

Calibration Excellence

This paper outlines the joint Emerson/Beamex calibration solution using AMS Suite: Intelligent Device Manager, AMS Suite Calibration Connector, and CMX calibration software and provides an in-depth explanation of how the technology works and the benefits it provides to users.

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What Is Calibration Excellence?

Calibration Excellence was jointly developed by Beamex and Emerson to provide users with the benefits of complete automation asset management and premier calibration management functionality in a single integrated solution. The components of this solution include Emerson's AMS Device Manager, Beamex's CMX calibration software, and the AMS Suite Calibration Connector – which provides the communication between AMS Device Manager and CMX.

Importance of Calibration

Calibration is a time-consuming maintenance activity that must be performed periodically on every field instrument in order to assure efficient operation of the process and to satisfy the requirements of regulatory agencies. Instrument calibrations involve the comparison of the instrument's value to a known reference value. Calibrations can take one to four hours per device using generally accepted procedures. Since many plants have thousands of field instruments, a significant portion of maintenance time must be spent on calibration alone. The primary reason for calibration is that even the best measuring instruments or their sensors are not permanently stable. Over time, they can drift and lose the ability to meet their accuracy specifications. Drift, whatever the cause, makes recalibration necessary.

Environmental conditions, elapsed time, and type of application can impact the stability of an instrument, and instruments from different manufacturers can show varying performance. Regular calibration of instruments helps maintain a high level of performance and safety in processes, as well as controlling emissions or meeting other environmental regulations. Regular calibration helps ensure the credibility of measurements, as well as the quality of process measurements at a good-as-new level.

When calibrating, the calibration procedure itself is critical. Performing the procedure in the same way each time, regardless of which personnel are involved, is vital for consistency of results. Then calculations must be carefully done and accurately documented. Manual calibration processes are both time-consuming and error-prone.

There are ways to automate parts of the calibration process. With a documenting calibrator, the same calibration procedure can be automatically transferred from a computer to the calibrator before starting the route. Maintenance personnel can easily follow the step-by-step procedure while performing calibrations to ensure the required consistency.

While many facilities have made the change to documenting calibrators, there are other process changes that can be made to further streamline calibration practices and ensure documentation accuracy.

How Calibration Excellence Works

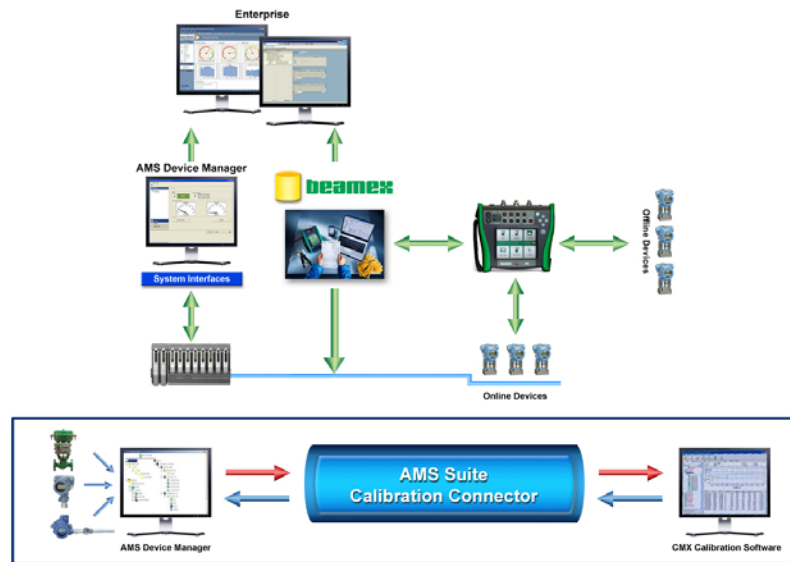
With the Calibration Excellence solution from Emerson and Beamex, not only is the physical calibration procedure standardized with a documenting calibrator, but the documentation and historical records of all calibration procedures are automated.

Using the AMS Suite Calibration Connector, the Beamex CMX software and AMS Device Manager are synchronized to keep all device records up-to-date. The AMS Suite Calibration Connector utilizes an XML schema to transfer selected device information from AMS Device Manager to CMX. This means users do not have to spend significant time manually entering device information for smart assets, such as HART or FOUNDATION fieldbus devices. Since all of this information is already found in AMS Device Manager, the AMS Suite Calibration Connector simply transfers it into CMX, with no manual entry necessary.

If a device is replaced in AMS Device Manager, the new device information will be automatically sent to CMX as an update. Users will not have to maintain two instances of instrument information. By using a documenting calibrator, results are automatically stored in the calibrator's memory during the calibration process. Then the results are automatically transferred from the calibrator's memory to the computer/database. This eliminates the user step of manually recording the results, making the entire process much faster, less costly, and more accurate.

Streamlining calibration processes by automating and standardizing as many steps as possible greatly improves the quality and accuracy of calibration results.

*Calibration Excellence
architecture*



CMX Calibration Management

In addition, Beamex® CMX Professional for calibration management provides a best-in-class solution that supports the full range of automation assets. The SQL database application includes multi-level plant structure, planning and scheduling of calibration work, maintaining calibration procedures, communication with calibrators, storing of calibration history and documentation in the form of calibration certificates, standard reports/labels, and custom report design.

The database can be installed on single workstation PC or on shared network server. Additional software options for CMX include:

- Pocket PC interface: allows the user to manually enter data into a Pocket PC onsite, offering a completely “paperless” calibration system including analyzers, detectors, and pH.
- Change Management, including Audit Trail and Electronic Signature: automatically tracks all additions, changes and removals made into database. The entire CMX application is developed

in accordance with procedures that make it possible to validate the software compliance to the user requirements.

- Multifunctional Instrument support: allows flexible record configuration for a complex instrument that requires testing of multiple parameters. Examples include the Rosemount 3095 MultiVariable Transmitter (test differential pressure, static pressure, and RTD temperature measurements) or the Rosemount 848T Foundation Fieldbus Temperature Transmitter (test each of the 8 independent channel inputs).
- Weighing Instrument support: allows a user to uniquely configure calibration and testing for eccentricity test, repeatability test, weighing test and minimum weight test for each weighing instrument, scale or balance.
- Configurable User Interface and Report Design: allows editing of the user-interface to be modified to meet company-specific terminology. It is also possible to add, hide and modify user-definable fields. Via the Report Design feature, add company logos and/or design the layout of the text/graphic elements within a report template or design completely new ones. Documentation can be provided in straight hard copy print out or in electronic format (e.g. PDF, HTML, RTF, XLS) for data export, emailing or sharing documents over the Internet.
- History Trend: determine the optimum calibration interval for a particular instrument. Results from previous calibrations can be analyzed to see how much the instrument has drifted over a certain time period and to make conclusions concerning the calibration interval or the quality of the instrument.

Installation Notes

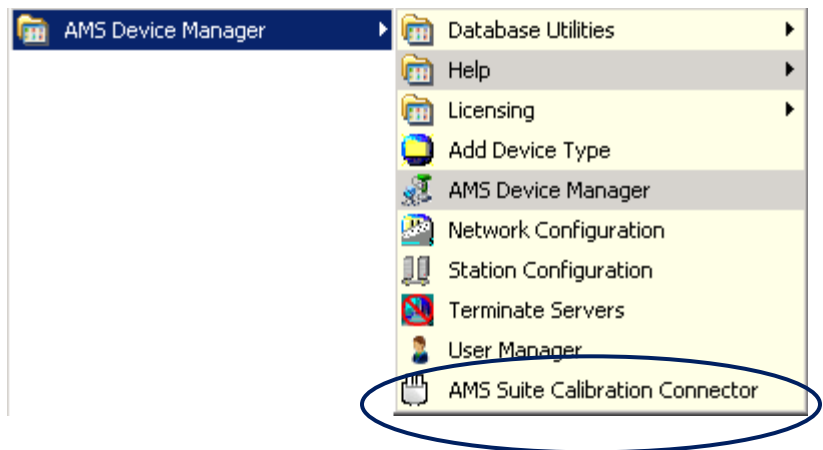
The Calibration Excellence solution requires the following components:

- AMS Device Manager v12.0
- AMS Suite Calibration Connector

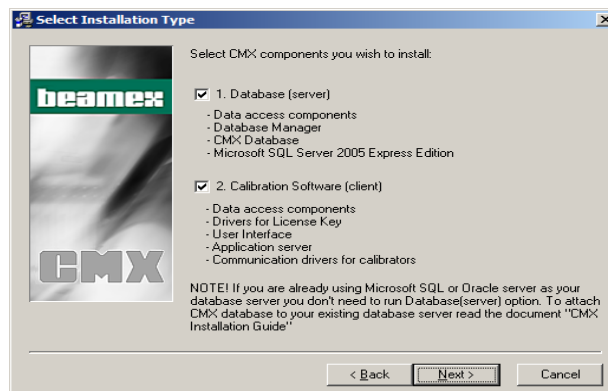
- CMX Professional v2.7
- CMX Connector Manager v2.9.914.0

The solution requires a sequential installation. First, AMS Device Manager must be installed. Then the AMS Suite Calibration Connector should be installed to the path where AMS Device Manager is installed. Finally, the CMX application and Database Manager should be installed prior to installing the CMX Connector Manager.

To install the AMS Suite Calibration Connector, you will need to run the AmsSuiteCalibrationConnector_Setup.exe from the installation folder and follow the prompts. Once complete, the connector will be added to the AMS Device Manager menu group.

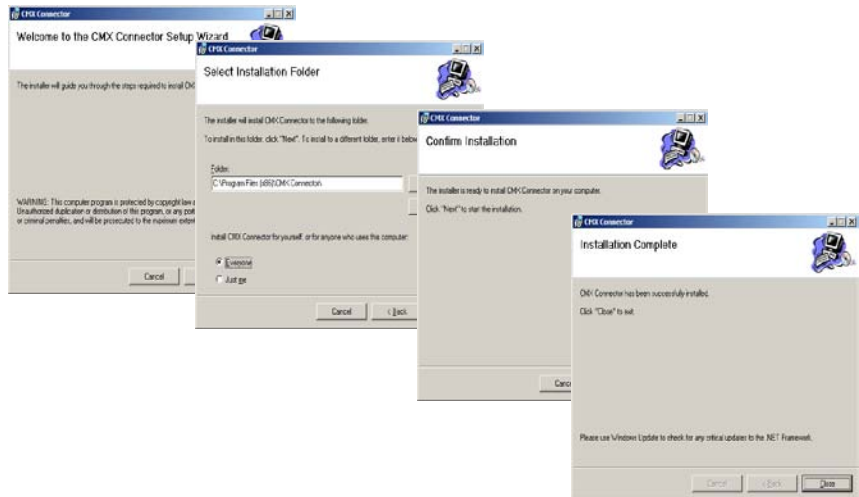


Prior to installing CMX Professional, refer to the Installation Guide found in the installation CD 'Documents' folder to ensure the best deployment for a particular network. Specific instructions may vary depending on the deployment. Follow the prompts and use the defaults when possible. Be sure to select both CMX components to be installed during the process.



The CMX application does support a Client Only installation, which can be applied if multiple stations require the functionality.

To begin the installation, run the setup.exe from the root installation folder and follow the prompts.



The CMX Connector Manager and CMX Database Manager will be added to the program menu during the installation.



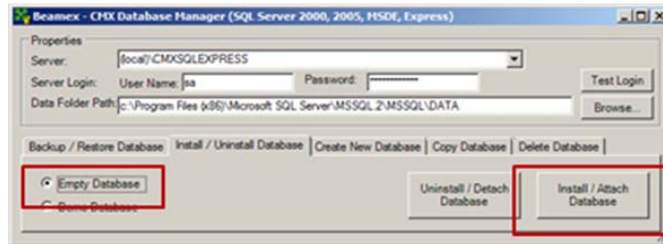
Contact Beamex at support.usa@beamex.com for more information specific to CMX Professional.

Configuring the Solution Components

Both the AMS Suite Calibration Connector and the CMX Connector require folders to be setup for XML file transfer.

Configuring CMX Database Manager

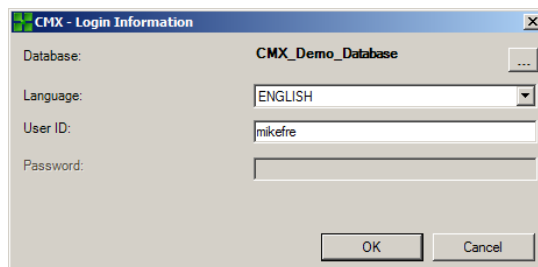
1. Open the CMX Database Manager from the program menu. By default, the installation will be using a demo database.
2. Go to the **Install/Uninstall Database** tab, choose the **Empty Database** option, and click **Install/Attach Database**.



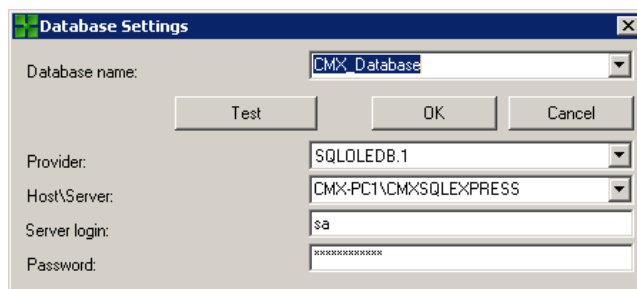
3. Continue to click **OK** in the dialogue boxes. Then click the **Test Login** button to ensure the login is successful.

Configuring CMX Professional

4. Once the empty database is created, you will need to change the database when you log in to CMX.

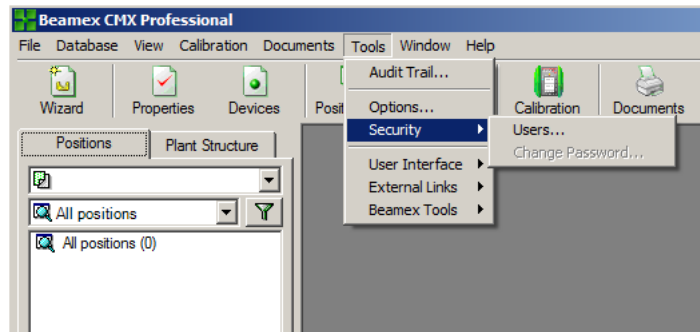


5. Be sure to use the Test button to verify database connectivity.
6. If using the CMX Client on another machine, be sure to include the Host\Server field and choose the proper machine and SQL instance when setting up the database.



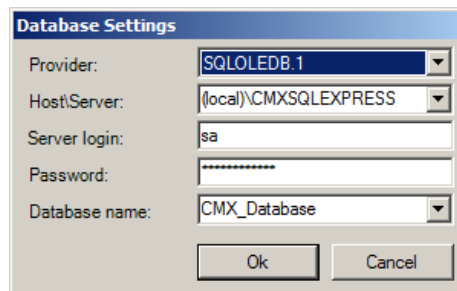
7. When logging in for the first time, you must use the master password provided with the CMX license.

- After you are logged in, you can set up and configure users as needed.

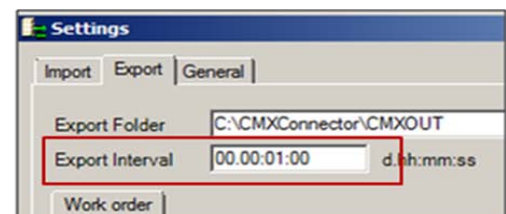
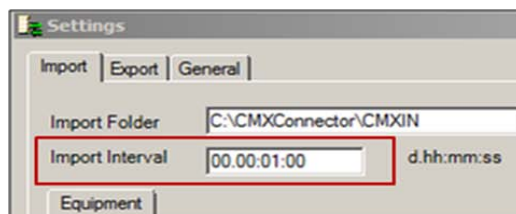


Configuring CMX Connector Manager

- Open the CMX Connector Manager from the program menu. Go to File and choose Database Connections.
- If the CMX software will be used as a Client\Server setup, the Host\Server file will need to be changed to the Server computer name.



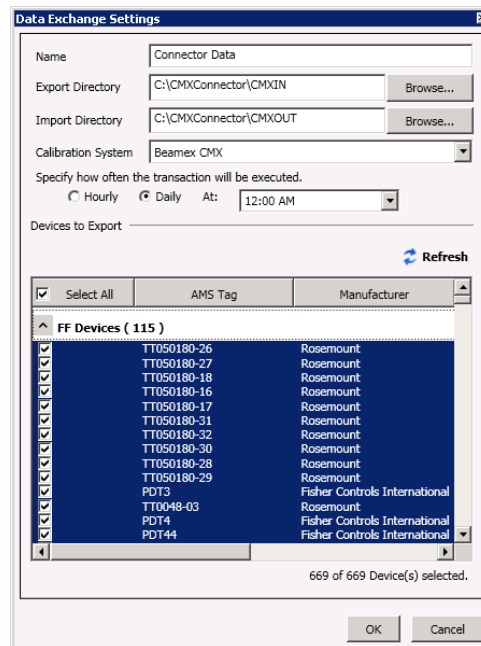
- Test the database connection by choosing File → Test Database Connection.
- Check the Root CMX Connector folder to ensure there are two folders within it (CMXIN and CMXOUT). If these folders do not exist, manually create them.
- Set the Import and Export collection interval times through File → Settings.



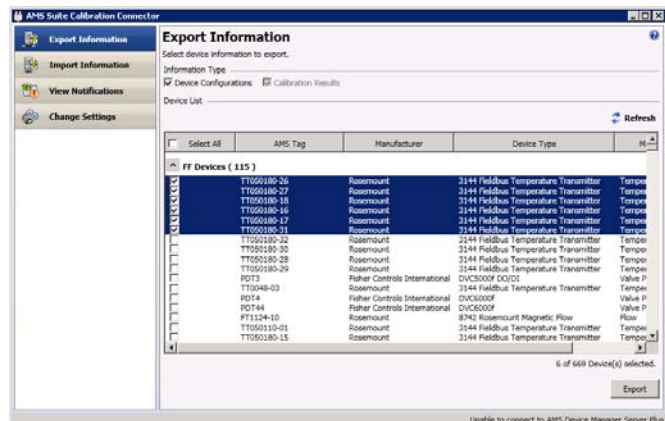
- Restart the CMX Interface service for the changes to take effect.

Configuring AMS Suite Calibration Connector

- Open the AMS Suite Calibration Connector from the Program menu or from the system tray.
- Log in using a valid AMS Device Manager account. Use the **Change Settings** tab and click **Add**.
- Set up the necessary fields and click **OK**.



- On the **Export Information** tab, select the type of calibration information you want to export. Then select the devices from the device list and click **Export**.



19. On the **Import Information** tab, select the type of calibration information you want to import. Choose the AMS tags to import and click **Import**.
20. On the **View Notifications** tab, select an item to display more details.

Comprehensive Asset Management

AMS Device Manager provides an online connection to smart instrumentation, giving users the ability to gain a holistic view of the health of their assets. Calibration is just one aspect of an asset's health, and combining the information from the device itself with the calibration information provides a complete picture of which assets need attention.

In addition, AMS Device Manager supports device configuration, and advanced capabilities via SNAP-ON applications to address all maintenance needs. Paired together, AMS Device Manager and CMX offer users the best in asset management and calibration technologies for managing their automation assets.

Case Study: GlaxoSmithKline

GlaxoSmithKline in Cork, Ireland, piloted the Calibration Excellence solution and gained numerous benefits. Don Brady, an automation engineer at GSK, reported that the Calibration Excellence solution helped the facility:

- Reduce the steps in its overall calibration process from 17 steps to 10 steps;
- Remove two steps that each posed risks of human data-entry errors;
- Conduct Emerson and Beamex consulting workshops to review existing processes and optimize and refine the new processes to use improved technologies;
- Use the new system's flexibility to manage workflow processes.

"We've also eliminated 21,000 sheets of paper per year," added Brady. "And we streamlined our end-to-end workflow, which reduced our calibration time by about 15 minutes per calibration. We've also eliminated calculation errors and rework because pass/fail calculations are performed in real-time out in the plant. In addition, we reduced scheduled calibrations by 8%, which was part of the data migration from a legacy system.

"We're also generating email alerts when a calibration failure happens, but now only calibration failures need to be reviewed and approved. Finally, we've been able to extend some intervals between calibrations, which are recommended by the devices and system in the form of email alerts. So far, we removed 234 calibrations from our schedule during first 12 months of analysis, and this should peak during the third year of operation."

Conclusion

By automating key parts of the calibration process, the Calibration Excellence solution contributes significantly to reduced maintenance costs. Automated calibration eliminates manual, error-prone data entry of calibration schemes into self-documenting calibrators prior to testing, as well as handwritten or typed documentation of the results.

In plants with hundreds or thousands of field devices, these savings represent a significant economic benefit that is simply too great to ignore.