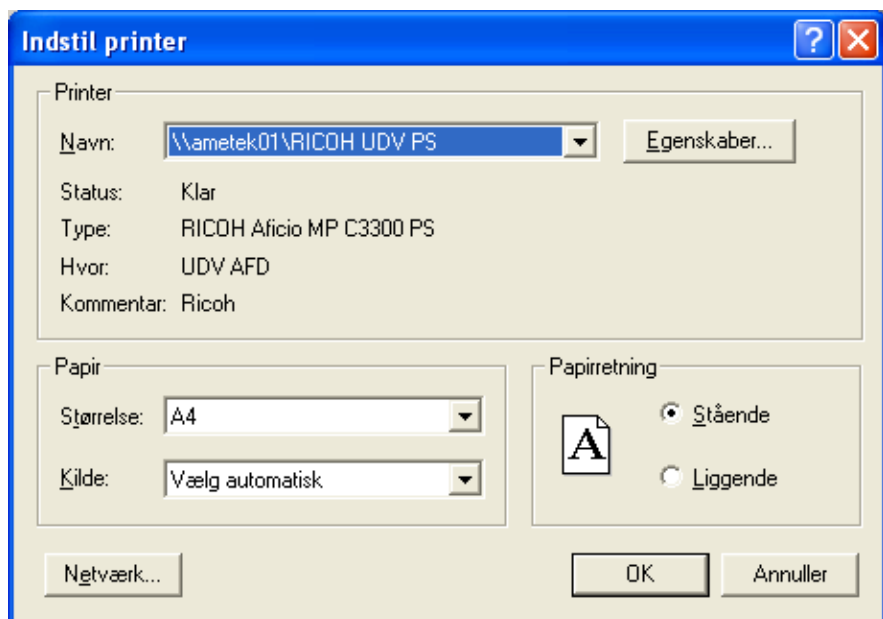
The JOFRACAL program is supplied on a USB stick and comes complete with its own installation program and automatically installs these programs.

If you want to install the program manually, the USB also contains a SETUP.EXE file in the Jofracal folder.

## 2.5 Setup Printer

This option provides a standard Windows® procedure which enables you to edit the settings for the current printer or change to another printer.

If you are unsure how to use these settings, refer to your Windows® Help.





## 3. Starting the Ametrim software.

### 3.1 Starting the AmeTrim Software



#### **Note...**

Before starting this software, the PC and the calibrator must be connected together and the calibrator switched on (see section 4.1).

The calibrator must not be performing any tasks like switch test, autostep or workorders. That means that the calibrator must be in the main menu before starting the software.

Use the normal Windows procedure to start the AmeTrim software. If you are unsure of how to start software programs, refer to your Windows Help

### 3.2 Connecting the PC and the Calibrator

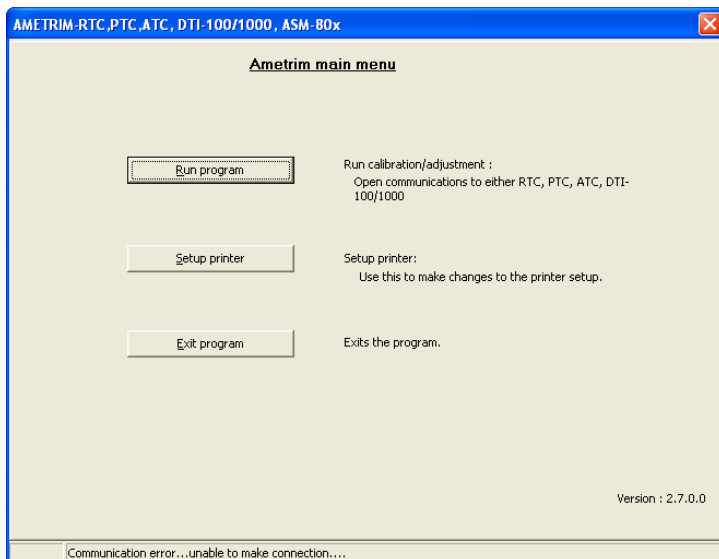


#### **Caution...**

Connect the USB serial cable provided to the USB device port on the side of the calibrator and to a USB port on the PC.

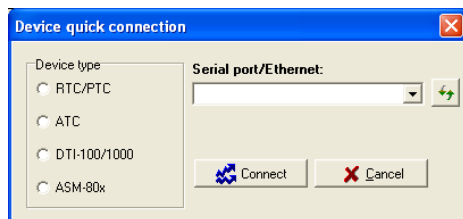
For communication via TCP/IP connect the Ethernet cable to the connection also on the side of the RTC calibrator.

### 3.3 Ametrim - Main menu.



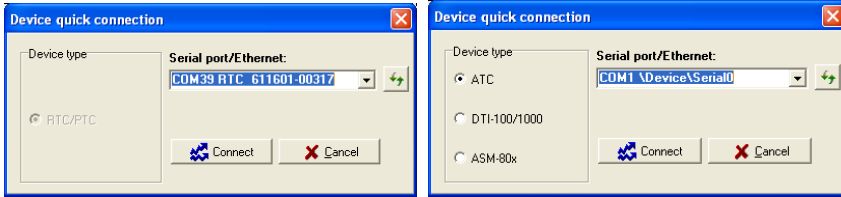
### 3.4 Run Program.

In the main menu select “Run Program” to start the calibration.



The displayed device types on the left depend on the method and type of comport selected.


If the Ethernet or virtual serial port created by the RTC/PTC communications driver is selected then only the RTC/PTC device is displayed and locked, whereas standard serial port selections enable the choice of ATC, DTI and ASM devices.



Press “Connect” to start communications.

### Note...

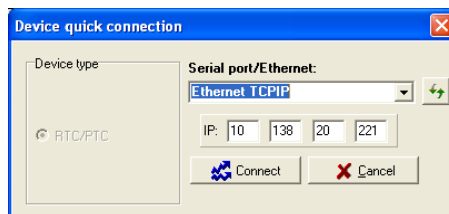
If no RTC appears in the list check it is properly connected and Windows has registered a new hardware device.

This is required the very first time you connect a particular RTC to a PC. Then press the  button to refresh the list.

## 3.5 TCPIP Ethernet communication (RTC only)

If the Ethernet option is selected, the IP address interface appears and the user can enter the IP address allocated to the connected RTC.

Should the user choose the Ethernet TCPIP protocol, ensure the Ethernet cable is connected and the RTC/PTC IP address is configured.

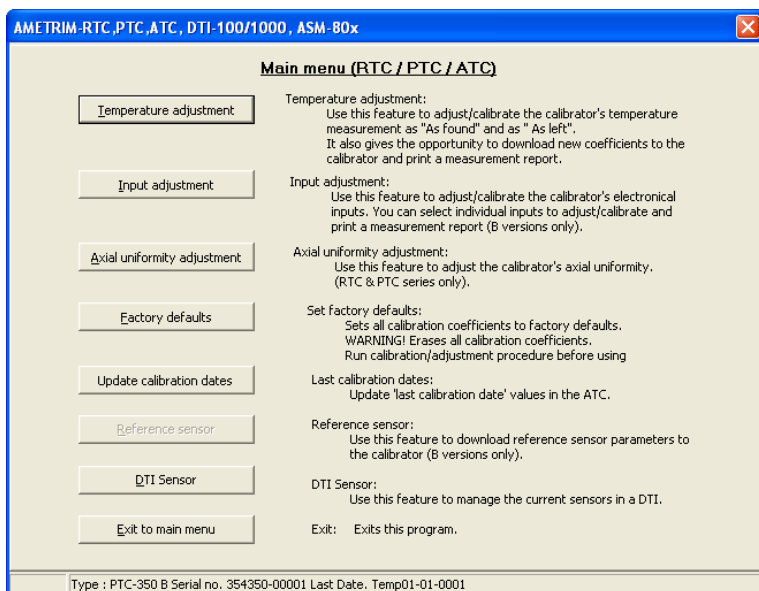


Note. Please refer to the **RTC user manual** regarding setting the IP address on the actual calibrator.

## 4. AMETRIM – RTC/PTC/ATC main menu.

As the software starts, it detects the type of calibrator connected to the PC and reads its serial number. This information is displayed at the bottom of the main menu window

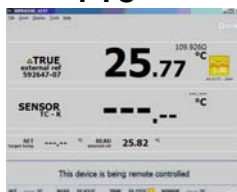
### RTC/PTC/ATC main menu.



### Note...

When software is used to control the calibrator, the calibrator's keyboard is disabled and the display indicates that the calibrator is remote controlled.

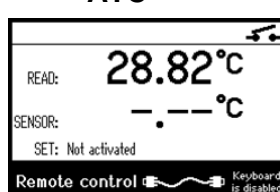
#### PTC



#### RTC



#### ATC



Depending on the instrument type connected the following processes may be activated or not:

- **Temperature Adjustment:** This checks the accuracy of the heat source and internal sensor in the calibrator (**all devices**)
- **Input Adjustment:** This checks the accuracy of the calibrator's electrical inputs (**ATC B series, RTC/PTC B & C series**).
- **Axial uniformity adjustment:** This ensures temperature uniformity throughout the insert (**RTC/PTC series**).
- **Factory defaults:** Sets all calibration coefficients to factory defaults.
- **Update Calibration dates.** Change calibration dates of the instrument (**All devices**).
- **Reference sensor:** Use this feature to manage the coefficients of the sensors in an AMETEK Digital Temperature Indicator (DTI) instrument (**ATC B series only**).
- **DTI Sensor:** Use this feature to manage the coefficients of the sensors in an AMETEK Digital Temperature Indicator (DTI) instrument (**all devices**).

## 4.1 Temperature Adjustment

This enables you to check the accuracy of the heat source and the internal sensor in the calibrator.

This can be done in 3 ways:

- Using the external reference sensor on the ATC/PTC/RTC (B or C versions) to measure the TRUE temperature, AmeTrim can perform a fully automatic calibration and adjustment of the internal sensor. The calibrated reference sensor should then be connected to the reference input.
- Using a Digital Temperature Indicator (DTI) AmeTrim can read the TRUE temperature from the DTI and also make a fully automatic calibration and adjustment of the internal sensor. The DTI must be connected to a vacant serial COM port. See fig. 1.
- Using any other reference instrument, AmeTrim will set the temperature sequence and the TRUE values can be entered as they occur as manual inputs.

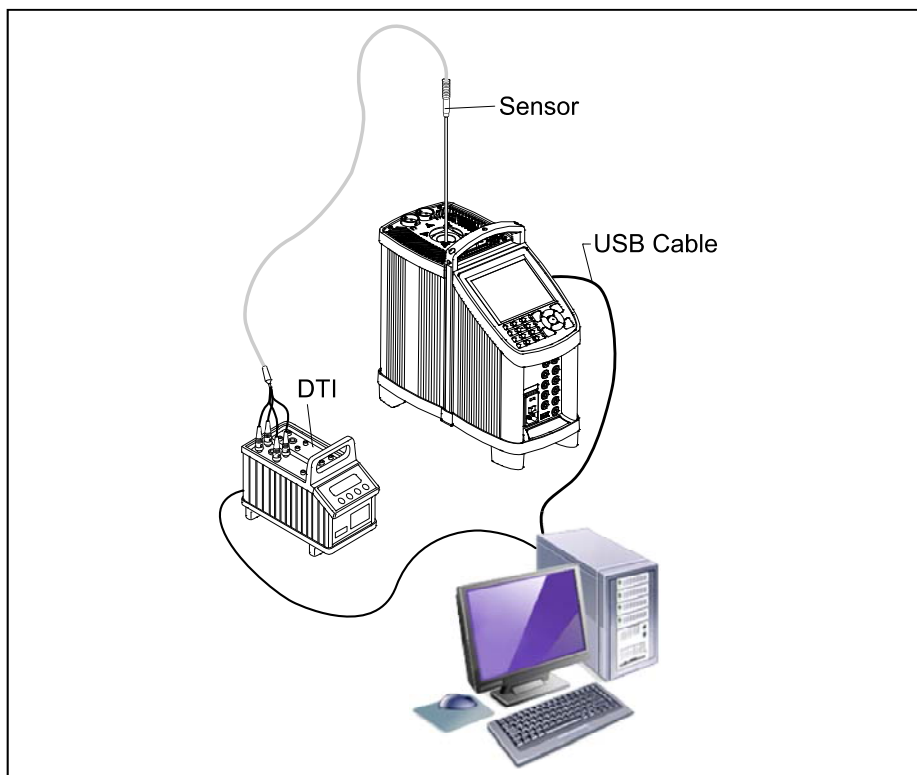
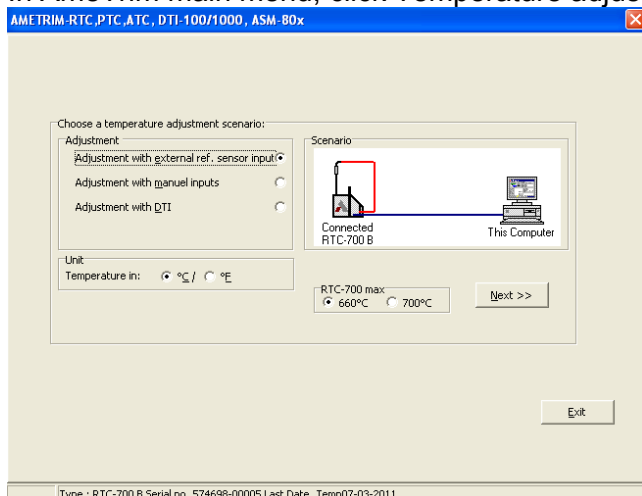


Fig. 1



In AmeTrim main menu, click Temperature adjustment.





Click a radio button to select the scenario that should be used, depending on which calibrated temperature reference that is available.



Click a radio button to select the desired temperature units.

Ensure that the precision thermometer is positioned correctly and ready to measure the temperatures.

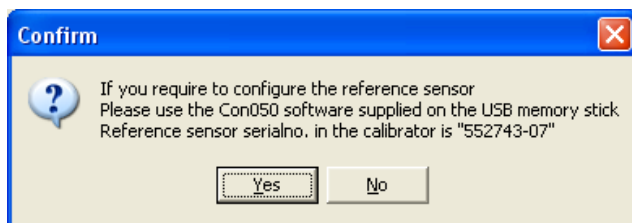


Confirm that the calibration should be started.



### Note.

An option exists for the RTC-700 the maximum temperature can be set to 660°C.



If using the reference sensor on the RTC/PTC scenario, only the Con050 software can be used to configure it.



Click Yes. The calibrator immediately starts working towards the temperature defined in the first step.

A new dialogue containing a table with pre-defined temperature steps is displayed. The calibrator type determines the range of these steps.



AMETRIM-RTC,PTC,ATC,DTI-100/1000,ASM-80x

Instrument type: RTC-156 B, Serial: 574364-00003

Measurement data

Steps	Read temp.	True temp.
-30		
-15		
0		
25		
50		
75		
100		
125		
155		

Status

Instrument


**Set temperature** -30.000 °C

**Read temperature** 24.436 °C

**True temperature** 24.769 °C

Calibration

**Status** Reaching SET temperature

**Next temperature**  -15 °C

**Time left of calibration (aprox.)** 9:00 (hh:mm)

Stop

Type : RTC-156 B Serial no. 574364-00003 Last Date: Temp05-03-2010

When using the external reference sensor input on the calibrator, or when using a DTI, the calibration and adjustment will now run automatically.

## Adjusting with manual inputs

If “manual inputs” is selected in the adjustment Scenario menu, the calibration will be performed in a little different way.



Select Start to begin, when the True temperature is stable click “Enter value”. In the new dialogue, type in the correct “TRUE temperature” value read from the external precision thermometer.

AMETRIM-RTC,PTC,ATC,DTI-100/1000,ASM-80x

**Manuel temperature adjustment**

Instrument type: PTC-350 B

Measurement Data

Steps	Read temp.	True temp.
33		
100		
200		
300		
350		

Interaction

Enter value

Calculate

Download

Print

Start

Info

Select the button “Enter value”, when the “True” temperature is stable on the external readout. When all temperatures have been measured, you can calculate a new set of coefficients and download them to the calibrator, and you can print the measured data.

Exit

Type : PTC-350 B Serial no. 354350-00001 Last Date: Temp01-01-0001



Click OK. The READ temperature measured by the calibrator and the TRUE value are entered in the table.

The calibrator now starts working towards the next temperature level.



Repeat these steps until READ and TRUE values have been entered for each temperature step.



Click Calculate to provide a new set of calibration coefficients for the calibrator.



### **Note...**

Downloading new coefficients to the calibrator overwrites the existing ones already resident in the calibrator.

To prevent unintentional overwriting of existing coefficients, a warning appears requiring you to confirm the download.



When you are satisfied with the measured and calculated values, click Download to send the correction values to the calibrator.



Click Done to exit the Temperature adjustment option.

## **4.2 Input adjustment (ATC B, RTC/PTC B & C series).**

This option allows you to check the accuracy of the calibrator's electrical inputs (for B and C versions only). In addition to the equipment already described in sections 4.1, you also require a calibrated reference signal source. For Cold Junction compensation, you will also require a stable temperature source, for example an ice bath, and a conversion table to provide the sensor's corresponding  $\mu V$  value for the bath's temperature.



### **Note...**

Before calibrating/adjusting the inputs the calibrator must have been turned on for at least half an hour with the SET temperature "Not Activated" (the initial mode when turned on).

In order to calibrate the inputs the following calibrated signals must be used:

<b>ATC Nominal values</b>	<b>Accepted range</b>
• RTD and Reference Inputs:	
50 $\Omega$	(45 to 70 $\Omega$ )
176 $\Omega$	(150 to 200 $\Omega$ )
345 $\Omega$	(330 to 350 $\Omega$ )
• RTD inputs:	
1000 $\Omega$	(800 to 1200 $\Omega$ )
2700 $\Omega$	(2300 to 2900 $\Omega$ )
• mA inputs:	
0 mA	(-1 to +1 mA)
10 mA	(9 to 11 mA)
20 mA	(18 to 22 mA)
• V Inputs:	
0 V	(-1 to +1 V)
5 V	(3 to 7 V)
10 V	(9 to 11 V)
• mV inputs:	
0 mV	(-1 to +1 mV)
35 mV	(25 to 45 mV)
70 mV	(63 to 77 mV)

**RTC Nominal values****Accepted range**

- RTD and Reference Inputs:
  - 18 $\Omega$  (15 to 22 $\Omega$ )
  - 345 $\Omega$  (330 to 350 $\Omega$ )
- DLC inputs
  - 0 mV (-1 to +1 mV)
- RTD 400 inputs:
  - 18 $\Omega$  (15 to 22 $\Omega$ )
  - 345 $\Omega$  (330 to 350 $\Omega$ )
- RTD 4000 inputs:
  - 18 $\Omega$  (15 to 22 $\Omega$ )
  - 3450 $\Omega$  (3330 to 3500 $\Omega$ )
- mA inputs:
  - 0 mA (-1 to +1 mA)
  - 20 mA (18 to 22 mA)
- V Inputs:
  - 0 V (-1 to +1 V)
  - 10 V (9 to 11 V)
- mV inputs:
  - 0 mV (-1 to +1 mV)
  - 70 mV (63 to 77 mV)

**PTC Nominal values****Accepted range**

- RTD and Reference Inputs:
  - 18 $\Omega$  (15 to 22 $\Omega$ )
  - 345 $\Omega$  (330 to 350 $\Omega$ )
- RTD 400 inputs:
  - 18 $\Omega$  (15 to 22 $\Omega$ )
  - 345 $\Omega$  (330 to 350 $\Omega$ )
- RTD 4000 inputs:
  - 18 $\Omega$  (15 to 22 $\Omega$ )
  - 3450 $\Omega$  (3330 to 3500 $\Omega$ )
- mA inputs:
  - 0 mA (-1 to +1 mA)
  - 20 mA (18 to 22 mA)
- mV inputs:
  - 0 mV (-1 to +1 mV)
  - 70 mV (63 to 77 mV)
- Cold Junction compensation: T-type thermocouple and a reference junction, for example an ice bath.

The number and type of electrical inputs to be checked is user-definable. You can also define if you want to check the inputs by just measuring them or to measure, adjust and then calibrate the electrical inputs.

Cold Junction compensation requires a special setup, using a calibrated temperature source, for example an ice bath. This and the measurement principles are shown briefly below:

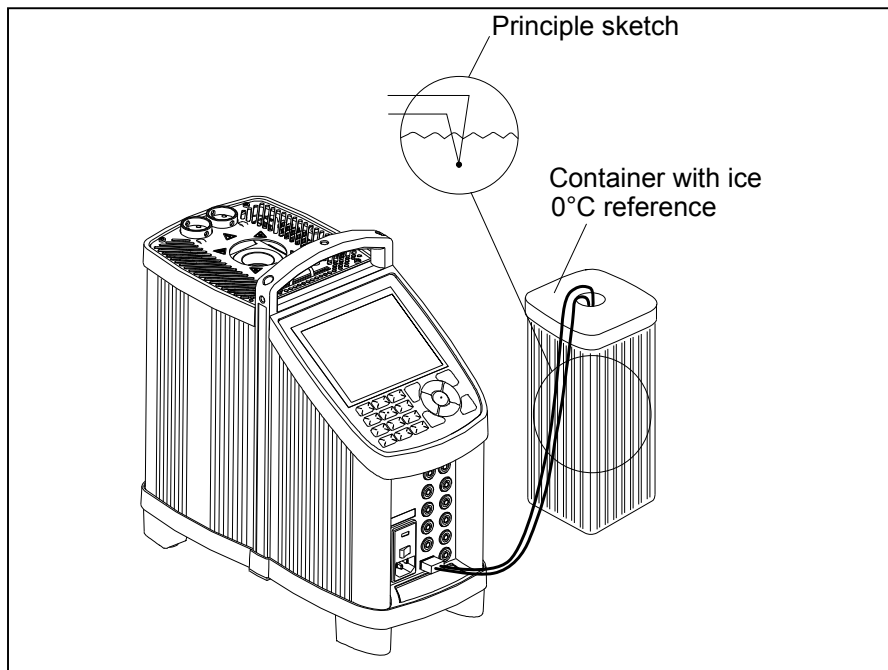
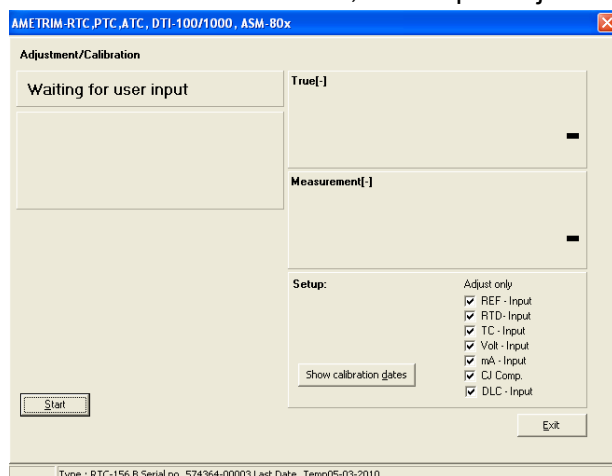


Fig. 2

If at any point you do not wish to continue, click Stop. The software exits this option and returns to the Main Menu.



In AmeTrimTC main menu, click Input adjustment.



By clicking the Calibration Date button, you can view the last calibration dates for each of the inputs.

## To adjust and calibrate the current Input values



Use the check box list to select the inputs to be measured.

If you have selected more than one input to be measured, the measurements occur in the same order as they appear in the check box list.



Connect the reference signal source to the appropriate input(s) when prompted.



Click Start and follow the instructions on screen.

Each input has several pre-set input values. Ensure that the reference signal source is adjusted correctly when prompted.

For Cold Junction compensation, ensure the corresponding  $\mu\text{V}$  value for the calibrated junction temperature is entered ( $0\mu\text{V}$  @  $0^\circ\text{C}$ ).



### **Note...**

There is no reporting facility in AmeTrim for the RTC/PTC.



If you do not require any further measurements, click Exit to return to the Main Menu.

The software measures the pre-set values for the selected input, adjusts the settings and then re-calibrates the calibrator's inputs. All this is done before moving on to the next selected input.



If you do not require any further measurements, click Done to return to the Main Menu.

### 4.3 Axial uniformity adjustment. (RTC/PTC series).

This option enables you to ensure the temperature uniformity throughout the insert.

In the AmeTrim main menu, select “Axial uniformity adjustment”.

A new dialogue containing a table with pre-defined temperature steps is displayed. The calibrator type determines the range of these steps.

AMETRIM-RTC,PTC,ATC,DTI-100/1000,ASM-80x

**Axial uniformity adjustment**

Instrument type: PTC-155 A, Serial: 354155-00001

Measurement data

Steps	Read temp.	T1-T2.
-25		
50		
155		

Instrument

Set temperature — °C

Read temperature — °C

Status: NOT RUNNING

Scenario

32.8 t1 32.8

32.8 t2

PTC-155 A

Enter value

Info

Place the sensor at the bottom of the well. When Stability is declared:

1. Measure the temperature at the bottom of the well(T2)
2. Move the sensor up 60mm from the bottom.
3. Allow 2 min. to stabilize then measure the temperature(T1)
4. Calculate the temperature difference between the 2 positions (T1-T2).
5. Select the button "Enter value", and enter the difference

Ametrim will calculate new coefficients and download to the calibrator.

These steps are repeated until the gradient specifications are fulfilled.

NOTE! RTC 700 requires measurement in 3 positions:  
(T3) = Bottom, (T2) = 30mm from bottom, T(1) = 80mm from bottom.  
Calculate the temperature differences T1-T2 and T3-T2 and enter the values.

Start

Exit

Type : PTC-155 A Serial no. 354155-00001 Last Date. Temp01-01-0001



#### Note...

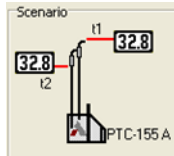
For RTC-158/250 axial uniformity adjustment must not be carried out when the calibrator is filled with liquid.

Adjustment must be carried out when using an insert.



## RTC-156/157/158/159/250, PTC-125/155/350 scenario

Requires difference measured between top and bottom.  
(T2) = Bottom, T(1) = 60mm from bottom



### Note...

Use AMETEK 127587 temperature sensor (recommended) or similar with short measuring zone for axial uniformity adjustment.

For every temperature point, the following must be repeated until uniformity specifications are achieved.



Place the sensor at the bottom of the well. When Stability is declared:



Measure the temperature at the bottom of the well (T2).



Move the sensor up 60mm from the bottom.



Allow 2 min. to stabilize then measure the temperature (T1).



Calculate the temperature difference between the 2 positions (T1-T2).



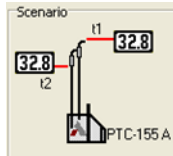
Select the button "Enter value", and enter the difference.

AmeTrim will calculation and download the new coefficients.

If uniformity is within specifications, AmeTrim will continue to the next temperature. Otherwise the process is repeated.

## PTC-660 scenario







Requires difference measured between top and bottom.  
(T2) = Bottom, T(1) = 50mm from bottom



### Note...

Use STS-150 A966 temperature sensor (recommended) or similar with short measuring zone for axial uniformity adjustment.

For every temperature point, the following must be repeated until uniformity specifications are achieved.

-  Place the sensor at the bottom of the well. When Stability is declared:
-  Measure the temperature at the bottom of the well (T2).
-  Move the sensor up 50mm from the bottom.
-  Allow 2 min. to stabilize then measure the temperature (T1).
-  Calculate the temperature difference between the 2 positions (T1-T2).
-  Select the button "Enter value", and enter the difference.

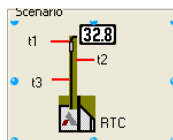
AmeTrim will calculation and download the new coefficients.  
If uniformity is within specifications, AmeTrim will continue to the next temperature. Otherwise the process is repeated.

## RTC-700 scenario

RTC-700 require difference measured in 2 zones

Requiring a sensor at 3 different positions.









(T3) = Bottom, (T2) = 30mm from bottom. T(1) = 80mm from bottom



### Note...

Use STS-200 A 970 temperature sensor (recommended) or similar for axial uniformity adjustment.

For every temperature point, the following must be repeated until uniformity specifications are achieved.

-  Place the sensor at the bottom of the well. When Stability is declared:
-  Measure the temperature at the bottom of the well (T3).
-  Move the sensor up 30mm from the bottom.
-  Allow 2 min. to stabilize then measure the temperature (T2).
-  Move the sensor up 80mm from the bottom.
-  Allow 2 min. to stabilize then measure the temperature (T1).
-  Calculate the temperature difference between the 3 positions (T1-T2) and (T3-T2).
-  Select the button "Enter value", and enter the difference.

AmeTrim will calculation and download the new coefficients.  
If uniformity is within specifications, AmeTrim will continue to the next temperature. Otherwise the process is repeated.

## Reference sensor

This option enables you to view the calibration values currently loaded in the DTI for the reference sensors as well as enter and download values for new reference sensors. You require the calibration certificate for the new reference sensor.



A new dialogue with a table containing the coefficients stored in the DTI for sensor 1 and sensor 2. Current sensor coefficients are automatically uploaded.

The screenshot shows a software window titled "AMETRIM-RTC,PTC,ATC, DTI-100/1000, ASM-80x". Inside, it displays information for "DTI1000, Serial No. DTI1000 - 518423-01607". A section titled "Last calibration date:" shows a date field with "Callendar van Dusen" selected. Below this is a table of coefficients:

R0	1,000000E+02
A	3,908300E-03
B	-5,775000E-07
C	-4,183000E-12

To the right of the table is a section "Interaction to device:" with buttons for "Upload", "Download", and "Default". Below the table is a "Serial number:" field with "575704-06" and a "Sensor to use:" section with radio buttons for "Sensor 1" (selected) and "Sensor 2". An "Exit" button is at the bottom right. A status bar at the very bottom reads "No ErrorTime Elapsed 610".

## To enter values for a new reference sensor



Click a radio button to select sensor 1 or sensor 2. And press "Upload" to read current coefficients.



Type in a unique and descriptive name for the reference sensor.

Use the mouse to position the pointer in the boxes in the table.



Select “ITS-90” or “Callendar van Dusen coefficients” and type in the coefficients from the Calibration Certificate supplied with the reference sensor.



When all the values from the Calibration Certificate have been entered, click “Download” values.

When the values are downloaded they overwrite the ones stored in the indicator.

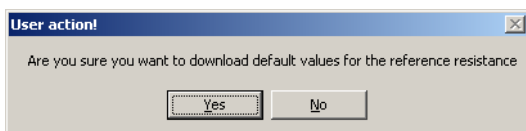


### **Note...**

These coefficients are not saved. Therefore, they must be typed in and downloaded when they need to be used.

## **Default values**

This option downloads a set of default values, which are stored in the AmeTrim-ATC/DTI software.



Press “Yes” to download default values to the DTI.

## 4.4 Factory defaults ( RTC/PTC )

Sets all calibration coefficients to factory defaults.



**WARNING!** Erases all calibration coefficients.

AMETRIM-RTC,PTC,ATC, DTI-100/1000, ASM-80x

**Download RTC factory defaults**

<p>Heat source</p> <p><input type="checkbox"/> Internal reference</p> <p><input type="checkbox"/> Top zone</p> <p><input type="checkbox"/> Bottom zone</p>	<p>Input</p> <p><input type="checkbox"/> RTD 400 - Input</p> <p><input type="checkbox"/> RTD 4000 - Input</p> <p><input type="checkbox"/> Volt - Input</p> <p><input type="checkbox"/> mA - Input</p> <p><input type="checkbox"/> TC - Input</p> <p><input type="checkbox"/> C/J Comp.</p>
<p>REF/DLC - Input</p> <p><input type="checkbox"/> REF - Input</p> <p><input type="checkbox"/> DLC -Input</p>	

Type : PTC-155 A Serial no. 354155-00001 Last Date, Temp01-01-0001

# 4.5 Update calibration dates

The page allows the user to update the calibration dates in the RTC/PTC calibrator.

AMETRIM-RTC,PTC,ATC, DTI-100/1000, ASM-80x

**Calibration date update**

Heat source calibrated 07-03-2011 Send date(s) to calibrator

Reference input calibrated 05-02-2010 Reload and Verify

Sensor input calibrated 05-02-2010

Exit

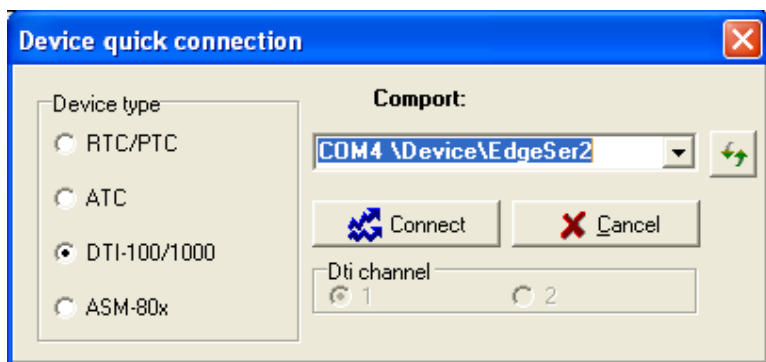
Type : RTC-700 B Serial no. 574698-00005 Last Date, Temp07-03-2011



**NOTE!** For PTC series only the Heat source date is actual.

## 5. Using DTI with the AmeTrim

In the main menu select “Run Program” to start the calibration.



Select “DTI” and “Comport” in the “Device Quick Connect” dialog box and press “Connect”.

### 5.1 Connecting the PC and the DTI



#### Caution...

1. Ensure that both the PC and the DTI are switched off at the mains. Failure to do so may result in your equipment being damaged.
2. Connect the serial cable provided to the “RS 232” port on the back of the DTI and to the COM port on the PC.
3. Switch on the PC and the DTI.

### 5.2 Ametrim - DTI main menu.

As the software starts, it detects the type of calibrator connected to the PC and reads its serial number. This information is displayed at the bottom of the main menu window



## DTI main menu.

AMETRIM-RTC,PTC,ATC, DTI-100/1000, ASM-80x

### DTI main menu

Reference sensor	DTI Sensor: Use this feature to manage the current sensors in a DTI.
Set to default values	DTI REFMAX & REFMIN defaults : Reset the DTI REFMAX & REFMIN reference resistance value to default.
RTD input adjustment	DTI Adjustment : Use this to run DTI adjustment procedure
Calibration date	DTI Set calibration date : Download calibration date to DTI
Analog output adjustment	DTI Analog output : Adjust Dti analog output
Exit to main menu	Exit: Return to main menu.

**Current DTI reference resistance values**

Current REFMax. :	359.971863 Ohm	Current REFMin. :	-0.000240 Ohm
-------------------	----------------	-------------------	---------------

Connection, Type : DTI Serial no. DTI1000 - 518423-01607

This DTI menu is divided into 5 different processes:

- **Reference sensor:** Use this feature to manage the coefficients of the sensors in the DTI.
- **Set to default values:** Use this feature to set internal reference resistor values to default values if odd values have been downloaded.
- **RTD-input adjustment:** Use this feature to calculate and download new values for internal reference resistors.
- **Calibration date:** Use this feature to download a new calibration date to the DTI.
- **Analog output adjustment:** Use this feature to adjust the analog output (only DTI-1000 with firmware version 1.60 or earlier).

## Reference sensor

This option enables you to view the calibration values currently loaded in the DTI for the reference sensors as well as enter and download values for new reference sensors. In addition to the equipment already described in sections 5.1, you also require the calibration certificate for the new reference sensor.



In DTI main menu, click “Sensor coefficients”.

A new dialogue with a table containing the coefficients stored in the DTI for sensor 1 and sensor 2. Current sensor coefficients are automatically uploaded.

The screenshot shows a software window titled "AMETRIM-RTC, PTC, ATC, DTI-100/1000, ASM-80x". Inside the window, the text "DTI1000, Serial No. DTI1000 - 518423-01607" is displayed. Below this, the label "Last calibration date:" is followed by a text box containing "Callendar van Dusen". To the right of this text box is a table with four rows of calibration coefficients:

R0	1,000000E+02
A	3,908300E-03
B	-5,775000E-07
C	-4,183000E-12

To the right of the table is a section titled "Interaction to device" containing three buttons: "Upload", "Download", and "Default". Below the table, the text "Serial number : 575704-06" is displayed. Below this, the text "Sensor to use :" is followed by two radio buttons: "Sensor 1" (which is selected) and "Sensor 2". At the bottom right of the window is an "Exit" button. At the bottom of the window, the text "No ErrorTime Elapsed 610" is displayed.

## To enter values for a new reference sensor



Click a radio button to select sensor 1 or sensor 2. And press “Upload” to read current coefficients.



Type in a unique and descriptive name for the reference sensor.

Use the mouse to position the pointer in the boxes in the table.



Select “ITS-90” or “Callendar van Dusen coefficients” and type in the coefficients from the Calibration Certificate supplied with the reference sensor.



When all the values from the Calibration Certificate have been entered, click “Download” values.

When the values are downloaded they overwrite the ones stored in the indicator.

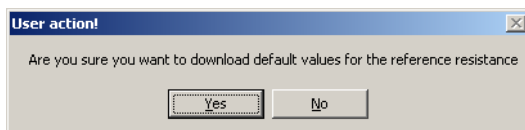


### **Note...**

These coefficients are not saved. Therefore, they must be typed in and downloaded when they need to be used.

## **Default values**

This option downloads a set of default values, which are stored in the AmeTrim-ATC/DTI software.



Press “Yes” to download default values to the DTI.

### 5.3 RTD input adjustment

This option allows you to adjust the DTI by calculating and downloading new values for the internal reference resistors. For adjusting the internal reference resistors you need the following:

#### DTI-100 / DTI-1000 / DTI-1000 A :

50 ohm resistor

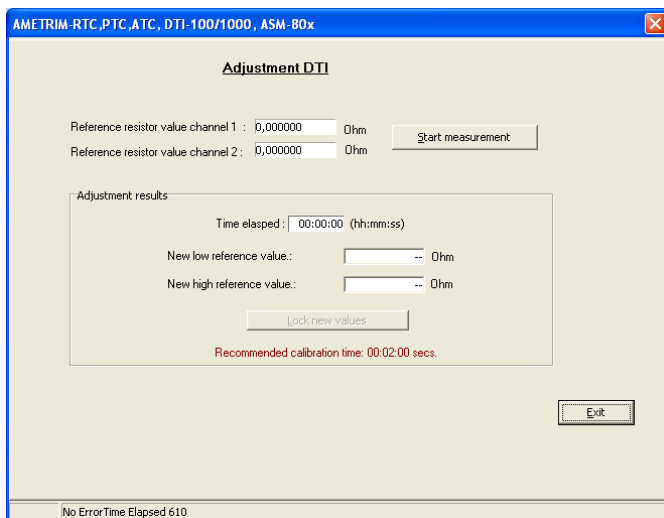
350 ohm resistor

#### DTI-1000 B :

12 ohm resistor

85 ohm resistor

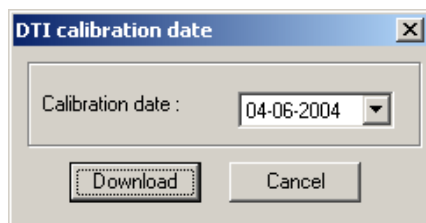
It is recommended to use resistors with an accuracy of 6 ppm or better.



Connect the reference resistors to the input channels and enter the resistor values. Press “Start measurement”, wait until the readings for “New low reference value” and “New high reference value” have stabilized (approx. 2 minutes) and press “Lock new values” to stop the measurement. The locked values can now be downloaded to the DTI or cancelled.

## Calibration date

This option allows you to change the calibration date without adjusting the DTI.

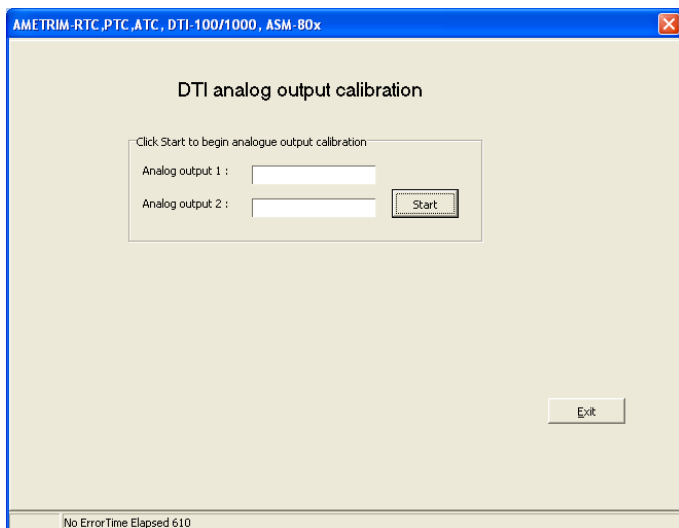


Select the date of calibration and press “Download”.

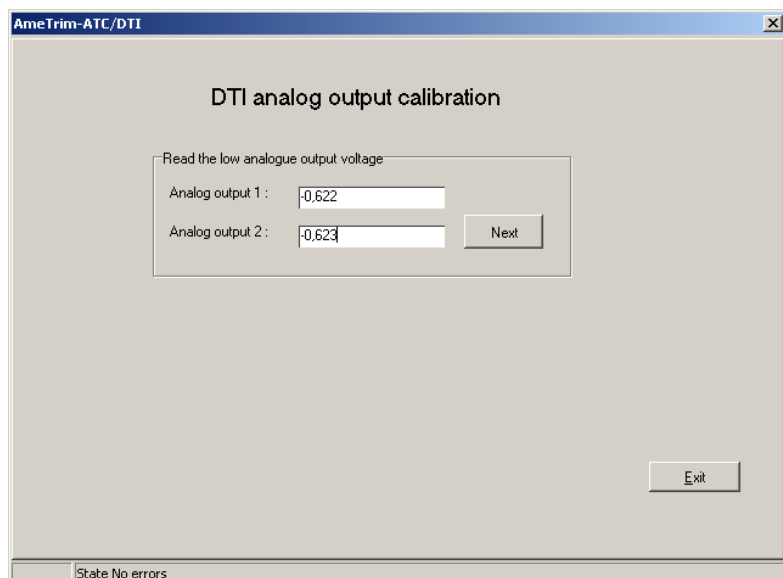
## 5.4 Analog output adjustment

(only DTI-1000 with firmware ver. 1.60 or earlier).

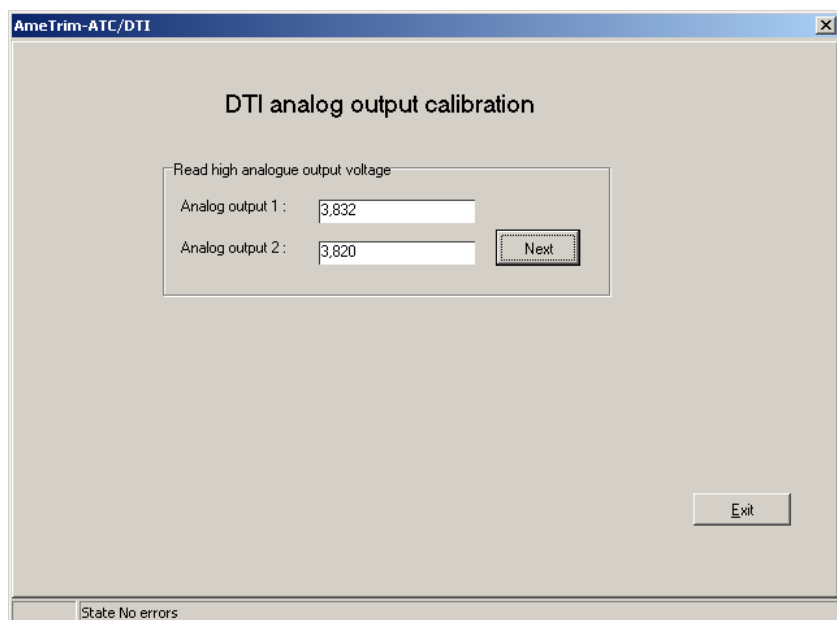
This option allows you to adjust the analog output of the DTI-1000. For adjusting the analog output you need a voltmeter 0V to 5V range with 0.1mV resolution and an accuracy of 0.1 mV.



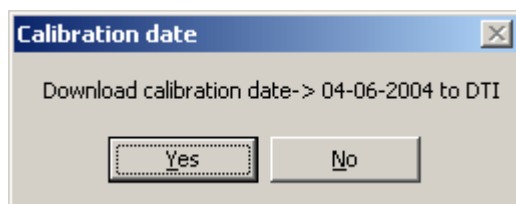
After entering the DTI analog output adjustment window, press "Start" to begin the adjustment procedure.



Measure the output voltages of the two analog outputs, enter the values and press “Next”.



Repeat the measurement of the output voltage for high output, enter the values and press “Next”.

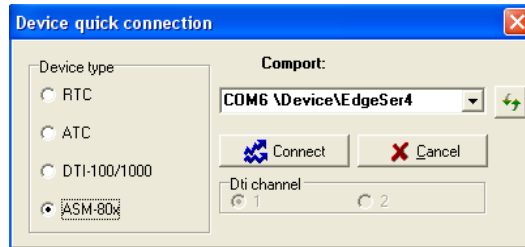


Press “Yes” to download calibration date and then “Exit” to return to the main menu.



## 6. Using ASM with the AmeTrim

In the main menu select “Run Program” to start the calibration.



Select “ASM-80x” and “Comport” in the “Device Quick Connect” dialog box and press “Connect”.

If the ASM-80x is not switched on or is not connected to the selected port, then the software returns to the AMETRIM adjustment software main menu.



### Note...

Before starting this software, the PC and the ASM-80x must be connected together and the ASM-80x switched on.

### 6.1 Connecting the PC and the ASM-80x



### Caution...

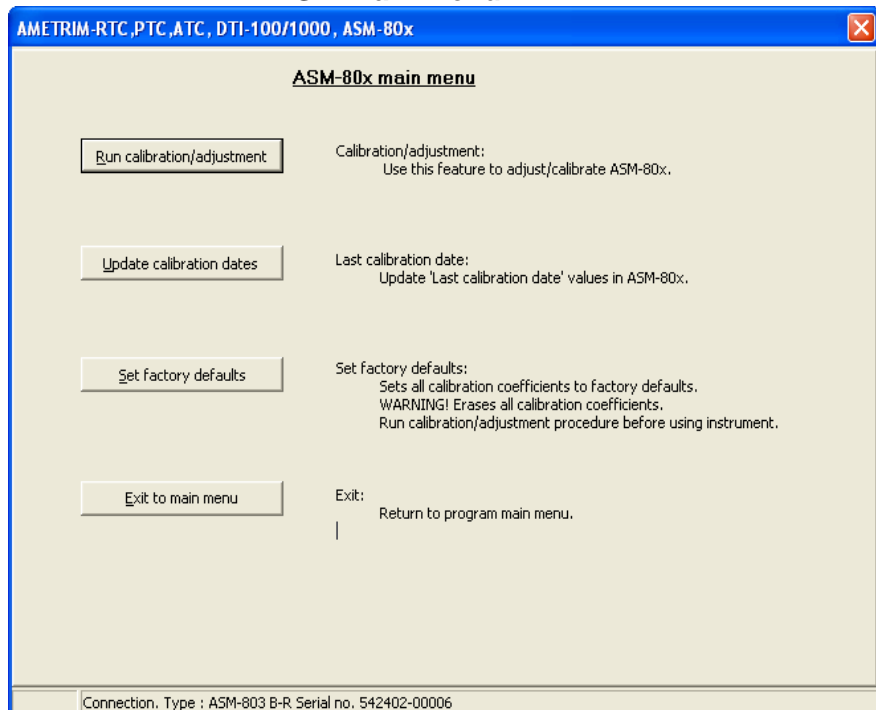
- 1.Ensure that both the PC and the ASM-80x are switched off at the mains. Failure to do so may result in your equipment being damaged.
- 2.Connect the serial cable provided to the “RS 232” port on the front of the ASM-80x and to the COM port on the PC.
- 3.Switch on the PC and the ASM-80x.

If the calibrator is not switched on or is not one of the models covered by this manual, then the software closes automatically.

As the software starts, it detects the type of instrument connected to the PC and reads its serial number.

This information plus the COM port the calibrator is connected to is displayed at the bottom of the AMETRIM window.

### ASM main menu



## 6.2 Run calibration/adjustment

This option allows you to check the accuracy of the ASM-80x electrical inputs. You will require a calibrated reference signal source.

For Cold Junction compensation, you will also require a stable temperature source, for example an ice bath, and a conversion table to provide the sensor's corresponding  $\mu\text{V}$  value for the bath's temperature.



### Note...

Before calibrating/adjusting the inputs, the ASM-80x must have been turned on for at least half an hour.

In order to calibrate the inputs the following calibrated signals must be used:

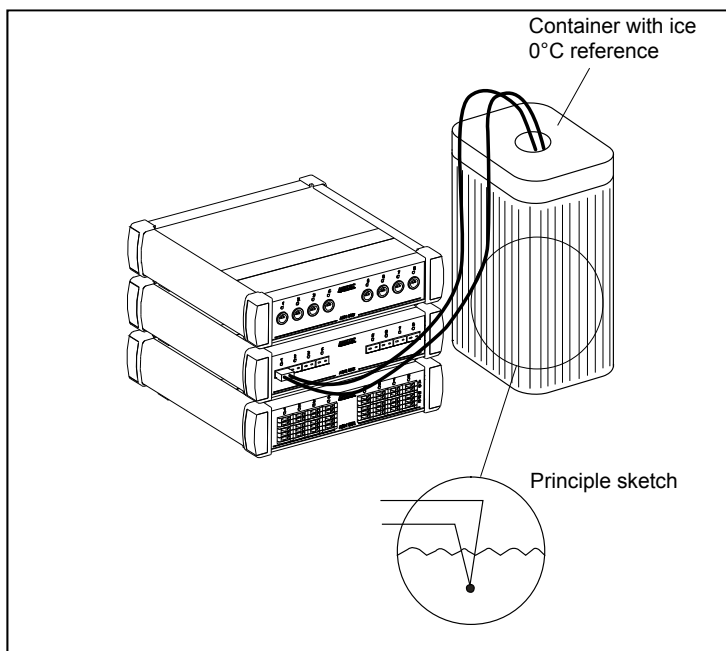
#### Nominal values

#### Accepted range

- |                               |  |
|-------------------------------|--|
| • RTD Input:                  |  |
| 50 $\Omega$                   | (20 to 70 $\Omega$ )   |
| 176 $\Omega$                  | (150 to 200 $\Omega$ )   |
| 360 $\Omega$                  | (330 to 390 $\Omega$ )   |
| 1760 $\Omega$                 | (1500 to 2000 $\Omega$ )   |
| 3600 $\Omega$                 | (3300 to 3900 $\Omega$ )   |
| • mA inputs:                  |  |
| 0 mA                          | (-1 to +1 mA)  |
| 10 mA                         | (9 to 11 mA)   |
| 20 mA                         | (18 to 22 mA)  |
| • V Inputs:                   |  |
| 0 V                           | (-1 to +1 V)   |
| 5 V                           | (3 to 7 V)   |
| 10 V                          | (9 to 11 V)  |
| • mV inputs:                  |  |
| 0 mV                          | (-1 to +1 mV)  |
| 35 mV                         | (25 to 45 mV)  |
| 70 mV                         | (63 to 77 mV)  |
| • Cold Junction compensation: | T-type thermocouple and a reference junction, for example an ice bath. |

The number and type of electrical inputs to be checked is user-definable. You can also define if you want to check the inputs by just measuring them, adjust and calibrate or to measure, adjust and then calibrate the electrical inputs.

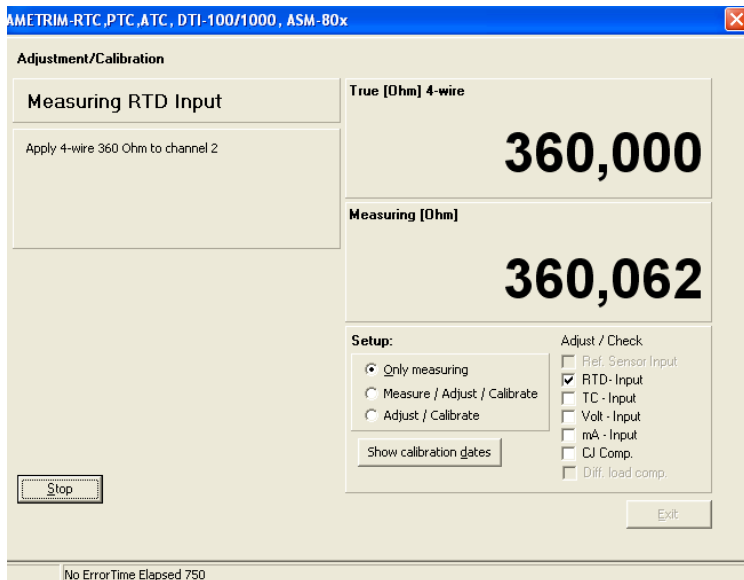
Cold Junction compensation requires a special setup, using a calibrated thermocouple and temperature source, for example an ice bath. This and the measurement principles are shown briefly below:



If at any point you do not wish to continue, click Stop. The software exits this option and returns to the Main Menu.








In AMETRIM main menu, click Run calibration/adjustment.




By clicking the Calibration dates button, you can view the last calibration date.

## To calibrate the ASM-80x

-  Click the radio button Only measuring.
-  Use the check box list to select the inputs to be measured. For A-models, only CJ-Comp. Can be selected.
-  Use the check box list to select the input types to be measured.
-  Connect the reference signal source to the appropriate channel when prompted.
-  Click Start and follow the instructions on screen.

The software starts measuring the first of the selected inputs. Ensure that the correct reference signal source is connected when prompted.

-  When all the selected inputs have been measured a new dialogue appears.



Type a unique name for the measurements. Click As found and ensure that the date is correct. This information will appear in a measurement report displayed on screen.



Click OK to view the measurement report.



### Note...

These results are not saved electronically. If you require a record of these measurements, click Print while it is displayed.



When you are finished viewing or printing the report, click Close. This returns you to the first dialogue in the Temperature adjustment option.



If you do not require any further measurements, click Done to return to the Main Menu.

## To adjust and calibrate (as left) the ASM-80x



### Note...

If you select Cold Junction compensation, either you must also select the mV (TC) Input or be sure that the mV(TC) range is calibrated.



Click the radio button Adjust/Calibrate.



Use the check box list to select the inputs to be measured.

If you have selected more than one check box, the measurements occur in the same order as they appear in the check box list.



Connect the reference signal source to the appropriate channel (when prompted).



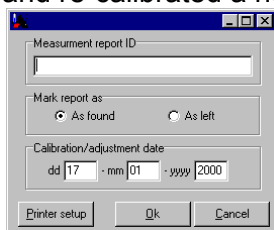
Click Start and follow the instructions on screen.

Each input has several pre-set input values. Ensure that the reference signal source is adjusted correctly when prompted.

For Cold Junction compensation, ensure the corresponding  $\mu\text{V}$  value for the calibrated junction temperature is entered ( $0\mu\text{V}$  @  $0^\circ\text{C}$ ).

The software measures the pre-set values for the selected input, adjusts the settings and then re-calibrates the calibrator's inputs. All this is done before moving on to the next selected input.

When all the selected inputs have been measured, adjusted and re-calibrated a new dialogue appears.



Type a unique name for the measurements. Click As left and ensure that the date is correct. This information will appear in a measurement report displayed on screen.



Click OK to view the measurement report.



### Note...

These results are not saved electronically. If you require a record of these measurements, click Print while the report is displayed.



When you are finished viewing or printing the report, click Close. This returns you to the first dialogue in the Temperature adjustment option.



If you do not require any further measurements, click Done to return to the Main Menu.

## **To calibrate (as found), adjust and calibrate (as left) the ASM-80x**



### **Note...**

If you select Cold Junction compensation, either you must also select the mV (TC) Input or be sure that the mV(TC) range is calibrated.



Click the radio button Measure/Adjust/Calibrate.



Use the check box list to select the inputs to be measured.

If you have selected more than one check box, the measurements occur in the same order as they appear in the check box list.



Connect the reference signal source to the appropriate channel (when prompted).



Click Start and follow the instructions on screen.

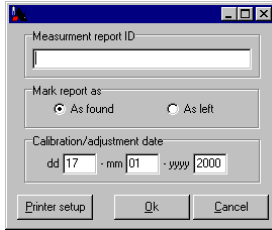
Each input has several pre-set input values. Ensure that the reference signal source is adjusted correctly when prompted.

For Cold Junction compensation, ensure the corresponding  $\mu\text{V}$  value for the calibrated junction temperature is entered ( $0\mu\text{V}$  @  $0^\circ\text{C}$ ).

The software measures the pre-set values for the selected input, adjusts the settings and then re-calibrates the calibrator's inputs. All this is done before moving on to the next selected input.



When all the selected inputs have been measured, adjusted and re-calibrated a new dialogue appears.



Type a unique name for the measurements. Click As left and ensure that the date is correct. This information will appear in a measurement report displayed on screen.



Click OK to view the measurement report.



### **Note...**

These results are not saved electronically. If you require a record of these measurements, click Print while the report is displayed.



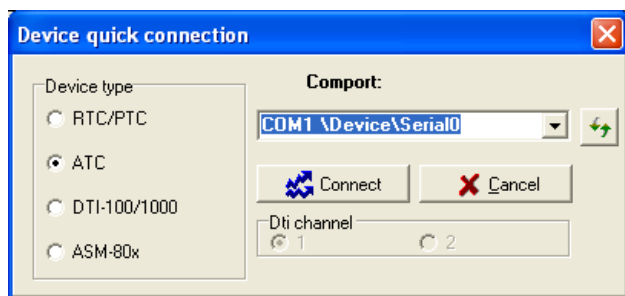
When you are finished viewing or printing the report, click Close. This returns you to the first dialogue in the Temperature adjustment option.



If you do not require any further measurements, click Done to return to the Main Menu.

## 7. Using ATC with the AmeTrim

In the main menu select “Run Program” to start the calibration.



Select “ATC” and “Comport” in the “Device Quick Connect” dialog box and press “Connect”.

### 7.1 Connecting the PC and the ATC



#### Caution...

1. Ensure that both the PC and the calibrator are switched off at the mains. Failure to do so may result in your equipment being damaged.
2. Connect the serial cable provided to the “RS232” port on the front of the calibrator and to the COM port on the PC.
3. Switch on the PC and the calibrator.

Use the normal Windows procedure to start the AmeTrim-ATC software.

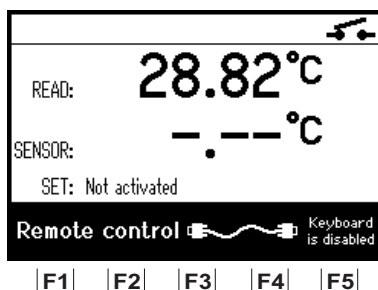
If the calibrator is not switched on or is not one of the models covered by this manual, then the software closes automatically.

The calibrator must not be performing any tasks like switch test, autostep or workorders. That means that the calibrator must be in the main menu before starting the software.

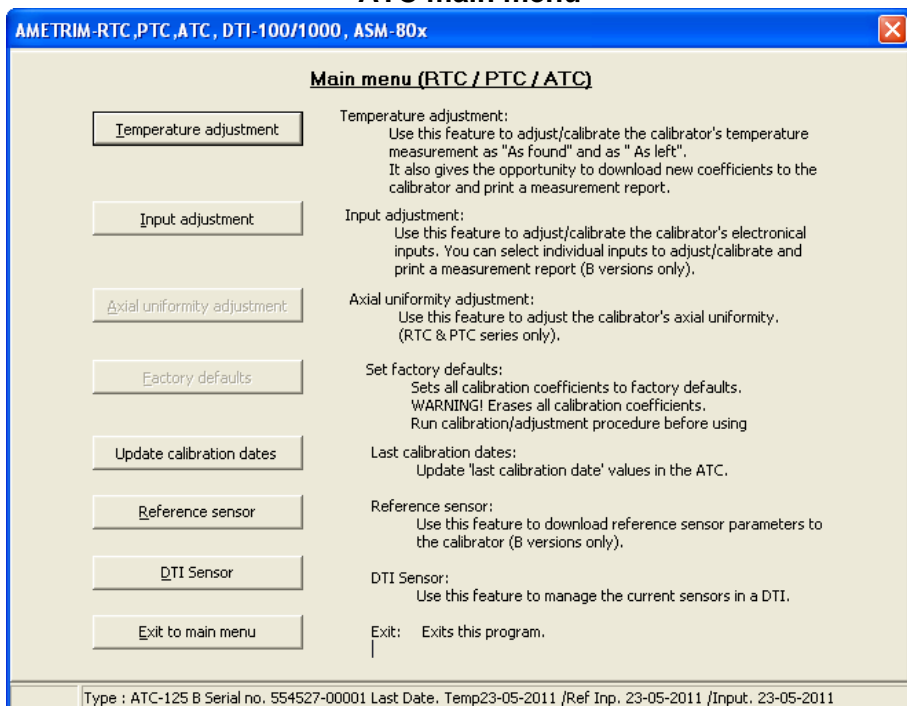


## Note...

When software is used to control the calibrator, the calibrator's keyboard is disabled and the display indicates that the calibrator is remote controlled.



## ATC main menu



## 7.2 Adjusting and calibrating the instrument

Ametrim allows you to calibrate/adjust the calibrator yourself using the AmeTrim-ATC Adjust and Calibration Software. This software is divided into 3 separate processes:

- **Temperature Adjustment:** This checks the accuracy of the heat source and internal sensor in the calibrator, (section 7.3).
- **Input Adjustment:** This checks the accuracy of the calibrator's electrical inputs (for B versions only), (section 7.4).
- **Calibration date:** Use this feature to download a new calibration date to the DTI.
- **Reference Sensor:** This ensures that the electrical values from the reference sensor correspond to the correct temperature values. The calibration values of the sensor can be downloaded to the calibrator. (B versions only), (section 7.5).
- **DTI Sensor:** Use this feature to manage the coefficients of the sensors in an AMETEK Digital Temperature Indicator (DTI) instrument.

## 7.3 Temperature Adjustment

- Temperature Adjustment
- This enables you to check the accuracy of the heat source and the internal sensor in the calibrator.
- This can be done in 3 ways:
  - Using the external reference sensor on the ATC (B-version) to measure the TRUE temperature, AmeTrim-ATC can perform a fully automatic calibration and adjustment of the internal sensor. The calibrated reference sensor should then be connected to the reference input.
  - Using a Digital Temperature Indicator (DTI) AmeTrim-ATC can read the TRUE temperature from the DTI and also make a fully automatic calibration and adjustment of the internal sensor. The DTI must be connected to a vacant serial COM port. See fig. 3.
  - Using any other reference instrument, AmeTrim-ATC will set the temperature sequence and the TRUE values can be entered as they occur as manual inputs.

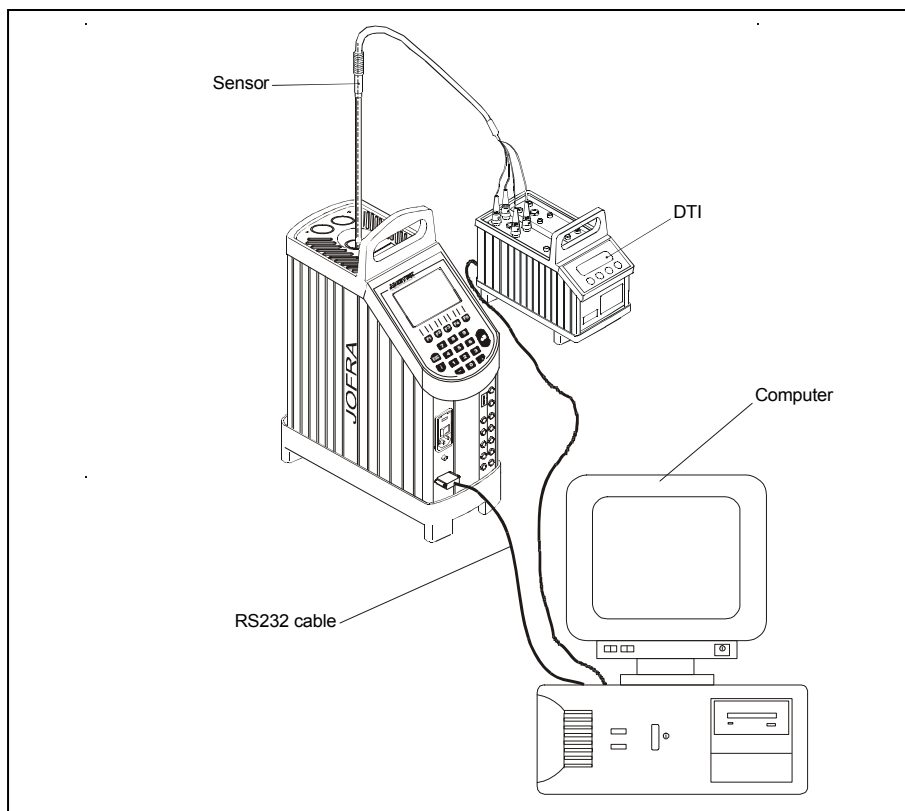
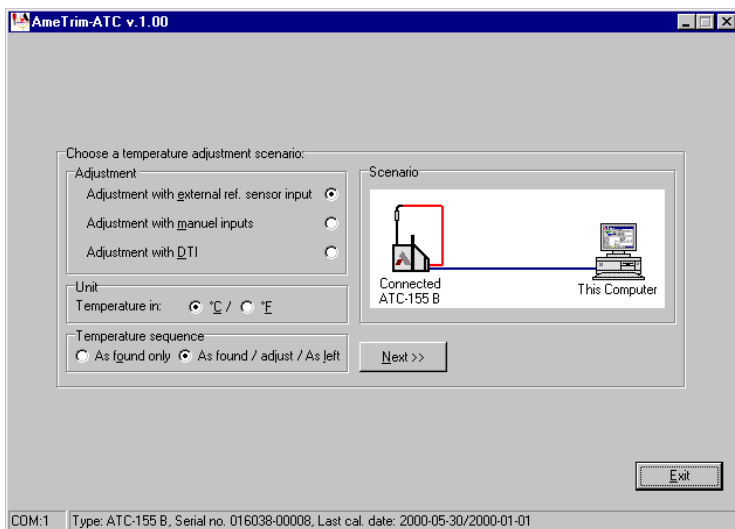


Fig. 3



In AmeTrim-ATC main menu, click Temperature adjustment.



Click a radio button to select the scenario that should be used, depending on which calibrated temperature reference that is available.



Click a radio button to select the desired temperature units.



Click a radio button to select whether the calibration only should be performed as an “As Found” which means without adjusting the internal sensor, or if it should be both as an “As found” measurement followed by and adjustment of the sensor and a final “As Left” calibration after the adjustment. After the calibration measurement reports on both calibrations can be printed.



Enter the ambient temperature and the operator initials. These are to be used on the printed measurement reports.

**Enter information**

Calibrator serial number  
Serial No. 016038-00008

Ambient temperature  
Ambient  °C

Operator Initials  
Operator

Ok Cancel

Ensure that the precision thermometer is positioned correctly and ready to measure the temperatures.



Confirm that the calibration should be started.

Information on the last calibration date for the reference input is read from the calibrator and given to help you ensuring an adequate calibrated reference.

**Confirm**

The current reference sensor in the calibrator is "DEFAULT-ITS90"  
Last calibration date for the reference input was: 2000-01-01 (yyyy-mm-dd)

Do you want to continue with the temperature calibration ?

The calibration will start when you press the "Next" button. Please connect the reference sensor now.

Yes No



Click Yes. The calibrator immediately starts working towards the temperature defined in the first step.

A new dialogue containing a table with pre-defined temperature steps is displayed. The calibrator type determines the range of these steps.



**AmeTrim-ATC v.1.00**

Instrument type: ATC-155 B, Serial: 016038-00008

Measurement data

Steps	Read temp.	True temp.
-15	-15.00	-15.15
0	0.00	-0.07
25		
50		
75		
100		
125		
155		

Status

Instrument


**Set temperature** 25.00 °C

**Read temperature** 25.00 °C

**True temperature** 25.03 °C

Calibration

**Status** Stable in about 5:51 min.

**Next temperature**  50 °C

**Time left of calibration (approx.)** 5:56 (hh:mm)

CDM:1 Type: ATC-155 B, Serial no. 016038-00008, Last cal. date: 2000-05-30/2000-01-01

**Stop**

When using the external reference sensor input on the calibrator, or when using a DTI, the calibration and adjustment will now run automatically.

## Adjusting with manual inputs

If manual inputs are selected in the adjustment Scenario menu, the calibration will be performed in a little different way.



Enter the data to be used on the printed measurement reports and click Ok.

**Enter information**

Calibrator serial number

Serial No. 016038-00008

Ambient temperature

Ambient  °C

Operator Initials

Operator

Decimals

True values

Reference equipment

**Ok** **Cancel**



When the True temperature is stable click “Enter value”. In

the new dialogue, type in the correct “TRUE temperature” value read from the external precision thermometer.

Steps	Read temp.	True temp.
15		
0		
25		
50		
75		
100		
125		
155		



Click OK. The READ temperature measured by the calibrator and the TRUE value are entered in the table.

The calibrator now starts working towards the next temperature level.



Repeat these steps until READ and TRUE values have been entered for each temperature step.



Click Calculate to provide a new set of calibration coefficients for the calibrator.



### Note...

If you want a record of the measured TRUE and READ values, you must click Print now. These values are not saved once you return to the AmeTrim Main Menu.



### Note...

Downloading new coefficients to the calibrator overwrites the existing ones already resident in the calibrator.

To prevent unintentional overwriting of existing coefficients, a warning appears requiring you to confirm the download.



When you are satisfied with the measured and calculated values, click Download to send the correction values to the calibrator.



Click Done to exit the Temperature adjustment option.

## 7.4 Input Adjustment (B versions only)

This option allows you to check the accuracy of the calibrator's electrical inputs (for B versions only). In addition to the equipment already described in sections 7.1, you also require a calibrated reference signal source. For Cold Junction compensation, you will also require a stable temperature source, for example an ice bath, and a conversion table to provide the sensor's corresponding  $\mu\text{V}$  value for the bath's temperature.



### Note...

Before calibrating/adjusting the inputs the calibrator must have been turned on for at least half an hour with the SET temperature "Not Activated" (the initial mode when turned on).

In order to calibrate the inputs the following calibrated signals must be used:

<b>Nominal values</b>	<b>Accepted range</b>
• RTD and Reference Inputs:	
50 $\Omega$	(45 to 70 $\Omega$ )
176 $\Omega$	(150 to 200 $\Omega$ )
345 $\Omega$	(330 to 350 $\Omega$ )
• RTD inputs:	
1000 $\Omega$	(800 to 1200 $\Omega$ )
2700 $\Omega$	(2300 to 2900 $\Omega$ )
• mA inputs:	
0 mA	(-1 to +1 mA)
10 mA	(9 to 11 mA)
20 mA	(18 to 22 mA)
• V Inputs:	
0 V	(-1 to +1 V)
5 V	(3 to 7 V)
10 V	(9 to 11 V)
• mV inputs:	
0 mV	(-1 to +1 mV)
35 mV	(25 to 45 mV)
70 mV	(63 to 77 mV)
• Cold Junction compensation:	N-type thermocouple and a reference junction, for example an ice bath.

Note that Cold Junction compensation is only possible when "Measure/Adjust/Calibrate" is selected.

The number and type of electrical inputs to be checked is user-definable. You can also define if you want to check the inputs by just measuring them or to measure, adjust and then calibrate the electrical inputs.

Cold Junction compensation requires a special setup, using a calibrated temperature source, for example an ice bath. This and the measurement principles are shown briefly below:

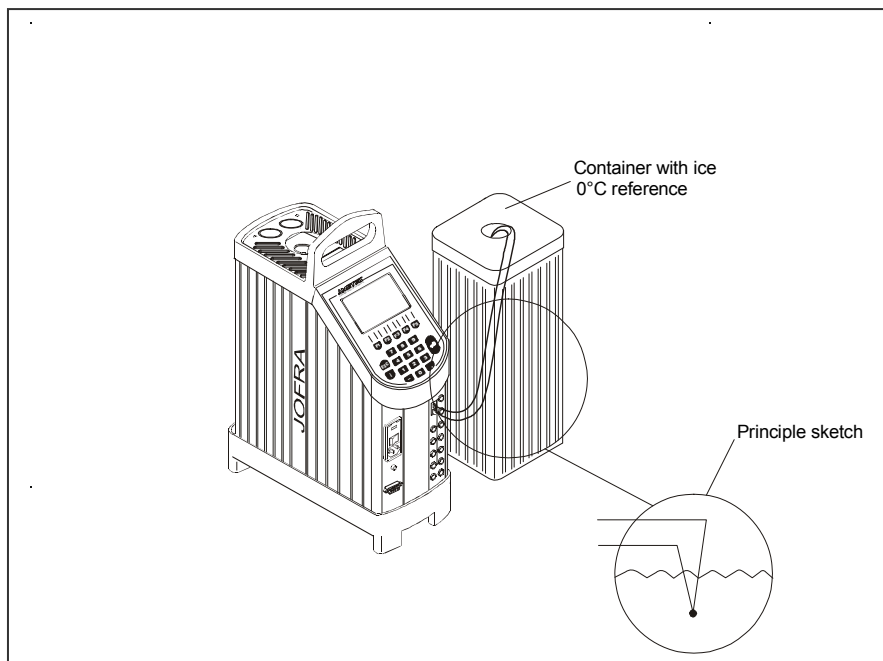
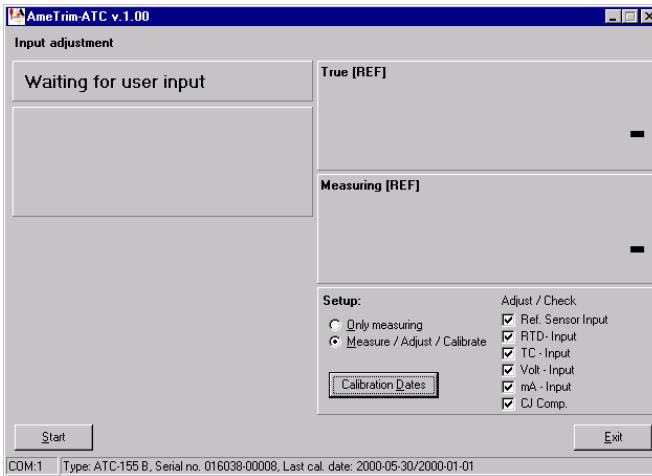


Fig. 4

If at any point you do not wish to continue, click Stop. The software exits this option and returns to the Main Menu.



In AmeTrim-ATC main menu, click Input adjustment.



By clicking the Calibration Date button, you can view the last calibration dates for each of the inputs.

## To view the current Input values



Click the radio button Only measuring.



Use the check box list to select the inputs to be measured.

If you have selected more than one input to be measured, the measurements occur in the same order as they appear in the check box list.



Use the check box list to select the inputs to be measured.



Connect the reference signal source to the appropriate input(s) when prompted.



Click Start and follow the instructions on screen.

The software starts measuring the first of the selected inputs. Ensure that the correct reference signal source is connected when prompted.



When all the selected inputs have been measured a new dialogue appears.



Type a unique name for the measurements. Click As found and ensure that the date is correct. This information will appear in a measurement report displayed on screen.



Click OK to view the measurement report.



### Note...

These results are not saved electronically. If you require a record of these measurements, click Print while it is displayed.



When you are finished viewing or printing the report, click Close. This returns you to the first dialogue in the Temperature adjustment option.



If you do not require any further measurements, click Done to return to the Main Menu.

## To view, adjust and calibrate the current Input values



### Note...

If you select Cold Junction compensation, either you must also select the mV (TC) Input or be sure that the (TC) Input is calibrated.



Click the radio button Measure/Adjust/Calibrate.



Use the check box list to select the inputs to be measured.

If you have selected more than one check box, the measurements occur in the same order as they appear in the check box list.



Connect the reference signal source to the appropriate input(s) (when prompted).



Click Start and follow the instructions on screen.

Each input has several pre-set input values. Ensure that the reference signal source is adjusted correctly when prompted.

For Cold Junction compensation, ensure the corresponding  $\mu\text{V}$  value for the calibrated junction temperature is entered ( $0\mu\text{V} @ 0^\circ\text{C}$ ).

The software measures the pre-set values for the selected input, adjusts the settings and then re-calibrates the calibrator's inputs. All this is done before moving on to the next selected input.



When all the selected inputs have been measured, adjusted and re-calibrated a new dialogue appears.

Measurement report ID

Mark report as:  
☒ As found ☐ As left

Calibration/adjustment date:  
dd 17 - mm 01 - yyyy 2000

Printer setup OK Cancel



Type a unique name for the measurements. Click As left and ensure that the date is correct. This information will appear in a measurement report displayed on screen.



Click OK to view the measurement report.



### Note...

These results are not saved electronically. If you require a record of these measurements, click Print while the report is displayed.





When you are finished viewing or printing the report, click Close. This returns you to the first dialogue in the Temperature adjustment option.



If you do not require any further measurements, click Done to return to the Main Menu.

## 7.5 Reference Sensor

This option enables you to view the calibration values currently loaded in the calibrator for the reference sensor as well as enter and download values for new reference sensors. In addition to the equipment already described in sections 7.1, you also require the calibration certificate for the new reference sensor.



In AmeTrim-ATC main menu, click Reference sensor.

A new dialogue with a table containing the calibration of corresponding temperatures and resistances of the reference sensor. If none are present in the calibrator, then the default values are displayed.

**AmeTrim-ATC v1.00**  
Reference sensor download

Reference sensor parameters  
Sensor serial no.: Default-ITS90

	Ref. Temp.	Ohm
Step 1	-25,000	90,190
Step 2	0,000	100,000
Step 3	100,000	138,510
Step 4	200,000	175,860
Step 5	300,000	212,050

Add step Delete step

Unit  
☒ Temperature in °C    ☐ Temperature in °F

Interaction  
 Upload values  
 Download values  
 Default values



Exit

COM:1 | Type: ATC-155 B, Serial no. 016038-00008, Last cal. date: 2000-05-30/2000-01-01







Click a radio button to select the desired temperature units.

## To view current values in the Calibrator

-  Click Upload values. The current reference sensor values stored in the calibrator are displayed.
-  Click Done when you are finished viewing the values. This returns you to the AmeTrim-ATC Main Menu.

## To enter values for a new reference sensor

-  Type in a unique and descriptive name for the reference sensor.  
Use the mouse to position the pointer in the boxes in the table.
-  Type in the temperature and resistance values from the Calibration Certificate supplied with the reference sensor.
-  If the calibration data fills more than the steps currently displayed, click Add step. If it fills less than the number of steps displayed, click Delete step.
-  When all the values from the Calibration Certificate have been entered, click Download values.  
When the values are downloaded they overwrite the ones stored in the calibrator.

## Default values

This option downloads a set of default values, which are stored in the AmeTrim-ATC software.

## 7.6 Managing DTI sensor coefficients

This dialog enables you to type in coefficient values for the reference sensor connected to the DTI



### Note...

These coefficients are not saved. Therefore, they must be typed in and downloaded when they need to be used.

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DTI sensor Data

Sensor position:

☒ Sensor 1 ☐ Sensor 2

Sensor name: Test 4

Ro: 1.000584E+02 B: -5.771973E-07

A: 3.918022E-03 C: -1.445963E-11

Interaction

Upload

Download

Default

Exit

COM:1 Type: ATC-650 B, Serial no. Not Assigned, Last cal. date: 2000-01-01/2000-01-01



Select the channel that is used to connect this sensor to the DTI.



Type in the correct coefficients for the selected sensor



When you are satisfied with all the values, click Download. Default values can be selected by using the Default button.

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Portable dry-block calibrators, precision thermometers and liquid baths. Temperature sensors for industrial and marine use.

##### *Pressure Calibrators*

Convenient electronic systems ranging from -25 mbar to 1000 bar - fully temperature-compensated for problem-free and accurate field use.

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Process signal measurement and simulation for easy control loop calibration and measurement tasks.

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