Beamex CMX Calibration Software

User Guide

By Beamex

8835000 / CMXuEng / Version 2.10a

Contents

Software Registration

IMPORTANT! For warranty service and access to technical support for your Beamex products, complete this form and return it to Oy Beamex Ab. All rights under the limited warranty come into force after receipt of your completed Registration.

License Key number(s): _____

_____

_____

_____

Company: _____

Contact person: _____

Street Address: _____

City: _____

State: _____

Zip Code: _____

Country: _____

E-mail: _____

Telephone: _____

Fax: _____

Select Business branch:

☐ Power & Energy (excl. Nuclear) ☐ Pharmaceutical ☐ Automotive
☐ Nuclear ☐ Food & Beverage ☐ Aviation
☐ Oil & Gas ☐ Manufacturing ☐ Marine
☐ Petrochemical & Chemical ☐ Metal & Mining ☐ Pulp & Paper
☐ Service ☐ Education
☐ Other:_____

NOTE:

Upon receipt of the product registration Beamex will send you information on relevant Beamex products as they become available. If you would prefer not to receive information on relevant Beamex products please tick here. ☐

Send your software registration to:
Oy Beamex Ab
Ristisuonraitti 10
FIN-68600 PIETARSAARI
FINLAND
E-mail: support@beamex.com
Phone: +358 10 550 5000
Fax: +358 10 550 5404
Internet: www.beamex.com

Feedback

We want to improve our products and services constantly. Therefore we'd like to know Your opinion of the product You use. Please spend a moment of Your valuable time in filling this form. All respondents will receive a surprise gift in return.

Certain questions can be answered immediately after receiving the product. Others require some use of the product before You are able to answer them. The best way to fill the form is to answer the items as it applies, and send the form to us when all items are answered. There are however no definite restrictions; fill in the form when you feel like it (all items need not be answered). Then send it to Beamex using one of the possibilities listed below.

Mail: Beamex Oy, Ab
            Quality Feedback
            Ristisuonraitti 10
            FIN-68600 Pietarsaari
            FINLAND

Fax   +358 - 10 - 550 5404
            Only the next page need to be faxed to us.

Internet: http://www.beamex.com
            A similar form is available as a web page

E-mail: support@beamex.com
            Refer to the numbered items on the next page in Your e-mail message.

1. Name of the product you give feedback of: _____

2. Serial number and software version number (if applicable) _____
   _____

3. Any comments when receiving the product. Did the package contain all required items and was it as expected?

   _____

   _____

4. For how long have you been using the product? _____

5. How helpful was the manual in using the product?
   (Tick a box in the percentage scale below)

   | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
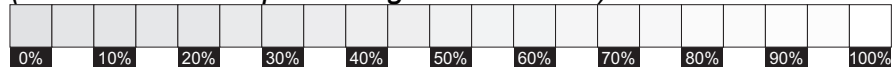
6. How well did the product suit your needs?

   | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
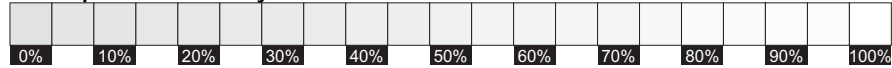
7. How satisfied are you with the product?

   | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
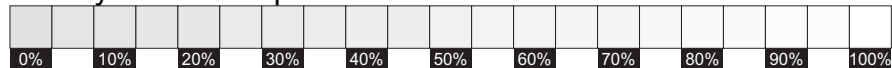
8. Did anything in the product exceed your expectations? In that case, what was it?

   _____

   _____

9. Did anything in the product disappoint you? In that case, please specify.

   _____

   _____

10. Any ideas You want to propose to Beamex so that we can improve our products, operations and/or services.

    _____

    _____

Please fill in these fields in order to receive your surprise gift.

Title & Name:
_____

Address:
_____
_____
_____

☐ Please contact me concerning the Feedback I have given.

☐ I want to receive more information on Beamex products.

Size (tick one)
☐XS ☐S ☐M ☐L ☐XL ☐XXL

Introduction

General

Beamex was founded in 1975 by people with experience in calibration and quality maintenance of instruments. CMX is developed based on that knowledge. CMX also represents Beamex's 3rd generation of calibration management software.

CMX has an "Explorer-like" user interface. This enables the software to be simple to use by any operator familiar with Windows®.

CMX communicates with Beamex's communicating calibrators (excluding PC105). Several calibrators by other manufacturers also communicate with CMX.

The main features are:

- Automated calibration and documentation
- Versatile calibrator communication
- Support for several database platforms
- Security and change management control
- Pocket PC interface
- Extensive services and support

CMX Family

CMX software is tailor made for different needs. Therefore there are different CMX Family members (versions) available. The following list presents all members of CMX Family:

- **CMX Light**
  Easy-to-use calibration software for single workstations.
  Note that CMX Light is a legacy version, no longer developed. The last release is V2, revision 2.9.

- **CMX Professional**
  Calibration software with wide customization possibilities.
  CMX Professional has two installation options:
    - **Workstation** installation and
    - **Floating** installation on a network server.

- **CMX Enterprise**
  All in one calibration solution for large companies. One floating installation on the corporate server for sharing the same system in all locations worldwide.

See chapter **Feature Comparison** for more information of differences between members of CMX Family.

How to see/know which CMX version you have

The splash screen shown when CMX is started shows which version you have at hand. Another way to identify your CMX version is opening the About screen using menu commands **Help, About**.

How to know which features presented here apply to your CMX

Features presented in this manual have in the beginning of the topic, a paragraph explaining differences in functionality between members of CMX family. This, of course, only if the feature differs between CMX family members.

Symbols used for a feature's availability in different CMX versions:
- — **Not** available/applicable
- O **Optionally** available
- ● **Standard** feature

Feature Comparison

The following table presents the features available in CMX products:

CMX Feature	Light	Professional	Enterprise
Positions/tags in the database	300	1000	Unlimited
Optional 5000 Positions in the database	—	○	—
Optional 10 000 Positions in the database	—	○	—
Single workstation license	●	●	—
Floating server license	—	○	●
Networking / multi-user support	—	●	●
Position and Device database	●	●	●
Position and Device sets	●	●	●
Calibrator database	●	●	●
Wizard for database population	●	●	●
Communication with Beamex calibrators	●	●	●
Manual data entry	●	●	●
Average and uncertainty calculation	—	●	●
Plant structure	●	●	●
User accounts, groups and permissions	●	●	●
Pickup lists	●	●	●
Saveable database filters	—	●	●
Standard paper report templates	9	17	17
Importing/exporting report templates	●	●	●
Starting CMX using startup parameters.	—	●	●
User Defined Transfer Functions	—	●	●
User Defined PRT Sensors	—	●	●
User Defined Pressure Units	—	●	●
Site User Maintenance	—	●	●
CMX Database Manager tool	●	●	●
Oracle database support	—	○	●
Communication with 3rd party calibrators	—	○	○
Configurable user interface	—	○	●
History trend	—	○	●
Report design	—	○	●
Pocket PC interface	—	○	●
Change management	—	○	●
Weighing instrument support	—	○	●
Lightweight Directory Access Protocol (LDAP)	—	○	●
CMX Connector - Asset Management Connection	—	○	○
Work Order Handling	—	○	●
Maintenance Inspection	—	○	●
CWSI, Calibration Web Service Interface	—	●	●
Software service agreement (SSA) for 12 months	—	○	○

Symbols used: — **Not** available/applicable
○ **Optionally** available
● **Standard** feature

SSA and Support

A Software Service Agreement (SSA) can be included in CMX. SSA is highly recommended because all updates during the SSA's duration are free. Also: Customers with a valid SSA have "priority one" service when contacting CMX support.

Contact Information to Beamex Software Support:

Telephone:	**+358 - 10 – 5505000**	(Ask for Support)
Fax:	**+358 - 10 – 5505404**	
E-mail:	**support@beamex.com**	
Address:	**Beamex Oy Ab** **Ristisuonraitti 10** **FIN-68600 Pietarsaari** **Finland**	

About This Document

The user of this document is expected to be familiar with the Windows® environment and such terms as **Clicking**, **Selecting**, **Double-clicking**, **Marking**, using the **secondary button** of the mouse, **Drag and drop**, **Resizing a window**, etc. If you are unsure of a term, please refer to a Windows® User Guide.

This document focuses on giving you advice on how to use CMX. For information concerning a device communicating with CMX, please consult the instruction manual of that particular device.

The installation media in which the software was shipped also includes this document in PDF format.

Typographic conventions

This document uses the following typographic conventions:

- All words related to a CMX window are shown using bold font style. Specifically:
  - o Menu and submenu commands. A comma separates the menu and submenu command from each other.
    Example: **File, Exit**.
  - o Command buttons:
    Example: Click **OK**.
  - o Window names:
    Example: the **Calibrators** window.
- File names and directories are in capital letters.
  Example: D:\CMX\CMX.EXE.
- References to other parts in this guide are shown in bold.
  Example: See the **Calibration** section in this guide.

A Short Presentation of the Sections in This Document

This chapter briefly presents all sections found in this document.

Introduction

Basic Information about CMX, this manual and calibration.

Starting CMX

A short section telling you how to start CMX and how to select a database.

General Presentation of CMX

Gives you a detailed description of CMX's user interface, menus common features etc. A good read before you start taking CMX into serious use.

Basic Settings

Contains information that should be reviewed when CMX is taken into use. Many of the settings described in this section are usually done only once, like the Plant Structure data. Certain parts, like the User and User Group settings are updated whenever changes occur.

Adding Instruments to the Database

Tells you how to add instruments to CMX's database using either the Wizard or entering Position, Device, Function and Calibration Procedure data one by one. This section also describes how to edit, link and unlink Positions/Devices.

Queries, Filters and Sets

A section for finding out what kind of tools CMX provides when you need to limit the displayed data somehow.

Check Out / Check In Feature

Check Out / Check In Feature is a tool for locking instruments chosen for calibration so no other user may edit the instrument data during calibration. After calibration is done, the instrument is unlocked. Locking instruments may be done manually or automatically depending on your settings.

Calibration

Here are the ways to utilize CMX for calibration presented. Communication with a calibrator as well as manual data entry. This section also includes a presentation on how to view the calibration results in CMX.

Calibration Certificates and Other Documents

Tells about the Documents types that are available in CMX: Calibration Certificates, Reports and Labels.

Change Management and Audit Trail

Change Management and Audit Trail makes it possible to log changes made to the database. The electronic signature feature is also presented here.

Pocket PC Interface

Pocket PC Interface allows you to send instrument data to a Pocket PC, manually enter calibration results and receive the results to CMX. In other words, the Pocket PC Interface is a "mobile manual entry utility".

Calibrating Weighing Instruments

Weighing Instrument Calibration allows you to calibrate Weighing Instruments using the Manual Entry window. If you also have the Pocket PC Interface, you will furthermore be able to calibrate Weighing Instruments using a Pocket PC.

Note that Weighing Instrument Calibration is not available in CMX Light, is an option in CMX Professional and is a standard feature in CMX Enterprise.

Maintenance Inspection

Maintenance Inspection allows you to perform check procedures according to IEC 60079-17 standard and also according to your own needs. The actual check procedure is done using a compatible tablet with **bmobile**[tm] software.

Work Order Handling

Work Order Handling is a tool for handling work orders sent from asset and work management software. CMX receives the necessary data and after calibration using CMX, Pocket PC, a calibrator or a compatible tablet, updates and returns the work order data back to asset and work management software.

CMX Database Manager

Presents a tool for database experts. CMX Database Manager allows you to backup, restore and copy CMX databases.

Additional Information

Contains useful information of, e.g. calibrators communicating with CMX.

Other Documents

When CMX is installed, some additional Help files are also included:

- **CMX_Calculations.chm**
  presents all the calculations that CMX performs.
  This Help file may be opened from CMX Main Windows' Help menu. Select option **CMX Calculations**.

- **CMX_Report_Variables.chm**
  presents all variables available in the Report Designer.
  See chapter **Creating Your Own Certificates** in section **Calibration Certificates and Other Documents**.
  This Help file may be opened from CMX Main Windows' Help menu. Select option **CMX Report Variables**

Note.
These help files are also available pdf format in the **Documents** folder of the CMX installation media.

What's New

The following main additions have been included into CMX Professional and Enterprise, versions 2, revisions 2.10:

- **Maintenance Inspection** option, a tool for performing check procedures according to IEC 60079-17 standard or custom checks. The actual check procedure is done using a compatible tablet with ***b*mobile**[tm] software.
  Maintenance Inspection is not available in CMX Light, optional in CMX Professional and a standard feature in CMX Enterprise.

- **Enhanced Work Order Handling** takes care of work orders sent from asset and work management software. Beamex® Business Bridge software communicates between CMX and asset and work management software.
  Enhanced work order handling is not available in CMX Light, optional in CMX Professional and a standard feature in CMX Enterprise.

Other minor enhancements and additions have also been done.

For detailed information concerning CMX updates, including update history, see **Release Note** included in installation media.

About Calibration

A calibration procedure means measuring a process instrument's accuracy against another more accurate device, for example a calibrator. The calibrator normally contains measurement modules allowing the measurement of different engineering units at different ranges.

What is Calibrated?

The calibration may be carried out for a process Position (sometimes also called a "Tag") with an installed Device, or the calibration may be for an uninstalled Device; more precisely, the calibration is for a particular Function of the Position/Device.

The Three Steps

The calibration process is normally a three step event containing:

- *As Found calibration*, done to verify the current state of the instrument before adjustment.

- *Adjustment*, made to bring the instrument within the required specifications.

- *As Left calibration*, the final calibration in order to establish the state of the instrument after the adjustment.

When entering the result manually to CMX there is no limitations in the amount of As Found and As Left calibrations or the number of calibration points. If you are sending instruments for calibration using communicating calibrator, refer to the calibrator manual to find out whether there are any limitations in either the amount of As Found and As Left calibrations or the number of calibration points.

Starting CMX

About CMX's Installation

When CMX was delivered, a separate installation booklet was included in the shipment. Refer to it when installing CMX.

Alternatively, if you have lost the installation booklet, the installation instructions of all CMX family members are included on the installation media.

Alternatively, the installation booklets are also available in the Downloads section of Beamex's web site: http://www.beamex.com/.

Note.
When downloading the installation instructions, remember to select the instructions that suit the CMX version at hand.

How to Start CMX

When CMX is installed you can start using the software. Locate the CMX icon in your Start menu to start the software.

To use a fully functional CMX, the License Key must be in place. Without the License Key CMX starts up as a Limited Evaluation version. Detailed info of the License Key is in chapter **License Key** on page 18.

CMX automatically places the current Windows® User ID as the default user for logging into CMX. If you are logging in for the very first time you must use the Supervisor User ID and Password delivered with CMX. Change the Supervisor User ID and add other Users according to your needs. Adding Users is described in **Basic Settings** section's chapter **Users and User Groups**.

See also: **User Interface Language** on page 15.

Availability of LDAP:
-- CMX Light
O CMX Professional
● CMX Enterprise

Note.
If Lightweight Directory Access Protocol (LDAP) is enabled in CMX, use your network user name and password to log into CMX. More of LDAP in section **Basic Settings**, chapter **LDAP Options**.

Opening a Database

The available databases depend on the installed CMX version.

In **CMX Light**:

- **CMX_Light_Database** is the database available **when the License Key is installed**.
  Other databases cannot be opened when CMX Light is running with the License key in place.

- **CMX_Light_Demo_Database** is a demo database available when the License Key is **not** in place. the amount of positions/devices are limited to 15. Other databases cannot be opened with CMX Light in demo mode (Limited Evaluation version).

In **CMX Professional** and **Enterprise**:

- **CMX_Demo_Database** is a demo database for getting acquainted with CMX. This is the default database when CMX is started for the first time after installation.

- **CMX_Database** is an empty database for creating your own database. When needed, you may switch to this database as described further on in this chapter.
  Note.
  *You may also use **CMX_Demo_Database** as the basis for your own database. When the demo positions/devices are no longer needed, just remove them from the database.*

- **Other databases.** You may create your own CMX databases using the tools available in **CMX Database Manager**. This however requires that you have experience in working with databases and database servers.

Notes.
All databases mentioned above have the same Supervisor User ID and Password (shipped with CMX installation media).
More info of CMX versions is in **Introduction** section's chapter **CMX Family**.

Switching between databases:

During login CMX offers to connect to the latest database used. To switch database, select another (host and) database from the login window.

Alternatively, when CMX is already running, use the main window's menu to select:

- **File, Log Off** in **CMX Enterprise** or **CMX Professional** with the floating server license option or

- **File, Database** in **CMX Professional** without the floating server license option.

Then enter required information to log into another database.

Note.

CMX includes a possibility to utilize either **SQL Server Authentication** (default) or **Windows Authentication**. Use the **Authentication** selection list to choose the one you want.

See also: **User Interface Language**.

User Interface Language

When starting CMX or switching between databases, the log-in window includes the possibility to select the user interface language from the **Language** combo. The available user interface language options depend on the selected user interface languages during installation.

Notes.

During the installation, the base database was also selected. Certain pick-up list options are displayed using the language of the base database.

Function Templates and their Calibration Procedures have the same language as the base database.

Starting CMX Using Startup Parameters

Availability:
-- CMX Light
● CMX Professional
● CMX Enterprise

CMX may also be started using certain startup parameters in the command line.

In 32 bit Windows® operating systems:

"C:\Program Files\CMX\BxbMUIPD.exe" **/DB:***CMX_Demo_Database* **/LANG:***ENGLISH* **/USER:***123* **/PWD:***SECRET* **/IP:**"*101DR-PI0014*"

In 64 bit Windows® operating systems:

"C:\Program Files (x86)\CMX\BxbMUIPD.exe" **/DB:***CMX_Demo_Database* **/LANG:***ENGLISH* **/USER:***123* **/PWD:***SECRET* **/IP:**"*101DR-PI0014*"

Begin the command line entry with the path where your CMX is installed and the name of the CMX software (BxbMUIPD.exe) followed by the necessary parameters. Each parameter starts with a preceding space and a slash character.

The following command line parameters are available:

PARAMETER	DEFINITION
/DB:*DATABASE NAME*	The name of the database to be opened. /DB: parameter is mandatory
/LANG:*LANGUAGE*	The user interface language. Language name should be written as is it seen in language selection list during normal start/login, e.g. "*FINNISH*". If no /LANG: parameter is specified, CMX uses the language chosen in a previous start. If no /LANG: parameter is specified and no previous starts (with current version of CMX) have been made, English language is used.
/USER:*USER ID*	User ID to be used when opening the database. If no /USER: parameter is specified, CMX login dialog is displayed.
/PWD:*PASSWORD*	Password to be used when opening the database. If password is required and no /PWD: parameter is specified, CMX login dialog is displayed.
/P:*POSITION ID*	The Position Property window is opened and the data of the specified position is displayed. If the Position ID is invalid, the Position Property window is not opened.
/D:*DEVICE ID*	The Device Property window is opened and the data of the specified device is displayed. If the Device ID is invalid, the Device Property window is not opened.

If both a **/P:** and a **/D:** parameter is entered, the **/P:** parameter takes precedence and the **/D:** parameter is ignored.

Wildcards can also be used. For example "**/P:***101%*" displays all positions that begin with "101". Wildcards used in a Microsoft SQL Server database are presented in section **Queries, Filters and Sets**, chapter **Wildcards**.

Notes!

Do not use the command line if there is a possibility that unauthorized people may get hold of User IDs and Passwords. The command line displays all text written in it, even the User ID and the Password.

Database settings must be set correctly before command line parameters can be used. Set the Provider, Server, Server Login and password settings to the database server where the wanted database is located. Set the parameters by opening the database manually before using the command line parameters.

Each time CMX is started with command line parameters, a new CMX instance will be started. So, to free CMX licenses, remember to close the CMX instance after use.

If your Position IDs and/or Device IDs contain space characters, include the ID inside quotes, e.g.:
… /P:**"DEPT 714 - PT101.3"**.

License Key

The License Key must always be connected to the computer while you are using a fully functional CMX. Without the License Key, CMX starts up as a Limited Evaluation version. Most of the functionality is still available, but CMX uses a demo database with a limited amount of positions/devices. The maximum amount of positions/devices in the demo database is 15.

Where should the License Key be located?

- In **CMX Enterprise** and
  CMX Professional with the floating server license option:
  The License Key must be installed into the server where CMX Application Server is running.

- In **CMX Light** and
  CMX Professional without the floating server license option:
  The License Key must be installed into the workstation where CMX is running.

General Presentation of CMX

CMX and the Instrument Database

The relation between CMX and the Instrument Database is like the relation between a word processing software and the document you write. CMX, just like the word processor, is a tool for handling the information you create. With CMX you create a database instead of a document.

All instrument data as well as calibration history data is saved in the database. CMX is the tool for opening, viewing and editing the database.

About CMX's User Interface

A general description of CMX's user interface.

The Main Window
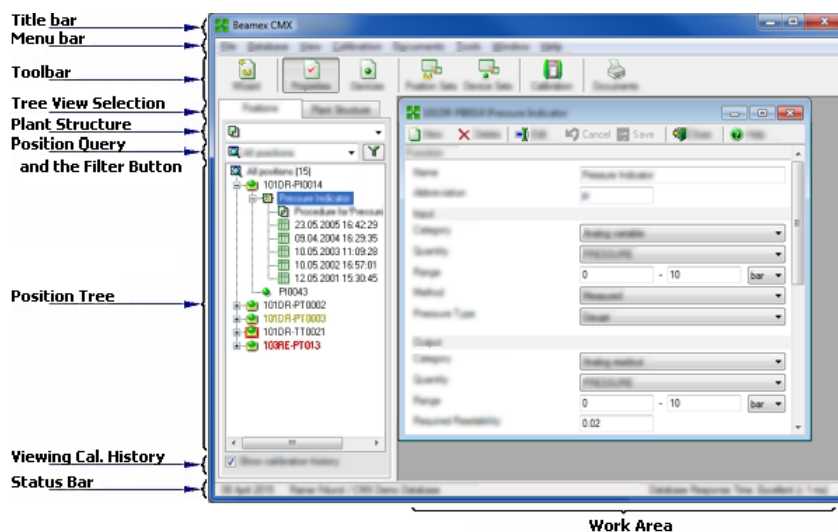
The Main Window is divided into following main parts:

1. **Title Bar**. Contains the Name of the software and sometimes also additional information depending on the selected item.

2. **Menu Bar**. The Menu structure is presented in a subsequent chapter.

3. **Toolbar**. The Toolbar structure is presented in a subsequent chapter.

4. **Tree View Selection Tabs**. Selects whether the Plant Structure Tree or the Position Tree is shown (Position Tree shown in the previous picture).

5. **Plant Structure List** (not shown when the Plant Structure Tree is shown instead of the Position Tree). This is the **primary** level filtering for the Positions shown in the Position Tree. More of the plant structure in a subsequent chapter.

6. **Position Query List** (not shown when the Plant Structure Tree is shown instead of the Position Tree). This is the **secondary** level filtering for the Positions shown in the Position Tree, i.e. the query is carried out to Positions located in the selected part of the plant structure. More of the queries in a subsequent chapter.
The **Filter Button** is the **tertiary** level filtering for the Positions shown in the Position Tree. More of the filter in a subsequent chapter.

7. **Position Tree.** Shows a list of Positions (all or part of them depending on the selections in the two lists and the Filter button above the Position Tree) and their contents in a tree like structure. More of the tree structure in a subsequent chapter.

8. **Viewing Calibration History Check Box.** If unchecked, only the latest calibration is shown in the Position Tree. When checked, all calibrations are shown in the Position Tree.

9. **Status Bar.** Shows the current date, the name of the currently logged user and the database response time.
Hints for increasing the response time can be found in **CMX Help**, topic **General Settings Fields**.

10. **The Work Area**. A place for an opened **property window**, **Devices** window, **Set** windows, **Print** window, **Send to Calibrator** and **Receive from Calibrator** windows.

The Tree

The Tree Structure on the left side of CMX's main window shows either a list of positions (all or part of them depending on the Plant Structure List, Position Query List and Filter settings) or the Plant Structure including all Positions.

The color of the Position ID is:

- **Black** when the Position's calibration date is not due soon.

- **Yellow** when the Position is due for calibration but the next calibration date hasn't been exceeded yet. The time period when the Position ID is yellow is user defined. See the **Basic Settings** section's chapter **Function Due List Options**.

- **Red** when the Position's due date for the calibration has expired.

Note.
The same colors indicating the need of calibration are used for Calibrators, Devices, Calibrator Modules and Users in their respective trees.

The Tree Structure shows position data in the following hierarchical order:
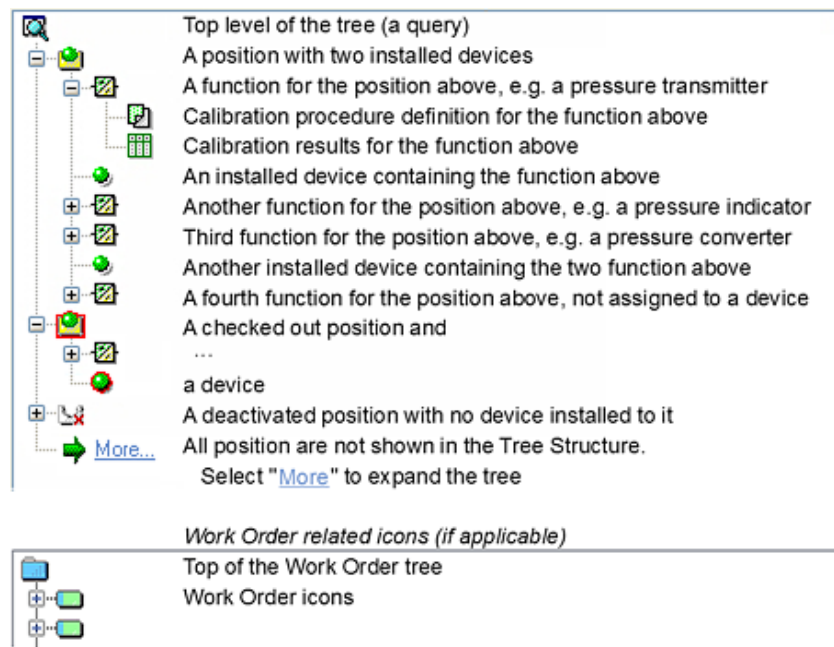
When you double-click one of the items in the Tree Structure, a property window opens in the Work Area. There all item related data is displayed for viewing and possible editing.

When the property window is already open, a single click in the Tree Structure changes the contents of the property window to display the data of the clicked item.

Several other main functions of CMX may also be started from the **Context Menu** "popping up" above the Tree Structure, but they are covered later on in this manual. This is just a reminder to frequently use the context menu that opens by clicking the secondary mouse key.

Notes.
CMX supports deactivating items shown in the Tree Structure (not available in CMX Light). Deactivation means that a Position/Device etc. is no longer in use. A deactivated item has a small red "x" in the lower right corner of the icon.
A checked out Position/Device has a red border surrounding the icon. More of checking out in section **Check Out /Check In**.
Work Order Handling is described in section **Work Order Handling**.

The Work Area

The work area is used for showing the following types of windows:

- The property window for displaying additional information of the item selected in the Tree Structure.
- **Send To Calibrator** and **Receive From Calibrator** windows while communicating with a calibrator
- **Print** window for printing Certificates, Reports and Labels.
- **Devices** window (rightmost window in the picture below).
- **Position Sets** and **Device Sets** windows (also shown in the picture below).
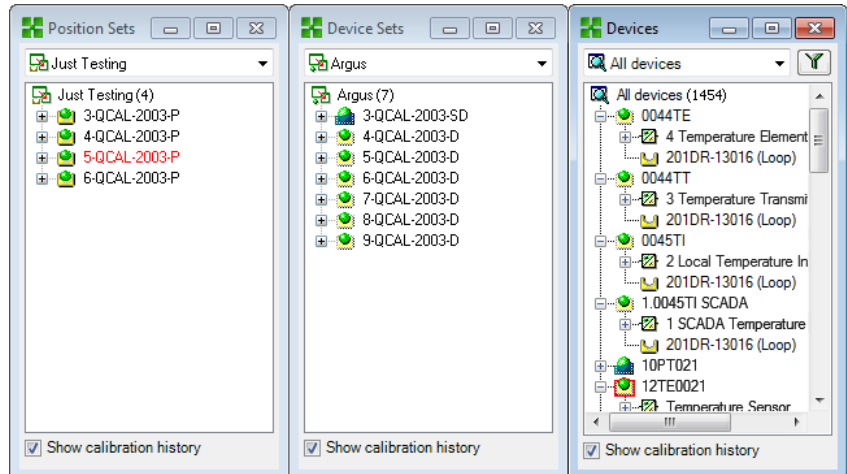
The **Devices** window, **Device Sets** window and **Position Sets** window all work like the Tree Structure except that they are "floating" in the work area. Sets are described in section **Queries, Filters and Sets**.

The Menu Structure

File	
Database …	Opens a dialog for viewing/changing the database connection. Availability: −− CMX Light ● CMX Professional[* −− CMX Enterprise *) with **no** floating server license option.
Log Off …	Opens a dialog for viewing/changing the database host connection. Availability: −− CMX Light ● CMX Professional[+ ● CMX Enterprise +) with floating server license option.
Import, Document Layouts…	A possibility to import Certificate, Report and Label layouts from another database/source. Availability: −− CMX Light ● CMX Professional ● CMX Enterprise
Export, Document Layouts…	A possibility to export Certificate, Report and Label layouts to make them available for another database. Availability: −− CMX Light ● CMX Professional ● CMX Enterprise
Exit	Closes CMX

Database	
Wizard…	Launches the Wizard that creates a new Position, a linked Device etc.
Device Manufacturers…	Opens the window for viewing/defining Device Manufacturers
Calibrators…	Opens the window for viewing/defining Calibrators (and further on the Calibrator Manufacturers)
Lists…	Opens the window for viewing/defining CMX lists, i.e. sets of predefined alternatives, available in several windows.
Function Template…	Opens the Function Template window where the Function Templates may edited and new Templates added.

View	
Properties	Opens/closes the property window
Devices	Opens/closes the **Devices** window
History Trend	Opens/closes the History Trend window. Availability: –– CMX Light O CMX Professional ● CMX Enterprise
Position Sets	Opens/closes the **Position Sets** window
Device Sets	Opens/closes the **Device Sets** window
Refresh	Refreshes the active tree.

Calibration	
Send…	Opens the window used for sending instruments/functions to the connected calibrator.
Receive…	Opens the window used for receiving calibration results of instruments/functions from the connected calibrator.
Manual Entry…	Opens the window used for entering calibration results. This is useful when a calibrator does not communicate with CMX.
Documents	
Certificates, Print…	Opens a window where you can select instruments with calibration results and print calibration certificates.
*) Certificates, Design…	A possibility to create your own certificates.
Reports, Print…	Opens a window where you can select instruments and print reports.
*) Reports, Design…	A possibility to create your own reports.
Labels, Print…	Opens a window where you can select instruments and print calibration labels.
*) Labels, Design…	A possibility to create your own labels.
*) History Trend, Print…	Opens a window where you can select instruments and print history trend graphs.
*) History Trend, Design…	A possibility to create your own history trend graphs.

*) Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

Tools	
*) Audit Trail…	Opens the Audit Trail window.
Options…	Opens the **Options** window. Here are all CMX's basic settings viewed/edited.
Security, Users…	Opens the window where Users and User Groups are maintained.
Security, Change Password…	Allows the current user to change ones password. Note that this menu option is only available if passwords are required in the **Security** page of the **Options** window.
*) User Interface, Edit	Activates the Direct Edit of CMX's user interface.
*) User Interface, Save	Saves the changes made to the User Interface during Direct Edit.
*) User Interface, Cancel Changes	Cancels the changes made to the User Interface during Direct Edit.
*) User Interface, Customize…	Opens the window used for customizing CMX's user interface.
**) External links	Allows you to add a quick link to any kind of file (including applications) recognized by the operating system. The linked files are listed in a submenu below the External Links menu option. The link may also be an internet link as long as the beginning (http://) is cut off.
Beamex Tools	Contains links to Beamex calibrator tools, e.g Picture Capturers, Device Description Senders, Demos etc.

*) Availability:
 −− CMX Light
 O CMX Professional
 ● CMX Enterprise

**) Availability:
 −− CMX Light
 ● CMX Professional
 ● CMX Enterprise

Window	
Cascade	Reorders the sub-windows found in the Work Area.
Tile Horizontal	Reorders the sub-windows found in the Work Area.
Tile Vertical	Reorders the sub-windows found in the Work Area.

Help	
CMX Help…	Opens CMX's main help file.
CMX Calculations…	Opens CMX Calculations help file which describes the calculations that CMX performs.
CMX Report Variables…	Opens CMX Report Variables help file which describes CMX variables available in CMX's Report Design tool. Availability of this menu option: –– CMX Light ● CMX Professional ● CMX Enterprise
Index…	Opens CMX help file's index tab.
Search…	Opens CMX help file's search tab.
About CMX…	Opens the window where CMX's license and copyright info is displayed.

The Toolbar

The main window toolbar comprises of the following tools:

Wizard

Opens a Wizard utility for creating a new Position (and a Device). This is the fastest way of creating an instrument. Only the most significant fields are shown.

Properties

Opens/closes the Properties window in the Work Area.

Devices

Opens/closes the **Devices** window in the Work Area.

Position Sets

Opens/closes the **Position Sets** window in the Work Area.

Device Sets

Opens/closes the **Device Sets** window in the Work Area.

Calibration

Contains a menu with calibration related functions, the same as in the main windows' Calibration menu.

Documents

Contains a menu with available types of documents (Certificates, Reports, Labels and History Trend(*). Selecting one of the items opens a window with the possibility to print the selected type of Document.
*) No History Trend in CMX Light

Other Windows

There are three main types of windows in CMX.

1. The main window, described in the previous chapters.

2. Windows appearing in the work area of the main window, e.g. the item properties window.
These windows are closely related to things presented in the main window. That's why they are located in the work area.
Additionally, you may open several of this type of windows at the same time.

3. Windows that appear outside the CMX main window.
More or less "stand-alone" windows available for a specific task, e.g. the **Calibrators** window.
You can open only one of these windows at a time. Also, working in the main window is not possible as long as one of these windows are open. To return to the main window, close the "stand-alone" window.
The **Manual Entry** window falls into this category with the following exceptions: You can open several **Manual Entry** windows and also use the main window while the **Manual Entry** window(s) is/are open.

The layout and functionality of the third and second type of windows vary a lot, so there are not many common features in them. The Toolbar is however relatively common:

New	Clears all fields in the window and allows data entry of a new item
Delete	Deletes the currently shown item.
Edit	Allows editing the fields of the currently shown item
Cancel	Active only when adding a new item or editing an existing item. Cancels the edited/added item.
Save	Active only when adding a new item or editing an existing item. Saves the edited/added item.
Close	Closes the window
Help	Opens the Help window displaying help for the task at hand.

Multiple Users

Simultaneous Data Editing

When multiple users are working on the same database and two or more users are simultaneously editing the same record, then the one who saves his edits first "wins". This is called **optimistic concurrency control**.

The changes made by other users are rejected and a message informing of the situation is shown for them.

See also: **Manual Check Out / Check In**

Accessibility

CMX's Accessibility feature allows limiting access of data on user group level. Define users in groups according to the department/plant etc. The accessibility for the following database items may be defined:

- Plant Structure Nodes,
- Calibrators,
- Calibrator Modules,
- Positions,
- Devices and
- Saved Filters.

The accessibility setting is done for each item individually (available among the item's properties). The setting is hierarchical; if the access of a plant node is denied for certain user groups, access to all nodes, positions and devices below that node are also denied.

This feature is useful, e.g. when a single database contains data of several departments/plants etc. Then users arranged to groups according to their department/plant see only the database items that concern them.

Notes.
Only users with the proper authorization can view and/or edit accessibility settings.
The possibility to save filters is not available in CMX Light.

See also:
Users and User Groups and **Site User Maintenance** both in section **Basic Settings**.

Uncertainty Calculation

Availability:
-- CMX Light
● CMX Professional
● CMX Enterprise

CMX's Uncertainty Calculation feature can be configured according to your own needs:

- The uncertainty of Beamex calibrator modules is automatically available, e.g. among calibration results.

- CMX supports up to eight user defined uncertainties (B type uncertainties). They may be activated via the user interface customization tool.

- In calibration options, you may select whether the expanded uncertainty of all uncertainty components is shown among results or not.

Common Features

This chapter and its subchapters describe some features/utilities that is used not just in one window but in several CMX windows.

Context Menus (Pop-up Menus)

A Context Menu (pop-up menu) is a menu that appears when you click on the secondary mouse key. The menu is called a Context Menu because it provides tools suited for the place where the Context Menu was invoked.

CMX is provided with a wealth of Context Menus. If you are not sure what you can do at a certain moment or with a certain item, try opening the Context Menu. Then you will see a list of common tasks.

Drag and Drop Feature

Many of CMX's windows support the drag and drop feature. It is a quick tool for doing certain tasks in CMX, like selecting instruments for calibrations, printing, sets as well as linking Devices and Positions.

Selection List Features

Many of CMX's lists allow you to add a new item to it, if none of the available alternatives suit your needs.

If the item to be added does not require any additional information, e.g. a process connection, just write the new connection type and it is added to the list of process connections.

If the item to be added does not require any additional information, e.g. a process connection, just write the new connection type and it is added to the list of process connections.

When the item to be added requires additional information, CMX shows an item titled "**<New…>**" in the list. Selecting this option opens a window where you can create an all new item for the list.

An example of the latter feature is when you add a new calibrator to the database. If the Calibrator Model you are adding is not listed among Calibrator Models found in the database, select "**<New…>**". A window opens where you can add the new Model and its Manufacturer into the database. All this is done without opening the **Calibrator Manufacturers** window where Calibrator Model and Manufacturer data is viewed and maintained.

Activation/Deactivation

CMX's Activation/Deactivation feature allows activation and deactivation of Positions, Devices as well as most of the other items shown in a Tree Structure. Deactivation of, e.g. a Device means that the Device is no longer used. The deactivated item has a small red "x" in the lower right corner of the icon shown in the Tree Structure.

Deactivation is hierarchical. When you, e.g. deactivate a Plant Structure node, all Positions, Devices, Functions and Procedures below that node are also deactivated. Furthermore: (re)activation is also hierarchical.

Note.
Deactivation is not possible for a Device that is installed in a Position. Unlink the Device and then deactivate it.

Check Out /Check In

Check Out / Check In feature is a tool that locks Positions/Devices for other users than the one who did the Check Out. This feature is presented in section **Check Out /Check In**.

Document Links

Several items in CMX's database include a possibility to link documents to them.
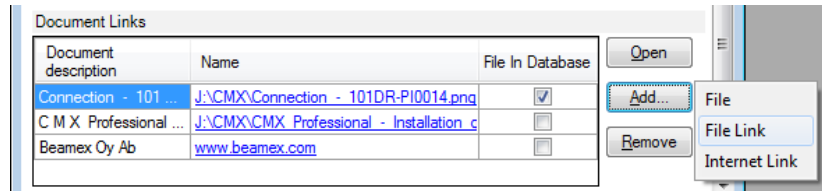
CMX supports three kinds of document links:

- **File**. This embeds the document into the database. Because of the risk of increasing the database size, this option can be enabled/disabled in **CMX Options** windows' **General Settings**.
  For an embedded file, the check box in **File in Database** column is checked.

- **File Link**. This option adds a link to an external file. The file itself is not embedded in CMX's database, just the link.
  For a linked file, the check box in **File in Database** column is not checked.

- **Internet Link**. This adds an internet link to the list. When adding the link, omit the beginning (http://).

Note.
The number of links for each item is not limited. Additionally, there are no file type restrictions. Any file will do just as long as you have software suited to view the file.

User Fields

User Fields may freely be used for whatever suits your needs. They are however not visible by default.

Free Field 1	
Free Field 2	
Free Field 3	
Free Field 4	
Free Field 5	

Free Check 1	☐	Free Check 2	☐
Free Check 3	☐	Free Check 4	☐
Free Check 5	☐		

To make the User Fields visible you must have the user rights to customize CMX's User Interface. Customizing is described in **Basic Settings** section's chapter **Customizing the User Interface**.

The text fields and check boxes may be freely used. The label text for the free field may be edited using either the User Interface customizing tools or the **Direct Editing of the User Interface** tool also described in the **Basic Settings** section.

Pocket PC option supports the use of all User Fields. Certain modern calibrators support calibration related User Fields and Checks. Any data entered into these fields are retrieved to CMX and can be seen among calibration results. To activate these fields in CMX (and compatible calibrators), customize the **Calibration Result Properties** window with **Customizing the User Interface** tool.

Software Options

This chapter presents available software options for CMX, i.e. additional features that are purchased either at the same time as CMX or later on to add CMX's functionality.

Note that most of the options presented further on are standard features in CMX Enterprise.

Report Designer Option

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

Allows you to create your own Calibration Certificate, Report, Label and History Trend Layouts.

More info in **Calibration Certificates and Other Documents** section's chapter **Creating Your Own Certificates**.

Change Management and Audit Trail Option

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

Change Management and Audit Trail option is a tool for keeping track of changes made to CMX's database.

More info in section **Change Management and Audit Trail**.

Optional Drivers for Non-Beamex Calibrators

Availability:
-- CMX Light
O CMX Professional
O CMX Enterprise

Allows you to communicate with non-Beamex Calibrators. For more information contact Beamex or your local representative of Beamex products.

Pocket PC Interface Option

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

Makes it possible to send instrument data to a Pocket PC. Then the Pocket PC may be used as a portable manual calibration data entry tool. Entered results may then be transferred to CMX's main database.

More info in section **Pocket PC Interface**.

Weighing Instrument Calibration Option

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

Allows you to use CMX when calibrating Weighing Instruments.

More info in section **Calibrating Weighing Instruments**.

Maintenance Inspection Option

A tool for doing checks that yield answers "yes" or "no".

More info in section **Maintenance Inspection**

Work Order Handling Option

An enhanced utility for handling work orders sent from/to ERP (Enterprise Resource Planning) or CMMS (Computerized Maintenance Management System) software.

More info in section **Work Order Handling**

History Trend Option

Allows you to view Calibration History data both numerically and graphically. The option makes it possible to evaluate calibrations and e.g. determine the instrument's drift between different calibrations.

More info in **Calibration** section's chapter **History Trend Option**.

User Interface Configuration Option

Allows you to edit the user interface to suit your needs.

More info in section **Basic Settings**, chapter **Editing the User Interface**.

LDAP Authentication Option

A possibility to use Lightweight Directory Access Protocol (LDAP) for user authentication.

More info in section **Basic Settings**, chapter **LDAP Options**.

Basic Settings

General

The Basic Settings section contains information of CMX's settings that should be checked/edited before taking CMX into full use. All settings can be changed later on too, but going through the settings at first makes the daily work more efficient.

Note.
If you utilize the Weighing Instrument Calibration feature, see chapter **Basic Settings for Weighing Instruments** in section **Calibrating Weighing Instruments**. It contains information of Weight Sets, Weights and other Weighing Instrument Calibration related Basic Settings.

The Options Window

The **Options** window can be opened from the main window's **Tools** menu. It allows you to define the following type of options:

- **General Settings**. What type of database queries are run at startup etc.

- **Function Due List**. Settings that define when CMX indicates that a Function is in need of calibration.

- **Calibrator Due List**. Settings that define when CMX indicates that a calibrator is in need of re-calibration.

- **ID Generation**. Needed if you want CMX to automatically generate Position/Device IDs.

- **Certificate**. Contains fields for defining how the calibration certificate number is generated.

- **Calibration**. Fields for defining calibration related settings.

- **Security**. Whether a password is required when logging in to CMX as well as other security matters.

- **LDAP**. Lightweight Directory Access Protocol settings.

- **Change Management**. Different Audit Trail and Electronic Signature related settings.

Availability of LDAP and Change Management:
-- CMX Light
○ CMX Professional
● CMX Enterprise

The subsequent chapters have additional information of each setting.

Note.
Certain option pages may also be opened directly from a configuration window, e.g. the **Security** page may be opened from the **Tools** menu of the **Users** window.

General Settings

As the name implies, the page contains settings that define what is done while starting up CMX (e.g. Position Query) or when opening certain windows, like the **Calibrator** window.

Field level information is available in the on-line help delivered with CMX.

Function Due List Options

In the Tree view, CMX uses yellow text color for the Position ID / Device ID to indicate that one or more of the Position's/Device's Functions need to be calibrated soon. Here you can define the time interval CMX uses for activating the "Function in need of calibration" color.

Notes.
Red text color for the Position ID / Device ID indicates that the calibration of one or more of the Position's/Device's Functions are overdue (the scheduled calibration date has expired).
The same colors indicating the need of recalibration are used for Calibrators and Calibrator Modules in their respective trees.

Field level information is available in the on-line help delivered with CMX.

Calibrator Due List Options

This page allows you to define the time interval CMX uses for activating the yellow "Calibrator in need of re-calibration" color.

Field level information is available in the on-line help delivered with CMX.

ID Generation Options

Each Position and Device need to have a unique ID. It is used for identifying Positions and Devices.

The Position ID and/or the Device ID can be manually entered or created automatically, if activated on this page. Also the format of the automatically created IDs (prefix-number-suffix) can be defined.

Field level information is available in the on-line help delivered with CMX.

Calibration Certificate Options

Each calibration is assigned with a unique certificate number. This number will appear on every calibration certificate which is produced for that calibration.

Field level information is available in the on-line help delivered with CMX.

Calibration Options

This page allows you to define calibration related settings, like is "**Save as Both**" allowed, i.e. the results of one calibration repeat is saved both as **As Found** and as **As Left** results when no adjustment was needed.

Field level information is available in the on-line help delivered with CMX.

Security Options

On this page you can define whether users need a password as well as various other password related settings.

Changing these settings is allowed to database administrators and users with the rights to change security options.

Field level information is available in the on-line help delivered with CMX.

LDAP Options

Availability:
–– CMX Light
○ CMX Professional
● CMX Enterprise

LDAP is short for **Lightweight Directory Access Protocol**. It is a method used in networks to authenticate/identify users. When you try to log on to a network, an LDAP server approves (or disapproves) your login.

If LDAP is enabled in CMX, it supersedes CMX's password settings. Then, instead of checking users' passwords from CMX's database, they are checked from an LDAP server on the network. The network user name must however exist as a CMX **User ID** too.

Changing these settings is allowed to database administrators and users with the rights to maintain LDAP options. Additionally: Editing LDAP settings should be performed by, or with the help of, people with experience of LDAP and knowledge of company's Local Area Network settings. Preferably someone from company's IT support.

Field level information is available in the on-line help delivered with CMX.

Note.
You may override LDAP authentication by using CMX's License Key number as the User ID and Master Password as the password. Both the License Key number and the Master Password were shipped with the original delivery of CMX.

Change Management Options

If Change Management feature is part of your CMX, this page allows you to change settings concerning changes to the instrument database.

The uppermost check box determines whether **Audit Trail** used or not. Other fields refine how Audit Trail is utilized.

If required, activate the **Electronic Signature** feature using the check box with the same name.

Field level information is available in the on-line help delivered with CMX.

More information about the Audit Trail window and the Electronic Signature is available in section Change Management and Audit Trail.

Users and User Groups

The **Users** window can be opened from the main window's **Tools** menu. It is located in the **Security** submenu.

The left pane of the window displays either a Tree Structure list of Users or User Groups / Sites, depending on which tab is selected. The right pane displays property data for the User or User Group / Site, selected from the list on the left pane.

Actually, the tabs on the left pane do not reveal anything new (compared with each other). They display the same information but the viewpoint is different:

- When the **Users** tab is selected all users are shown and for each user the groups he/she belongs to can be seen on the next tree level.

- When the **User Groups** tab is selected, all User Groups / Sites are shown and for each group/site, the users belonging to it can be seen on the next tree level.

Availability of Site User Maintenance:
−− CMX Light
● CMX Professional
● CMX Enterprise

To streamline the use of large corporate databases in CMX, a possibility to define Sites and Site Managers is also available. More of **Site User Maintenance** is available in chapter **Site User Maintenance** on page 48.

Note.
Users entered into CMX's database need not be users that actually do calibrations. Users responsible for the calibration/maintenance duties may also be entered. They for instance sign calibrations and accept changes made to the database.

About What to Do With Users and User Groups

The easiest way to work with CMX is using only one user definition with the password security inactivated. The password security settings are easily available via the **Tools** menu in the **Users** window (as well as from the main window's **Tools** menu's **Options** window's **Security** page). The drawback for this easy method is that anyone with access to the computer where CMX is installed may start the software and do what they please.

When CMX is installed and started for the first time: The safe way is to change the administrator password from its default value (delivered in an envelope together with the software

installation kit), memorize the new administrator password and create a suitable set of **Users** and **User Groups**.

Each User must belong to at least one User Group. If the password security is enabled, a button for defining the user's password is available in the user's property data.

Define the permissions (what the group members are allowed to do with CMX) for each User Group.

Note.
CMX automatically places the current Windows® User ID as the default user for logging into CMX. For ease of use, enter the same User IDs into CMX.

Supervisors

Supervisors are by default allowed to do anything that can be done with CMX, e.g. add Users, reactivate a User account, define User Groups etc. A Supervisor need not be assigned to any Group, Supervisors have all rights anyhow.

Whether a user is a Supervisor or not, can be seen (or edited, if you have the permission) in the property data shown on the right hand side of the **Users** window.

There is no upper limit for the amount of supervisors but at least one Supervisor is required. CMX does not allow deleting the last Supervisor.

See also note in chapter **User Deactivation and Lock Out** on page 46.

Users

Each person using the database may be assigned a unique User ID (assigned by a Supervisor) and optionally a password. A User can belong to one or more User Groups depending on the duties of that particular User.

Field level information is available in the on-line help delivered with CMX.

Notes.
The permissions are defined for User Groups. Once a User is assigned to a Group, he/she gets the permissions defined for that Group.
If LDAP authentication is enabled, for all CMX users:
Enter the same CMX **User ID**s as is used as **User Name**s in Windows network. See also **LDAP Options** on page 42.

Changing the Password

Each user may change their own password. Changing the password is available in the main window's **Tools, Security** menu (provided that passwords are used).

Supervisors and Users belonging to a **User Groups** with the permission to maintain Users and User Groups may change the password of all users in the **Users** window which can be opened from the main window's **Tools, Security** menu.

Note.
If LDAP authentication is enabled, passwords are not changed in CMX. With LDAP, the handling of passwords is maintained in Windows. See **LDAP Options** on page 42.

User Deactivation and Lock Out

CMX automatically defines users as **Inactive Users** if the User's Expiration Date has passed. A User may also be **Locked** if too many illegal attempts to log into the database was done using that particular User Name.

The Supervisor and a User belonging to a User Group with the permission to maintain Users and User Groups have the rights to activate and release locked Users.

To activate a user, edit the Expiration Date field.

To unlock a User, click the **Release User** button.

Note.
User's expiry date does not apply to Supervisors. A Supervisor can access the database as long as he/she has Supervisor rights.

User Groups

A Supervisor or a User belonging to a Group with permission to maintain Users and User Groups may add and remove User Groups as well as change the permissions of User Groups.

Field level information is available in the on-line help delivered with CMX.

Permissions

The permissions tab shown for User Groups contains a list of commands and tasks available in CMX.

A command or a task that is unchecked in the list may not be performed by users belonging to that group. They are disabled in CMX's menus and toolbars.

A list of available permissions is available in CMX on-line help.

See also:
Accessibility in section **General Presentation of CMX**.

Site User Maintenance

CMX's Site User Maintenance makes it possible to organize the use of CMX in, e.g. large groups of companies.

Standard **Users** and **User Groups** are all managed by **Supervisors** or Users belonging to a User Group that have permissions to maintain Users and User Groups. However, when a CMX database is commonly managed for several sites, all Users with permissions to maintain Users and User Groups can see/edit all Users and User Groups.

When utilizing Site User Maintenance, Supervisors can create **Site Groups** and **Site Managers** who maintain Users in the site and groups they belong to only.

Note.
Site User Management affects **Accessibility**, **Owner Group** and **Owner** selection lists. More of this in chapter **Working with Site User Maintenance**.

Working with Site User Maintenance

First of all, you need to enable Site User Maintenance. This is done in **Tools, Options** Window's **Security** section. Make sure the **Enable Site User Maintenance** check box is checked. Note that this setting can be changed by **Supervisors** and **Users** having the permission to maintain security options. After Site User Maintenance is enabled, **Site Groups** and standard **User Groups** can be created by **Supervisors only**.

Here's how a Supervisor creates Site Groups and Site Managers and takes the feature into use:

1. Create new User Groups with **Site Group** check box checked. Each Site Group is a site/plant/company/sub-organization in the group of companies as defined by the Supervisor. Site Groups have special characteristics as presented further on.

2. Add a standard User Group with **User Maintain** permission, among other suitable permissions. You may name the User Group freely, but a descriptive one, like **Site Managers** is recommended.

3. If no standard User Groups with permissions for different tasks exist, create them.

4. Add all Users that you want to include as Site Managers to the Site Managers group, other applicable standard User Groups and applicable Site Group(s). **Note that after Site User Maintenance is enabled, all new non-supervisor users need to belong to a Site Group.**

5. Add/assign other Users to Site Groups and applicable standard User Groups, or give this task to a Site Manager.

6. Additionally, to fully utilize Site User Maintenance, the Accessibility settings should be set according to the current Site Group definitions. More of this further on.

Notes.
Adding standard User Groups is recommended, since they can be used to define different permissions for different Users. Each User is then assigned to (at least) one standard User Group that defines the User's permissions and also to a Site Group which defines the User's location in the organization.

Any non-supervisor Users added before Site User Maintenance was enabled may (inadvertently) be unassigned to a Site Group. Users not assigned to any Site Group are not able to log into CMX. Make sure all non-supervisor Users are assigned to at least one Site Group when Site User Maintenance is active.

About Site Managers:

- A Site Manager is allowed to maintain users belonging to the Site Groups and Standard User Groups the Site Manager belongs to.

- If a Site Manager adds Users to CMX, each User must be assigned to a Site Group and (preferably) also to a standard User Group.

- Only the Site Groups and standard User Groups the Site Manager belongs to are visible to him/her.

- Site Managers may view but not edit the permissions of any groups visible to him/her.

- Site Managers cannot create new Site Groups or standard User Groups.

About Site Groups:

- A **Site Group** is shown among standard **User Groups**. To distinguish a Site Group from a standard User Group, the group name for the Site Group is shown in blue in the tree structures. To more easily distinguish a Site Group from a User Group, the use of a prefix is recommended, e.g.:
  "> Paper Mill, Finland".

- Although permissions may be defined for a Site Group (by a Supervisor), it is not recommended. All Users assigned to a Site Group will inherit the permissions from the Site Group as well as the permissions from the standard User Group the User belongs to.

About Accessibility and Owner Settings

Accessibility, *Owner Group* and *Owner* are selection list fields available in several property windows. They define the visibility and ownership of the item currently viewed.

- *Accessibility* is available in:
Plant Structure Node, Position, Device, Calibrator, Module and Filter property windows.

- *Owner Group* is available in:
Plant Structure Node, Position and Device property windows.

- *Owner* is available in:
Plant Structure Node, Position, Device and Procedure property windows.

The contents of the selection lists vary depending on whether Site User Maintenance is enabled or not:

- When Site User Maintenance is **enabled**:
Accessibility and *Owner Group* selection lists contain Site Groups. Only the Site Groups the current User belongs to are shown. Supervisors have all Site Groups available.
Owner selection list contains Users that belong to the same Site Group(s) the current User belongs to.

- When Site User Maintenance is **disabled**:
Accessibility and *Owner Group* selection lists contains all User Groups.
Owner selection list contains all Users.

More of Accessibility in chapter **Accessibility** in section **General Presentation of CMX**.

Plant Structure
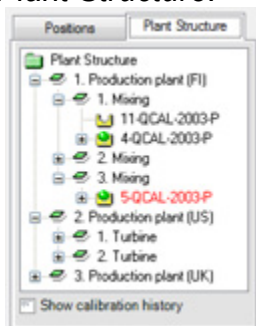
The **Plant Structure** is opened from by selecting **Plant Structure** from the main window's **Tree View Selection Tabs**.

The Plant Structure displays a hierarchical view of where the Positions (instruments) are located.

CMX's Plant Structure allows you to create as many levels as is needed for the Plant Structure. The green slanted squares in the example picture are "Plant Structure Nodes". A Node can be anything that somehow defines all or part of the plant.

Positions are at the end of a hierarchical chain of Nodes. Positions need not be located at a certain hierarchy level. They may be placed on any level.

Creating a Plant Structure is optional, but if you create one, we recommend creating it before you start adding Positions. Then, while adding Positions you are able to select its location in the readily made Plant Structure.

Working With Plant Structure Nodes

Adding Plant Structure Nodes

Adding a Plant Structure Node is done in the following manner:

1. Select an existing Node that is hierarchically just above the level of the intended new node (or the green folder on top of the Plant Structure).

2. Either click the secondary button on your mouse above the selected node or use the **New** button found in the Node Property window's toolbar.
The new node is added hierarchically below the previously selected/viewed node.

3. Enter a **Name** for the Plant Node and make sure that the **Active Plant Node** Check box is checked. All other fields are optional.

Full field level information of the Node properties are available in the on-line help delivered with CMX.

Notes.
Adding a Node to a Position is not possible. A "chain of Nodes" ends in a Position.
You cannot add a Position to the Plant Structure's top level (the green folder). The items just below the top level have to be Nodes.
A description of how to add Positions to CMX's database is in section **Adding Instruments to the Database**.

Editing Plant Structure Nodes

Make sure you have the properties window opened in the Main Window's Work Area. If not, click the **Properties** button in the Main Window toolbar.

To edit a Plant Structure Node, select it in the Tree Structure and click the **Edit** icon in the properties window's toolbar.

Deleting Plant Structure Nodes

To delete a Plant Structure Node, open the Context Menu (Pop-up Menu) and select the **Delete** option.

Note.
Deleting a node also deletes all items hierarchically below the node to be deleted.

Device Manufacturers

The **Device Manufacturers** window can be opened from the main window's **Database** menu. Select the **Device Manufacturers** option.

The **Device Manufacturers** window is primarily meant for editing existing Manufacturer and Model data. Adding Manufacturers and Models can easily be done in the main window while adding Devices. There is of course the possibility to add Manufacturers and Models in the **Device Manufacturers** window too, if you want it.

Also: Entering Device Manufacturer and Model data is optional. If full device data (e.g. rangeability, wetted parts material process connection etc.) is entered for all instruments anyhow, this is a way of creating "device templates" that speed up the adding of Positions (instruments to be calibrated) later on.

Note.
There is a separate window for **Calibrator Manufacturers** presented on page 63, so only data for instruments to be calibrated should be entered here.

Working With Device Manufacturers

Adding Device Manufacturers

To add a Device Manufacturer to CMX's database, select either **File, New, Device Manufacturer**, use the Context Menu or click the **New** icon on the **Manufacturers** window's toolbar while a Manufacturer is selected in the Tree Structure.

Full field level information of the Device Manufacturer properties are available in the on-line help delivered with CMX.

Notes.
A Device Manufacturer is also added to the list of **Calibrator Manufacturers**. This minimizes the workload if a single manufacturer delivers both devices that need to be calibrated and calibrators.

Editing Device Manufacturers

To edit a Device Manufacturer in CMX's database, select it in the Tree Structure and choose either **File**, **Edit Record** or click the **Edit** icon on the **Manufacturers** window's toolbar.

Deleting Device Manufacturers

To delete a Device Manufacturer from CMX's database, select it and then choose either **File, Delete** or use the Context Menu or click the **Delete** icon on the **Manufacturers** window's toolbar.

Note.
Deleting a Device Manufacturer is not possible if there is a reference to the Manufacturer in the database.

Working With Device Models

Device Models are a kind of "templates" in CMX. Create a model of all types of Devices a Device Manufacturer produces (and is in use on your plant). Then each time a new item of that same model is bought, you only need to select the model from CMX's list and enter the serial number to add the instrument to the database.

Adding Device Models

To add a Device Model to CMX's database, select either **File, New, Device Model**, use the Context Menu or click the **New** icon on the **Manufacturers** window's toolbar while a Device Model is selected in the Tree Structure.

Full field level information of the Device Model properties are available in the on-line help delivered with CMX.

Notes.
The Device Model will be added to the selected Manufacturer on the Tree Structure. If a Device Model is selected, the new Device Model will be added to the same Device Manufacturer as the selected Device Model.
Currently there is no possibility to move a Device Model from one Manufacturer to another.

Editing Device Models

To edit a Device Model in CMX's database, select it in the Tree Structure and choose either **File**, **Edit Record** or click the **Edit** icon on the **Manufacturers** window's toolbar.

Deleting Device Models

To delete a Device Model from CMX's database, select it and then choose either **File, Delete,** use the Context Menu or click the **Delete** icon on the **Manufacturers** window's toolbar.

Note.
Deleting a Device Model is not possible if there is a reference to the Device Model in the database.

Calibrators

The **Calibrators** window can be opened from the main window's **Database** menu. Select the **Calibrators** option.

If you have purchased the Weighing Instrument Calibration option, see chapter **Basic Settings for Weighing Instruments** in section **Calibrating Weighing Instruments**. It contains information of Weight Sets, Weights and other Weighing Instrument Calibration related Basic Settings.

Here you can manage all the calibrators you use. Entering Calibrator, Calibrator Module and Module Range data is needed for the traceability of the performed calibrations. The Module Range is a quantity the module is capable of measuring or sourcing within a certain measurement range.

The left pane of the window contains a **Calibrators** and a **Modules** tab.

- The **Calibrators** tab displays a Tree Structure of all Calibrators with the installed Modules, suitable external Modules and the measurement Ranges of the Modules. The Tree Structure does however not show any free internal Modules.

- The **Modules** tab shows a Tree Structure of all modules. The Module's Ranges are shown and if the Module is installed in a Calibrator, the Calibrator is shown below the Module before the Ranges. The Tree Structure does however not show any Calibrators with no installed Modules.

To be able to use a Calibrator it has to have one or more Modules (with measurement Ranges) installed.

Notes.
If you have a Calibrator that is not modular (or has only one module), just repeat the Calibrator data for the module and then add the Module Range(s) for the calibrator.
Adding Calibrator Manufacturers and Models can be done while adding Calibrators. Just select the "**<New…>**" option from the list of Models/Manufacturers.

Working With Calibrator Data

Adding Calibrators

How to **add** a Calibrator to CMX's database depends on the Calibrator at hand:

- For communicating Beamex Calibrators: Use the **Detect Calibrator** button found in the lower left corner of the **Calibrators** window or the **Detect Calibrator** option found in the **Tools** menu. Then CMX will automatically add the connected Calibrator, its Modules and measurement Ranges to the database.
  Note.
  Modern calibrators utilizing USB communication require that a USB driver is installed before they communicate with CMX. For more details, see section **Additional Information**, chapter **Calibrators and USB Communication**.

- All other Calibrators (and their Modules and measurement Ranges) are manually added to the database. Select either **File, New, Calibrator**, use the Context Menu or click the **New** icon on the Calibrators window's toolbar while a Calibrator is selected on the Tree Structure on the left.

The required fields are Calibrator Model and Serial Number. The Serial Number field is required since it identifies the new Calibrator from others that are of the same Model. Entering a Calibration due date, allows CMX to indicate the need to re-calibrate. Therefore the Due Date field is recommended.

Select the Calibrator Model from the list of pre-entered Models (see **Working With Calibrator Models**) or if you are adding a new Model, select the last item on the list: **<New…>** and enter new Calibrator Model data as described in **Working With Calibrator Models** on page 64.

Full field level information of Calibrator properties are available in the on-line help delivered with CMX.

To manually add Modules to a calibrator, see the chapters **Adding Modules** on page 59 and **Installing and Removing Modules to/from a Calibrator** on page 61.

Note.
Adding a Calibrator manually while viewing the Tree Structure of the **Modules** tab gives seemingly no results. Since the new calibrator has no installed modules it is only shown in the Tree Structure of the **Calibrators** tab.

Adding Modules

When adding modules, check first where the highlight is in the Tree Structure:

- If you are viewing the **Calibrators** tab and the highlight is on the query level (the uppermost row of the Tree Structure), the new Module will be a free Module not shown in the Tree Structure of the **Calibrators** tab. To view your newly created Module, switch to the **Modules** tab.

- If you are viewing the **Calibrators** tab and the highlight is on any other level than the query level, the new Module will automatically installed to the highlighted Calibrator. If a Module or a Range is highlighted, the new Module will be installed to the same Calibrator as the highlighted Module/Range.

- If you are viewing the **Modules** tab and the highlight is on a Calibrator level, a new internal Module will automatically installed to the highlighted Calibrator. In all other cases, the new Module will be a free Module.

The required fields are: Module, Model Manufacturer and Serial Number. The Serial Number field is required since it identifies the new Model from others that are of the same Model.

Select the Manufacturer from the provided list. Similarly, select the Module Model from the list of pre-entered Module Models (see **Working With Module Models**) or if you are adding a new Model, select the last item on the list: **<New…>** and enter new Module Model data as described in **Working With Module Models** on page 65.

Full field level information of Calibrator Module properties are available in the on-line help delivered with CMX.

Adding Module Ranges

To add a measurement Range to a Module, select the Module or a Range that is already added to the Module. Then select either **File, New, Module Range**, use the Context Menu or click the **New** icon on the Calibrators window's toolbar while a measurement Range is selected on the Tree Structure on the left.

The primary required fields are: Range Name, Quantity, High Limit and Low Limit,

Pressure Type field is needed when the Quantity field is set to Pressure.

Temperature Scale and Sensor Type fields are needed when the Quantity field is set to Temperature.

Reference Junction and RJ Temperature fields are needed when the Sensor Type is a Thermocouple. If the RJ Mode field is set to "External", then also the External Sensor Type and External Wire field need values.

Wire is needed when the Sensor Type is a RTD-sensor or the unit for the Electrical quantity is "ohm" or "kohm".

Fields starting from Temp. Coefficient are needed for error calculation and uncertainty calculation. Leaving any of the fields unchecked may result in unpredictable error/uncertainty results.

Full field level information of Calibrator Module Range properties are available in the on-line help delivered with CMX.

Installing and Removing Modules to/from a Calibrator

If you add Modules to CMX's database using the CMX's possibilities efficiently (see chapters **Adding Calibrators** on page 58 and **Adding Modules** on page 59), the Modules are automatically installed to the Calibrators.

If you however for some reason need to install or remove Modules, select the Calibrator in the Tree Structure (no matter on which tab, Calibrators or Modules), From the properties window on the right, select the Installed Modules tab. Then you will see a list of free Modules and Modules installed to that calibrator. Click the **Edit** button on the Property window's Toolbar. Then the buttons between the two lists allow you to move Modules from one list to another.

Note.
This chapter explains how to "install and remove" Modules from a Calibrator in CMX software. Refer to the Manuals of the Calibrators on how to do it for the actual Calibrator (if it is allowed for calibrator users).

Editing Calibrators/Modules/Module Ranges

To edit a Calibrator/Module/Module Range in CMX's database, select it in the Tree Structure and click the **Edit** icon on the property window's toolbar or select **Edit Record** from the **File** menu.

Deleting Calibrators/Modules/Module Ranges

To delete a Calibrator/Module/Module Range from CMX's database, select it and then choose either **File, Delete,** use the Context Menu or click the **Delete** icon on the **Calibrators** window's toolbar.

Notes.
Deleting is not possible if there is a reference to the Calibrator/Module/Module Range in the database.
If a calibrator to be deleted is on a list of *Calibrators to Use*, CMX asks for confirmation before the calibrator is deleted. *Calibrators to Use* field can be found among **Calibration Procedure** data.
When deleting a Calibrator/Module/Module Range, all items hierarchically below the item to be deleted will also be deleted.

Copying Calibrators

CMX includes a possibility to copy Calibrators together with its Modules and Module Ranges. This is useful when you have several similar calibrators in use. Add just one and copy the rest from the first one. All you need to do is add the serial numbers to the copied items.

When in **Calibrators** window, viewing Calibrators, click with mouse's secondary button (rightmost button for right handed users) on a Calibrator you want to copy. The pop-up menu includes a **Copy** option.

This pop-up menu option copies the calibrator, all modules and module ranges linked to it and prompts for serial numbers to the new Calibrator and its Modules.

The **Copy** option is also available in **Calibrators** window's **File** menu. The functionality is the same as for the option in the pop-up menu.

Note.
Possible document links are not copied.

Calibrator Manufacturers

The **Calibrator Manufacturers** window can be opened from the **Calibrators** window's **Database** menu. Select the **Calibrator Manufacturers** option.

Just as with Device Manufacturers, entering Calibrator Manufacturer and Model data is optional but makes it easier to add similar Calibrators and Calibrator Modules to the database. Full data is entered only once. Then only the unique data (e.g. the serial number) need to be entered for individual Calibrators and Calibrator Modules.

Note.
There is a separate window for entering **Device Manufacturers** presented on page 54, so only data of calibrators should be entered here.

Working With Calibrator Manufacturers

Adding Calibrator Manufacturers

To add a Calibrator Manufacturer to CMX's database, select **File, New, Calibrator Manufacturer**, the **New** button in the toolbar or use the Context Menu.

The only required field is the Manufacturer Name field. All other fields are optional.

Full field level information of the Calibrator Manufacturer properties are available in the on-line help delivered with CMX.

Note.
A Manufacturer of Calibrators is also added to the list of Device Manufacturers. This minimizes the workload if a single manufacturer delivers both calibrators and devices that need to be calibrated.

Editing Calibrator Manufacturers

To edit a Calibrator Manufacturer in CMX's database, select it in the Tree Structure and choose either **File**, **Edit Record** or click the **Edit** icon on the **Calibrator Manufacturers** window's toolbar.

Deleting Calibrator Manufacturers

To delete a Calibrator Manufacturer from CMX's database, select it and then choose either **File, Delete,** use the Context Menu or click the **Delete** icon on the **Calibrator Manufacturers** window's toolbar.

Note.
Deleting a Calibrator Manufacturer is not possible if there is a reference to the Manufacturer in the database.

Working With Calibrator Models

Adding Calibrator Models

To add a Calibrator Model to CMX's database, select either **File, New, Calibrator Model**, use the Context Menu or click the **New** icon on the **Calibrator Manufacturers** window's toolbar while a Calibrator Model is selected in the Tree Structure.

The only required field is the Model field. All other fields are optional.

Full field level information of Calibrator Model properties are available in the on-line help delivered with CMX.

Notes.
The Calibrator Model will be added to the selected Manufacturer on the Tree Structure. If a Calibrator Model or a Module Model is selected, the new Calibrator Model will be added to the same Calibrator Manufacturer as the selected Calibrator Model or Module Model.
Currently there is no possibility to move a Calibrator Model from one Manufacturer to another.

Editing Calibrator Models

To edit a Calibrator Model in CMX's database, select it in the Tree Structure and choose either **File**, **Edit Record** or click the **Edit** icon on the **Calibrator Manufacturers** window's toolbar.

Deleting Calibrator Models

To delete a Calibrator Model from CMX's database, select it and then choose either **File, Delete,** use the Context Menu or click the **Delete** icon on the **Calibrator Manufacturers** window's toolbar.

Note.
Deleting a Calibrator Model is not possible if there is a reference to the Model in the database.

Working With Module Models

Adding Module Models

To add a Module Model to CMX's database, select either **File, New, Module Model**, use the Context Menu or click the **New** icon on the **Calibrator Manufacturers** window's toolbar while a Module Model is selected in the Tree Structure.

The required fields are **Model**, **Manufacturer** and **Module Type**. In order to enable CMX to communicate with the calibrator in which the module is installed, a Communication Name must be defined. All other fields are optional.

Full field level information of the Module Model properties are available in the on-line help delivered with CMX.

Notes.
The Calibrator Module Model will be added to the selected Manufacturer on the Tree Structure. If a Calibrator Model or a Module Model is selected, the new Module Model will be added to the same Calibrator Manufacturer as the selected Calibrator Model or Module Model.
Currently there is no possibility to move a Calibrator Module Model from one Manufacturer to another.

Editing Module Models

To edit a Module Model in CMX's database, select it in the Tree Structure and choose either **File**, **Edit Record** or click the **Edit** icon on the **Calibrator Manufacturers** window's toolbar.

Deleting Module Models

To delete a Module Model from CMX's database, select it and then choose either **File, Delete,** use the Context Menu or click the **Delete** icon on the **Calibrator Manufacturers** window's toolbar.

Note.
Deleting a Module Model is not possible if there is a reference to the Model in the database.

Lists

What is a List?

Most devices have a process connection, e.g. a ¼" thread for that particular purpose. If you enter a lot of device data it will be an arduous work to write the same connection info over and over. To minimize the workload, CMX offers the Lists.

Enter the frequently repeated data into the lists. Then whenever the data is needed you just pick it from the list of pre-entered options. No need to write it over and over again.

The **Lists** window is primarily meant for editing existing list data. Adding list items can easily be done while selecting data from a list seen in other windows. There you just enter the missing item to the list. There is of course the possibility to add list items in the **Lists** window too, if you want it.

Currently CMX provides the following lists:
- Calibrator Hierarchy,
- Process Connection[*],
- Process Medium[*],
- Signature Status[+],
- Audit Trail Description[+] and
- User Defined Units.

*) *Not available in CMX Light*
+) *Not available in CMX Light and*
   optional in CMX Professional

Editing Lists

The **Lists** window can be opened from the main window's **Database** menu. Select the **Lists** option.

Select one of the available lists and view the current list items in the table below.

Editing existing items in a list

Select **File, Edit**, click the **Edit** icon in the toolbar or use the Context Menu's **Edit** option.

Adding items to a list

Select **File, New**, click the **New** icon in the toolbar or use the Context Menu's **New** option.

Deleting items from a list

Select **File, Delete**, click the **Delete** icon in the toolbar or use the Context Menu's **Delete** option.

Note.
Adding User Defined Units is not done in **Lists** window. They can only be edited/deleted in **Lists** window.
A User Defined Unit is added using one of the following methods:

1. Create a new instrument and for its Function, select **Value** as **Input** and/or **Output Quantity**. Then enter the Range values and instead of selecting an existing User Defined Unit, just write your own unit.
2. Create a new Function Template. Set **Input** and/or **Output Quantity** as **Value** and enter a new User Defined Unit as part of the measurement/keyed **Range**.
3. Edit an existing Function with **Value** as **Input** and/or **Output Quantity**. Enter a new User Defined Unit as part of the measurement/keyed **Range**.

When a User Defined Unit is added using one of the above mentioned methods, the new unit is included in the list of User Defined Units shown in **Lists** window.

Function Templates

CMX's Function Templates help adding Functions to Devices and Positions. CMX is shipped with a pre-entered set of Function Templates. The pre-entered Function Templates may be edited and new templates may be created/copied according to your own needs.

Each Function typically has at least one Calibration Procedure. The procedure contains, among other things, the calibration points and error limits.

To maintain the existing Function Templates and their Calibration Procedures, select **Database**, **Function Template** in the main window's menu.

Function Template fields are similar to **Function Property Window Fields**.

Field level information for Calibration Procedures is available in the on-line help delivered with CMX.

Editing Function Templates and Calibration Procedure Templates

Select the item you want to edit in the **Function Template** window. Then either press the **Edit** button on the Toolbar or use the **File** menu's **Edit Record** option.

To save or cancel the edits, use either the option available in the toolbar or the corresponding options available in the **File** menu.

Creating a New Function Template

To create a new Function Template from scratch:

Make sure you have selected a Function Template in the Tree Structure. Click **New** on toolbar. The fields in the property window are cleared to allow you to create a new Function Template from scratch.

Another way to create a new Function Template is using the **New** option either in the **File** menu or in the pop-up menu of a Function Template.

A new Calibration Procedure Template is automatically created for the new Function Template. Please check its contents to make sure it suits your needs.

Function Template fields are similar to **Function Property Window Fields**.

See also **Copying a Function Template**. It allows you to make a new Function Template and Calibration Procedure Template(s) using an existing Function Template and its Calibration Procedure Template(s) as the sources for the new items.

Creating a New Calibration Procedure Template

To create a new Calibration Procedure Template from scratch:

Make sure you have selected a Calibration Procedure in the Tree Structure. Click **New** on toolbar. The fields in the property window are cleared to allow you to create a new Calibration Procedure from scratch.

Another way to create a new Calibration Procedure is using the **New** option either in the **File** menu or in the pop-up menu of a Calibration Procedure .

The new Calibration Procedure Template is automatically linked to the selected Function Template. If a Calibration Procedure Template was selected, the new Calibration Procedure Template is linked to the same Function Template that the selected Calibration Procedure Template is linked to. A Function Template may have several Calibration Procedure Templates or even no Calibration Procedure Template at all.

Calibration Procedure Template fields are similar to **Calibration Procedure Property Window Fields**.

See also **Copying a Function Template**. It allows you to make a new Function Template and Calibration Procedure Template(s) using an existing Function Template and its Calibration Procedure Template(s) as the sources for the new items.

Notes.
When adding Functions using the wizard:
The first active Calibration Procedure Template of a Function Template is always selected for use when creating a Position/Device/Function.
When adding Functions using the Tree Structure's pop-up menu:
The new Function contains all Procedures created for the selected Function Template.

Copying a Function Template

Copying allows you to create a new Function Template and Calibration Procedure Template based on existing ones.

To copy a Function Template and its Calibration Procedure Templates, select the **Copy** option from the pop-up menu appearing in the Tree Structure or use the corresponding option found in the **File** menu. Make sure you rename the new Templates according to your own needs.

The new Function Template inherits all the Calibration Procedure Templates of the original Function Template.

Deleting Function Templates and Calibration Procedure Templates

When deleting a Function Template or a Calibration Procedure Template, use one of the following methods:

- Select **Delete** from the toolbar

- Select **Delete** from the Tree Structure's Pop-up menu.

- Select **Delete** from the **File** menu.

Editing the User Interface

CMX has handy tools for editing the user interface according to your needs. All texts may be changed and fields that are of no interest to you may be hidden (does not apply to required fields). See also: **User Interface Language** on page 15.

> **Important!**
> If you have activated Window's UAC (User Account Control) feature do as follows:
> Run CMX in **Run as administrator** mode when editing the User Interface. This is done, e.g. by clicking the secondary mouse button above CMX's icon and selecting **Run as administrator** from the pop-up menu. Otherwise you will lose all your edits.

Direct Editing of the User Interface

To use the Direct edit tool, select the main window's **Tools** menu's **User Interface** option. Choose the **Edit** option from the submenu. Now all fields in all CMX windows are available for editing.

Edit a field text by clicking on the secondary button of your mouse. Press Enter to stop editing the field text.

Remember to save the changes. The **Save** as well as the **Cancel Changes** options are in the menu where the editing was invoked.

Customizing the User Interface

User interface customizing is started from the main window's **Tools** menu's **User Interface** option. Choose the **Customize…** option from the submenu. Then a separate window for customizing the user interface is opened.

Select the window to be edited/customized from the list on the left side of the window. Press the **Edit** button and then edit/customize a field by clicking on the secondary button of your mouse.

The following editing/customizing utilities are available:

- **Editing** the field text

- Resetting the field to display the **default text**

- Defining a field as **hidden** or making a previously hidden field **visible**. This option is not available for required fields

Adding Instruments to the Database

General

CMX supports four ways of adding instruments to its database:

- Using the **Wizard** is the quick way of adding single Function Positions with an installed Device.

- Using the **Tree Views** seen in the main window. This method leaves all control to you. Positions, Devices, Functions and Calibration Procedure definitions are all added according to your own needs.

- **Copying** a Device and/or a Position. This possibility is found in the context menus of Tree Structures. More of this in chapter **Copying Positions and Devices**.

- **Receiving** new instruments from a calibrator supporting this feature (e.g. Beamex's communicating MC series calibrators do support this feature). More of this possibility in **Calibration** section's chapter **Receiving Calibration Result Data**.

About Instruments, Positions and Devices

For CMX an **Instrument** is anything that need to be calibrated or otherwise periodically checked. CMX adds the Instruments as Positions and Devices containing Functions and Calibration Procedures.

A **Position** (also called a "**Tag**") is the instrument's location seen in plans and drawings. Typically, it is the symbolic name for the Function(s) that is/are needed at a particular place of the plant (e.g. "TTIR" is the symbolic name used for a Temperature Transmitter, Indicator and Recorder found in instrumentation drawings).

A **Device** is the physical instrument installed into a Position. It realizes the Function(s) defined by the Position. Devices are occasionally removed from a Position (e.g. for maintenance), stored as Spare Devices and then reinstalled to either another Position or even the same Position it was installed in before.

CMX supports installation, removal and reinstallation of Devices. The chapters further on describe how to create and work with Positions and Devices.

Maximum Amount of Positions, Devices and Functions

The following table presents the amount of Positions, Devices and Functions that can be added to different CMX versions.

CMX version	Max. amount of Positions/Devices	Max. amount of Functions in Positions/Devices
CMX Light	300/300	400/400
CMX Professional	1.000/1.000, 5.000/5.000 10.000/10.000 or unlimited	1.300/1.300, 6.500/6.500 13.000/13.000 or unlimited
CMX Enterprise	Unlimited	Unlimited

The maximum amounts in CMX Professional are fixed when CMX Professional is purchased.

Using the Wizard

The **Wizard** can be started from the main window's toolbar of from the **Database** menu's **Wizard** option. It is the toolbar's leftmost button.

The Wizard is a fast tool for creating a new Position and an installed Device. You only need to fill in the fields required to create a Position (and a Device).

Notes.
The wizard creates a Position/Device with a single Function. To add more functions use the method described in chapter **Adding Functions** on page 79.
For maximum amount of Positions, Devices and Functions, see chapter **Maximum Amount of Positions, Devices and Functions** on page 74.

Step 1 of 5 - Position Data

Enter the basic Position data and its location in the **Plant Structure**. Either enter the plant path manually or select it by opening the Plant Structure Tree from the button on the right side.

Notes.
When entering the path manually, remember to use the path separator defined in the **General Settings**.
You cannot create the Plant Structure here, but select/enter the location of a previously added Plant Structure.

Field level information is available in the on-line help delivered with CMX.

Step 2 of 5 - Device Data

Enter the basic Device data.

Field level information is available in the on-line help delivered with CMX.

Step 3 of 5 – Function Template

Select one of the available Function Templates or use the last item on the list to create a User Defined Function.

All pre-entered templates are described in the on-line help delivered with CMX.

Note.
If a certain function need to be entered several times and there is no suitable Function Type available, consider creating a custom Function Type Template for it. See section **Basic Settings**, chapter **Function Templates**.

Step 4 of 5 – Function Data

Specify the input and output data for the Function. The fields shown vary depending on the selected Function Template.

Field level information is available in the on-line help delivered with CMX.

Step 5 of 5 – Calibration Procedure Data

Remember to add a Calibration Due Date to the new Instrument and either accept or edit the default calibration procedure data values on the other fields.

Field level information is available in the on-line help delivered with CMX.

Note.
When you have added an instrument using custom User Defined templates in the wizard, please check all Function and Procedure fields in the property window. The wizard may have omitted some fields. In that case, enter necessary data manually.

Using the Main Window's Tree Views

The Wizard is a shortcut for making a Position/Device with a single Function. This chapter together with its subchapters describes how to make any type of instrument, e.g. one with multiple Functions.

All instrument data located in CMX's Instrument Database are hierarchically arranged in the same order as the following chapters.

Adding Positions

There are three ways of adding a Position in CMX:

- Click the secondary button on the mouse in the up-permost row of the **Position** Tree.

- Click the secondary button on the mouse above a Plant Structure node in the **Plant Structure** Tree.

- When viewing the **properties** of an existing Position there is a button for creating a **New** Position in the property window.

Position ID is the only required field, all others are optional. The Position ID field may have a default value based on your database settings. If it is empty, you need to enter a unique ID.

Field level information for Positions is available in the on-line help delivered with CMX.

Notes.
A new position may also be created using the copy option of a context menu of a tree. Open the menu with your mouse pointer above a position icon and select the **Copy** option.
For maximum amount of Positions, see chapter **Maximum Amount of Positions, Devices and Functions** on page 74.

Adding Devices

There are four ways of creating Devices in CMX:

- Click the secondary button on the mouse above a Position seen in the **Position** Tree.

- Click the secondary button on the mouse above a Position seen in the **Plant Structure** Tree.

- Click the secondary button on the mouse in the uppermost row of the **Device** Tree. Open the **Devices** window, if it is not visible.

- When viewing the **properties** of an existing Device there is a button for creating a **New** Device in the property window.

Note for the two first methods:
If the Position from which the adding of the Device was invoked has functions but no installed Devices, the new Device will be installed to the Position and automatically "inherits" the same functions as the Position.
Otherwise the device will be added to the Device Tree as a free Device. All other methods also add the Device to the Device Tree as a free Device.

Device ID is the only required field, all others are optional. The Device ID field may have a default value based on your database settings. If it is empty, you need to enter a unique ID.

Notes.
Adding Device Manufacturers and Models can be done while adding Devices. Just select the "**<New…>**" option from the list of Models/Manufacturers.
A new device may also be created using the copy option of a context menu of a tree. Open the menu with your mouse pointer above a device icon and select the **Copy** option.
For maximum amount of Devices, see chapter **Maximum Amount of Positions, Devices and Functions** on page 74.

Field level information for Devices is available in the on-line help delivered with CMX.

Adding Functions

To add Functions you need to have an existing Position or a Device to add the Function to. There are four ways of creating Functions in CMX:

- Click the secondary button on the mouse above a Position seen in the **Position** Tree.

- Click the secondary button on the mouse above a Position seen in the **Plant Structure** Tree.

- To add a Function to a Device, open the **Devices** window and click the secondary button on the mouse above a Device.

- When viewing the **properties** of an existing Function there is a button for creating a **New** Function in the property window. The new Function will be added to the same Position and/or Device as the previously viewed Function.

Note.
Adding a Function to a Position with an installed Device automatically adds the new Function to the installed Device too. If the Position has several Devices installed to it, the new Function is added to the Position but not to any of the installed Devices.

The definition of a Function starts with selecting the Function Template. Field level information for Function Templates is available in the on-line help delivered with CMX.

The fields to be entered depend very much on the chosen template. CMX helps you out by adding default values to the fields that do require some entry.

Notes.
If a certain function need to be entered several times and there is no suitable Function Template available, consider creating a custom Function Template for it. See section **Basic Settings**, chapter **Function Templates**.
For maximum amount of Functions, see chapter **Maximum Amount of Positions, Devices and Functions** on page 74.

Field level information for Functions is available in the on-line help delivered with CMX.

Fieldbus Device Specifics

This chapter presents some fieldbus instrument specifics allowing faster creation of these types of instruments.

FOUNDATION™ Fieldbus and Profibus PA Devices

When adding a FOUNDATION™ Fieldbus or a Profibus PA instrument into CMX's database, the following settings should be used:

- Select **Digital variable** as the **Output Category**.

- When you have chosen the **Output Quantity**, select either **Foundation H1** or **Profibus PA** as the **Output Method**.

HART® Devices

When adding a HART instrument into CMX's database, the Analog Output (AO) and the Digital Output (PV) should be added as two Functions with the following settings:

- The Analog Output (AO) as a **transmitter** with the output category **analog variable** selected.

- The Digital Output (PV) as a **transmitter** with the output category **digital variable** selected. Select the same Quantity both for the input and the output. Select **HART** as the Output Method.

User Defined Transfer Function

Among Function data is a field for defining the instrument's **Transfer Function**, i.e. input/output correlation. In addition to standard Transfer Functions, an option called "**User Defined Transfer Function**" is also available.

This option is usable when CMX's standard Transfer Functions do not apply, but corresponding input/output pair values are known.

When **User Defined Transfer Function** is selected as the instrument's Transfer Function, a table for entering up input/output pairs appears. You need not enter exactly ten input and output pairs, although it is the default amount of rows in the table, but as many as is needed (minimum amount: 3 rows). Leave excess rows empty and they will be removed when you finish editing and reopen the function property window. To add more rows to the table, move to the current last row and press the **Enter** key.

IMPORTANT!
* **First input and output pair (point) must be same as input and output 0 % range values.**
* **Enter absolute input and output values in increasing order (percentage of span point of view).**
* **Last input and output values must be equal or greater than input and output 100 % range values.**

Notes.

CMX and calibrators supporting **User Defined Transfer Function** approximate the values between entered input/output pairs by calculating a curve between a pair of points that connects smoothly to the adjoining curve. The entered input/output pairs need to be points of a strictly increasing function.

User Defined Transfer Functions are supported in CMX's manual entry and in Pocket PC option, and also in modern calibrators, like Beamex® MC4 and later. When trying to send instruments with "User Defined Transfer Function" as the **Transfer Function** to a calibrator not supporting this feature, the following error message appears:
        "**Unsupported transfer function**".

User Defined Pressure Units

CMX has a comprehensive set of pre-entered pressure units. If however they are not suited for your needs, you can create custom pressure units as follows:

1. Select the **Unit** list for a pressure input or output.

2. Scroll down to the bottom of the list and select option "**New**".

3. Enter required data in the opened window:

   - **Unit Name**. A free descriptive text. See note below.
   - **Reference Unit**. The pre-entered unit that is used as the basis for calculating the user defined pressure unit.
   - **Factor**. A factor for converting the measured pressure from the reference unit to the user defined pressure unit.

4. Select OK and you are ready.

Notes.

To minimize the risk of confusion that may lead to serious accidents, avoid using unit names that resemble "reserved names", i.e. names of standard units available in CMX.

Use some sort of prefix or suffix, e.g. "**#**", in the unit name. This is to indicate that this is a custom pressure unit, not to be confused with standard units available in CMX.

Currently this feature is available in CMX's Manual Entry window, in CMX for Pocket PC and modern calibrators.

Editing/Deleting Custom Pressure Units

To edit, check or even delete a custom pressure unit, select the unit and close the list. Click the secondary button on the mouse above the unit list. A pop-up menu opens with the options **Edit** and **Delete**. Select appropriate option,.
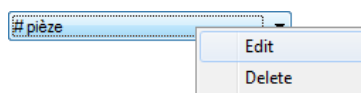
User Defined PRT Sensors

CMX supports entering custom **Callendar - van Dusen** equation coefficients for Platinum Resistance Temperature (PRT) type RTD sensors used, e.g. as reference sensors. Here's how to add a user defined PRT sensor:

1. Select the **Sensor Type** list for a temperature input or output.
2. Scroll down to the bottom of the list and select option "**New**".
3. Enter required data in the opened window:

   - **Sensor Name**. A free descriptive text. See note below.
   - **High & Low Limit**. Defines the temperature range in which the custom sensor is used.
   - **R0**, the custom sensor's resistance in Ohms at 0 °C
   - **A**, **B** & **C** are factors that customize the PRT sensor.
   - **Resolution**. The resolution of the custom sensor.

4. Select OK and you are ready.

Notes.
To minimize the risk of confusion that may lead to serious accidents, avoid using sensor names that resemble "reserved names", i.e. names of standard sensors available in CMX.

Use some sort of descriptive text, e.g. sensor's serial number, in the sensor name. This is to indicate that this is a custom PRT sensor, not to be confused with standard sensors available in CMX.

User defined PRT sensors are supported by modern calibrators, e.g. Beamex® MC4 Documenting Process Calibrator and later.

More of **Callendar - van Dusen** equation in a separate help file called **CMX_Calculations.chm**. Open it from CMX Main Windows' Help menu. Select option **CMX Calculations**. Look for main topic **PRT Sensor Calculations** and from there sub topic **Callendar - van Dusen Equation**.

Editing/Deleting Custom PRT Sensors

To edit, check or even delete a custom PRT sensor, select the sensor and close the list. Click the secondary button on the mouse above the sensor list. A pop-up menu opens with the options **Edit** and **Delete**. Select appropriate option.
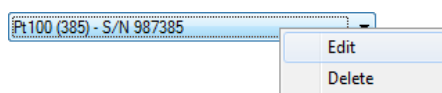
Adding Procedures

CMX automatically creates a Procedure with default settings for new Functions except if the Function was created using the **New** button in the Function property window. Then the Procedure needs to be manually added.

Procedures may also be added if you need another Procedure for certain needs (e.g. there is a separate Procedure for quality related calibrations and another for less demanding calibrations).

There are four ways of creating Procedures in CMX:

- Click the secondary button on the mouse above a Function seen in the **Position** Tree.

- Click the secondary button on the mouse above a Function seen in the **Plant Structure** Tree.

- Click the secondary button on the mouse above a Function seen in the **Device** Tree.

- When viewing the **properties** of an existing Procedure there is a button for creating a **New** Procedure in the property window. The new Procedure will be added to the same Function as the previously viewed Procedure.

Enter a name for the Procedure and check the default values CMX have added to the fields that do require some entry.

Notes.
CMX always uses the first available Procedure for the Function (the uppermost active Procedure shown in the Tree). If a Function has several Procedures, deactivate all Procedures preceding the one you want to use for calibration.
There are no limitations for the amount of Calibration Procedures, except the available memory in the computer(s)/server(s) used to run CMX and store its database.

Field level information for Calibration Procedures is available in the on-line help delivered with CMX.

Other Instrument Related Functions

This section describes the following tasks:

- Linking and Unlinking Devices

- Assigning Spare Devices

- Copying Positions and Devices

- Editing Positions, Devices, Functions and Procedures

- Deleting Positions, Devices, Functions and Procedures

Linking and Unlinking Devices

When you link a Device to a Position you inform CMX that the physical Device is installed to that Position.

Availability of the report:
— CMX Light
● CMX Professional
● CMX Enterprise

You may later produce a report detailing where a certain Device has been in the plant(s), or you may even see which Devices have been installed in a certain Position.

When you create a new Position and/or a Device, there is a simple possibility to link the Position and the Device. Existing Positions and Devices are linked by using another method. Both methods are described in the following subchapters.

Linking While Creating the Instrument Database

There are two ways to link a Device to a Position when creating (or adding a Device to) the database:

- Create a new Position using the **Wizard**. Then you also add a Device to the Position. This method requires that neither the Position nor the Device already exist in the database.

- Add a Device to an existing Position seen in the **Position** Tree (alternatively, the Plant Structure Tree). Open the Context Menu (pop-up menu) of the Position and add a Device. Then the new Device inherits all Functions and Procedures of the Position and is automatically linked to the Position. This method requires that the Device does not already exist in the database but the empty Position with Functions does exist.

In both cases the new Device inherits all free Functions and Procedures of the Position and is automatically linked to the Position. Note that a Function and a Procedure added to the Position after the Device was created will only be the Position's Functions/Procedures, not the Device's. It's the creation order that determines what happens.

Keep in mind that these two last methods of linking are handy only when creating the instrument database (or adding a new Device). When both the Position and the Device already exist in instrument database, see chapter **Linking Existing Positions and Devices**.

Linking Several Devices to the Same Position

Out of the two methods presented above, the latter allows you to link several Devices to the same Position. If a Device is linked to a Position but the Position still has free Functions, A new device created to the Position "inherits" all free Functions. As a result, the Position now has two installed Devices.

Additionally: If you add more Functions to the Position and then add a yet another Device, the new Device "inherits" the free Functions.

Note.
This method of linking several Devices to a Position is not the only way. See the next chapter to find out how to link several already existing Devices to an existing Position. There you can also find out how to link a single Device to several Positions.

Linking Existing Positions and Devices

To link a Device to a Position, open the **Devices** window, select an uninstalled Device (a green circle without a yellow "cup") and drag-drop it to the desired Position seen in the Position Tree (alternatively, the Plant Structure Tree).

A dialog window opens. There you can either link the device as an installed one or as a spare device for the Position.

Another way to link a Device is unlinking an already linked Device and selecting a spare Device as the new linked Device. Both the unlinking and the linking are done using the Context Menu (pop-up menu) available in the Position Tree (alternatively, the Plant Structure Tree).

If CMX displays an error message stating that automatic linking is not possible, drag-drop the Device's **Functions** to the Position's corresponding **Functions** one by one. This method is needed when the Position/Device has several similar Functions or the amount of Functions is not the same in the Position and the Device.

Note.
When linking a Device with existing Function(s)/Procedure(s) to a Position, the Device will automatically inherit Position's Function/Procedure data with the following exceptions: **Initial Calibration Date**, **Initial Calibration Count** and **Total Calibrations** fields stay unique for Position and Device.

Linking Several Devices to the Same Position

If a Position has more Functions than the first linked Device, the free Functions of the Position may be linked to another Device with suitable Functions. To link: drag the Device's Functions to the Position's free Functions.

If the Position still has free Functions after linking the second Device's Functions, a third Device's Functions may be linked to the Position. The Position may have as many linked Devices as there are Functions and there is no limit to the amount of Functions in a Position.

Note.
This method of linking applies to situation when both the Devices and the Position already exist in the instrument database. See chapter **Linking While Creating the Instrument Database** on page 85 to learn how to add several **new** Devices to a Position.

Linking the Same Device to Several Positions

If a Device has more Functions than the Position it was first linked to, the remaining Functions may be linked to other Positions. Drag the free Functions to Functions in other Position.

The Device may be linked to as many Positions as there are Functions in the Device and there is no limit to the amount of Functions in a Device.

General Notes Concerning Linking

- In order to link a Device to a Position, the Functions' Input/Output Category, Input/Output Quantity and Transfer Function of the Position and the Device data must "match". Rest of the function data will be synchronized (Position Function data overwrites possibly conflicting Device Function data).

- A Device with a Function can not be linked to a Position without a "matching" Function.

- An inactive Device cannot be installed to a Position. Note that the active/inactive setting is not available in CMX Light.

- An already linked Device cannot be linked to another Position. The Device must be unlinked first.

- An unlinked Device can be a spare Device for many Positions, but as soon as it is installed into a Position, it can no longer be a spare for any Position. CMX automatically removes the spare Device definitions.

- A link leaves a "trace" in the CMX database only if the Device is calibrated while installed to a Position.

- Assigning a Device as a spare Device does not require that the Functions of the spare Device and the Position match.

Unlinking Devices

To unlink a Device open the Position Tree (alternatively, the Plant Structure Tree), expand the tree at the Position where the Device to be unlinked is located. Open the Device's Context Menu (pop-up menu) and select the **Unlink** option.

This method applies to both installed and Spare Devices.

Assigning Spare Devices

Assigning a Spare Device is quite similar to linking existing Positions and Devices.

To assign a Device as a Spare Device to a Position, open the Device Tree, select an uninstalled Device and drag-drop it to the desired Position seen in the Position Tree (alternatively, the Plant Structure Tree).

A dialog window opens. Make sure that the "Install as Spare Device" check box is selected. Then select **Ok**.

If you want to assign an already installed Device as a spare Device for the same Position, click the secondary button on the mouse. The context menu has an option to assign the linked Device as a spare Device.

Note.
Assigning a Device as a spare Device does not require that the Functions of the spare Device and the Position match.

Copying Positions and Devices

CMX's Position, Device and Plant Structure Trees have in their context menus the possibility to copy a Position and/or a Device.

Click your mouse's secondary button above either a Position or a Device. The context menu has a **Copy** option (provided you have the user privileges to create a Position and/or a Device).

- For an empty Position, a window opens where you can add the **Position ID**, **Name** and **Plant** path data. In CMX Professional and CMX Enterprise you may also set Position's **Accessibility**. This however, depends on your privileges to edit Accessibility data.

- For a free Device, a window opens where you can add the **Device ID**, **Serial Number** and **Model** data. In CMX Professional and CMX Enterprise you may also set Device's **Accessibility**. This however, depends on your privileges to edit Accessibility data.

- For a linked Position/Device, both previously mentioned windows are shown (one at a time).

Note.
Copying a Position/Device also copies all Functions and Calibration Procedures the original Position/Device had.

Editing Items Displayed in a Tree

When viewing the **properties** of an existing Position, Device, Function and Procedure there is a button for **Editing** the data in the property window.

Items shown in sub windows (**Manufacturers**, **Calibrators**, **Users**, **Lists** and **Function Template** Windows) also have an **Edit Record** option in the window's **File** Menu.

Note.
Editing linked Functions or Calibration Procedures of linked Positions and Devices always apply to the Procedure/Function of both the Position and Device.

Deleting Items Displayed in a Tree

The option to delete an item shown in a Tree is shown in the item's Context Menu (pop-up menu). The toolbar also contains a button for deleting items.

Items shown in sub windows (**Manufacturers**, **Calibrators**, **Users**, **Lists** and **Function Template** Windows) also have a **Delete** option in the window's **File** menu.

Queries, Filters and Sets

General

This section describes tools that help you sort, group and view the instrument data according to you own needs.

What Is a Query

A query is a tool found in all database software. It contains search criteria that select the data to be displayed.

Available Queries

CMX has queries available for Positions, Devices, Calibrators and Calibrator Modules. Queries are part of the software and therefore available at any time. Use filters for temporary filtering the instrument data.

The available queries are shown in a list just above the Tree. The following table describes all currently available queries.

Query Description	Position Queries	Device Queries	Calibrator/ Module Queries
Does not filter out anything. Everything is shown.	All Positions	All Devices	All Calibrators/ Modules
Shows only the items due (or overdue) for calibration.	Due for Calibration	Due for Calibration	Due for Calibration
Shows the items due within a specified period.	Due within…	Due within…	Due within…
Shows unlinked Positions/Devices only.	Empty Positions	Free Devices	-
Shows all currently added Positions. See also the note below.	New Positions	-	-

Notes.

The "New Positions" query is not available in the list of Position Queries. It is automatically created when adding Positions and also disappears automatically when you choose another query from the list.

Keep in mind that the Position Query list is the **secondary** level query. The **Plant Structure List**, shown above the Position Query list, is the **primary** level filtering for the Positions shown in the Position Tree.

What Is a Filter

A filter is a handy tool for limiting the displayed data. You may define what to filter in the **Position Filter Conditions** window or **Device Filter Conditions** window.

In **CMX Light**:

Filter settings are only kept for as long as the filtering is active or until CMX is closed.

In **CMX Professional** and **CMX Enterprise**:

You also have the possibility to save useful filters for future needs and create more sophisticated searches using the SQL Editor. See subsequent chapters.

How to Filter Data

To open the **Position Filter Conditions** window, press the filtering button on the right side of the Main Windows' Position query list. The button has an icon that looks like a funnel. The same feature is in the **Devices** window that displays the Device Tree.

When you click either of the filtering buttons, a window with all filterable fields is presented. Then select suitable filtering parameters.

For text fields: Enter any amount of characters that suit your filtering needs. While searching for matches, all fields starting with the same characters are selected for display in the Tree with the filtered data. See also: **Wildcards.**

To activate a filter:

When all filter conditions are set, press the **Apply** button in the **Filter Conditions** window. Then the Position or Device Tree only shows the Positions/Devices that fit the filter parameters.

Notes.

Both the Position Tree and the Device Tree may have their own independent filters active.

Filters are not case sensitive. **TIRCA** and **Tirca** returns the same results.

You may also search for empty fields. Enter **IS NULL** as the search criteria. This is the exception to case sensitivity: **IS NULL** need to be written with capital letters.

For all error limit fields:
When entering numeric values, use the same decimal separator as is defined for your CMX database. Keep in mind that the decimal separator in your database may differ from the decimal separator used by the operating system. When in doubt, consult your IT specialist.

Check boxes have three possible states: **Checked**, **unchecked** or **mixed**. Mixed displays as a little green square in the check box. By default, all check boxes in Filter Conditions windows are displayed in mixed state. This means the value of the check box does not matter. If you change the check box's state to either checked or unchecked, the check box is part of the filter query.

To deactivate a filter, do one of the following:

- Double click the Filter icon seen in the Main Window.
- Open the **Filter Conditions** window again, press the **Clear Fields** button and then the **Apply** button.

Wildcards

Wildcard characters are special characters that represent one or more other characters. They help filtering data. The following table lists all supported wildcards and describes how they are used.

Wildcard character	Wildcard description	Filtering example
%	Any string of zero or more characters.	Setting, e.g. the Position ID filter criteria to "**%CA**" the following Position IDs are accepted: LIR**CA**Z100, L**CA**101, PI**CA**102, T**CA**Z103
_ (under-score)	Any single character	Setting the Position ID filter criteria to "**_CA**" the following Position IDs are accepted (compared with the previous result): **LCA**101, **TCA**Z103
[ ]	Any single character within the specified range ([a-f]) or set ([abcdef]).	Setting the Position ID filter criteria to "**[A-L]CA**" the following Position ID is accepted (compared with the previous results): **LCA**101
[^]	Any single character **not** within the specified range ([^a-f]) or set ([^abcdef])	Setting the Position ID filter criteria to "**[^A-L]CA**" the following Position ID is accepted (compared with the previous results): **TCA**101

Availability of Oracle database:
–– CMX Light
O CMX Professional
O CMX Enterprise

Note.
The wildcards mentioned here apply for Microsoft SQL Server. If you are using Oracle database, refer to Oracle's own wildcard definitions.

Using Saved Filters

If you have already saved a useful filter, you may take it into use by choosing from the **Filter Name** list.

Saving Filters

You may give a name to a filter, set its accessibility and enter a description for it using the uppermost fields in the **Filter Conditions** window.

Note.
If no user group is selected in the filter's **Accessibility** list, CMX treats the filter as private, i.e. no other user has access to it. If you want other users to have access to a filter you created, check as many user groups as you want in the **Accessibility** list.

To save a new filter, click the **New** button in the toolbar and then enter a name for the filter. After all settings are as required, save the filter by clicking the **Save** button in the toolbar.

To edit an existing filter, click the **Edit** button in the toolbar. Then do the necessary edits and click the **Save** button in the toolbar.
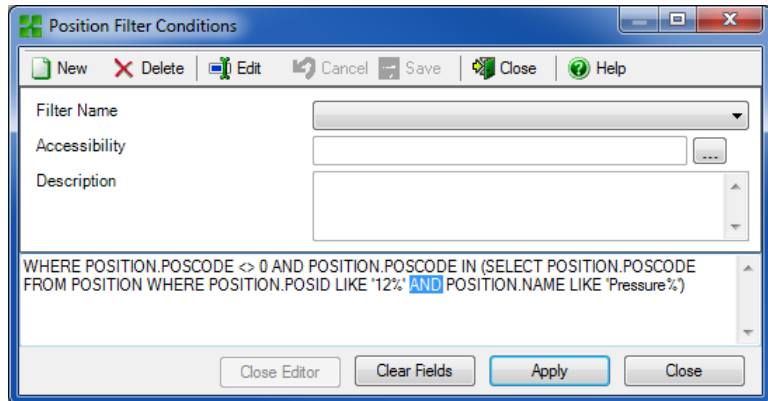
SQL Editor

The **SQL Editor** button found in the **Filter Conditions** window shows the current filtering settings as a standard SQL query.

The Filter Conditions windows' SQL Editor allows users with SQL knowledge to edit queries. E.g. all filter parameters in the normal filter window use the AND operator between all queried fields. In the SQL editor the operator may be changed to OR.

A more advanced SQL query cannot be displayed in the normal filter window. In that case the **Close Editor** button is disabled and that particular query may only be edited in the SQL Editor view.

Note.
Your edits may create a query that does not give any results at all. Make sure you type all SQL parameters correctly.

What Is a Set

Sets are groups of Devices or Positions that are selected as part of a collection. Usually a set contains items that are calibrated at the same time and/or are located e.g. in the same department.

Device and Position Sets

The **Device Sets** as well as the **Position Sets** window is opened (and closed) from the main window's toolbar or from the **View** menu. The upper part of the window contains a list of existing sets. The last item in the list includes a possibility to create a new set.

A set is saved with the database and remain available until it is deleted.

Editing a Set

To **add** an item to a set, drag-drop it from a Tree containing similar items as the set.

- Devices can only be dragged from the Device Tree seen in the **Devices** window. If the window is not visible, open it from the main window's toolbar or the **View** menu.

- Positions can be dragged from the Position Tree or the Plant Structure Tree. One of the Trees is always available on the left side of the main window.

Removing an item from the set is done from the item's Context Menu (pop-up menu). Similarly, the whole set is deleted from the Context Menu opening from the set name (the uppermost row in the set Tree).

# Check Out / Check In Feature

General

Check Out / Check In feature is a utility that allows you to "lock" the Positions/Devices currently under calibration (or being edited). The data of Positions/Devices that are Checked Out may not be calibrated/edited by other CMX users than the one who did the Check Out. When Checking In, the Position/Device is "unlocked" and may again be calibrated/edited by all CMX users.

Check Out / Check In feature is part of CMX's standard tools starting from CMX V2, revision 2.1.

Check Out / Check In Characteristics

This chapter presents the common characteristics of the Check Out / Check In feature. **Automatic Check Out / Check In** and **Manual Check Out / Check In** specifics are presented in their own subchapters.

- A Position/Device that is Checked Out, has a red frame around its icon (see adjacent picture).

- When a Position/Device is Checked Out, all data belonging to it: *Position, Device, Function(s), Procedure(s)* and *Calibration History* is locked.
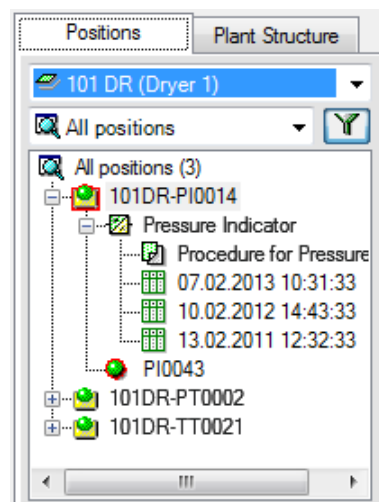
- The data of a locked Position/Device may be deleted/edited only by the user that did the Check Out.

- A locked Position/Device may be sent for calibration or chosen for Manual Entry only by the user that did the Check Out.

- The uppermost row of a locked item's property window displays the following information:
  [Checked Out By *<User Name>* / *<Date>* *<Time>*]

- A locked item does not lock documents linked to it.

- A locked item does not lock pick-up lists it uses.

- You may use CMX's filtering utility to find/view locked items.

Availability of Audit Trail:
−− CMX Light
○ CMX Professional
● CMX Enterprise

- If **Audit Trail** is part of your CMX package, all Check Outs and Check Ins are saved in the Audit Trail.

Note.
You may still calibrate Positions/Devices without utilizing the Check Out / Check In feature.

Automatic Check Out / Check In

When activated, the Automatic Check Out / Check In feature automatically checks out a Position/Device sent for calibration or selected for Manual Entry. Similarly, when the calibration results are saved to CMX's database, the instrument is automatically Checked In.

By default, Automatic Check Out / Check In feature is not activated. You may activate it in the **Options** window's **General Settings** section (menu commands **Tools**, **Options**). Check the check box **Automatic Calibration Time Check Out / Check In** to activate Automatic Check Out / Check In feature

Notes.

Calibrating a single Function of a multi-function Position/Device locks the Position/Device and all its Functions until the single Function is calibrated and results are saved in the database.

When several Functions of a multi-function Position/Device are sent for calibration, the Position/Device is locked until the results of all Functions are saved in the database.

Manual Check Out / Check In

Manual Check Out / Check In can be used no matter if Automatic Check Out / Check In is activated or not. Additionally, a Position/Device Checked Out using automatic Check Out may be checked in using manual Check In.

Manual Check Out / Check In is more versatile than Automatic Check Out / Check In. It can be used, e.g. for locking an item that needs editing. Then, in a multi-user environment, no other users may simultaneously edit the same data and cause clashes. See also: **Simultaneous Data Editing**.

Checking Out a Single Instrument

An instrument may be manually Checked Out from any tree structure (**Position Tree, Device Tree, Plant Structure Tree, Position Set Tree, Device Set Tree**). Click on the mouse's secondary button to open a context menu above either a **Position** or a **Device**.

If the Position/device is not checked out, the context menu has a Check Out option.
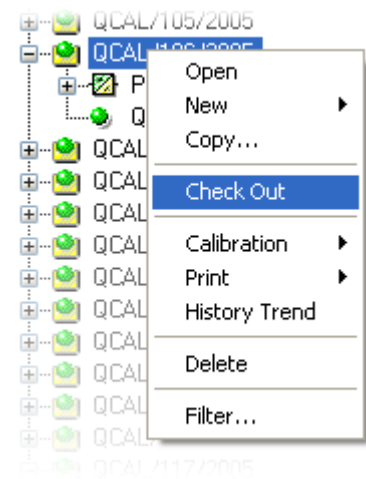
> Note that the option is available only for users with permission to edit Position and Device data.

Checking Out Multiple Instruments

A group of instruments may be manually Checked Out from the **Query** level of a tree (the uppermost item in a tree, see adjacent picture).

This method locks all items belonging to the group except the items that were already locked. They stay locked for the user who originally checked them out.
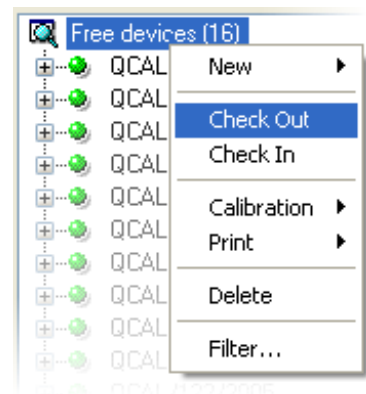
Note.
When doing multiple Check Outs, CMX displays a dialog asking to confirm the operation.

Checking In a Single Instrument

An instrument may be manually Checked In from any tree structure. Click on the mouse's secondary button to open a context menu above a Checked Out **Position** or **Device**.

> Note that the Check In option is available only for the user who Checked Out the instrument, for users with Supervisor privileges and the Database Administrator.

Checking In Multiple Instruments

To Check In multiple items, click on the mouse's secondary button above a **Query** (the uppermost item in a tree as shown in one of the previous pictures). Select Check In from the context menu.

> This method unlocks all items Checked Out by the logged in user. If the logged in user has Supervisor privileges or is the Database Administrator, all items will be Checked In.

Note.
When doing multiple Check Ins, CMX displays a dialog asking to confirm the operation.

Calibration

General

Calibrations can be done after the necessary instrument data is entered into the database.

A Position must have an installed Device (with Functions) before a calibration can be performed, but a Device (with Functions) can be calibrated before it is installed into a Position. If a Device is installed into a Position, then only a Position calibration may be carried out, not a Device calibration.

CMX supports the following methods of calibration data entry:

1. **Off-line Calibration** (sometimes also called Batch Calibration), where Instruments/Functions to be calibrated are sent from CMX to a Calibrator able to communicate with CMX. Then the calibrator is moved to the field/laboratory where the instrument is located. After the calibration is performed the calibrator is brought back and reconnected to CMX. The results of the calibration are then received to CMX.
   For more information, see **Selecting Instruments for Calibration** on page 110 and **Receiving Calibration Result Data** on page 113.

2. **Manual Entry** is for situations, where a calibrator unable to communicate with CMX is used for calibration.
   For more information, see **Manual Entry of Calibration Results** on page 115.

Manual Entry supports multiple As Found and As Left test. In Off-line Calibration, the amount of As Found and As Left repeats depends on the communicating calibrator. When in doubt, refer to the calibrator manual.

The communication cable used for calibrator communication is shipped with the calibrator.

Notes.

If you have the Weighing Instrument Calibration feature, some additional info on how to calibrate Weighing Instruments is presented in chapter **Calibrating Weighing Instruments** in section **Calibrating Weighing Instruments**.

Calibrators communicating via RS232-serial port:
Use only cables specifically done for communication between the calibrator and the computer.
Connecting and disconnecting the communication cable should be done when the power is off on both the computer and the calibrator.

For more details concerning calibrators utilizing USB port for communication, see section **Additional Information**, chapter **Calibrators and USB Communication**

The Typical Calibration Procedure

The typical sequence of phases in a calibration procedure is as follows.

Selection of Functions and Downloading

The Functions due for calibration are selected from the database and sent to the appropriate calibrator. A query or a predefined set could be used to find the Functions due for calibration.
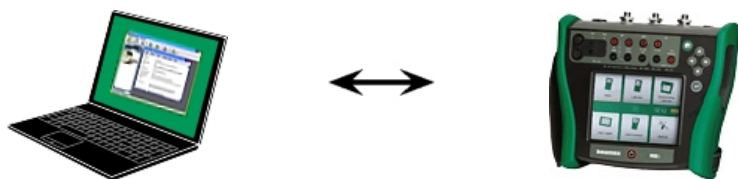
As Found Calibration

The calibrator is moved into the field, and an As Found calibration is performed using the setup information in the memory. The results are saved in the memory of the calibrator.
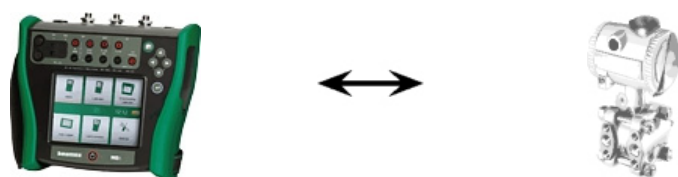
Instrument Adjustment

If needed, the instrument function is adjusted with the help of the calibrator measurement modules. The maximum error is reduced to the Adjust To limit.

As Left Calibration

The instrument function is calibrated again, to check that the maximum error is at the desired level. The results are stored in the calibrator memory, and another scheduled calibration can be performed.

Receiving of Calibration Results

After all calibrations have been performed, the calibrator is reconnected to the computer, and CMX will receive the calibration results, and save the calibration data for use in the future.

Printing of Results

CMX can then e.g. produce calibration certificates reports based on saved calibration data.

# Calibration Web Service Interface, CWSI

About CWSI

Calibration Web Service Interface, CWSI, is a tool for communication between calibrators and CMX in virtualized environments.

CWSI introduces two new components into CMX: **CWSI Server** and **CWSI Client**. **CWSI Server** is installed on a server, e.g. the same server as **CMX Server** is installed. **CWSI Client** is installed on all computers where CMX main software is run. More info of CWSI installation is in **CMX Installation Manual** and in CWSI Help file included in **CWSI Server** and **CWSI Client**. The help file is also available as a pdf file on CMX's installation disc.
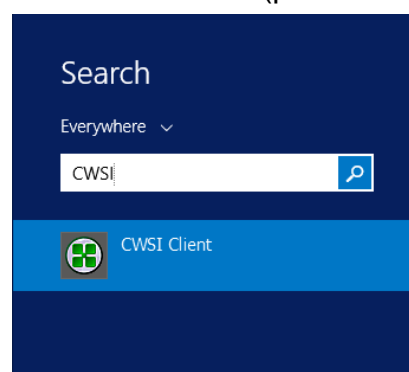
Starting CWSI

Before using CWSI, **CWSI Client** must be started and connected to **CWSI Server**.

In **Windows 7** and **10**, search for **CWSI Client** from the menu opening from the Windows logo, typically found in the lower left corner:
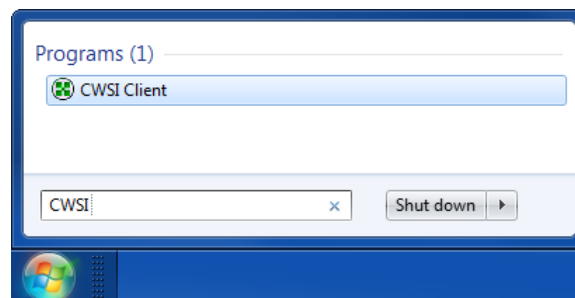
In **Windows 8**, open **Charms** (picture to the left), select **Search**, enter CWSI in the opened search window and click on the **CWSI Client** icon (picture below).

Ensure that the **CWSI Client** is found in the system tray:
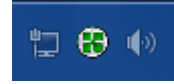
The context menu of the system tray icon allows you to configure the connection to **CWSI Server** and connect to **CWSI Server**.

Configuring **CMX Server** is done similarly, but on the computer it resides in, provided you have the rights to make changes to the computer. The configuration software is called **CMX Server Configurator**.

Using CWSI in CMX

In CMX, CWSI is available in both **Send to Calibrator** and **Receive from Calibrator** windows. Select **CWSI** as your **Protocol**. The small button with three dots allows you to check/edit **CWSI Server** settings ensuring connection to **CWSI Server**. The picture below presents the default settings.
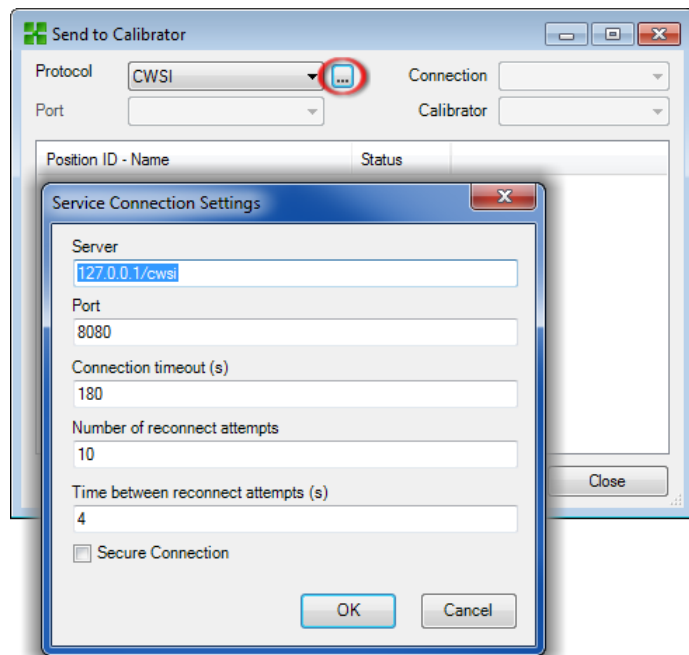
If CMX connects to CMX Server, then the **Connection** selection list shows all matching **CWSI Clients** where **CMX user id** (set in **CWSI Client**'s **Options**) is the same as **User ID** in CMX. Each connected calibrator of the **CWSI Client** is listed in the Calibrator list. In any other manner both Send and Receive windows can be used normally.

Note.
If CWSI is configured to require a "Secret" (a password unique to CWSI), The "Secret" has to be entered before sending and receiving commences.

Selecting Instruments for Calibration

Since a calibrator treats each Function in an instrument as a separate item to be calibrated, CMX sends Functions to the calibrator, not instruments.

CMX has a separate window for collecting the Functions that will be sent to the calibrator. The window is opened using one of the following methods:

- Selecting **Send** from the main window's toolbar (found in a submenu that opens from the Calibration button).

- Selecting **Calibration**, **Send** from a suitable Context Menu (pop-up menu).

- Selecting the **Send** option from the main window's **Calibration** menu.

Adding Functions to be calibrated to the **Send to Calibrator** window is done using the following ways:

- Selecting **Calibration**, **Send to Calibrator** from a suitable Context Menu (pop-up menu). This option is available for the following items shown in one of CMX's Trees:

    o A Position with an installed Device. If the Position contains several Functions, all Functions are added to the list.

    o A Function in a Position with an installed Device.

    o An uninstalled Device (containing Functions). If the Device contains several Functions, all Functions are added to the list.

    o A Function in an uninstalled Device.

- Dragging Functions, Positions or Devices from a Tree to the **Send to Calibrator** window.

- Selecting the name of a query or a set (the uppermost row in a Tree) and dragging it to the **Send to Calibrator** window is also supported. Then all items included in the query/set are added to the list of Functions to be calibrated.

- Dragging a Plant Structure level from the Plant Structure Tree to the **Send to Calibrator** window. Then all Functions of Positions/Devices hierarchically below that Plant Structure level are added to the **Send to Calibrator** window.

Sending Instruments for Calibration
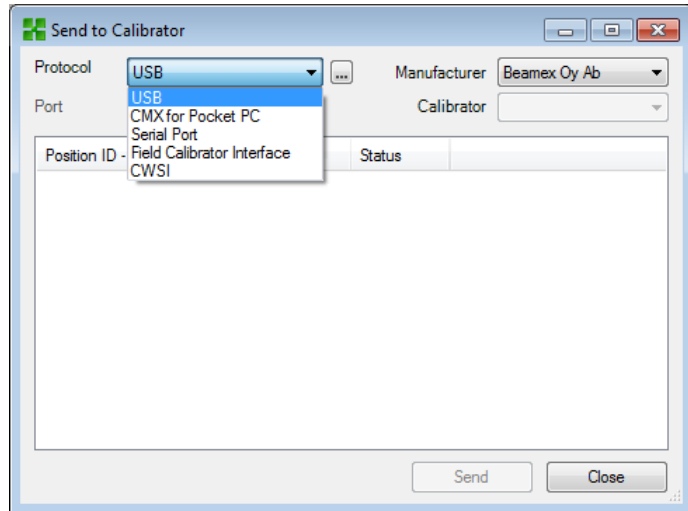
When you open the **Send to Calibrator** window, you first have to select the **Protocol**. The options are:

- **USB** for calibrators using USB port for communicating with the PC.

- **CMX for Pocket PC** for communicating with CMX's Pocket PC option.

- **Serial Port** for communicating with older calibrators using serial communication and Beamex's CALIBINT legacy protocol. Remember to select the COM **Port** too.

- **Field Calibrator Interface** is for communicating with calibrators supporting standard FCINTF protocol.

Availability of CWSI:
−− CMX Light
● CMX Professional
● CMX Enterprise

- **CWSI** is for communicating with calibrators via Calibration Web Service Interface (CWSI). More of this in chapter **Calibration Web Service Interface, CWSI** on page 108.

The calibrator may also be selected. Use the list of manufacturers and models to identify the calibrator.

When you press the **Send** button, the communication with the calibrator starts. The status column tells you how the communication advances.

Notes.

The "Auto Detect" option available for **Serial Port** protocol is fully compliant with Beamex calibrators. Other calibrator brands may not support auto detection.

CMX Light supports communication with Beamex calibrators only.

CMX remembers the Protocol, Port and Calibrator settings so the next time you open the **Send to Calibrator** window, the settings are already according to your needs.

Closing the **Send to Calibrator** window before pressing the **Send** button cancels the sending procedure. Next time you open the **Send to Calibrator** window, the list of functions to be sent is empty.

When sending instruments to certain newer calibrators, the instrument's Plant Structure path may also be included in sent data. To activate this feature, open CMX's Options window. See Calibration Options.

Modern calibrators using Universal Serial Bus (**USB**) for communication require that a USB driver is installed before they communicate with CMX. For more details, see section **Additional Information**, chapter **Calibrators and USB Communication**.

If the Calibration Options setting **Warn when Calibrator/Module is Overdue** is checked, CMX warns if you send instruments for calibration to a calibrator with an overdue calibration.

Receiving Calibration Result Data

To open the **Receive from Calibrator** window use one of the following methods:

- Select **Receive** from the main window's toolbar (found in a submenu that opens from the Calibration button).

- Select **Calibration**, **Receive** from a suitable Context Menu (pop-up menu).

- Selecting the **Receive** option from the main window's **Calibration** menu.

CMX remembers the latest Protocol and Port used as well as the latest manufacturer/calibrator settings, so normally you do not need to change the settings shown in the upper part of the **Receive from Calibrator** window. For available Protocol options, see **Sending Instruments for Calibration** on page 111.

Press the **Connect** button to see a list of Positions/Functions available in the calibrator's memory. The results column indicates whether a Position/Function contains calibration results or not.

Remember to check/uncheck the check boxes found at the bottom of the window according to your needs. We recommend that you select the **Delete Instruments After Receive From Calibrator** check box.

When you press the **Receive** button, the communication with the calibrator starts. The status column tells you how the communication advances.

See also: **Receiving Instrument History** on page 115 and **Avoiding Duplicate Results** on page 115.

Notes.

The **Receive from Calibrator** window has a **Confirm External References** check box. If it is checked, a window for entering external calibrator reference data opens for the following input/output methods:
  - Input and/or Output Method is "**Keyed**".
  - Input Method is set to "**Controlled and Measured**".

If the Instrument data of the instrument to be received differs from the data in CMX's database, CMX asks whether you want to receive the calibration results and update the instrument data in CMX or if you want to cancel the receiving of results.

When receiving calibration results of an instrument that is not in CMX's database, CMX asks if the new Device (Field Entry Device, a.k.a. **FED**) should be added to the database. Adding instrument data is only available in modern calibrator types supporting this feature. If unsure, check by receiving a new instrument created in the calibrator. CMX informs you if it finds a new instrument and asks if the instrument should be added to CMX's database.

Modern calibrators using Universal Serial Bus (**USB**) for communication require that a USB driver, shipped with the calibrator, is installed before they communicate with CMX. For more details, see section **Additional Information**, chapter **Calibrators and USB Communication**.

Modern communicating calibrators may support long Position ID and Device ID fields or even instruments without either or both ID fields. CMX does not support empty ID fields or ID fields longer than 65 characters. When Positions/Devices with missing or too long IDs are received, CMX informs the user about this and offers a possibility to give/change Position ID and/or Device ID. The information will also be updated in the calibrator.

If the Calibration Options setting **Warn when Calibrator/Module is Overdue** is checked, CMX warns if you receive calibrated instruments from a calibrator with an overdue calibration.

If the field **Reject if Calibrator is Overdue** in an instrument's Calibration Procedure is checked, you cannot receive calibration results for that instrument from a calibrator with an overdue calibration.

Hint.
If you have an instrument capable of communicating with other devices (e.g. a HART® or a fieldbus instrument) that you want to add to CMX's database, do as follows: Connect them to a calibrator with suitable communication capabilities, e.g. Beamex's MC5 Multifunction Calibrator. Read the instrument data into the Calibrator and connect the Calibrator to CMX. Receive the instrument data from MC5. This method enables you to build your database without retyping anything that is already available in the instrument's memory.

Receiving Instrument History

In **Receive from Calibrator** window:

If the Status column of the list of instruments contain data (e.g. "Current"), the instrument data has changed in the calibrator, e.g. the measurement span has been edited. If you want to save the instrument history and corresponding results, make sure you check the **Show Instrument History** check box below the list of instruments. The status may be:

- **Original**. In this calibration, the instrument is as they were during the earliest calibration.

- **Current**. In this calibration, the instrument is as it currently is in the calibrator.

- **Edited *X*** where *X* is a number starting from 1. These are intermediate versions between the "Original" and "Current"

This feature is available in modern calibrators.

Avoiding Duplicate Results

When receiving calibration results, CMX compares the calibration date of the results to be received with calibrations already received. If the dates and, when applicable, the errors match, CMX prompts you to confirm receiving these kind of results.

Receiving duplicates is easily avoided by deleting already received results from the calibrator. As mentioned earlier, this functionality is available with the **Delete Instruments After Receive From Calibrator** check box in **Receive from Calibrator** window.

Manual Entry of Calibration Results

If calibrations are carried out with a calibrator that is unable to communicate with CMX then Manual Entry is the solution. In Manual Entry calibration results and all calibration related data is typed into the database.

Notes.

CMX supports opening several Manual Entry windows. This allows you to, e.g. calibrate several temperature sensors at the same time, each sensor having its own Manual Entry window open.

If you have purchased the Weighing Instrument Calibration option, some additional info on how to calibrate Weighing Instruments is presented in chapter **Calibrating Weighing Instruments** in section **Calibrating Weighing Instruments**.

Selecting Functions for Manual Entry

There are several ways of selecting a Function for Manual Entry:

- Select the Position/Device/Function to be calibrated from a Position Tree, Plant Structure Tree or a Device Tree and then select **Manual Entry** from the toolbar (found in a submenu that opens from the Calibration button).

- Select the Position/Device/Function to be calibrated from a Position Tree, Plant Structure Tree or a Device Tree and then select **Manual Entry** from the main window's **Calibration** menu.

- Click the secondary button on the mouse above a Position or a Function seen in the **Position** Tree. Then select **Calibration, Manual Entry**.

- Click the secondary button on the mouse above a Position or a Function seen in the **Plant Structure** Tree. Then select **Calibration, Manual Entry**.

- Click the secondary button on the mouse above a Device or a Function seen in the **Device** Tree. Then select **Calibration, Manual Entry**.

Using any of the above mentioned methods opens the **Manual Entry** window ready for data entry.

Note.
When selecting a Position/Device and choosing **Calibration, Manual Entry**, only the first (the uppermost) Function of the Position/Device is sent to the **Manual Entry** window. This is because CMX's Manual Entry currently only supports the calibration of one Function at a time.
To select any other Function (as well as the first Function) in a Position/Device for Manual Entry, click the secondary button on the mouse above the Function instead of the Position/Device.

Reminder.
To be able to calibrate a Position, a Device (containing Functions) needs to be linked to it. A Device (containing Functions) may be calibrated although it is not linked to a Position. When a Device is linked to a Position, Manual Entry may be invoked for the Position only.

Entering Calibration Results

Enter the results in the grid shown on the **Results** tab. Also check the **Calibration Date** field and the **Calibrated By** fields shown in the same tab. You can select one or two users as the ones that carried out the calibration.

Enter calibration related data (e.g. the environment temperature) into the **Conditions** tab.

The **Procedure** tab contains read-only data about the calibration procedure, including possible instructions to guide you through the calibration.

Depending on your Calibration settings, you may have to select input and output calibrators and modules used in the calibration. More about this in **Basic Settings** section's chapter **Calibration Options**. Note that you may select multiple input/output calibrators and modules for each calibration point.

The way the Calibrators and Modules (references) are sorted in the **Manual Entry** window depends on settings defined in the **Options** window's **Calibration** section.

Field level information is available in the on-line help delivered with CMX.

Notes.

For unstable readings, you may add the "**~**" character (tilde) after or before the calibration point values, e.g. **12.045~**. If you enter the "**~**" character before the numbers, CMX moves the character at the end of the number. This is done to avoid mix-up between the minus sign and the "**~**" character.
Input values outside the calibration point's *Max. Deviation* limit are indicated in red. This does however not affect any calculations.

If the Calibration Options setting **Warn when Calibrator/Module is Overdue** is checked, CMX warns if you select a calibrator or module with an overdue calibration.


New Repeat

To start entering the results of the next calibration repeat, press the **New** button in the **Manual Entry** window's toolbar. If you have entered any data into the **Conditions** tab, CMX automatically copies them as part of the new repeat's data. Edit them, if needed.

To view previously entered results the click icons on the left side of the **Manual Entry** window.

Saving the Results

When you press the **Save** button in the **Manual Entry** window's toolbar, CMX saves the results in the database. If you continue entering results, they will be saved as a separate calibration saved on the same day.

While saving results CMX displays information of each repeat in a window similar to the one below:
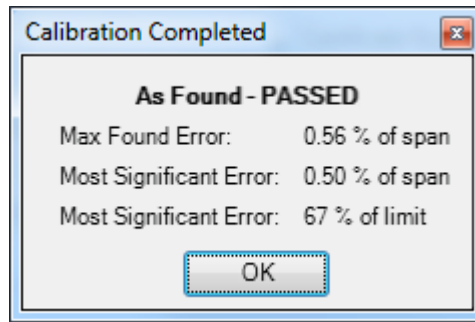
Fields:

- **Max Found Error** is the repeat's found maximum error value.
- **Most Significant Error** (value) is the numeric value of the found error that is closest to corresponding error limit.
- **Most Significant Error** (percentage) indicates how close to the calibration point's error limit the most significant error value is. The percentage value is less than or equal to 100 % if the calibration passed and more than 100 % if the calibration failed.

When the relative component of the Reject if Error limit is used, the **Max Found Error** may differ from **Most Significant Error**. More of Error Limit Function's components in CMX's on-line Help. Another source for information of Error Limit Function is in **CMX Calculations** Help file. Open it from CMX Main Windows' Help menu. Select option **CMX Calculations**.

Note.
Depending on your calibration settings, results may be save "as both" (the results are saved both as As Found and as As Left results). This setting is among the **Calibration options** in the **Options window**.

If the field **Reject if Calibrator is Overdue** in an instrument's Calibration Procedure is checked, you cannot save calibration results if you have selected a calibrator or module with an overdue calibration.

Ending Manual Entry

To end Manual Entry, press the **Close** button in the **Manual Entry** window's toolbar or select **Close** from the **File** menu. If the results of the last repeat was not (fully) saved, CMX prompts you to save them first.

Viewing the Results

The result property window can be opened from the following Trees:

- The **Position** Tree,
- The **Plant Structure** Tree and the
- The **Device** Tree.
- The **Position Set** and **Device Set** Trees.

The results icon:

In all cases: Click on the tree to see the results icon. It is located below the Function icon. Either double click on the results icon or select the **Properties** button in the main window's toolbar.

The results are shown below in "latest repeat result first" order.

The **Valid Result** check box allows you to exclude somehow not usable results from calibration history analysis.

Availability of uncertainty data:
-- CMX Light
● CMX Professional
● CMX Enterprise

CMX uses the calibrator module specifications to calculate the input and output uncertainties shown in the result table.

The **Environmental Data** and the **Calibration Notes** found among the calibration results can be edited. Also the status of the **Valid Result** check box can be changed. To do it, click the **Edit** button found in the property window's toolbar.

Note.
If an input or output value ends in a "**~**" character (tilde), e.g. **12.045~**, the reading was unstable. Adding this character is possible in CMX's manual entry window, in CMX for Pocket PC and when appropriate, the character is automatically added in a reading when using certain modern calibrators.

Average Results and Expanded Uncertainty

Average results and uncertainties can be shown among calibration results. They are individually activated/deactivated in the **Options** window's **Calibration** page. To open the **Options** window, select **Tools, Options** from CMX's main window's menu.

If **Show Average Results** is checked, the calibration result window includes an additional table of average results for all calibrations with more than one As Found or As Left repeat. For Switches: Multiple switch cycles in a single calibration repeat is enough for CMX to calculate average results.

If **Show Expanded Uncertainty** is checked, the calibration result window includes an extra column of Expanded Uncertainty data among each calibration repeat. Also: the error graph displays uncertainty bars for each calibration point.

More info of average and uncertainty calculations in a separate help file entitled "**CMX Calculations**". Open it from CMX Main Windows' Help menu. Select option **CMX Calculations**.

Approving Calibration Results

The approval of calibration results vary depending on whether Change Management and its Electronic Signature feature is active or not.

- With the Change Management / Electronic Signature, a table of signatures and an **Sign** button is found at the bottom of the result window.

- Otherwise a table of approvals and an **Approval** button is found at the bottom of the result window.

To approve/sign results, press the **Approve** (or **Sign**) button and enter required information.

Note.
Approving/signing calibration results is allowed only if you have the appropriate user rights.

Deleting Calibration Results

To delete calibration results, open the Context Menu and select the **Delete** option.

Note.
Deleting calibration results is allowed only if you have the appropriate user rights.

History Trend

History Trend is a utility for viewing calibration history data. It is available both for Positions and Devices. The data is displayed graphically and is also available in numeric format in a table.

The biggest difference between the standard Calibration Results window and the History Trend window is that you can view several calibration results simultaneously in the History Trend window. It allows you to evaluate the calibrations of a Position or a Device for a longer time period compared to the normal calibration result view.

Examples of how to utilize the History Trend feature:

- Get an overview of how a particular device drifts between calibrations and also whether the drift increases with time.

- How different devices are suited for use in a particular Position.

Note.
For Weighing Instrument, the History Trend is available for the actual Weighing Test only.

Opening the History Trend Window

The History Trend window is opened using one of the following methods:

- Click the secondary button on your mouse above a **Position**, **Function**, **Procedure** or a **Result** icon seen in a main window Tree Structure. Select **History Trend** from the opened pop-up menu.

- Click the secondary button on your mouse above a **Device**, **Function**, **Procedure** or a **Result** icon seen in the **Devices** window. Select **History Trend** from the opened pop-up menu.

- The **View** menu of the main window includes a **History Trend** option.

Calibration Certificates and Other Documents

General

CMX allows the printing of the following document types:

- Calibration Certificates,
- Reports,
- Labels and
- History Trend graphs(* and
- Audit Trail reports(*.

*) *Not available in CMX Light*.

To print documentation from CMX, use the **Documents** button found in the main window's toolbar or select the document type to be printed from the **Documents** Menu. A third possibility is using the Context Menu. In all cases: A more detailed print selection window will be open for that document type.

Exception:
Audit Trail Reports are printed from the Audit Trail window. More of this in chapter **The Audit Trail Window**.

Printing Certificates

Select the certificate layout from the list available in the **Print Certificate** window. Then drag the Position, Device, Function or Result icon from a Tree to the print list. Note that a Position can only be dragged from a Position Tree, Position Set Tree and the Plant Structure Tree. A Device can only be dragged from a Device Tree and the Device Set Tree.

Use the **Preview** button to see on the screen how the printed certificate looks like.

Note.
Only Positions/Devices/Functions with saved calibration results may be dragged to the **Print Certificate** window.

Printing Reports

Select the report layout from the list available in the **Print Report** window. Then drag the Position from the Position Tree, Position Set Tree or the Plant Structure Tree and Devices from the Device Tree or the Device Set Tree.

About the check boxes:

If none of the check boxes are checked, the report contains data based on the latest repeat of the latest calibration.

- If only **All Repeats** is checked, the report contains data based on all repeats of the latest calibration.

- If **History** is checked, the report contains data based on all repeats of all calibrations for the selected items. In this case the **All Repeats** setting does not matter.

Availability of Results and AVG Only check boxes:
-- CMX Light
● CMX Professional
● CMX Enterprise

- If **Results** is checked, then the report includes data for all calibration points. Otherwise the data is presented on repeat level.
  Example: If a 5 point up-down calibration is done, then the report includes either one row of data (**Results** unchecked) or nine rows of data (**Results** checked).

- If **AVG Only** is checked, then the report includes average results only, omitting the individual repeats. If only one repeat was done, i.e. no average results are available, then that single repeat is printed no matter if **AVG Only** is checked or unchecked.
  Notes.
  AVG Only is visible only when **Calibration Options** field **Show Average Results** is checked.
  Then: **AVG Only** is available when either **History** or **All Repeats** check box is checked.

Use the **Preview** button to see on the screen how the printed report looks like.

Note.
One of the available reports is called **Manual Entry Form**. Print it to have a practical form for manually entering calibration results.

Printing Labels

Select the label layout from the list available in the **Print Label** window. Then drag the Position from the Position Tree, Position Set Tree or the Plant Structure Tree and Devices from the Device Tree or the Device Set Tree.

Use the **Preview** button to see on the screen how the printed labels look like.

Printing History Trend Graphs

Availability:
-- CMX Light
○ CMX Professional
● CMX Enterprise

Select the history trend layout from the list available in the **Print History Trend** window. Then drag the Position, Device or Function icon from a Tree to the print list. Note that a Position can only be dragged from a Position Tree, Position Set Tree and the Plant Structure Tree. A Device can only be dragged from a Device Tree and the Device Set Tree.

Use the **Preview** button to see on the screen how the printed certificate looks like.

Note.
Only Positions/Devices/Functions with saved calibration results may be dragged to the **Print History Trend** window.

Printing Audit Trail Reports

Availability:
-- CMX Light
○ CMX Professional
● CMX Enterprise

Audit Trail window has a toolbar button for printing a report of displayed Audit Trail data. More of this in chapter **The Audit Trail Window**.

Importing/Exporting Document Layouts

Sometimes you need to copy document layout from a CMX database to another. The tools for doing that are in the **File** menu. To copy the document layout, do as follows:

1. Open the database where the document layout to be copied exists. Then select **File, Export, Document Layouts**.

2. Select the **Layout Type** and press the corresponding **Export** button. A dialog for selecting the folder appears.

3. Select appropriate folder and press **Save**.

4. Open the database where you want to have a copy of the exported document layout. Then select **File, Import, Document Layouts**.

5. Select correct **Layout Type** and then **Browse** to the folder where the exported layout is.

6. If applicable, edit the **Layout Name** and **Description**.

7. Press the **Import** button.

Note.
If you receive a standalone document layout, sent by mail from, e.g. Beamex, start from phase 4 in the list above. Just replace the word "exported" with "standalone".

Creating Your Own Certificates

The Report Design tool allows you to make your own Certificate, Report etc. layouts.

Since the software module used for creating layouts for Certificates, Reports etc. is a third party software it has its own on-line help made available while creating the layouts.

Adding/editing e.g. a new Calibration Certificate layout is done using menu commands: **Documents**, **Certificates**, **Design**. Others are added/edited similarly. Just change the document type.

Exception:
Editing Audit Trail Reports is invoked in the Audit Trail window. More of this in section **The Audit Trail Window**. Also note that you can have only one Audit Trail Report Layout for each CMX database. You may however edit the existing one to suit your needs, provided you have the rights and tools to edit document layouts.

CMX is shipped with a Help file called **CMX_Report_Variables.chm**. It presents all variables available in the Report Designer. Open it from CMX Main Windows' Help menu. Select option **CMX Report Variables**.

Important!
If you have activated Window's UAC (User Account Control) feature, you'll need to run CMX as administrator to be able to save the edited documents. Otherwise you will get an error message and your edits are not saved.

Change Management and Audit Trail

General

Change Management and Audit Trail includes tools for keeping track of changes made to CMX's database. Additionally, whoever makes a change to the database may also be asked to give a description for the change.

Users with the proper authorization may review the change log (Audit Trail) and mark the changes reviewed.

The feature also includes a possibility to utilize electronic signatures

Briefly, CMX's Change management feature includes all the tools required to comply with regulations of which most important are GAMP4 (Good Automated Manufacturing Practices) and 21 CFR Part 11 (Electronic records; Electronic signatures).

How to Change or check your Change Management and Audit Trail settings is described in section **Basic Settings**, chapter **The Options Window**.

The Audit Trail Window

The **Audit Trail** window can be opened from the main window's **Tools** menu. Use the **Display** button in the toolbar to select the type of records you want to see.

Large Audit Trail databases (containing more than 50 000 rows) are opened showing the latest month only. Use the date fields below the toolbar to select another time period for viewing.

To mark events as reviewed (requires that you have the rights to do it), press the **Edit** button in the toolbar. Then you can use one of the following methods:

- Use the check box in the next to last column to mark a single event as reviewed.

- Use the **Review All** button in the toolbar to mark all events as reviewed.

Hints.

- To sort the Audit Trail data, click on the header of the column you want to sort by.

- To copy Audit Trail data to the clipboard (for pasting into, e.g. Excel), highlight the part you want to copy. Then use the Windows standard keyboard shortcut for copying (Ctrl C).

- To print Audit Trail data, use the **Documents** button in the toolbar. The **Print** and **Print Preview** options print/display the Audit Trail data for the selected date range.
  The **Documents** button also has the **Design** option. It is active, provided the Report Design option is part of your CMX software. More of Reports and Calibration Certificates in **Calibration Certificates and Other Documents** section.

Note.
If the same CMX database is contacted from several time zones, consider setting the time format in CMX **Options** windows' **Change Management Options** to suit your needs.

Electronic Signature

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

If the Electronic Signature is activated, every time a change concerning Device, Position or Calibration data is made to the database, a window opens where the following fields are available:

- **Status**. A list of status values is presented. The following values are pre-entered in the database: **Approved, Draft, Rejected, Reviewed** and **Withdrawn**. The list is editable so you may also add your own status values.

- The master approval check box. Only user with permissions to approve may change this field.

- **User ID** and **Password**. The ID of the logged user is pre-entered, but any valid User ID may be entered. Remember to utilize password security!

The Electronic Signature history of a Position, Device or a Calibration is located as the last items in the Properties window. Use the **Sign** button to change the status of the Device/Position/Calibration.

Electronic Record

Electronic Record is the name used for the group of data that has been approved with the Electronic Signature. If anything that is part of a certain Electronic Record is changed after it was signed, the data requires a new approval using the Electronic Signature.

The following list describes what type of data belongs to the available Electronic Records:

Type	Data belonging to the Electronic Record
Position	Data shown in the following property windows: Position, Function and Procedure.
Device	Data shown in the following property windows: Device, Function and Procedure.
Calibration	Data shown in the Calibration results property window.

Pocket PC Interface

General

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

CMX's Pocket PC Interface consists of software installed into a Pocket PC and communication between CMX and the Pocket PC. Together they allow you to transfer data of instruments to be calibrated to a Pocket PC, perform the calibration wherever it is suitable for you, enter the calibration data into the Pocket PC and then reconnect to CMX and upload the results to CMX's database.

Thus CMX for Pocket PC is a "portable manual entry tool"

Recommended Hardware Specifications

Operating System	Memory ROM/RAM	Display	Compact Framework
Windows Mobile 6.5	64MB/128 MB	240×320, 480×640 or 240×400 color TFT Touch Screen	v. 3.5

CMX for Pocket PC will most likely also work with latest Service Pack and Security Updates.

Although not recommended, CMX for Pocket PC will most likely also run on older operating systems. However, CMX for Pocket PC does not run on all models running Windows Mobile 6.1.

Specification for the communicating Desktop/Laptop Computer:

* Windows Mobile Device Center installed

Microsoft .NET Compact Framework 3.5 or later has to be installed on the Pocket PC. Newer pocket PCs may include a version of .NET Compact Framework. Older Pocket PCs may not necessarily have a .NET Compact Framework or it is an older version. If you need to add or update the .NET Compact Framework, see notes on next page or download .NET Compact Framework 3.5 from here:
https://www.microsoft.com/en-us/download/details.aspx?id=65

Notes.

The CMX installation media's Pocket PC folder also contains a subfolder named **Compact Framework**. It contains the latest **.Net Compact Framework** Service Pack (valid when the installation media was done).

If you update the CMX main software and your Pocket PC software is no longer compatible with it, CMX recognizes the problem and prompts you to update the Pocket PC software. If you updated CMX from an installation media, it also contains new Pocket PC software.

Before updating either CMX main software or the Pocket PC software, make sure you upload all results from all your Pocket PCs to CMX.

Installing CMX for Pocket PC

If **CMX for Pocket PC** software is already installed on your Pocket PC it must be uninstalled before the new version is installed. For instructions on how to uninstall CMX for Pocket PC read chapter **Uninstalling CMX for Pocket PC** on page 139.

CMX for Pocket PC can be installed on Pocket PCs with the following operating system: Windows® Mobile 6.5 and later.

CMX for Pocket PC's installation files are located in the CMX Installation CD-ROM's **Pocket PC** folder. Start the **Setup** software and follow the instructions on computer's screen.

Setup is divided into two phases: First the Pocket PC **Installer** is installed to your desktop/laptop computer. Then the actual CMX for Pocket PC software is installed to your Pocket PC.

If you are installing CMX for Pocket PC to several Pocket PCs, the first installation is done as described above. Subsequent installations can be done using the desktop/laptop computer's **Windows Mobile Device Center** software. See instructions for subsequent installations further on.

Notes.

You may install the CMX for Pocket PC to as many Pocket PCs as you like.

The installation of CMX for Pocket PC can also be done manually:
Copy all files found in **Pocket PC\Files** folder on the CMX installation media to an optional program folder (e.g. **Program Files\CMX for Pocket PC**) in your Pocket PC.

Subsequent installations with Windows Mobile Device Center (Windows® 7 or 8)

These instructions apply in the following case:

- You have already installed CMX for Pocket PC into one Pocket PC as described in chapter **Installing CMX for Pocket PC** on page 136.
- You have several Pocket PCs you want to install CMX for Pocket PC into.

Dock your Pocket PC device on your computer. Open **Windows Mobile Device Center** and select **Program and Services**. Select **Add/Remove Programs** from the list. If **Add/Remove Programs** is not visible click on the **More** link. Check the **Beamex CMX for Pocket PC** option that is shown in the opened window and click the **OK** button to run the installation.

Changing the User Interface Language in Pocket PC

By default, **CMX for Pocket PC** installs all available user interface languages into Pocket PC. All languages are available in **CMX for Pocket PC**'s Tools menu. Choose one that suits your needs.

If you do not need certain languages, you can remove them by exploring the Pocket PC to folder:
   Pocket PC:\Program Files\CMX for Pocket PC\Languages\
This folder contains sub-folders, one for each language. Remove the folders that you do not need. They are easily recognized since the folders have names based on the language. Then when you restart CMX for Pocket PC, the Tools menu no longer contain the language folders removed from Pocket PC.

Creating Customized User Interface Languages for Pocket PC

If you want to create a custom user interface language, you must first create a specific sub-folder to this folder in your Pocket PC:

    Pocket PC:\Program Files\CMX for Pocket PC\Languages\

The allowed folder names for this use are:

    UserDefined1, **UserDefined2** and **UserDefined3**.

Be sure you name the folder(s) as defined here. Otherwise CMX for Pocket PC will not recognize them and they are not available for use in CMX for Pocket PC.

Continue by copying one of the existing language files (*Translation.xml*) to where editing is possible and edit it according to your needs. Then copy the edited file into the folder you created for a custom user interface language.

Note.
Editing the language file requires knowledge of XML files and how to edit them.

Uninstalling CMX for Pocket PC

Uninstalling CMX for Pocket PC is required if a new version is going to replace the currently installed version or if you for some reason re-install the same version.

Before uninstalling CMX for Pocket PC from the actual Pocket PCs, remove Pocket PC **Installer** from your desktop/laptop computer.

To remove Pocket PC **Installer** from your desktop/laptop computer, do as follows:

- Open Windows **Start** menu,
- select **Settings, Control Panel** and from the opened window,
- select **Add or Remove Programs** tab.
- From the list of programs, select **CMX for Pocket PC Installer**.
- Click the **Remove** button.

Uninstalling CMX for Pocket PC from your Pocket PCs can optionally be done through ActiveSync®, Windows Mobile Device Center or directly on the Pocket PC.

Note.
Before attempting to remove **CMX for Pocket PC**, ensure that it is not running in the background. If you're unsure, do as follows:

- Open Pocket PC's **Start** menu,
- select **Settings** and from the opened window,
- select **System** tab.
- Select **Memory** icon and from the opened window,
- select **Running Programs** tab.

Now you are able to see a list of running programs. If **CMX for Pocket PC** is on the list, select it and tap "Stop". Newer Pocket PC operating systems may also have a shortcut for opening the memory window directly from the desktop.

Option 1: Uninstall using Windows Mobile Device Center (Windows® 7 or 8)

Connect your Pocket PC to your desktop/laptop computer and open Windows Mobile Device Center on your PC. Select "Program and Services". Select "Add/Remove Programs" from the list (if Add/Remove Programs is not visible click on the "more" link). Uncheck the **Beamex CMX for Pocket PC** option that is shown in the opened window and proceed by clicking **OK**.

Option 2: Uninstalling directly on the Pocket PC

Select **Start, Settings, Remove Programs** on your Pocket PC. In the list of installed programs select **Beamex CMX for Pocket PC** and click **Remove**.

Sending Instrument Data to the Pocket PC

Availability:
-- CMX Light
○ CMX Professional
● CMX Enterprise

For CMX the Pocket PC is like a calibrator connected to the USB port. Sending instrument data as well as receiving results is done just like it is done for any other communicating calibrator.

Open the **Send to Calibrator** window (menu commands: **Calibration**, **Send**) and drag the instruments you want to calibrate to the window.

Select **ActiveSync®** as the port. CMX uses it to communicate with the Pocket PC no matter if the Pocket PC is connected to a USB port or if the Pocket PC uses some ActiveSync® compatible wireless technology.

When all instruments have been selected for sending, press the **Send** button.

Using the Pocket PC Interface

This chapter describes the use of CMX for Pocket PC software.

Section **Work Order Handling** presents some additional information when using your Pocket PC for Work Order Handling.

Starting

When CMX for Pocket PC is started for the first time or it is not used for a while, the CMX for Pocket PC icon is not seen in the **Start** menu. In that case, select **Programs** from the **Start** menu and locate the CMX icon in the list of available programs. CMX icon:

When CMX for Pocket PC has recently been used, the CMX icon is available in the **Start** menu's list of recently used programs. Use the CMX icon to start CMX for Pocket PC.

When CMX for Pocket PC starts, a list of sent instruments is shown.

In the example startup picture on the right some of the instruments have already been calibrated.

An instrument that is still not calibrated is presented with bold text together with its calibration due date.

A calibrated instrument is shown with regular text together with two dates: the uppermost is the due date sent from CMX and the lower is the actual calibration date.

The icons used are similar to what is used in CMX main window, with the following addition:

A calibrated position/device has a check mark on the icon.

Selecting Instruments for Calibration Data Entry

In the list of sent instruments, tap on the instrument you want to calibrate and a calibration window opens.

Note.
If you want to simultaneously enter calibration results of multiple instruments, see chapter **Calibrating Groups of Instruments** on page 146.

Viewing Instrument Details

Instrument data may be viewed starting from the calibration window (**Tools, View Instrument Details**). The same menu commands also apply in the list of sent instruments. There you are also able to use the pop-up menu.

The Instrument Details window always opens with the Position data shown. Use the **View** menu to select other views of instrument data.

You may edit instrument data by entering the **Tools**, **Edit** menu commands. Be aware that unnecessary alterations may cause problems when receiving the results (the main CMX software may not "recognize" the instrument as the one that was sent).

Note.
If the instrument is already calibrated, only the Environment and Note data may be edited in Pocket PC.

To close the Instrument Details window, select **Tools**, **Close**.

Entering Calibration Data

This chapter and its subchapters describe how to enter calibration data of process instruments into Pocket PC. When calibrating **Weighing Instruments** in Pocket PC, see chapter **Using a Pocket PC** in section **Calibrating Weighing Instruments**.

CMX for Pocket PC shows input and output values in the upper part of the window.

Tap on the editable large numeric fields.

Use the up/down navigation buttons to change the pre-entered values. Alternatively, use the "keyboard" that opens from the lower right corner.

Immediately to the left of the numeric fields is an area for indicating/saving that the entered value was unstable. Tap the area and the "unstable" symbol (~) becomes visible.
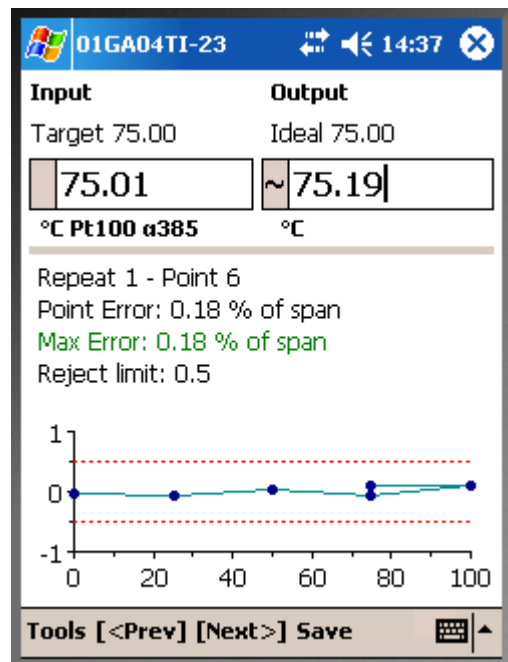
When both the input and output values are edited accordingly, either tap the **[Next>]** button or press the middle button in a 5-way navigation button (if applicable).

The fields in the middle of the window as well as the graph below the fields are updated. Also: The large numeric fields have pre-entered values for the next calibration point.

Note.
Input values outside the calibration point's *Max. Deviation* limit are indicated in red. This does however not affect any calculations.
During the calibration run and even when viewing results, before the results are saved, you can correct any mistakes by tapping the **[<Prev]** button until you see the point/data with the erroneous data. Correct the data and tap the **[Next>]** button until you are back where you were.

Saving Results

You can save the results at any time, even if only part of the data is entered. Then the results are saved as a partly done repeat.

Before the results are saved you are requested to enter calibrator reference data and then continue to see **Summary** data (see adjacent picture). Additional result data is available in the other tabs. One of them is a tab where you may enter environment data.

After you save the results, a pop-up window opens where you may either start another calibration run or end the calibration and return to the list of instruments.
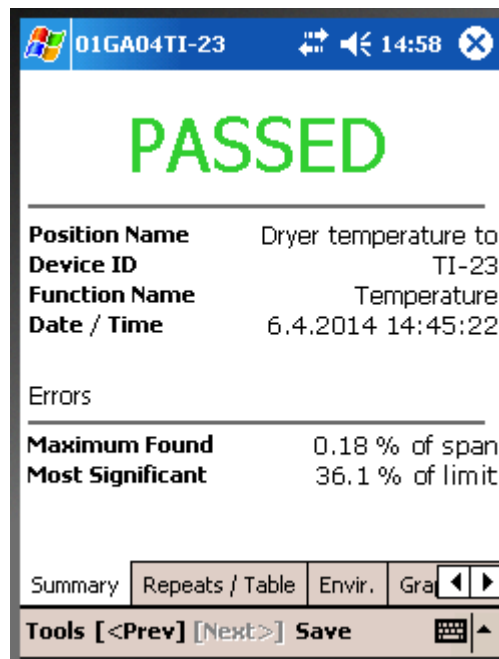
Calibrator References

In the calibrator reference window you may enter calibrator references for the calibration. If the **Points** field is set to **All**, then the entered calibrator reference applies for all points. If the **Points** field is set to a single point, e.g. **3/9**, the entered calibrator reference is valid from that point onwards either to the last point or to the following point with a new calibrator reference.

Note.
The Calibrator reference window may also be opened while entering the calibration point values. Open the **Tools** menu and select option **Set Calibrator Reference**.

Environment Data

You may enter environment at the end of the calibration or at any time during the calibration too. Open the **Tools** menu and select option **Environment Information**.

Note.
Environment data history is not saved. Whenever you rewrite the environment data, they are the ones that are saved at the end of calibration.

Calibrating Groups of Instruments

A **Group** in CMX for Pocket PC can be any set of standard instruments that you want to calibrate at the same time. A Group can be:

- Instruments part of a control loop

- A set of Temperature Sensors that are calibrated at the same time using, e.g. a temperature dry block.

- Etc. etc. Your own needs define the Group.

Activating Group Calibration

To activate Group calibration, open the **Tools** menu in CMX for Pocket PC's Instrument List window.

Check **Create Group** and you are ready to select (highlight) multiple instruments.

When ready, select **Tools** menu's **Calibrate** option to advance to **Group View** window.
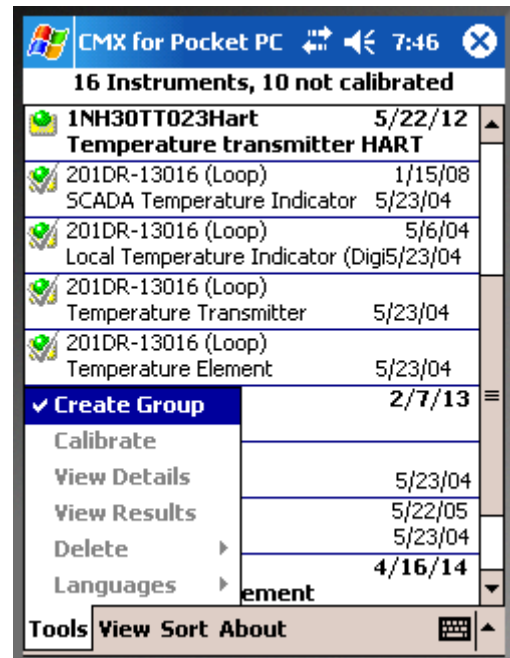
Notes.
To get back to "normal" Instrument List and calibrating a single instrument at a time, uncheck **Create Group.**
Groups cannot be saved and only one group may be active at a time.
Maximum amount of items in a group is 10.

Group View

In **Group View** window you may sort the selected instruments using the pop-up menu available. See adjacent picture.

The group calibration advances in the order the instruments are in the group, first points first for all instruments. Then the second points for all instruments etc. This continues until all calibration points for all instruments are done.
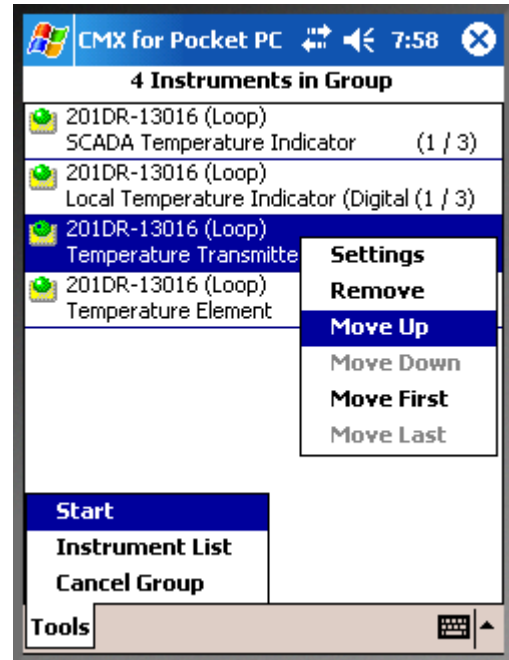
Example of default calibration advancement in group calibration for instruments **A, B** and **C**:

A, 5 points	**B**, 3 points	**C**, 6 points
1st point ⇨	1st point ⇨	1st point ⇘
⇐	⇐	⇙
⇘ 2nd point ⇨	2nd point ⇨	2nd point ⇘
⇐	⇐	⇙
⇘ 3rd point ⇨	3rd point ⇨	3rd point ⇘
⇐	⇐	⇙
⇘ 4th point ⇨	⇨	4th point ⇘
⇐	⇐	⇙
⇘ 5th point ⇨	⇨	5th point ⇘
		⇐ ⇐ ⇙
		⇘ 6th point

Start Group Calibration by clicking the **Start** menu option.

Calibrating a Group

Entering calibration results is done mostly as it is done for a single instrument as described in chapter **Entering Calibration Data** and its subchapters starting from page 144.

A row in the Calibration window indicates which instrument is calibrated in the Group and at which calibration point you are.
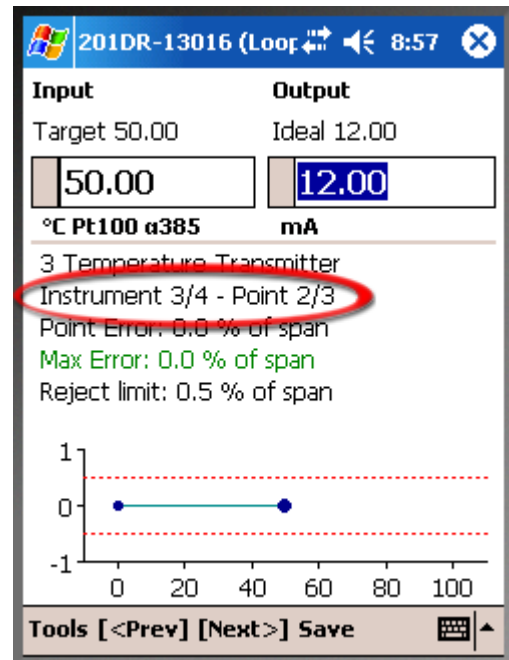
In the adjacent picture:

The third instrument of a group of four (3/4) is active at the moment and the current calibration point is the second of three (2/3).

If you want to depart from the default order the calibration points are done in, open **Tools** menu and tap on menu item **Select Instrument** then select which instrument's next point should be done now. After the special point is done, **CMX for Pocket PC** continues according to the default advancement.

Calibration Reference and **Environment Data** are entered similarly as they are for a single instrument (see chapters **Calibrator References** on page 145 and **Environment Data** on page 145). The only exception is that when the data is entered for the first time for any of the Group's items, the data is copied to all instruments belonging to the Group. You may, of course, customize the Calibrator Reference and Environment data for each instrument when needed.

Chapter **Saving Results** on page 145 also applies for Groups.

Notes.
The **Tools** menu includes the option **Cancel Calibration**. It removes the current instrument from the group.
Selecting **Reject All** cancels all open instruments and the Group calibration ends.

Receiving Data from the Pocket PC

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

As sending instrument data to the Pocket PC, receiving data is just like receiving data from a communicating calibrator:

Select **Calibration, Receive** in CMX's main window, select **ActiveSync**® port, connect and receive the results from the Pocket PC.

Note.
If you have the **Calibration Options** field *Update Calibrator data from instruments received from Pocket PC* checked, the following happens when you receive a calibration that refers to a calibrator that is in the Pocket PC's memory, but not in CMX's database:
CMX opens a dialog asking whether the calibrator should be added to CMX's database.
How different types of calibrators are received to CMX database:
 - A **Weight Set** is fully received, including specifications.
 - A **Beamex calibrator** is received and specifications are added to it from CMX's database.
 - A **non Beamex calibrator** is received without specifications since no specifications are available in Pocket PC's memory.

Calibrating Weighing Instruments

General

Availability:
-- CMX Light
O CMX Professional
● CMX Enterprise

CMX's Weighing Instrument Calibration feature includes a possibility to add Weight Sets and Weights as well as Weighing Instruments to be calibrated into CMX's database. Weighing Instruments can then be calibrated by using either the Manual Entry window or by using the Pocket PC interface.

CMX's Weighing Instrument Calibration feature is based on:

- OIML international recommendation OIML R 76-1: 1992
  (OIML = **Organization Internationale de Métrologie Légale** or **International Organization of Legal Metrology**),

- European standard EN45501:1992 + AC:1993,

- NIST Handbook 44 – 2004 / 2.20. Scales
  (NIST = **The National Institute of Standards and Technology**, US),

- **EURAMET cg-18, Version 3.0 (03/2011)**
  Previously: EA-10/18 EA Guidelines on the calibration of non-automatic weighing instruments (EA = European co-operation for accreditation).

- **U.S. Pharmacopeia Convention's Chapter 41** (briefly **USP 41**).

This section presents Weighing Instrument Calibration specific information. Where the functionality of CMX's Weighing Instrument Calibration is similar to other type of instruments and calibrators, this section refers to the more general presentation elsewhere in this document.

Basic Settings for Weighing Instruments

Availability:
-- CMX Light
○ CMX Professional
● CMX Enterprise

This chapter and its subchapters present basic settings specific for Weight Sets and Weights. Subjects like creating a Plant Structure are not described here. This is because Weighing Instrument Calibration does not affect it at all. Please read the section **Basic Settings** to see a full description of CMX's Basic Settings.

Entering Weight Sets and Weights

For CMX, Weight Sets, Weights and process instrument Calibrators are analogous in the following way:

- A set of weights used for calibrating Weighing Instruments equals a calibrator used for calibrating process instruments.

- A single weight equals a measurement module in a process instrument calibrator.

- Finally, the specifications of a weight equal a measurement range in the module of a process instrument calibrator.

Only the fields that have a specific meaning for Weights and Weight Sets are described in the following chapters. Equally important fields that have the same meaning for weights and calibrators are not discussed here. For descriptions of other fields, refer to section **Description of Fields** in the on-line help.

Finally, the following chapters present a straight forward method of adding Weight Sets, Weights and Weight Specifications. CMX's flexible user interface allows you to do the same thing using other views/windows too. Feel free to also experiment with the other possibilities, but use this as the way to get into entering Weight Set, Weight and Weight Specification data.

Weight Sets

To add a Weight Set, open the Calibrators window. Use the following menu commands when you are in the Main Window: **Database**, **Calibrators**.

To add a Weight Set, click the mouse's secondary button anywhere in the **Calibrators** tree structure. Select **New, Calibrator** (remember, a Weight Set is a "Calibrator for Weighing Instruments").
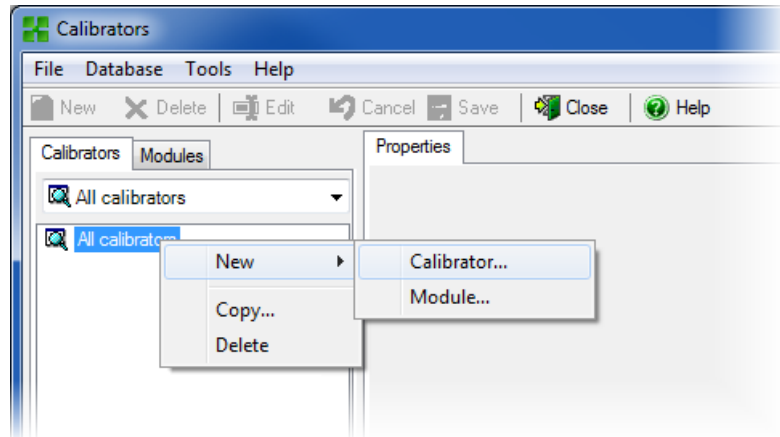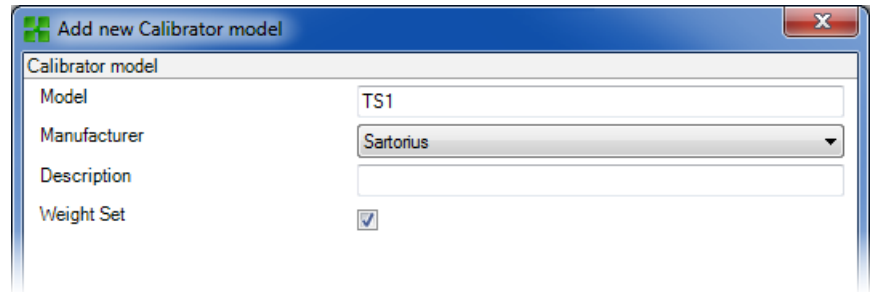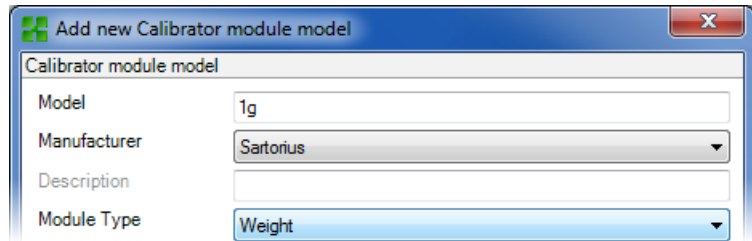

A window like the one below opens:
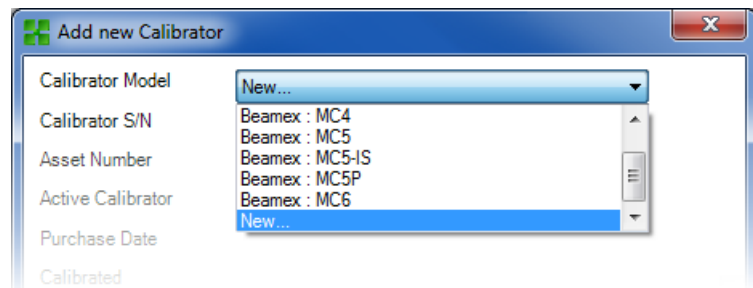
Select the **New** option in the **Calibrator Model** combo or select an existing Weight Set from the list if you are adding a new similar set. In the latter case, advance to **Adding "New Calibrator" Data**.

Adding a New Calibrator Model
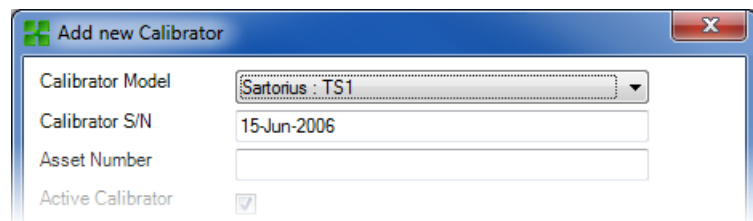
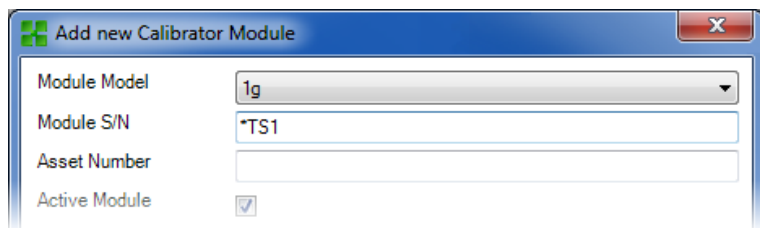When adding a new Weight Set, enter the set's name as the **Model**. Also, assure that you check the **Weight Set** check box. Then CMX treats the new Calibrator Model as a Weight Set, not a Process Instrument Calibrator.

Full field level information of Calibrator Model properties are available in the on-line help delivered with CMX.

When ready, press the OK key to return to the **Add New Calibrator** window.

Adding "New Calibrator" Data

When the Calibrator Model is entered/selected, add a serial number to the Weight Set. The Serial Number field is a required field in CMX (together with the **Calibrator Model** field they identify the Calibrator / Weight Set). If the weight set has no serial number, enter its purchase date as a serial number.


Full field level information of Calibrator properties are available in the on-line help delivered with CMX.

Weights

To add a Weight to a Weight Set, click the mouse's secondary button above the Weight Set in the **Calibrators** window. Select **New, Module** (remember, a Weight is a "Calibrator Module").
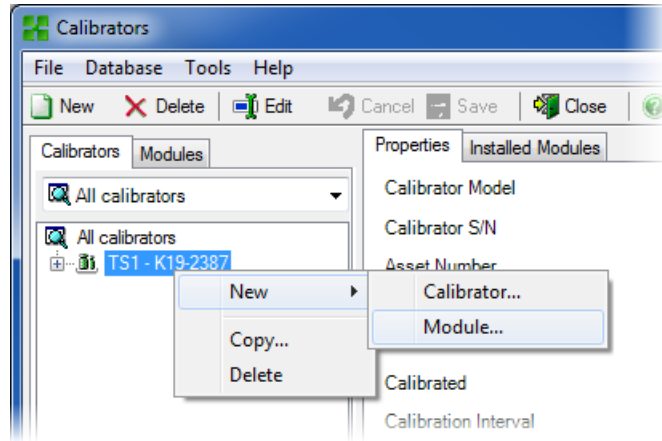
A window like the one below opens:
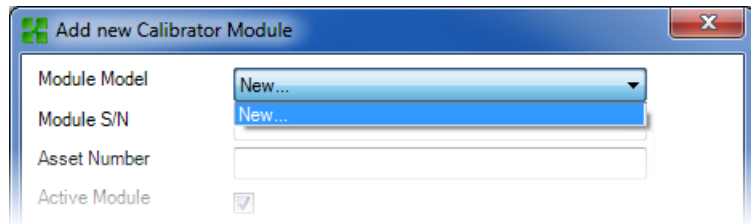
Select the **New** option in the **Module Model** combo or select an existing Weight from the list if you are adding a new similar Weight. In the latter case, advance to **Adding "New Calibrator Module" Data**.

Adding a New Calibrator Module Model

When adding a new Weight, enter it's weight as the **Model**. Also, assure that you select Weight from the **Module Type** combo. Then CMX treats the new Calibrator Module Model as a Weight, not a Process Instrument Calibrator Module.

Full field level information of the Module Model properties are available in the on-line help delivered with CMX.

When ready, press the OK key to return to the **Add New Calibrator Module** window.

Adding "New Calibrator Module" Data

When the Calibrator Module Model is entered/selected, add a "serial number" to the Weight. The Serial Number field is a required field in CMX (together with the **Module Model** field they identify the Module / Weight).

Hint!
Enter the Weight Set name as the Serial Number. This "ties" the weight to the set it belongs to. If you have several weights with the same nominal weight, include the identifying symbol (*) or number (1, 2 …) to the serial number.

Full field level information of Calibrator Module properties are available in the on-line help delivered with CMX.

Weight Specifications

To add Weight Specifications to a Weight, click the mouse's secondary button above the Weight in the **Calibrators** window. Select **New, Module Range** (remember, a Weight Specification is a "Calibrator Module Range").
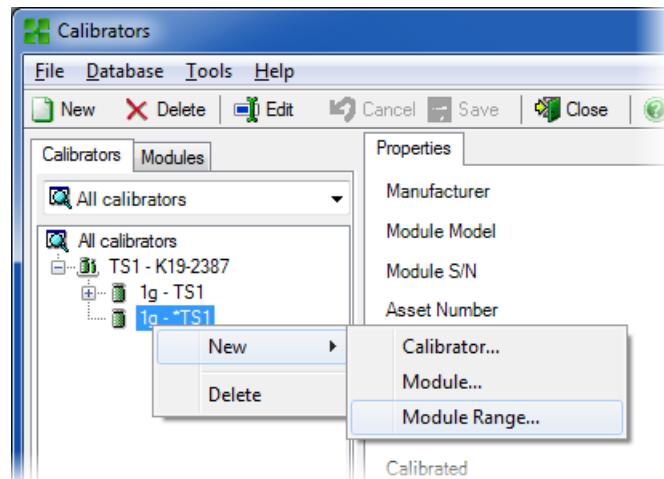
A window like the one below opens:

Some important fields are highlighted in the picture above. Enter a **Range Name** and set the **Method** field to "Keyed". Enter both the **Nominal** and **Conventional** ("true") mass for the weight.

If you want CMX to calculate uncertainties, a **Constant Error** (the uncertainty of the Conventional Mass or the Nominal Mass, depending on the instrument's **Calibration Procedure**

settings) need to be entered and an **Error Calculation Method** need to be selected.

Full field level information of Calibrator Module Range properties are available in the on-line help delivered with CMX.

Weighing Instrument Function Templates and Calibration Procedures

CMX is shipped with pre-entered Function Templates and Calibration Procedures. This makes it easy to create new Functions for Positions and Devices. There is also a Function Template and Calibration Procedure suited for Weighing Instruments. Select them when creating a Weighing Instrument Function and edit them to suit the specifics of your Weighing Instrument.

The subchapters further on only present the Weighing Instrument specific fields.

Hint.
You can also make you own Weighing Instrument Function Templates and Calibration Procedures using the **Function Templates** utility presented in **Basic Settings** section. CMX automatically adds the Weighing Instrument specific fields if the new Function's **Input/Output Quantity** field is set to "Mass".

Function Fields Specific for Weighing Instruments

Field	Description
Partial Weighing Ranges	Select the amount of unique partial weighing ranges found in the Weighing Instrument at hand. Required field for Weighing Instruments.
*d1 … d4	Actual Scale Interval. OIMLR76-1: "the difference between the values corresponding to two consecutive scalemarks, for analogue indication, or the difference between two consecutive indicated values, for digital indication." The "*Partial Weighing Ranges*" setting determines the amount of *Actual Scale Intervals* seen. Required field(s) for Weighing Instruments.
e1 … e4	Verification Scale Interval. The "*Partial Weighing Ranges*" setting determines the amount of *Verification Scale Intervals* seen. Required field(s) for Weighing Instruments. Note. Editing the Scale Intervals affect the MPE values found among a Weighing Instrument's **Calibration Procedure data**, unless you are using a custom *Accuracy Class*.
Scale Range 1 … Scale Range 4	Defines the Scale's Partial Weighing Range. Visible only for Weighing Instruments with more than one weighing range. Required field(s) for Weighing Instruments.

Note.
Make sure both input and output methods are set to "**Keyed**".

Full field level information for Function Templates is available in the on-line help delivered with CMX.

Calibration Procedure Fields Specific for Weighing Instruments

Field	Description
Accuracy Class	A list of standard Weighing Instrument accuracy classes and a possibility to make a customized accuracy class. Available standard accuracy classes: - HB 44 I - HB 44 II - HB 44 III - HB 44 IIII - HB 44 IIIIL - OIML I - OIML II - OIML III - OIML IIII **HB 44**: NIST Handbook 44: 'Specifications, Tolerances and Other Technical Requirements for a Weighing and Measuring Devices'. Used in USA. **OIML**: 'International Recommendation OIML R 76-1', 1992. Used in Europe. Note. Selecting a standard *Accuracy Class* affects the *MPE Range* and *MPE* fields. New *MPE* limits are calculated based on the Weighing Instrument's *Verification Scale Interval* data found among **Function data**.
MPE Range	Maximum Permissible Error range(s) and their corresponding Maximum Permissible Error (MPE). The amount of MPE ranges depends on the selected *Accuracy Class*. Also note that selecting a standard *Accuracy Class* automatically defines the *MPE Range*s. Edit the *MPE Range*s and *MPE* limits only when using custom *Accuracy Class*es. Available error calculation methods: 　　% of accuracy class limit 　　% of load 　　absolute error

Repeatability Stdev. Limit	Maximum permissible standard deviation for repeatability test. If field is left empty, repeatability test's standard deviation error limit is not in use.
	More info of uncertainty calculation in a help file entitled "CMX Calculations". Open it from CMX Main Windows' Help menu. Select option **CMX Calculations**.
	Note that this field is visible for Weighing instruments and enabled only when *USP 41 Repeatability Test* check box is **unchecked**.
Minimum Weight Limit	Maximum permissible minimum weight deviation error limit. If you make a custom minimum weight test, make sure it requires at least ten repeats. Otherwise this deviation error calculation always fails. If field is left empty, minimum weight test's error limit is not in use and CMX indicates the test's status is "Passed".
	More info of CMX's calculations can be found in a help file entitled "CMX Calculations".
	Note that this field is visible for Weighing instruments only when *USP 41 Repeatability Test* check box is **unchecked**.
Minimum Weight k-value	Is the coverage factor in a Weighing instrument's Minimum Weight Test. **Default value is 3**, which is for 99 % confidence level (USP requirement before USP 41).
	Note that this field is visible for Weighing instruments only when *USP 41 Repeatability Test* check box is **unchecked**.
	More info of CMX's calculations can be found in a help file entitled "CMX Calculations". Open it from CMX Main Windows' Help menu. Select option **CMX Calculations**.

Repeatability Limit	Replaces *Minimum Weight Limit* when *USP 41 Repeatability Test* is checked.
	This is the pass/fail limit for USP 41 Repeatability Test.
	Default value: 0.0010. Note that the trailing zero is significant.
	Note that this field is visible for Weighing instruments only when *USP 41 Repeatability Test* check box **is checked**.
Repeatability k-value	This field replaces *Minimum Weight k-value* when *USP 41 Repeatability Test* is checked.
	The value of this field should be 2 (USP 41 requirement).
	Note that this field is visible for Weighing instruments only when *USP 41 Repeatability Test* check box **is checked**.
Repeatability Accuracy Limit	Accuracy limit for the repeatability test Default value: *0.10 % of load*
	Note that this field is enabled only when *USP 41 Repeatability Test* check box **is checked**.
USP 41 Repeatability	Checked if USP 41 rules are enabled for Repeatability test. Default value: *Not Checked*
	Checking this field affects the following Calibration Procedure fields: - *Repeatability Stdev. Limit,* - *Minimum Weight Limit,* - *Minimum Weight k-value,* - *Repeatability Limit,* - *Repeatability k-value,* - *Repeatability Accuracy Limit* and - *Minimum Weight Test Calibration Points.*

MPE in Service	Check if service error limits should be used. Maximum permissible errors are doubled when service error limits are used. If *MPE in Service* field is checked, both error limits, "normal" limit and service error limit, are shown in graph in Manual Entry, Result view, Certificates and in the PocketPC.
Hysteresis in Uncertainty	Check if the found hysteresis of a Weighing Instrument is to be included in uncertainty calculation.

Weight Mass	The mass value that is used when calibrating Weighing Instruments. Options:
	  - Conventional Mass
	  - Nominal Mass
	
	Note that this selection affects the calculations. More of this in CMX's online Help files. See **Calibrator Module Range Fields**: **Nominal Mass**, **Conventional Mass** and **Constant Error**.

Eccentricity Uncertainty	How the found eccentricity should be included in uncertainty calculation. Options:
	  - Full Value
	  - Half Value
	  - Not Included

Uncert. at No Load Point	How uncertainty at no load point is calculated. Options:
	  - As with other loads
	    (default value)
	  - No Load resolution
	    uncertainty only
	  - Zero
	More info of uncertainty calculation in a help file entitled "CMX Calculations". Open it from CMX Main Windows' Help menu. Select option **CMX Calculations**.

No Load Resol. Uncert.	How the no load resolution uncertainty is calculated. Options:
	  - d0/(2*sqrt(3)) *(default value)*
	  - d0/(4*sqrt(3))
	More info of uncertainty calculation in a help file entitled "CMX Calculations".

Eccentricity Test Calibration Points	In how many points the Eccentricity test is done. Select a value from the combo box. CMX updates the table below accordingly and shows a picture of the eccentricity test points.
Repeatability Test Calibration Points	How many repeats are done in the Repeatability test and what mass is used in the test. When *USP 41 Repeatability* check box **is checked**: The amount of similar Repeatability Test Calibration Points needs to be at least 10. They need to be between 5% and 100% of the balance capacity. If the points are not correct then an instructional error message is shown and the procedure cannot be saved before the test points are correct.
Weighing Test Calibration Points	Calibration points to be used in the actual weighing test (linearity test). Select one from the list.
Minimum Weight Test Calibration Points	Select how many minimum weight test repeats are done and what mass is used for the test (percentage of full scale). To get minimum weight deviation calculation results, at least 10 repeats is needed. Note that this table of calibration points is visible for Weighing instruments only when *USP 41 Repeatability Test* check box is unchecked.

Full field level information for Calibration Procedures is available in the on-line help delivered with CMX.

Adding Weighing Instruments to the Instrument Database

Adding Weighing Instruments to CMX is done just as any other instrument. Remember to select a Function Type meant for Weighing Instruments when adding the Function(s). The fields unique for Weighing Instruments are presented in the two previous chapters:

- **Function Fields Specific for Weighing Instruments** and

- **Calibration Procedure Fields Specific for Weighing Instruments**.

General presentation of adding instruments is in section **Adding Instruments to the Database**.

Hint.
You can also make you own Weighing Instrument Function Templates and Calibration Procedures using the **Function Templates** utility presented in **Basic Settings** section. CMX automatically adds the Weighing Instrument specific fields if the new Function's **Input/Output Quantity** field is set to "Mass".

# Calibrating Weighing Instruments

Calibrating Weighing Instruments requires good knowledge of Weighing Instrument Calibration practises. CMX gives you tools to document the calibration, but does not offer full Weighing Instrument Calibration theory. One of the following subchapters does however offer some basic terminology for the uninitiated.

Terminology

This section presents some Weighing Instrument Calibration related keywords. The focus is on the different types of calibrations that are part of Weighing Instrument Calibrations. The descriptions are based on the standard mentioned in the beginning of this section and "**EA-10**/18 EA Guidelines on the calibration of non-automatic weighing instruments" (EA = European co-operation for accreditation).

Eccentricity Test

The test consists of placing a test load in different positions on the load receptor in such a manner that the centre of gravity of the load takes positions indicated in the adjacent picture.
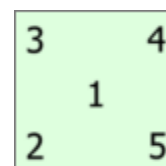
The test load should not be below 10 % of full scale. Otherwise the uncertainty component of the eccentricity test may be too large for uncertainties close to full scale.

Repeatability Test

The test searches the difference between the results of several weighings of the same load. The conditions should, as far as possible, be identical. This applies to the handling of the load and the instrument as well as environmental conditions.

U.S. Pharmacopeia Convention's Chapter 41 (briefly USP 41), official in late 2013, defines a new procedure for doing the repeatability and minimum weight tests. CMX supports calculating both the old Repeatability and Minimum Weight tests and the new test according to USP 41. Which one is used is defined in Weighing Instrument's Calibration Procedure.

Weighing Test

This test is performed with at least five different test loads distributed fairly evenly over the normal weighing range. The purpose of this test is an appraisal of the performance of the instrument over the whole weighing range.

For people more familiar with calibrating process instruments, this test equals the typical "up/down" calibration of a process instrument.

Minimum Weight Test

Minimum weight test (also known as: Minimum Weighing Capability Test) determines the smallest weight the Weighing Instrument is able to detect. This test is based on USP's (United States Pharmacopeia) definition of Minimum Sample Weight.

See also **Repeatability Test** above.

Sending Weighing Instruments to Manual Entry Window or to a Pocket PC

Sending Weighing Instruments to the Manual Entry window or to a Pocket PC is done as any other kind of instruments. Similarly, receiving the results do not require any special duties. Just do it as you have done for other kind of instruments.

For more information of selecting/sending, see **Selecting Functions for Manual Entry** and **Sending Instrument Data to the PocketPC**.

Using Manual Entry

When entering calibration data of a Weighing Instrument, the Manual Entry window's result table adapts to the needs of Weighing Instrument Calibration.

Select the type of calibration from the list on the left. Then enter the results in the grid shown on the **Results** tab. Columns with a gray background are read-only data. Depending on your Calibration settings, you may have to select a Weight Set and Weight(s) used in the calibration. More about this in **Basic Settings** section's chapter **Calibration Options**.

Also check the **Calibration Date** field and the **Calibrated By** fields shown in the same tab. You can select one or two users as the ones that carried out the calibration. Additionally, if a calibration certificate number is not automatically created, a field for adding the certificate number is shown. Whether the certificate number is automatically set by CMX or not, is part of CMX's configuration options. More of this in **Basic Settings** section's chapter **Calibration Certificate Options**.

Enter calibration related data (e.g. the environment temperature) into the **Conditions** tab.

The **Procedure** tab contains read-only data about the calibration procedure, including possible instructions to guide you through the calibration.

Field level information is available in the on-line help delivered with CMX.

Using a Pocket PC

This chapter describes how to calibrate a Weighing Instrument using a Pocket PC. For a more general description of how to calibrate instruments using a Pocket PC see section **Pocket PC Interface**.

Pocket PC's list of sent instruments does look the same no matter what kind of instruments are listed. In the example picture, the **Position ID** and **Function Name** fields reveal that the two lowermost items are Weighing Instruments.

In the list of sent instruments, tap on the instrument you want to calibrate and a calibration window opens. The calibration window for Weighing Instruments is suited for Weighing Instrument Calibration needs.

By default CMX starts a Weighing Instrument Calibration with an **Eccentricity Test**. The current **Calibration Type** can be seen in the middle of the screen (see the red ellipse in the adjacent picture).

You can change the Calibration Type from the calibration window's **Tools** menu. Then, if any unsaved data exists, CMX asks you to confirm that the current calibration is aborted.


For each calibration point, the input field displays a target value.

Click on the Weight Set button (the green circle in the picture on the previous page) to select/check weights.

A window for selecting weights opens. First select a Weight Set, then the suitable weights from the list of weights. This window also includes a possibility to enter a **Tare Weight** for Weighing Instruments that cannot be zeroed.
The **Add. Weight** field allows you to enter the additional weight that was needed to change the least significant digit in a digital Weighing Instrument.

When a weight (or several weights) is selected and you close the window for selecting weights, The nominal or conventional weight (depending on your basic settings) is shown in the framed Input field. The same value is copied as the Ideal output value and the editable output value (with the Weighing Instrument's resolution taken into account).
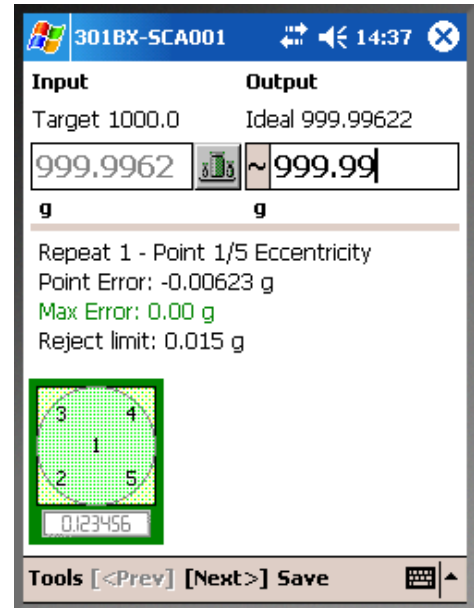
Use the up/down navigation buttons to change the pre-entered output value. Alternatively, use the "keyboard" that opens from the lower right corner.

Notes.
Immediately to the left of the field where the output reading is entered is an area for indicating/saving that the reading was unstable. Tap the area and the "unstable" symbol (~) becomes visible.
For Weighing Test: Input values outside the calibration point's *Max. Deviation* limit are indicated in red. This does however not affect any calculations.
For Eccentricity, Repeatability, and Minimum Weight test, CMX remembers the selected weights. Thus when you press **[Next>]**, you do not need to re-select the same weight(s). In Weighing Test CMX lets you choose the weights during upscale calibration. During downscale calibration CMX pre-selects the weights used for corresponding points in upscale calibration.
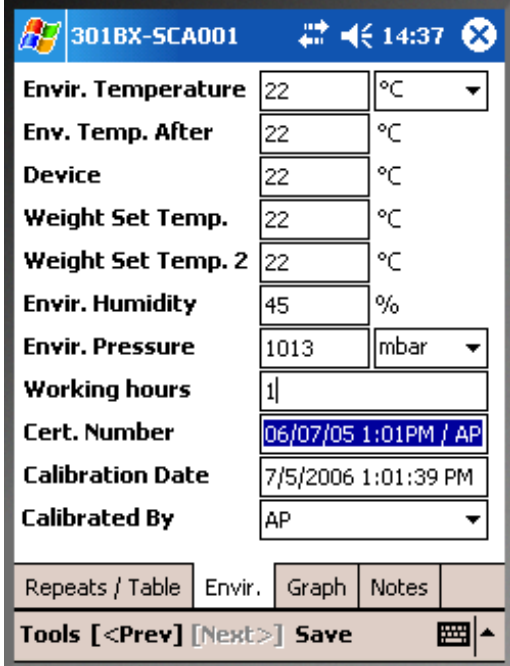For situations where a **Tare Weight** is entered: Enter the true reading (including both the calibration weights and the Tare Weight). CMX automatically subtracts the Tare Weight from the reading before performing any error and uncertainty calculations.

Calibration Result View

After the calibration points are entered, the calibration result window opens, There you are able to get an overview of the calibration. If, e.g. an error occurred when entering the data of a point and it is seen in the overview window, you can still correct the mistake by tapping the **[<Prev]** button until you see the point with the erroneous data. Correct the data and tap the **[Next>]** button until you are back in the calibration result window.

Remember to check the **Envir**. tab for entering the environment data.

If automatic certificate number generation is disabled, you are able to enter the certificate number here.

Saving Results

You can save the results at any time, even if only part of the data is entered. Then the results are saved as a partly done repeat.

After the results are saved in Pocket PC's memory, first a dialog opens telling you about error related data as when saving results in CMX for Pocket PC in general. See **Saving Results** in section **Pocket PC Interface**.

Then CMX for Pocket PC displays a list of calibrations already done (the table on the right).

It also allows you to select what type of calibration should be done next.
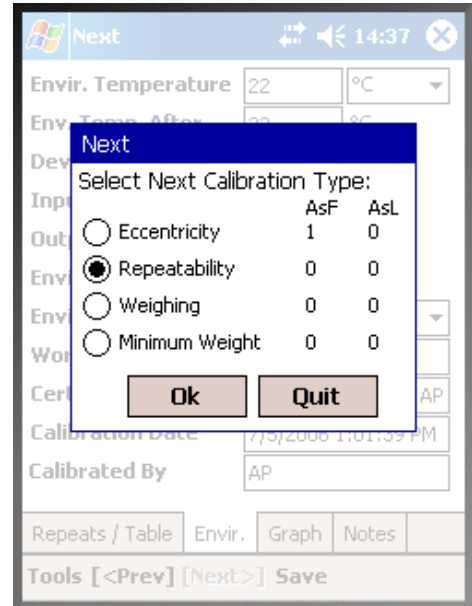
Notes.
You can do one As Found test (AsF) and one As Left test (AsL) for Eccentricity, Repeatability, and Weighing tests. You may however do several As Found and As Left Minimum Weight tests.
After the first As Left test is saved, you may only do As Left tests.

Maintenance Inspection

General

Maintenance Inspection allows you to run check procedures either according to IEC 60079-17 standard or by creating custom check procedures. The checks and check procedure definitions are saved in CMX's database. When checks are scheduled to be done, the checks are sent to a compatible tablet with *b*mobile^{tm} software. After the checks are done, the results are returned to CMX and when needed forwarded to an asset management software.

Beamex *b*mobile^{tm} software is available at this address (URL):

http://www.beamex.net/download/bMobile/

Note that downloading apps from **unknown sources**, i.e. others than Google Play Store, must be enabled in your tablet.

Download the app and install it just like any Android App.

The tablet's requirements are:

- Android tablet, operating system version 4.4 (Kit-Kat), or later.

- Recommended screen resolution: 1280 x 720 or higher.

- Recommended screen size: 8 inch or higher.

- USB port, for communication with CMX.

Maintenance Inspection in CMX

All Checklist definitions are done in CMX. The following sub chapters present how the Checklists are defined.

Function

When selecting a Function Template for a new Position/Device that is meant to be a Checklist, select one of the following templates:

- **Checklist**, includes a fully customizable Checklist with three pre-entered checks.
- **Checklist, IEC60079-17, Table 1**. A pre-entered Checklist according to IEC60079-17, Table 1. This may be customized, if needed.
- **Checklist, IEC60079-17, Table 2**. A pre-entered Checklist according to IEC60079-17, Table 2. This may be customized too, if needed.

For a Checklist Function, the Quantity is **CHECKLIST**.

Procedure

Each procedure contains a single Checklist. A Checklist consists of an unbounded amount of Checklist items. The Checklist items may be arranged to unbounded amount of groups. The picture below presents a Checklist consisting of three Checklist items in a single group.

The following Checklist items may be used for editing/configuring the Checklist, when procedure is in edit mode:

- All texts in italics in the picture above may be edited to suit your needs.
- The group name may be edited by double-clicking on the name ("**Group 1**" in the picture above).
- With the three check boxes (**Passed**, **Failed** and **Skipped**) you may define what kind of changes during the check procedure have to have a written note.
- The colorful round buttons to the right allows sorting, adding and deleting checklist items and groups.

Sending Checklists to a Tablet

To send Checklists to a compatible tablet with *b*mobile software installed, connect the tablet to a USB port in the computer CMX is installed to.

Open the **Send to Calibrator** window and select **USB** as the **Protocol** and *b*mobile as the **Calibrator**. The send procedure is similar to sending any other instrument into a calibrator. I this case, the tablet is the "calibrator" and the Checklist is the "instrument".

Receiving Checklist Results from a Tablet

Just open the **Send to Calibrator** window and select **USB** as the **Protocol** and *b*mobile as the **Calibrator**. The receive procedure is similar to receiving any other instrument from a calibrator. I this case, the tablet is the "calibrator" and the Checklist is the "instrument".

Viewing Checklist Results

The result view looks like procedure properties window with additional passed/failed status for each check and also the master pass/fail status.

Checklist Reports

Reports for checklists include instrument data as presented in regular certificates. The checklist results are shown below in table format.

Maintenance Inspection in a Tablet

The requirements for a tablet is presented in this section's chapter **General**, on page 173.

Additionally, the tablet must include **Beamex *b*mobile**tm software, provided by Beamex.

Installing *b*mobile software to a tablet

Beamex *b*mobiletm software is available at this address (URL):

> http://www.beamex.net/download/bMobile/

Note that downloading apps from **unknown sources**, i.e. others than Google Play Store, must be enabled in your tablet.

Download the app and install it just like any Android App.

Working with a Tablet

Start ***b*mobile** by tapping the icon shown in the adjacent picture. Use the **All Apps** view to locate the icon.

Checklists

***b*mobile** opens in Home View (Checklist). It presents all Checklists sent from CMX. The icons in front of checklists describe the status of the each checklist:

In Progress, i.e. currently going through the checks that are part of this check list.

Open, which means this check list hasn't been run through as yet.

Failed, i.e. the checklist has been run through and master pass/fail status is "Failed".

Passed, i.e. the checklist has been run through and the master pass/fail status is "Passed".

To run through a checklist, tap on it.

Note.
***b*mobile**'s Home View includes tools for sorting and filtering checklists. Open ***b*mobile**'s help file for detailed information on the available options.

Doing the Checks

When you tap on a checklist in *b*mobile's Home View, the current checklist's window opens with **Description** tab selected.

All items to be checked, and the possible groups the checks belong to, are listed in the **Checklist** tab.

The **Details** tab presents the results and allows you to add tester name and environment related data. They need not be entered before the actual test, because after the tests are done you return to the **Details** tab.

The **Start** link at the bottom of the **Description** tab page starts the checklist run.

During the checklist run each check is presented with the possibility to enter the test's status as **Pass**, **Fail** or **Skip**. As long as you are not pressing the **Next** link, you are able to change the status.

When the last point of the checklist run is done, the current checklist window's **Details** tab is opened.

The **Details** tab allows you to select tester, add environmental information and enter master **Pass** or **Fail** status to the test.

Notes.
Previously not existing testers cannot be added into *b*mobile, but you can select one of the available testers sent from CMX.
Working hours are entered for each tester in the pop-up window for adding testers. The **Details** tab presents the total hours as read-only data.

Work Order Handling

General

Enhanced Work Order Handling is an option in CMX. To fully utilize it, an ERP (Enterprise Resource Planning) or CMMS (Computerized Maintenance Management System) software together with **Beamex® Business Bridge** software should be part of the system. The latter does the communication between the ERP/CMMS and CMX.

Enhanced Work Order Handling eliminates re-typing calibration data/information to an ERP/CMMS software. Business Bridge takes care of transferring information between CMX and ERP/CMMS software.

CMX's Basic Work Order Handling

CMX has had, even from the beginning, basic non-optional work order handling for Positions. You can manually enter a work order to a Position.

However, with basic work order handling, there is no possibility to automatically reply from CMX back to the ERP/CMMS software. When the calibration/calibrations are done, the Work order has to be manually set to "Done" in the ERP/CMMS software.

CMX's Enhanced Work Order Handling

CMX's Enhanced Work Order Handling option makes CMX's work order handling more useful, especially when working with CMX in conjunction with ERP/CMMS software. Business Bridge software provides a transfer channel for sharing instrument, work order and basic calibration data between CMX ERP/CMMS software.

When CMX's Enhanced Work Order Handling option is active, the following fields are shown among instrument's Calibration Procedure data:

- **Work Order Number**,
- **Work Order State**,
- **Work Order Start Date** and
- **Work Order End Date**.

Work Order State field has four possible states:

- **Not Available**, (Currently no work order assigned),
- **Open**, (Work order assigned, but not calibrated, yet),
- **Done** (Calibration done) and
- **Cancel** (Calibration cancelled).

Business Bridge changes the Work Order State automatically based on information from ERP/CMMS software and CMX:

- When a Work Order is entered into ERP/CMMS software, **Business Bridge** communicates the **Work Order Number**, **Work Order Start Date** and **Work Order End Date**.
  Additionally: the **Work Order State** is set to state **Open** in CMX.
- When a calibration is done or canceled in CMX, **Business Bridge** communicates state **Done** or **Cancel** to ERP/CMMS software, then automatically changes the **Work Order State** in CMX to **Not Available** and clears the **Work Order Number**, **Work Order Start Date** and **Work Order End Date** fields.

Depending on settings on **Options** window's **General** page, the state change from **Open** to **Done** is changed either manually or automatically in CMX.

When needed, the **Work Order State** may be manually changed to **Cancel** from the pop-up menu available in Tree views. See also **Changes in CMX User Interface**, on page 182.

Notes.

Depending on your **Business Bridge** settings, the Work Order Number sent from ERP/CMMS can be located in a Procedure's **Work Order Number** field and/or in a Position's **Work Order Number** field.

Free Devices do not have a **Work Order Number** field on their Device page. If you want to see the Work Order Number in the Device page, consult Beamex's support. Remember that the Work Order Number can be assigned to be seen on free Device's Procedure page.

If a work order message from an ERP/CMMS software contains both the Position ID and the Function abbreviation, only the matching Function's Calibration Procedure will receive the Work Order

If a work order message from an ERP/CMMS software contains the Position ID only, Position's all Functions / Calibration Procedures will receive the Work Order.

Work Order Start Date and **Work Order End Date** are not obligatory fields. They may also be empty fields.

If the start dates and/or end dates vary for a multiple instrument work order, the earliest date is shown with a tilde (~) in front to the date.

Changes in CMX User Interface

When Enhanced Work Order Handling is Active, CMX's main window includes an additional tab beside the Position tree and the Plant Structure tree: **Work Orders** tree.
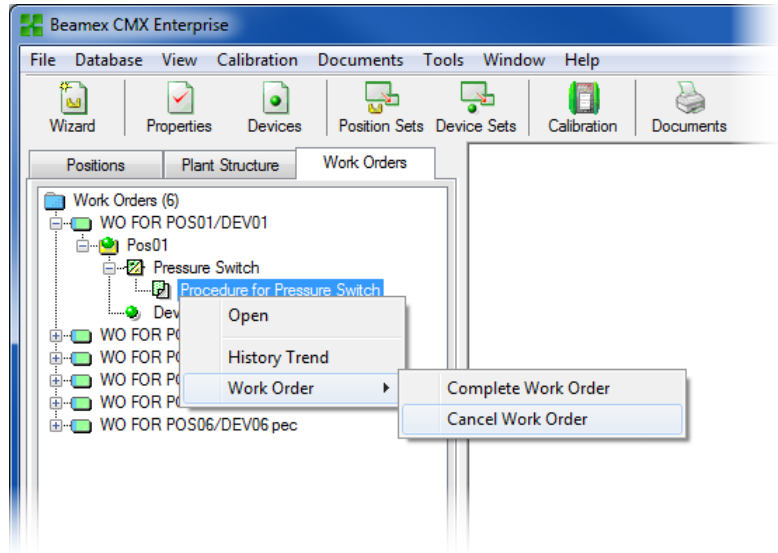
If any work orders are active, the pop-up menu on Procedure level includes a sub-menu for changing the Work Order's state:

- **Complete Work Order** sets a Function's Work Order State to "**Done**". This is useful, especially, when the state is changed manually. Note that changing the state from "**Open**" to "**Done**" requires that the calibration is done.

- **Cancel Work Order** sets a Function's Work Order State to "**Cancelled**".


Notes.

A Work Order item in the **Work Orders** tree has no property data. It is a virtual element in the tree structure.

The Work Order sub-menu is also available in Devices, Positions and Plant Structure Trees.

Remember to Cancel/Complete all Functions/Procedures being part of a Work Order. Otherwise, Business Bridge does not forward the data to ERP/CMMS.

Settings in CMX Options

In CMX's main window, select **Tools**, **Options** to edit Enhanced Work Order Handling options.
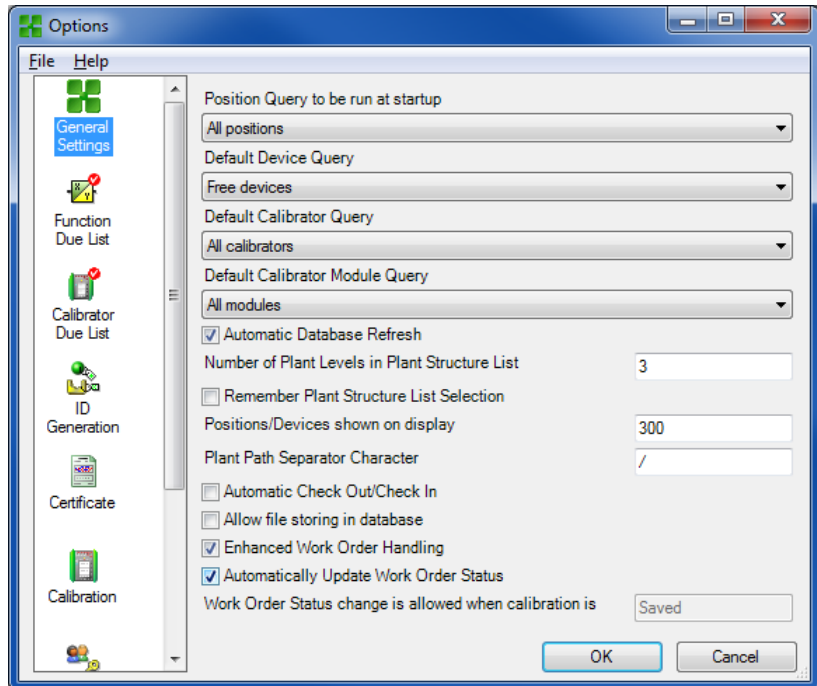
Among all other general options, the following options are part of Enhanced Work Order Handling

- **Enhance Work Order Handling** enables/disables the Enhanced Work Order Handling feature.
- **Automatically Update Work Order State**
  When checked and when all Work Order related calibrations are done/approved, CMX changes **Work Order** State to "**Done**". Then Business Bridge software sends the Work Order State to ERP/CMMS software.
- **Work Order State change is allowed when calibration is**…
  This is read only information received from Business Bridge software. Available options:
  - **Saved**. CMX sets the **Work Order State** to "**Done**" when all required calibrations are saved.
  - **Approved**. CMX sets the **Work Order State** to "**Done**" when all required calibrations are approved in CMX.

Calibration Using Enhanced Work Order Handling

When calibrations are done using Enhanced Work Order Handling, everything starts from your ERP/CMMS software. The work order is created in and ERP/CMMS software, transferred to CMX using Business Bridge software.

The actual calibrations are done just as always, nothing new there. The **Work Order State** changes according to CMX's settings:

- If the **Work Order State** is set to be **automatically** updated, the state is set to "**Done**".

- If the **Work Order State** is set to be **manually** updated, a dialog opens when the calibrations are saved/approved asking whether the state should be changed to "**Done**".

Then Business Bridge transfers data to your ERP/CMMS software, specifying the work order is done.

Note.
The pop-up menu described in chapter **Changes in CMX User Interface**, on page 182, allows you to change the **Work Order State**, when necessary.

Special Situations

This chapter presents Enhanced Work Order related special situations.

Cancelling a Work Order in CMX

Sometimes there is a need to cancel a calibration. This can be done in CMX using the pop-up menu presented in chapter **Changes in CMX User Interface**, on page 182.

If an instrument has already been calibrated, you can still cancel it, provided the full work order is not yet set to "**Done**". Then Business Bridge communicates the value "**Aborted**", for that particular instrument, to ERP/CMMS software.

Emergency Calibration

An emergency calibration means that there is an acute need to calibrate an instrument but there is no time or no means to create a work order in the ERP/CMMS software first. CMX supports emergency calibrations as follows:

- Do the calibration normally and save the results in CMX's database.
- Afterwards, in ERP/CMMS software:
  Create a **Work Order Number** and set the **Work Order Start Date** to a date prior to the moment the emergency calibration was performed. Send the work order to CMX.
- A person with **Calibration - Modify** permission edits the instrument's results to add the **Work Order Number** sent from ERP/CMMS software to the calibrated instrument's **Calibration Result** page.
- Depending on Work Order State's update settings in CMX, the state is either set to "**Done**" automatically or CMX asks you whether to update the state or not.
- When the Work Order State is "**Done**", Business Bridge communicates the Work Order Number and the Work Order State "**Done**" to the ERP/CMMS software.

This allows doing emergency calibrations without a pre-made work order. However, the work order state will still be included afterwards to ERP/CMMS software just as for "normal" calibrations.

Note.
Emergency calibration of free devices is not supported.

Pocket PC and Enhanced Work Order Handling

Enhanced Work Order Handling option is included in CMX for Pocket PC option as follows:

- You switch to **Work Order Mode** from CMX for Pocket PC's **Tools** menu. The same menu is used for returning to "normal mode".

- In Work Order Mode, the work orders are listed according to the current sort order (set in **Sort** menu). Any instruments sent to Pocket PC that are not part of any work order are listed after the work orders.

- When selecting a work order, the instrument being part of that particular work order are shown. To return to the Work Order list, select **Back** from the menu bar.

Note.
While in Work Order Mode: Group calibration is possible for instruments belonging to the same work order only. To do group calibration for a group of instruments not being part of the same work order, use "normal mode".

CMX Database Manager

General

CMX Database Manager is a tool for doing backups of your databases as well as restoring databases using a backup database as the source. Additionally you can also install/uninstall, create and copy CMX databases.

Note that certain CMX Database Manager features are not available in CMX Light.

Warning!
CMX Database Manager should be used by experienced database and database server users. Using this tool without knowing what you are doing may result in loss of valuable data.

Starting CMX Database Manager

CMX Database Manager is installed in the same folder as CMX. Look for **BxbDatabaseSetup.exe**.

The next chapters describe the use of the Database Manager.

Note.
Start the CMX Database Manager in same computer where the CMX database server is.

Server Connection

The upper part of **CMX Database Manager**'s window contains server connection data. The data is pre-entered as needed for CMX. If you log into another server, you need to enter the server login and password accordingly. Click **Login**, to log into the server.

Note.
CMX Database Manager includes a possibility utilize either **SQL Server Authentication** (default) or **Windows Authentication**. Use the **Authentication** selection list to choose the one you want.

The following sub chapters describe the functionality of the lower part of the window.

Backup and Restore a Database

Select the database to be backed up or restored from the Database Name list.

When making a backup copy of a CMX database, the backup file is named as the original file with the addition of the backup date (format: _yyyy-mm-dd_hh-mm). The path and the backup file name is editable but we recommend you use the default values.

To restore a database, first select the backup database to be used for restoring and then click the **Restore** button.

Notes.

Making database backups is highly recommended. It minimizes data loss in case of power failure, network problems etc.

CMX Database Manager must be run locally on the computer where the database is located, you can not, e.g. restore a database remotely (via the network) to another computer.

If you get the following error message when restoring a backup file:
   "Restore failed for server
   '*computer name*\CMXSQLEXPRESS",
it means you are trying to restore backup file that is located in a path the SQL server does not have permissions to. An example is the desktop. Each user may copy files etc. to their own desktop, but the SQL server does not have permissions to the desktop.
Copy the backup file to, e.g. the root of the C:\ disk. Then retry.

Database backup and restore is not possible if the same database is in use in CMX. Close CMX before starting backup or restore procedures.

Installing and Uninstalling a Database

CMX is shipped with two databases. The installed databases depend on the installed CMX version.

In **CMX Light**:

- **CMX_Light_Database**, an empty database for creating your own database.
  This database is available when the License Key is installed.

- **CMX_Light_Demo_Database**, a demo database to see how the user interface looks like with some data added to the database. Maximum amount of positions/devices: 15.
  This database is available when the License Key is **not** in place.

In **CMX Professional** and **Enterprise**:

- **CMX_Demo_Database**, a demo database to see how the user interface looks like with some data added to the database. This is the default database when CMX is started for the first time after installation.

- **CMX_Database**, an empty database for creating your own database. When needed, you may switch to this database as described in section **Starting CMX**, chapter **Opening a Database**.

If you want to either uninstall or re-install one of the databases, use the tools found in the second tab.

First select which database you want to work with and then select the button that suits your needs (**Uninstall/Detach** or **Install/Attach**).

Notes.
Uninstalling a Database is not possible if the same database is in use in CMX. Close CMX before starting the uninstall procedure.
If you have entered your own data into either of the databases shipped with CMX, uninstalling that database results in data loss!

Creating a New Database

Allows you to create an all new (empty) CMX database. Give the new database a name. Standard Windows® file naming conventions apply, except that you do not need to enter the file extension. Then click the **Create** button.

Taking the new database into use depends on the type of CMX software you have.

- In **CMX Enterprise** or **CMX Professional with the floating server license option** you first need to add the database to the **CMX Application Server**. Open the **Application Server** from the icon found in the system tray ( ). Enter the following menu commands in the **Application Server** window: **Tools**, **Database Settings**.

During login CMX offers to connect to the latest database used. To switch database, select another (host and) database from the login window.
Alternatively, when CMX is already running, use the main window's menu to select:

- **File**, **Database** in **CMX Professional without the floating server license option** or

- **File**, **Host** in **CMX Enterprise** or **CMX Professional floating server license option**. Then enter required information to log into another database.

Copying a Database

This feature allows you to copy a backup database and create a new CMX database of it.

Give the new database a name. Standard Windows® file naming conventions apply, except that you do not need to enter the file extension. Then click the **Copy** button.

See the end of chapter **Creating a New Database** for information on how to take use of the copied (new) database.

Deleting a Database

Select the database to be deleted from the list provided. Click the **Delete** button to do it.

Note.
There is no way of retrieving a deleted database. Perform the delete only if you are sure that the database to be deleted is no longer of use at all.

Moving a Database

Select the database to be moved and the destination server. You may also rename the database to be moved.

Note.
The source and destination databases have to be in the same computer when moving. If not, use CMX Database Manager's Backup and Restore tools.

The **Move** utility includes a possibility to utilize either **SQL Server Authentication** (default) or **Windows Authentication**. Use the **Authentication** selection list to choose the one you want.

Additional Information

General

This section includes additional information not related to CMX alone, but useful when working with calibrators communicating with CMX.

Calibrators and USB Communication

This chapter applies to **Beamex** calibrators that use USB communication when connected to a computer. This description is general, so check the calibrator's own manual for possible detailed information.

The first time you connect a calibrator to a computer, using the USB cable delivered with the calibrator, Windows' **Found New Hardware Wizard** initializes wanting to install a device driver.

The driver is available in the following locations:

- In the folder where **CMX** is installed.
  Default path: **C:\Program Files\CMX**.

- On **CMX** Calibration Maintenance Management software installation media. Path: **X:\Drivers\USB Drivers**.

- On a CD-ROM called **Beamex Integrated Calibration Solutions** shipped with the calibrator.
  Path: **X:\Product related***Calibrator***\Drivers**.

- At Beamex's web site (http://www.beamex.com/).
  Look for downloads. The driver may be part of the calibrator's software update package or separately available. Check the web page's description.

Installing the driver for Windows® Vista and Windows® 7:

Select option **Locate and install driver software**. In the next window, select **Don't search online**, then **Browse my computer for driver software**. Next browse to the location where the driver is. See also notes further on.

Installing the driver for Windows® 8, Windows Server 2012 and later:

If the USB drivers have been installed during CMX's installation, the drivers are automatically available when a calibrator is connected to the computer.
If the drivers weren't installed during CMX's installation, they have to be installed manually as follows:

- Connect the calibrator to the computer's USB port.

- Open **Device Manager**. It can be opened, e.g. by clicking the mouse's secondary button above the Windows logo.

- In the Device Manager, open the **Other devices** list and click the mouse's secondary button above a Beamex calibrator.

- Select **Update Driver Software** form the pop-up menu.

- Select **Browse my computer for driver software** in the opened window.

To avoid further questions by the operating system, check the **Always trust software from "Beamex Oy Ab"** setting in the next dialog.

Notes.

The driver has been tested in 64 bit versions of the recommended operating systems for CMX Client installation.

Windows may warn that the driver is not digitally signed. Please ignore this warning and proceed with the installation. If your system administrator has not allowed using drivers without digital signature you must ask him to allow it.

Absolute Pressure Measurement and Uncertainty Calculation

Absolute Pressure Measurement uses two pressure modules simultaneously: a gauge pressure module and a barometric module. The total uncertainty of that kind of measurement is a combination of the uncertainties of both modules used in the calibration.

There's a catch in how CMX calculates the total uncertainty of an absolute pressure, but first we need to know what kind of pressure modules Beamex offers:

By default, Beamex calibrators use external pressure modules as follows:

- **High Accuracy EXT**(-IS) modules in **MC5**, **MC5-IS** and **MC5P**.

- **Standard Accuracy EXT-s**(-IS) modules in **MC2**, **MC2-IS**, **MC4** (and MC3).

The 1 year uncertainties of available external and internal barometric modules are as follows:

- **High Accuracy EXT B**:
0.05 kPa / 0.5 mbar / 0.0073 psi

- **High Accuracy Internal Barometric Module** used in **MC5**, **MC5-IS** and **MC5P**:
0.05 kPa / 0.5 mbar / 0.0073 psi

- **Standard Accuracy Internal Barometric Module** used in
MC2, **MC2-IS**, **MC4** (and MC3):
0.1 kPa / 1 mbar / 0.0146 psi

CMX's catch is that it assumes that the barometric module is of the same type as the gauge module.

So, if you are consistent with the use of pressure modules, i.e. you measure absolute pressure using a High Accuracy barometric module together with a High Accuracy gauge pressure module or a Standard Accuracy barometric module together with a Standard Accuracy gauge pressure module, you'll be fine. The uncertainty calculation works as it should.

But if you combine pressure module types when you measure absolute pressure, the uncertainty of the barometric module is assumed wrongly. Thus, depending on the combination, the total uncertainty is either 0.05 kPa (or 0.5 mbar / 0.0073 psi) too good or too poor.

Examples:

1. A **High Accuracy EXT2C** gauge module is used in an MC4 with a **Standard Accuracy Internal Barometric Module.**
   Then CMX assumes that the barometric module is a High Accuracy module too and uses a too good accuracy component when calculating the total uncertainty. You should add 0.05 kPa (or 0.5 mbar / 0.0073 psi) to the total uncertainty.

2. A **High Accuracy EXT B** barometric module is used in an MC4 with a **Standard Accuracy Internal Gauge Module.**
   Then CMX assumes that the barometric module is a standard accuracy module too and uses a too poor accuracy component when calculating the total uncertainty. You should subtract 0.05 kPa (or 0.5 mbar / 0.0073 psi) from the total uncertainty.

3. A **Standard Accuracy EXT2C-s** gauge module is used in an MC5 with a **High Accuracy Internal Gauge Module.**
   Then CMX assumes that the barometric module is a standard accuracy module too and uses a too poor accuracy component when calculating the total uncertainty. You should subtract 0.05 kPa (or 0.5 mbar / 0.0073 psi) from the total uncertainty.

Note.
If absolute pressure is **always** measured using the same pair of standard accuracy and high accuracy modules, consider editing the absolute pressure measuring range specifications for that particular gauge module. The field in question is *Constant Error*. More of specifications in chapters **Adding Module Ranges** and **Calibrator Module Range Fields**. When performing this customization, you should record the change for future needs. If you later on purchase more pressure modules / calibrators and maybe use a different combination to measure absolute pressure, you need to assure the specifications are valid for that combination.

Temperature Blocks and CMX

When calibrating temperature instruments using Beamex' Temperature Blocks, such as FB Field Temperature Block series and MB Metrology Temperature Block series, there are some issues to be taken into account. Here's a brief description of them.

Specifications of Temperature Blocks

The specifications of Temperature Blocks are divided into several components as follows:

Component	Description
Display Accuracy	The specification of the internal measurement.
Stability	The instability of the block's temperature
Axial Uniformity	The vertical temperature gradient in the block
Radial Uniformity	The horizontal temperature gradient in the block
Load Effect	Measurement probe(s) leaking heat to/from the block to the ambient
Hysteresis	The variation in readouts when reaching a certain temperature from highter or lower temperatures
Reference Connection	From reading the reference sensor connected to the Temperature Block

Notes.
Not all components are valid in all applications using a Temperature Block.
Detailed specification data is in the Temperature Block's User Guide.

Specifications of Temperature Blocks in CMX

In CMX, the uncertainty for a certain calibrator's/module's (sub-)range is saved as a Constant Error and a possible Relative Error, % of Reading. For Temperature Blocks, the Constant Error and Relative Error are combined from applicable components presented in chapter **Uncertainties of Temperature Blocks**. The possible methods of use are as follows:

Method 1:
Temperature Block With Internal Temperature Measurement

A Temperature Block is used for creating the necessary temperature and the Temperature Block's internal temperature sensor is used for measuring the Block's temperature. The Input Method setting of the instrument to be calibrated is "Controlled/Measured" and no external reference sensor is connected to the calibrator or the Temperature Block.

The following specification components of the Temperature Block are combined in CMX's Constant Error and Relative Error data:

- *Display Accuracy*
- *Stability*
- *Axial Uniformity*
- *Radial Uniformity*
- *Load Effect*
- *Hysteresis*

Method 2:
Reference Sensor Connected to R-type Temperature Block

An R-type Temperature Block controls the temperature and a reference sensor connected to the Temperature Block is used for measuring the temperature. The Input Method setting of the instrument to be calibrated is "Controlled/Measured".

In this case, the following specification components of the R-type Temperature Block are combined in CMX's Constant Error and Relative Error data:

- *Stability*
- *Axial Uniformity*
- *Radial Uniformity*
- *Load Effect*
- *Reference Connection*

In modern calibrators, communicating with a Temperature Block, you may define the used reference sensor model. When receiving calibration results to CMX, the reference sensor and, when applicable, its specifications are included with calibration result data. Also: The Temperature Block's specifications, as presented above, are included with calibration result data. See also note below.

Note.
For Beamex smart sensors, the specifications are already available in CMX. For other sensors and devices, the model and its specifications need to be added to CMX's database prior to using them in calibrations.

Method 3:
Reference Sensor Connected to an External Device

Temperature Block controls the temperature and an external reference sensor is in the block, but the sensor is connected to an external temperature measuring device. The Input Method setting of the instrument to be calibrated is "Controlled".

In this case, the following specification components of the Temperature Block are combined in CMX's Constant Error and Relative Error data:

- *Stability*
- *Axial Uniformity*
- *Radial Uniformity*
- *Load Effect*

There are two possibilities for the reference sensor connection:

A. The reference sensor is connected to the calibrator.

B. The reference sensor is measured using a third party device.

In modern calibrators, communicating with a Temperature Block, you may define the used reference sensor model and, when applicable, the third party device model used for measuring the reference sensor. When receiving calibration results to CMX, the reference sensor, the third party device and, when applicable, their specifications are included with calibration result data. Also: The Temperature Block's specifications, as presented above, are included with calibration result data. See also note in method 2.

How the Temperature Block's accuracy specifications are converted to uncertainty data in CMX

Equation:

$$u_{tb} = \sqrt{\left(\frac{DA}{\sqrt{3}}\right)^2 + \left(\frac{St}{\sqrt{3}}\right)^2 + \left(\frac{AU}{\sqrt{3}}\right)^2 + \left(\frac{RU}{\sqrt{3}}\right)^2 + \quad \cdots}$$

$$\cdots \quad \overline{\left(\frac{LE}{\sqrt{3}}\right)^2 + \left(\frac{Hy}{\sqrt{3}}\right)^2 + \left(\frac{RC}{\sqrt{3}}\right)^2}$$

Where:

u_{tb}	is the standard uncertainty of a Temperature Block.
DA	is the Display Accuracy specification. Zero when using methods 2 and 3.
St	is the Stability specification.
AU	is the Axial Uniformity specification.
RU	is the Radial Uniformity specification.
LE	is the Load Effect specification.
Hy	is the Hysteresis specification. Zero when using methods 2 and 3.
RC	is the Reference Connection specification. Zero when using methods 1 and 3.

Notes.
All specifications have a rectangular probability distribution.
That is why they are divided by the square root of three.
In CMX, the uncertainties are saved as expanded uncertainties, i.e. the standard uncertainties are multiplied by two.

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SecondLanguage

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Glossary of Terms

Availability

Symbols used for a feature's availability in different CMX versions:
— **Not** available
○ **Optionally** available
● **Standard** feature

Business Bridge

Beamex® Business Bridge is a software that communicates between CMX and ERP/CMMS Asset Management software. When purchased, Beamex's support helps customizing Business Bridge to work between CMX and the Asset Management software in use.

Calibration Points

Calibration Points are the input signal values (sometimes the output signal values) used in the calibration of a function.

Calibration Procedure

The procedure includes information on how the calibration should be accomplished, like:

- Can the calibration be performed automatically or is it done manually

- Can the calibration be carried out on the field or not.

- Recommended calibrator(s) to be used in the calibration.

d1, d2, d3 and d4

Actual scale interval. More information in CMX's help file (excluding CMX Light). Search for "Actual scale interval".

Device

A Device is the physical instrument that can be installed into a Position.

e1, e2, e3 and e4

Verification scale interval. More information in CMX's help file (excluding CMX Light). Search for "Verification scale interval".

ERP/CMMS

ERP = Enterprise Resource Planning
CMMS = Computerized Maintenance Management System

Both are asset management software.

Function

A single task done with an instrument, e.g. temperature transmitter, pressure indicator etc. Instruments capable of performing several tasks are called multifunction instruments.

Function Type is the description of the function (input/output quantities and ranges) and information concerning the calibration of the function (e.g. calibration points and error limits).

See also Multi-function.

Input Method

How the input signal of the instrument is obtained into CMX. Examples of Input Methods:

Measured by the calibrator, Sourced by the calibrator, Controlled by a pressure controller and measured by the calibrator etc.

Instrument

For CMX, any Position seen on the main windows' Positions Tree are instruments. No matter what kind of function the instrument contains.

Instrument Collection

A collection of instruments located in the same database.

Multi-function

A multi-function Position or Device can carry out several operations, e.g. a temperature transmitter and a temperature indicator is an instrument with two functions.

Output Method

How the output signal of the instrument is obtained into CMX.

Position

A Position is the location in a process where a device can be installed. Positions often have symbolic names (tags) like TTI 215 in instrumentation drawings.

A Position can be calibrated only when a device is installed because a location cannot be calibrated.

Secondary Button

The mouse's secondary button is the rightmost one, if you are using the mouse with your right hand.

Sets

Sets are groups of Device's or Position's Functions that the user may create with the Set Maintain utility. Usually Devices or Positions belonging to a set have something in common, e.g. they are all calibrated during the same week, they are all located in the same unit of plant etc.

How the sets are devised depend on the user application requirements.

User ID

An abbreviation for identifying each user of CMX. Needed, e.g. when starting CMX. Using the same User IDs as is used on your network login is recommended.

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Notes