Technical

Note

Exaquantum

Exaquantum Excel Usage Best Practice

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YOKOGAWA
Yokogawa Electric Corporation

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Highlights

The Highlights section gives details of the changes made since the previous issue of this document.

Summary of Changes

This is R3.20 Issue 1.0 of the document related to Product Library version 9.0.

Detail of Changes

The changes are as follows:

Chapter/Section/Page	Change

Table of Contents

Chapter 1 Introduction

Exaquantum, including add-on packages, makes extensive use of Microsoft Excel (hereafter Excel) to perform reporting and data presentation tasks.

Use of Excel provides a flexible and powerful way to present information to users and as such is a very important part of the product.

This document provides guidance on using Excel with Exaquantum, highlighting best practices and identifying common issues. It should be read by anyone looking to use Excel with Exaquantum, particularly those who provide support to other users of Excel.

It is not intended to be a complete instruction on the use of Excel since there is much information available already. Please refer to the references and resources section at the end of the document for details.

It is planned that this document will be reviewed whenever a new release of Exaquantum is issued.

Missing topics and other suggestions can be mailed to support@ymx.yokogawa.com . These will be considered for inclusion in the next release of the document.

Chapter 2 Products covered by this document

The document covers the following products and uses:

- Exaquantum/Explorer client, also known as thick client or full client
- Exaquantum/Web client, also known as thin client

It discusses the use of the Exaquantum Explorer Excel Add-in and the Exaquantum Query Excel Add-in.

The Exaquantum Query Excel Add-in is covered in Chapter 7.

It does not cover the Exaquantum Tag Documenter Add-in which functions in the same way as the Tag Configuration Viewer Application. This is fully documented in chapter 5 of the Exaquantum Engineering Guide Volume 3.

The use of the Add-in provided by the Exaquantum/RM add on application is also not covered in this document. This is fully documented in the Exaquantum/RM User Manual.

It should however be noted that the add-ins provided by the Exaquantum product itself should not be used in templates created for use by Exaquantum/RM (Section 1.1 of the Exaquantum/RM User Manual).

Chapter 3 Challenges of Excel

There are two main challenges involved in maintaining a product that works with Excel.

3.1 Updates to Excel

Perhaps the biggest challenge is that Microsoft are continually developing Excel which means that sometimes changes to the product are made that can affect Exaquantum add-ins adversely.

> The effect of these changes is sometimes only discovered when issues are reported by customers. Changes can be both within Excel functionality and within other related changes such as DCOM changes made by security hotfixes.

The issue is further complicated by Office 365 which can make changes to the installed version that are pushed down to users' workstations. Please read note about supported versions of Excel in Chapter 4 below.

3.2 Excel Automation

For products such as Exaquantum/RM and Exaquantum/Batch reporting, Excel is not opened in the traditional way. Instead Excel automation is used to generate new Excel sheets. Since Excel is hidden, the user cannot see any error pop-ups that might be visible if they were using Excel normally.

This document does not cover those products that use Excel automation.

Chapter 4 Supported versions of Excel

Different releases of Exaquantum support different releases of Excel. It is therefore important that the Exaquantum GS for the release of Exaquantum being used is referenced to ensure that a supported version of Excel is used.

There is also a list in the installation guide but there may be notes and exclusions in the GS which are not documented in the installation guide.

Support for newer version of Excel released after any version of Exaquantum may not work. To use a newer version of Excel it may be necessary to upgrade to a newer version of Exaquantum.

Exaquantum R3.20 currently supports the following 32-bit versions of Excel

- Microsoft Excel or Microsoft Office Standard 2016 Volume License
- Microsoft Excel or Microsoft Office Professional Plus 2016 Volume License
- Microsoft Excel or Microsoft Office Standard 2013 SP1 Volume License
- Microsoft Excel or Microsoft Office Professional Plus 2013 SP1 Volume License
- Microsoft Excel or Microsoft Office 2010 (SP2)
- Specific releases of Office 365 desktop version only on the Simi-Annual Channel (see sections 4.2 below)

Exaquantum R3.20 currently supports the following 64-bit versions of Excel (see section 4.1 below for further details).

- Specific releases of Office 365 desktop version only on the Simi-Annual Channel (see sections 4.2 below)

4.1 64-Bit Excel

Exaquantum's Excel add-ins are not supported for use with 64-Bit office before Exaquantum version R3.20.

When 64-Bit Excel was originally introduced, Microsoft did not recommend its use except in a very small number of cases.

Over time 64–Bit Office has become the standard version that is installed by customers and is also now the default installation.

From Exaquantum Version R3.20 onwards the Exaquantum Add-ins now support the 64-Bit version of Office 365 (see section 4.2 below).

No other 64 bit version is supported.

4.2 Office 365

It is difficult to support Office 365 due to the possibility of functionality changes that can happen at short notice. However, since many customers use Office 365, it became clear that the Exaquantum Add-ins would need to function in this environment.

Exaquantum Excel add-ins do not support Office 365 before Exaquantum version R3.20.

Note that Office 365 support is based around the SAC (Semi-Annual Channel) versions and not the monthly channel. Please review the relevant GS for information regarding the specific versions of SAC supported for each release. See also the following reference which is also reference in the GS.

SAC is the default channel for Office 365 ProPlus.

The Monthly channel is the default for products like Office 365 Business.

> https://www.yokogawa.com/nl/solutions/products-platforms/solution-based-software/data-historian/data-historian-exaquantum/#Details_Support-info

An SAC release has a distinct lifetime and as such, it is possible to go out of support during the lifetime of a particular Exaquantum release. Please refer to the link above for the latest approved release of Office 365.

Chapter 5 Installation Best Practices

5.1 Installed version

Check that the version of Office installed is supported by the Exaquantum version being used. Information is available in the relevant GS documents or the installation guide of the products in use. In some cases, other versions of Office may work but since these have not been tested, performance cannot be guaranteed. Such versions are used at local risk.

Pay particular attention to whether the Office installation is 32 or 64-Bit since only Exaquantum R3.20 and later can be used with 64-Bit Office.

> Note that this is not a question of using at own risk, older versions will not work with 64-Bit Office.
>
> See also section Chapter 4 above for more details of the 64 bit office support.

A supported version of Microsoft Excel is a conditional prerequisite for Exaquantum.

5.2 Excel Add-Ins Post Installation Integration

As a supported version of Microsoft Excel is only a conditional prerequisite for Exaquantum it is possible that Excel is not installed prior to installation.

However the best practice is to ensure that a support version of Excel is installed before Exaquantum is installed (see section 2.12 of the Exaquantum Installation Guide).

If for any reason this is not possible then the procedure in Section 10.19 of the Exaquantum Installation Guide must be followed.

The main reason for this is that if Excel is installed before Exaquantum the installation procedure will install the Exaquantum Excel add-ins into the library folder. If Excel is not present when Exaquantum is installed, the add-ins go to the Exaquantum folder.

It is important that the Excel Add-in files exist in the correct location. The reason for this is in order that a report will function correctly for all users, the Add-in files must be in a location that Excel expects. Failure to do so will mean that any workbook may only work for the user who created it.

If the version of Excel is upgraded without reinstalling Exaquantum then the ‘correct location’ for the Add-ins changes and they need to be moved for workbooks to continue to function. See for example the FAQ “After upgrading to a new version of Excel, the Exaquantum add-ins are missing and I cannot locate the files. Where are they?”

> https://ymx.yokogawa.com/content/S636748650292611165/Exaquantum%20add-ins%20are%20missing.pdf

Note if there are multiple copies of the Exaquantum Excel Add-ins on a machine this can cause problems with different users having connection to different add-in files. See for example the FAQ “Why do I get an Automation Error Running the Excel Add-in even after installing a patch?”

> https://ymx.yokogawa.com/content/S636741813069565965/Automation%20Error%20Running%20the%20Excel%20Add-in%2088.pdf

The situation is easily avoided by ensuring that there are no duplicate copies of Excel add-ins. Achieve this by searching for files with an xlam extension.

5.3 Historical Data Access into Excel

Prior to R3.20 there was a potential issue with obtaining Historical Data Access into Excel. This was due to the way that Historical Data was written from the server into Excel Cells. The process that actually performed the write was running as the service user not the interactive user and in many cases this will be blocked (see section 5.3.1 for details).

From R3.20 the external callback is to the Excel addin running ‘out of process’ as the interactive user. Hence changes to the DCOM setting for Excel do not impact the return of data from the Historian.

5.3.1 Specific notes when using Exaquantum releases prior to R3.20

When accessing historical Exaquantum data from Excel the Exaquantum/Explorer Excel Add-in uses an application to write data into Excel cells. This application will be running as the Exaquantum Service User which in general will not be the user running Excel. The service users therefore requires access to Excel being run interactively by a different user.

If live data is available but history requests fail, it is possible that the access to Excel for the service user is not correctly set up.

By default Microsoft DCOM security only allows the interactive user to write data into Excel cells.

This default is changed by the IT Security Tool during installation but it is possible that this can be reset for example when Microsoft Security Patches are installed.

Re-running the IT Security tool will fix this but this will involve shutting down the system and may only be a temporary fix depending on what caused the reset in the first place.

For a more complete fix see the FAQ “There is no History data when using the Excel Addins” on the support web site.

https://ymx.yokogawa.com/content/S636749499462960279/There%20is%20no%20history%20data%20when%20using%20the%20Excel%20addins.pdf

Chapter 6 Excel Add-in Best Practices

The following sections give guidance on the use of the Excel add-in and highlight some common issues that are encountered.

6.1 Using time and date expressions in Excel workbooks

Exaquantum data is collected into Excel Worksheet cells using formulas that normally start with the Exaquantum function QData. Each cell is refreshed according to the update rate specified in the cell equation.

> Note: Unless manually created or edited the update rate in the formula will reflect that configured in Set Data Range/Update dialog at the time the cells were populated from the Data Selector.
>
> Changes made using the Set Data Range/Update dialog will have no effect on formulas already configured.

Each refresh cycle all cells are deleted and then repopulated with the latest data according to the times requested.

It is important to recognize that QData formulas are subject to the same rules as other Excel formulas. In Excel, calculations are all recalculated when a value changes in a workbook.

> Switching off Auto recalculation on the sheet will prevent all such recalculations preventing new data being requested.
>
> Using the Stop data update option will have a similar effect but in this case the data may still be received from the Exaquantum Server but the cells will not have here value changed.
>
> No new requests will be made and any further configuration will result in #REGISTER being displayed in the cells populated by the new calls.

Use of Date(), Today(), Now() or any other Excel date/time function is dangerous because it will also update when a value changes. This can lead to a situation where Exaquantum QData calls are re-evaluated whenever an Excel Date/time function updates. The update of the date/time function will also cause the QData calls to be re-evaluated leading to an excessive number of calls which will impact performance.

For this reason, Excel date/time functions such as those listed above, should not be used in Excel Exaquantum/Add-in worksheets.

6.2 Updating Excel Exaquantum add-in worksheets

The Excel add-in refreshes data by deleting all current values and then refreshing the cells. Cell reference mappings are kept in memory and used to refresh data.

If cells are being edited, moved or added to while the sheet is running, this can affect the mapping leading to inconsistent behavior including the addition of unrequested cells.

For this reason, data update should be stopped when changes are being made to Excel worksheets.

In general, exceptionally large queries should be avoided. In R3.20 it is possible to return up to 1048576 data values in a single QData call. A row or column with 1048576 cells is difficult to view, however, as it will be necessary to scroll up and down. Even if this data is trended the number of points in the trend would tend to make it unreadable with large number of data points. It is therefore always better to use smaller more manageable sized queries in most cases.

There is also a hard limit of 50MB of server data extraction when using On-Demand Aggregations which should be considered when making large queries (see section 2.7 of the Exaquantum/Explorer User's Manual Volume 3 for details).

6.3 Note when using "NOW" in the time specification

NOW is a default time setting in the Set Data Range/Update dialog when initially launched by any user.

This is a keyword which the Add-in needs to interpret. It is not related to the Now() Excel function.

It should be noted here that the Now() function, if used in an Exaquantum/Explorer Add-in Function, can cause performance issues. See section 2.7 of the Exaquantum/Explorer User's Manual Volume 3 for a list of Excel function that can cause performance problems when used in this way.

How this is interpreted depends on the release of Exaquantum installed (see below).

It should also be noted that whenever a sheet, which contains one or more Exaquantum/Explorer Excel Add-in functions using the NOW keyword is recalculated, new data will always return. This still applies whether an update rate is specified or not.

6.3.1 Prior to R3.20

When "NOW" is used to define the data that should be retrieved by Excel, there is a difference in the way that it is interpreted between the full Excel add-in and the web version.

- When "NOW" is specified for the time in the Exaquantum/Web Excel Add-In, the time of the Exaquantum Web client PC is applied
- When "NOW" is specified for the time in the Exaquantum/Explorer Excel Add-In, the time of the Exaquantum server is applied

For example, there is the following difference when referring to the data with "DataType" (Live) and "Data Range" (Point) and specifying the time to "NOW".

Exaquantum/Web Excel Add-In refers to the tag data of the current time on the Web client PC, while Exaquantum/Explorer Excel Add-In refers to the latest tag data on the server.

6.3.2 R3.20 and later

From R3.20 onwards the behavior has been changed to make it consistent.

The keyword NOW is always interpreted by the Exaquantum Data Server.

6.4 Making Changes in Exaquantum Role-based Namespace (RBNS)

Changes in Exaquantum to Role-based Namespace configurations require a restart of Exaquantum Web Excel Support service on the web server to be made available to Exaquantum/Web clients. It is therefore good practice to plan RBNS configuration fully in advance and to make any changes in bulk so that multiple restarts are avoided.

Chapter 7 Using the Exaquantum Query Excel Add-in

The Exaquantum Query Excel Add-in provides a mechanism to return Process and A & E data into Excel using the Exaquantum Query Wizard.

The Exaquantum Query Wizard itself uses an OLEDB provider to retrieve data from Exaquantum.

Where the OLEDB provider runs has changed from release to release of Exaquantum.

This can have implications when upgrading to new releases of Exaquantum.

Prior to R3.20 the OLEDB provider was available on the client as well as the server. Requests from the Exaquantum Query Wizard Add-in accessed the provider locally this meant that requests from the client to the server was managed by the OLEDB itself.

In order to support Office 365 64-bit this mechanism was changed and the OLEDB provider now only runs on the Server.

The Exaquantum Query Excel Add-in now uses ODBC to make a connection to Microsoft SQL Server and stored procedures now run the OLEDB provider locally on the Server. Data is therefore returned to the client by the 64-bit SQL Server not the OLEDB provider itself.

7.1 Known issue affecting all Exaquantum Releases

Item 29 of the R3.20 release notes highlights an issue that affects the use of the Exaquantum Query wizard in all releases.

This relates to reading Historical Tag Data using the OLE_DB provider. Reading data for a long duration can fail to return any data. This is due to a timeout limiting how long the request can run. An error message is logged in the Windows Application event log:

> Synchronous read timed out Q:\Exaquantum\QDataAccess\DataAccess.cpp Line 638 : Synchronous read timed out : R3.01 : 2015/07/29 08:14:24.323

If this error massage is displayed then reducing the time range of the request may fix the problem.

It is also possible to modify the timeout in the registry on the PC where Excel is running. The registry key is:

> HKLM\Software\WOW6432Node\Quantum\Client\QDataAccessSyncReadTimeout.

The default is 120 seconds.

If this is modified a restart of Excel will be required before the new value is seen.

There is also a similar issue with obtaining A and E data. Alarm and Event data is obtained from the database using SQL Server queries rather than the data access methods required when accessing Process Data. It is possible that SQL Server will timeout a request for a large number of rows. Reducing the time range or providing filters will usually fix the problem.

7.2 Known Issues affecting releases prior to R3.20

The DCOM issue described in section 5.3 can also affect the use of the OLEDB provider in releases prior to R3.20.

There is also an issue which has been fixed in R3.20 which will affect all releases prior to this. This is documented as issue 9 in section 4 (page 15) of the Release Notes.

This relates to the situation when an Exaquantum system has a third party OPC server storing Alarm and Event messages. When attributes defined in Exaquantum as fixed default attributes are not supported by a third party OPC Server an error will be generated, as these values will be NULL. This will result in these events not being displayed.

7.3 Known Issues specific to Exaquantum R3.20

In the Exaquantum R3.20 due to where the OLEDB provider now runs the connection string used in Excel to access this will be incorrect if they were created on a system running an Exaquantum release prior to this. To fix this a procedure has been provided in the section 6 of the release notes (See item 28 on page 31).

There is one more issue affecting the Query wizard in Exaquantum R3.20 this is documented as Item 27 in the release notes (page 31). This records the fact that the data returned by the OLEDB provider is not correct. This effects all queries where the data is requested for more than one item.

If the default time stamp data will in general be different for each item requested but the OLEDB provider will only return one timestamp column into Excel.

On the other hand, if a specific interval is requested data for all items will be returned for each interval meaning that only one timestamp column should be returned but currently this is not the case and a timestamp column is returned with each item value.

It has been discovered that this is due to a problem with the name used for the Timestamp column in the query. It is coded as TimeStamp with an uppercase S. This is incorrect.

Editing the Query directly in Excel using the connection dialog and replacing TimeStamp with Timestamp will correct this issue.

Chapter 8 Other sources of information

Excel is covered in detail throughput our documentation set and in some FAQs that are available on our website. There are also training materials that can be accessed for more information.

The following list provides details.

8.1 Documentation

The use of the Excel/Explorer add-in is covered in detail in IM 36J04A12-03E – Exaquantum Explorer Users Manual Volume 3.

Installation and configuration of Excel add-in is covered in Chapter 2.12 and 10.19 of IM 36J04A13-01E – Exaquantum Installation Guide.

8.2 Training Courses

There are a variety of training courses available that cover use of Excel add-ins.

NTPP901 - Exaquantum Desktop Client Users Course

NTPP902 - Exaquantum Web Client Users Course

NTPP903 - Exaquantum Advanced User Course

For further details, please see the Training Materials section on our website:

https://ymx.yokogawa.com/training-exaquantum

8.3 Frequently Asked Questions (FAQs)

The support website contains many FAQs concerning Excel. These can be found at https://ymx.yokogawa.com/faqs

Some specific FAQs are listed below:

Why do I get an Automation Error Running the Excel Add-in even after installing a patch?

https://ymx.yokogawa.com/content/S636741813069565965/Automation%20Error%20Running%20the%20Excel%20Add-in%2088.pdf

After upgrading to a new version of Excel, the Exaquantum add-ins are missing and I cannot locate the files. Where are they?

https://ymx.yokogawa.com/content/S636748650292611165/Exaquantum%20add-ins%20are%20missing.pdf

There is no History data when using the Excel Addins.

https://ymx.yokogawa.com/content/S636749499462960279/There%20is%20no%20history%20data%20when%20using%20the%20Excel%20addins.pdf

8.4 Further Support

Further support can be accessed via usual Exaquantum support channels. This will be via a local affiliate in the first case, with escalation to YMX as second line support if required.