

User Manual
JofraCal
for JOFRA Temperature, Pressure and Signal
Calibrators

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1. INTRODUCTION

This manual contains installation and operating instructions for:

JOFRA WINDOWS' CALIBRATION PROGRAM

JofraCal

The program was developed by:

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1.1 General information

The JofraCal program is designed to perform temperature tests and to calibrate temperature sensors using JOFRA equipment with RS-232 communication ports.

The software comes on a CD-ROM 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.

1.2 Hardware requirements

JofraCal can communicate with the following JOFRA equipment and has the following requirements from the PC:

1.2.1 JOFRA calibrator, models:

- | | |
|----------------------------------|--------------|
| • D55SE-RS | • CTC-140 A |
| • D55SE-RS with external tower | • CTC-320 A |
| | • CTC-320 B |
| • CE140SE-RS | • CTC-650 A |
| • CE140SE-RS with external tower | • CTC-650 B |
| | • CTC-1200 A |
| • 250SE-RS | • MTC-140 A |
| • 250SE-2-RS | • MTC-320 A |
| • CE250SE-RS | • MTC-320 B |
| | • MTC-650 A |
| • 650SE-RS | • MTC-650 B |
| • 650SE-2-RS | |
| • CE650SE-RS | • ITC-155 A |
| | • ITC-320 A |
| • 1200SE-RS | • ITC-650 A |
| • ATC-155 A | • ETC-125 A |
| • ATC-155 B | • ETC-400 A |
| • ATC-156 A | • ETC-400 R |
| • ATC-156 B | |
| • ATC-157 A | |
| • ATC-157 B | • ATC-140 A |
| • ATC-320 A | • ATC-140 B |
| • ATC-320 B | • ATC-250 A |
| • ATC-650 A | • ATC-250 B |
| • ATC-650 B | |

JOFRA DTI, model:

- DTI (1000, 100, 50)
- ASC300
- ASC300-R

1.2.2 PCs, minimum hardware requirements:

- Intel™ 486 processor (Pentium™ 200MHz recommended)
- 32MB RAM (64MB recommended)
- 40MB free disk space on hard disk (60MB recommended) prior to installation
- Standard VGA (800x600, 256 colours). 1024x768 recommended.
- CD-ROM drive for installation of program
- 1 or 2 free RS-232 serial ports, depending on configuration

1.2.3 PCs, minimum software requirements:

- Microsoft Windows® 98, Microsoft Windows® NT 4.0, Microsoft Windows® 2000, Microsoft Windows® ME, Microsoft Windows® XP.
- System fonts: MS Sans Serif and Arial

1.3 Installing JofraCal

The JofraCal program is supplied on a CD-ROM and comes complete with its own installation program.

Future upgrades available for download on www.ametek.dk.



Simply insert the CD and follow the instructions on screen.

By default, JofraCal is installed in the directory: *Default program folder\JofraCal*

and an icon automatically appears on the Program's menu.

If you want to install the program manually, the CD also contains a SETUP.EXE file.

☞ Note: when installing on Microsoft Windows NT® and Microsoft Windows® 2000 Professional, you must have Administrator's privileges. If not please contact your local System Administrator.

1.4 Reinstalling JofraCal

The installation program detects whether JofraCal is already installed on the PC. If already installed you will have the option to repair the current installation or remove it.

Repairing the installation will overwrite the installation program files.

Uninstalling (remove option) JofraCal will only delete the program files.

Databases are not deleted nor are they overwritten if reinstalled to the same location. If a complete reinstallation is required including databases, the old installation folder must be deleted manually or reinstalled to another location.

1.5 Converting the AmeCal–Temperature Database

It is possible to use data from the existing AmeCal–Temperature database with the new JofraCal software.

Before an AmeCal–Temperature database can be used with JofraCal it must be converted.

(See Database conversion program Section 15 Page 127)

Most data from the AmeCal database is converted including:

- Test devices, their relevant history and certificate information
- Heat source information
- Procedures

- System configuration.

1.6 Connecting JofraCal to a JOFRA device

JofraCal can be connected to a JOFRA calibrator and/or JOFRA Digital Temperature Instrument (DTI/ASC300) using a serial connection (RS232). The JOFRA device must therefore be equipped with a serial communication port. The device should be connected to a free serial port on the PC - please refer to the PC manual for further information regarding the location and appearance of serial ports. Use the serial cable supplied with the device.



- The JOFRA device must be switched off when connecting the cable from the PC.
- The JOFRA device and the PC must be earthed to avoid noise interference and damage to the equipment.
- You are advised not to switch the calibrator on until JofraCal has been started.

1.7 Starting the JofraCal program

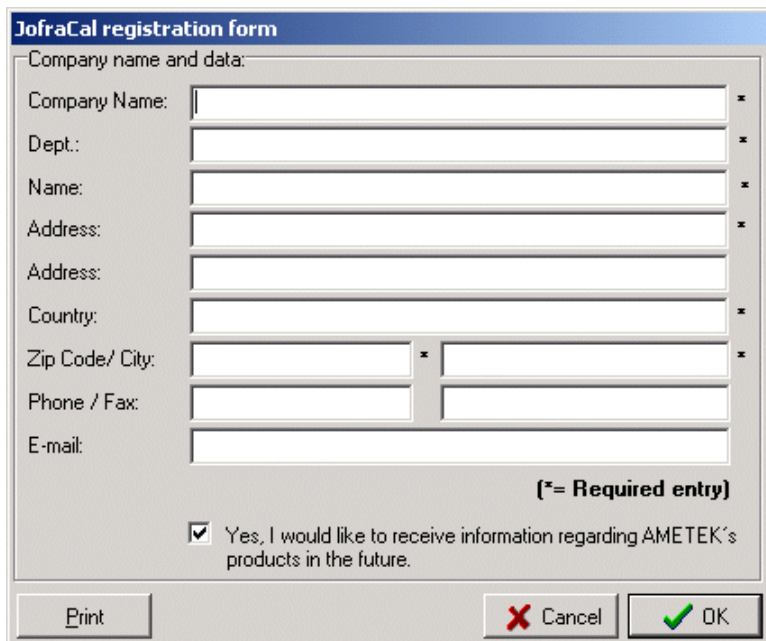
1.7.1 Windows98/2000/NT/ME/XP®

- Click *Start*.
- Select *Programs*.
- Select *JofraCal*.
- Select *JofraCal Calibration software*.

1.7.2 First time access to JofraCal

When the software is started for the first time, you are required to fill out the registration form.

Registration form



JofraCal registration form

Company name and data:

Company Name: *

Dept.: *

Name: *

Address: *

Address:

Country: *


Zip Code/ City: * *

Phone / Fax:

E-mail:

(* = Required entry)

☒ Yes, I would like to receive information regarding AMETEK's products in the future.

Note that the fields marked with a "*" must be filled out. Only when all these compulsory fields are complete you are able to click .

On start up, JofraCal begins by displaying the login dialog in which the operator must select a user and key in the password.



User and access levels, these are described in section 2 page 23.

As no user-defined names have been added at this stage, you are required to use one of the default names. These are:

MASTER or USER
(No passwords are required)

JofraCal also remembers the location of the database last used and the complete path is displayed in the database field.

The first time you log in JofraCal a default database is located in the JofraCal subdirectory \DB.

Databases can be created, selected and deleted. This is described in section 1.11 page 20.

Note: The logon dialog can also be called from the menu in JofraCal allowing the user to change both database and user without closing the program.

1.8 Backup copies



ALWAYS MAKE BACKUP COPIES!



Loosing data can waste a great deal of time and resources, and it is important that you take the time required to make a backup copy of your database. The backup copy should include all files in the JofraCal\DB folder. Backup copies should be made using a suitable backup program - follow the manufacturer's instructions.

1.9 Uninstalling JofraCal

JofraCal is removed from the PC as follows:

- Open Control Panel
- Open Add/Remove Programs
- Select JofraCal
- Press Add/Remove button and follow instructions on screens

JofraCal default database (CDS files in the \DB folder) will not be deleted during the uninstall process. The database can therefore be used for subsequent installations of JofraCal or other programs.

1.10 Program structure for JofraCal

Like other Windows® programs, JofraCal uses buttons, dialog boxes, grids, tables, etc. JofraCal uses paging controls to navigate through the main areas of the program.



The JofraCal functions are divided into five main areas:

- Device maintenance (section 3 page 27)
- Calibration setup (section 4 page 38)
- Upload / Download (section 9 page 83)
- Scheduler (section 10 page 89)
- Online Calibrating (section 13 page 108)

Apart from the main program areas, there is the system configuration dialog (section 14 page 117) called from the menu.

These functions are described in detail in the specified sections of this manual.

1.11 Database management

Under installation a default database is created. It consists of several CDS (Client Data Set) files and is located in the subdirectory \DB of the JofraCal installation folder.

For users who only require a single database, this database is always default start up database.

Program menu – database options



Select another database by clicking on the select button.



When using multiple databases, the correct database must be selected before logging on to JofraCal.

1.11.1 To create a new database

For those wishing to use multiple databases, simply create a new subdirectory and copy the new database files into the new folder. An empty database can be found on the installation CD.

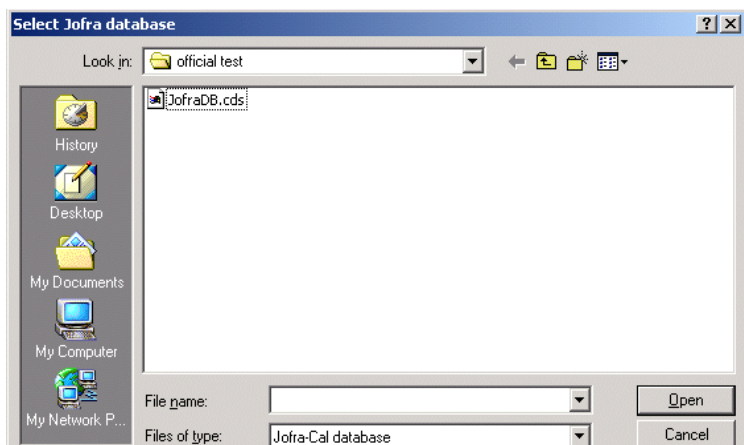


Warning. Make sure the CDS database files are not write protected after copying from the CD. Remove the ReadOnly flag if necessary.

1.11.2 To select a database

Before logging on, select the Program>logon to bring up the logon on page. Use the Select button to show the database selection dialog and find the required JofraCal.CDS file.

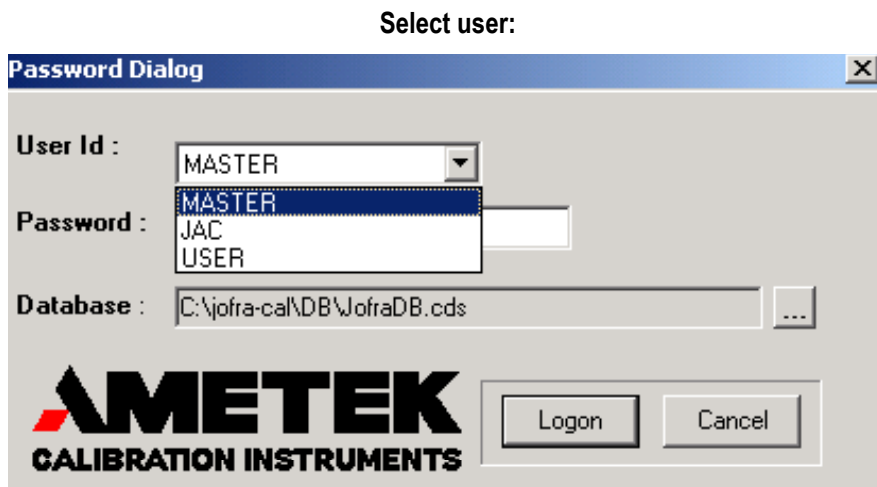
Program – Select Database



Use this dialog to locate and select the correct database. Click Open to use the selected database and return to the login menu.

2. HOW TO SELECT A USER

- ☞ When using multiple databases, the correct database must be selected before logging on to AmeCal–Temperature.
- ☞ You must select a user in order to run JofraCal.



Users are maintained in the System setup. Users can have either full access (*super users*) or restricted access (*normal users*) to the JofraCal system. Please note that users do not require full access to perform a calibration (section 14.4.1 page 124).

Details of the default user names are found in section 2.4 page 24. These provide access to the program before any user names are defined.

2.1 Super users

Super users have access to the complete database and can create, delete and edit sensors, heat sources, procedures, etc.

2.2 Normal users

Normal users cannot create, edit or delete information, nor can they modify the system setup. They can only perform calibrations using existing information, but may create certificates once the calibration procedure has been completed.

2.3 Select a user

Select a user from the User list box.

Confirm by clicking

A rectangular button with a thin border and the text "Logon" centered inside.

- or -

to exit JofraCal, click

A rectangular button with a thin border and the text "Cancel" centered inside.

An error message will be displayed if an unknown user or an incorrect password is entered.

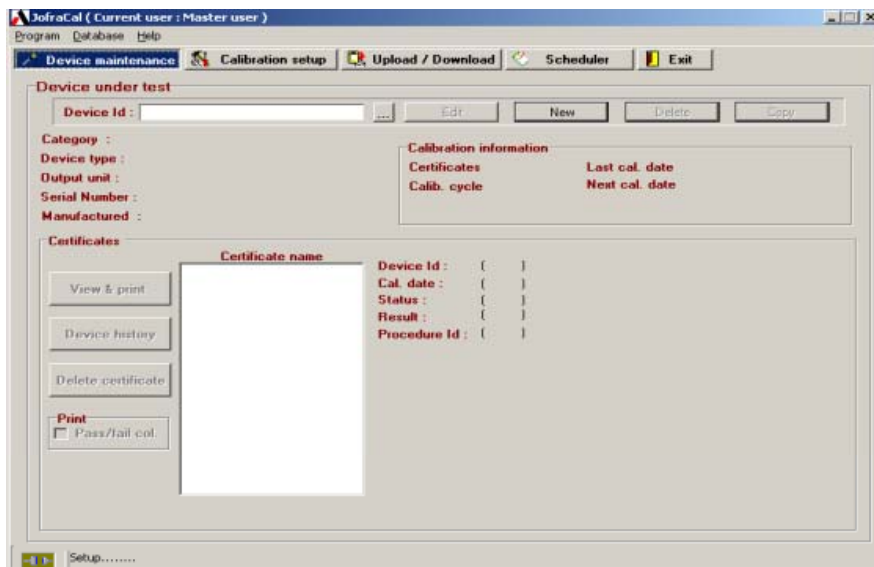
2.4 Program default user names

Two users will be set up the first time you run JofraCal. The first user name, *MASTER*, is a super user. The other user name, *USER*, is a normal user. No password has been linked to these two users. Once the 'real' users have been set up, *MASTER* and *USER* can be deleted. Note that user ID can only be deleted by a super user, and that the current user cannot be deleted, (Section 14.4.1 page 124).

2.5 Main menu

When JofraCal has accepted the selected user, the main menu is shown:

Main menu



JofraCal uses paging controls to navigate through the main areas of the program. The active page is always highlighted in blue. Select a page by clicking on the page tab.

The 5 main areas of Jofracal

Device Maintenance: Test device database and calibration history.

Calibration Setup: Select a device, set up and run a calibration.

Upload/Download: Up/download offline calibrations and maintain reference sensor database.

Scheduler: Earmark devices due for calibration.

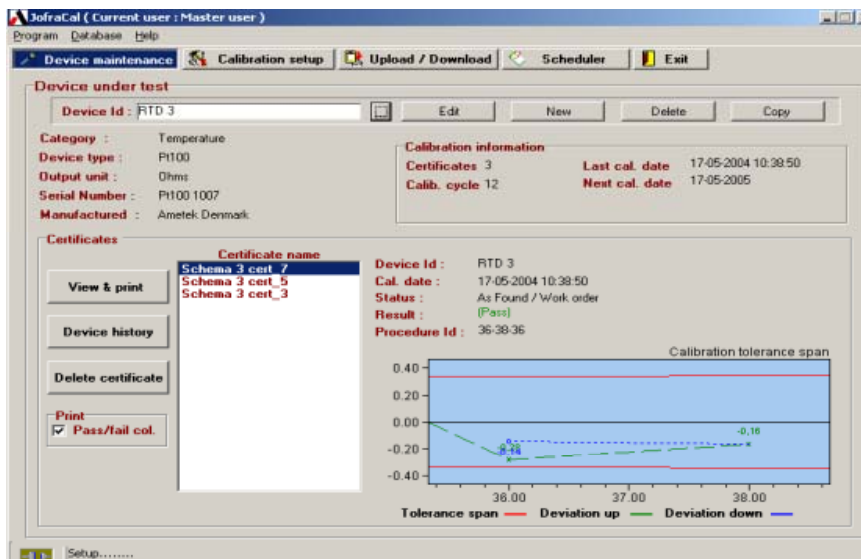
Calibrating: Online calibrating.

Exit: Not visible during online calibration.

☞ Note that the 'Calibrating' page tab replaces the 'Exit' during online calibration.


3. DEVICE MAINTENANCE

Device maintenance dialog:



The device maintenance allows the user to maintain and view the test instrument database. The user can create, copy, delete and edit a test device. (See Section 3.3 Page 36).

3.1 View a test device

To view a device the user must click the  select button to display the Device search dialog. (Section 12 page 102).

3.1.1 Device summary details

When a device is selected the user can find information regarding the device's basic properties, calibration history, and a list of previous calibration certificates.

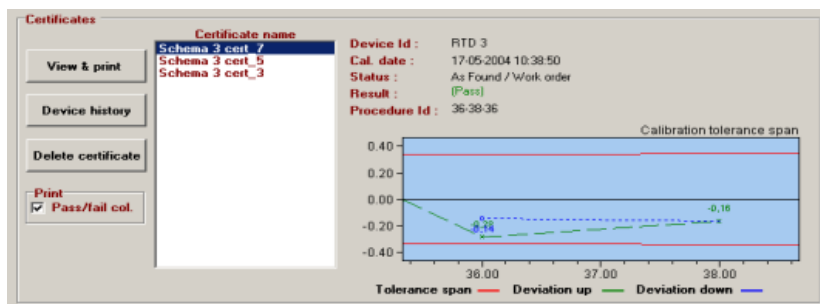
Device summary details – maintenance

| Device under test | | Calibration information | |
|-------------------|--------------------|-------------------------|---------------------|
| Device Id : | PT100-1 reserve | Certificates | 25 |
| Category : | Temperature | Last cal. date | 30-04-2004 11:26:48 |
| Device type : | Pt100 | Calib cycle | 12 |
| Output unit : | Ohms | Next cal. date | 30-04-2005 |
| Serial Number : | PT100 5115 | | |
| Manufactured : | Ametek Denmark A/S | | |

3.1.2 Calibration certificates & history

Device calibration history is seen in the lower half to the device maintenance screen including a list of all completed certificates. A brief summary of the highlighted certificate (date, pass/fail, deviation graph) is detailed to the right.

Device calibration certificates - maintenance



3.1.3 Viewing a certificate

All certificates created by JofraCal are saved in a certificate database file 'Certfile.CDS' and may be viewed, printed and saved in PDF format as, and when, required.

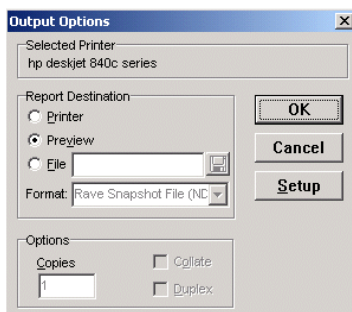
Highlight the Certificate you wish to view from the certificate list, then

View & print

click the button.

The system displays the following window:

Certificate output options - maintenance



The user has 3 output options:

1. Send direct to the printer.
2. Preview the certificate on the screen.
3. Save as a PDF of NDF formats.

If the user chooses to preview the certificate the following screen appears.

A two-page report is displayed.

Certificate preview – page 1:

Page 1 of 2 Zoom 100%

Calibration certificate

Certificate no. Schema 3 cert_11
Calibration status. As Left
Time start 15:00:00 Duration 00:08:37 Calibration date. 7. juni 2004

AMETEK
CALIBRATION INSTRUMENTS

Device under test

| | | | |
|----------------|----------------|--------------------|---------------|
| Identification | RTD 1 | Serial number | PT100 1002 |
| Manufacturer | Ametek Denmark | Pass/Fail criteria | 0,40% +0,20°C |
| Device type | PT100 | Max. Deviation | -0,12°C |
| DevSubType | P100(90)305 | Last calibrated | 7. juni 2004 |
| Output unit | Ohms | | |

Note

| | | |
|---------|--------------|------------|
| Factory | Department | Sections |
| East | Department A | Electronic |

D.U.T read Input on device

True read Reference input on source

Reference sensor

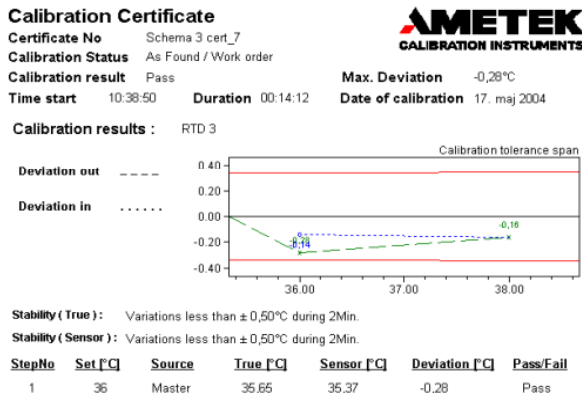
| | | | |
|----------------|-------------------|---------------|---------------|
| Identification | Ref on ATC cooler | Serial number | Default-ITS90 |
| Manufacturer | Ametek Denmark | | |

Note

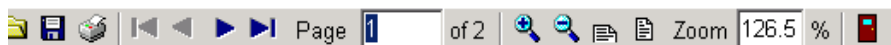
Heatsource (Master)

| | | | |
|----------------|------------|---------------|--------------|
| Identification | ATC Cooler | Serial number | 509674-00003 |
| Manufacturer | Ametek | Device type | ATC-156 B |

Certificate preview – page 2 results:



The window may be resized by dragging its corners, or it can be maximized to fill the entire screen.



The buttons at the top of the screen provide the following functions:



Open an NDR or PDF file.



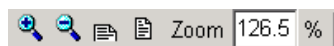
Save certificate in NDR or PDF format.



Print certificate currently displayed

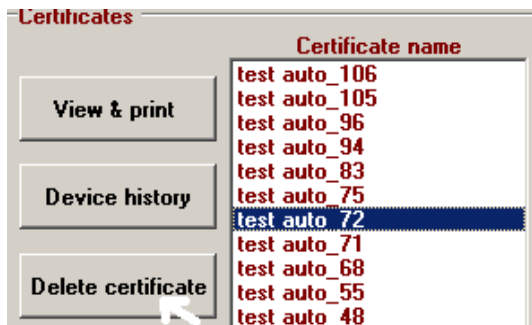


Page navigating. First, Previous, Next, last pages.
Select page number.



Page sizing controls to adjust the page view.

3.1.4 Delete certificate

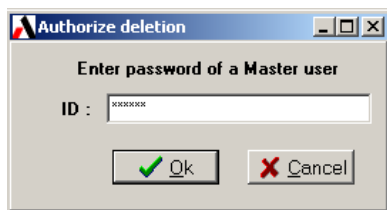


Delete a certificate by first selecting the certificate from the list you wish to delete then click the **Delete certificate** button.



Super users can only delete certificates.

To confirm deletion JofraCal will ask for authorization from a registered Master User. Here the user simply types in a valid password for a Master user.



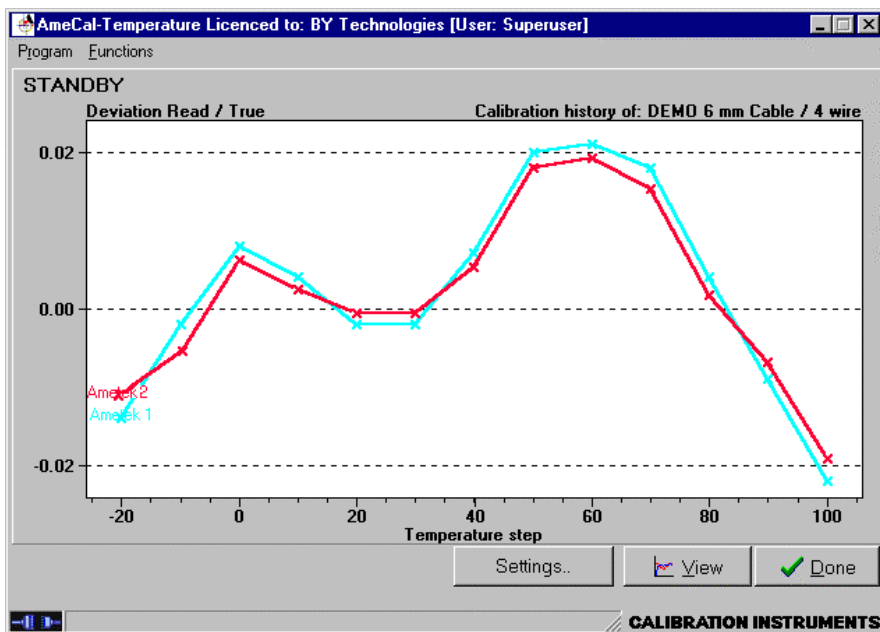
3.2 View History

All calibrations to a particular sensor can be viewed on screen as a graph. This indicates changes in the sensor's sensitivity and accuracy between different calibrations. This can be useful to show changes over time or variations between different calibration groups:

Click **Device history** to view the history of the currently selected test device.

A window containing a graph is shown:

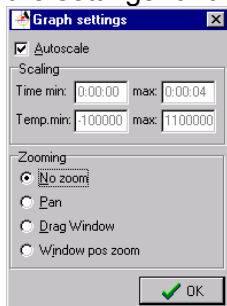
History - viewing:



The buttons at the bottom of the screen provide the following functions:

Settings..

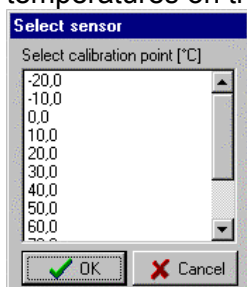
This opens a new window where you are able to change the settings for the graph:



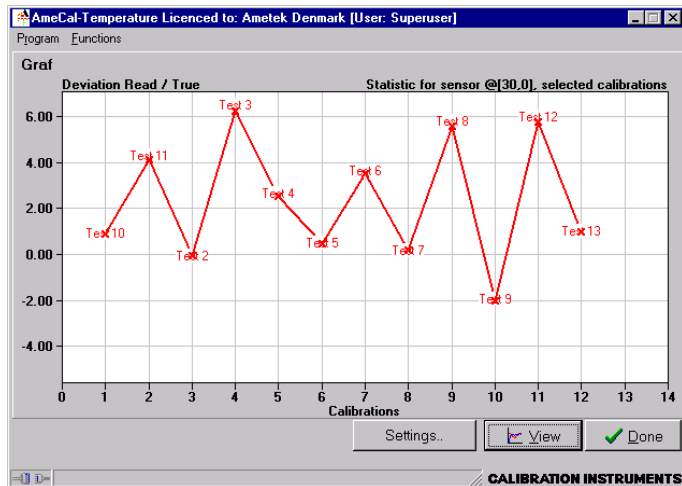
You can define the axis settings and zoom on areas of interest.

View

This provides a numeric list of all the calibration temperatures on the graph.



Use this list to select a specific calibration temperature and view all the measured values at this temperature for the sensor.



This returns you to the device maintenance page.

3.3 Edit a test device

Device under test data form contains the properties of a test device instrument.

Edit test device properties - Maintenance:

Device under test (DUT)

| | |
|----------------|--------------------|
| Device ID : | PT100-reserve |
| Manufacturer : | Ametek Denmark A/S |
| Serial No : | pt100-12 |
| Description : | Pt sensor |

Temperature range:

Min : 32,00 °F Max : 752,00 °F

Pass/Fail criteria : \pm (0,2 %rdg.+ 0,90)

Calibration

Last certificate No. : test auto_48

Last certificate : 21-04-2004

Calibration interval : 12 months

Scheduled ☐

Test setup : test

Procedure : Switch proc

Certificate note :
 Max. 30 characters.

Notes :

| | |
|---------------|------------------|
| Category : | Temperature |
| Device type : | Rtd |
| Sub type : | P100(90)385 |
| Output type : | Native (default) |
| Input wires : | 4 wire |

Location / Tags

Factory => Eastern site

Department => Electronic

Sections => R&D

Ok Cancel



Changes can only be made by a user with MASTER access.

3.3.1 Test device properties

Contains information identifying the test device.

- Device ID. (Unique value identifying every device in database)
- Maker
- Serial number
- Description
- Temperature ranges. Devices' min & max temperature limits.
- Pass-Fail. Calibration pass/fail criteria.
- Last certificate. Date and name of last calibration certificate.
- Calibration interval. How often device is to be calibrated.
- Schedule. Is the device scheduled for calibration?
- Calibration parameters. Calibration Setup and procedure ID's.
- Notes. Certificate and general notes.
- Location /tags. Identifies the devices' position.

3.3.2 Defining a device type

Definition of a test device comprises of:

- Category
- Type
- Subtypes
- Output

See Section 11.4 Page 96 for full details on Test device definition.

4. CALIBRATION SETUP

Click on the  tab to begin a calibration.

The calibration process is divided into 3 distinct stages and is navigated by “Vertical page tabs” on the right of the form.

- ① Selecting the test device(s).
- ② Create or select a predefined scenario.
- ③ Create or select a procedure method.

If the scenario and procedure have already been defined then the user must only select the device and click on the



button.

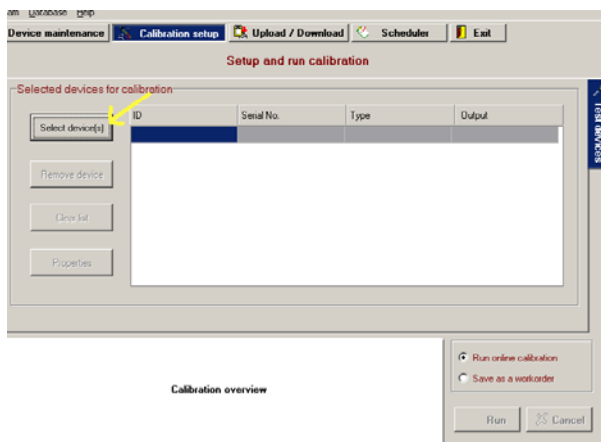
Normally the scenario and procedure are defined when the user creates a test device in the Edit Test device Dialog. (Section 11 Page 92).

4.1 Select a test device for calibration

First step is to select the devices to be calibrated.

Click on the ‘Select devices’ button highlighted by the yellow arrow in the below picture.

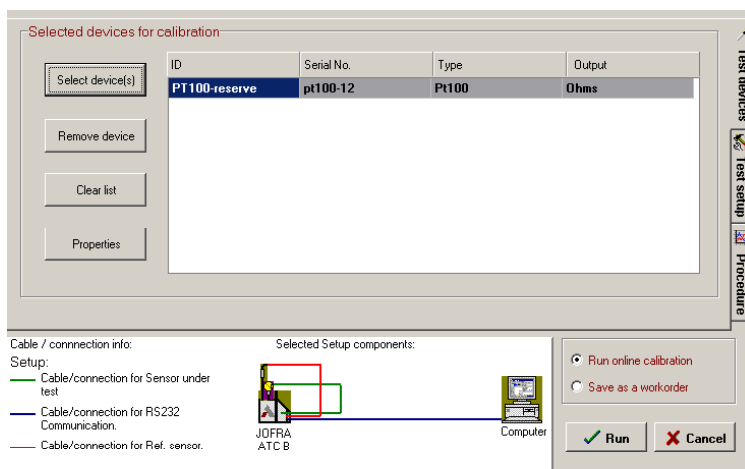
Initial screen – calibration setup



The JofraCal Search dialog is displayed. See (Section 12 Page 102) for details on the search dialog.

After selecting a device Jofracal returns to the setup pages.

Calibration setup after selecting a device





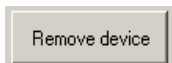
Note the 2 extra vertical tabs now displayed, Test setup (scenario) and procedures.

In this case the device in question has been assigned a setup routine, seen by the graphic scenario summary below the device list.

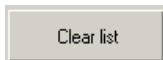
There are 4 control buttons on the device selection page.



Select device(s) for calibration.



Remove the device currently highlighted from list.



Remove all selected devices from list.



View the properties of the device currently highlighted. See (Section 11 Page 92) for details on the test device dialog.

4.2 Defining the calibration test setup scenario

The second stage of setting up a calibration is defining the test environment.

A "test setup" method can be defined and saved, then later assigned to any other test device in the database.

The **Test setup** can actually be first assigned in the **Edit Test device Dialog** when first creating the Test device See (Section 11.2 Page 95) or later here in the Calibration setup.

Test setup page – Calibration setup

Setup and run calibration

Setup ID :

| | Identification | Type | Serial no | Edit |
|-------------------|---------------------------|-----------|---------------|------|
| <u>Master</u> | ATC cooler | ATC-156 B | 509674-00003 | |
| <u>Slave</u> | Not in use | | | |
| <u>True read</u> | Reference input on source | | | |
| <u>Ref sensor</u> | ATC ref sens | Pt100 | Default-ITS90 | |
| <u>D.U.T Read</u> | RTD via input | | | |

Serial ports:

Test devices
Test setup
Procedure

The following buttons allow the user to maintain the Test setup definitions database.

Select a predefined Test setup definition.

Create a new Test setup definition.

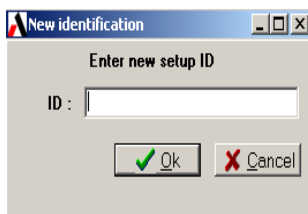
Delete the current “Test setup” definition. Be sure no other device uses this record.

Copy the current “Test setup”.

4.2.1 Creating a new Test setup

When copying or creating a new scenario the user is requested to enter a new Test Setup ID.

Request Test Setup ID



A dialog box titled "New identification" with a standard Windows title bar. Inside, it says "Enter new setup ID". Below this is a text input field labeled "ID :". At the bottom are two buttons: "Ok" with a green checkmark icon and "Cancel" with a red X icon.

Key in the new ID and click OK. A blank Test Setup page is presented ready for a complete new definition.

| | Identification | Type | Serial no | Edit | Serial ports |
|------------|----------------|------|-----------|------|--------------|
| Master | No Selection | | | ... | |
| Slave | Not in use | | | ... | |
| True read | | | | ? | |
| Ref sensor | N/A | | | ... | |
| D.U.T Read | | | | ... | |

4.2.2 Test Setup parameters


The following calibration variables are defined in this page:

Master heat source: To select a Master heat source click on the select ... button adjacent Master label.

(For details on the heat source dialog see Section 5 Page 49)

Slave heat source: To select a Slave heat source click on the select ... button adjacent Slave label. (Same as in Master).


True reading method: Defines how the True reference measurement reading will be done.

Click on the select  button adjacent True read label.
For details on the True read method dialog see (Section 6 Page 54).

Reference Sensor: If the True read method is anything other than 'internal' then this parameter must be defined.

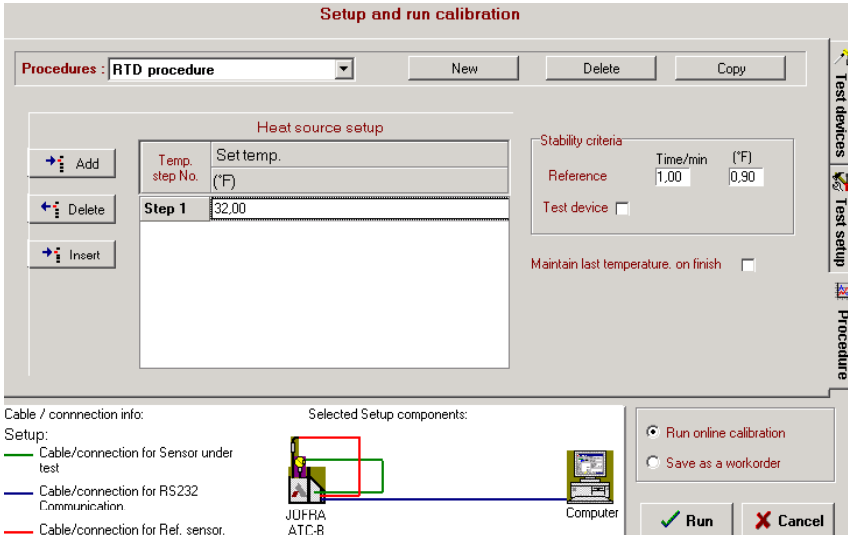
Click on the select  button adjacent Ref Sensor label.
For details on the Reference sensor dialog see (Section 7 Page 62).

D.U.T reading method – Defines how the Test device measurement reading will be done.

Click on the select  button adjacent D.U.T read label.
For details on the D.U.T read method dialog see (Section 8 Page 74).

4.3 Defining the calibration procedure

This window is used to select a calibration procedure.



Setup and run calibration

Procedures : RTD procedure [New] [Delete] [Copy]

Heat source setup

| Temp. step No. | Set temp. (°F) |
|----------------|----------------|
| Step 1 | 32.00 |

Stability criteria

Reference Time/min (°F) 1.00 0.90

Test device ☐

Maintain last temperature, on finish ☐

Cable / connection info:

Setup:

- Cable/connection for Sensor under test
- Cable/connection for RS232 Communication
- Cable/connection for Ref. sensor.

Selected Setup components:

JUHFA ATC-B Computer

Run online calibration ☒ Save as a workorder ☐

[Run] [Cancel]


The 3rd and final stage of the **calibration setup** is to define the temperature steps called procedures.

Procedures can be defined, saved and reused by any test device.

The **Procedure** can actually be first assigned in the **Edit Test device Dialog** when first creating the Test device (See Section 11.3 Page 96) or later here in the Calibration setup.

The following buttons allow the user to maintain the **Procedures** database.

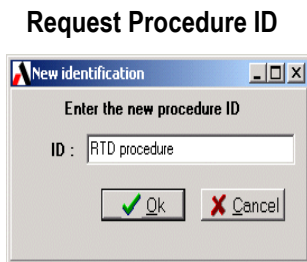
4.3.1 Selecting an existing Procedure

 Select a predefined Procedure definition.
Click on the list box and select the desired Procedure.

4.3.2 Creating a new Procedure.

 Create a new Test setup definition.

When creating a new procedure the user is requested to enter a new Procedure ID.



Type in the new ID and click OK. An initialised Procedure page is presented ready for editing

Procedure definition page

4.3.3 Deleting a procedure

Delete

Delete the currently displayed Procedure definition. JofraCal requests confirmation prior to final deletion.

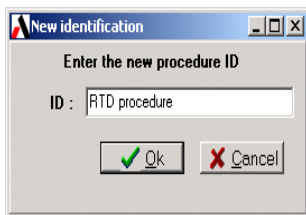
Be sure no other device uses this record.

4.3.4 Copy a procedure

Copy

Copy the currently displayed Procedure. When copying the new procedure the user is requested to enter a new Procedure ID.

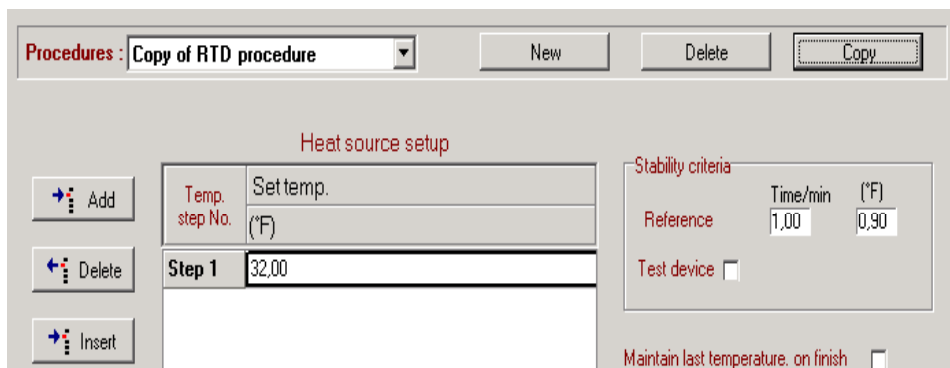
Request Procedure ID



A dialog box titled "New identification" with a standard Windows window border. Inside, the text "Enter the new procedure ID" is displayed above a text input field containing "RTD procedure". Below the input field are two buttons: "Ok" with a green checkmark icon and "Cancel" with a red X icon.

Enter the new ID and click OK. An identical procedure with a new name is displayed in the Procedure page however with a new name.

Procedure definition page



The "Procedure definition page" interface. At the top, a "Procedures:" dropdown menu shows "Copy of RTD procedure". To its right are "New", "Delete", and "Copy" buttons. Below this is a "Heat source setup" section containing a table with columns "Temp. step No." and "Set temp. (°F)". The table has one row: "Step 1" with the value "32,00". To the left of the table are "Add", "Delete", and "Insert" buttons. To the right is a "Stability criteria" section with fields for "Reference" (1,00), "Time/min" (0,90), and "°F" (0,90). There is also a "Test device" checkbox and a "Maintain last temperature, on finish" checkbox at the bottom right.

| Temp. step No. | Set temp. (°F) |
|----------------|----------------|
| Step 1 | 32,00 |

4.3.5 Test Setup parameters

The following calibration variables are defined in this page:

Temperature steps

The calibration set temperature points are entered and must be within the admissible temperature range.

Source




This is only available when a Slave (calibrator + manual heat source) is selected in the calibration setup.

| Temp. step No. | Set temp. (°C) | Source |
|-------------------|-------------------|--------|
| Step 1 | 35.00 | Master |
| Step 2 | 36.00 | Master |
| Step 3 | 41.00 | Slave |

Slope (gradient)

Is only applicable to Switch test calibrations.

The calibrator's temperature slope may be selected from within the limits of the calibrator type. If a value is selected outside the accepted range then JofraCal replaces the value with MIN or Max.

| | |
|--|---|
|  Add | Add a line to the calibration steps. |
|  Delete | Delete a line to the calibration steps. |
|  Insert | Insert a line to the calibration steps. |

4.3.6 Stability criteria

Stability is applied to the True reference temperature and is optional for the test device.

The criteria are specified as a stability time and stability value (temperature tolerance). The heat source is regarded as being stable when its temperature fluctuations (the Read or True temperature) are less than or equal to the given temperature tolerance in the given time. The temperature tolerance is specified as a \pm temperature and the time as a number of minutes.



Note: If the criteria are too relaxed then the Set temperature may not be reached.

| Stability criteria | | |
|---|----------|------|
| | Time/min | (°C) |
| Reference | 5.00 | 0.50 |
| Test device <input checked="" type="checkbox"/> | 5.00 | 0.50 |

The Test device (READ) stability option is only visible if the user has Selected 'Convert to temperature' in Calibration setup.
(See Section 8.7 Page 78).

Maintain last temperature

When the calibration process has been completed, JofraCal generally sets the calibrator to the storage temperature.
See (Section 14.3.2 Page 123)

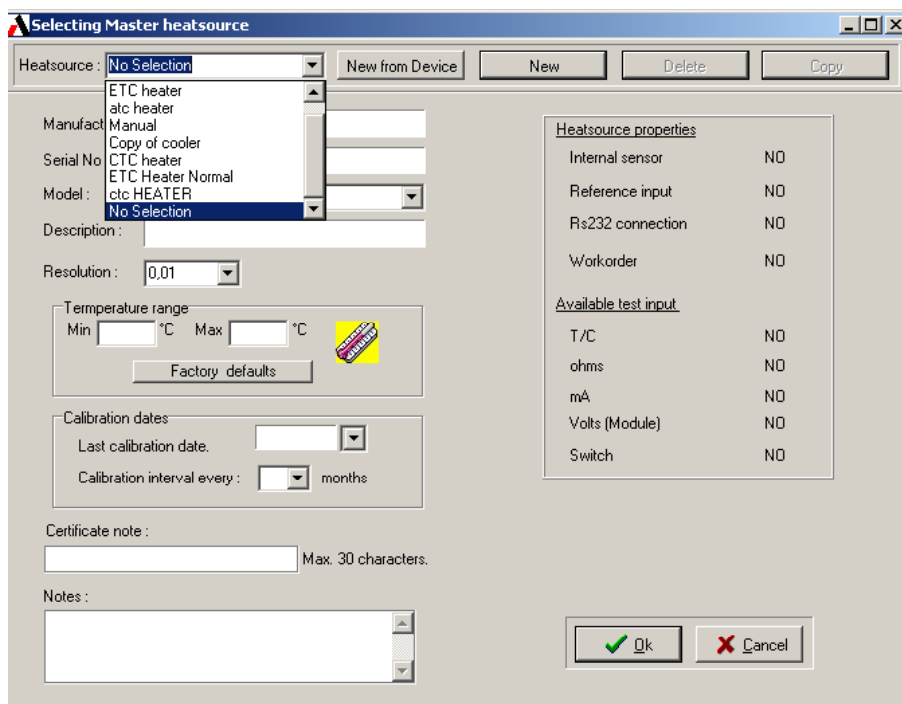
Maintain last temperature, on finish ☐

If the Maintain last temp on finish check box has been checked then JofraCal will leave the calibrator at the last set temperature.

5. DEFINING HEAT SOURCES

The heat source dialog is used in the administration of the calibrator database and enables the user to select, create, delete and edit heat source definition records.

Heat source dialog



Selecting Master heatsource

Heatsource: **No Selection** [New from Device] [New] [Delete] [Copy]

Manufact: [ETC heater] [atc heater] [Manual] [Copy of cooler] [CTC heater] [ETC Heater Normal] [etc HEATER] [No Selection]

Serial No: []

Model: []

Description: []

Resolution: [0.01]

Temperature range
Min [] °C Max [] °C [Factory defaults]

Calibration dates
Last calibration date: []
Calibration interval every: [] months

Certificate note: [] Max. 30 characters.

Notes: []

Heatsource properties

| | |
|------------------|----|
| Internal sensor | NO |
| Reference input | NO |
| Rs232 connection | NO |
| Workorder | NO |

Available test input

| | |
|----------------|----|
| T/C | NO |
| ohms | NO |
| mA | NO |
| Volts (Module) | NO |
| Switch | NO |

[Ok] [Cancel]

If no heat source type is currently assigned then “No Selection” is the default.

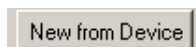
5.1 Select a Heat source



Use the drop down list of previously defined heat sources to select the desired Heat source for the calibration. The heat source properties are displayed. See (Heat source properties Section 5.3 Page 51).

The list entry “No selection” is used if the user wishes to remove the current selection. Example. The user wishes to remove a Slave heat source definition.

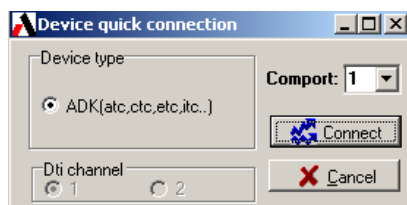
5.2 Create new heat source from connected device



This button is used to make a quick connection to a heat source through the RS-232 serial port and retrieves the serial number.

First the user is asked for the serial port and the

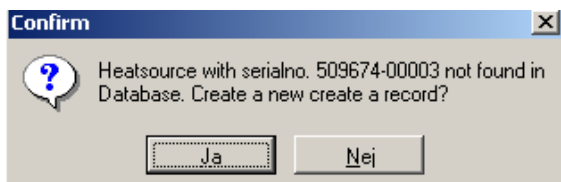
Quick connect dialog



If a record with the same serial number and type exists, then JofraCal will retrieve and present that heat source.

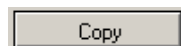
Or if not found ask the user to create a new heat source record.

Confirm creation of a new record



If the user answers yes a new heat source record will be created after prompting the user for a new ID.

5.3 Copy a heat source record



Copy the current heat source to a new record. The user is again prompted for a new ID then the new heat source with the same properties but new ID is displayed.

5.4 Delete a heat source record



Deletes the current heat source. JofraCal requests confirmation prior to the final deletion.

5.5 Heat source general data

This section describes the properties in the Heat source dialog.

Manufacturer

The calibrator manufacturer is displayed on the certificate.

Serial number

The calibrator serial number is displayed on the certificate.

Calibrator model

Select by dropdown list box the Calibrator type.

E.g. ATC-320B, CTC650A etc...

Calibration dates

The date the calibrator was last calibrated and the interval between calibrations.

Description

The user's own description of the calibrator.

Minimum/maximum temperature

This is used to specify the calibrator's admissible temperature range. When the calibration procedure is set up, JofraCal controls whether the given test temperatures are admissible, i.e. whether the temperatures are within the temperature ranges of the calibrator.

Resolution

The maximum temperature resolution displayed on the calibrator.

Calibration notes

This field may be used to enter a comment about sensor usage (maximum 240 characters). Not displayed on the certificate.

Certificate note

This field may be used to enter a certificate comment (maximum 29 characters).

5.6 Heat source function properties

This area gives the user a quick insight regarding the calibrators' functionality. The information shows if the calibrator in question has the following function capabilities.

Heat source functions

Heatsource properties

| | |
|------------------|-----|
| Internal sensor | YES |
| Reference input | NO |
| RS232 connection | YES |
| Workorder | NO |

Available test input

| | |
|----------------|----|
| T/C | NO |
| ohms | NO |
| mA | NO |
| Volts (Module) | NO |
| Switch | NO |

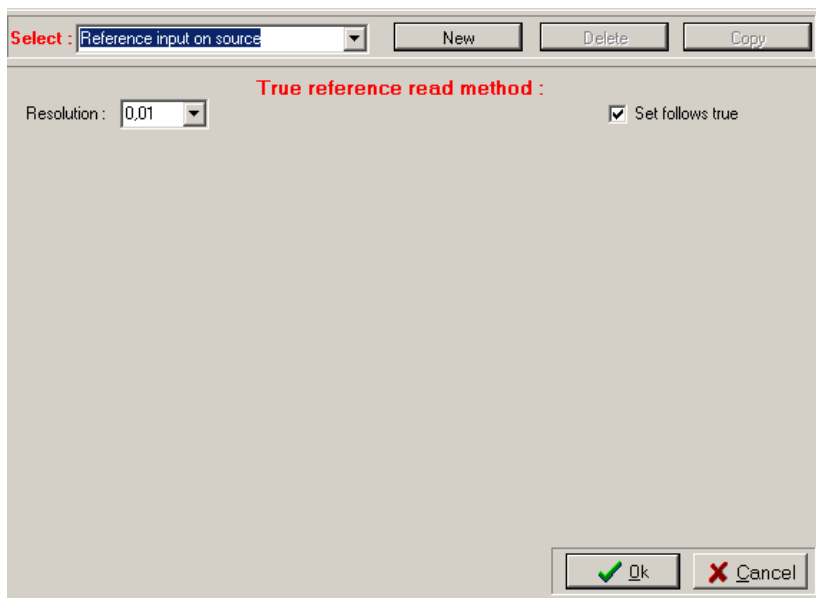
6. TRUE READING METHOD

The true reading method is one of the four main elements of a Calibration test setup and is called from the Calibration Setup page.

The purpose of this form is to define how the true reference temperature is to be measured.

It is important that the True reading method is defined before the device under test reading method, because it directly affects the available reading methods for the Test device.

True reading method dialog



The dialog box titled "True reading method dialog" contains the following elements:

- A "Select:" label followed by a dropdown menu showing "Reference input on source".
- Three buttons: "New", "Delete", and "Copy".
- A "Resolution:" label followed by a dropdown menu showing "0,01".
- A red heading "True reference read method :".
- A checkbox labeled "Set follows true" which is checked.
- At the bottom right, two buttons: "Ok" (with a green checkmark icon) and "Cancel" (with a red X icon).

There are 2 types of Reading methods, which can be selected.

- Predefined standard methods that follow with the JofraCal database.
- User-defined methods.

6.1 Predefined standard methods

Internal sensor. (Not available with Manual external heat source).

Reference input. Ametek ATC-B series only

Whether these options are available depend upon the selected Master heat sources' function properties. (See Section 5.6 page 53)

6.2 User-defined methods

These are reading methods in which the operator has defined and normally includes some form of data logger or manual reading device.

Any User-defined methods can be used in both True and DUT reading methods.

Logging devices can be for example one of Ametek's DTI or ASC300 devices. Any other device is considered a manual logger as JofraCal cannot automatically read from the device and temperatures would have to be manually keyed.

(See logging devices Section 8.8 Page 81)


6.3 Selecting a True reading method



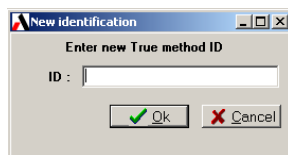
Use the drop down list of previously defined reading methods. The methods listed are directly dependent upon the Master heat source used in the calibration.

E.g. “Reference input on source” is only an option when using the ATC–B series calibrator.

6.4 Creating a user-defined method

Click on the  button and the JofraCal prompts the user for an identification name.

Enter new True ID

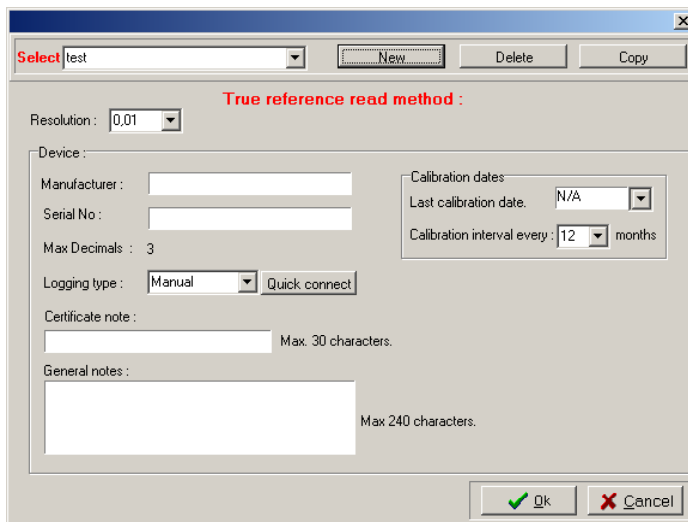


A small dialog box titled "New identification" with a close button (X). It contains the text "Enter new True method ID" and a label "ID:" followed by a text input field. At the bottom are two buttons: "Ok" with a green checkmark and "Cancel" with a red X.

Enter the new ID and Click



A new empty form is displayed

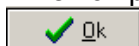


The main application window titled "JofraCal" with a close button (X). It features a "Select" dropdown menu showing "test", and three buttons: "New", "Delete", and "Copy". Below this is a section titled "True reference read method :" in red. It includes a "Resolution:" label with a dropdown set to "0.01". A "Device:" section contains fields for "Manufacturer:", "Serial No:", and "Max Decimals:" (set to 3). There is a "Logging type:" dropdown set to "Manual" and a "Quick connect" button. To the right, "Calibration dates" are shown with "Last calibration date." set to "N/A" and "Calibration interval every:" set to "12" months. At the bottom, there is a "Certificate note:" field (Max. 30 characters) and a "General notes:" text area (Max 240 characters). At the very bottom are "Ok" and "Cancel" buttons.

True method dialog becomes visible to enable the user to define the logging device. (DTI, ASC300 or manual).


See True read parameters. (Section 6.7 Page 58) for a description of setting the dialog controls.

When all parameters and logger information are keyed, click the

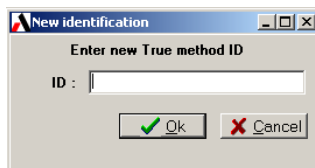


button.

6.5 Copy a User-defined method

Click on the  button and the JofraCal prompts the user for an identification name.

Enter new True ID



Follow the same instructions as if creating a new User-defined method.

6.6 Deleting a True reading method

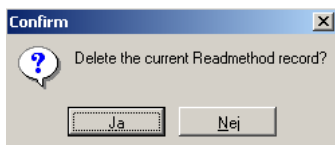
Only User-defined methods may be deleted from the list.

Select the reading method you wish to delete then click the delete



button.

JofraCal will ask the user to confirm the deletion.

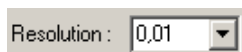


Click Yes (Ja) to confirm deletion.

6.7 True read parameters

6.7.1 General parameters

Resolution:




Use the resolution control to set the decimals for the calibration true measurement reading.

The resolution can be set to: 1 (default), 0.1, 0.01 or 0.001 however options depend upon the calibrator or logger used for true reading.

Set follows true:



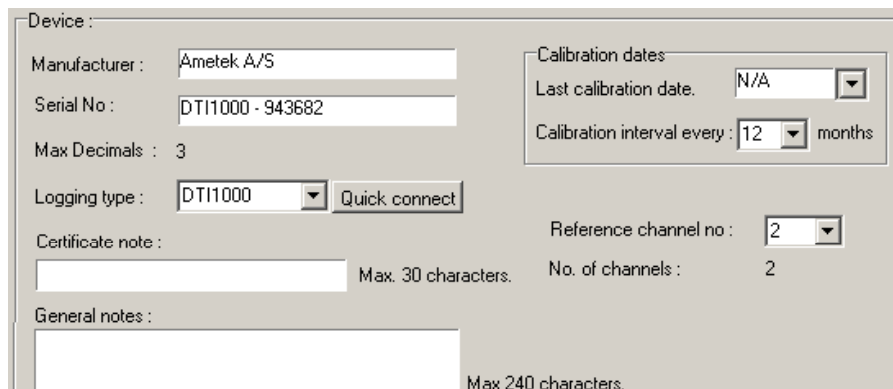
This is only available for ATC-B series calibrators. When this option is enabled, the calibrator's SET temperature is adjusted to the "True" temperature measured by the reference sensor. A result of this is that it takes the calibrator longer before it indicates stable.

 Note that it is only possible to reach the exact True temperature, if the stability criteria are tight enough. It is recommended to use the criteria $\pm 0.03^{\circ}\text{C}$ / 0.05°F in 10 minutes to be stable.

6.7.2 Logging device parameters

The device section parameters of the **True read dialog** describe the logging device used for the True reading method and are visible in User-defined reading methods.

Device section of the True read dialog



Device :

Manufacturer : Ametek A/S

Serial No : DTI1000 - 943682

Max Decimals : 3

Logging type : DTI1000 Quick connect

Certificate note :
 Max. 30 characters.

General notes :
 Max 240 characters.

Calibration dates

Last calibration date. N/A

Calibration interval every : 12 months

Reference channel no : 2

No. of channels : 2

Manufacturer

The logger manufacturer is displayed on the certificate.

Serial number

The logger serial number is displayed on the certificate.

Logging type

Select the device type from the drop down list.

The device list contains the names of logging devices known to JofraCal and can communicate via RS-232 serial port.

Select "Manual" if device is other than a DTI or ASC300.

decimals : 3

ing type : **DTI1000** Quick connect

ate note : ASC300

al notes : Manual

Max. 30 cha

If the logging device (DTI or ASC) is connected via an RS-232 it is possible to use the **Quick connect** to retrieve the type and serial number of the device. (See Section **6.8** Page 61)

Calibration dates

The date the logger was last calibrated and the interval between calibrations.

Reference channel no.

If the logger has more than 1 input channel then the reference channel needs to be defined, e.g. DTI.

Resolution:

Indicates the maximum temperature resolution displayed on the logger.

Notes

This field may be used to enter a comment about sensor usage (maximum 240 characters). Not displayed on the certificate.

Certificate note

This field may be used to enter a certificate comment (maximum 29 characters).

6.8 Quick connect to logging device:

Use the quick connect button to connect and retrieve information from a logging device through an RS-232 serial port. (DTI or ASC).

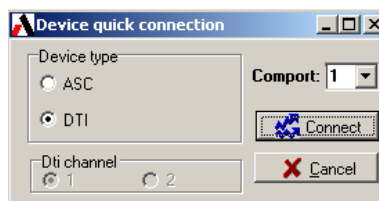
If successful it will use the information to automatically set the following controls.


- Device type list box
- Manufacturer
- Max decimals
- Serial number (DTI only).

Using the quick connect is strongly recommended as it avoids any keying errors.

Click on the  button.

Quick connect dialog



The user must indicate the type of logger and the serial comport then click the  button.

7. REFERENCE SENSORS

The External reference sensor dialog is used in the administration of the reference sensor database and enables the user to select, create, delete and edit these records.

The dialog is called from calibration setup (See section 4.2 page 40) or the UpLoad / DownLoad page. (See section 9 page 83).

External reference sensor dialog:

Edit external reference sensor

Select : **DTI ch 1** New from Device New Delete Copy

Manufacturer : **Ametek A/S**

Serial no : **Test sens1**

Calibration dates:

Last calibration date: **N/A**

Calibration interval every : **12** months

Temperature range:

Min : **0,00** °C Max : **150,00** °C

Cert Notes :
 Max. 30 characters.

Notes :

Sensor parameters Connect device

Tables Calendar van Dusen ITS 90 Defaults

IEC 751 coefficients: DTI & ASC

R0 : **1,000111E+02**

A : **3,908300E-03**

B : **-5,775000E-07**

C : **-4,183000E-12**


Temperature unit = °C

Currently connected device

Device type :

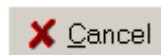
Sn :

Ok Cancel

 You may create any number of external reference sensors within the system, but two external reference sensors may not have the same name or the same serial number.



Closes the dialog and saves any changes.



Closes the dialog and asks the user if unsaved changes are to be discarded.

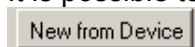
7.1 Selecting a Reference sensor



Use the drop down list of previously defined reference sensors to select the required sensor. The Reference sensor properties are displayed. (See Reference sensor properties Section 7.5 Page 65).

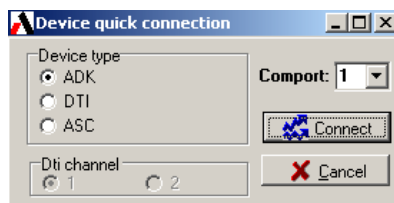
7.2 New reference sensor from device

It is possible to create a new reference sensor record by using the



button. It allows the user to make a quick connection to an ATC, DTI or ASC device connected by a RS-232 serial port. First the user is asked for the serial port and the device type.

Quick connect dialog



If successful, JofraCal retrieves the reference sensor serial number and the database scanned for an existing reference sensor.

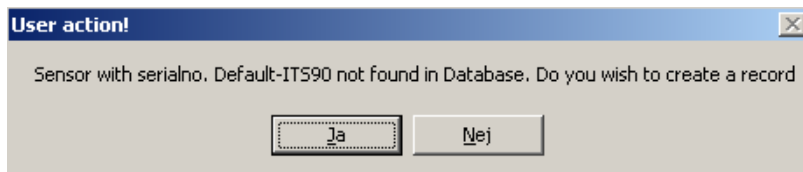
If a record with the same serial number and device type exists then it will

Retrieve and present that reference sensor.

If not

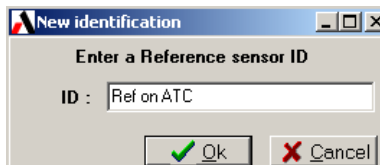
Ask the user to create a new reference sensor record.

Confirm creation of a new record



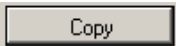
If the user answers yes, the user is prompted for a new ID.

Enter new reference sensor ID

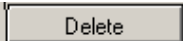


Click OK and a new reference sensor will be created and displayed.

7.3 Copy reference sensor

The  button copies the current reference sensor to a new record. The user is again prompted for a new ID. An identical reference sensor is displayed albeit with a new ID.

7.4 Delete reference sensor

The  button deletes the current reference sensor. JofraCal requests confirmation from the user before the actual deletion.

7.5 Reference sensor properties

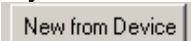
This section describes the properties in the reference sensor dialog.

Manufacturer

The reference sensor manufacturer is displayed on the certificate.

Serial number

The reference sensor serial number is displayed on the certificate.

It should also be unique. When using the  button it is the retrieved serial number that is used to scan the database to check if an existing reference sensor already exists.

Calibration dates

The date the reference sensor was last calibrated and the interval between calibrations.

Minimum/maximum temperature

This is used to specify the reference sensors' admissible temperature range.

Notes

This field may be used to enter comments about sensor usage. Maximum length 240 characters. Not displayed on the certificate.

Certificate note

This field may be used to enter a certificate comment.
(Maximum length 30 characters).

7.6 Sensor parameters / coefficients

This area of the form enables the user to define and download the relevant sensor parameters.

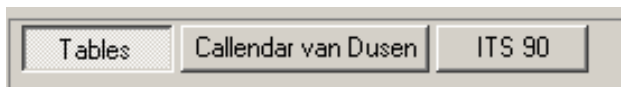
There are 3 types of parameters/coefficients the user can work with.

Tables: Used with ATC (Section 7.7.7 Page 71)

Van Dusen: Used with DTI (Section 7.7.9 Page 73)

ITS90 : Used with DTI(2.0+) or ASC300 (Section 7.7.8 Page 72)

Tab controls to the 3 parameter types



The user can move from page to page by selecting the desired tab.

Warning.

It is the parameter page selection that determines which type of parameters are downloaded or uploaded from the reference sensor.

Example: If Callendar van Dusen is selected and the user starts to download, it is the van Dusen values that are sent to the device, not ITS90.

The exception to this is when an ATC is connected. Tables are downloaded regardless of the selection.

Connect / disconnect button.



Connect device

or



Disconnect ATC

Defaults

Overwrite the current values with default values.

Upload

Upload parameters from connected device.

Download

Upload parameters from connected device.

Connection status panel

| Currently connected device | |
|----------------------------|--------------|
| Device type : | ATC-156 B |
| Sn : | 509674-00003 |

This panel displays the details of the currently connected device.

7.7 Up/Downloading reference sensor coefficients

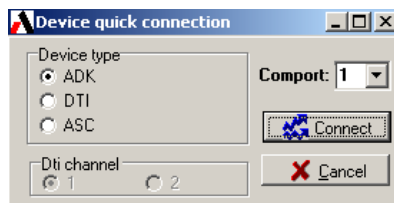
Before any reference sensor data can be downloaded to a reference sensor, the user must first connect to the device containing the sensor.

7.7.1 Connecting

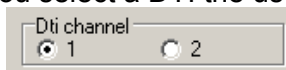
Click on the  Connect device button.

Select the serial port and the device type.

Quick connect dialog

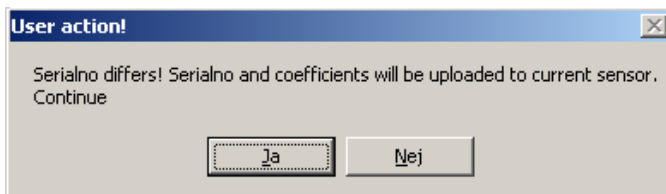


DTI Channel. If you select a DTI the user is also required to select the channel number.




Warning:

When a connection is made there is no immediate verification that the reference sensor matches the reference sensor the user is currently editing. However the user receives a warning at up/download from the device.




The user can also select another sensor while connection is open.

7.7.2 Disconnecting

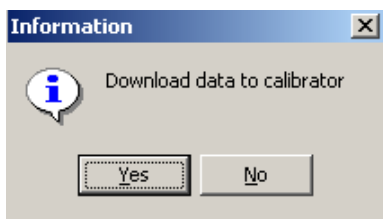
To close the current connection, click on the  button or simply close the dialog box by click the OK or Cancel buttons.

7.7.3 Downloading

A rectangular button with a light gray background and a thin black border. The word "Download" is centered in a black, sans-serif font.

Click the  button to download parameters to the currently connected device.

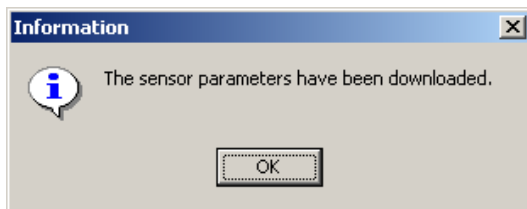
Confirm download



After confirmation is received JofraCal begins to send the sensor data to the device.


JofraCal then informs the user when download is complete.

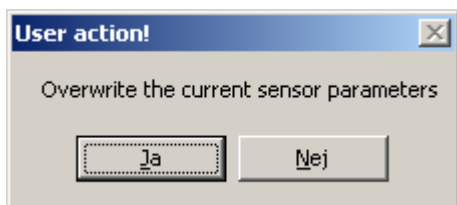
Successful download



7.7.4 Uploading


A rectangular button with a light gray background and a thin black border. The word "Upload" is centered in a black, sans-serif font.

Click the  button to upload sensor parameters from the connected device.




After confirmation is received JofraCal begins to load sensor data up from the device.

7.7.5 Default values

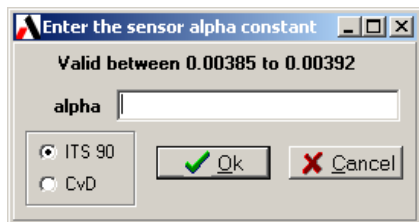
Click on  button to load the default values of the display parameter type.
Example. If tables are selected then the default table values are loaded.

7.7.6 Calculate coefficients

The  button in the Tables parameter page is used to generate Van Dusen or ITS90 coefficients based on the data found in the table grid.

The user is prompted for information in the following form.

Calculate sensor coefficients

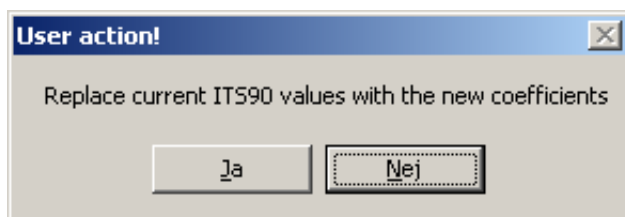


The user must choose which set of temperature calculation coefficients are to be created ITS90 or Van Dusen.

If ITS90 is selected the user must also enter an “alpha” constant value.

When the calculations are complete the user is asked to confirm overwriting the existing values.

Confirm replacement of existing data



JofraCal then jumps to the parameter page with the fresh calculated coefficients displayed.

7.7.7 Tables

The ‘Tables’ page consists of a grid containing the ohms-temperature relationship over a certain temperature range.

Ohms-temperature relationship

Tables Calendar van Dusen ITS-90

Table constants - ATC B series

| Steps | Temperature | Ohm |
|---------|-------------|----------|
| Step 1 | -200,0000 | 18,5201 |
| Step 2 | -100,0000 | 60,3395 |
| Step 3 | 0,0000 | 100,0000 |
| Step 4 | 100,0000 | 138,5055 |
| Step 5 | 200,0000 | 175,8560 |
| Step 6 | 300,0000 | 212,0515 |
| Step 7 | 400,0000 | 247,0920 |
| Step 8 | 500,0000 | 280,9775 |
| Step 9 | 600,0000 | 313,7080 |
| Step 10 | 700,0000 | 345,2835 |

Add step Del step Calculate

Use the **Add step** and **Del step** buttons to add and delete the steps.

Editing the temperature - ohms

Key values in the grid cells, press ENTER and ARROW to move to next cell.

The **Calculate** button is used to generate Van Dusen or ITS90 coefficients based on the data found in the table grid.
(See Section 7.7.6 Page 70)

7.7.8 ITS 90

The ITS 90 coefficients can only be used with the DTI version 2.0+.

| Tables | Callendar van Dusen | ITS-90 |
|---|---------------------|--------|
| <u>ITS-90 coefficients DTI Vers 2.0</u> | | |
| RTPW | 1,000000E+02 | |
| aLR | 0,000000E-01 | |
| bLR | 0,000000E-01 | |
| cLR | 0,000000E-01 | |
| aHR | 0,000000E-01 | |
| bHR | 0,000000E-01 | |
| cHR | 0,000000E-01 | |
| dHR | 0,000000E-01 | |

7.7.9 Callendar Van Dusen

The Van Dusen coefficients can only be used with both the ASC300 and all DTI's

| Tables | Callendar van Dusen | ITS-90 |
|---|---------------------|--------|
| <u>IEC 751 coefficients DTI & ASC</u> | | |
| R0 | 1,000000E+02 | |
| A | 3,908300E-03 | |
| B | -5,775000E-07 | |
| C | -4,183000E-12 | |

8. D.U.T READING METHOD

The Device Under Test reading method is one of the four main elements of a Calibration test setup and is called from the Calibration Setup page. (See Section 4.2.2 page 42)

The purpose of this form is to define the measuring method for the device under test.

D.U.T reading method dialog

Select : ASC 2 New Delete Copy

Device under test reading method :

Read method settings

Resolution : 0,1 ☒ Convert to temperature

Certificate note : certificate comments Max. 30 characters

Logging device

Manufacturer : Ametek A/S

Serial No. : ASC 20020

Logging method : ASC300-R Quick connect

Certificate note :
Logger notes for certificate.

Calibration dates

Last calibration date : N/A

Calibration interval every : 12 months

Ok Cancel

There are 2 types of Reading methods, which can be selected.

- Predefined methods
- User-defined methods.

8.1 Predefined standard methods

Input on device. ATC, SE and switch on CTC, ITC type calibrators.

Manual Read. Manual test devices only.

Dti (available channel). Use the available channel on the same DTI defined in the True reading method.

Whether these options are available depend upon the function properties of the selected Master heat source. (Section 5.6 page 53)

8.2 User-defined methods


(See True read - User-defined methods. Section 6.2 page 55)

8.3 Selecting a D.U.T reading method

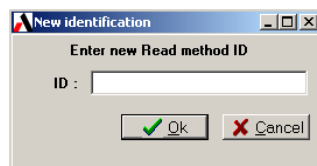


Use the drop down list of previously defined reading method. The methods listed are directly dependent upon the Master heat source and True reading method.

8.4 Creating a user-defined method

Click on the  button and the JofraCal prompts the user for an identification name.

New read method ID



Enter the new ID and Click



A new empty form is displayed and ready for editing.

When a user-defined method is selected the **logging device** section of the dialog is visible to enable the user to define the logging device. Example DTI, ASC300 or manual.


See D.U.T read parameters (Section 8.7.1 Page 78) for a description of all parameters.

When all parameters and logger information are keyed, click the

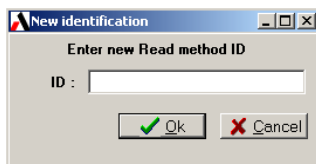


button to save the information.

8.5 Copy a User-defined method

Click on the  button and the JofraCal prompts the user for an identification name.

Enter new read method ID

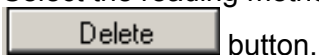


Follow the same instructions as if creating a new User-defined method.

8.6 Deleting a D.U.T reading method

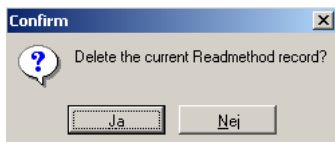
Only User-defined methods may be deleted from the list.

Select the reading method you wish to delete then click the delete



button.

JofraCal will ask the user to confirm the deletion.

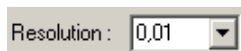


Click Yes (Ja) to confirm deletion.

8.7 D.U.T read parameters

8.7.1 General parameters

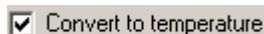
Resolution:

Resolution : 0.01

Use the resolution control to set the decimals for the calibration D.U.T measurement.

The resolution can be set to: 1 (default), 0.1, 0.01 or 0.001 however options depend upon the calibrator or logger used for reading.

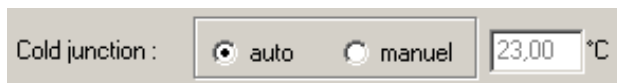
Convert to temperature:

☒ Convert to temperature

Determines whether the sensor's measured data should be converted into temperatures. This is achieved using standard formular resident in the calibrator.

Cold junction compensation

When TC inputs are used, the Cold Junction Compensation function is displayed:

Cold junction : ☒ auto ☐ manuel 23.00 °C

Use this function in one of two ways:

Auto: Where the calibrator measures the TC input temperature automatically.

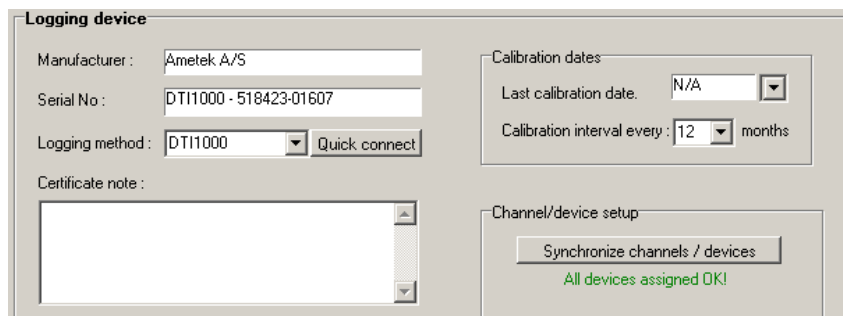
Manual: For online measurements, the temperature defined in this field is used. Note that this temperature is not saved. It is only displayed in the certificate.

For work orders, the temperature is entered via the calibrator during the calibration. The calibrator prompts you for the value before measuring.

8.7.2 Logging device parameters

The device section parameters of the D.U.T **read dialog** describe the logging device used for the True reading method and are visible in User-defined reading methods.

Logging device section of the D.U.T read dialog



Manufacturer

The logger manufacturer is displayed on the certificate.

Serial number

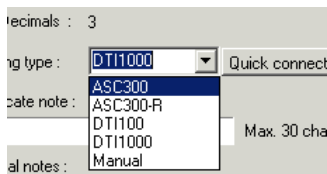
The logger serial number is displayed on the certificate.

Logging type

Select the device type from the drop down list.

The device list contains the names of loggers known to JofraCal and can communicate via RS-232 serial port.

Select "Manual" if device is other than a DTI or ASC300.

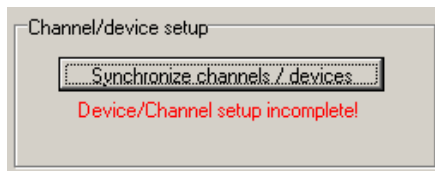


If the logging device (DTI or ASC) is connected via an RS-232 it is possible to use the **Quick connect** to retrieve the type and serial number of the device. (See Section 6.8 Page 61)

Calibration dates

The date the logger was last calibrated and the interval between calibrations.

Channel - Device setup



If the logger has more than 1 input channel then the user must define the channel the test device is connected to. If this parameter is not in place a **warning** is displayed as in the above example.

Synchronizing of devices and channels is designed for future use of scanners with multiple input channels.

Click on the **Synchronize channels / devices...** to synchronize the channels. (See Section 8.8 page 81).

Resolution:

Maximum resolution for the logger.

Notes

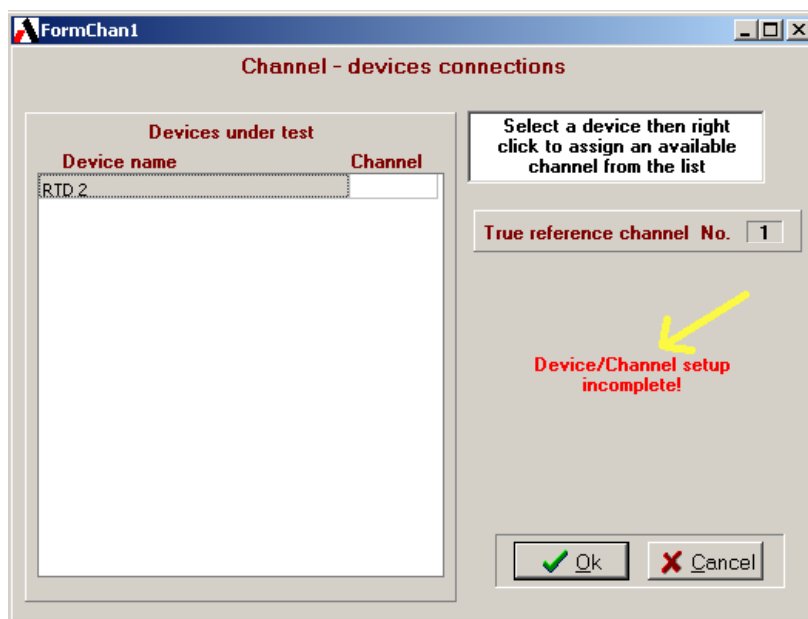
This field may be used to enter a comment about sensor usage (maximum 240 characters). Not displayed on the certificate.

Certificate note

This field may be used to enter a certificate comment (maximum 29 characters).

8.8 Synchronizing logging devices

Define the test device / input channel connection(s).



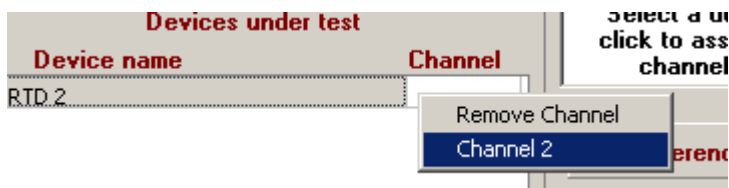
The “Device name” lists contains the test device(s) in the calibration and their assigned channel number.

**Device/Channel setup
incomplete!**

The warning in red **Device/Channel setup incomplete!** remains displayed until all devices have been assigned a channel number.

When all parameters are in place the warning is replaced with

All devices assigned OK!



Select a channel.

You cannot directly edit the channel number.

Select the device you wish to edit then "Right" mouse click to display the available options. You can either remove the current channel setting or assign another from the floating menu list.

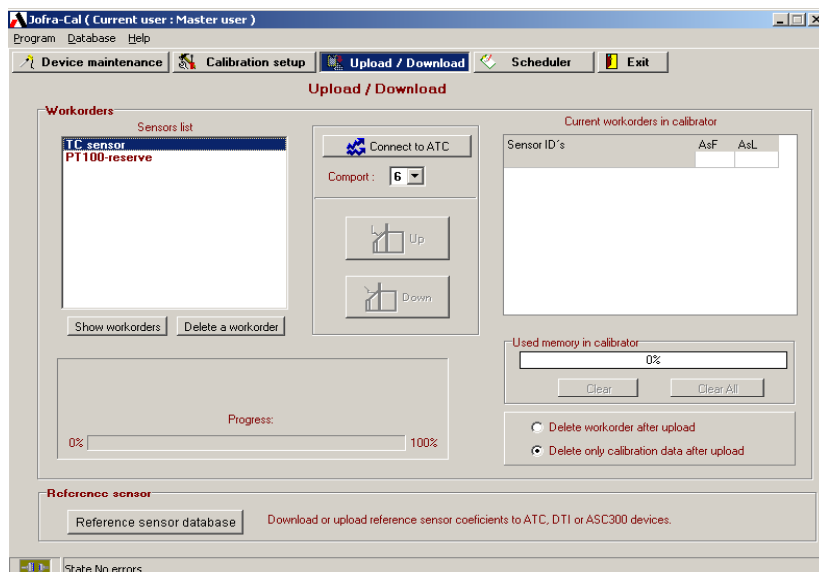
9. UPLOAD/DOWNLOAD



This function can only be used with the Jofra ATC-B series version calibrators.

Using this function with the ATC-B series calibrators, allows calibration procedures to be semi-automated. Calibrations are defined in the JofraCal 'Calibration Setup' and saved as work orders. These work orders are then downloaded to the ATC calibrator via the RS-232 interface. Calibrations are run offline with the results saved as certificates in the calibrator, which can be later uploaded to JofraCal.

The Reference sensor panel contains a link to the Reference sensor dialog where it is possible to up/download sensor coefficients. (See Section 7 Page 62)



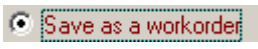
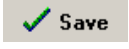


Note. The user is prevented from leaving the Up/Download page while the communication to the ATC is open.
(See Section 9.1.6 page 87).

9.1 Work orders

The calibrator can store up to 20 work orders. When all the calibrator's memory is used, it is necessary to remove (delete) some of the resident work orders before new ones can be downloaded.


9.1.1 Creating a work order

Defining a work order is the same as preparing and running an online calibration (See Section 4 Page 38) with the exception that the user must select  then click .

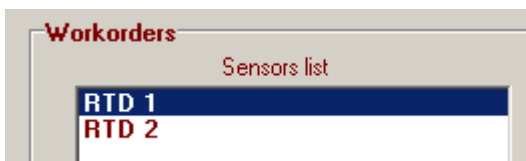


JofraCal jumps directly to the Up/down screen with the list of defined calibration work orders, ready for downloading.

9.1.2 The work order list

Click on the  to display the defined work order calibrations if not already listed.

Work orders ready for download



To delete a work order, simply select an ID from the Sensor list and click

Delete a workorder

9.1.3 Connecting to the ATC

To connect to the ATC, select a serial port then click on the Connect button.



Note. When connecting to an ATC calibrator, ensure that it is in normal operation mode and not running any tasks such as Autostep, Switch or calibrations.

After communications are opened successfully JofraCal retrieves the work order list currently in the Calibrator. (See Section 9.1.4 page 86).

Also  upload and  download buttons are active during open communications.

The user can now download or upload calibration procedures to and from the ATC calibrator.

9.1.4 Current work orders in calibrator

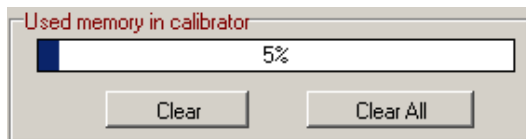
These are listed in the Grid to the right hand side of the page along with details of their completion status.

List of work orders currently in the ATC

| Current workorders in calibrator | | |
|----------------------------------|-----|-----|
| Sensor ID's | AsF | AsL |
| Man dut | No | No |

There is also a memory gauge indicating the available space in the ATC.

Memory usage on the ATC



Clear

Delete the selected work order on the ATC.

Clear All

Delete all the listed work orders on the ATC.

It is possible to automatically delete the entire work order or just the results, after uploading to the PC, depending on the following selection.

☐ Delete workorder after upload
☒ Delete only calibration data after upload


9.1.5 Up / downloading work orders

To download a calibration select a sensor from the work orders list then

Click the  button.

When the download is completed


- The work order ID appears in the "Work orders in calibrator" grid.
- The work order ID is deleted from the PC's "work order" list.
- The ATC memory usage gauge will be updated.

To upload any completed work orders, select from the "work orders" in "calibrator" list then select the job from the list then click the  button.

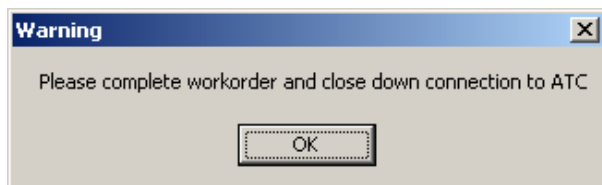
When upload is complete JofraCal will either delete the work order from the ATC or just change its completion status AsF or AsL. The certificate can then be viewed from the Viewing certificates in the Device maintenance page. (See Section 3.1.3 Page 29)

9.1.6 Disconnecting the ATC Up/Download

It is important to disconnect the ATC when finished or before proceeding to other areas of JofraCal.

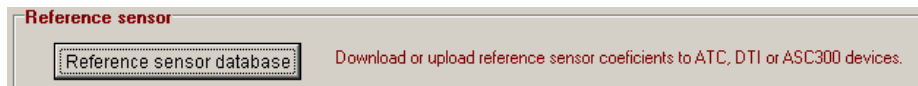
Therefore JofraCal prevents the user from leaving the Up/Down load page until clicking the  button closes communications.

The following warning will appear if the user attempts to leave the Up/Down load page.



9.2 Reference sensor.

Allows quick access to the reference sensor dialog click on the Reference sensor database button.



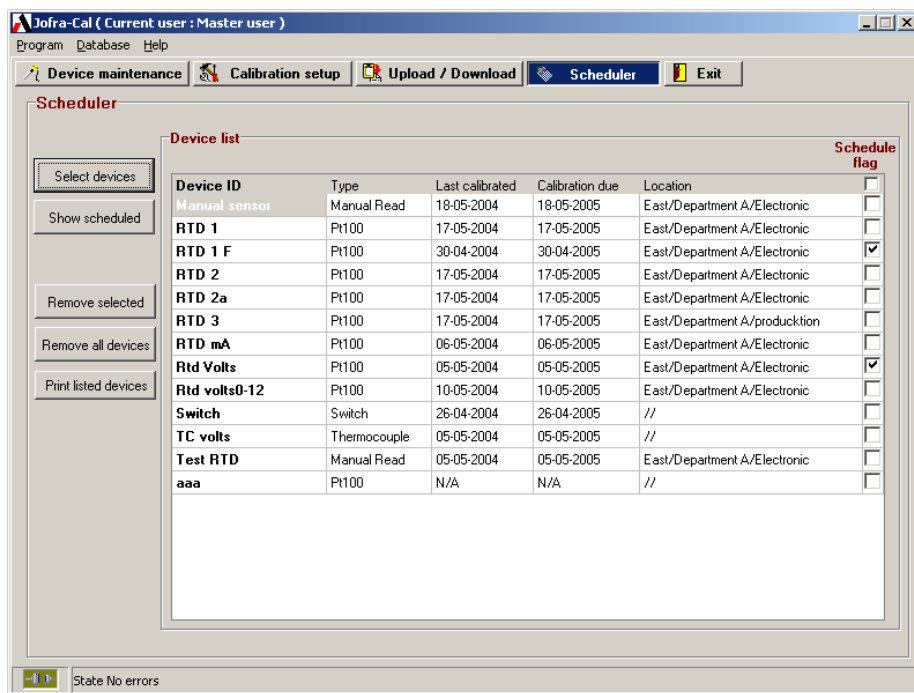
See (Section 7 Page 62) for details regarding maintaining reference sensor databases.

10. SCHEDULER

The scheduler allows a user to easily administrate the calibration of test devices.

Typically a supervisor would build a list of devices due for calibration, flag them for calibration and if required generate a report for those responsible for the actual calibration.

JofraCal scheduler page



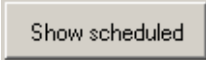
| Device ID | Type | Last calibrated | Calibration due | Location | Schedule flag |
|---------------|--------------|-----------------|-----------------|------------------------------|-------------------------------------|
| Manual sensor | Manual Read | 18-05-2004 | 18-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| RTD 1 | Pt100 | 17-05-2004 | 17-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| RTD 1 F | Pt100 | 30-04-2004 | 30-04-2005 | East/Department A/Electronic | <input checked="" type="checkbox"/> |
| RTD 2 | Pt100 | 17-05-2004 | 17-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| RTD 2a | Pt100 | 17-05-2004 | 17-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| RTD 3 | Pt100 | 17-05-2004 | 17-05-2005 | East/Department A/production | <input type="checkbox"/> |
| RTD mA | Pt100 | 06-05-2004 | 06-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| Rtd Volts | Pt100 | 05-05-2004 | 05-05-2005 | East/Department A/Electronic | <input checked="" type="checkbox"/> |
| Rtd volts0-12 | Pt100 | 10-05-2004 | 10-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| Switch | Switch | 26-04-2004 | 26-04-2005 | // | <input type="checkbox"/> |
| TC volts | Thermocouple | 05-05-2004 | 05-05-2005 | // | <input type="checkbox"/> |
| Test RTD | Manual Read | 05-05-2004 | 05-05-2005 | East/Department A/Electronic | <input type="checkbox"/> |
| aaa | Pt100 | N/A | N/A | // | <input type="checkbox"/> |

State No errors

10.1 Selecting devices


To select devices from the Test device database click the button, which opens the JofraCal search dialog.
(See Section 102 Page 12).



The  button will display all the devices already flagged as scheduled for calibration.

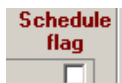
10.2 Scheduling for calibration

The devices displayed in the list can now be scheduled or unscheduled through the checkbox controls on the right hand side.

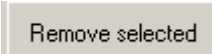
This can be done on an individual basis by using the checkboxes on each device row 

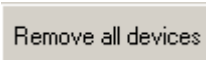
or

schedule all devices at once by checking the top checkbox

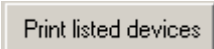


10.3 Remove from schedule list

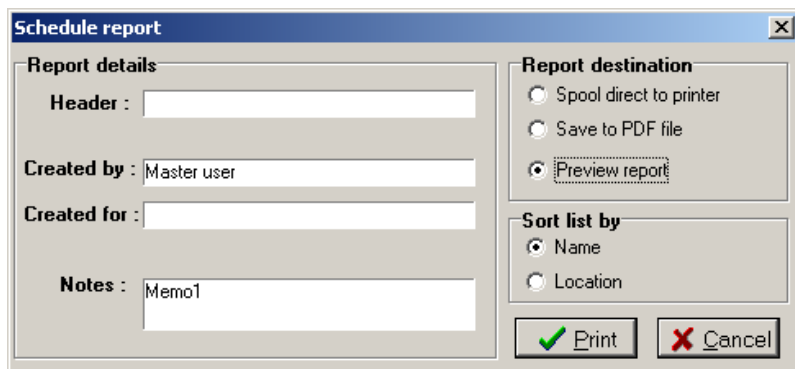
 Remove a selected device from the list.

 Remove all devices from scheduler list.

10.4 Scheduled devices report

The  button will generate a report from the listed devices. JofraCal requests various report parameters.

Scheduled devices report parameters



To give the report more flexibility the user can define the following report parameters:

- Report header.
- Created for. Who is the report for?
- Notes. Any relevant comments.

The user can also determine the destination of the report and the sort sequence for the listed devices.

11. HOW TO EDIT A TEST DEVICE

Device under test data form contains the properties of a test device instrument.

Edit test device properties – Maintenance:

Device under test (DUT)

Device ID : PT100-reserve
 Manufacturer : Ametek Denmark A/S
 Serial No : pt100-12
 Description : Pt sensor

Temperature range:
 Min : 32,00 °F Max : 752,00 °F

Pass/Fail criteria : ±(0,2 %rdg.+ 0,90)

Calibration
 Last certificate No : test auto_48
 Last certificate : 21-04-2004
 Calibration interval : 12 months
 Scheduled ☐
 Test setup : test
 Procedure : Switch proc

Certificate note : Max. 30 characters.
 Notes :

Category : Temperature
 Device type : Rtd
 Sub type : P100(90)385
 Output type : Native (default)
 Input wires : 4 wire

Location / Tags
 Factory => Eastern site
 Department => Electronic
 Sections => R&D

Ok Cancel



Changes can only be made by a user with MASTER access.

11.1 Test device properties

This section describes briefly the fields where you can enter information and where this information is displayed.

Manufacturer

The sensor's manufacturer is displayed on the certificate.

Serial number

The sensor's serial number is displayed on the certificate.

Sensor type, subtype and output properties

(See Section 11.4 Page 96)

Last calibration date

| | | |
|--------------------|------------|---|
| Last certificate : | 17-05-2004 | ▼ |
|--------------------|------------|---|

The date of calibration is automatically inserted in this field when JofraCal has calibrated a sensor. Any date entered manually will be overwritten when JofraCal performs a new calibration using the sensor. The field may be left empty. The current Windows® date format is shown to the right of the field.

Last certificate number

| | |
|------------------------|-----------------|
| Last certificate No. : | Schema 3 cert_2 |
|------------------------|-----------------|

JofraCal automatically inserts the certificate number of the last calibration. Any text entered will be overwritten when JofraCal performs a new calibration using the sensor.

Calibration interval

| | | |
|------------------------|----|---------|
| Calibration interval : | 12 | months |
| Scheduled | 1 | |
| Test setup : | 2 | |
| | 3 | - input |
| Procedure : | 6 | |
| | 12 | 6 |
| | 18 | |
| Certificate note : | 24 | |

Define how often the test device should be calibrated by selecting the interval (months) from the dropdown list. JofraCal uses the interval together with the last calibration date to warn users of outdated test devices.

Scheduled

Check the control to mark the test device as scheduled.

Pass/Fail criterion

The Pass/Fail criterion is shown as two fields. The first is a percentage deviation calculated on the basis of the measured values, the second is an absolute temperature deviation. The permitted tolerance is the sum of these two tolerance values. The tolerance is used to determine the state of the *Pass/Fail* field on certificates.

Example: The Pass/Fail criterion is specified as $\pm(1.7\% \text{ rdg.} + 0.8^{\circ}\text{C})$. The heat source is set to 45°C . When the heat source and the sensor under test are stable, the true temperature is 45.0°C and the sensor reads 46.2°C . The tolerance is calculated as $\pm(1.7\% \text{ of } 45.0^{\circ}\text{C} + 0.8^{\circ}\text{C})$, i.e. $\pm(0.77^{\circ}\text{C} + 0.8^{\circ}\text{C}) = \pm 1.6^{\circ}\text{C}$. If the absolute difference between the measured temperature and the true temperature is greater than the tolerance, the *Pass/Fail* field will be set to *Fail*. In this case however, the difference is $46.2^{\circ}\text{C} - 45.0^{\circ}\text{C} = 1.2^{\circ}\text{C}$, i.e. less than the tolerance of $\pm 1.6^{\circ}\text{C}$, and the *Pass/Fail* field is set to *Pass*.

Notes

This field may be used to enter a comment about sensor usage (maximum 240 characters). Not displayed on the certificate.

Certificate note

This field may be used to enter a certificate comment (maximum 29 characters).

Sensor location tags

Each test device has 3 location parameters to the identification and search process. The operator determines how many location levels are implemented.

These are optional. The explanatory location labels can be changed in the System Setup, see section **14.4.1** page 124.

Minimum/maximum temperature

This is used to specify the sensor's admissible temperature range. When the calibration procedure is set up, JofraCal controls whether the given test temperatures are admissible, i.e. whether the temperatures are within the temperature ranges of the sensor and the heat source.

11.2 Defining a test device calibration setup

It is possible to create or assign an existing calibration setup definition from within the "Edit test device" dialog.

Click on the select  button to define the Test setup. See (Section 4 page 38)

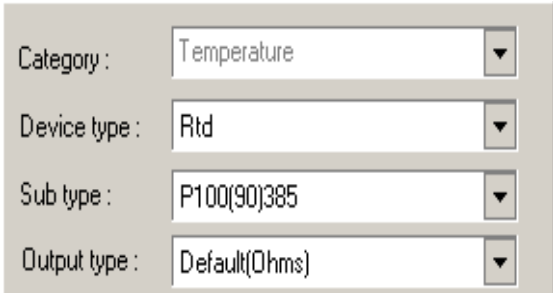
11.3 Defining a test device Procedure

It is possible to create or assign an existing procedure definition from within the “Edit test device “ dialog.

Click on the select  button to define the temperature steps. See (Section 4.3 page 43)

11.4 Defining a device type

Every test device has the following properties, which completely describe its attributes.



The screenshot shows a dialog box with four rows of properties, each with a label and a dropdown menu:

- Category : Temperature
- Device type : Rtd
- Sub type : P100(90)385
- Output type : Default(Ohms)

Category

There are 3 fields of measuring JofraCal will work in:

- Temperature (See temp definitions Section 11.4.1page 97).
- Signal (See signal definitions Section 11.4.2 page 100)
- Pressure (See pressure definitions Section 11.4.3 page 101)

Each category offers a different set of Device type options as do different device types offering a different set of Sub types and output unit options.

Details of all the different Types, Subtypes and output options can be found below.

Note: Only temperature is implemented in Jofracal version 1.0

11.4.1 Temperature device definitions

Temperature Types

There are 4 categories of temperature sensors:

- RTD (Rtd Sub types Section 11.4.1.1.1 page 97)
- Thermocouple (TC Sub types Section 11.4.1.1.2 page 98)
- Switch (No sub types)
- Manual. (No sub types)

Temperature device subtypes

11.4.1.1.1 Resistance Subtypes RTD

The possible RTD type selections are listed. Select from:

- *RTD P50(68)391*
- *RTD Pt-50M (Russian)*
- *RTD P100(90)385*
- *RTD Pt-100 MILL*
- *RTD P100(68)391*
- *RTD Pt-100M (Russian)*
- *RTD P500(90)385*
- *RTD P1K(90)385*
- *RTD P100(90)391*
- *RTD P50(90)391*
- *RTD M50(90)428*
- *RTD M100(90)428*
- *RTD P10(90)385*
- *RTD P50(90)385*
- *RTD P50(90)385*
- *RTD P400(90)385*

- *RTD M50(90)426*
- *RTD M100(90)426*
- *RTD M10(90)427*
- *RTD H120(90)672*
- *RTD H100(90)617*
- *RTD P50(68)385*
- *RTD P100(68)385*
- *RTD M53(68)426*
- *RTD P100(90)JIS*
- *RTD YSI(90)400*
- *RTD P100(90)392*

11.4.1.1.2 Thermocouple – TC


The possible TC type selections are listed. Select from:

Select from:

- *TC Type EE*
- *TC Type J*
- *TC Type K*
- *TC Type L*
- *TC Type N*
- *TC Type R*
- *TC Type S*
- *TC Type T*
- *TC Type XK (Russian)**
- *TC-HType B (not available in ATC calibrators)*

- TC-H Type E
- TC-H Type K
- TC-H Type N
- TC-H Type R
- TC-H Type S
- TC Type U
- TC Type BP
- TC Type C

A T/C input (TC module or TC-H module) is connected to the calibrator (see appendix **B.4** for connecting modules). The possible T/C type selections are listed.

 * For SE-calibrators with *TC module: Type XK (Russian)* input adds a temperature compensation to the measured temperature. This compensates for an error caused by the cold junction compensation in the input module at 23°C.

Output unit

Default
MA
Volts 0-4
Volts 0-12

Default output

- Ohms -> RTD
- mV -> Thermocouple

Input wires

Input wires :

Used for RTD type devices only.

Temperature Scale

Used only with the following input devices:

mA input, 4-20mA

V-DC Module: LOW, 0-4VDC

V-DC Module: HIGH, 0-12VDC

Temperature scaling

| | | | | |
|--------------|---------------------------------|---|----------------------------------|----|
| Low input : | <input type="text" value="0"/> | = | <input type="text" value="0"/> | °C |
| High input : | <input type="text" value="12"/> | = | <input type="text" value="400"/> | °C |

Note that the *Convert to temperature* field must be selected in the D.U.T reading method for the scaling to be used.

(See section 8.7.1 page 78).

The sensor's measured values (current or voltage depending on the input module) are converted to temperatures defined on the basis of a linear relationship between input values and temperatures. The relationship is determined by the two fields *Low input* and *High input*. The lowest input value (4mA or 0V depending on the input module) and highest input value (20mA, 4V or 12V) are equivalent to the temperatures specified here.

11.4.2 Signal device definitions

Not yet implemented.

11.4.3 Pressure device definitions


Not yet implemented.

12. USING THE DEVICE SEARCH DIALOG

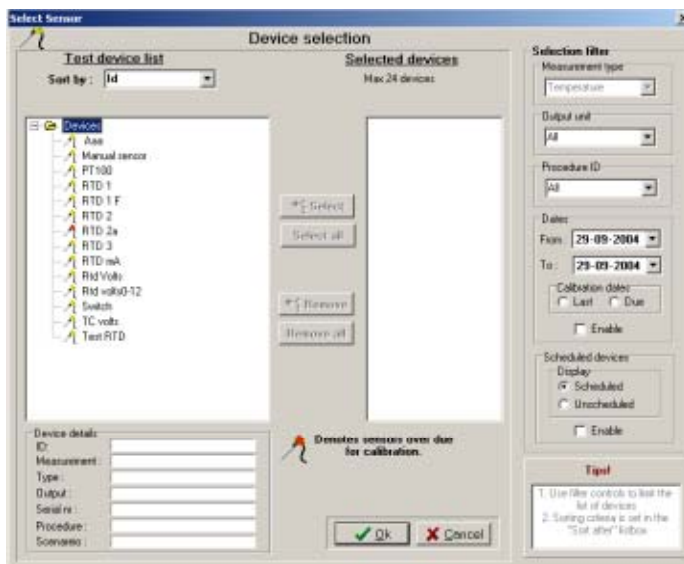
The Test device search dialog is used to select one or more devices from the test device database depending from where it is called.

The list of test devices available for selection appears in the left panel while those selected appear in the right.

The test device list is in a typical Windows file browser format where maps can be folded or unfolded.

As the user navigates through the device list by mouse or cursor, details of the individual sensors can be seen below the list in the “device details”. The highlighted device can be selected either by a double mouse click or by clicking on the  Select button.

Device search & selection dialog:



12.1 Selected / deselecting

Depending on where the search dialog is called from, the following controls are used for the selection process.



- Select the highlighted device (or Double mouse click)



- Select all devices listed (when called from the scheduler)



- Remove the highlighted device from the selected list.

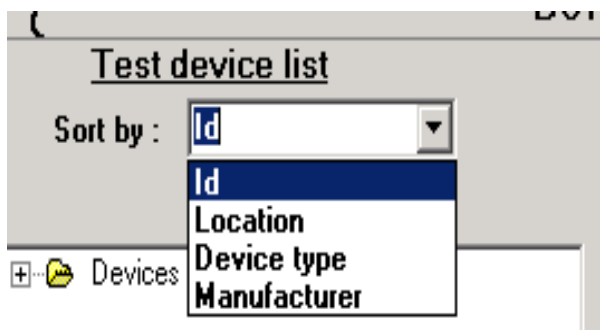


- Remove all selected devices.

12.2 Sorting devices

Devices can be grouped and sorted according to their type, location, manufacturer or ID.

Sorting parameters

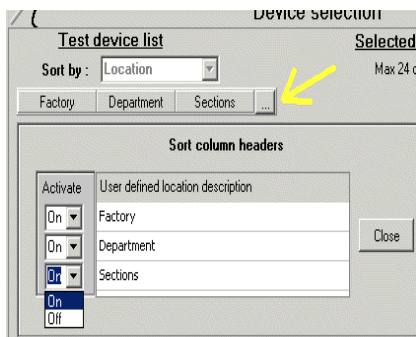


12.2.1 Sorting by location

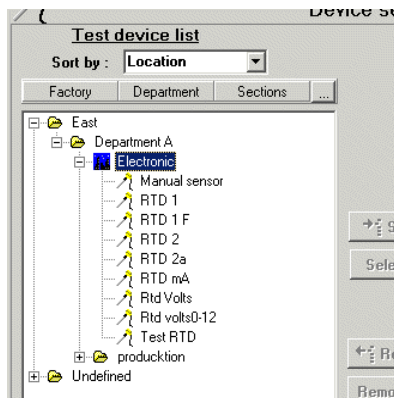
When sorting by location the user can determine the levels of grouping/sorting by clicking the define button indicated by the yellow

arrow. The defined location levels can be activated or deactivated as desired.

Location sort parameters:



Devices sorted by location:



The location descriptions are defined in the system configuration.
(See Location labels Section 14.4.1 Page 124).

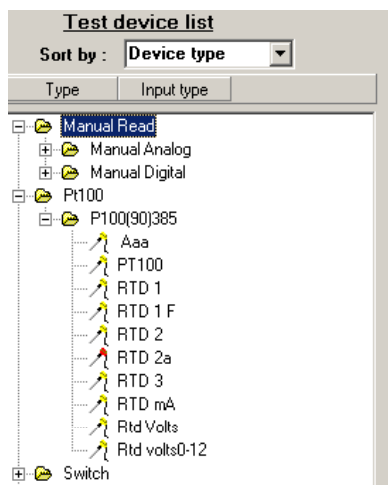


Note! It is essential that the users are careful with the keying of device location parameters for the location sorting to work correctly.

12.2.2 Sorting by device type

Devices are listed according to their type and subtype.

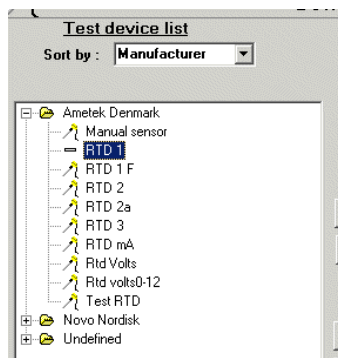
Devices sorted by device type:



12.2.3 Sorting by manufacturer

Devices are listed according to their manufacturer.

Devices sorted by manufacturer:

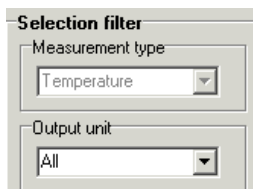


12.3 Selection filters:

The selection filter controls can refine the list of displayed test devices to a manageable level. There are several parameters the user can use to reduce the displayed devices.

12.3.1 Filter with device type and output unit

Type, output filters



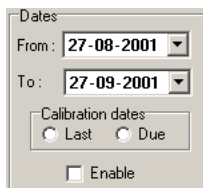
The screenshot shows a dialog box titled "Selection filter". It contains two sections. The first section, "Measurement type", has a dropdown menu with "Temperature" selected. The second section, "Output unit", has a dropdown menu with "All" selected.

Measurement type: Temperature, Signal and Pressure.

Output units: Native (Ohms,mV,switch>manual), mA or Volts.

12.3.2 Filter with dates

Date range filters



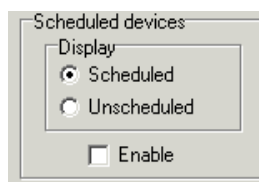
The screenshot shows a dialog box titled "Dates". It contains two date selection fields: "From:" with the date "27-08-2001" and "To:" with the date "27-09-2001". Below these are two radio buttons labeled "Last" and "Due", with "Last" selected. At the bottom is a checkbox labeled "Enable" which is currently unchecked.

Display devices within certain dates. The date range can be applied to either last calibration or calibration due.

To activate the date range, check the ☐ Enable checkbox.

12.3.3 Filter using the device scheduled property

Scheduled property filters

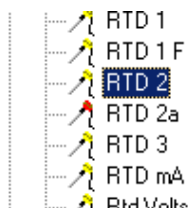


All test devices contain a scheduled flag property. This can be used to filter the listed devices.

To activate the date range, check the ☐ Enable checkbox.

12.3.4 Due for calibration indicator.

All test devices due for calibration are listed with a red icon.



13. ONLINE CALIBRATION

The online **calibration** page enables the user to run and follow progress of a calibration.

The online **calibrating** page tab is only visible when an online



calibration is

in progress and actually replaces the **EXIT** tab.

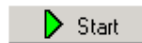
Directly after clicking



from the calibration setup page

the user is presented with either the single device calibration form or the multi device calibration form, depending on the number of test devices.

Communication lines have been established and JofraCal awaits the

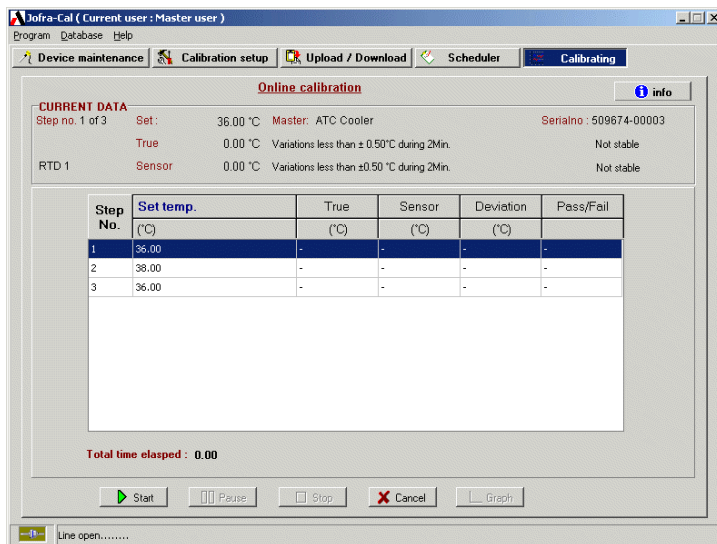


command from the user.

13.1 Single device calibration

When calibrating a single device the data grid rows represent the temperature points for the calibration. The current steps' reading can be seen in the "Current Data" area.

Single online calibration form:



Jofra-Cal (Current user: Master user)

Program Database Help

Device maintenance Calibration setup Upload / Download Scheduler **Calibrating**

Online calibration info

CURRENT DATA

Step no. 1 of 3 Set: 36.00 °C Master: ATC Cooler Serialno: 509674-00003

True 0.00 °C Variations less than $\pm 0.50^{\circ}\text{C}$ during 2Min. Not stable

RTD 1 Sensor 0.00 °C Variations less than $\pm 0.50^{\circ}\text{C}$ during 2Min. Not stable

| Step No. | Set temp. (°C) | True (°C) | Sensor (°C) | Deviation (°C) | Pass/Fail |
|----------|----------------|-----------|-------------|----------------|-----------|
| 1 | 36.00 | - | - | - | - |
| 2 | 38.00 | - | - | - | - |
| 3 | 36.00 | - | - | - | - |

Total time elapsed: 0.00

Start Pause Stop Cancel Graph

Line open.....

13.2 Multi device calibration

During multi-device calibration the data grid rows represent the test devices involved in the calibration.

The test device being currently read is always highlighted.


Below is an example of a multi calibration where devices are read one at a time. After stability is acquired, the readings are logged, then Jofracal moves to the next device requesting the user to change test device if required.

Multi device online calibration form:

| CURRENT DATA | | | | | |
|---------------------|---------------------|-----------------|--|-------------------------|--------------|
| Step no. 2 of 3 | Set: | 38.00 °C | Master: ATC Cooler | SerialNo : 509674-00003 | |
| | True | 37.46 °C | Variations less than $\pm 0.50^{\circ}\text{C}$ during 2Min. | Stable | |
| RTD 1 | Sensor | 37.42 °C | Variations less than $\pm 0.50^{\circ}\text{C}$ during 2Min. | | |
| Device Id | True | Device | Time to stability | Deviation | Pass/Fail |
| RTD 1 | 37.39 | 37.35 | logged | -0.04 | Pass |
| RTD 2 | 37.46 °C | 37.42 °C | 0:55 (mm:ss) | - | - |
| RTD 1 Step 1 | Set temp°C 36.00 | True°C 35.51 | Test °C 35.40 | Diff°C -0.11 | Pass Pass |

13.2.1 Viewing previous steps in multi-device calibration

Results from previous steps can be viewed by Left clicking the devices' row followed by a right mouse click. See the above picture.

 **Note.** The test device being currently read is always highlighted regardless of the device results you may be viewing

13.3 Multiple calibration with scanners

If a JofraCal recognized scanner or the 2 channels of the DTI is used to read the test devices, then all devices are read simultaneously requiring no manual changing of test devices by the user.

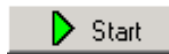
Multi device online using scanner

| Device Id | True | Device | Time to stability | Deviation | Pass/Fail |
|-----------|----------|----------|-------------------|-----------|-----------|
| RTD 2 | 37.93 °C | 38.31 °C | 1:55 (mm:ss) | - | - |
| RTD 2a | 37.93 °C | 37.95 °C | 1:55 (mm:ss) | - | - |

13.4 Online control buttons

Only the **Start** and **Cancel** buttons are enabled which are used to begin and cancel the online calibration.


No data is logged initially. Start the calibration process by clicking







Online control buttons




When the calibration is in progress the remaining control buttons are enabled.


The  button closes down the calibration completely and returns to the Calibration setup page.

To interrupt the calibration process, click . Click  again to continue the process.

To stop the calibration, click the  button. The  is then enabled to allow the user to restart the calibration at temperature step 1, and all previously logged data is deleted.

To view online graph information click on the  Button. See (Section 13.8 Page 114).

13.5 Calibration completion

When the calibration is complete the  **save/close** button appears allowing the user to close and save the calibration results as a certificate.

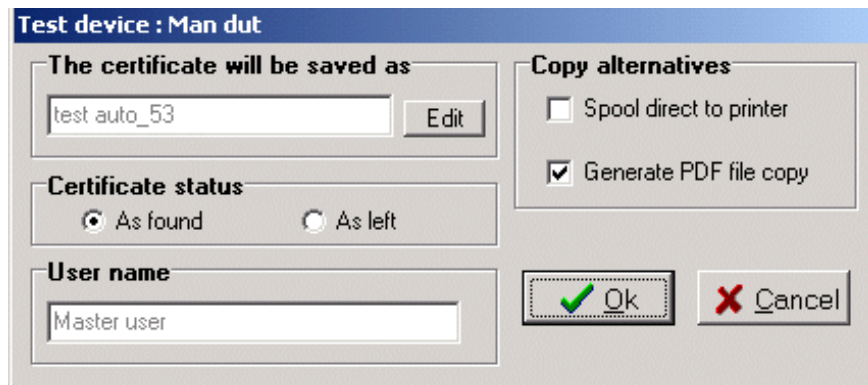


The user is asked if the results are to be saved. If Yes then the 'Save certificate' form is displayed.

13.6 Saving the calibration certificate

When the user chooses to save the calibration results the following screen is presented.

Save results as certificate dialog

A dialog box titled 'Test device : Man dut'. It contains three main sections: 'The certificate will be saved as' with a text field containing 'test auto_53' and an 'Edit' button; 'Certificate status' with two radio buttons, 'As found' (selected) and 'As left'; and 'User name' with a text field containing 'Master user'. To the right of these sections is a 'Copy alternatives' section with two checkboxes: 'Spool direct to printer' (unchecked) and 'Generate PDF file copy' (checked). At the bottom right are two buttons: 'Ok' with a green checkmark icon and 'Cancel' with a red X icon.

The default values when the Window is displayed are defined in the system configuration. See (Section 14 page 119).

13.6.1 Certificate name

If Automatic certificate number applies (see Section 14.2.1 page 120), it is still possible to edit the default certificate ID by clicking

 button.

13.6.2 Certificate copy alternatives

Apart from saving the certificate to the database copy of the certificate can be also:

- **Sent direct to the printer**

 Spool direct to printer

- **Saved as a PDF file.**

 Generate PDF file copy

13.6.3 AsFound AsLeft


Define the certificate status by checking the relevant control.

AsFound AsLeft

Certificate status

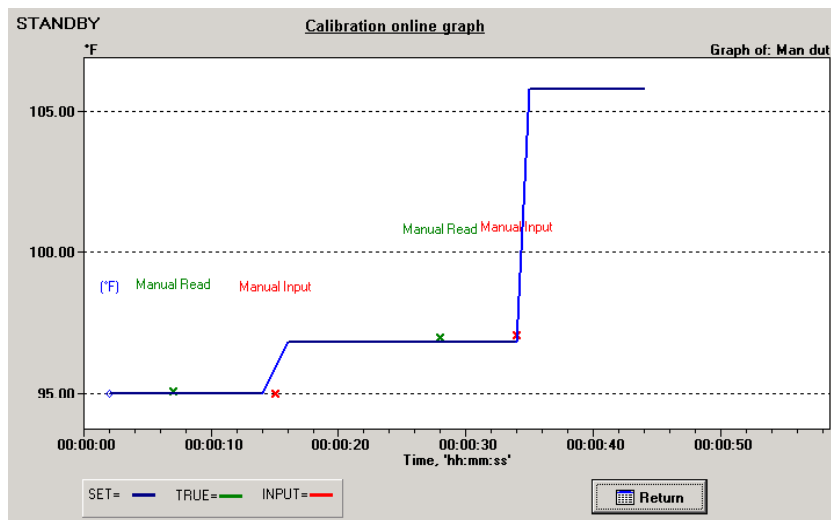
☒ As found ☐ As left


13.7 Online Information

Information regarding the ongoing calibration can be viewed by clicking on the  info .

13.8 Online graph information


Online calibration progress graph



Use  Return to return to the online calibration page. The calibration is not effected by which window is currently visible.

13.9 Reading of data from devices


Data is read from the connected device(s) and displayed in the top right *CURRENT DATA* box. The live data consists of the true temperature (calibrator's *Read* temperature or external reference sensor's *True* temperature depending on scenario) and the sensor under test value (either temperature or measured unit). If manual reading has been selected, the corresponding field will be shown as *Manual*.


 JofraCal retrieves data from the devices approximately once every second. A change in, for example, the calibrator switch input will, therefore, be displayed by JofraCal up to one second later.

13.10 Temperature steps

At the beginning of every temperature step, JofraCal sets the heat source to the specified *Set* temperature and, if applicable, to the specified slope rate. When using a manual heat source (*Heat source type* set to *Other heat source* in scenario), the system will display a window, which reminds the user to set the correct temperature.

Calibration continues with the next temperature step when the following criteria have been met:

- The true temperature (*Read* or *True* depending on True read method) fulfils the stability criterion specified in the calibration procedure (See section 4.3 page 43). If *Manual reading* is selected in the scenario, the temperature will be considered stable when a temperature has been entered manually using . If the heat source is a JOFRA calibrator an additional criteria must be met: The calibrator *Read* temperature must stay within the specified temperature tolerance of the calibrator type.

- The sensor under test temperature (*Sensor*) fulfils the stability criterion specified in the calibration procedure. (See section 4.3 page 43). This only applies if the *Use sensor stability criteria* field is checked. Furthermore, the *True* temperature must be stable. If *Manual reading* is selected in the scenario, the temperature will be considered stable when a temperature has been entered manually using .

Stability status is displayed to the left of the *Stability Countdown or stable buttons*. A status text is shown for *True* and *Sensor* temperatures. Status texts include:

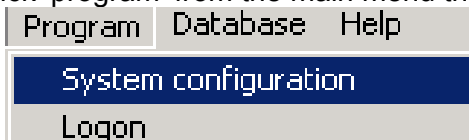
- *Press when stable*. Manual input.
- *Not stable*. The temperature is not yet satisfying the stability criterion.
- *Stable*. The temperature is stable.
- *12:34 (mm:ss)*. The temperature is within the permitted temperature tolerance. The time remaining until the stability criterion is met is shown as minutes and seconds counting down. If the temperature drifts outside the permitted temperature, the tolerance stability will again be displayed as *Not stable*. Not shown if *Manual reading* has been selected.

13.11 Storage temperature

When the last temperature step has been completed, JofraCal sets the heat source to the storage temperature (defined in System configuration, see section 14.3.2, page 123, unless the *Maintain last temp on finish* field in the calibration procedure window has been checked. This only applies if the heat source is a JOFRA calibrator.

14. SYSTEM CONFIGURATION

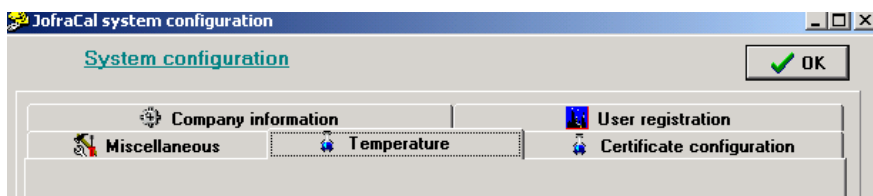
Click 'program' from the main menu then select 'system configuration'.



The system configuration dialog consists of 5 main areas:

- Company information
- Certificate configuration
- User registration
- Temperature
- Miscellaneous

System setup - menu:

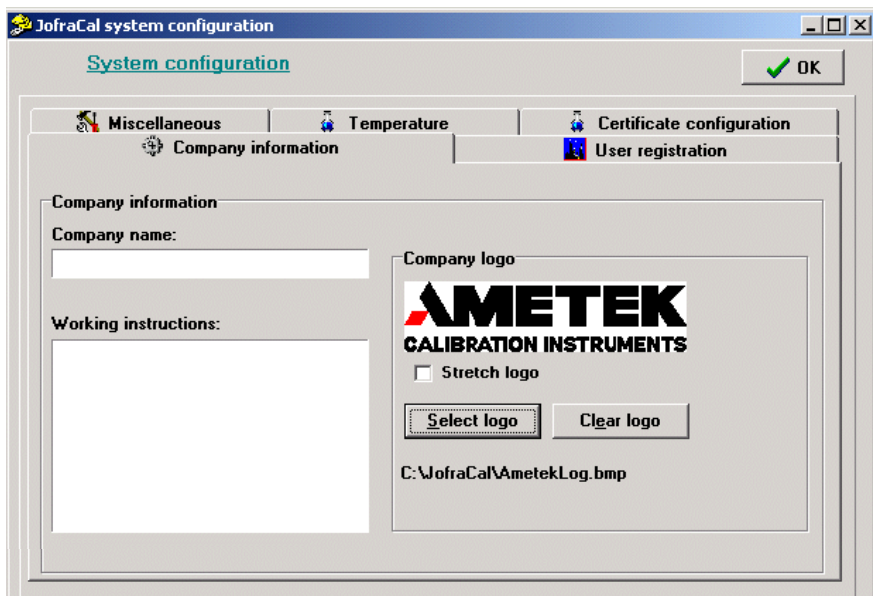


These options are described in the following sections.

14.1 Company information

Click  **Company information** to edit company information.

System setup - company information:



There are three main parameters:

14.1.1 Company name

The name is inserted at the top of all new certificates.

14.1.2 Working instructions

Working instructions are inserted on all new certificates immediately below the company name. The field may be used to enter general information.

14.1.3 Company Logo

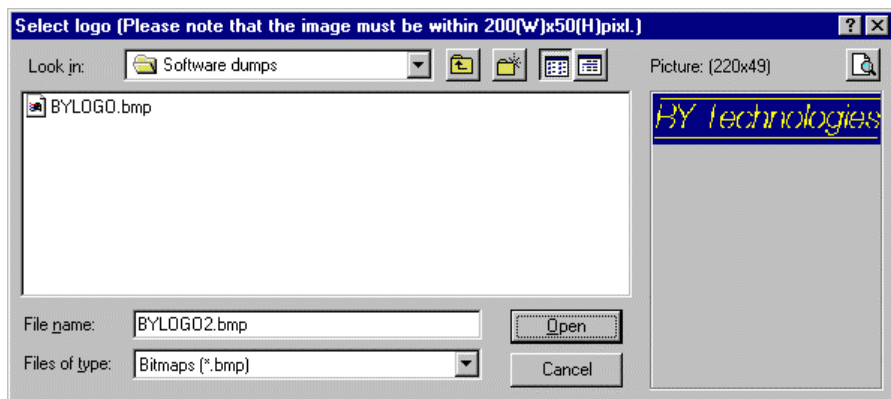
This inserts a logo in the top right-hand corner of your certificates. The logo is included as a Bitmap (*.BMP) file. For the best results, the logo

should have the dimensions 200 x 50 pixels. However, if the logo does not match these dimensions exactly, it can be stretched to fit.

To include a logo in your certificate

Click **Select logo** and use the Select Logo dialog to locate and select your logo.

System setup – select logo:



If, as in the example above, your logo does not fit the 200 x 50 pixels, use the *Stretch logo* option to fill out the space. However, note that this may result in your logo being distorted.

To change the logo, repeat the above step. To remove the logo from your certificates, click **Clear logo**.

14.2 Certificate

Click on the  **Certificate configuration** page tab to edit the certification setup.

System setup - certificate:

Certificate configuration

☒ Send copy to PDF file
 ☒ Automatize certificate no.

☐ Send copy to printer

☐ Include graph in certificate

☒ Translate certificate texts

Next certificate No:

Lead text:

Number:

| Key | Value |
|----------------|-------------|
| Identification | ID |
| Device type | Apparattype |
| Manufacturer | Fremstiller |
| Serial number | Serienummer |

The certificate setup consists of three parts, certificate numbering, graph file and certificate translation.

14.2.1 Certificate numbering

All certificates are assigned an ID as they are created. JofraCal can be set to two possible numbering methods:

- Automatic numbering. If you select this option, IDs will consist of a *Lead text* (which you define) followed by a consecutive number. You define the first number in the series, e.g. *AMETEK certificate No. 7*. The Lead text (*AMETEK certificate No.*) and the number (7) are automatically separated by a space.
- Manual numbering. The ID must be entered manually when a new certificate is created. JofraCal checks whether the ID assigned to the certificate is already in use. Two certificates may not have the same ID.

Three parameters are used to control certificate numbering:

14.2.2 Automatic numbering of certificates

☒ **Automatize certificate no.**

Check this field if you want JofraCal to number certificates automatically.

14.2.3 Next certificate - lead text

Only used with automatic numbering. The field contains the fixed text for the certificate ID.

14.2.4 Next certificate - number

Only used with automatic numbering. The field contains the number of the next certificate. Certificates are numbered consecutively.

14.2.5 Certificate translation

All certificate texts can be translated. This option may be used if a different language or different explanations are required. Certificate translation is based around a table and a number of additional parameters.



Please note that translated texts are not saved with each certificate. This means that when a certificate is printed using the translated texts, the current translated texts are used. This may lead to confusion if the meanings of texts are changed once a certificate has been generated, and the certificate is reprinted at a later date.

14.2.6 Translate certificate texts

Check this field if you want JofraCal to translate all certificate texts. The original English texts will be used if the field is not checked. Arial typeface supports text in all languages.

14.2.7 Translation table

The table consists of two columns. The left-hand column contains the original English texts, while the right-hand column contains the


translated texts. Initially, the two columns are identical. Please note that only the right-hand column may be edited.

Certificate translation table

| <input checked="" type="checkbox"/> Translate certificate texts | |
|---|----------------|
| Key | Value |
| Identification | Identifikation |
| Device type | Apparattype |
| Manufacturer | Fremstiller |

The translation text is stored in a file: AmTransl.INI. This can be edited manually, but it is recommended that edits be made from AmeCal Temperature.

14.3 Temperature

Click on the  Temperature page tab in system setup to edit the temperature related parameters:

System setup - temperature:

Temperature

Measuring unit

☒ °C Celcius
☐ °F Fahrenheit
☐ °K Kelvin

Device storage temperature

35 °C

The window contains the following parameters:

14.3.1 Measuring unit

JofraCal incorporates the following three temperature units:

- Celsius (°C)
- Fahrenheit (°F)
- Kelvin (K)

14.3.2 Storage temperature

When the calibration process is complete, the JOFRA calibrator can be set to a predetermined storage temperature. The default value is 20°C, which ensures that the calibrator can be switched off and stored and the sensors removed from the socket without risk of thermal shock or burns.

14.4 Miscellaneous

- 1 Click on  Miscellaneous page tab in system setup to edit various parameters:

System setup - miscellaneous:

| Userdefined sensor location information | |
|---|----------------------|
| Database field | Location description |
| Loc1 | Factory |
| Loc2 | Department |
| Loc3 | Sections |

Define the test device database location structure

DTI resolution message

☒ Show "Set DTI resolution" info message when starting calibration

Calibration uncertainty message

Select uncertainty information :

Not Defined

Add

Delete

The window contains the following parameters:

14.4.1 User defined sensor location labels

Location: The miscellaneous page allows the user to define the devices' location structure. Each test device has 3 location parameters to simplify identification and search of a device.

The example below from the test sensor selection & editing window uses all 3 levels starting with a factory ID, department and finally sections.

(See **Sorting by location** section 12.2.1 page 103).

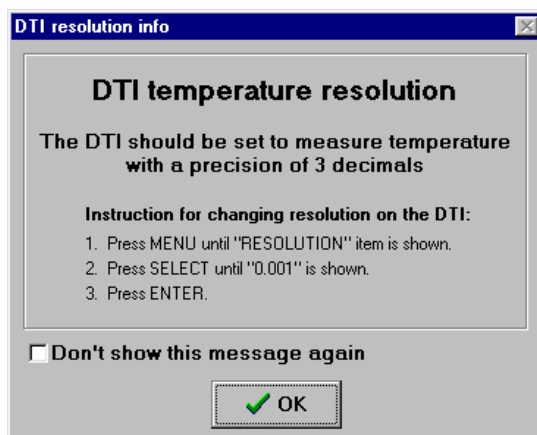
Sensor under test window – location tags:

The screenshot shows a window titled "Location / Tags" with a light gray background. It contains three rows of labels and text input fields. The first row is labeled "Factory" and has an arrow pointing to a text box containing "Eastern plant". The second row is labeled "Department" and has an arrow pointing to a text box containing "Research and development". The third row is labeled "Sections" and has an arrow pointing to a text box containing "Electronic".

14.4.2 DTI resolution message

When the calibration process starts, JofraCal displays a message window informing the user to set the JOFRA DTI to the correct resolution (if a DTI is included in the scenario):

DTI resolution message:



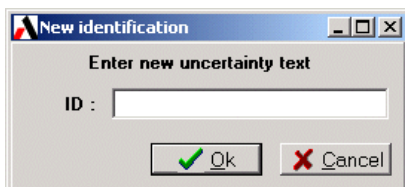
The user can check the *Don't show this message again* check box to disable the message window in the future. Note, however, that *Miscellaneous setup* can be used to re-enable the message window by checking *Show "Set DTI resolution" message window when starting calibration*.

14.4.3 Calibration Uncertainty information

This field allows you to type in comments about factors that may affect the reliability of the calibration. These comments are stored in a database and can be displayed when a calibration commences. Select from the previous defined comments from the dropdown list.

To define a new uncertainty description, click on the **Add** button.

Uncertainty description



Type in the new description and click OK.

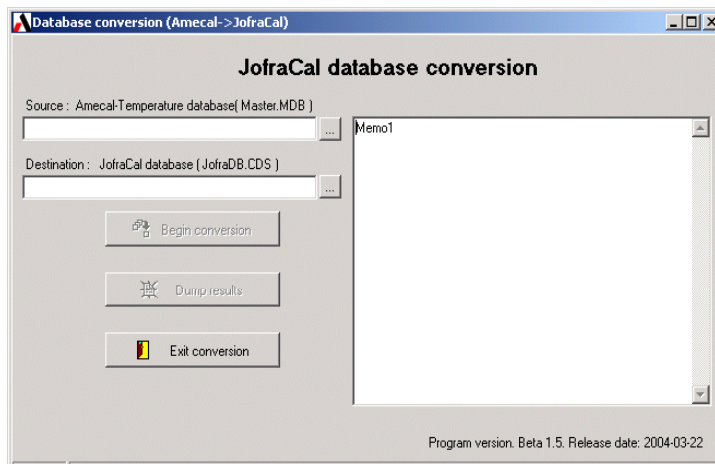
15. DATABASE CONVERSION PROGRAM

The database conversion program converts an existing Amecal-Temperature database (MSACCESS) to a JofraCal database (Client dataset based database - CDS files).

This is done using the conversion program that is installed together with JofraCal.

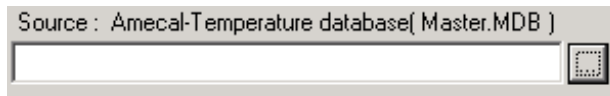
1. Click *Start*.
2. Select *Programs*.
3. Select *JofraCal*.
4. Select *Database conversion*.

Database conversion program

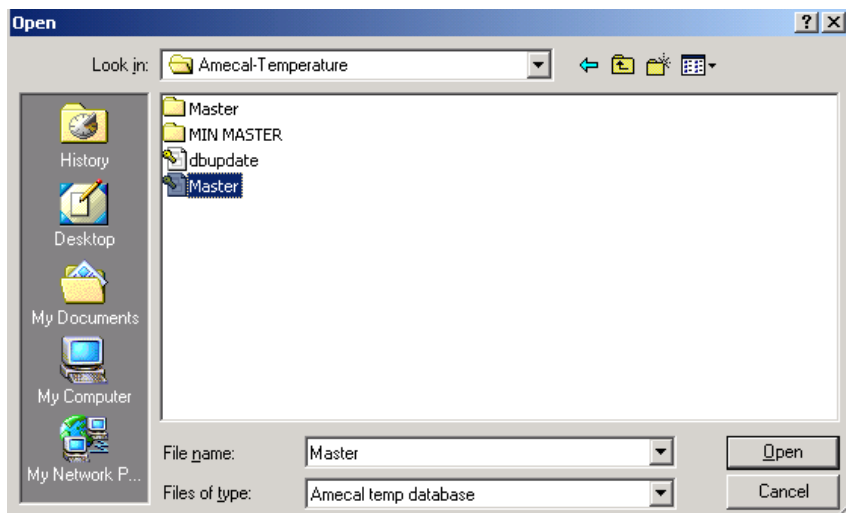


15.1 Selecting the Amecal-Temperature database

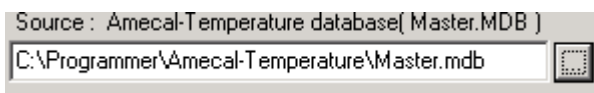
Click on the Select button to find the **Source** database.



A standard windows search dialog is displayed.



Locate and select the Amecal-Temperature database file and click open.

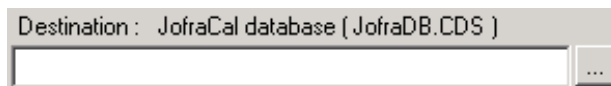


The
displayed in the source component.

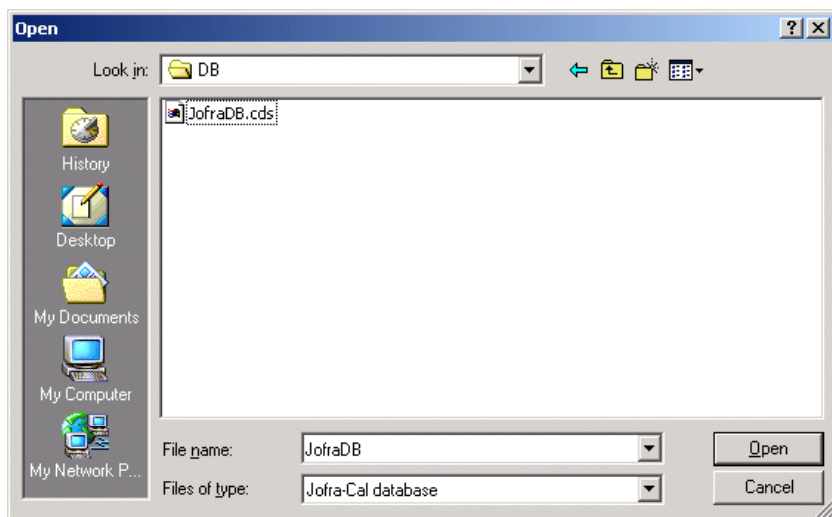
file path is now

15.2 Selecting the JofraCal database

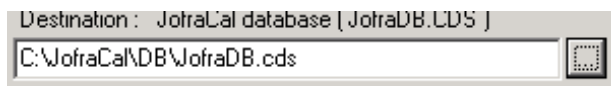
Click on the Select button to find the **Destination** database.



Using the same windows search dialog, locate the JofraCal database. JofraCal.CDS file.



Locate and select the JofraCal database “JofraCal.CDS” file and click open.

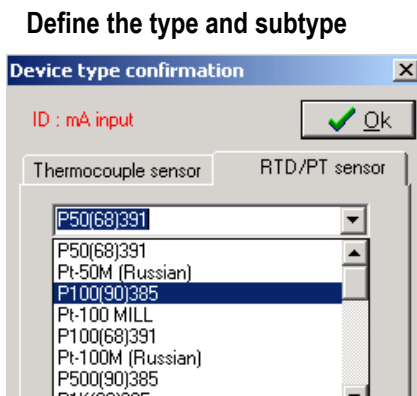


The file path is now displayed in the source component.

15.3 Running the conversion

To begin the conversion click the  **Begin conversion** button.

Occasionally the program requires more information to ensure that the correct data is converted and will prompt the user to determine a Test device type.



Select the type and/or subtype of the test device then click OK.

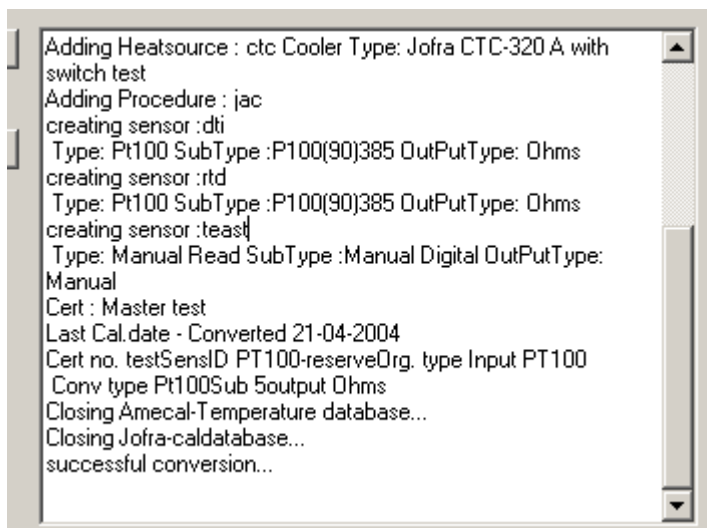
15.4 Conversion log panel

Progress of the conversion can be seen in the scrolling window to the right of screen.

A scrolling screen displays the conversion of

- Test devices
- Heat sources
- Procedures
- Certificates


Conversion log window



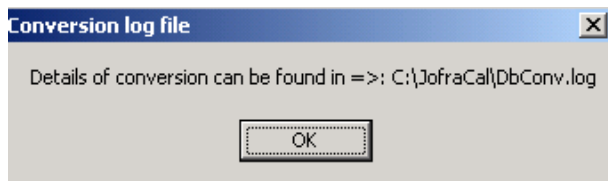
The last line of the log file will report if the conversion was successful or was aborted.

15.5 Close and save the conversion details

When completed the user has the possibility to save the conversion log details to a file.

Click the  **Dump results** button to save details to the "DBConv.log" file saved in the JofraCal folder.

The conversion program informs the user where the file is saved.



To close the conversion program simply select the



button.

APP. A. SERIAL COMMUNICATION

The PC and the JOFRA device (calibrator or DTI) must be connected using the correct type of serial cable. Use a JOFRA cable, (type 60V991 for SE series and a 105366 for ATC series) and ensure that the device is switched off when you connect the cable from the PC. Both the device and the PC should be earthed to avoid noise interference and damage to the equipment. The PC and the device should also be connected to the same mains circuit.

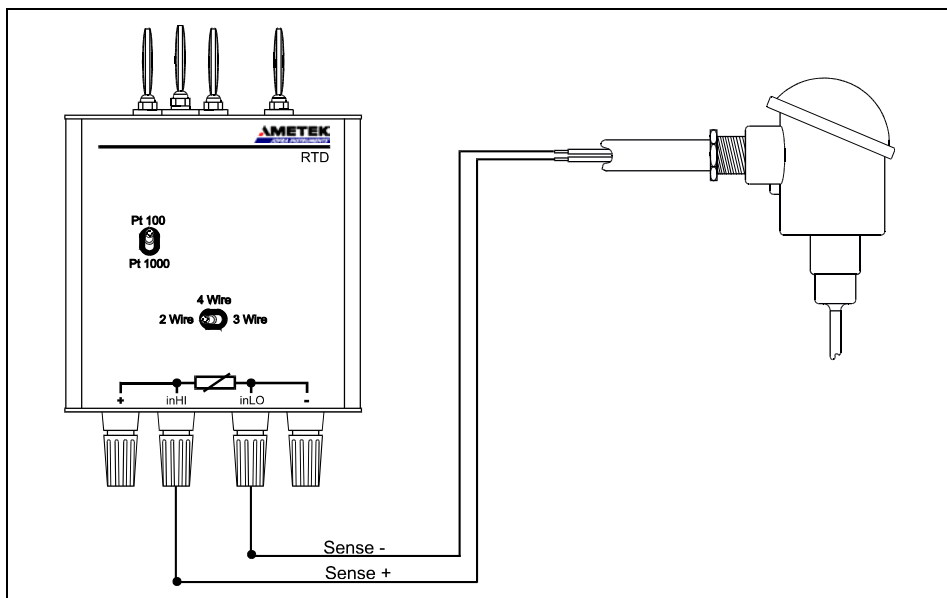
Applies to SE-series calibrators only

When the calibrator is switched on, it detects the signal levels from the PC. Serial communication will not be initialized if the calibrator cannot detect a signal from the PC, and it will be impossible for JofraCal to communicate with the calibrator. You are therefore advised not to switch the calibrator on until JofraCal has been started. Alternatively, you will have to switch the calibrator off before turning it back on. It is not sufficient to turn the PC on, since the serial port will not be initialized until JofraCal is started up.

APP. B. HOW TO CONNECT INPUT MODULES

Input modules of the type RTD, TC, TC-H and V-DC may all be used with JOFRA SE calibrators with an RS-232 serial interface. The modules allow the user to test the sensors and compare the input signals with the test temperatures that are generated. The modules are connected to the mA-socket on the calibrator (see the calibrator manual).

B.1 Using a 2-way RTD sensor with an RTD input module



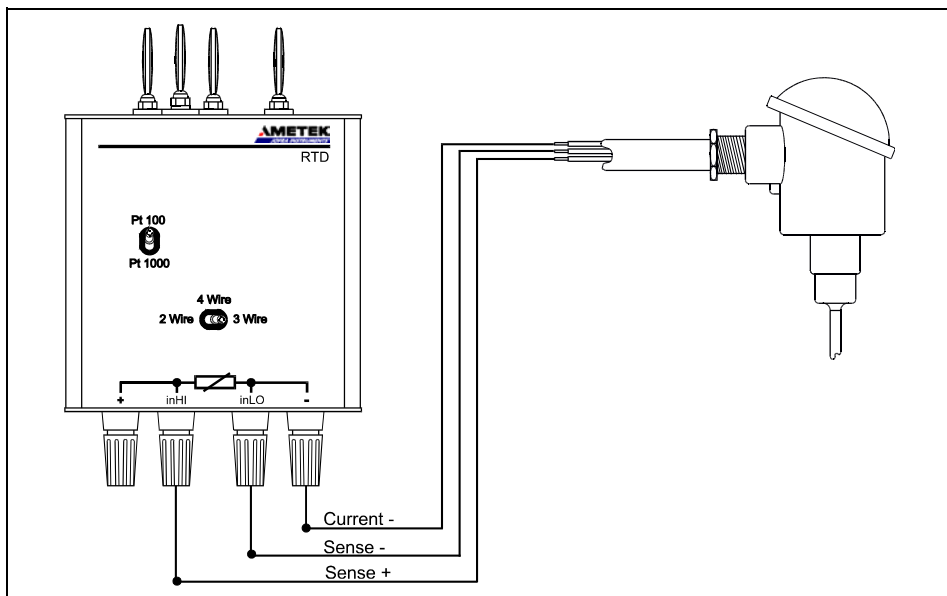
- ① Connect the two sensor cables to the RTD module as shown on the diagram.
- ② Set the *Wire* switch to the *2 Wire* position on the module.

For RTD modules without a *Wire* switch, you will have to cause short-circuits between + to *inHI*, and - to *inLO*.

3

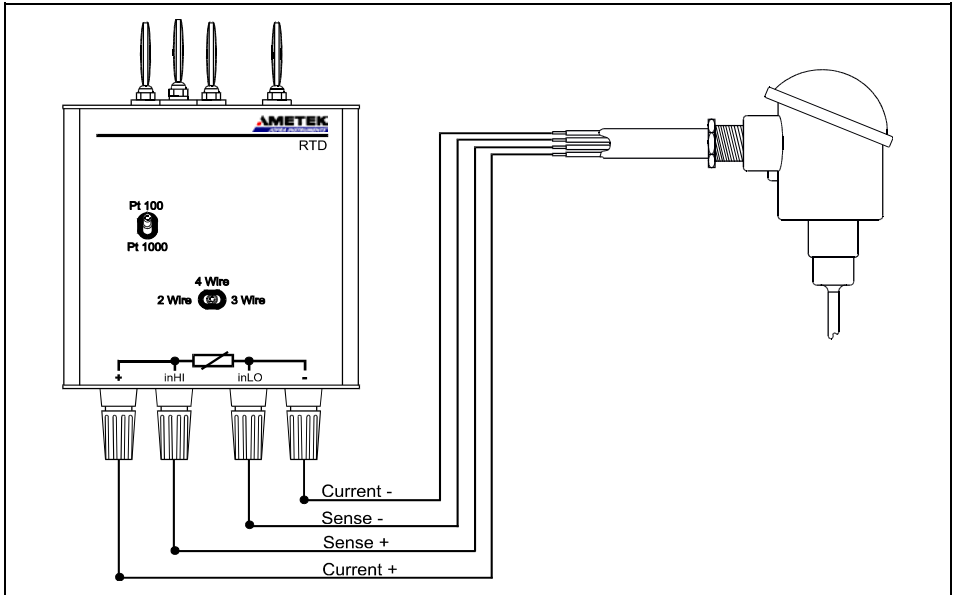
Select a sensor type using the *Pt-100/Pt-1000* switch. *Pt-50* sensors use the *Pt-100* position, while *Pt-500* sensors use the *Pt-1000* position.

B.2 Using a 3-way RTD sensor with an RTD input module



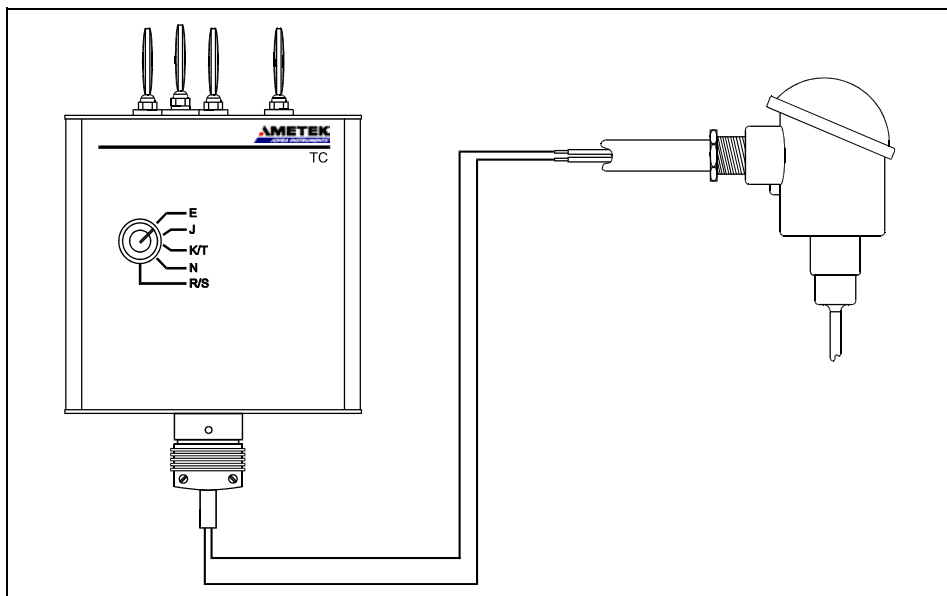
- ① Connect the 3 sensor cables to the RTD module as shown on the diagram.
- ② Set the *Wire* switch to the 3 *Wire* position on the module.
- ③ Select a sensor type using the *Pt-100/Pt-1000* switch. *Pt-50* sensors use the *Pt-100* position, while *Pt-500* sensors use the *Pt-1000* position.

B.3 Using a 4-way RTD sensor with an RTD input module



- ① Connect the 4 sensor cables to the RTD module as shown on the diagram.
- ② Set the *Wire* switch to the *4 Wire* position on the module.
- ③ Select a sensor type using the *Pt-100/Pt-1000* switch. *Pt-50* sensors use the *Pt-100* position, while *Pt-500* sensors use the *Pt-1000* position.

B.4 Using a thermocouple sensor with a TC input module

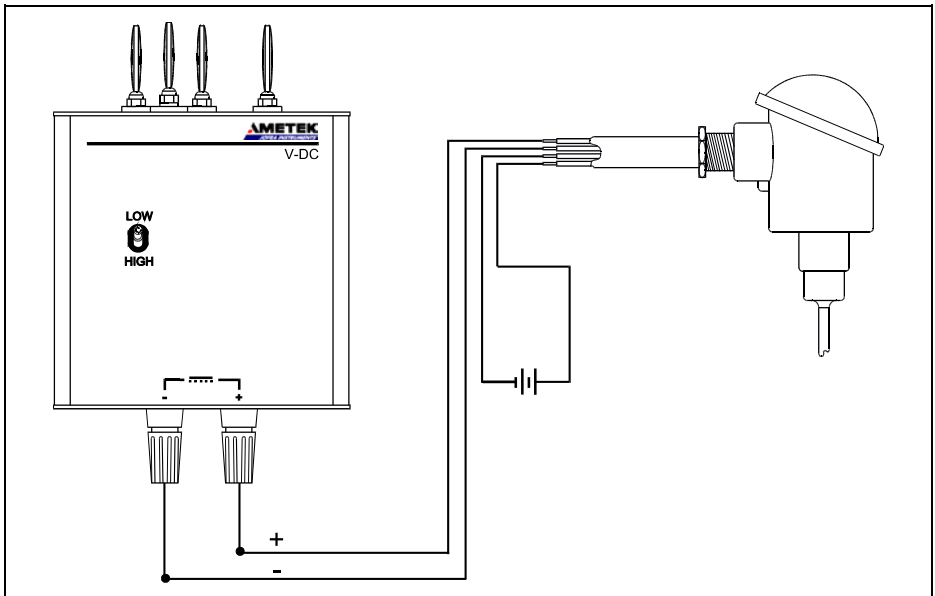


- ① Connect the thermocouple sensor to the TC module as shown on the diagram.
- ② Select the thermocouple type to be tested by rotating the selector switch on the module. If you selected *TC module: Type XK (Russian)* as input type (see section 11.4.1.1.2 page 98) the selector switch must be placed in position *E*.

B.5 Using a thermocouple sensor with a TC-H input module

Thermocouple sensor connection to a TC-H module is identical to the TC module see previous section.

B.6 Using a voltage transmitter with a V-DC input module



- 1 Connect the 2 transmitter cables to the V-DC module as shown on the diagram.

Note that the transmitter must have a separate voltage supply.

- 2 Select the voltage using the *Low/High* switch on the module.