OPC Router 4.28 User Guide



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Introduction

Dear reader,

the OPC Router is a software router for freely configurable data transfers between OPC servers (and thus controllers) and databases (and thus any MES, ERP and other business application programs). Extend the functionality of the OPC Router with additional plug-ins, e.g. to connect SAP systems or printers, to print labels, to execute self-written scripts for special connections or to send messages via e-mail or a Telegram bot.

If you want to use multiple OPC Router services, you can manage them via the central management.

The licenses for the OPC Router are unlimited in the number of configured connections and in the number and scope of data transfers. Data transfers can be triggered by various triggers.

This manual will show you the basics of OPC Router configuration. Please refer also to manuals of systems connected to OPC Router, e. g. to grant OPC Router access to these systems. If you need help setting up a plug-in or using a transfer object or

trigger, you can always request documentation for it by clicking the button in the respective window. On the "Welcome Page" you will find a link to the online documentation as well as other useful links, e.g. to our "Knowledge Base".

We apologize for not providing the complete manual in English yet. Please contact us to obtain the latest translation.

inray Industriesoftware is always willing to provide training courses as well as configuring OPC Router according to your needs. Please contact us for further information and offers.

Yours team of inray Industriesoftware

About the manual

This manual uses the following notations:

C:\Program files\inray\ log_1.txt http://localhost/	File names and paths, URL
Datasource	Names of parameters and objects' properties.
<datasource></datasource>	Place holder to be filled during development. (Delete brackets < and >!)
Dim TextHandle TextHandle.SetCoord 10,10	Source code samples and templates
"Change"	Names of controls, tabs, buttons etc. within GUI.
File-New or File - New	Menu/Submenu entries.

Terms used

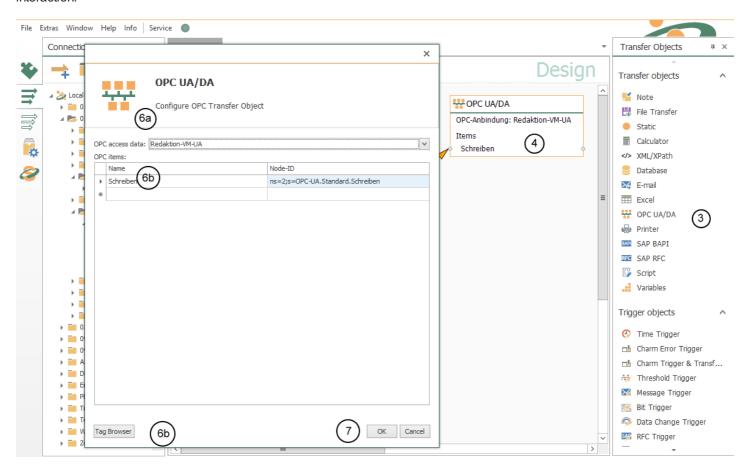
(set of) access data	Technically speaking: instance of a plug-in, e. g. the access data to one specific OPC Server, a specific database server etc. as in OPC access data, database access data etc
element (of a transfer object)	Part of a transfer object, e. g. a table's column within a database transfer object or an OPC item within an OPC transfer object or a specific variable used. Elements (sometimes also called items) are connected during development to define a transfer.
item, transfer object item	see "element". Not to be mixed up with OPC item, so mostly element is used.
configuration	"Configuration" means (as a rule) the basic settings and the creation of access data within the OPC Router Configuration (GUI). Whereas "development" or "projection" means defining connections (also via OPC Router Configuration GUI).
plug-in	Plug-ins provide the Router's functions, e. g. connection to OPC, database or mail servers, to ERP systems, as well as use of intern variables etc. Most plug-ins have to be licensed separately. The manual uses the term for all sets of access data of a specific plug-in also.
plug-in instance	see "access data".
development	see "projection".
projection	The process of defining connections (projection of transfers). i. e. the process of defining sources, destinations, triggers as well as (de-)activating. Also referred to as "development" in contrast to "configuration". However, OPC Router is both configured and projected via OPC Router Configuration (GUI).
snap-in	The dialogue left of the display

transfer	Data transfer during runtime. During projection the same as "connection".
transfer object	Source, destination or trigger of a transfer.
variable	As a rule, an instance of the variable plug-in, i. e. a variable to be used within transfers. Other variables carry special names like template variable or placeholder.
connection	Combination of at least one data source, one destination and one trigger. A connection defines how a transfer is executed: Which data is transferred under which condition to which destination.

Images

Some of the screenshots present several numbered mouse pointers. The numbers refer to the instructions in the text. Therefore, numbers might have been left out. The following example shows steps 3 to 7 of the specific chapter.

Several pop-up dialogs might be shown side by side, even if they open one after another, just to show the results of mouse interaction:



Installation/Update

OPC Router Setup will install OPC Router including management GUI, Windows Service, OPC Router Status (runtime supervision) including all plug-ins in trial mode (2 hours runtime). WebView2 is also installed with the setup. For this you need an active internet connection. After the license key has been entered, all plug-ins licensed will run unlimited while plug-ins not licensed will be deactivated.

OPC Router Setup will neither install database servers nor OPC servers to connect your PLCs. These components have to be installed separately. OPC Router's purpose is only to connect those components.

System Requirements

- .NET 6 (will be installed if necessary)
- hardware: We strongly recommend to run server applications on adequate hardware (multi-core processor, 4 GB RAM min., Raid-5-HDD). Should the database server run on the same system, 8 GB RAM is minimum
- Operating system: We recommend Microsoft Windows Server operating systems. Client operating systems (64 bit) can also be used for test purposes.

The following Windows versions are supported:

- Windows Server 2008 x64
- Windows Server 2008 R2 x64
- Windows Server 2012 x64
- Windows Server 2012 R2 x64
- Windows Server 2016 x64
- Windows Server 2019 x64
- Windows 7 x64
- Windows 8 x64
- Windows 8.1 x64
- Windows 10 x64
- Windows 10 loT x64

CAUTION

Attention: Productive operation with client operating systems: Due to technical limitations, inray explicitly recommends operation with server operating systems. Client operating systems, such as Windows 10, may experience unwanted behavior, unplanned reboots, and incomplete records due to unforeseen forced and forced upgrades. Other technical limitations, such as the limited number of incoming TCP / IP connections, especially in large projects, lead to downtime of connections.

Please inform yourself before installation, if an operation of the OPC router on a client operating system meets their requirements and is compatible with the license right of Microsoft.

- accessible OPC Server to communicate with PLCs (OPC DA 4.0, UA, XML)
- accessible database server (MS SQL, Oracle, MySQL and all others via ODBC. MS Access and writing/reading XML files supported as well)
- for connection to Oracle databases: installed Oracle instant client (ODAC)
- SAP plug-in supports SAP systems 4.0b or newer, log-on-pad has to be installed.

Installation/Update

CAUTION

Important: Before installing, check whether all system requirements are met. Read the security guidelines and follow the manual carefully.

OPC Router Setup installs all components needed and configures as follows:

Windows Service, starting automatically, meaning the runtime service executing data transfers will be started with the startup
of the system. Immediately after the installation, the router service does not run because no configuration has yet been
carried out. After the configuration (and after each update), start the service once manually via the button in the router
Management.

■ NOTE

Note: If the server does not have an Internet connection, the necessary certificates must be installed manually. Please contact the inray support.

Installation

- · Backup your system.
- OPC Router Setup might update or install Windows components. Therefore, quit all running programs.
- · Check whether system requirements are met.
- Execute setup.exe on your installation source.
- · Select one of the three install options.

Complete

This is the default installation. This installs the OPC Router 4 completely. Follow the introductions of the installer.

Management

Herewith you install only the OPC Router Management. Use this function if e.g. the OPC Router is present on a Docker and you want to connect to it. Follow the instructions of the installer.

Custom

Select which functions you want to install. To do so, tick the corresponding function.

After setup is completed you can configure OPC Router.

Update

Updating from a 4.x to a newer 4.x version means removing the old version and install the new version. Your project files remain unaffected.

We recommend to test a new version within your deployment or QA environment. Thus you ensure that your project file is compatible with the new version. As a rule, OPC Router 4 automatically adjusts project files to new versions.

- Backup your system.
- 2. OPC Router Setup might update or install Windows components. Therefore, quit all running programs.
- 3. Check under which user the OPC Router service runs, and remember.
- 4. Remove OPC Router 4.x via control panel. Project files remain unaffected
- 5. Check whether system requirements are met.
- 6. Execute setup.exe on your installation source.

- 7. Follow the setup routine.
- 8. Check the user context of the service. If necessary, reconfigure according to step 3.
- 9. Open the OPC Router Management.
- 10. Turn the project productively.
- 11. Restart OPC Router Service.

Update OPC Router to .NET 6

The OPC Router versions require the installation of .NET 6 on the server. .NET 6 is a Windows component and may requires some Windows updates.

□ NOTE

Note: If an error with the content "The File 'createconnections.exe ... is not marked for installation." occurs during the installation, there is a conflict with a preinstalled Heidenhain x86 component - this should be uninstalled before installing the OPC Router.

Overview

The OPC router 4 management contains the Management, the possibility of productive switching and the status display at runtime.

You will also find there

- OPC router converter, which converts OPC router 3 projects
- OPC router service Status, which executes the data transfers as a run-time component.

Management is being started via start menu (Programs – inray – OPC Router).

OPC Router Management executes all steps of bringing OPC Router into service, including licensing:

- 1. Configuration of plug-ins needed, e. g. access data of accessible OPC and database servers, definition of variables (Chose plug-in in project configuration tree, left-hand side, then edit on corresponding tab).
- 2. *Projection (of connections):* Which data is to be transferred when wherefrom where? (Create and open connections in left-hand side project configuration, chose transfer objects on right-hand side toolbox, edit on corresponding tab)
- 3. Productive switching of the whole project or individual connections.
- 4. Start service if service has been running (default), restart is executed automatically (button).
- 5. Monitoring and error diagnostics left over the snap-in directory on button "Status".

The following chapters describe the steps in detail. Please note that only licensed plug-ins are accessible.

The entire project is stored in local databases (MongoDB), including the transfer protocol.

□ NOTE

Remember: Project backup: If the entire computer (VM, disk backup) is not backed up, the program directory of the router where the database files are located should be backed up.

OPC Router Service is the runtime component, working in the background as a Windows service and executing the data transfers. The service must be restarted after changes to plug-in configurations, individual connections can also be productive without restarting. Individual configuration regular is only necessary for use in systems with windows authentication.

64-bit-environments

The OPC router setup will automatically set up the service for the 64-bit architecture.

CAUTION

Important: If you provide 64-bit drivers for connection of external systems (e. g. SAP systems, OLE-DB driver) only in a 32-bit version, you must configure the router service manually.

- 1. Go to "Service" in the top menu bar.
- 2. Under menu "Service", select "Registry".
- 3. Force the entry to "Register with: 32 bits".
- 4. Restart the OPC router.

Copyright

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Security Guidelines

OPC Router is being installed via a simple setup program. The GUI makes configuration and development (of Router projects) simple as can be. Nonetheless it is very important to read and follow these guidelines carefully to avoid data loss and resulting damages and ensure data and system integrity.

□ CAUTION

Important: Please consult your system administrator before installing or updating and follow your company's own policy or code of conduct concerning software. We strongly recommend that access to the computer with OPC Router installed is limited and for authorized staff only. Keep in mind that access data to connected systems have to be stored on this computer.

Knowledge assumed

Installation, configurations and administration (as well as understanding the manual) assumes the following knowledge: Administration of Windows operating systems, IT security, knowledge about 3rd party systems connected (e. g. database administration, OPC Servers, MES, ERP systems used in this context).

Installation and Update

- 1. We recommend to backup your production system before installing or updating.
- 2. OPC Router Setup might update or install Windows components. Please exit all running programs before installing.
- 3. We strongly recommend to ensure that existing configuration is compatible with any update before updating your production system (e. g. update test within quality control environment)
- 4. If you change the installation path proposed by the setup routine, please remember your settings to simplify any support by inray.

Development

Router projects can be developed within your production system. However, we recommend to backup your system before installing new plug-ins or activate new transfers. If you are testing new transfers within your production system, please remember to backup your database and ensure data consistency. We recommend to test all Router projects thoroughly before going productive.

DANGER

Testing your Router projects within production environment might, dependent on your transfer configuration, result in changing your production facilities' configuration (via programmable logic controllers, PLCs) and result in loss of material or severe damage of machinery. Please be sure that only authorized and qualified staff activate such projects. inray takes no liability for such self-inflicted damages (see below).

Limitations of Liability and Warranty

The OPC Router and its manual are provided by inray Industriesoftware GmbH "as is" and any express or implied warranties, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose and non-infringement, are disclaimed. In no event shall inray or their suppliers be liable for any direct, indirect, incidental, special, exemplary, or consequential damages (including, but not limited to, procurement of substitute goods or services; loss of use, data, savings or profits; or business interruption) however caused and on any theory of liability whether in contract, strict liability, or tort (including negligence or otherwise) arising in any way out of the use of this software, even if advised of the possibility of such damage.

inray Industriesoftware advises you to double check Router projects carefully before going productive. inray does not guarantee that Router projects developed according to this manual are compatible with future versions. Limitations of liability and warranty included in the end user license agreement EULA and/or other agreements between inray and the licensee remain unaffected.

Errors Excepted

This manual is adapted to the Router's development. However, inray Industries of tware does not guarantee that the information in this manual is always consistent with the current version of OPC Router. The manual is therefore subject to errors, especially where 3rd party systems are concerned (Windows components, OPC configuration). Please check manuals of 3rd party systems regularly.

Settings

The following options can be set by opening "Settings" in the project configuration. Select a runtime like "Local service" and click on "options".

Runtime

Connection time-out	Time (in s) that the connection may take before a connection error is returned.
System Metrics update Interval (s)	How often system data is transferred to the OPC Router License Portal

Message group

Storage time for events	Time range in which the data are kept.
Storage time for transferred values	Time range in which the data are kept in case of faults.
Log transferred values	Activate if transferred values are to be recorded
Size of ring buffer	Select the needed size of ring buffer.
Maximum log size for transferred values (GB)	Specification of the maximum log size for transferred values in GB. Setting how far the OPC router is allowed to fill the status databases. We recommend 8 or 9 GB for the database.
Maximum log size for events (GB)	Specify the maximum log size for events in GB.
Maximum amount of signs status	Limitation of the number of displayed characters of transferred values in the status view. This only affects arrays and strings.

Project backup

Project backup	Select when to perform an automatic project backup.
Maximum number of stored backup files	Number of project backups that are kept. If this number is exceeded in the target directory, the oldest project backup is automatically deleted.
Backup directory	Destination directory where the project backup will be saved.

Log output

Log all transfers	Writes all transfers to log file. This option overrides deactivation of logging in single connections.
Zip log files	This setting affects only the log files of the service. At the change of the day, the service automatically compresses the log file of the last day into a zip file. The associated text file will be deleted afterwards. Depending on the project, the required hard disk space can be significantly reduced.

Error	Logs errors. Recommended during normal operation.
Warning	Logs warnings. Recommend during normal operation.
Trace	Detailed logging to trace errors. Should be deactivated during normal operation.
Debug	Logs debug information for developers. Should be deactivated during normal operation.
Log folder	Folder for log files (default: < OPC Router-Program folder > \LogDir).

You can log the Router's activities in several levels. During normal operations, we recommend to log warnings and errors. The log file remains small, and if an error occurs, you have got detailed information. If an error occurs, activated "Trace" to log more information to find the error's cause. Open the log file with right click on the router's tray icon, then "Open log file".

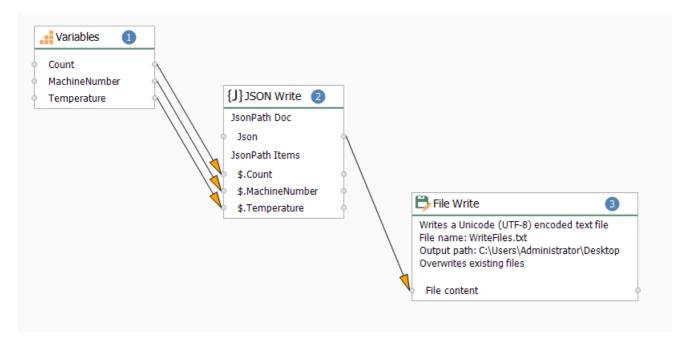
Every time an OPC Router process is started, it issues a message with its current version.

Language of Configuration

Use menu "Extras - Select language" to switch the language. You have to restart OPC router Configuration to complete switching.

Show transfer steps

If you want to see in which order your transfer objects are executed in the connection, you can switch it on or off under "Information - Show transfer steps".



Resetting the database to factory defaults

In the expert mode: At "File - Database settings" you have the possibility to reset the database to the delivery state at the tab "Delete database" content. In this area you can still select whether you want to delete all connections, all plug-ins or all router settings. If you select Delete all connections, all templates will be deleted!

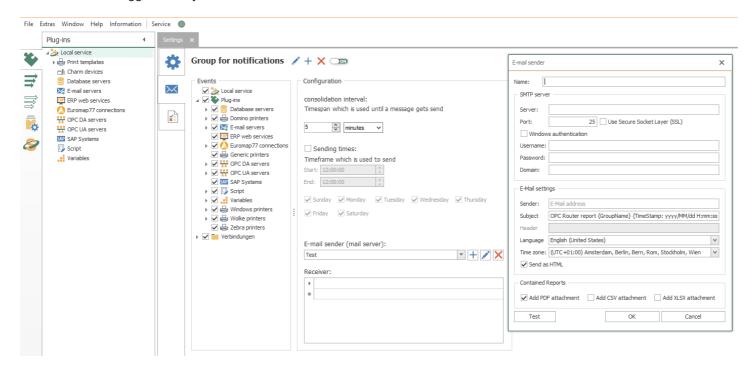
Notification group

Via the menu item "Extras - Settings" you will find the notification area at the button for the basic settings.

The mail can be used for the following scenarios:

- transfer error
- plug-in error, plug-in again responsive
- connection error (plug-in / trigger error)
- runtime was stopped / started

At this point, enter all the shipping information and select the areas to which the notification applies in the list of events. You can also give a name for the notification via the settings. Click on the pen button. To rename an existing notification, click the plus sign. With the On / Off-ToggleSwitch you activate the notification or deactivate it.



Settings

consolidation interval	The amount of time before a message is sent.
Timespan which is used until a message gets send	The length of time in which you can send. Events outside of this range are collected and sent later. Enter a start time and an end time and, if necessary, activate a weekday by activating an appropriate checkbox.
E-Mail sender (mail server)	Select a mail server as sender from the drop-down menu. To add a mail server, click on the button with the plus sign and make the settings. To edit or delete a mail server, select the appropriate buttons.
Receiver	At this point, enter the recipients who should receive this notification.

E-mail sender name

Name	Give the e-mail notification a name.

Server	Name of the server.
Port	Port on the server, which is used for the mail traffic.
Use Secure Socket Layer benutzen (SSL)	Uses SSL encryption. The server must support this, the appropriate port must be set.
Windows authentification	Alternatively, uses the user under which the router runtime is running (default: "system").
Username	Username for logging on to the server (SMTP or NT authentication).
Password	Password to log in to the server (SMTP or NT authentication).
Domain	Domain to which the user is registered. (For login to the server via NT authentication)

E-Mail settings

Sender	Enter the sender e-mail address. The sender must have the format of a mail address (name@domain.xx).
Subject	Enter a subject for your notification. Max 255 characters are possible.
Header	Extended entry of a header possible.
Language	Select a language from the drop-down menu.
Time zone	Select a time zone from the drop-down menu.
Send as HTML	Activate the checkbox if you want to send the notification in HTML format.

Enthaltene Reports

Add PDF attachment	Activate the checkbox if you want to send a PDF file.
Add CSV attachment	Activate the checkbox if you want to send a CSV file.
Add XLSX attachment	Activate the checkbox if you want to send a XLSX file

The "Test" button allows you to verify that the server connection is working.

Confirm your entries with "OK".

Certificate management

Via the menu item Extras–Settings you will find the certificate management area next to the button for the basic settings. In this area you can import certificates, create your own certificates or view existing certificates.

The following buttons are available:

Import: With this button you have the possibility to import certificates from your PC into the OPC Router certificate administration. They will be available later in the drop-down menus of the individual applications.

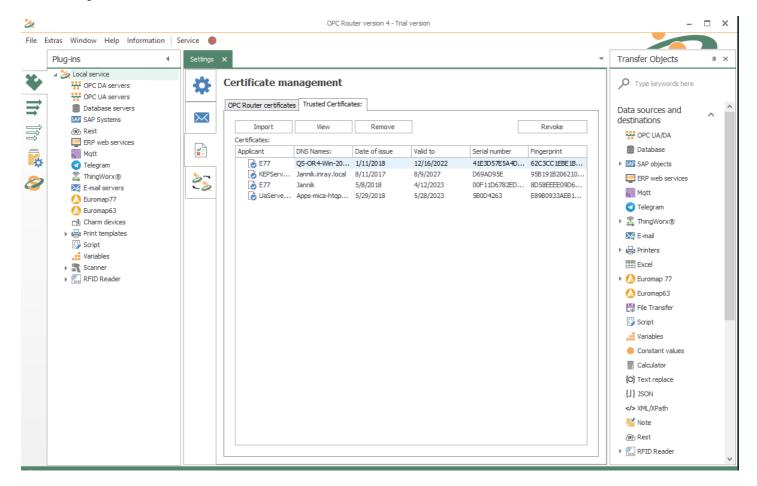
View: Select a certificate in the list and click the "View" button to display the details and the path for the certificate.

Add private key: The private key is the secret key that will later be used to sign the encrypted connection. The private key is created by you and should not be made public. A private key can only be added for OPC Router certificates and not for trusted certificates.

Remove: Select a certificate and click the "Remove" button to delete this certificate from the list.

Create: With this button you can create your own certificates. Enter the appropriate properties and confirm your entries with "Create". You can only create OPC Router certificates and not trusted certificates.

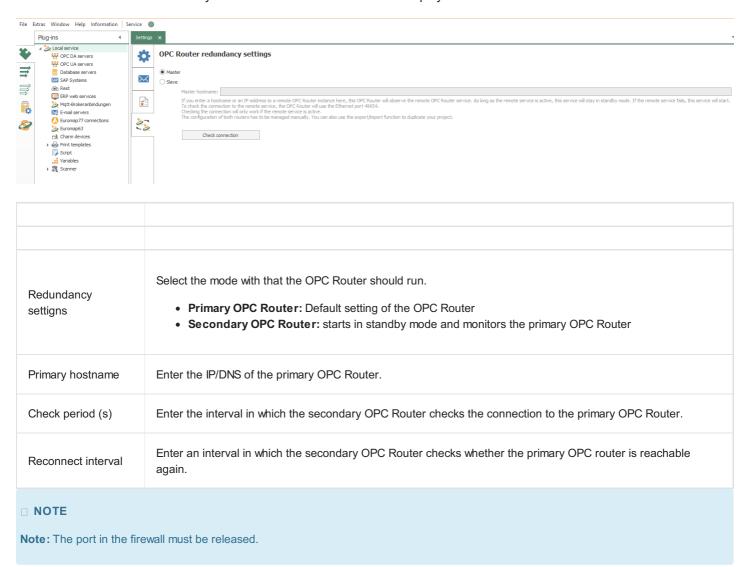
Revoke: Trusted certificates can be invalidated using the "Revoke" button. You can then only re-import it to use it as a valid trusted certificate again.



Redundancy

Via the menu item Settings, you will find the redundancy settings. This way, the OPC router can be protected against failures.

There is a "Primary OPC Router" and a "Secondary OPC Router". Here only the port in the firewall must be released. If the connection leaves from the secondary OPC Router to the primary OPC Router, the connections are switched to active and begin to transfer. This is shown in green in the status display. If the secondary OPC Router can reconnect to the Primary OPC Router, the connections switch back to standby. This is shown in blue in the status display.



The state changes due to the redundancy are logged. A log entry is created when the redundancy becomes active (master has failed) or becomes inactive again (master is reachable again).

□ WARNING

Attention: SAP® triggers and ThingWorx® triggers can be problematic in redundancy operation with identical user data. There are problems because the plug-ins are also initialized in the secondary system and want to access the same user data, which can lead to errors in the assignment of sessions with SAP® and ThingWorx® connections.

Store and Forward

Via the menu item Extras - Settings you will find the Store and Forward button.

Store and Forward can be used to cache data when servers are unreachable.

To enable Store anf Forward, click the slider at the top so that it is turned ON.

□ WARNING

Attention: Even with Store and Forward enabled, it must be additionally enabled in connections you want to.

Settings

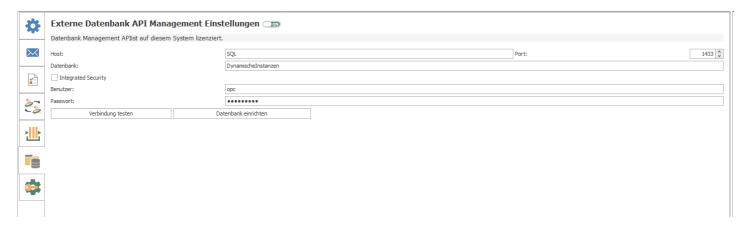
Enable storage time	Specifies the maximum time in hours that the router keeps the recorded values. After this time has elapsed, without the plug-in coming out of the error state again, the values that are too old are discarded.
Storage in GB	Maximum storage capacity that the OPC Router provides for the buffered values. Indication in gigabyte.
Behavior when memory capacity is reached	 Connection error: The configured connection switches to error state. Ignore: No further data is recorded.
Activate store and forward as default for new connections	Enable this option if you want the Store and Forward option to be enabled for newly created connections.

Dynamic instances API

Via the menu item Extras - Settings you can find the button Dynamic Instances API Settings.

Dynamic instances allow you to generate as well as remove connections at runtime.

More information about dynamic instances and how to use them correctly can be found here: Dynamic instances



Settings

Host	Specify the DNS or the IP of the database host
Database	Specify the name of the database where the tables for the dynamic instances should be stored
User data	Enter the user data for the database. When using the Windows user data the OPC Router runtime must be logged on in the correct context.

Licensing

Licensing procedure

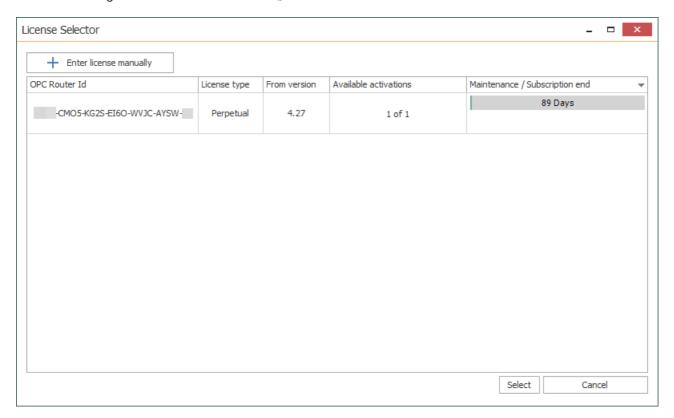
Every inray software can be run without a license for two hours after installation. In demo mode you can extensively test all standard modules. After entering the license key, the actually licensed modules are usable depending on the license, the other modules remain in the two hours demo mode.

If you need a longer demo license, it can be issued by our sales department e.g. for a 30-day demo license. Please contact our sales department for this.

Licensing is done via the inray license portal. Licensing can be done online as well as offline.

For online licensing proceed as follows:

- 1. Select a service like "local service" and click on "Licensing".
- 2. Select "Online Licensing".
- 3. Log in to the OPC Router license portal via the "Log in" window. If you do not have a user account yet, you can create a new user account or log in with your existing Microsoft or LinkedIn account.
- 4. After successful login, the login window closes and "Enter system data" opens. Enter the necessary data here.
- 5. Select an existing license or add a new one via "Add new license".



- 6. Confirm.
- 7. The licenses are taken over directly and there is no need to restart the OPC Router Service. In addition, you will see the runtime for each licensed plug-in and add-on.

For offline licensing proceed as follows:

- 1. Open the license manager of the OPC Router. Select the corresponding runtime and click on "License". Alternatively click on "Licenses" in the runtime.
- 2. Select "Offline licensing".
- 3. Save the Request.txt file to upload it from an internet-enabled device.
- 4. Use an internet-enabled device to access the homepage https://license.opc-router.com/.
- 5. Sign in the OPC Router License Portal. You can create a new user account or log in with your existing Microsoft or Linkdln

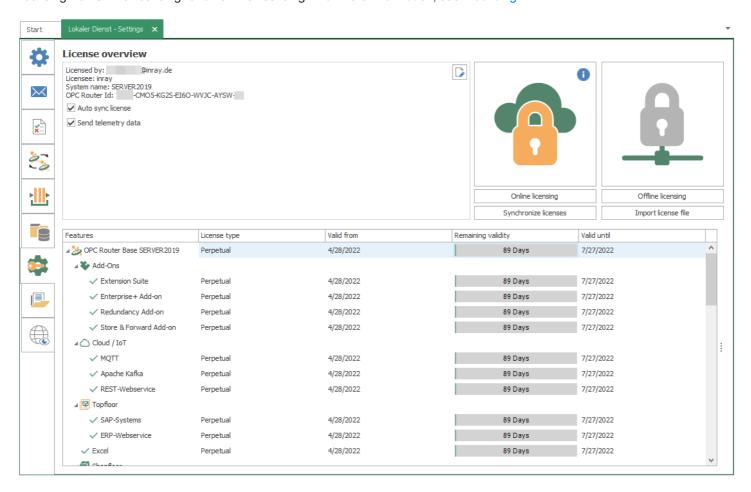
account.

- 6. After successful login, you will see an overview of your licenses. If the desired license is not included, you can select the license via "Add License key".
- 7. Behind the desired license, under Activate, you will find a key icon. Click on the icon.
- 8. Follow instructions in the pop-up and upload the Request.txt file.
- 9. Confirm with "Activate". Now an activation.lic file is downloaded.
- 10. Copy the activation.lic file to your server on which the OPC Router is installed.
- 11. Enter the necessary data in the "Enter system data" window.
- 12. Click on "Import license file" in the OPC Router. Use the "activation.lic" file.
- 13. Now your OPC Router is licensed. In addition, you will see the runtime for each licensed plug-in and add-on.

Future system enhancements will be licensed to your specific customer name and system ID. License keys are credited to your account and do not need to be entered separately.

Licence overview

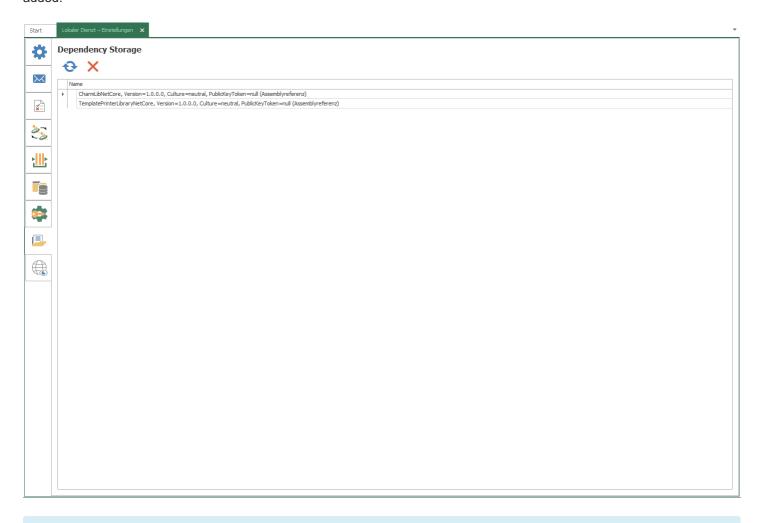
The license overview is located in the settings under "Licensing". In addition to the license overview, you will also find the option for licensing via "Online licensing" and "Offline licensing". For more information, see Licensing.



Features	Here you can see all features that the OPC Router offers. The Add-Ons are also displayed here.
Licence type	The type of license is displayed here. Types of licenses: • 2 hours runtime test, if no license is available • Subscription • Perpetual • Educational • Demo If the support and update entitlement has expired, this is also indicated in the license type. If a license is invalid for this version, this is also indicated here.
Valid from	From when the license is valid
Remaining validity	Represents the remaining time as a bar and howlong the license is still valid. Here you can also see for howmany days the license has expired.
Valid until	Until when the license is valid.

Dependency Storage

In Dependency Storage, you can manage all added assemblies. You can update the list or delete those that have already been added.



□ NOTE

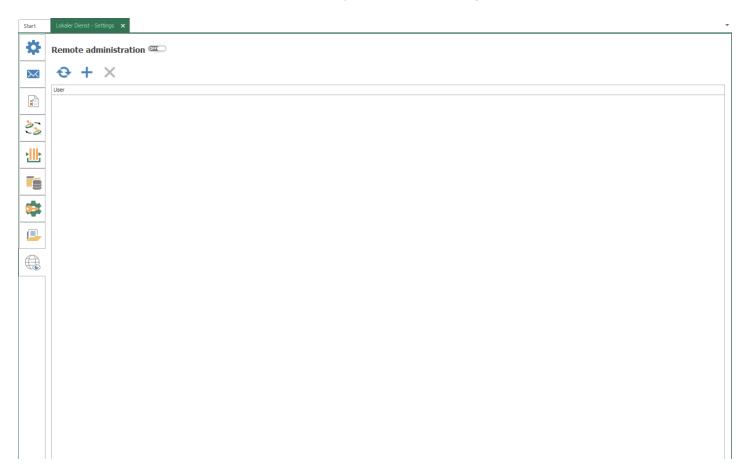
Note: The assemblies are added in the Script Editor.

Remote management

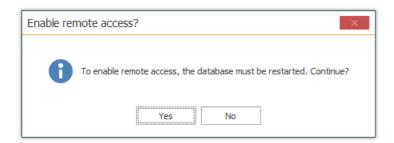
The OPC Router allows you to manage multiple runtimes. These can be connected via Docker, see central management, as well as via Windows as before.

Windows

To access an external OPC Router runtime on a Windows system the remote management must be activated.



To be able to activate this, a new user must be created. To do this, click on to activate the remote management. Confirm the message that the database is restarted. After that the remote management of the OPC Router is activated.



If you disable remote management, the database must also be restarted. After that, the runtime is only available locally again.

Docker

If you want to access an OPC Router runtime in Docker, this function is activated by default and the user that was created when the runtime was created will be stored here as user. Remote management cannot be disabled in this case. The created user in the Docker setup is then stored in the database. For more information about the Docker setup, see Service Settings.

Central management









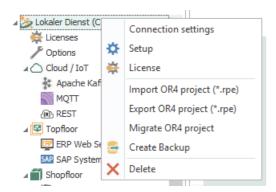
You can connect several OPC Router services in the OPC Router management. You have the following options:

- Integrate existing service
- Set up Docker manually
- Docker assisted setup

All 3 options are explained below.

Service Settings

You can take settings for the runtime. On the runtime click the right mouse button.



Connection settings

Set the connection settings.

Name	Change the name of the runtime
Username	Enter an username for the login
Password	Enter a password for the login
Enable TLS	Enable TLS for a secured connection

Manual connection information:

Server IP	Enter an IP where the runtime is running.
Port	Enter a port where the runtime is running.

Connection String:

Uri	Enter the uri for the connection.

With "Test connection" you can check whether the runtime is available.

Settings

Take settings on the runtime. You can find more information at Settings.

Licensing

You can license the runtime. You find more information at Licensing.

Import OR4 project (*.rpe)

You can import a existing runtime. For that select a project.

After that you get an overview over possible conflicts. Select how the OPC Router should handle these conflicts:

- · Overwrite existing connections
- · Keep existing connections
- Rename imported connections

After that select how the OPC Router should handle the set of access data.

You have these opinions:

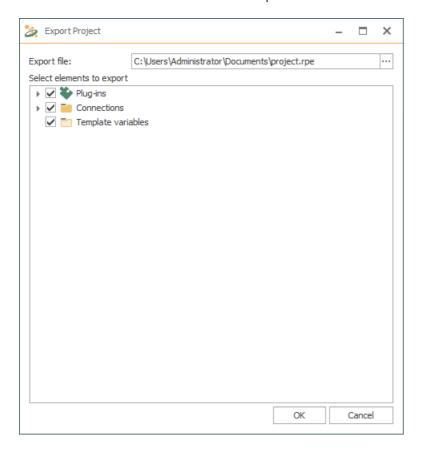
- · Keep existing set of access data
- · Rename imported set of access data
- · Replace existing set of access data

After that click OK.

Export OR4 project (*.rpe)

You have the opinion to export a project. At "Export-File" click the button on the right side.

After that select which elements should be exported.



Click OK to export the project.

Migrate OR4 project



With the migration the configuration database will be cleared. All settings which you had set get lost.

If you migrate a project all connections and settings are taken over. The database will be overwritten.

Project which are created with version 4.18 or later will be converted vom SQL to MongoDB and are on the version 4.25.

Create Backup

Use this function to make a backup of the runtime and the OPC Router management.

You can copy the path of the file.



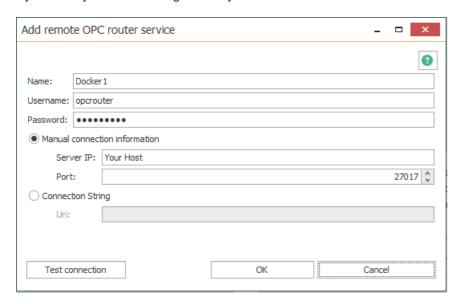
Click "Create" to start the process.

Delete

You can delete not needed runtimes.

integrate existing runtime

If you already have an existing runtime you can connect to it. Click on the OPC Router icon and click "Integrate existing runtime".



Enter the required data.

Name	Name of the runtime in the overview
Username	Enter the name of the corresponding user here to be able to connect to the runtime.
Password	Enter the appropriate password here to connect to the runtime.
Manual connection information	Select this option if you want to connect to the runtime via IP address and port. Server IP: IP address of the server Port: Port of the server
Connection String	Select this option if you want to connect to the runtime using the connection string. Uri: Uri string for the connection to the server

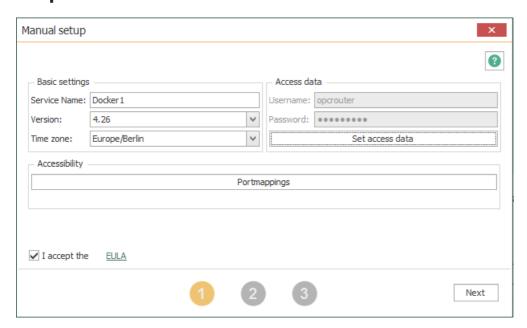
Uri example: mongodb://[IP]:[Port]/?readPreference=primary&appname=OPCRouter4Tests&ssl=false

Manual Docker setup

If you want to set up a new runtime and do this on your own, click on "Manual Docker setup".

The setup takes place in 3 steps, which are explained below.

Step 1



Runtime name	Enter the name of the runtime here, which is displayed in the overview in the router.
Version	Select here the version you want to use in the runtime.
Time zone	Select the appropriate time zone.
Set access data	Set the user data for access here. These are set via Windows security.
EULA	Accept the End User License Agreement to continue.

Portmapping

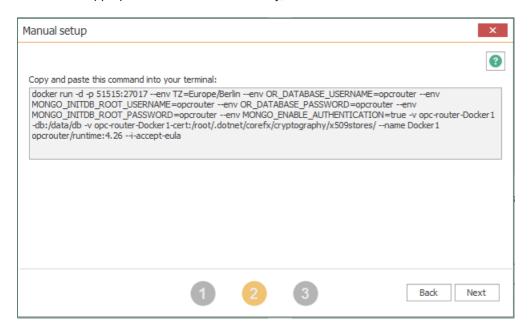
Enter here the ports that the OPC Router can use for functions to send data via.

Exposed Port	Port, which must be addressed on the remote server for the respective function.
Internal Port	Port, which must be addressed on Docker for the respective function.
UDP	Specify whether to use UDP or TCP. Note: f the field has a filled square, it has not yet received a value assignment and is accordingly NULL.

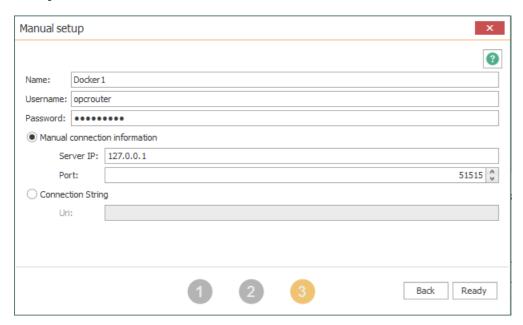
Step 2

After the setup, you will see the Command. Copy this command into the terminal on the PC where you installed Docker. If you do

not have the appropriate version installed locally, it will be downloaded.



Step 3



In the last step you will be shown an overview of the respective settings. Here you can enter the IP address of the respective server on which the runtime is running.

NAME	NAME OF THE RUNTIME IN THE RUNTIME OVERVIEW
Username	Enter the name of the corresponding user here to be able to connect to the runtime.
Password	Enter the appropriate password here to connect to the runtime.
Manual connection information	Select this option if you want to connect to the runtime via IP address and port. Server IP: IP address of the server Port: Port of the server

NAME	NAME OF THE RUNTIME IN THE RUNTIME OVERVIEW
Connection String	Select this option if you want to connect to the runtime using the connection string. Uri: Uri string for the connection to the server

Example Uri: mongodb://[IP]:[Port]/?readPreference=primary&appname=OPCRouter4Tests&ssl=false

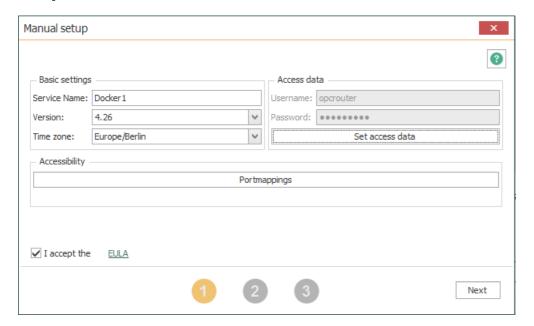
Automatic Docker setup



If you want to set up the runtime automatically, click on "Automatic Docker setup".

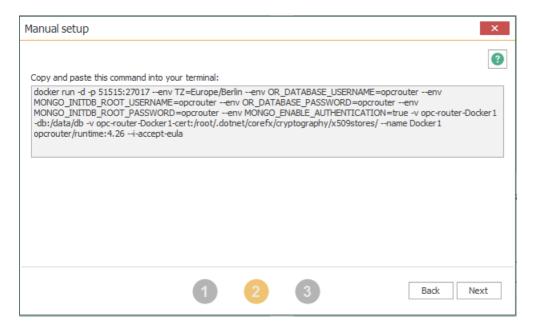
The 4 steps to set up are explained below.

Step 1



Host	Specify the IP address or DNS name of the host where the SSH server is running.
Port	Specify the SSH port of the host.
Username	Specify the name of the user who is logged in to the SSH server on the host.
Passwort	Enter the password of the user.
Keyfile	Select here the text file, in which is the Private Key, with which you can connect to the Docker via SSH.

Step 2



RUNTIME NAME	ENTER THE NAME OF THE RUNTIME HERE, WHICH IS DISPLAYED IN THE OVERVIEW IN THE ROUTER.
Version	Select here the version you want to use in the runtime.
Time zone	Select the appropriate time zone.
Set access data	Set the user data for access here. These are set via Windows security.
Accessibility	Set the ports for access here.
EULA	Accept the End User License Agreement to continue.

Portmapping

Enter here the ports that the OPC Router can use for functions to send data via.

Exposed Port	Port, which must be addressed on the remote server for the respective function.
Internal Port	Port, which must be addressed on Docker for the respective function.
UDP	Specify whether to use UDP or TCP. Note: f the field has a filled square, it has not yet received a value assignment and is accordingly NULL.

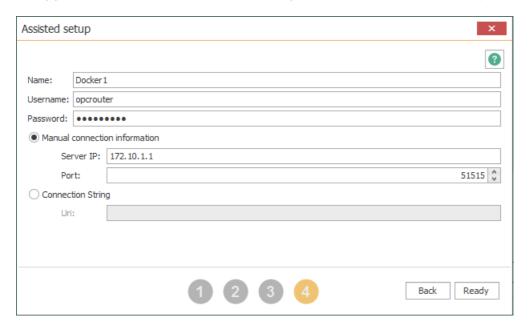
Step 3

If you do not have Docker on your system yet, this step will install it. After that the version of the OPC Router will be installed on Docker. Click "Next" if all steps are successful. The following steps are followed for installation and execution:

- 1. A connection to the host is established via SSH.
- 2. After that, it checks if a connection to the Docker Hub can be established.
- 3. This checks if a Docker installation is present. If not, Docker will be installed.
- 4. In this step the image of the OPC Router will be downloaded.
- 5. Finally, Docker run is executed, which starts Docker with the OPC Router runtime.

Step 4

Finally you will see an overview of all the necessary information. Click "Done" to complete the setup.



Plug-ins

□ NOTE

Note: Right-click on "Local Service" to get back to the basic settings area.

Cloud / IoT

To communicate with devices, you can use these plug-ins. Among other things, they are used with IoT, "Internet of Things".

apache_kafka

mqtt

rest

Apache Kafka

The Apache Kafka messaging protocol allows data to be transferred between devices.

You can use the Apache Kafka plug-in to generate queries from message log connections.

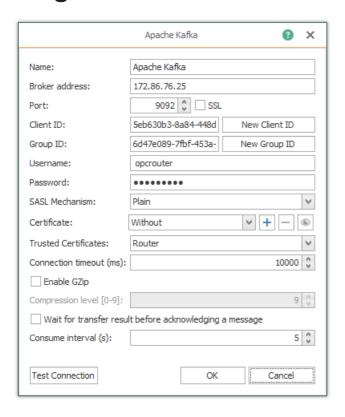
This operation is standard:

- 1. Open the plug-in by double-clicking on "Apache Kafka" at the Plug-ins menu.
- 2. Choose "Add new set of access data "or double-click on an existing entry.
- 3. Make the necessary settings (see section "Plug-in").
- 4. Confirm with "OK".

The Apache Kafka connection is now available for configuring a connection.

Use the "Test connection" button to check your connection.

Plug-in



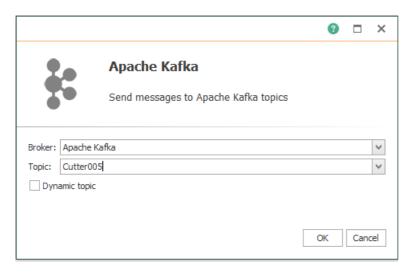
You set the following properties in the configuration of the Apache Kafka plug-in:

Name	Assign a unique name to the Apache Kafka connection.
Broker address	Enter the address of the broker.
Port	Uses SSL encryption. The server must support this, the corresponding Port must be set.
SSL	Verwendet SSL-Verschlüsselung. Der Server muss dies unterstützen, der entsprechende Port eingestellt sein.
Client ID	Display of the Client ID. The button "New Client ID" creates a new ID.
Group ID	Display of the Group ID. The button "New Group ID" creates a new ID.
Username	Username for logging in to the server.
Passwort	Password for logging in to the server.
SASL Mechanism	Used for authentication. SASL authentication is supported over both unencrypted connections and TLS connections. You have the following options: • PLAIN: Authentication with user and password. They are stored in the local Kafka configuration. • SCRAM-SHA-256/512: credentials are stored centrally in ZooKeeper. This option can be used when ZooKeeper cluster nodes are running in an isolated private network. • GSSAPI: Authentication at a Kerberos-Server.
Certificate	Selection of a client certificate from the drop-down list, which the OPC Router also sends.

Trusted Certificates	Select which certificates to accept. For example, all certificates, Windows certificates only, or router certificates only.
Connection timeout	Timeout in millisecond before the transfer gets cancelled.
Enable GZip	Enables zipping the messages. You can also define the compression level.
Wait for transfer result before acknowledging message	Only acknowlegde the message to the broker, if the wohle transfer was ok.
Consume interval (s)	Interval for the trigger to check for changed values of the topic.

Transfer object

To enable a connection proceed as follows.



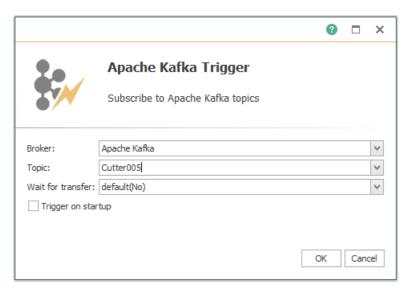
After double-clicking the transfer object, set the following properties:

Broker	Select a configured broker connection from the drop-down menu.
Topic	Enter the topic.
Dynamic topic	Activate if different topics are required. Topic can be defined variably via Input.

Confirm your entries with "OK".

Trigger

This trigger trigges if the Apache Kafka topic changes. Returns the payload and the key.



The individual properties are:

Broker	Select a configured broker connection from the drop-down menu.
Topic	Enter the topic.
Wait for transfer	Select whether and in what form to wait for the transfer.
Trigger on startup	Activate if the Router should trigger this topic if the OPC Router-service gets started.

MQTT

The Mqtt machine-to-machine messaging protocol allows telemetry data to be transferred between devices.

You can use the Mqtt plug-in to generate queries from message log connections.

This operation is standard:

- 1. Open the plug-in by double-clicking on "Mqtt" at the Plug-ins menu.
- 2. Choose "Add new set of access data "or double-click on an existing entry.
- 3. Make the necessary settings (see section "Plug-in").
- 4. Confirm with "OK".

The Mqtt connection is now available for configuring a connection.

Use the "Test connection" button to check your connection.

Plug-in

You set the following properties in the configuration of the Mqtt plug-in:

Router configuration:

Name	Assign a unique name to the Mqtt connection.
Cloud profile	Choose here between the default profile, Google IoT, AWS or Azure IoT.
Keep alive	The ping interval in which the OPC router sends a ping to the server. If no data comes in the interval, the router will abort the wait.
Wait for transfer	Wait for transfer causes the router to respond to the broker only after the transfer has completed or failed.

Cloud profile:

You can switch between different cloud profiles, which have different properties:

Google loT:

For instructions on how to create a connection to the Google loT Core platform, please visit our Knowledge Base.

Project ID	Enter here the name of the project you created to the Google loT Cloud.
Registry ID	Enter the name of the registry here, which was selected to the Google loT Cloud.
Region	Select the respective region here: • us-central1 • europe-west1 • asia-east1
Device ID	Enter the ID of the device to be connected here.
Certificate	Please select a certificate from the OPC Router Store or create a new certificate.

AWS:

For instructions on how to create a connection to the Amazon IoT Cloud, visit our Knowledge Base.

API endpoint address	Enter the address for the connection to the AWS Cloud here.
Import new certificate	Select this item if you want to import a new certificate.
Certificate	Select here the certificate from the AWS IoT Cloud.

Private key file	Select here the file from the AWS IoT Cloud. You can download this file beforehand. You can find more information about this on our Knowledge Base.
Select existing certificate	Please select a certificate from the OPC Router Store or create a new certificate.

Azure IoT:

For instructions on how to create a connection in Azure IoT Cloud, please visit our Knowledge Base.

Hostname	The name of the connection to the Azure IoT Cloud.
Shared access key name	The name of the policy to the Azure loT Cloud.
Shared access key	Enter the key to establish a secure connection.
Enter connection string	Open the pop-up to enter the connection string.
Device ID	Enter the Device ID for the device here.
Time to live (days)	Enter here the Duration of validity which is generated from the access key. When the time is expired, a new token is generated from the access key. Important: The shared access key does not need to be replaced.
Primary Device Dey	Select here if it should be a Primary Device.
Secondary Device Key	Select here if it should be a Secondary Device.

Connection properties

Broker connection	Enter the address of the broker
Port	Port on the server used for the Mqtt connection
SSL	Uses SSL encryption. The server must support this, the corresponding Port must be set.
Continuous session	Activate if a persistent connection is desired. Missed messages are sent afterwards.
Timeout	Length of time to wait to see if a connection can be re-established.
SSL protocols	Choose the protocols.
Client ID	Display of the Client ID. The button "Create new Client ID" creates a new ID.

Create new Client ID	Creates a new Client ID that is displayed in the Client ID field.
Username	Username for logging in to the server.
Password	Password for logging in to the server.
Certificate	Selection of a client certificate from the drop-down list, which the OPC Router also sends.
Accepted Certificates	Select which certificates to accept. For example, all certificates, Windows certificates only, or router certificates only.
MQTT version	Select the Mqtt protocol version from the drop-down menu.
Quality of Service type	Selection the Standard Quality of Service: • 0 = at most once • 1 = at least once • 2 = exactly one

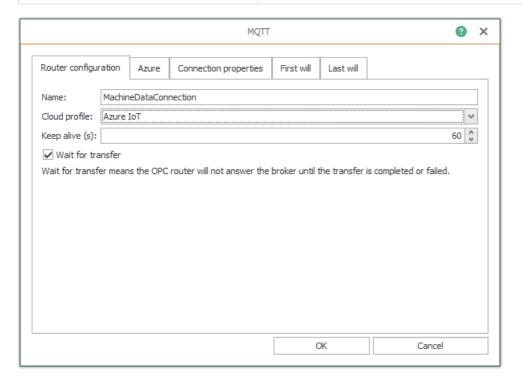
Tab: First will

Activate first will	Activate checkbox to activate the "First will" checkbox. Activity when establishing a connection.
Topic	Specifies which topic the first will to look at.
Payload	Specifies which user data is to be transmitted during communication.
Quality of Service	Selection the Quality of Service: • 0 = at most once • 1 = at least once • 2 = exactly one
Retain	Activate if you want the broker has to hold the data.

Tab: Last will

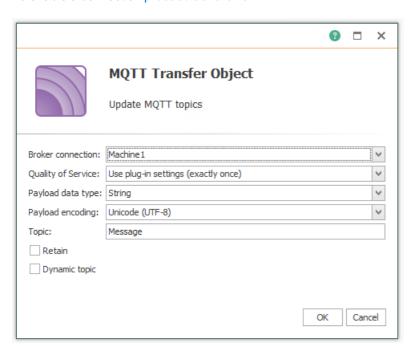
Activate last will	Activate checkbox to activate the last will. Activity before a connection termination.
Topic	Specifies which topic the load should look at.
Payload	Specifies which user data has to be transmitted during communication.

Quality of Service	Selection the Quality of Service: • 0 = at most once • 1 = at least once • 2 = exactly one
Retain	Activate if you want the broker has to hold the data.
Send last will when clearing connection	Activate if the last will to be sent even when the connection is terminated.



Transfer object

To enable a connection proceed as follows.



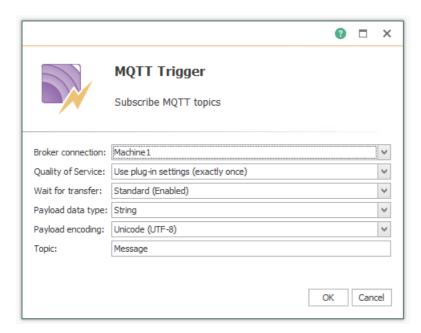
After double-clicking the transfer object, set the following properties:

Broker connection	Select a configured broker connection from the drop-down menu.
Quality of Service	Selection how often the query should be executed.
Payload data type	Selection of the data type Byte Array or String.
Payload encoding	Selection of the encoding for the Mqtt query.
Topic	Enter the topic.
Hold	When activated, the query result remains visible until a new one is generated.
Dynamic topic	Activate if different topics are required. Topic can be defined variably via Input.

Confirm your entries with "OK".

MQTT trigger

In the property mask you can set the binding parameters for your Mqtt query:



The individual properties are:

Broker connection	Select a configured broker connection from the drop-down menu.
Quality of Service	Selection how often the query should be executed.
Wait for transfer	Select whether and in what form to wait for the transfer.
Payload data type	Selection of the data type Byte Array or String.
Payload encoding	Selection of the encoding for the Mqtt query.
Topic	Enter the topic.

REST

The Rest plug-in allows you to submit queries from web services and generate mappings from them.



The operation is standard:

- 1. Open the plug-in by double-click on "Rest connection" at menu "Plug-ins"
- 2. Choose "Add new set of access data" or double-click an existing entry.
- 3. Make the necessary settings (see section "Plug-in").
- 4. Confirm with "OK".

The remaining connection is now available for configuring a connection.

With button "Test" you can check the connection.

REST Plug-ins

If you want to use the REST Plug-in you have the possibility to address a REST API via the REST connection and to provide an own API in the OPC Router. Both possibilities are explained on the following pages.

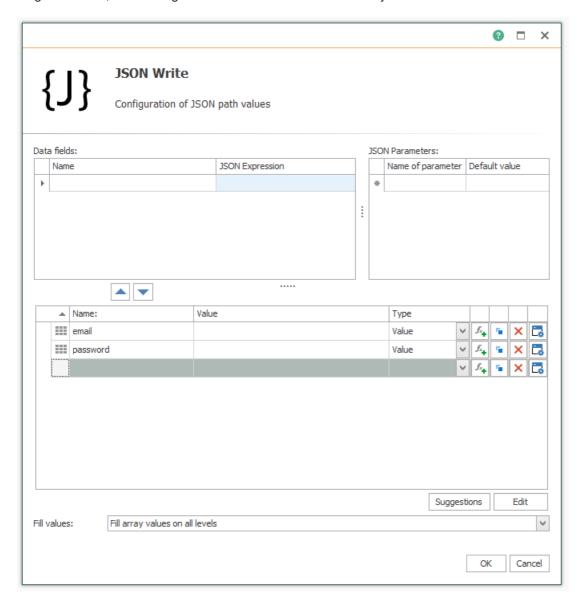
rest_connection_plug_in.md

rest_api_plug_in.md

Connection example for Bearer Token

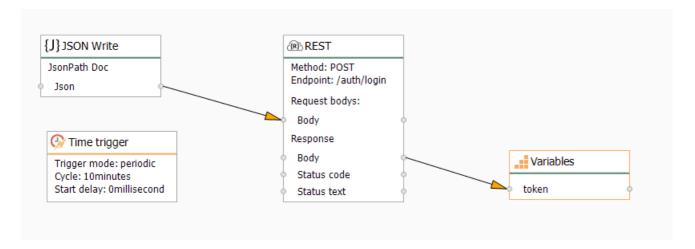
Collect token

To get the token, write the login data in the JSON Write transfer object in the table below.



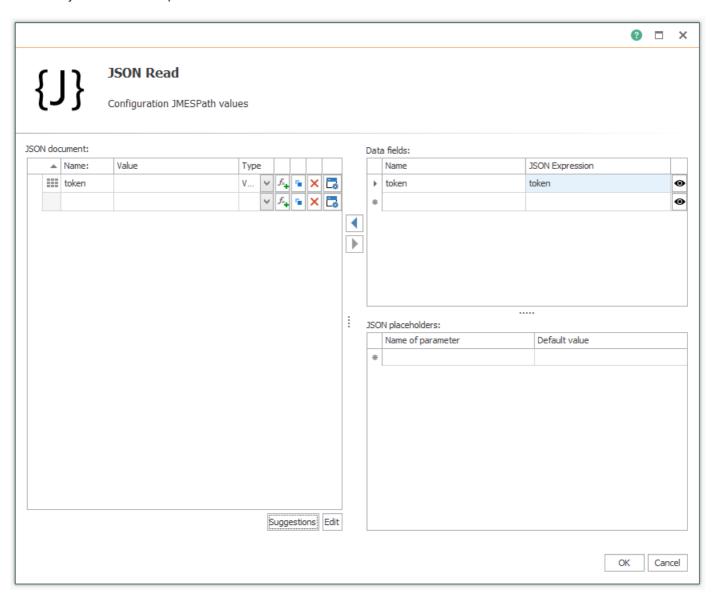
Define a REST transfer object. Include the REST plug-in here. Note that the login is set to None in the REST plug-in. Specify the corresponding URL endpoint. Select POST as the method. In the request, specify the "application/json" in the format. Connect the json parameter from the JSON write transfer object to the body parameter in the request body from the REST transfer object.

Create a variable with the name token, which is type-less. Connect the body parameter in the response to the variable. To execute the connection cyclically, include a time trigger and set the desired cycle.

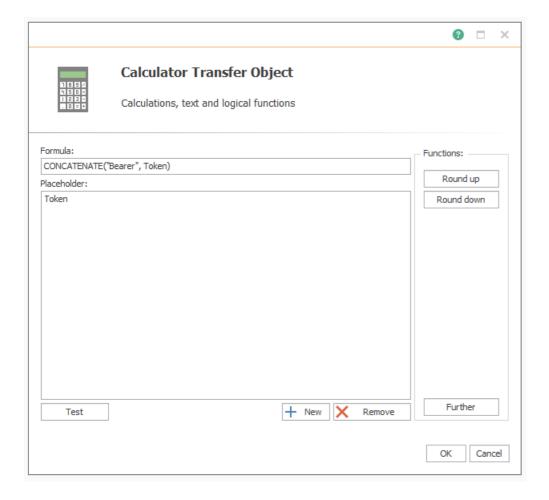


Pass token

Pass the token in a second connection. Drag a variable into the canvas and select the appropriate variable. Drag a JSON Read transfer object into the workspace and create a token element.



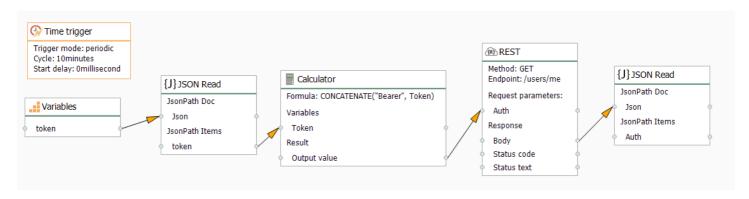
Drag the variable to the Json parameter from the JsonPath Doc. Create a calculator transfer object and select the CONCATENATE function via the "More" button. Create a placeholder using the "New" button. Enter the following parameters into the function as shown in the screenshot.



Connect the parameter from the JsonPath item to the variable of the calculator transfer object.

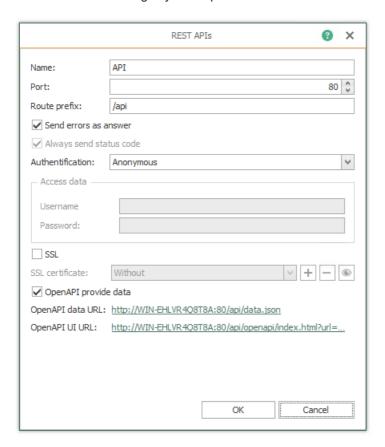
Create a new transfer object using the GET method. In the request, select the format application/json and create a parameter with the parameter type HttpHeader.

Connect the output value of the computer transfer object to the request parameter of the REST transfer object. Then connect the body parameter of the response of the REST transfer object to a desired other transfer object. To execute the connection cyclically, create a time trigger.



REST-API

With the REST API Plug-in you can provide an API in the OPC Router.



Assign a name for the API.
Assign the port to access the API here. Note: Be sure to share the port if you want to access the API from the network.
Set the prefix here, which must be specified after the IP address with the port. Example: 100.1.1.1:80/api
If an error occurs, the status code of Response is sent.
The status code is sent, for example, in the event of a successful transmission.
Specify how to authenticate from the outside: • Anonymous • Basic • Close API

Username (available with authentication method Basic)	Enter the username here.
Password (available with authentication method Basic)	Enter the password here.
SSL	Set SSL if you want the connection to be secured.
SSL certificate	Select a certificate here or create a new one.
OpenAPI provide data	Set this field if you want the API to provide data from OpenAPI.

Rest connection

With the REST connection, you can address an API to be able to read data.

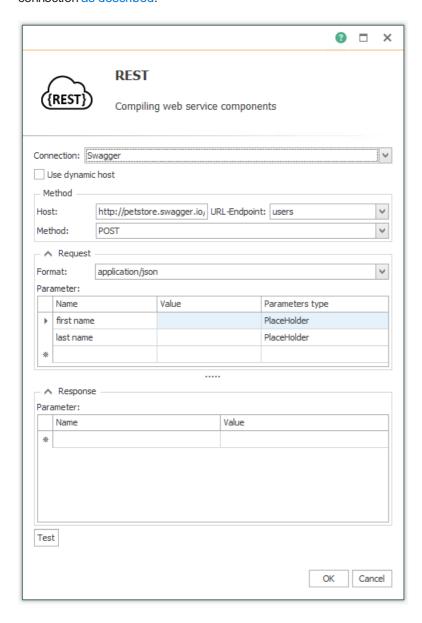


Name	Any name under which this connection appears in the connection configuration.
Host-URL	URL the web service to be connected.
OpenAPI-Path	URL, the programming interface API. The API transfer object sends the response data by means of the remaining trigger.
Authentification	If you need to log in to the web service, select the desired type here. You will receive this information from the administrator of the web service.
Http-Header	Fields for transferring the important http parameters.
Timeout (s)	Time (in seconds) that the connection may take before a connection error is returned.
Trusted Certificates	 Selection which certificates of the OPC router the user should trust. All: Every certificate is accepted. Router: Connection is allowed if the certificate is at the router certificate management and trusted. Windows: Connection is allowed if the certificate is found in the Windows certificate store.

Certificate	Selection of a client certificate from the drop-down list sent by the OPC router. You can use the plus sign to add another certificate and the minus sign to remove one. Another button allows you to display the properties of an existing certificate.

Transfer Object

Web service components can be combined with the remainder transfer object. Create a remainder transfer object within the connection as described.



After double-clicking on the transfer object, set the following properties:

Connection	Hostname of the web service.
Define dynamic host URL	Enable if hostname changes. You can also use the Test button to check the dynamic host.
Host	The address you created in the REST connection plug-in is displayed here.
URL- Endpoint	Enter the address for the endpoint. You can add variables for the URL by placing placeholders within the URL. For example: {URLPlaceholder1}. This placeholder will automatically be added to the request parameter section as UrlSegment and you can fill it through the OPC Router runtime.
Method	Select a method for the connection from the drop-down list.

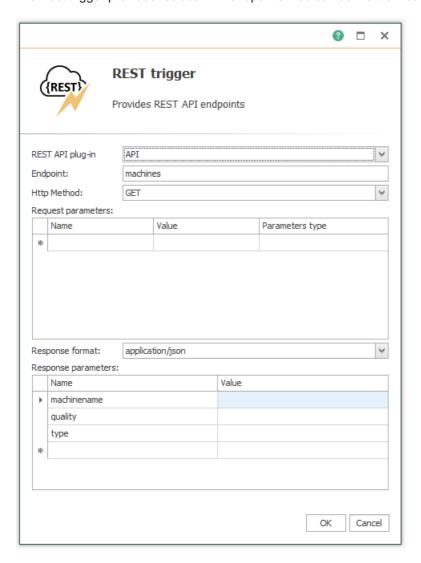
Format	Select the format for the connection from the drop-down list. e.g. Json or Xml
Request parameters	Determine the parameters for the request of the connection.
Response parameters	Determine the parameters for the response of the connection.
Test	About button "Test" determine if the connection is made. If you have checked the "Dynamic host" checkbox, this button opens a text field in which you can further define the URL endpoint in the "Host address" field. Check your entry with "Send".

□ WARNING

Attention: Please take care when entering the URL on uppercase and lowercase letters. The URLs are Case sensitive!

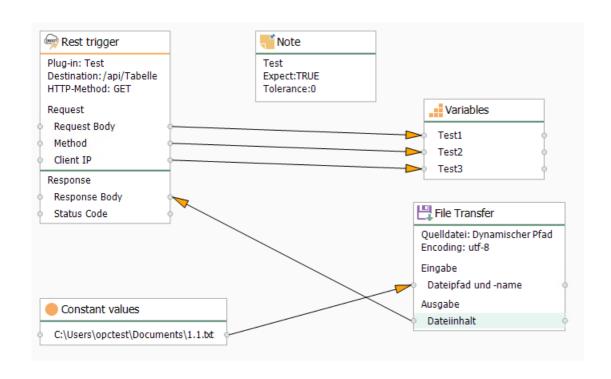
Trigger

The Rest trigger provides residual API endpoints. You can define the incoming and outgoing parameters in the properties mask:



The individual properties are:

Rest API Plug-in	Selection of a Rest connection from the drop-down menu.
Endpoint	Address of the OPC server (protocol: opc.tcp, http or https)
Http Method	Selecting the Http method from the drop-down menu.
Request parameters	Determine the parameters for the connection request.
Response format	Select the required format here e.g. JSON.
Response parameters	Determine the parameters for the connection response.

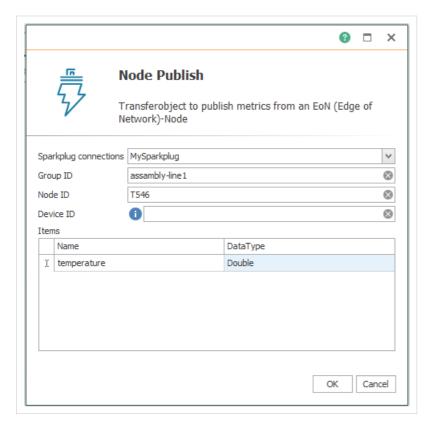


Sparkplug

Transfer objects

Node publish

The Sparkplug Node Publish transfer object allows you to send a defined payload to different applications. The different nodes can be narrowed down and reached via the filter options.

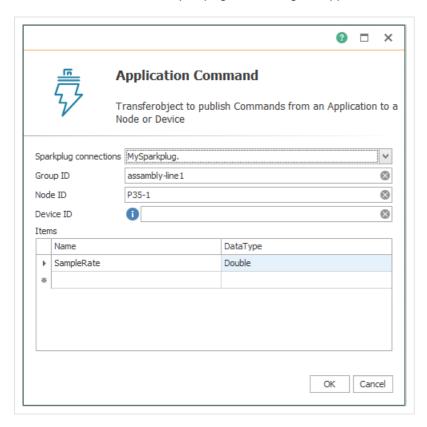


Only connections created for node profiles in the plug-in settings can be selected. Sparkplug-Anbindung Select a Sparkplug connection created under Plug-Ins. Group ID Select a Group ID for the transfer object. Leave the field blank to use the settings of the plug-in Node ID Select a Node ID for the transfer object. Leave the field blank to use the settings of the plug-in Device ID Optional Items Enter the payload data for the connection here. These can be supplied with data via arrows, as usual.

*

Application Command

You can send commands to Sparkplug nodes using the Application Command Transfer object.



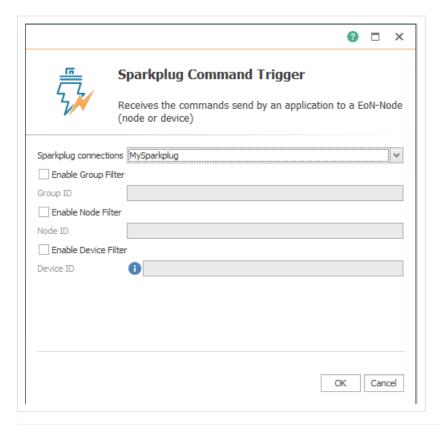
Sparkplug connection	Select a Sparkplug connection created under Plug-Ins.
Group ID	Select a unique Group ID.
Node ID	Select a unique Node ID.
Device ID	Optional
Items	Enter the payload data for the connection here. These can be supplied with data via arrows, as usual.

*

Trigger

Sparkplug Command Trigger

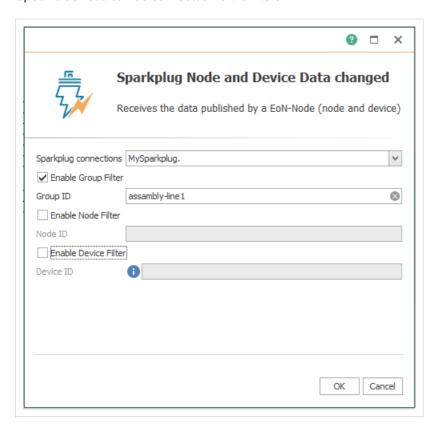
The Sparkplug Command Trigger can be used to receive commands sent by applications to the various nodes. The information contained can be output for further processing.



Only connections created for node profiles in the plug-in settings can be selected. Sparkplug connection Select a Sparkplug connection created under Plug-Ins Group Filter Specify a group filter for the trigger. Caution: The specified filters are of type string and filter mode is 'equal'. Node Filter Specify a node filter for the trigger. Caution: The specified filters are of type string and filter mode is 'equal'. Device Filter Specify a device filter for the trigger. Caution: The specified filters are of type string and filter mode is 'equal'.

Sparkplug Node and Device Data changed-Trigger

The Sparkplug node and device data changed trigger initiates a connection as soon as a connected device changes its data. Specific devices can be connected via the filters.



Sparkplug-Anbindung	Select a Sparkplug connection created under Plug-Ins
Group Filter	Specify a group filter for the trigger. Caution: The specified filters are of type string and filter mode is 'contain'.
Node Filter	Specify a node filter for the trigger. Caution: The specified filters are of type string and filter mode is 'contain'.
Device Filter	Specify a device filter for the trigger. Caution: The specified filters are of type string and filter mode is 'contain'.

Sparkplug Plug-ins

Sparkplugeinstellungen

Name	Vergeben Sie der Sparkplug-Anbindung einen eindeutigen Namen.
Variante	Wählen Sie die Variante Sparkplug A oder Sparkplug B aus
Profil	Bestimmen Sie das Profil der Sparkpluganbindung, mit der sich bei dem Sparkplug Broker angemeldet werden soll
Group ID (Nur bei Profil: Node)	Vergeben Sie eine frei wählbare eindeutige Group ID, die als default verwendet werden soll
Node ID (Nur bei Profil: Node)	Vergeben Sie eine frei wählbare eindeutige Node ID, die als default verwendet werden soll
Application Identifier (Nur bei Profil: Application)	Vergeben Sie einen frei wählbaren eindeutigen Application Identifier, die als default verwendet werden soll
Keep alive (s)	Angabe des Keep alive in Sekunden

Verbindungseinstellungen

Brokeranbindung	Geben Sie die Adresse des Brokers ein.
Port	Port auf dem Server, der für die Mqtt-Anbindung genutzt wird.
SSL	Verwendet SSL-Verschlüsselung. Der Server muss dies unterstützen, der entsprechende Port eingestellt sein.
Client ID	Eingabe einer eindeutigen Client ID.
Neue Client ID erstellen	Erzeugt eine neue eindeutige Client ID, die im Feld Client ID angezeigt wird.
SSL Protokolle	Wählen Sie die Algorithmen, die verwendet werden dürfen. Hinweis : Einige Mqtt Broker lehnen Verbindungen ab, falls zu alte Protokolle verwendet werden könnten.
Benutzername	Benutzername zur Anmeldung auf dem Server.
Passwort	Kennwort zur Anmeldung auf dem Server.
Zertifikat	Auswahl eines Client-Zertifikates aus der Drop-down-Liste, welches der OPC Router mit versendet.
Vertraute Zertifikate	Auswählen, welche Zertifikate akzeptiert werden sollen. Z. B. alle Zertifikate, nur Windows-Zertifikate oder nur Router-Zertifikate.

Topfloor

Overview over Plug-ins:

sap-r

erp_webservices



SAP® plug-in connects OPC router to all reachable SAP® systems (4.0b or higher) via IDoc, BAPI or RFC. Supported are all current SAP® systems (e. g. NetWeaver, ECC 6, R/3 ab 4.0b ...). Prerequisite are either the SAP® log-on pad or library librfc32.dll installed on the computer hosting OPC router. The library has to be stored at \Windows\System32. If the program is to run in 32-bit mode on 64 bit OS, the 32-version of the DLL has to be in. \Windows\SYSWOW64.

To use Netweaver, the SAP® NetWeaver RFC SDK must be installed. SAP® files have not be delivered by inray Industriesoftware GmbH. Therefore you need a current SAP® account (status 2018). The following link will help you: https://help.theobald-software.com/en/erpconnect/sap-connection/netweaver-dll.

When the librfc32 file is used, Microsoft Visual C++ 2005 Service Pack 1 must be installed on some systems: https://www.microsoft.com/de-DE/download/details.aspx?id=26347

The following SAP® authorizations are required by the OPC Router:

The following objects are needed at least to establish a connection:

```
S_RFC RFC_TYPE=FUGR ;RFC_NAME=SYST ;ACTVT=16 ;
S_RFC RFC_TYPE=FUGR ;RFC_NAME=RFC1 ;ACTVT=16 ;
```

Look up tables and table meta data:

```
S_RFC RFC_TYPE=FUGR;RFC_NAME=SDTX;ACTVT=16;
S_RFC RFC_TYPE=FUGR;RFC_NAME=SDIFRUNTIME;ACTVT=16;
S_TABU_DIS ACTVT=03;DICBERCLS=&NC&;
```

Look up table for IDOCs: EDBAS or use the following separate authority check for each table to read:

```
S_RFC RFC_TYPE=FUGR;RFC_NAME=SDTX;ACTVT=16;
S_RFC RFC_TYPE=FUGR;RFC_NAME=SDIFRUNTIME;ACTVT=16;
S_TABU_DIS ACTVT=03;DICBERCLS=XXXX;
S_TABU_NAM ACTVT = 03; TABLE = DD02V
```

XXXX is the Authority Group for the table. To find out, which authority group belongs to which table look at table TDDAT (e.g. with SE16). If the table is not listed there the authority group is &NC&. For authorizing specific tables please use authorization object S_TABU_NAM instead of S_TABU_DIS.

If Custom functions like Z_XTRACT_IS_TABLE_COMPRESSION, Z_XTRACT_IS_TABLE or Z_XTRACT_IS_TABLE_JOIN are used

```
S_RFC RFC_TYPE=FUGR ;RFC_NAME=XXXX ;ACTVT=16 ;
```

XXXX is here the name of the function group where the custom function module are located.

SAP Query: Look up and executing a query:

```
S_RFC RFC_TYPE=FUGR ;RFC_NAME=AQRC ;ACTVT=16 ;
```

Defining access data:

- 1. Open plug-in by clicking "SAP® systems" in the project configuration's plug-in list.
- 2. Chose "Add" or double-click an existing entry to edit.
- 3. Specify access data. (chapter Plug-in).
- 4. Click on button "Check connection" to verify the OPC Router is getting access to the server and if access data are correct. This is to exclude one typical source of errors.
- 5. Confirm with "OK".

The SAP® server can now be used to define a connection.

□ NOTE

Note: In any case, use the switchboard "Test" to check the connection and prevent runtime errors. Note that changes are accepted only after confirmation with "OK".

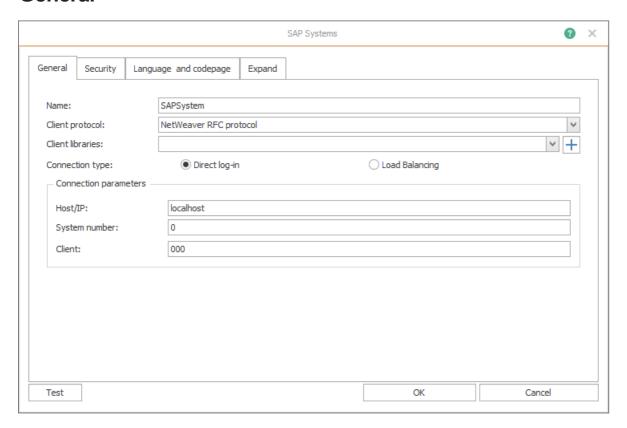
Plug-in

□ NOTE

Note: If you want to use load balancing, you need an Enterprise license.

The following properties have to be specified for each set of SAP® access data:

General



NAME	THIS SET'S NAME. THE NAME WILL BE SHOWN IN PROJECTION. SELECT A NAME YOU WILL RECOGNIZE!
Client protocol	Select the client protocol from the drop-down menu. Must be set when setting up an R3 connection and when creating an RFC server.
Client libaries	Add here the *.dll files for windows and the *.so files for Docker.
Connection types	Select the desired registration procedure: • Direct log-in • Load Balancing

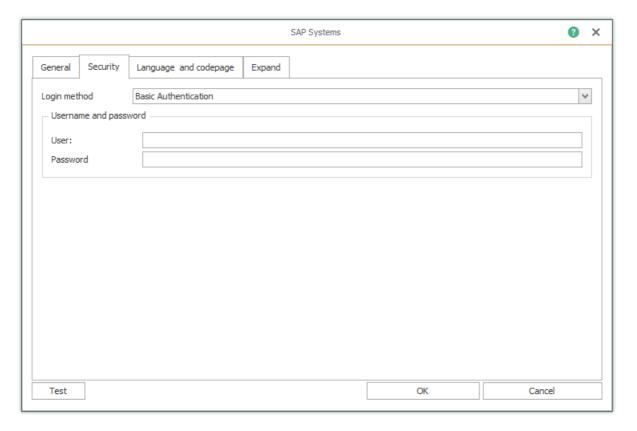
Direct log-in

Host/IP	Server (Name or IP) with SAP® system. Explicit log-on is required (no load balancing).
System number	Number of SAP® system.
Client	SAP® client (company code).

Load Balancing

Message server	Name or IP of SAP® message server
Log-on group	Log-on group (of SAP® system)
System number	Number of SAP® system
Client	SAP® client (company code).

Security

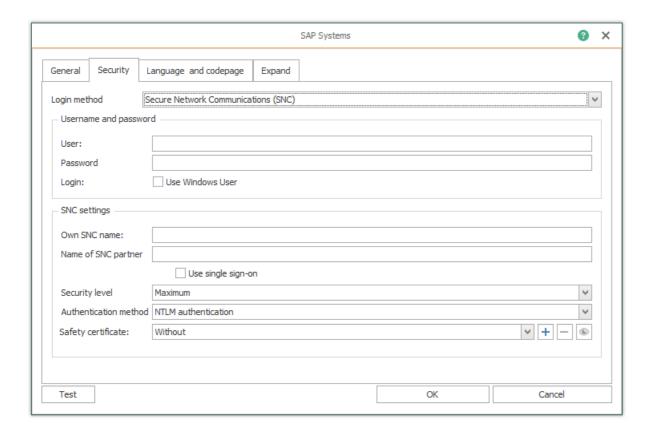


Login method	 Basic Authentication Secure Network Communications (SNC)

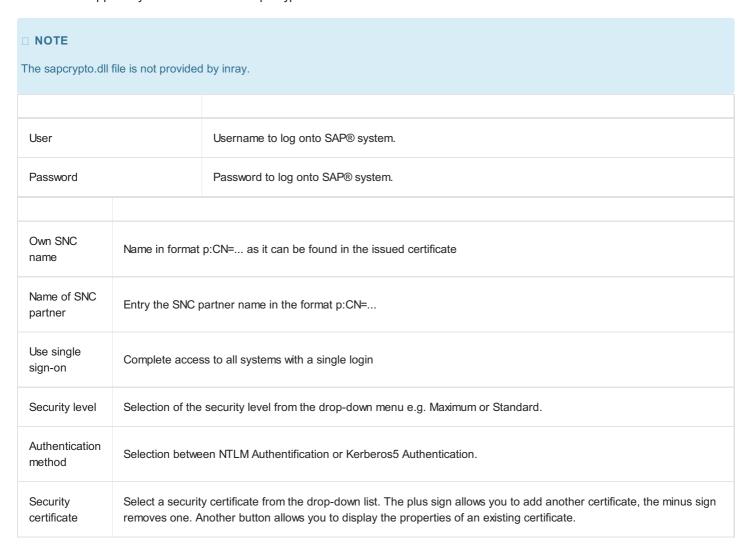
Basic Authentication

User	Username to log onto SAP® system.
Password	Password to log onto SAP® system.

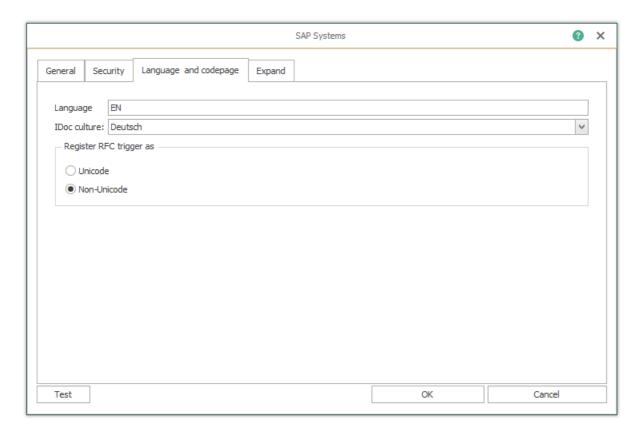
Secure Network Communications (SNC)



Contact the support if you want to use the sapscryptto.dll file.



Language and codepage



Language	Enter the language you want to use here. For example, "de" for German, "en" for English etc.
IDoc culture	Selection of the IDoc language (Culture) German or English to prevent a crash if an instance in the SAP® plug-in contains an invalid IDoc language. The date notation for example is different: First February in German 01.02.2018, in English 02.01.2018

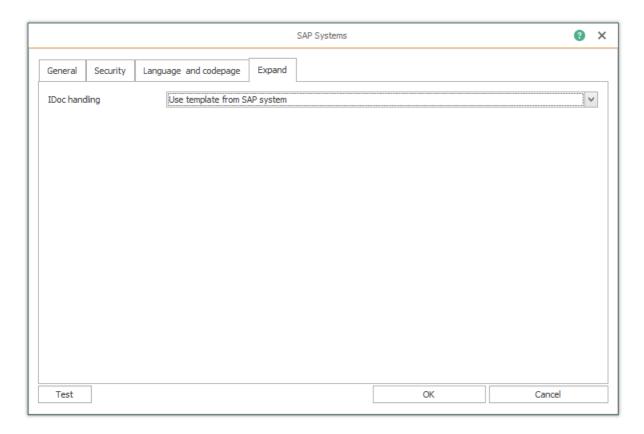
Register RFC Trigger as

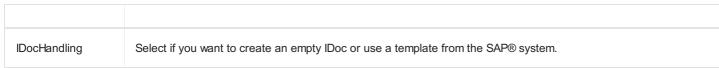
Unicode	Register RFC triggers as unicode
Non-Unicode	Register RFC triggers as non-unicode

If you use SAP Netweaver, you must activate the setting Unicode. If you use the RFC Protocol, the encoding dependent on which librfc32l file you use. The file exists with Unicode (librc32u) and without Unicode (librfc32).

The target in the SAP Transaction SM59 must be changed in Unicode/No Unicode, too. This depends on, what is set in the OPC Router and which library is used.

Expand





You can use the button "Test" to check whether your connection is successful.

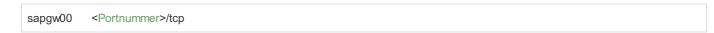
□ NOTE

Note: To use the preferred settings from the used SAP user, the OPC Router need read access on the SAP table USR01.

Configuring the Port

By default, OPC Router uses port "33_<System-Nummer>_" to communicate with the SAP® server, e. g.. "3301", if System-No = 01. If your SAPO system uses a different port and SAP® GUI is not installed, you have to adjust the port:

- 1. Backup file C:\Windows\System32\drivers\etc\services.
- 2. Open file C:\Windows\System32\drivers\etc\services with a text editor (not the backup).
- 3. Add (or change) "sapgw00", whereas the port has to have format "XX00" e.g. "3600".



4. Save the file.

OPC Router will use that specific port.

Transfer objects

Overview over transfer objects:

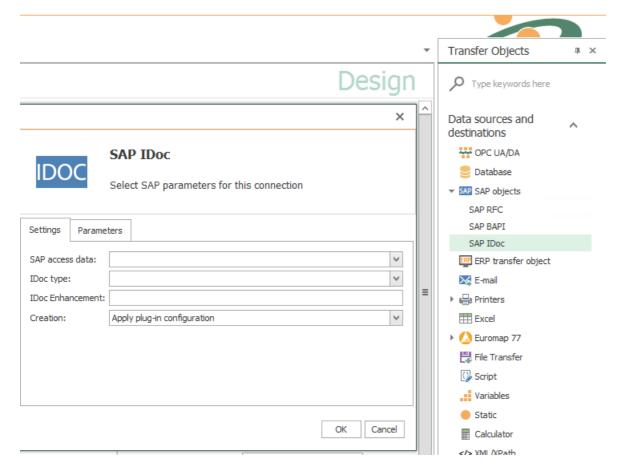
sap_idoc_transfer_object.md

sap_bapi_transfer_object.md

sap_rfc_transfer_object.md

SAP-IDoc

SAP-IDocs (Intermediate Documents) can be used both as source or destination. A set of SAP access data has to be specified within the plug-in configuration. The transfer object is created as described above. The transfer object can send Idocs, the Idoc trigger can receive Idocs.



Open transfer object by double click and configure as follows:

Tab: Settings

SAP access data	Select SAP set of access data.
IDoc Type	Select an IDoc type provided by your SAP system
IDoc Enhancement	Class enhancement of IDoc.
Creation	 Apply plug-in configuration: It selects what was selected in the SAP-plug-in by IDoc handling. Create empty IDoc: When an IDoc is loaded from SAP, the IDoc is sent, but the existing elements are emptied and only their own changes are sent. Use template from SAP system: The loaded IDoc from SAP is used but edited with its own values.

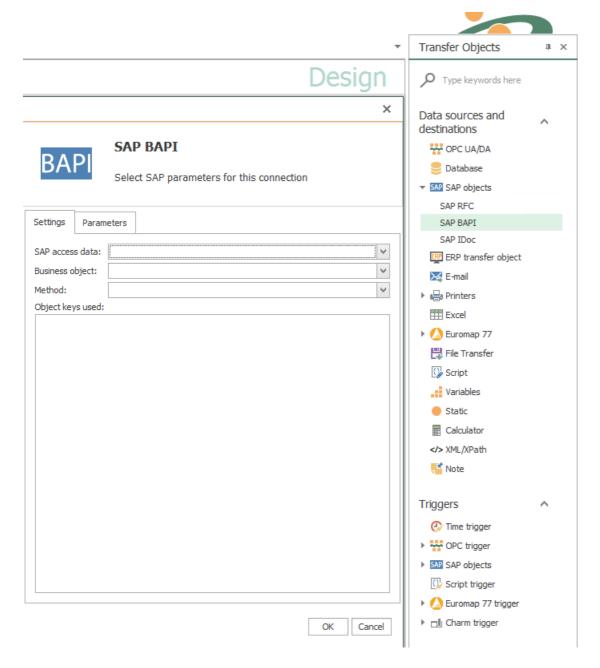
Tab: Parameters

Parameter selection	Please mark the segments you want to read or write.

You might write several records at once to the IDoc; the segments needed will be created as required. The other way round, the IDoc might deliver several records at once.

SAP-BAPI

SAP BAPI can be used both as source or destination. A set of SAP access data has to be specified within the plug-in configuration. The transfer object is created as described above.



Open transfer object by double click and configure as follows:

Tab Settings

SAP access data	Select SAP set of access data.
Business Object	Select Business Object.
Method	Select one of Business Object's methods.
Object keys used	Object keys define an object positively and are added automatically. Required if method depends on instance.

Registerkarte: Parameters

Please specify a function	Select the required parameters by setting the appropriate check mark. You can also take whole categories if you place the checkmark accordingly. Note: The specified table must have a primary key. Tables without primary keys are not supported.

Parameters are categorized:

- Import: Data transfer into SAP system
- Export: Data transfer from SAP system
- Change: Data transfer into SAP system and return of changed values.

Categories may contain sub-categories, e. g. "Table" containing data tables.

SAP-RFC

SAP RFC can be used both as source or destination. A set of SAP access data has to be specified within the plug-in configuration. The transfer object is created as describe above.

Open transfer object by double click and configure as follows:

Tab General

SAP access data	Select SAP set of access data.
Function Group	Select one of the function groups available.
Function Group/Search	Enter a search string (*=place holder) and click "Filter" to
Function Group/Selection	show only those groups matching you search term. Select here!
Function	Select one of the functions available in your Function Group.
Function/Search	Enter a search string (*=place holder) and click "Filter" to
Function/Selection	show only those functions matching you search term. Select here!

Registerkarte: Parameter

Parameters available	Select the required parameters by setting the checkmarks accordingly. You can also take whole categories (see below).

Parameters are categorized:

- Import: Data transfer into SAP system
- Export: Data transfer from SAP system
- Change: Data transfer into SAP system and return of changed values .

Categories may contain sub-categories, e. g. "Table" containing data tables.

Trigger

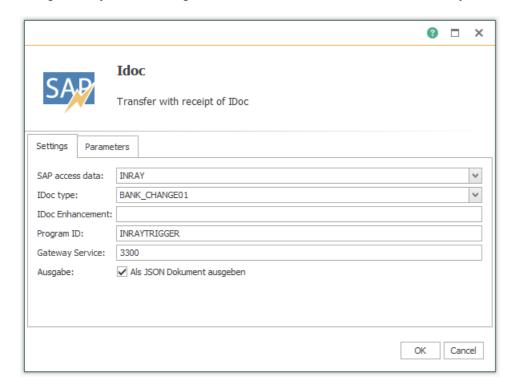
Overview over trigger:

sap_idoc_trigger_object.md

sap_rfc_trigger_object.md

IDoc

The IDoc trigger will be used if the OPC Router should receive an IDoc from the SAP system. SAP system will trigger the transfer through this object. SAP configuration is described as overview. Please consult you SAP manual.



Properties are:

SAP ACCESS DATA	SET OF SAP ACCESS DATA.
IDoc type	Type of IDoc the Trigger listens. Must be the same as in corresponding transfer object.
IDoc Enhancement	Class extension of the IDocs.
Program ID	Program ID used by SAP system to call destination, identical with program ID of transaction SM59.
Gateway Service	Gateway Service of SAP system
CAUTION	

Important: Program ID and function have to be written in CAPITALS. The combination of host, gateway and program ID has to be unique. From version 3.1.1.5 you can use the program ID several times provided gateway-service and/or hosts differ.

Example

IDoc Trigger Settings:

SAP access data	<sap access="" data=""></sap>
IDoc Type	PROCESSORDER
Program ID	INRAYTRIGGER

Gateway Service	Gateway Service of SAP system, e. g. 3302

Logical System within SAP transaction BD54:

LogSystem	OPCRIDOC01
Description	OPC Router with IDoc listener

Corresponding SAP Settings, SM59:

Destination	OPCROUTER
Connection Type	T TCP/IP
Activation Type	Registered Server Program
Program ID	INRAYTRIGGER
Gateway host	(no entry!)
Gateway service	(no entry!)

Communication Port in transaction WE21:

(Type)	Transactional RFC
Port	e.g. IDOCPORT
Version	(select appropriated IDoc version)
RFC destination	OPCROUTER

Partner profile in transaction WE20

(Partner type)	LS (Logical System)
Partner no.	OPCRIDOC01

Outbound parameters in WE20:

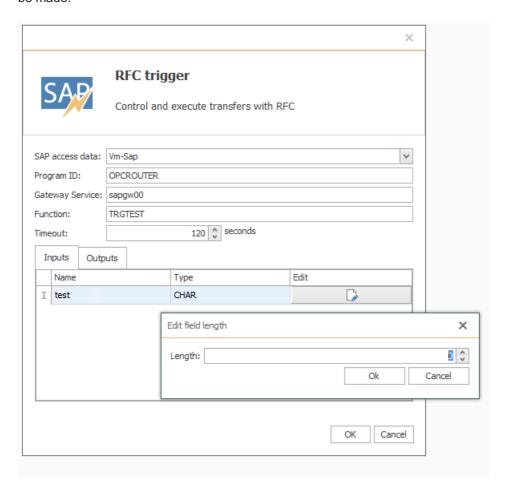
Receiver Port	IDOCPORT
Outpout mode	Transfer IDoc immed.

IDoc Type/Basic type	PROCESSORDER
Cancel processing after syntax error	(activated)

For testing, via WE19 an IDoc can be send manually providing partner no. and Port. Errors might be found in WE07. Function to call is IDOC_INBOUND_ASYNCHRONOS (as of 4.0), resp. INBOUND_IDOC_PROCESS (before 3.x).

RFC

With RFC trigger, SAP systems can trigger data transfers. Within SAP system, in transaction SM59 the corresponding entry has to be made.



Properties are:

SAP access data	Set of SAP access data.
Program ID	Program ID used by SAP system to call destination, identical with program ID of transaction SM59.
Gateway Service	Gateway Service of SAP system
Function	Function defined within SAP system that triggers this connection.
Time-out	Time span after which OPC Router will send time-out to SAP system if task has not been finished

The expected length for sent and received CHAR and NUM fields must be configured via the Edit button. The default length is 0. If you have not changed the length of a parameter, you get information about it when you close the dialog.

□ WARNING

Attention: The call of a non-existing function module forcibly leads to the deregistration of the server in the SAP Gateway. The registration can no longer be used and must be performed again, which manifests itself in ERP-Connect by a server restart.

□ WARNING

Attention: There is no way to delete functions once they have been made known to the NW Library. This applies to the entire process,

across all SAP systems and RFC servers. So you cannot change the name and type of the Import/Export/Tables parameters of a function block that is called by RFC server and identified by its function block name, nor the existence of the block itself. Do not make any changes while the OPC Router service is running. So if you change something it must always be published completely.

return parameters

TRANSFER_OK

- 1 = OK: Successful transfer of the connection
- 2 = Aborted: The transfer was aborted from a type transfer object, for example, if no data was contained in a table for a database transfer object. 3 = Error: An error occurred during the execution of the transfer. The request must be resent later and must not be marked as closed by the connected system.

CAUTION

Important: Program ID and function have to be written in CAPITALS. SAP call is set:

Call function '<FUNCTION'>' destination '<SAP-DESTINATION'>'.

The combination of host, gateway and program ID has to be unique. The program ID itself can be used multiple times - but only with different gateways / hosts.

You can also use the RFC trigger to create ITAB or STRUCTURE as parameters. Create the inputs and outputs accordingly by selecting the respective type, assigning a name, and choosing Edit to access the editor for the individual fields. Nesting is not possible.

Example

RFC-Trigger Properties:

SAP access data	<sap access="" data=""></sap>
Program ID	INRAYTRIGGER
Gateway Service	Gateway Service of SAP system, e. g. 3302
Function	TRIGGERFUNCTION

Corresponding SAP properties, SM59:

Destination	OPCROUTER
Connection Type	T TCP/IP
Activation Type	Registered Server Program
Program ID	INRAYTRIGGER
Gateway-Host	(no entry!)

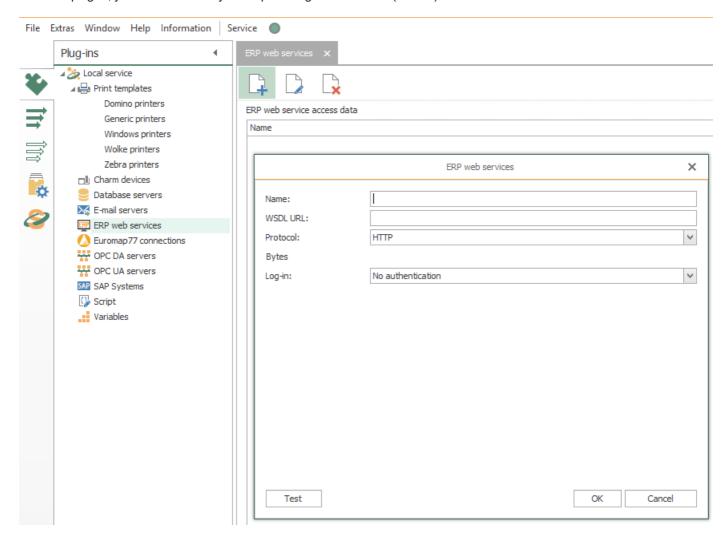
Gateway-Service	(no entry!)

By calling this function from within SAP system, SAP system will trigger OPC Router:

Call function 'TRIGGERFUNCTION' destination 'OPCROUTER'.

ERP Web Services

Via ERP plug-in, you connect to all systems providing a webservice (WSDL) interface.



Defining access data:

- 1. Open plug-in by clicking "ERP web services" at the plug-in-menu.
- 2. Chose "Add new set of access data" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Plug-in").
- 4. Confirm with "OK".

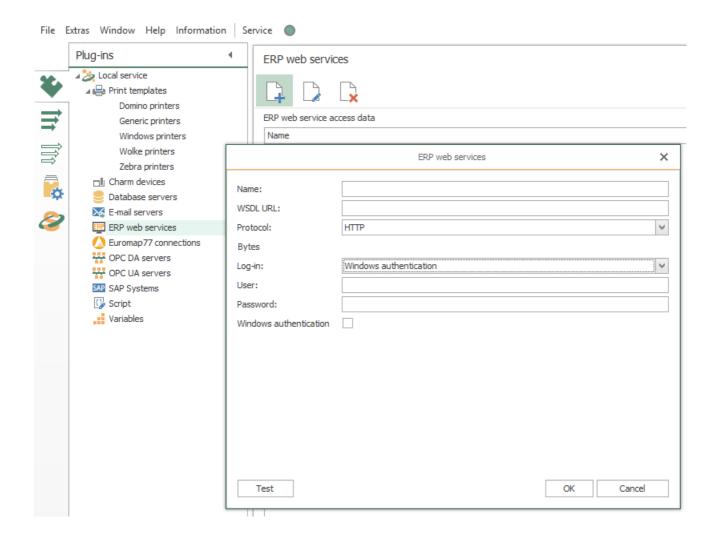
This set of access data can now be used to define a connection.

With the button "Test" you can check your connection.

Plug-in

Set the following properties in the ERP plug-in configuration:

Name	Any name under which this web service appears in the connection configuration. Select a name you will recognize!
WSDL-URL	URL of the WSDL file.
Endpoint (optional)	If required, enter an endpoint for your connection.
Protocol	Selection of a transmission protocol from the drop-down menu.
Log-in	If you need to log in to the web service, select the desired type here. The details are available from the administrator of the web service / ERP system. Depending on this property, you can make additional settings: No authentication: no authentication required, web service freely accessible. Basic authentication: Login with username / password. in web service method: login via a web service method. Selection and setting via the button "Log-in parameters" Windows authentication: Login with Windows (domain) users. When using Integrated Security, make sure that the user context under which the service is running is authorized. The computer with the web service must be a member of the domain, not necessarily at the computer with the OPC router.
User	Username to log on web service (at basic and NTLM authentication)
Password	Password to log on web service (at basic and NTLM authentication)
Windows authentication	When enabled, the user data where the router service is running.

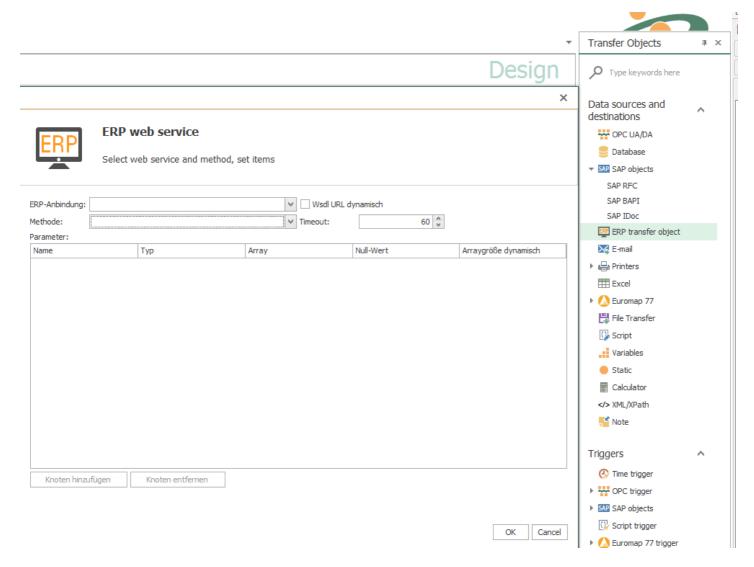


Authentication in Method

If you use the policy "in web service method", please set log-in parameters via button "Log-in parameters".

Transfer object

Webservices are both available as destination (input parameters) or source (output parameters). Create an ERP object as described above.



Double-click on transfer object to set the following properties:

ERP access data	Select one of the configured web service sets of access data.
Method	Select the method to be called.
Wsdl URL dynamical	Enable to pass the URL dynamically at runtime. However, the method and the parameters must be identical.
Timeout	Time (in ms) that the connection may take before a connection error is returned.

All input and output parameters of the webservice can be used.

Parameter of Type "Array"

Parameters of type "Array" offer two possibilities:

- Activate the property Size of array dynamic to read all elements within the array.
- Limit the number of elements read by defining an number of nodes. The number of nodes corresponds to the number of

elements reads. Attention: The webservice, not the OPC Router defines which elements are delivered.

- 1. Leave property Size of array dynamic deactivated.
- 2. Select the array.
- 3. Click on "Add node". These nodes appear within the array.
- 4. Add as many nodes as desired.

Remove a node by selecting it and click on "Remove node".

Nested classes with parameters do not support dynamic parameters. Do you still want to use nested classes so must be defined before how many elements the array has since all nodes have to be created by themselves.

Data type "Integer"

The type "integer" represents by XSD-standard an infinite number that can only be stored as a string. If an integer has to be passed, the web service must use the "int" data type, which is read out correctly.

Shopfloor

All plug-ins to devices or machines, which can be used e.g. in workshops.

opc_ua_server

opc_client

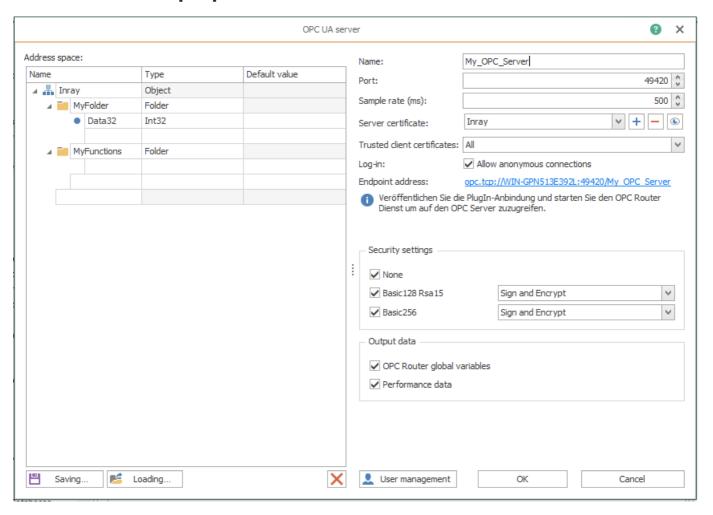
OPC-UA-Server

The OPC-UA-Server Plug-in publishes a OPC-UA-Server.

OPC-UA Server Plug-in

Set the following properties of the OPC UA server:

OPC-UA-Server properties



Name	Enter a unique name for your OPC-UA server plug-in
Port	Specify a network port for your OPC server.
Sample rate	Sample rate (ms) used by OPC Server to refresh values.
Server certificate	Select a server certificate for your OPC server.
Trusted client certificates	Select the certificate store to use for user authentication.
Log-in	Activate to allow anonymous connections.
Endpoint address	Shows the address to connect to your OPC server.

Security settings:

None	Allows unencrypted connections.

Basic128RSA15	Clients need Basic128RSA15 encryption to connect.
Basic256	Clients need Basic256 encryption to connect.

Output data:

Global variables	Activate to output the OPC Routers variables
Performance data	Activate to output some of the OPC Routers performance counters

User management:

Use the "User management" to define some users and specify rules for read and write permissions.

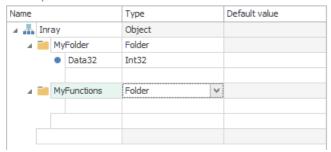
Address space:

Define the data point for your OPC-UA server.

Use the Column "Name" for a random name. Also you can define folders an objects.

Additionally you can define default values.

Address space:

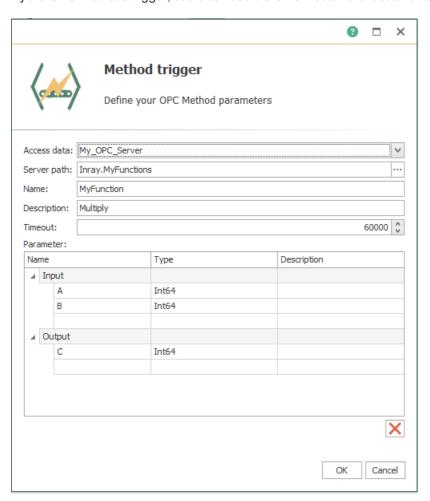


□ NOTE

Note: A server always starts with an object.

OPC methods trigger

By the OPC Methods trigger, users can use the OPC Router to execute functions on the OPC Router.



Die einzelnen Eigenschaften sind:

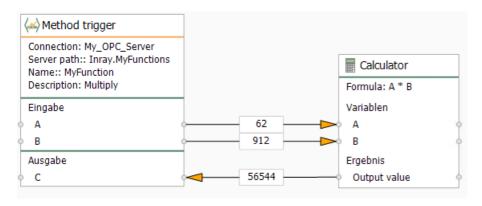
Access data	Select the OPC UA server instance you want to use.
Server path	Select the path on the server. You can use the tag browser.
Name	Select a name for your function.
Description	Enter a description for your function.
Timeout	After reaching the timeout (ms) the transfer will get canceled.

Parameter

Input and Output Parameter

Input	Define some input parameters. Set the data types and if you want a description for them.
Output	Define some output parameters. Set the data types and if you want a description for them.

In this simple method, two values are multiplied and the result is the response for the client.



NodeSets

You find the NodeSets in the OPC UA Server.

Import from CloudLib

If you want to use a Nodest that you don't have you can download it from the from CloudLib. Click on "Import from CloudLib" and sign in. Then select the NodeSet that you want.

After the download select "Address Space". Enter a name and select with type the object type that you want. The datapoints will be created automatically.

Import from file

Alternative to the CloudLib, you can import files to the OPC UA Server.

□ NOTE

Note: Note that the file must be a XML file.

OPC Client

With the client data can be fetched from the OPC-Server.

OPC UA

OPC plug-in connects OPC Router to all accessible OPC Servers.

If an OPC Server runs on a different computer, ...

• ... for OPC UA the router have to be approve as "Trusted Client", if an appropriate safety level is set on the OPC server

Operation is standard:

- 1. Open plug-in by double-click "OPC UA servers". The list of created OPC connections is displayed.
- 2. Chose "Add new set as access data" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Properties of OPC UA access data").
- 4. Use the "Check connection" button to initialize a connection. If a corresponding safety level is set on the OPC server, the connection will fail. You must then release the OPC router on the OPC server as a trustworthy client. Reinitialize your OPC server, if necessary. Test again to verify successful connection setup.
- 5. Confirm with "OK".

The OPC server can now be used to define a connection.

Properties of OPC UA access data

□ NOTE

Note: If you want to use the function to read data from a redundancy server, you need the Enterprise license.

The following properties have to be specified for each set of OPC access data:

OPC UA Access Data

Name	This set's name. The name will be shown in projection. Select a name you will recognize!
Client certificate	Select a client certificate from the drop-down menu. Using the plus sign, you can add another certificate, using the minus sign to remove one. Another button allows you to display the properties of an existing certificate.
Trusted server certificates	Select which server certificates to accept.
Endpoint	OPC-Server's address (protocol: opc.tcp, http or https) Note: If encryption is used, the endpoint must be specified exactly as it is stored in the server's certificate. Fo example, if the certificate contains "Server.domain.local", the endpoint must also be addressed in this way, an not, for example, via the IP. Then the certificate is rejected by the OPC server.
Access path	When you specify an Access Path, only the data points located in the folder you selected are displayed in the Tag Browser of the transfer object or trigger. You can use the button next to the Access Path to open the Tag Browser and select the folder here. Important: You can only set the Access Path if you have selected the "Browse Path" function in the item identification.
Sample Rate	Sample rate (ms) used by OPC Server to refresh values. Set "0" to use smallest update rate.
Transfer OPC null values	Invalid OPC values will be transferred as well, e. g. as NULL into databases.
Timeout	Time (ms) allowed to establish before a connection error is thrown.
Array write mode	Decide how to handle incomplete arrays Use raw array: Send the incomplete, raw array exactly as it is. Fill missing values with recent values: Use the value of the most recent value for all missing values. Fill missing values with standard values: The standard value will be used for missing values. (e.g. NULL fint)

Item identification	Node ID: Data points are addressed directly by the node ID. Browse Path: Data points are addressed by the OPC server path. Important: If you use the browse path option, you may have some benefits by using the templates. The browse path option may need some more time in initializing, especially in huge projects.
MessageScruityMode	"None", "Sign" or "SignAndEncrypt".
SecruityPolicy	Encryption process. Use highest encryption provided by your OPC Server.
Highest security level	Activate to use highest security level provided by your OPC Server. If connection problems occur, deactivate and set security options manually.
Certificate validation	If the box is checked, the certificate of the server is checked. If the box is not checked, the certificate of the server is not verified.
Login Option	 Anonymous: Activate if your OPC Server allows anonymous connections. If not, deactivate and provide user credentials. Username: Login with credentials Certificate: Login over a certificate
User	Username to log on OPC Server (not: Windows Server)
Password	Password to log on OPC Server (not: Windows Server)
Authentication certificate	Select a certificate here or create a new certificate. The new certificate is then displayed under the settings in the certificate management. Click on Export and then include the certificate in the OPC-UA Server you are using.
Secondary Server	Activate the redundancy settings
Redundance server	Activate to specify a redundancy OPC server. Redundancy is activated if the primary server cannot be reached and (optionally) if the life item of the primary server cannot be read or assumes the value "0". Then enter the redundancy server and, if required, an object (item) on the selected redundancy server.

Use the "Check connection" button to check in advance if your data connections are working.

OPC Classic

□ WARNING

Attention: OPC Classic is not supported in Docker.

OPC plug-in connects OPC Router to all accessible OPC Servers.

If an OPC Server runs on a different computer, ...

• ... DCOM configuration has to be adjusted for *OPC Classic* connections.

Operation is standard:

- 1. Open plug-in by double-click "OPC Classic servers". The list of created OPC connections is displayed.
- 2. Chose "Add" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Properties of OPC Classic access data").
- 4. Confirm with "OK".

The OPC server can now be used to define a connection.

Properties of OPC Classic access data

□ NOTE

Note: If you want to use the function to read data from a redundancy server, you need the Enterprise license.

The following properties have to be specified for each set of OPC access data:

OPC DA Access Data

Name	This set's name. The name will be shown in projection. Select a name you will recognize!	
Host/IP	IP or host name of OPC Server's computer.	
OPC Server	OPC Servers accessible on computer specified under Host/IP. Select by drop-down	
Update rate	The update rate is the rate where the OPC server updates its data. Most OPC servers have an internal data memory and use the update rate to update the values in this memory. However, it depends on the OPC server which update rate is used. In the KepServer there is for example the setting Scan Mode. In the properties of the device you can set which scan rate should be used by the server and to what extent the update rate of the client is taken into account.	
Dead band	The Dead Band property ensures that no transfer takes place from the OPC server to the client as long as the value does not exceed a certain threshold. This can be used to relieve the network. This function is optional and does not have to be implemented by all OPC servers.	
Access path	Access path on OPC Server	
Array write mode	 Use raw array: This writes the original array to the datapoint. Filling missing values with recent values: If values are missing, they are filled with those that were last available. Fill missing values with standard values: Here the missing values in the array are overwritten with a default value. Note: The default value is always the default value of the respective data type. The default value for a string is "". 	

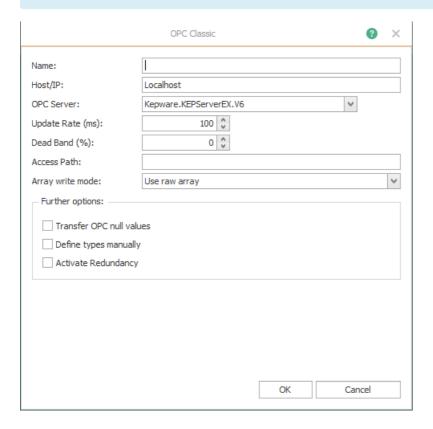
Extended Properties

Transfer OPC null values	Invalid OPC values will be transferred as well, e. g. as NULL into databases.
Define types manually	Define data types of OPC items manually to notify the OPC Server what type is expected.
Activate Redundancy	The redundancy is activated if the primary server is not available and (optional) if the primary server's life can not be read or assumes the value.

□ NOTE

Note: Respect the Windows firewall of the involved computers. Especially if OPC-Server and OPC Router are running on different computers the firewall can be used without any problems because of the dynamic port allocation via DCOM. If it is impossible to deactivate the firewalls,

please contact inray.



Use Access Path to simplify projection: If an access path is specified, you only have to enter the OPC Items' names later on.

Just define a set of access data for each PLC to connect. In your OPC Server, define an access path to each PLC. This access path has to be entered here.

If you want to connect different PLCs with identical items, you can use this alternative in combination with templates. Just define the OPC access data as variable within your template. Specify the set of access data when creating the connection from the template.

Transfer objects

Overview over transfer objects:

opc_transfer_object.md

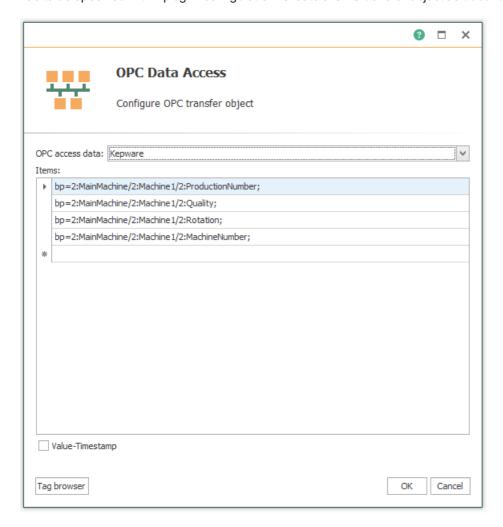
opc_structur_transfer_object.md

 $opc_message_transfer_object.md$

opc_methods_transfer_object.md

OPC Data Access

OPC servers and thus PLCs are available both as source and destination of data transfers. The OCP server's set of access data has to be specified within plug-in configuration. Create a OPC transfer object as described above.



Double-click on transfer object to assign the properties:

OPC access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize Classic/UA connections. CAUTION: If you are using FAS-inMOVE and if you are configuring OPC Router manually as well, do not select an OPC set of access data with prefix [FiMx] when projecting manually. These access data belong to FAS-inMOVE and might be changed or deleted from there. Create a new set of access data within plug-in configuration instead.
OPC items	Enter OPC items needed. Use the Tag Browser to browse items. Note: IF within OPC access data Define types manually is activated, use the drop-down to specify the data type that is expected.
Node ID	Enter Node ID of UA items needed. Use the Tag Browser to browse items.
Quality string	OPC quality as string will be available as transfer element. The selection is only available if "Transfer OPC null values" has been selected in the OPC Plug-in.
Quality ID	OPC quality as integer will be available as transfer element. The selection is only available if "Transfer OPC null values" has been selected in the OPC Plug-in.

Value- Timestamp	Indicates the time when the data point was transferred.

If you have checked "Transfer OPC null values" in the OPC UA Plug-in, the corresponding values of the data points will always be transferred if they are null. If "Transfer OPC null values" is not checked, the values are only transferred if the "Quality" of the data point is "Good" and it has a value.

If you have set Browsepath in the OPC UA plug-in, the data points will be displayed as shown in the screenshot above. If you have set Node-ID instead, the name of the data point and the Node-ID will be displayed in the transfer object. You can find more details here.

Within the item's list, select several items by holding mouse button down ("Ctrl + a" will select all). Selected items can be copied to clipboard and inserted ("Ctrl + c", "Ctrl + v").

□ NOTE

Note: OPC Classic: You may either enter tags/aliases from OPC server or address data blocks in PLC directly. Just keep in mind to specify the correct Access Path in your Plug-in Configuration.

Using the Tag Browser

Using the button "Tag Browser", you will open another dialog to browse and select OPC items. The dialog is not modal, you can switch between transfer object and browser.

Enter a search string (OPC Classic only) to hide the tree view and show all items matching the search term.

- 1. Select the row for the new item.
- 2. Open the Tag Browser
- 3. Assign Item by double-click.

Read Quality Values

With properties Quality string and Quality ID, the OPC quality values are available and can e. g. be transferred and stored together with the value.

STRING	ID/INTEGER
Timeout	-3
NotInitialized	-2
NotSpecified	-1
bad	0
badConfigurationError	4
badNotConnected	8
badDeviceFailure	12

STRING	ID/INTEGER
badSensorFailure	16
badLastKnownValue	20
badCommFailure	24
badOutOfService	28
badWaitingForInitialData	32
uncertain	64
uncertainLastUsableValue	68
uncertainSensorNotAccurate	80
uncertainEUExceeded	84
uncertainSubNormal	88
good	192
goodLocalOverride	216

OPC Methods Transfer Object

OPC Methods are provided by some OPC servers. Usually OPC Methods have an input, a output and they are calculating values. The required OPC server has to bis configured as plug-in instance. You can directly configure the transfer object within the connection as described.



Use double click to set up properties:

OPC-access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize UA connections.
Dynamic node id	Check this box if you want to hand the method over dynamically.
Methods	Select the method you want to use. Use the Tag Browser to browse the provided methods.
Parameters	Shows the needed input parameters and the result set.
□ NOTE	

Note: If you check "Dynamic node id" you must select a method over the tag browser. This method is a template and must have the same structure and the same data types as the dynamic method.

OPC Structures

OPC Structures are provided by some OPC servers. The required OPC server has to bis configured as plug-in instance. You can directly configure the transfer object within the connection as described.



After double-clicking on the transfer object, set the following properties:

OPC-access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize UA connections.
Datenpunkt	Enter OPC items needed. Use the Tag Browser to browse items.
OPC Structure	Preview of the structure from the selected OPC item.

Using the Tag Browser

Using the button "Tag Browser", you will open another dialog to browse and select OPC items. The dialog is not modal, you can switch between transfer object and browser.

Enter a search string (OPC Classic only) to hide the tree view and show all items matching the search term.

- 1. Select the row for the new item.
- 2. Open the Tag Browser
- 3. Assign Item by double-click.

OPC Message

Collect data in a request and send it to a controller. The controller can write the answer to another data point. You can directly configure the transfer object within the connection as described.



Configure the object's properties by double click:

OPC-Connection	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize DA/UA connections.
Send-Data point	Enter the address of the OPC item to increment. Use the Tag Browser to browse items.
MessageID automatisch hochzählen	Activate if the OPC Router increments the OPC item with every transfer.

In the lower table you can define the data points to write.

Tab Receive:

Wait for answer	Active if the transfer should hold until a answer was received.

Response-data point	Enter the OPC address of the OPC item which returns the counter of the response. Use the Tag Browser to browse items.
Response Timeout	Amount of seconds until the transfer is canceled.
Mismatch handling	Select the handling if counters are not equal.

In the lower table you can define the data points for your response.

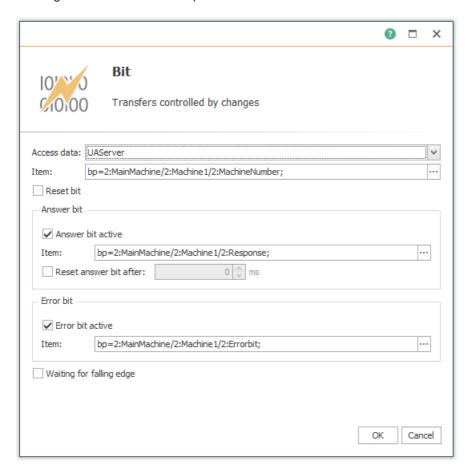
Trigger

Overview over trigger:

```
opc_client_treshold_trigger.md
opc_client_bit_trigger.md
opc_client_dc_missing_trigger.md
opc_client_dc_trigger.md
opc_client_multi_dc_trigger.md
opc_client_message_trigger.md
opc_client_opc_event_trigger.md
```

Bit trigger

The bit trigger triggers the data transfer when the assigned logical data point takes a value 1. If the assigned data point is not a logical data point, the trigger triggers when the data point takes a different value as NULL. You can also send a reply and a fault message to two additional data points if the transfer is incorrect.



OPC connection which the relevant data point is reached.
OPC data point that triggers the transfer as soon as it assumes a value other than 0. Use the button "" to open the tag browser (see below) for the interactive selection of an item. For OPC UA connections, the node ID is managed in the background.
Resets the OPC item to zero after the transfer. Should usually be disabled because a bit should only be written from one side. Instead, use the answer bit to tell the controller that the transfer has completed.
Sends one bit to another data point in response that the transfer has completed.
OPC data point to which the response is sent. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
After the set time, the response bit is reset.
Sends a bit to another data point if the data transfer was faulty.

OPC item	OPC item (bit) that is set with transfer errors. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Waiting for failing edge	If you don't want the OPC router to trigger continuously when the bit is active, activate this checkbox. This causes the OPC Router to trigger only once when the bit is active and then wait for a "falling edge" before triggering again.

Bit and message triggers for OPC telegrams

Bit and message triggers are used for OPC telegrams if you want to read several related items. The OPC router waits for another read cycle before the items are read out in the OPC transfer object to ensure that the PLC could write all values. On the SPS side the trigger should be written to the end.

Bit trigger always with response bit

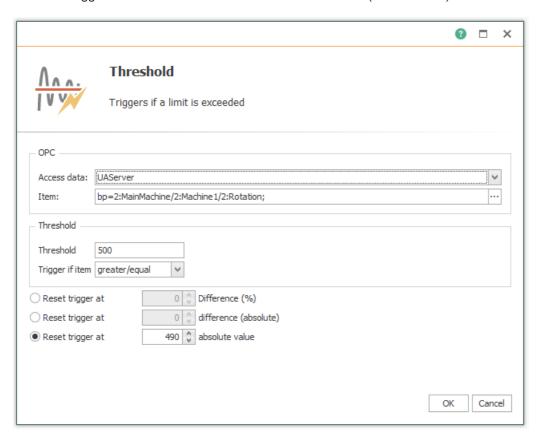
Always use the bit trigger with response bit. If the data point in the PLC changes twice within a read cycle, the OPC router does not notice this. The PLC must react accordingly to the missing response of the router. Standard praxis: A bit may only written from one side, the PLC resets the trigger data point after receiving the response. The OPC router resets the response data point after a set time period.

Timeout Handling

If the response counter has not been written, this must be intercepted by the PLC. One possibility here would be to create a timeout and to set the send counter again after a certain interval. If the response counter has not been written again after several intervals, the error must be escalated appropriately.

Threshold

Threshold trigger executes a data transfer with off-limit condition (of OPC value)



The properties are:

OPC access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize DA/UA connections.	
OPC item	Item whose off-limit condition will execute the transfer. Browse items with tag browser ("" button). OPC UA node IDs are registered in background.	
Threshold	Absolute value.	
Trigger if item	Set if threshold has to be under- or overrun.	
Hysteresis	If the trigger has executed the transfer once, it might be required that the trigger is re-released only if the OPC item's value is clearly different from threshold value. If this is the case, please specify the difference between OPC item and threshold with which the trigger is set active again. Example: The threshold is 20 °C, to be triggered when overrun. Temperature varies between 19 and 21 degrees, but only the first overrun has to be transferred. Hysteresis could be set to 18 degrees absolute value. Thus, the trigger will only release after the temperature has fallen below 18 (after having overrun 20).	

Tip: If the connection should be triggered permanently on off-limit condition, set hysteresis absolute value to the maximum value the item can take. Thus, it will trigger in OPC Routers cycle time interval as long as it is in off-limit condition. Combine with a data change trigger linked with AND to only trigger data changes above the limit. In the example above, the temperature will not exceed 100 degrees, then with threshold = 20 and trigger reset from 100 absolute value the trigger would always trigger when the temperature is between 20 and 100 degrees, in the frequency of the cycle time of the router (settings). You could limit this with an AND-linked datachange trigger to record only the data changes above the threshold.

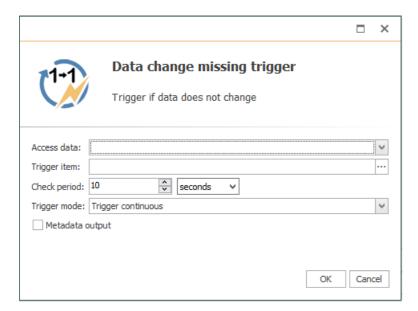
Data length and limit value triggers for analog values

You can set the data length and limit value triggers if you want to transmit a single analog value. Trigger item and transfer item are identical. The transfer starts immediately after the trigger condition has occurred.

Enter a search string (OPC DA only) to hide the tree view and show all items matching the search term. Contains the OPC transfer object other items to be transferred, values can be transferred which do not belong together.

Data-Change-Missing

The Data-Change-Missing-Trigger triggers if a value does not change its value for a specified time.



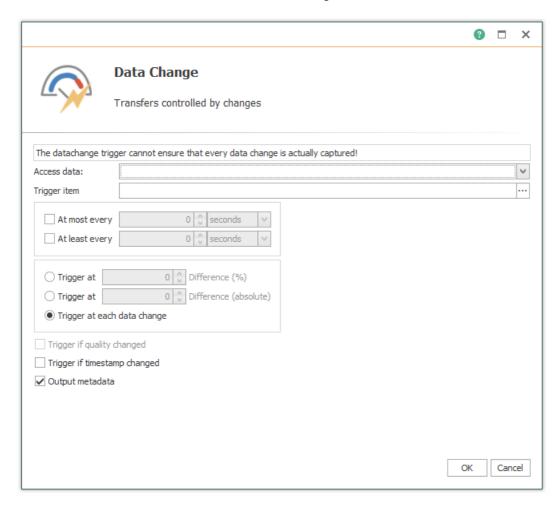
Access data	Select a set of Heidenhain access data.
Trigger item	Item which should get observed. Browse items with tag browser ("" button).
Check period	If the data point does not change its value within this time, the trigger triggers.
Trigger mode	Select if the trigger should trigger once or continuous. (Continuous means the selected check period)
Metadata output	Activate this if you want to send the last known data of the data point. It includes the quality ID, the quality string, the timestamp and the name of the data point.

Data Change trigger

□ NOTE

Note: The Datachange trigger cannot safely capture every data change.

Data change trigger executes transfers with a changing OPC value. You might specify tolerances and time intervals as to optimize the number of transfers – forced transfer, even if no change is made, or limitation of transfers with many data changes.



OPC access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize DA/UA connections.
Trigger item	Item whose change will execute the transfer. Browse items with tag browser ("" button). OPC UA node IDs are registered in background.

Use the extended button to define further properties

At most every	Minimum interval in which transfer will be executed even if no data change has occurred. Integers only, unit from milliseconds to hours.
At least every	If data change frequently the number of transfers can be limit. An entry means, e. g. Transfer every second maximum even if data changes more frequently. Integers only. Units from milliseconds to hours.

Trigger at difference (%)	Transfer will only execute if data changes by this difference.
Trigger at difference (absolute)	Transfer will only execute if data changes by this difference.
Trigger at each data change	Default. Overrides tolerance settings.
Trigger if quality changed	Activate the checkbox if you want to trigger at quality change.
Trigger if timestamp changed	Activate the checkbox if you want to trigger when the timestamp is changed.
Metadata output	Activate the checkbox if you want the metadata to be output.

□ NOTE

Note: Is "Transfer OPC null values" checked than the output of the null value with the data change trigger is "N/A". Is the box not checked the connection will not been executed when the values are null.

□ TIP

Tip: To set conditions for relative and absolute tolerance, project two data change triggers linked with AND or OR.

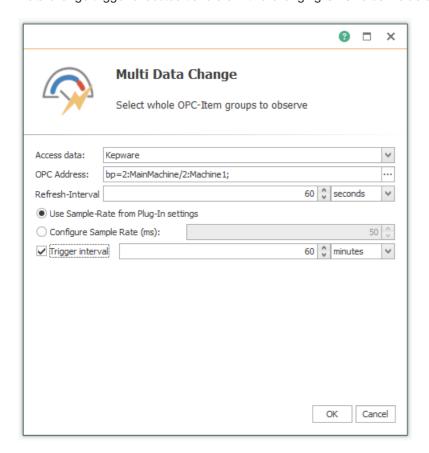
Data length and limit value triggers for analog values

You can set the data length and limit value triggers if you want to transmit a single analog value. Trigger item and transfer item are identical. The transfer starts immediately after the trigger condition has occurred.

Enter a search string (OPC DA only) to hide the tree view and show all items matching the search term. Contains the OPC transfer object other items to be transferred, values can be transferred which do not belong together.

Multi Data Change

Data change trigger executes transfers with a changing OPC value inside a OPC Group.



The individual properties are:

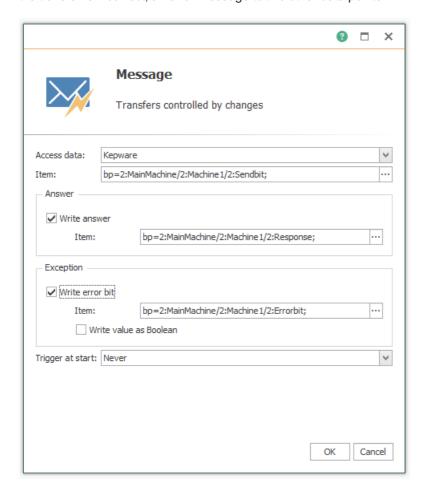
OPC access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize DA/UA connections.
OPC Address	Item group to execute the transfer. Browse item groups with tag browser ("" button). OPC UA node IDs are registered in background.
Refresh interval	This value is to check for new items within the OPC group. You don't need to publish the connection again, if data points are changed. This value does not affect transfer executions by opc item value changes.
Sample Rate from plug in	Use the sample rate defined in the plug-in settings.
Configure sample rate (ms)	Select this Value to use another sample rate than defined in the plug in.
Trigger interval	Check this box if you want all data points to be triggered in the specified interval.

Data and limit value triggers for analog values

Data range and limit value triggers are used when you want to transfer a single analog value. Trigger item and transfer item are identical. The transfer starts immediately after the trigger condition has occurred. If the OPC transfer object contains further items to be transferred, it may happen that values are transferred that do not belong together in terms of content.

Message trigger

The message trigger triggers the data transfer if the assigned numeric data point is 1 higher. You can also send an answer and, if the transfer is incorrect, an error message to two other data points.



OPC access data	Select a set of OPC access data. Dependent on plug-in configuration, OPC Router will recognize DA/UA connections.
OPC item	Item whose increase will execute the transfer. Browse items with tag browser ("" button). OPC UA node IDs are registered in background.
Write answer	Will transfer OPC item's value (or set a bit) to another item as confirmation that the transfer executes.
OPC item	OPC item the answer is send to. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Write error bit	Activate to set a bit with transfer errors.
OPC item	OPC item (bit) that is set with transfer errors. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Write value as Boolean	Sends the value as a Boolean to the datapoint.

Trigger with start	Set when the message trigger should fire at startup: • always • never • If message ID and answer ID are not equal

Bit and message triggers for OPC telegrams

Bit and message triggers are used for OPC telegrams if you want to read several related items. The OPC router waits for another read cycle before the items are read out in the OPC transfer object to ensure that the PLC could write all values. On the SPS side the trigger should be written to the end.

Message trigger values

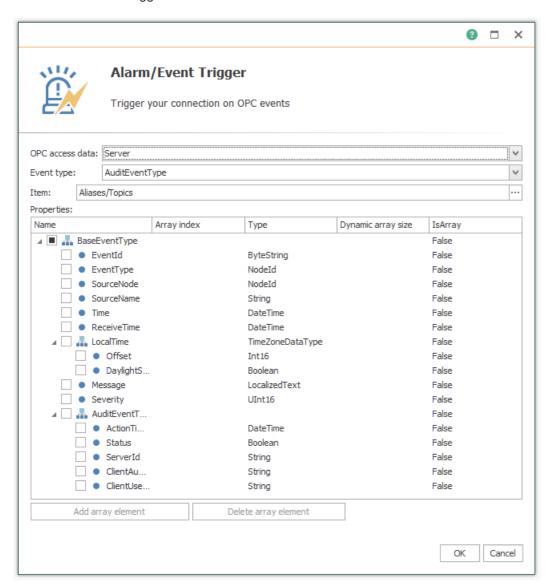
Record the value of the message trigger. This allows you to track whether records have not been transferred or duplicated. On the PLC side, the data point for the message trigger for new data is to be increased by the value 1.

Timeout Handling

If the response counter has not been written, this must be intercepted by the PLC. One possibility here would be to create a timeout and to set the send counter again after a certain interval. If the response counter has not been written again after several intervals, the error must be escalated appropriately.

Alarm/Event

Use the Alarm/Event trigger to execute connections on OPC events.



ACCESS DATA	SELECT A SET OF OPC ACCESS DATA.
Event type	Select the type of the OPC event.
Event-Datapoint	Select a datapoint for your OPC event.
Properties	Select the data you want to output if an event executed.

OPC-UA PubSub

Connection

Name	Enter a name for the plug-in.
Endpoint	Enter the endpoint to the OPC-UA PubSub server.
Message type	Select the message type: • JSON • UADP
Publish interval (ms)	Enter the publish interval.
Timeout (ms)	Specify here after how many seconds a timeout occurs.
Keep alive	Period until the next message is sent.
Publisher Id	Enter the ID for the OPC Router.

Advanced Settings

Certificates	Add a certificate for encrypted commuication.

MQTT

Client ID	Generate a client id with the button "Generate".
Mqtt Qos	Select the Qos.
Username	Enter a username
Password	Enter a password

OPC-UA Pub/Sub Writer

Connection

Plug-in	Connect the OPC UA Pub/Sub plug-in here.

DataSet

Writer Id	The transfer object selects the next available id. Another opinion is that you enter a Writer Id. Important: The ID must between 1 and 65535.
Queue Name	Enter the queue name (topic).

DataSetMetaData

Name	Name of the data set.
Version	Version of the data set. The version number must have major number and a minor number i.e. 1.0. If you update the data set you should update the version number i.e. 1.1.

Fields

Name	Specify the name of the data point to be read.
Туре	Specify which data type the data point to be read has.
Array	Specify whether the data point to be obtained is an array. You can set the following states: • filled field: field is NULL • empty field: field is false • Hook: field is true

OPC-UA Pub/Sub Reader

Connection

Plug-in	Connect the OPC UA Pub/Sub plug-in here.

DataSet

Publisher Id	Enter the Publisher Id of the Publisher here.
Writer Id	Enter the Writer Id of the Publisher here. Note: If you want to read all data sets of the queue you can type 0 for all writers.
Queue Name	Enter the queue name (topic) to which the subscriber should subscribe to the publisher.

DataSetMetaData

Browse	Read all data sets which the writer has send to the broker. For that enter the writer id and the queue name.
Name	Name of the data set. Note: If you use "Browse" you don't must enter any value.
Version	Version of the data set. The version number must have major number and a minor number i.e. 1.0. If you update the data set you should update the version number i.e. 1.1

Fields

Note: Use "Browse" to get all data sets which the writer sends to the broker. Another opinion is to enter the values manually.		
Name	Specify the name of the data point to be read.	
Туре	Specify which data type the data point to be read has.	

Array	Specify whether the data point to be obtained is an array. You can set the following states: • filled field: field is NULL • empty field: field is false • Hook: field is true

Heidenhain

□ WARNING

Attention: Heidenhai is not supported in Docker.

Heidenhain plug-in connects OPC Router to all accessible Heidenhain controls.

Operation is standard:

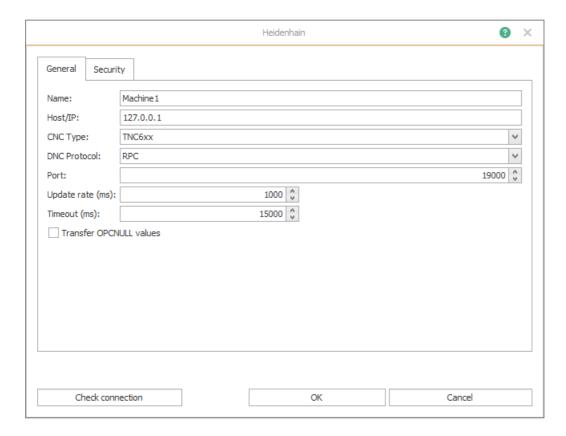
- 1. Open plug-in by double-click "Heidenhain". The list of created Heidenhain connections is displayed.
- 2. Chose "Add new set as access data" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Plug-in").
- 4. Confirm with "OK".

The Heidenhain server can now be used to define a connection.

Plug-in

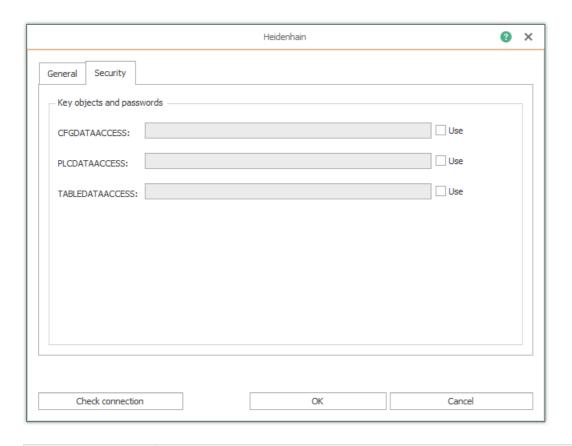
The following properties have to be specified for each set of Heidenhain access data:

General



Name	This set's name. The name will be shown in projection. Select a name you will recognize!
Host/IP	Heidenhain-Server's address
CNC-Type	Heidenhain CNC type.
DNC Protocol	Choice between the following protocols: COM LSV/2 RPC TCP/IP
Port	Select Ethernet port.
Update rate	Select values update rate in milliseconds
Timeout	Select the connections timeout in milliseconds
Transfer OPCNULL values	Check if NULL values should get transferred,

Security



CFGDATAACCESS	If the password is set, the checkbox must be activated and the valid password entered in order to be able to access the configuration.
PCLDATAACCESS	If the password is specified, the checkbox must be activated and the valid password entered in order to be able to access the data of the PLC program and the properties of the PLC runtime.
TABLEDATAACCESS	If the password is set, the checkbox must be activated and the valid password entered in order to able to access II tables, including that of the tool.

Control systems

CAUTION

Important: The machines need an Ethernet interface an the option DNC / option 18 needs to be enabled.

Control system	from NC Version	from DNC Version
iTNC 530	340420-06, 340422-01	1.6.1
iTNC 530	340480-01	1.6.1
iTNC 530	34049x-03, 60642x-01	1.6.1
NCK based		
TNC 128	771841-01	1.5.1
TNC 320	340551-03, 771851-01	1.5.1

TNC 620	34056x-01, 73498x-01, 81760x-01	1.5.1
TNC 640	34059x-01	1.5.1
MANUALplus 620	548328-05, 54843x-01	1.5.1
CNC PILOT 620	688945-01	1.5.1
CNC PILOT 640	688946-01, 688947-01	1.3.1
MillPlusIT V6x0	53895x-03, 73738x-01	1.5.1
GrindPlusIT	510060-04	1.5.1
GrindPlus 640	73502x-01	1.5.1

Automatic

You can select the "Automatic" tags in the tag browser. These tags are read only. Following tags are available:

ExecutionMode

The current operating mode of the machine.

MANUAL	Execution of an EasyOperate Cycle.
MDI	A block entered in MDI (M anual D ata Input) is executed.
RPF	Reference Point.
SINGLESTEP	Execution of a part program with SingleBlock active.
AUTOMATIC	Full execution of a part program.
OTHER	Type of execution is other than the known ones.
HANDWHEEL	Electronic hand-wheel is active

ProgramStatus

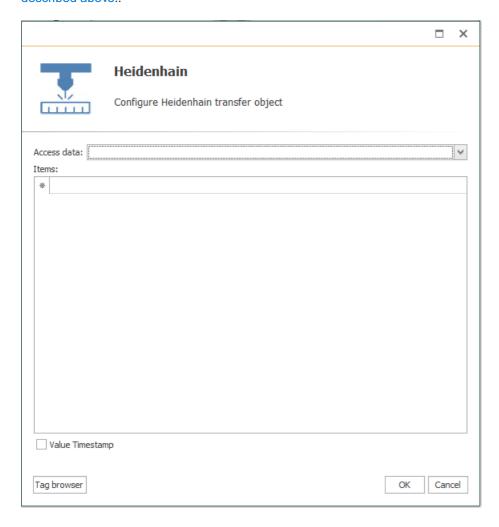
The state of the current part program.

IDLE	 State of execution after an error program stop program finish
RUNNING	Part program is running (executed)

STOPPED	Part program is stopped (M0 or single block execution)
INTERRUPTED	Part program is interrupted.
FINISHED	Part program has finished execution.
ERROR	Part program has encountered an error situation.
NOT_SELECTED	No part program is currently selected.

Transfer object

The Heidenhain server's set of access data has to be specified within plug-in configuration. Create a Heidenhain transfer object as described above..



Double-click on transfer object to assign the properties:

Access data	Select a set of Heidenhain access data. Dependent on plug-in configuration.
Items	Enter Heidenhain items needed. Use the Tag Browser to browse items.
Value Timestamp	Returns the timestamp of the transferred value.

Within the item's list, select several items by holding mouse button down ("Ctrl + a" will select all). Selected items can be copied to clipboard and inserted ("Ctrl + c", "Ctrl + v").

Using the Tag Browser

Using the button "Tag Browser", you will open another dialog to browse and select Heidenhain items. The dialog is not modal, you can switch between transfer object and browser.

Enter a search string to hide the tree view and show all items matching the search term.

- 1. Select the row for the new item.
- 2. Open the Tag Browser
- 3. Assign Item by double-click.

Heidenhain trigger

Overview over trigger:

heidenhain_message_trigger_object.md

heidenhain_bit_trigger_object.md

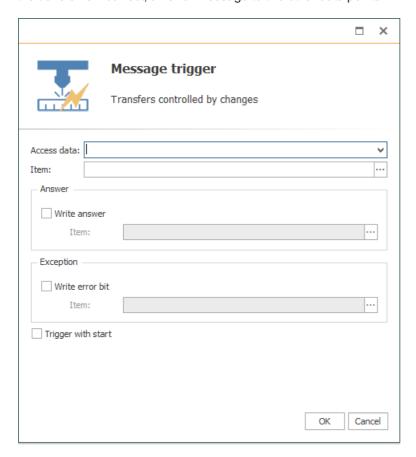
heidenhain_threshold_trigger_object.md

heidenhain_data_change_missing_trigger_object.md

heidenhain_data_change_trigger_object.md

Heidenhain-Message

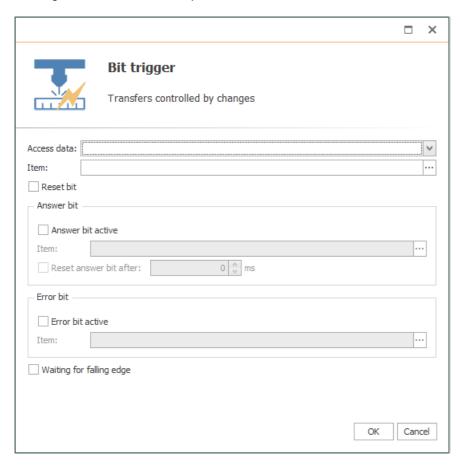
The message trigger triggers the data transfer if the assigned numeric data increments by 1. You can also send an answer and, if the transfer is incorrect, an error message to two other data points.



Access data	Select a set of Heidenhain access data.
ltem	Item whose increase will execute the transfer. Browse items with tag browser ("" button).
Write answer	Will transfer Heidenhain item's value (or set a bit) to another item as confirmation that the transfer executes.
Ttem	Heidenhain item the answer is send to. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Write error bit	Activate to set a bit with transfer errors.
ltem	Heidenhain item (bit) that is set with transfer errors. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Trigger with start	Release trigger once with OPC Router start.

Heidenhain-Bit

The bit trigger triggers the data transfer when the assigned logical data point takes a value 1. If the assigned data point is not a logical data point, the trigger triggers when the data point takes a different value as NULL. You can also send a reply and a fault message to two additional data points if the transfer is incorrect.

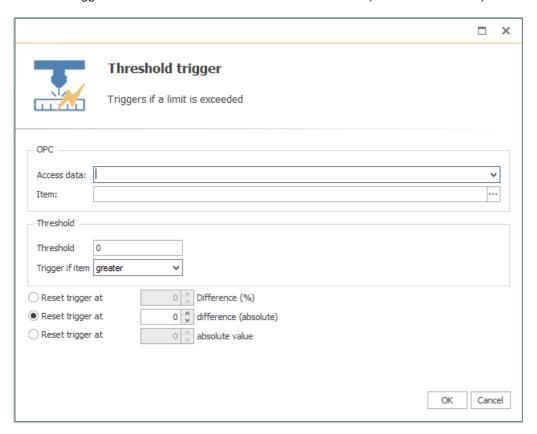


Access data	Heidenhain connection which the relevant data point is reached.
ltem	Heidenhain data point that triggers the transfer as soon as it assumes a value other than 0. Use the button " " to open the tag browser (see below) for the interactive selection of an item.
Reset bit	Resets the Heidenhain item to zero after the transfer. Should usually be disabled because a bit should only be written from one side. Instead, use the answer bit to tell the controller that the transfer has completed.
Answer bit active	Sends one bit to another data point in response that the transfer has completed.
ltem	Heidenhain data point to which the response is sent. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Reset answer bit after	After the set time, the response bit is reset.
Error bit active	Sends a bit to another data point if the data transfer was faulty.

ltem	Heidenhain item (bit) that is set with transfer errors. It must be a logical (bit) data point that has state "0" or "1". Use the button "" to open the tag browser (see below) for the interactive selection of an item.
Waiting for failing edge	If you don't want the OPC router to trigger continuously when the bit is active, activate this checkbox. This causes the OPC Router to trigger only once when the bit is active and then wait for a "falling edge" before triggering again.

Heidenhain-Threshold

Threshold trigger executes a data transfer with off-limit condition (of Heidenhain value)



The properties are:

Access data	Select a set of Heidenhain access data.
ltem	Item whose off-limit condition will execute the transfer. Browse items with tag browser ("" button).
Threshold	Absolute value.
Trigger if item	Set if threshold has to be under- or overrun.
Hysteresis	If the trigger has executed the transfer once, it might be required that the trigger is re-released only if the Heidenhain item's value is clearly different from threshold value. If this is the case, please specify the difference between Heidenhain item and threshold with which the trigger is set active again. Example: The threshold is 20 °C, to be triggered when overrun. Temperature varies between 19 and 21 degrees, but only the first overrun has to be transferred. Hysteresis could be set to 18 degrees absolute value. Thus, the trigger will only release after the temperature has fallen below 18 (after having overrun 20).

□ TIP

Tip: If the connection should be triggered permanently on off-limit condition, set hysteresis absolute value to the maximum value the item can take. Thus, it will trigger in OPC Routers cycle time interval as long as it is in off-limit condition. Combine with a data change trigger linked with AND to only trigger data changes above the limit. In the example above, the temperature will not exceed 100 degrees, then with threshold = 20 and trigger reset from 100 absolute value the trigger would always trigger when the temperature is between 20 and 100 degrees, in the frequency of the cycle time of the router (settings). You could limit this with an AND-linked datachange trigger to record only

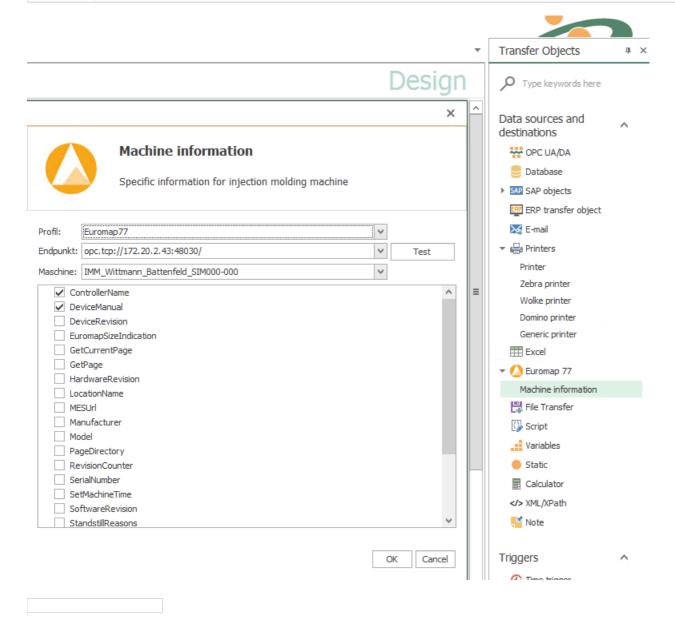


Euromap-77 Transfer Object

An Euromap object is available to you as transfer source and destination The required profile must be configured as a plug-in instance. Create a transfer object within the connection as axplained.

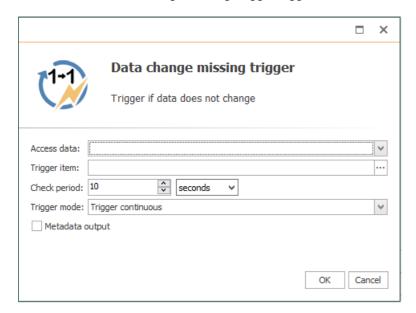
After double-clicking on the transfer object, set the following properties:

Profil	Here the profiles are available as configured instances of the Euromap77 plug-in. Select a profile from the drop-down list.
Endpoint	Select an endpoint from the drop-down list. With the button "Test" you can check if your connection works
Machine	Select a machine from the drop-down list. In the list below you will now get a selection list with all possible information of this machine. Activate the areas that are necessary for your configuration. Now you can use this selected information as transfer information.



Heidenhain Data-Change-Missing

The Heidenhain Data-Change-Missing-Trigger triggers if a value does not change its value for a specified time.



Access data	Select a set of Heidenhain access data.
Trigger item	Item which should get observed. Browse items with tag browser ("" button).
Check period	If the data point does not change its value within this time, the trigger triggers.
Trigger mode	Select if the trigger should trigger once or continuous. (Continuous means the selected check period)
Metadata output	Activate this if you want to send the last known data of the data point. It includes the quality ID, the quality string, the timestamp and the name of the data point.

Euromap-77 trigger

Trigger overview

em_machine_mode_trigger.md

em_part_counter_trigger.md

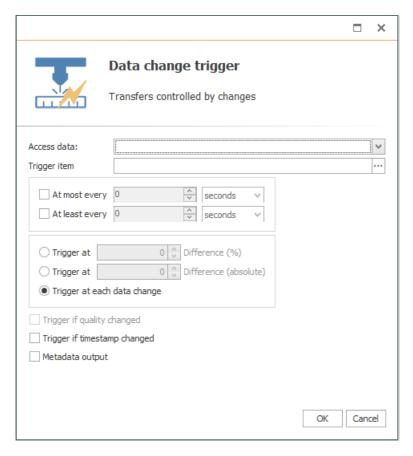
em_temp_datachange_trigger.md

em_production_state_trigger.md

em_temp_deviation_trigger.md

Heidenhain-Data Change

Data change trigger executes transfers with a changing Heidenhain value. You might specify tolerances and time intervals as to optimize the number of transfers – forced transfer, even if no change is made, or limitation of transfers with many data changes.



Access data	Select a set of Heidenhain access data.
Trigger item	Item whose change will execute the transfer. Browse items with tag browser ("" button).

Use the extended button to define further properties

At most every	Minimum interval in which transfer will be executed even if no data change has occurred. Integers only, unit from milliseconds to hours.
At least every	If data change frequently the number of transfers can be limit. An entry means, e. g. Transfer every second maximum even if data changes more frequently. Integers only. Units from milliseconds to hours.
Trigger at difference (%)	Transfer will only execute if data changes by this difference.
Trigger at difference (absolute)	Transfer will only execute if data changes by this difference.
Trigger at each data change	Default. Overrides tolerance settings.

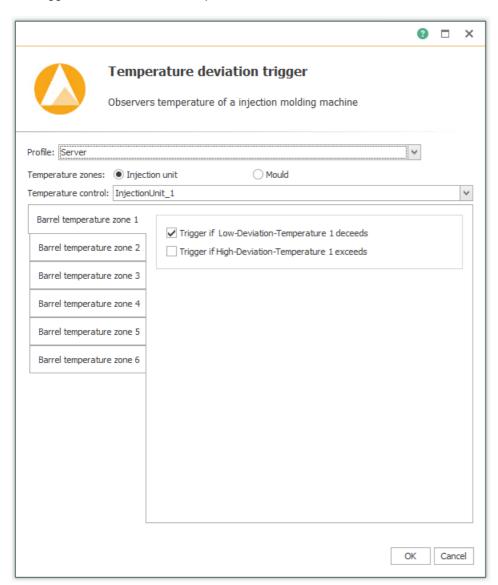
Trigger if quality changed	Activate the checkbox if you want to trigger at quality change.
Trigger if timestamp changed	Activate the checkbox if you want to trigger when the timestamp is changed.
Metadata output	Activate the checkbox if you want the metadata to be output.

□ TIP

Tip: To set conditions for relative and absolute tolerance, project two data change triggers linked with AND or OR.

Temperature deviation

This trigger is released when a temperature zone is below or above the deviation.



Profile	Select a connection that you have created in the plug-in.
Temperature zones	Select here between the injection unit and the mold.
Temperature monitoring	Select the temperature you want to monitor here.

Euromap-77

The Euromap 77 is a standard for injection molding machines based on the OPC standard. Injection molding machines that support this standard can be connected with the OPC router.

Creating the Euromap connection

- 1. Open the plug-in "Euromap 77 connections" by double click at the plug-in menu.
- 2. Please select "Create new profile" or double click on an available entry to change the connection.
- 3. Please define the settings now (see section "Plug-in"). Select an available command or create a new command set with the buttons. If you change a command set, the changes apply to all existing connections using this set.
- 4. Confirm with "OK".

The Euromap connection will be available for projection of connections now.

Temperature datachange

The Euromap77 trigger triggers the data transfer when the temperature value changes of a data point. The following trigger applications are available:

- Temperature datachange trigger: Monitors temperature changes within the selected injection molding machine.
- Temperature deviation: To monitor temperature-threshold violations of the selected injection molding machine.

The individual	properties are:
----------------	-----------------

Profile	Here the profiles are available as configured instances of the Euromap77 plug-in. Select a profile from the drop-down list.
Destination	Select an endpoint from the drop-down list. The "Check" button allows you to verify that your connection is working.
Machine	Select a machine from the drop-down list. In the list below you will now get a selection list with all possible information of this machine. Activate the areas that are necessary for your configuration. You can now use this selected information as transfer information.

By selecting the temperature zone type "InjectionUnit" or "Mould" and selecting the appropriate temperature monitoring, you specify the following properties:

Features temperature datachange trigger

At most every	Time interval in which data is transferred in any case, even if the value of the data point has not changed. Default always as an integer, no decimal places. As units therefore milliseconds, seconds, minutes or hours are to be selected.
At least every	If the value of the data point changes frequently, the transfer number can be limited over an interval. The entry thus means: It is at most e.g. transmitted every second, even if the value changes more often Default always as an integer, no decimal places. As units therefore milliseconds, seconds, minutes or hours are to be selected
Trigger at difference (%)	The transfer is only triggered if the value of the data point changes by this entry (relative).
Trigger at difference (absolute)	The transfer is only triggered if the value of the data point changes by this entry (absolute).
Trigger at each data change	Default setting, sets trigger at difference override.

Features temperature deviation

Trigger if Low-Deviation-Temperature 1 deceeds	When activated, the temperature is only triggered w
Trigger if High-Deviation-Temperature 1 exeeds	When activated, the temperature is triggered only when the highest deviation is exceeded.

Euromap-77 Plug-in

Please define the following properties to configure set of Euromap-77 connections:

Name	Any name where this connection appears in the connection configuration. Choose a name that is clearly recognizable for you!
Client certificate	Select a client certificate from the drop-down menu. You can use the plus sign to add another certificate and the minus sign to remove one. Another button allows you to display the properties of an existing certificate.
Authentication	Select authentication from the identity verification drop-down menu.
Endpoint	Enter an endpoint for your connection.
Machine name	Select a machine name from the drop-down menu.
Use highest security level	Activate the checkbox if you want to use the highest safety level and make the entries accordingly
Login credentials	If you have selected "Username and password" at authentication, entries are required in this area.
Security settings	If you have not enabled the highest levels of security, then security settings will be required in this area: • MessageSecurityMode • SecurityPolicy If unencrypted communication is required, the client certificate "Without" and MessageSecurityMode "None" must be selected.

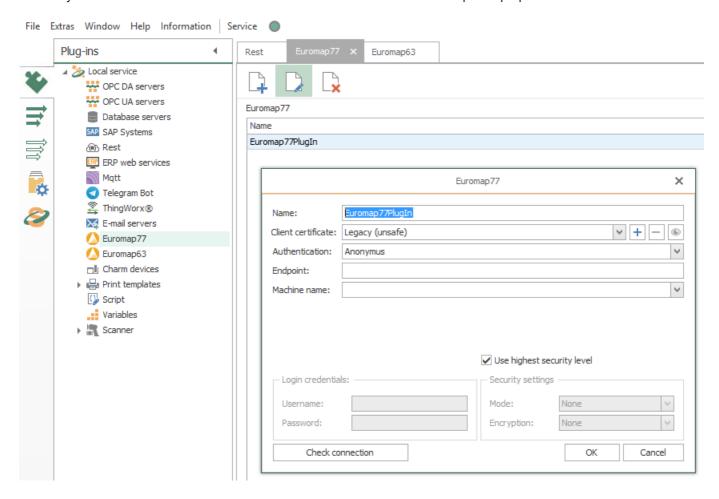
Create certificate

Application name	Assign an application name for the certificate.
Organization	Enter an organization as needed.
Organization unit	If necessary, enter an addition to the organization. For example, a place or hall of the organization.
Application URI	Enter the application URI.
DNS name	Enter the DNS name of your server.
Applicant	Enter the applicant.
Expires in (Months)	Specify the validity period of the certificate in months.

□ NOTE

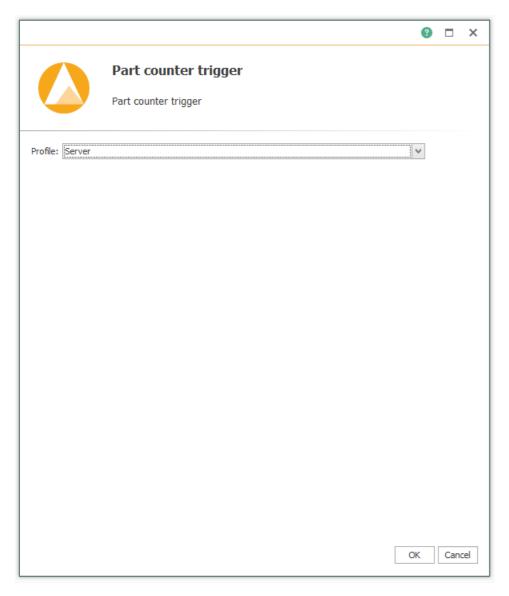
Note: Click on the window "Check certificate" on "Yes" to establish a connection. You can display the certificate, too.

Confirm your entries with "Create". You can now select the client certificate in the profile properties.



Part counter

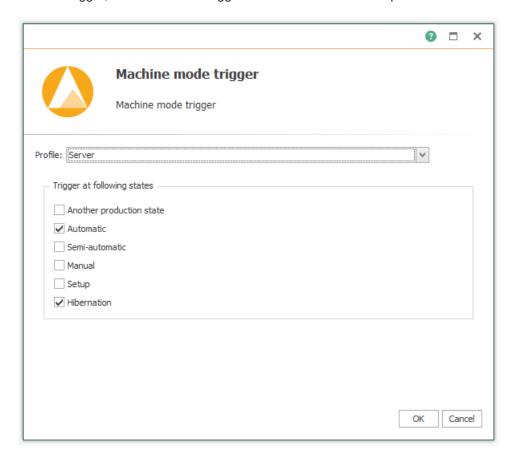
This trigger outputs the number of counted parts.



Profile	Select a connection that you have created in the plug-in.

Machine mode

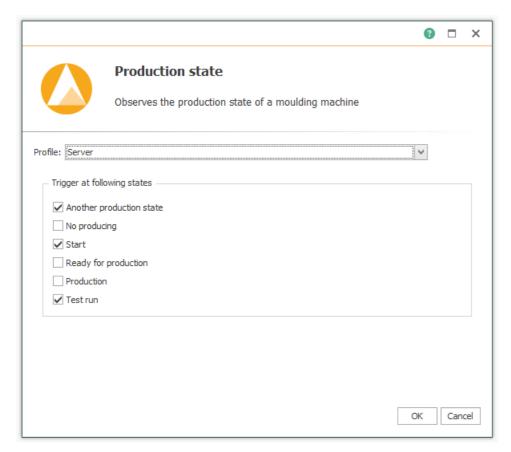
With this trigger, the connection is triggered when the machine accepts one of these status.



Profile	Select a connection that you have created in the plug-in.
Trigger at the following status	Select here the respective status at which triggering is to take place.

Production state

With this trigger, the connection is triggered when the following statuses are accepted.



Profile	Select a connection that you have created in the plug-in.
Trigger at the following status	Select here the respective status at which triggering is to take place.

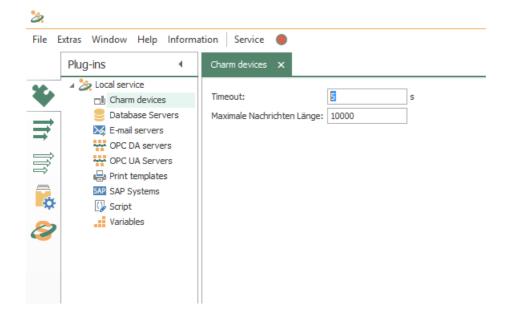
Charm

Charm devices send results to a defined port on the computer using the OPC router. The OPC router monitors this port and accepts the messages (results of measurements (inhibitor, microtoxins, etc.).

No connections are configured in this plug-in. The port to which the Charm device sends is set directly in the trigger.

Basically, a separate port must be created for each Charm device type. Recommended procedure: All charm devices of one type are sent to the same port. In the OPC router a single connection is created. In addition to the results, the OPC router also transmits information about the sending Charm device to the database. The logic of how the results are processed is in the database (or another transfer destination).

However, if you want to create a separate connection for each Charm device, a separate port must also be available for each device.



Timeout	When a Charm device establishes a connection, it has the time entered in milliseconds to send all data to the OPC router. Requires the Charm device longer, the connection is disconnected from the OPC router.
Maximal message length	When connecting the Charm device to the OPC router, data is sent. If more than the allowed characters are transferred, the OPC router disconnects the connection and sees the message as faulty.

Plug-in

The following properties are set in the Charm plug-in configuration for each set of Charm access data

Name	This set's name. The name will be shown in projection. Select a name you will recognize!
Port	Port on this computer (hosting OPC Router) to which the specific Charm devices will send data.

Trigger

Overview over trigger:

charm_error_trigger_object.md

charm_trigger_object.md

Charm-Error

The charm error trigger triggers a data transfer in the event of a faulty telegram. Since the charm trigger works faster than the error
trigger, the property of the trigger trigger for the corresponding port / device must be disabled. Then, in a further connection
controlled by the charm error trigger, information about erroneous messages can be treated separately, e.g. a separate database
table.

The individual properties are:

Device type	Type of charm reader.
Port	Port on this machine (with the OPC router) to which the Charm device sends its data.

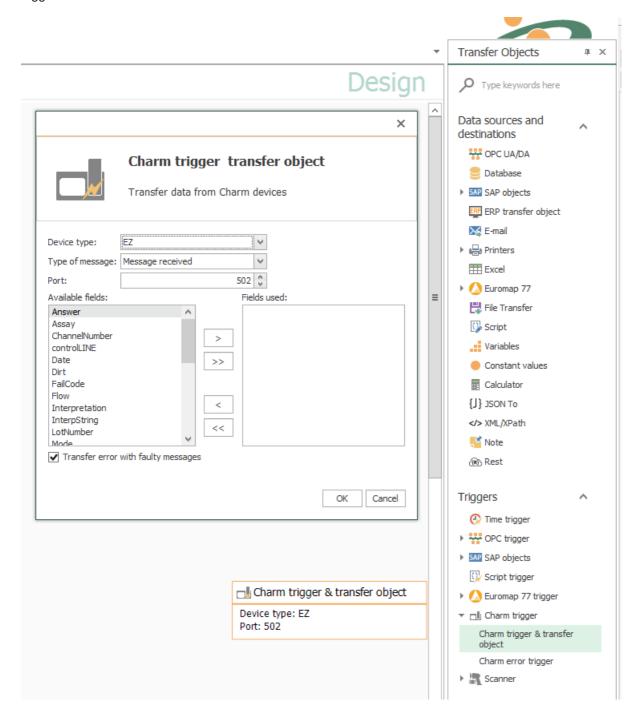
Confirm your entries with "OK".

□ NOTE

Note: In the Charm device, the IP address of the computer with the OPC router must be announced together with the port number set here. That's where the charm device has to send the data. The OPC router then transmits the data record by record.

Charm trigger

The Charm trigger releases a transfer when new data are presented by the Charm device observed. In contrast to the OPC Router 3, which provided the transfer object and trigger separately, both functions are now combined in the Charm trigger object - the trigger is also the data source.



Properties are:

Device type	Type of Charm-Reader. The devices "EZ", "EZ-M" and "EZ-M2" are predefined. However, you have the option of defining additional device types via an XML-file
Type of message	By default, "Message received" is set. When switching to "Heartbeat received", an internal device in the background receives a message.

Port	Port on this machine (with the OPC router) to which the Charm device sends the data. Basically, a separate port must be created for each Charm device type. Recommended Action: All Charm devices of one type send to the same port. A single connection is created in the OPC router for this purpose. In addition to the results, the OPC router also transmits the information about the sending Charm device to the database. The logic of how the results are processed resides in the database (or other transfer destination). However, if a separate connection is to be created for each Charm device, a separate port must also be available for each device.
Available fields/ Fields used	From the available fields, select the fields you want to use for your connection. Use the arrows to transfer or remove your selection.
Transfer error with faulty messages	Activate to trigger a transfer error in case of erroneous messages. Deactivate to ignore erroneous messages (e.g. to intercept faulty messages with the charm-error-trigger in another connection, see there).

Confirm your entries with "OK".

In addition to the message fields selected from the available fields, additional information about the message received is automatically output (message information). At "message information", the complete message, the IP address of the Charm device, the time stamp and a numbering of several consecutive messages are output.

News information

Complete message	The Complete Message of the Charm device.
Client address	IP address of the Charm device.
Message index	For multiple concurrent messages, the OPC Router will number each message.
Timestamp (UTC)	Timestamp of message (UTC).

□ NOTE

Note: In the Charm device, the IP address of the computer with the OPC router must be announced together with the port number set here. That's where the charm device has to send its data. The OPC router then transmits the data record by record.

Fields of predefined Charm device types

Name	EZ	EZ-M	EZ-M2	Description
Answer	X	X		Numerical test result including unit where necessary
Assay	X	Х		sample type

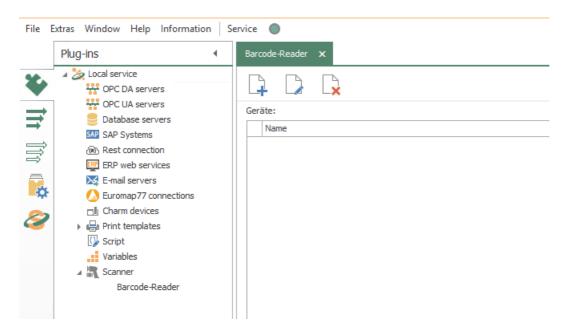
ChannelNumber	X	X	Х	EZ channel number
CommodityName		X	X	Raw material / article
controlLINE	Х	X	X	Intensity of the Control Line
CurrentCommoditySelectIndex		X		
CurrentDilutionSelectIndex		X		
CurrentMatrixSelectIndex		X		
CurrentTestSelectIndex		X		
Date	Х	X	X	Date of the test
DE_Name		Х	X	
Dirt	Х	Х	X	Degree of contamination of the lens
FailCode	Х	Х	X	Error code on failed test
Flow	Х	Х	X	Flow value (Correct application of the milk on the test strip)
Interpretation	Х	Х	Х	Interpretation of test result (positive, negative, etc.)
InterpString	Х			(Interpretation in newer firmware)
LotNumber	Х	Х		LOT number (as entered on the unit)
MatrixNumber			X	Matrix number of the test result
Mode	Х	X	X	Mode of the Charm device
OperatorID	Х	Х		Operator ID (as entered on the device)
Ratio		Х	X	Ratio of Extraction Solvent to Extraction
Remmisions	Х	Х		
Result	X	Х	X	Test result (positive, negative, invalid)
RFID			×	
SampleID	Х	Х	X	Test ID (as entered on the device)
StructVersion	Х	Х	X	
testLINE	Х	Х	X	Intensity of the test line
TestOutputName	Х	X	X	

TestTemperature	X	X	X	Incubator temperature at test time
TestType			X	
Time	X	X	Х	Time of the test
TipBlue	X	X		Displays value "Blue" when the test color is identified
TipGreen	X	X		Displays value "Green" when the test color is identified
TipRed	X	X		Displays value "Red" when the test color is identified
UnitSN	X	X	X	
XLine	X	X	X	Intensity of the X Line
YLine	X	X	X	Intensity of the Y Line
ZLine	X	X	X	Intensity of the Z Line

Scanner

The following scanner devices can currently be connected:

• Barcode-Reader



Plug-in

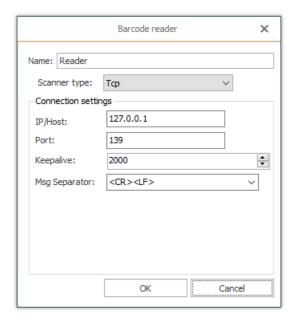
You can set the following properties in the configuration of the scanner plug-in for a barcode reader:

Name	Any name where this device appears in the connection configuration.
COM Port	Enter the COM port for communication with the barcode reader.

Connection settings serial Barcode reader

Baud rate	Select a baud rate. Specifies how often a signal in a communication channel changes state.
Data bits	Specify how many bits of data to transfer.
Parity	Select a parity from the drop-down menu. For example, Even, Mark, Space.
Stop bits	Specify how many stop bits are needed.
Flow control	Select how the data flow should be controlled. Eg. software, hardware

Connection settings Tcp Barcode reader



IP	Enter the IP of your Tcp barcode scanner.
Port	Enter the port of your Tcp barcode scanner.
Keepalive	Sends a bit to signal that it is still reachable.
Msg Separator	Which XML node should be used to separate the message.

Trigger

Currently a trigger for the barcode reader is available.

TI	: I : .	I	 	•	

The individual properties are:

Instance	Select an instance from the drop-down menu for the barcode reader whose scan product you want to use.
Values	Select the value to be read, in this case "Barcode".

RFID

This operation is standard:

- 1. Open the plug-in by double-clicking on "RFID Reader" in the "Plug-ins" menu.
- 2. Choose "Add" or double-click an existing entry.
- 3. Make the necessary settings (see section "Plug-in").
- 4. Confirm with "OK".

You can now make connections with your RFID reader.

Plug-in

The following properties are set in the configuration of the RFID Reader plug-in:

Name	Any name where this connection appears in the connection project planning. Choose a name that you can recognize uniquely!
Client certificate	Select a client certificate from the drop-down menu. Using the plus sign, you can add another certificate, using the minus sign to remove one. Another button allows you to display the properties of an existing certificate.
Authentication process	Select an authentication from the Identity Verification drop-down menu. If you select Username, you must enter Username and Password at Registration information.
Endpoint	Enter an endpoint for your connection opc.tpc://
RFID-Reader name	Select your RFID Reader from the drop-down menu.
Scan mode	Selection of scan mode between "Scan manually", "Scan in regular interval" or "Scan in background".
Scan interval (ms)	Enter the scan interval in milliseconds.
Trigger if minimum signal strength is reached	Only trigger the scan if the signal strength is sufficient.
Signal strength (RSSI)	Tags with a lower signal strength during scanning are ignored by the OPC router.
Trigger if an RFID tag was not captured for a defined time.	Specifies how long a tag must be outside the reading field before the OPC Router triggers another transfer for this tag.
Hibernation interval (ms)	Period where a RFID tag is not to be recorded.
Highest security level	Activate if the highest security level has to be used.

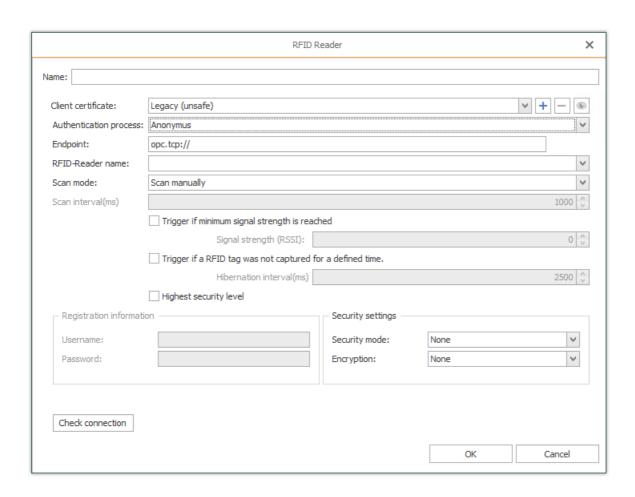
Registration information

Username	Enter a username to authenticate yourself.
Password	Enter a password to authenticate yourself.

Security settings

Security mode	No Security = "None", Signing = "Sign", Signing and Encrypting with "SignAndEncrypt".
Encryption	Encryption methods to choose from. Set the highest method available on the OPC server.

Use the "Check connection" button to check whether your connection to the RFID Reader is successful.



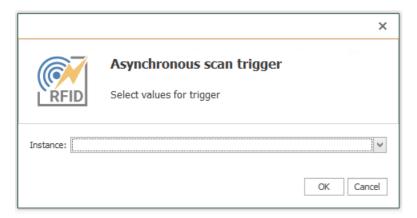
Transfer object

RFID reader transfer objects can synchronize scans,	read tags, writ	te, lock,	destroy or create	passwords.	You can di	rectly configure	Э
the transfer object within the connection as described	ł.						

After double-clicking the transfer object, select an instance from the drop-down menu.	

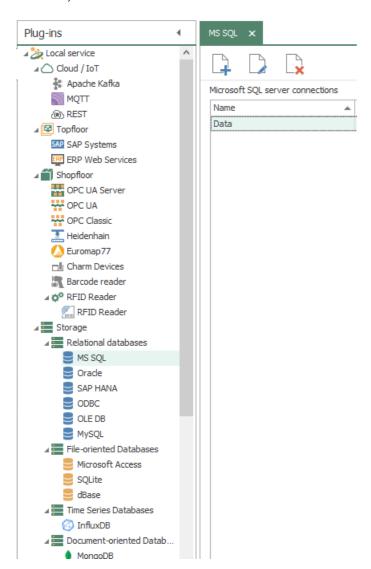
RFID Reader trigger

Scan asynchronous trigger of the RFID reader to trigger asynchronous scans. Select an instance from the drop-down menu after double-clicking.



Storage

The database plug-in connects OPC Router to as many database servers as you can reach. The database specific clients are required on the OPC Router's computer and have to be installed manually (e. g. MS SQL Server Native Client, MySQL ODBC driver etc).



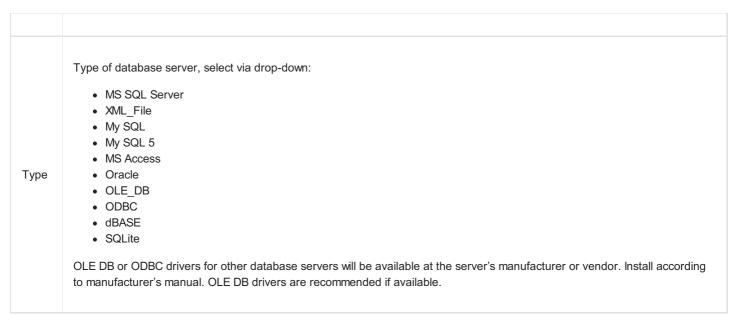
Defining access data:

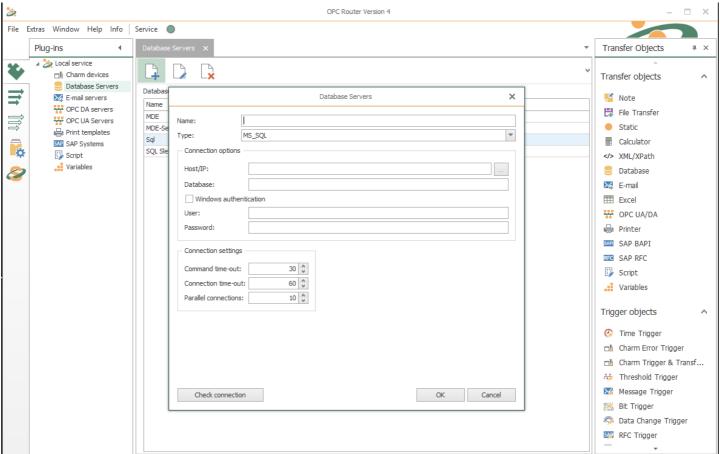
- 1. Open a plug-in by clicking on a database in the project configuration's plug-in list.
- 2. Chose "Add" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Relational databases").
- 4. Click on button "Check connection" to verify the OPC Router is getting access to database server and if access data are correct. This is to exclude one typical source of errors.
- 5. Confirm with "OK".

The database server can now be used to define a connection.

The following properties have to be specified for each set of database access data:

Name	This set's name. The name will be shown in projection. Select a name you will recognize!





Properties not applicable for a specific type of server are deactivated. Please refer to database server's manual for server-side configuration. Please contact your database administrator to get the correct setting for the properties. The picture shows connection to MS SQL Server after a successful test.

Relational databases

Overview over relational databases:

ms_sql_plug_in.md

oracle_plug_in.md

sap_hana_plug_in.md

odbc_plug_in.md

ole_db_plug_in.md

mysql_plug_in.md

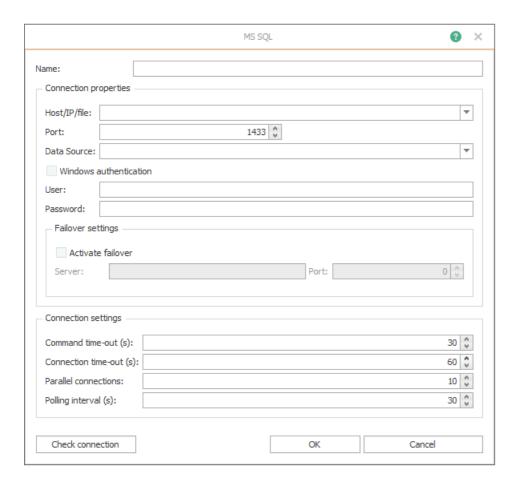
db_transfer_object.md

db_trigger_transfer_object.md

MS SQL

Options for MS SQL Servers

Host/IP/Files	Name of MS SQL Server (named pipe or <ip>:<port>, specifying a port number enforces communication via TCP/IP.</port></ip>	
Port	Selection of the port for the database connection. If necessary, the port can be changed.	
Data Source	Database on server to be used.	
Windows authentication	Activate to use Windows authentication instead of username and Password. Local accounts, DCOM users a Windows domain users (NT authentication) are supported. To use Windows authentication, the user under which the OPC Router service is running needs access rights to the database server. By default, this is the system user. To be able to define connection, the user under which OPC Router Configuration is running, needs those rights (by default: User logged-on the Windows System). In this case, "Check connection" is valid only for the configuration. Observer carefully if transfers are executed correctly!	
User	Username to log on MS SQL Server	
Password	Password to log on MS SQL Server	
Command time-out	Time (seconds) that the Router waits for an SQL command to terminate. Increase if your projects involve commands of long duration (e. g. stored procedures). Note that you also need to increase the value for the individual connections that trigger long queries.	
Activate failover	Enter the address of a failover server here. (Only the only the "connection string" is adjusted. The configuration of the failover cluster is done directly on the MS SQL Server).	
Command time-out	Time (seconds) that the router waits for an SQL command to complete. For long queries, it may be necessary to increase the value. Note that you also need to increase the value for the individual connections that initiate long queries.	
Connection time-out	Time (seconds) that the Router may need to establish connection.	
Parallel connections	Number of connections that the Router may establish parallely. The more connections the faster the Router the slower probably the database. Ask your database administrator how many connections the Router may establish. This depends on your project's scale, of course.	
Polling interval	Distance at which the database is queried.	



Oracle Plug-in

Options for Oracle

To connect to Oracle servers, the Oracle client has to be installed.

Starting with OPC Router version 4.13 a direct connection to Oracle servers can be established in addition to a connection via TNS. For older versions of the OPC Router you need the Oracle Instant Client (from the Oracle Data Access Components ODAC, download from Oracle). Also recommended are the Oracle Data Providers for .NET 2 and .NET 4 of the ODAC package.

□ WARNING ATTENTION: Only one Cloud Wallet can be configured. Once a Cloud Wallet is used, no other Oracle plug-in can be used. Name Name of Oracle configuration Connection host name type address of the server Server Port Selection of the port for the database connection. If necessary, the port can be changed. Schema Oracle schema Activate to use Windows authentication instead of username and Password. Local accounts, DCOM users a Windows domain users (NT authentication) are supported. To use Windows authentication, the user under which the OPC Router service is running needs access rights to the database server. By default, this is the system user. To be able to Windows define connection, the user under which OPC Router Configuration is running, needs those rights (by default: User authentication logged-on the Windows System). In this case, "Check connection" is valid only for the configuration. Observer carefully if transfers are executed correctly! User username to log on Oracle Password Password to log on Oracle Time (seconds) that the Router waits for an SQL command to terminate. Increase if your projects involve commands of Command long duration (e. g. stored procedures). Note that you also need to increase the value for the individual connections time-out that trigger long queries. Number of connections that the Router may establish parallely. The more connections the faster the Router the slower Parallel probably the database. Ask your database administrator how many connections the Router may establish. This connections depends on your project's scale, of course. Polling Distance at which the database is queried. interval

Connection type: Cloud Wallet

Wallet	Select a wallet from your file system. Via the button "" you can directly select a wallet on your hard disk. Afterwards this wallet is available in the dropdown menu.

Database	Select the database from the list
User	username to log on Oracle
Password	Password to log on Oracle
Command time-out	Time (seconds) that the Router waits for an SQL command to terminate. Increase if your projects involve commands of long duration (e. g. stored procedures). Note that you also need to increase the value for the individual connections that trigger long queries.
Parallel connections	Number of connections that the Router may establish parallely. The more connections the faster the Router the slower probably the database. Ask your database administrator how many connections the Router may establish. This depends on your project's scale, of course.
Polling interval	Distance at which the database is queried.

SAP HANA

Connection options für SAP Hana

Name	Any name under which this database server appears in the connection configuration. Choose a name that is unique for you during connection configuration.	
Host/IP/FIIe	Address of the SAP Hana Server	
Port	Selection of the Port. He can be changed.	
Data Source	Name of the database to use	
Schema	Schema	
Username	Username to log in to SAP Hana server	
Password	Password to log on to SAP Hana server	
Command time-out	Time (seconds) that the router waits for a command to complete. For long queries, it may be necessary to increase the value. Note that you also need to increase the value for the individual connections that initiate long queries.	
Connection time-out	Time (seconds) that the Router may need to establish connection.	
Parallel connections	Number of connections that the Router may establish parallely. The more connections the faster the Router the slower probably the database. Ask your database administrator how many connections the Router may establish. This depends on your project's scale, of course.	
Polling interval	Distance at which the database is queried.	

ODBC

Options for ODBC drivers

The ODBC driver needed must be installed and active.

Name	Name of the configuration
Data Source	Name of the database to use
User	Username to log on database
Password	Password to log on database

OLE DB

Options for OLE DB Providers

□ WARNING

Attention: OLE DB is not supported in Docker.

OLE DB connections need a connection string. The OLE DB provider needed has to be installed and must be active.

Name	Name of the configuration
Connection string	Select a connection string from the drop-down menu.
Command time-out	Time (seconds) that the Router waits for an SQL command to terminate. Increase if your projects involve commands of long duration (e. g. stored procedures). Note that you also need to increase the value for the individual connections that trigger long queries.
Command time-out	Time (seconds) that the router waits for a command to complete. For long queries, it may be necessary to increase the value. Note that you also need to increase the value for the individual connections that initiate long queries.
Connection time-out	Time (seconds) that the Router may need to establish connection.
Parallel connections	Number of connections that the Router may establish parallely. The more connections the faster the Router the slower probably the database. Ask your database administrator how many connections the Router may establish. This depends on your project's scale, of course.
Polling interval	Distance at which the database is queried.

MySQL

Options for MySQL/MySQL-5 Servers

Name	Name of the configuration	
Host/IP	IP address of MySQL server.	
Port	Selection of the port for the database connection. If necessary, the port can be changed.	
Data Source	Database on server to be used.	
Windows authentication	Activate to use Windows authentication instead of username and Password. Local accounts, DCOM users a Windows domain users (NT authentication) are supported. To use Windows authentication, the user under which the OPC Router service is running needs access rights to the database server. By default, this is the system user. To be able to define connection, the user under which OPC Router Configuration is running, needs those rights (by default: User logged-on the Windows System). In this case, "Check connection" is valid only for the configuration. Observer carefully if transfers are executed correctly!	
User	Username to log on MySQL	
Password	Password to log on MySQL	
Command time-out	Time (seconds) that the router waits for a command to complete. For long queries, it may be necessary to increase the value. Note that you also need to increase the value for the individual connections that initiate long queries.	
Connection time-out	Time (seconds) that the Router may need to establish connection.	
Parallel connections	Number of connections that the Router may establish parallely. The more connections the faster the Router the slower probably the database. Ask your database administrator how many connections the Router may establish. This depends on your project's scale, of course.	
Polling interval	Distance at which the database is queried.	

SQLite

Options for SQLite

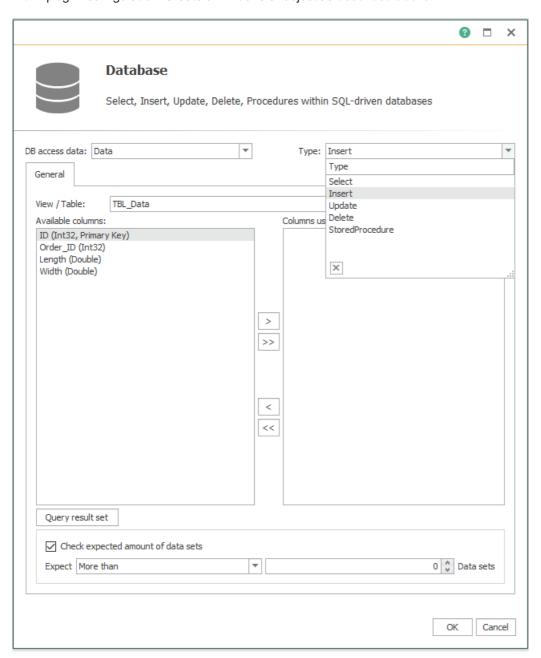
Name	Name of the configuration
File	Select an appropriate file.
Password	Password to log on database
DB access data	Select the DA access data from your SQLite file.

□ WARNING

Attention: Network paths will not be supported.

DB transfer object

Databases are available both as source and destination of data transfers. The database set of access data has to be specified within plug-in configuration. Create a DB transfer object as described above.



Configure the object's properties by double click:

DB access data	Select one of the configured sets of access data	

Select: Queries one or more rows from a table or a view. You have to define filter and sorting criteria as well. Thus, the transfer object will work as datasource.

Insert: Inserts a new row into a table. Thus, the transfer object will work as destination. For a database insert, incomplete arrays are padded. For example: If a single entry from a timestamp and several entries from an array should be read into a database, so the time stamp for the individual variables of the array can be done. The timestamp is therefore automatically used multiple times, until all variables have been read. Therefore, applies: An insert always determines the highest InsertCount. Entrys with smaller count are then expanded by a factor of X, so that the values in the table are filled up. Also selectable for views.

Type

Update: Updates one or several rows within a table. You have to define filter criteria as well. Thus, the transfer object will work as destination. Also selectable for views.

Delete: Deletes one or several rows within a table. You have to define filter criteria as well. Also selectable for views.

Stored procedure: Executes a stored procedure as soon as trigger conditions are met. Define parameter values (as destination) and use return values as source.

CAUTION

Important: If the type is set to "Stored Procedure", OPC Router will execute this Procedure immediately, submitting default parameters (string = NULL, int = 0 etc.). Thus, OPC Router detects the structure of the result set. Procedure will be rolled back. This means, that the Stored Procedure called must be transaction safe and must not return errors on default parameters.

Tab General (all types)

Table (View, Stored Procedure)	Table, View or Stored Procedure this object refers to. Note: Table has to have a primary key. Tables without primary key are not supported.
Available columns/Columns used	(View/Table operations) Available columns: Columns available in table or view, but not assigned to this object yet. Columns used: Columns assigned to this object and thus shown as items within this objects (to be used as source or destination). This distinction is made to keep the layout well-arranged, e. g. imagine you only need one out of 30 columns. So only this one column is shown in the connection layout. Move columns by double click onto their names or by the buttons provided (after having selected the columns). Buttons "Up" and "Down" will sort the columns (again, this is to keep the layout well-arranged) Stored Procedure: The lists show input and return parameters.

Tab Filter (Select, Update, Delete)

	Shows filters and filter groups. From this tree, the SQL statement is constructed. Filter values can be inserted dynamically during runtime. Use Variables/Constant values to insert constant filter criteria.
	Use Add-buttons to add filters or groups. Delete will remove the selected entry.
	Filter types:
	EQUAL: Compares if values are equal.
	GREATER: Compares if value is greater.
	GREATER_OR_EQUAL: Compares if value is greater or equal.
	SMALER: Compares if value is smaller.
Filter	SMALER_OR_EQUAL: Compares if value is smaller or equal.
	NOT_EQUAL: Compares if values are not equal.
	LIKE: Compares strings.
	LIKE_WILDCARD: Equal to LIKE %WERT%.
	LIKE_WILDCARD_END: Equal to LIKE WERT%.
	IN: Compares multiple values. Value input is an array.
	NOT_LIKE: Compares if strings are not equal.
	NOT_LIKE_WILDCARD: Equal to LIKE_WILDCARD but negated.
	NOT_IN: Compares if multiple values are not equal. Value input is an array.
	Entries are shown dependent on selected entry.
Edit	Junction: Defines whether filters are linked with AND or OR.
filter/filter group	Column: Column to be filtered
	Relational operator to compare values
	Preview of SQL Statement, e. g. WHERE (UtcTimeStamp >_ ?) AND (Value = ?) .
Preview	Here, all rows would be selected with a TimeStamp newer than the filter and with a value equal to the filter.
i i GviGvv	The values of the filter criteria have to be inserted during runtime. Thus, you can provide e. g. values of OPC items or othe tables as criteria. If the filter should be static, simply project a constant value object and transfer its value into the filter.

After confirming with "OK", you will see filter criteria as elements (items) of this transfer objects. Draw connection arrows from any source to assign values during runtime. With time filters, relative filter criteria like "-1d" (=yesterday) are allowed.

Tab Query (Select)

Sorting order	Ascending/Descending
Sorting by column	Column with sorting criteria.
Do not change records	Transferred records will not be changed.

Mark records after successful transfer	(only with select from table) In the column specified below, for every row transferred successfully, a "1" is inserted, a "2" if an error occurred. Note: In the table concerned, a simple primary key to the numerical column "ID" is required.
Column to mark	(only with select from table) Column to mark transferred rows. Default value set by database should be "0"
Count failed transfers	count the failed transfers Note: Select at "Error column" the column in which the number of failed transfers is to be counted up.
Delete records after successful transfer	only with select from table) Transferred rows will be deleted. CAUTION: Rows in database table will be deleted without recover possibility.
Abort transfer (with empty result)	If the result set is empty, the transfer is canceled.
Return read error (with empty result) If the result set is empty, the transfer is canceled and an error is logged in log file and monitor.	
Return empty record	Returns an empty record for an empty query result.
Limit number of records	Transfers only the specified number of rows/records. Be sure to have you result set sorted correctly.

Example: If only the newest record is to be transferred, then sorting column should be e. g. a "UtcTimeStamp" with Sorting order "Descending", the number of records limited to "1".

□ NOTE

Note: If the type is set to "Update", the transfer object will provide the number of rows updated as source.

Select always with filter

Use SQLSelect only with filters (WHERE clause) so as not to load the whole table into memory. In conjunction with transfer marks, you filter z. B. after <Transferflg> <> 1

Mark transferred records

Mark transferred records. In your tables, keep columns in which the OPC router can mark transferred data records ("Transfer flag" not transferred, transferred, transfer error). The transfer flag columns should be set to the default value of "0" and should not be allowed to assume NULL, so that a correct assignment to the three status are always guaranteed.

Index transfer flag

To improve performance, the transfer flag column should be indexed as follows:

• If the OPC router should filter by transfer flag = 0:

```
CREATE NONCLUSTERED INDEX [IX_TransferTable_Transferflag] ON [dbo].[TransferTable]
(
   [Transferflag] ASC
)
WHERE ([Transferflag]=(0))
GO
```

• If the OPC router should filter by transfer flag <>1:

```
CREATE NONCLUSTERED INDEX [IX_TransferTable_Transferflag] ON [dbo].[TransferTable]
(
[Transferflag] ASC
)
WHERE ([Transferflag]<>(1))
GO
```

Sort select results

Sort the table in ascending order after the transfer flag. This way, the untransferred records are transferred first; erroneous individual transfers are only attempted again at the end of the transfer. For performance optimization, filtering can be done after the transfer flag column (transfer flag = 0 or = 2). A correspondingly filtered index can be created in the database for this purpose.

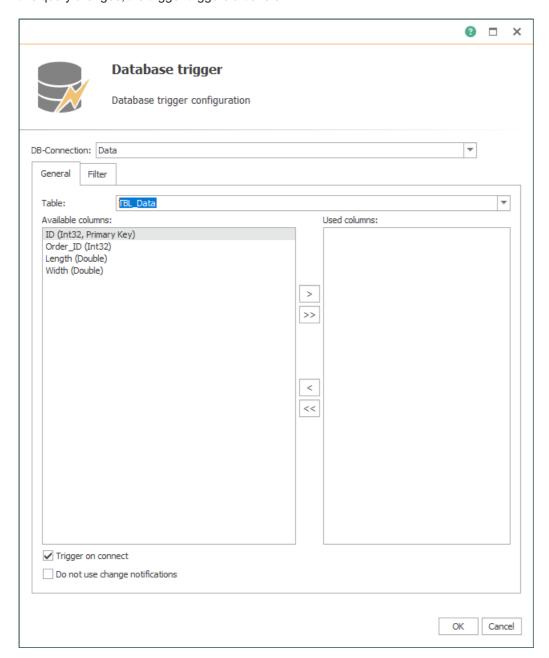
dBase

Options for dBASE

□ WARNING Attention: dBase is not supported in Docker.		
Name	Name of the configuration	
File	Select an appropriate directory from the drop-down menu.	
Db data source	Select a data source	

DB trigger

The database trigger monitors query results and triggers the transfer on change. The trigger defines a select query. If the result of this query changes, the trigger triggers a transfer.



The individual properties are:

DB-Connection	The configured instances of the DB plug-in are available here.

Tab General (all types)

Table	Table being monitored. Note: The specified table must have a primary key. Tables without a primary key are not supported.

Available columns	All available columns that have not yet been selected for the panel "Used fields". Select the columns to monitor.
Used fields	All already selected fields. Use the arrows between "Available columns" and "Used fields" to add or remove fields.
Triggern at OPC Router start	At router start it will be trigger.

Tab: Filter (Select, Update, Delete)

Filter	Displays filters and filter groups graphically. The SQL statement is constructed from this tree at runtime. You must enter the values here, unlike the DB transfer object. Use the buttons to add filter criteria ("Add filter") and grouped filter criteria ("Add filter group") to individual filter criteria. "Delete" deletes the selected criterion. Important: The filter set here must clearly specify a data record in the "table", which is then monitored.
Edit filter	The possible entries change depending on which element is selected at "Filter". Column: Column to filter on. Relational operator for the comparison of values. Value, after being filtered.
Preview	Preview the SQL statement.

Trigger

The properties of the trigger are explained in detail in relational databases.

db_trigger_transfer_object.md

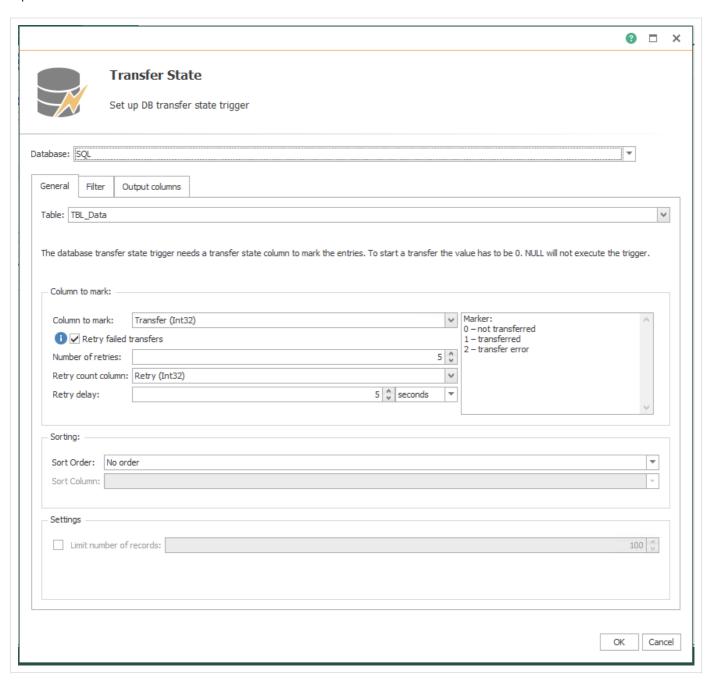
Transfer object

The properties of the transfer object are explained in detail in relational databases.

db_transfer_object.md

Transfer State Trigger

The transfer status trigger initiates connections as soon as a record created in the connected database is marked as ready for transfer via a flag. After the transfer is complete, the data set is marked as successful or failed. Failed transfers can optionally be repeated as often as desired via an additional counter.



transfer state trigger

Note

The transfer status trigger absolutely requires a primary key in the monitored table.

Tab: General

Column to Select the transfer column to be monitored in the table. The transfer status trigger triggers connections only if the value in the transfer column is 0. NULL values are ignored.

Retry failed transfers	Retry the execution after an error, please activate this checkbox.
Number of retries	Specifies the number of retries to start a new transfer attempt in case of failed transfers.
Retry count column	Select a column in the table where the retries can be incremented. Select a column with an integer data type. Attention: The Transfer Status Trigger triggers the connection only if there is a value < "Number of retries" as well as not NULL in the field of the retry count column.
Retry delay	Time period that is waited until a new transfer attempt is started.

Tab: Filter

Filter	Graphically represents filters and filter groups. The SQL statement is constructed from this tree at runtime. Use the buttons to add single filter criteria ("Filter") and grouped filter criteria ("Filter group"). "Delete" deletes the selected criterion. Filter types: EQUAL: Compares whether values are equal. GREATER: Compares whether the entered value is greater. GREATER_OR_EQUAL: Compares whether the entered value is greater or equal. SMALER: Compares whether the entered value is less. SMALER_OR_EQUAL: Compares whether the entered value is less than or equal to. NOT_EQUAL: Compares whether the entered value is not equal. LIKE: Compares strings. LIKE_WILDCARD: Corresponds to LIKE %VALUE%. LIKE_WILDCARD_END: Corresponds to LIKE VALUE%. IN: Compares with multiple values. The values must be passed as an array. NOT_LIKE: Compares if strings are different. NOT_LIKE_WILDCARD: Equivalent to LIKE_WILDCARD but negated. NOT_IN: Compares if multiple values are not equal. The values must be passed as an array.
Edit filter	The possible entries change depending on which element is selected under "Filter". Link: Sets the AND and OR operators between the filters/filter groups. Column: Column to be filtered by Comparison operator for the value comparison
Preview	Preview the SQL statement, e.g. WHERE (TIMESTAMP >_ ?) AND (VALUE = ?) . In the example, all records would be selected whose Timestamp field is greater than a timestamp to be set (= newer than date/time) and whose Value field is equal to a value to be set. The values for the filters can be defined dynamically at runtime (e.g. values from OPC items or other tables) or you can define a variable already at design time (which again could be changed at runtime).

Tab: Output columns

Available columns	Columns (data fields) that are displayed as elements (items) of the trigger and are thus available for transfers. This distinction primarily serves the overview in the project planning area - e.g. if only one column of 30 existing ones is required for the connection. Move the columns by double-clicking on the column name or via the "<" and ">" button (after selecting the column). "<<" and ">>" move all columns. Use the "Up" and "Down" buttons to sort the columns used. This also serves the clarity in the display.

File based databases

Overview over the plug-ins:

ms_access_plug_in.md

sqlite_plug_in.md

dbase_plug_in.md

MS Access

Password

Options for MS Access

Password (if file is protected)

□ WARNING Attention: MS Access is not supported in Docker.	
Name	Name of the configuration
File	Choose Access file via button "" In addition to the .mdb format .accdb files are also supported.
DB data source	Name of "database" to be used
User	Username (if file is protected)

Timeseries databases

With this database you can record time series. Each entry has a time stamp. It can be used, for example, to record sensor data or
RFID devices.

InfluxDB

Defining access data:

- 1. Open plug-in by clicking "InfluxDB" in the project configuration's plugin list.
- 2. Chose "Add" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Properties of InfluxDB access data").
- 4. Confirm with "OK".

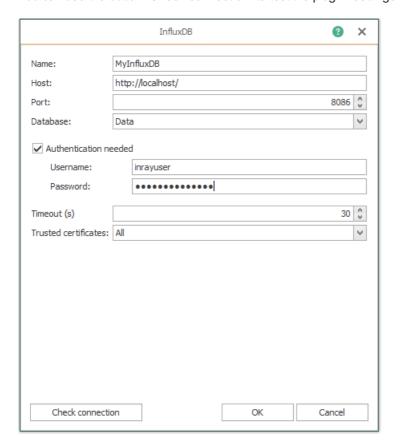
The InfluxDB server can now be used to define a connection.

Plug-in

The following properties are set in the configuration of the InfluxDB plug-in:

Name	Any name where this connection appears in the connection project planning. Choose a name that you can recognize uniquely!			
Host	Host address of the InfluxDB server with http:// prefix and port.			
Port	Specification of the port			
Database	Name of the database to use.			
Authentication needed	Activate this option if you need username and password for your InfluxDB server			
Timeout(s)	Provide the timeout in seconds			
Trusted certificates	Select the certificate store.			

You can use the button "Check connection" to test the plug-in settings.



Transfer Object

Double click the transfer object, configure the options and confirm by clicking "OK":

InfluxDB connection	Select a InfluxDB instance from the dropdown menu.			
Measurement	Select dynamic or a static. You can change a dynamic measurement by a input arrow through the runtime. A static measurement can only be configured in this dialog.			
Timestamp	Select the source of the timestamp. If you select InfluxDB, the timestamps of the InfluxDB server will be used, if you select OPC-Router the timestamp of the server where the OPC Router is installed will be used. If you select Dynamic you can define the timestamp by your own through an input arrow. All of the times will be stored in UTC.			
Null-Handling	Specify what should happen to entries that are null. Error: The transfer is aborted with an error. Discard: The entry is discarded. Replace: Null is replaced with a value that is specified.			
Tag keys	Tags for the value Note: The column is only available if "Replace" is selected.			
Field keys	Field of the value Note: The column is only available if "Replace" is selected.			

□ NOTE

Note: Measurements, tags and fields which doesn't exist will be created automatically.

□ NOTE

Note: If possible, inserts are made in batches. Incorrect data records do not prevent the insertion of valid data that has been transmitted at the same time. The transfer object shows a corresponding error

InfluxDB2-Server

Overview

influxdb2_plug_in.md

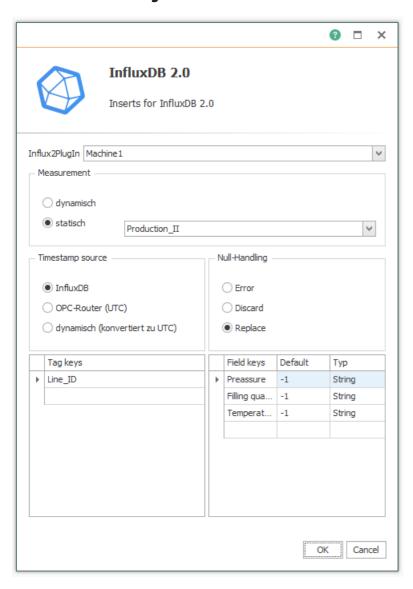
influxdb2_transfer_object.md

Plug-in

Open the plug-in setting for the InfluxDB2-Server.

Name	Name how the connection should be called in the OPC Router			
Host	Enter the URL of the InfluxDB Cloud here.			
No authentication	Select this option if you don't have any security measures in the Influx Cloud.			
Token	Enter her the token, which was created in the InfluxDB Cloud. Click in the InfluxDB Cloud on the corresponding token and copy it.			
Basic	 Username: Name from the user in the InfluxDB Cloud Password: Password with which you log in 			
Organization	Select here the organization which was created in the InfluxDB Cloud.			
Bucket	The data is stored in the bucket. Select here your created bucket.			
Trusted Certificates	Select here the corresponding certificate if you need one.			
Timeout	Enter here the timeout to the InfluxDB Cloud.			
Timeout R/W	Enter here the timeout for read and write.			

Transfer object



InfluxDB connection	Select a InfluxDB instance from the dropdown menu.
Measurement	Select dynamic or a static. You can change a dynamic measurement by a input arrow through the runtime. A static measurement can only be configured in this dialog.
Timestamp	Select the source of the timestamp. If you select InfluxDB, the timestamps of the InfluxDB server will be used, if you select OPC-Router the timestamp of the server where the OPC Router is installed will be used. If you select Dynamic you can define the timestamp by your own through an input arrow. All of the times will be stored in UTC.
Null-Handling	Specify what should happen to entries that are null. Error: The transfer is aborted with an error. Discard: The entry is discarded. Replace: Null is replaced with a value that is specified.
	Tags for the value

Field keys	Field of the value

Document oriented databases

Ν	MongoDB	stores of	data in the	form of c	documents,	which are	in JSON format.

MongoDB

The regular handling:

- 1. Open the plug-in via doubleclicking on "MongoDB" at the plug-in-menu.
- 2. Choose "Add new set of access data" or double click on the existing entry.
- 3. Do the needed settings (see part "Plug-in").
- 4. Confirm with "OK".

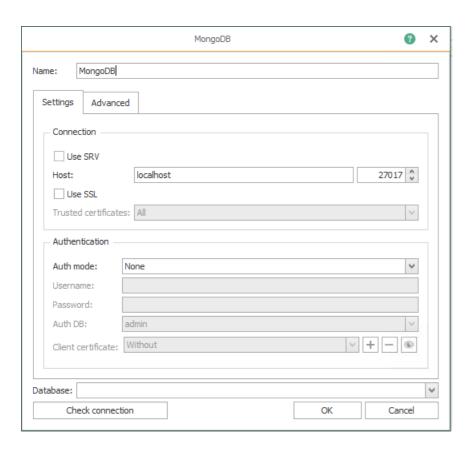
Plug-in

You can set the following properties in the configuration of the MongoDB plug-in:

Name	Enter a unique name for you MongoDB plug-in		
Use SRV	Activate to use the databases SRV mode		
Host	Enter the IP or DNS name of the MongoDB server		
Use SSL	Activate to encrypt the network connection to the server		
Auth mode	Select the authentication method you need		
Username	Enter a username		
Password	Enter the user password		
AuthDB	Select a user database for your MongoDB		
Client certificate	Select a client certificate to authenticate		
Database	Select a Mongo database		

Tab: Advanced

Timeout(s)	Select a timeout in seconds
Use Replica-Set	Select if you want to use a replica set
Replica-Set name:	Name of the replica set
Read Preference	Select your read preference settings



MongoDB Transfer Objects

Overview over transfer objekts:

mongodb_insert_transfer_object.md

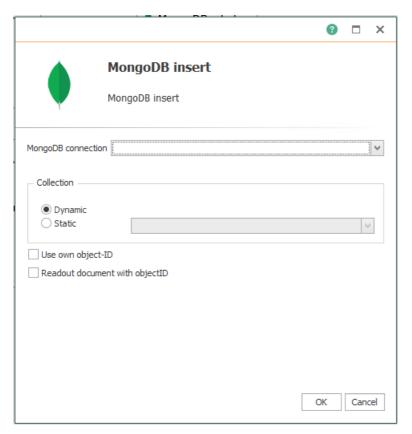
mongodb_select_transfer_object.md

mongodb_update_transfer_object.md

mongodb_delete_transfer_object.md

Insert

You can directly configure the transfer object within the connection as described.



Configure the object's properties by double click:

MongoDB connection	Select one of the configured sets of access data.
Collection Dynamic	Activate this option if you want to change the MongoDB collection by an arrow.
Collection Static	Activate this option if you want to use a static MongoDB collection.
Use own objectID	Use this option if you want to set the object ID. If not checked the OPC Router will create a random number.
Readout document with objectID	Returns the inserted document and object ID (JSON)

Apply your settings by clicking "OK".

The runtime needs the data in JSON.

If the data is not send in JSON, the data will get inserted with additional "data" tag.

FTP

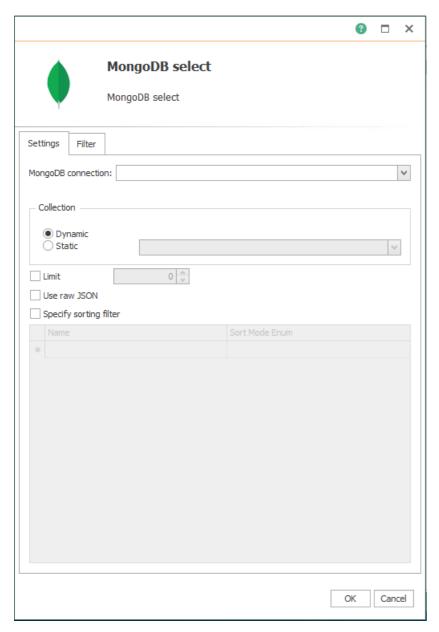
Operation is standard:

- 1. Open plug-in by double-click "FTP". The list of created FTP connections is displayed.
- 2. Chose "Add new set as access data" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Properties of FTP").
- 4. Use the "Check connection" button to initialize a connection.
- 5. Confirm with "OK".

The FTP server can now be used to define a connection.

Select

You can directly configure the transfer object within the connection as described.



Configure the object's properties by double click:

MongoDB connection	Select one of the configured sets of access data.
Collection Dynamic	Activate this option if you want to change the MongoDB collection by an arrow.
Collection Static	Activate this option if you want to use a static MongoDB collection.
Limit	Set maximum of selected documents.
Use raw JSON	Activate this otion if you want to use a raw JSON string as input. In this case the filter tab is not availabile.
Specify sorting filter	Here you can define sorting filters. Select the data field and descending or ascending.

Tab: Filter (Select, Update, Delete)

Filter	Shows filters and filter groups. Filter values can be inserted dynamically during runtime. Use Variables/Constant values to insert constant filter criteria. Use Add-buttons to add filters or groups. Delete will remove the selected entry.
Edit Filter/Filter group	Entries are shown dependent on selected entry. Junction: Defines whether filters are linked with AND or OR. Column: Column to be filtered Relational operator to compare values
Preview	Preview of the JSON-String, eg{"Date": {\$gte: "?"} In this case all documents which date is greater than the timestamp you have used are selected. Values for the filters can be changed during runtime.

Apply your settings by clicking "OK".

FTP-Plug-in

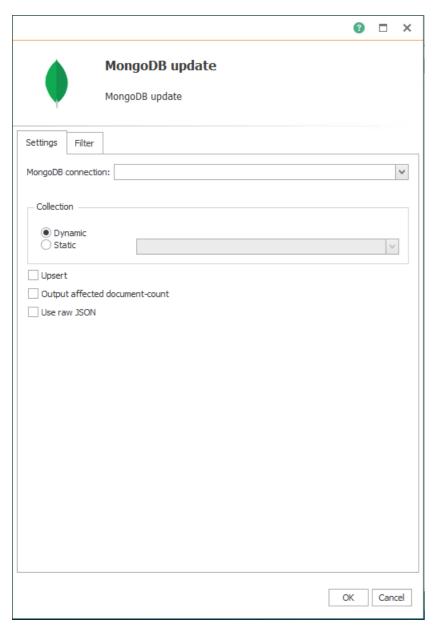
Set up following properties to connect to FTP servers:

Name	This set's name. The name will be shown in projection. Select a name you will recognize!
Hostname	IP or DNS of the FTP server.
Port	TCP/IP port of the FTP server.
Anonymous	Activate if you want to connect without user data.
User	Enter a username for the FTP server.
Password	Enter a password for the FTP server.
Reconnects	Number of attempts to reconnect. When the number of attempts is reached, an error is returned.
Use SSH	Activate to use the SSH protocol.
Use SSL	Activate to use SSL protocols.
SSL Protocols	Select SSL protocols you want to use. It need to match with the server protocols.
Client certificate	Select a client certificate if needed.
Trusted certificates	Select server certificates you want to trust.
Retries	Retries before a connection returned an error.
Timeout (s)	Timeout for your FTP-server plug-in.
Delay in ms	Delay between the time of finding the file and the start of downloading.

Use the "Check connection" button to check if your connection is successful.

Update

You can directly configure the transfer object within the connection as described.



Configure the object's properties by double click:

MongoDB connection	Select one of the configured sets of access data.
Collection Dynamic	Activate this option if you want to change the MongoDB collection by an arrow.
Collection Static	Activate this option if you want to use a static MongoDB collection.
Upsert	If Upsert is activated, the OPC Router will insert a document if there is no document to update
Output affected document- count	Returns the number of updated documents.
Use raw JSON	Activate this option if you want to use a raw JSON string as input. In this case the filter tab is not available.

Tab: Filter (Select, Update, Delete)

Filter	Shows filters and filter groups. Filter values can be inserted dynamically during runtime. Use Variables/Constant values to insert constant filter criteria. Use Add-buttons to add filters or groups. Delete will remove the selected entry.
Edit Filter/Filter group	Entries are shown dependent on selected entry. Junction: Defines whether filters are linked with AND or OR. Column: Column to be filtered Relational operator to compare values
Preview	Preview of the JSON-String, eg{"Date": {\$gte: "?"} In this case all documents which date is greater than the timestamp you have used are updated. Values for the filters can be changed during runtime.

Apply your settings by clicking "OK".

SMB

□ WARNING

Attention: SMB is not supported in Docker.

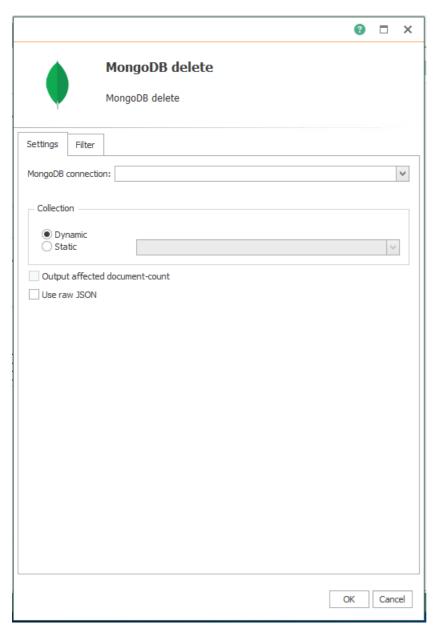
Operation is standard:

- 1. Open plug-in by double-click "SMB". The list of created SMB connections is displayed.
- 2. Chose "Add new set as access data" or double-click an existing entry to edit.
- 3. Specify access data. (chapter "Properties of SMB").
- 4. Use the "Check connection" button to initialize a connection.
- 5. Confirm with "OK".

The SMB server can now be used to define a connection.

Delete

You can directly configure the transfer object within the connection as described.



Configure the object's properties by double click:

MongoDB connection	Select one of the configured sets of access data.
Collection Dynamic	Activate this option if you want to change the MongoDB collection by an arrow.
Collection Static	Activate this option if you want to use a static MongoDB collection.
Output affected document- count	Returns the number of the deleted documents.
Use raw JSON	Activate this otion if you want to use a raw JSON string as input. In this case the filter tab is not availabile.

Tab: Filter (Select, Update, Delete)

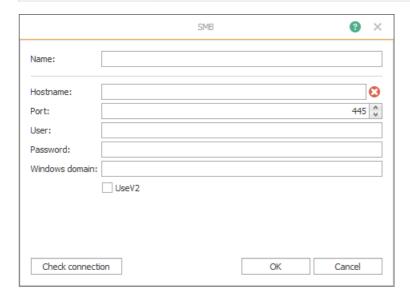
Filter	Shows filters and filter groups. Filter values can be inserted dynamically during runtime. Use Variables/Constant values to insert constant filter criteria. Use Add-buttons to add filters or groups. Delete will remove the selected entry.
Edit Filter/Filter group	Entries are shown dependent on selected entry. Junction: Defines whether filters are linked with AND or OR. Column: Column to be filtered
Preview	Preview of the JSON-String, eg{"Date": {\$gte: "?"} In this case all documents which date is greater than the timestamp you have used are deleted. Values for the filters can be changed during runtime.

Apply your settings by clicking "OK".

Properties of SMB

Set up following properties to connect to SMB servers:

Name	This set's name. The name will be shown in projection. Select a name you will recognize!
Hostname	IP or DNS of the FTP server.
Port	TCP/IP port of the FTP server.
User	Enter a username for the FTP server.
Password	Enter a password for the FTP server.
Windows domain	Enter a windows domain.



Network File Access

Chapter overview:

smb

ftp

nfa_transfer

nfa_trigger_object.md

Transfer objects

Overview of transfer objects:

nfa_delete_transfer_object.md

nfa_write_transfer_object.md

nfa_read_transfer_object.md

Network File Access-File Read

Network File Access-File Read transfer object can read files. File paths can be selected from a database or as a constant. You can directly configure the transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

Tab: Source

Dynamic or static	File source static or dynamic path. Dynamic paths can get defined by an connection arrow and it can change through the runtime.
Abort if file not found	Activate to abort the transfer if the file was not found.
Read binary	Select this option if you want to read a binary file like *.doc, *.jpg, * .xlsx,
Read Text, Encoding	Select if you want to read a simple text file and select the files encoding. Select if you want to read a simple text file and select the files encoding.

Network File Access-File Delete

Network File Access-File Delete transfer object can delete files. File paths can be selected from a database or as a constant. You can directly configure the transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

Path	Select the path where the OPC Router should delete files
Name pattern	Select a static or dynamic file name pattern. Dynamic file name pattern can get defined by a connection arrow and it can change through the runtime. You can use placeholders like *.
Include subdirectories	Activate if the OPC Router also have to delete files inside the subdirectories.
Delete unrestricted	Deletes all the files for the name pattern.
Files older than	Only delete files older than selected timespan.

Network File Access-File Write

Network File Access-File Write transfer object can read and manipulate files. File paths can be selected from a database or as a constant. You can directly configure the transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

Tab: Output path

Dynamic or static	File target static or dynamic path. Dynamic paths can get defined by a connection arrow and it can change through the runtime.

Tab: Existing files

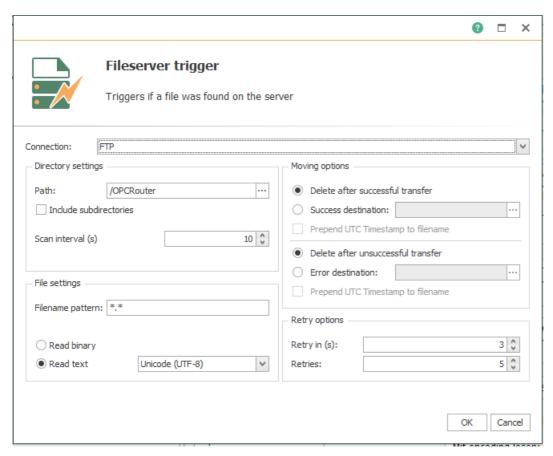
If file already exists	Overwrite: Will overwrite existing files. Throw error: Creates an error if the file is existing. Ignore: No action if file already exists.

Tab: File settings

Dynamic or static filename	Select a static or dynamic file name. Dynamic file names can get defined by a connection arrow and it can change through the runtime.
Prepend UTC Timestamp	Activate if you want to prepend the UTC timestamp to the file. For example the file "test.txt" gets renamend to "20191204_095646_test.txt".
Write binary	Select this option if you want to write a binary file like *.doc, *.jpg, * .xlsx,
Write text	Select if you want to write a simple text file and select the files encoding.

Trigger

The Network File Access-File Trigger executes a transfer if a file gets created.



After double-clicking on the transfer object, set the following properties:

Path	Select the path to observe.
Scan interval	Observes the directory in this interval.
Filename pattern	Define a filename pattern. You can use placeholders like *.
Read binary	Select this option if you want to read a binary file like *.doc, *.jpg, * .xlsx,
Read Text, Encoding	Select if you want to read a simple text file and select the files encoding.

Target options:

Delete after successful transfer	Deletes the file which triggered the trigger after a successful transfer
Success destination	Moves the file which triggered the trigger in a special folder.
Prepend UTC Timestamp to filename	Activate if you want to prepend the UTC timestamp to the file. For example the file "test.txt" gets renamed to "20191204_095646_test.txt"
Delete after error transfer	Deletes the file which triggered the trigger if a transfer aborts for some reason

Error destination	Moves the file which triggered the trigger in a special folder if the transfer gets an error
Prepend UTC Timestamp to filename	Activate if you want to prepend the UTC timestamp to the file. For example the file "test.txt" gets renamed to "20191204_095646_test.txt"
Seconds between tries	Select the time between the retries.
Number of retries	If the OPC Router can't access the selected file, it can retry for n times.

Advanced

Overview:

var_plug_in

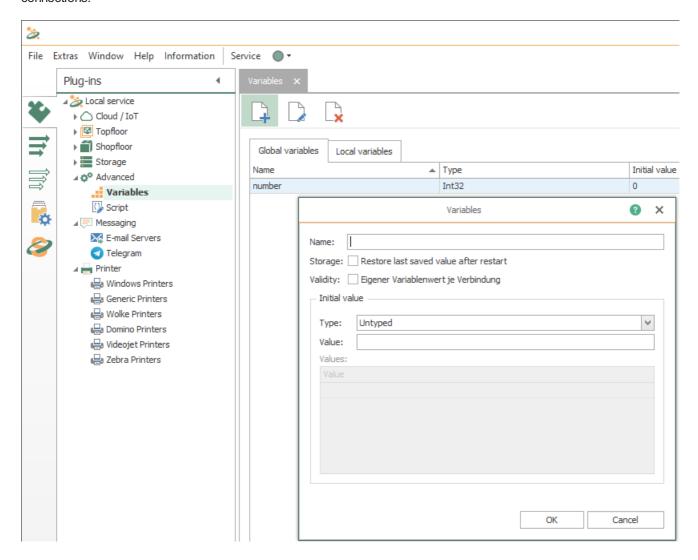
var_transfer_object

script_plug_in_script

Variable/Static plug-in

With the variable plug-in you can define any number of variables with name, type, and initial value. Of course, at runtime you can write values in the variables and trigger them again. In addition, some system variables are available that you can use in your configuration.

The use of variables thus lends itself to fixed, repeatedly required values that are not stored in a database or also to cache values that can not or should not be stored in a database. In complex projects, variables can also be used to provide values in multiple connections.



The operation is standard:

- Open the plug-in by double-clicking on "Variables" at the plug-in menu
- Choose between global variables and local variables:
 - o Global variables: The variable value is always identical in all connections in which it is used.
 - Local variables: The variable is declared individually in each connection. Each value assignment that has been made is
 only valid within the respective connection.
- Select "Add new variable" or double-click an existing entry.
- Make the necessary settings in the dialog:

Storage	If enabled, the last value of the variable is reloaded after restarting the OPC Router. If disabled, the set initial value is loaded. Every variable change is stored in the database, local variables are excluded from this.
Validity	Activate if you want to use a local variable. Local variables are only available in one connection. Other connections or the integrated OPC UA Server cannot access the value of local variables.
Туре	Select the appropriate data type. The data type is important to know the type beyond doubt, e.g. to distinguish a 1 as a number from a 1 as a byte. The data type Double is also selectable. Typeless is also possible, the variable can then be filled arbitrarily.
Value	Initial value of the variable. In connection configuration, you can read out this value and of course change it. You can also enter the value DB-NULL to output NULL values in the transfer object.

4. Confirm with "OK".

The variable is now available for configuring a connection.

transfer objects

Overview over transfer objects:

static_transfer_object.md

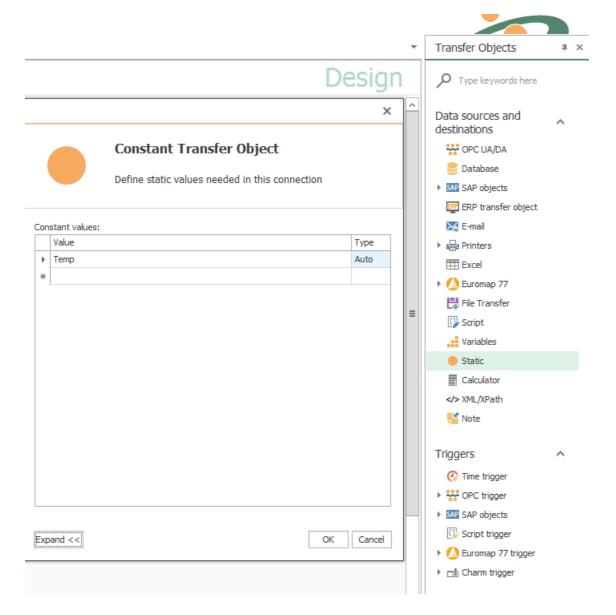
variable_transfer_object.md

Transfer static

Constants are available as a data source for fast configuration of "static" values. In contrast to variables, constant objects only apply within the connection in which they are configured. Constant objects can only be set at design time, not changed at runtime.

If a value is too long, you will be asked if you want to cut off this value. If you click "Yes", the value is truncated to the maximum length of 255 characters. If you click "No", the dialog remains open and you can select a new value.

Create a constant transfer object within the connection as explained.



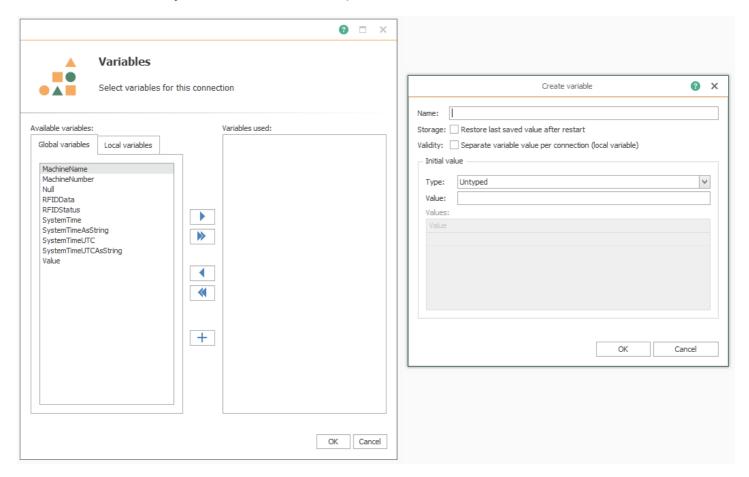
After double-clicking on the transfer object, set the following properties:

Value	Any value
Type (after click on "Expand")	(optional) Data type

Transfer variable

Self-defined variables are available to you both as sources and as targets, system variables as source. The required variables must be configured as plug-in instances. You can create new variables in the transfer object directly. To do this, click on the "Plus" icon. A new window will open as shown in the screenshot. The variable can either be type-less, or you can assign a fixed data type. All common data types, including arrays, can be selected. The newly created variables are then immediately moved to the "Used variables" area. Double-click on the variable or use the "<" and ">" buttons to move it. For this purpose, the respective variable must be selected. "<<" and ">>" move all variables.

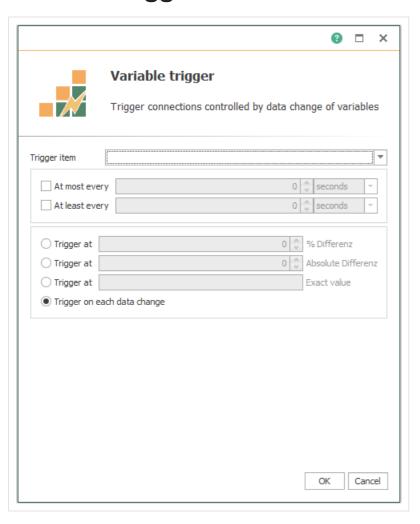
Create a variable transfer object within the connection as ecplained.



After double-clicking on the transfer object, set the following properties:

Available variables	Existing, not yet used variables. Global variables: The value of the variable is available in each connection. Local variables: The value of the variable is only available in the respective connection.
Variables used	Variables that are displayed as elements (items) of the transfer object and are therefore available for transfers.
Name	Name of the variable
Туре	Selection of the data type or Untyped
Value	Value of the variable

Variable trigger



Trigger item	Trigger variable whose change triggers the transfer.
At most every	If the value of the data point changes frequently, the transfer number can be limited here via an interval. The entry thus means: "It is transferred at most e.g. every second, even if the value changes more often". Default always as integer, no decimal places. Therefore, milliseconds, seconds, minutes or hours are to be selected as units.
At least every	Time interval in which data is transmitted in any case, even if the value of the data point has not changed. Default always as integer, no decimal places. Therefore, milliseconds, seconds, minutes or hours are to be selected as units.
Trigger at % difference	The transfer is only triggered if the value of the data point changes by this entry (relative).
Trigger at total difference	The transfer is only triggered if the value of the data point changes by this entry (absolute).
Trigger at exact value	Executes the connection if exactly one value is present.

Trigger on each data change	Default setting, overrides triggering at difference.

Script

Editing scripts

WARNING

Attention: Within a Docker container, only assemblies compiled for .net Core are supported.

The script plug-in allows you to freely define transfer and trigger objects with your own C # code. In this respect, the plug-in configuration differs from the other plug-ins: After assigning the name and type, open a code editor to edit the script.

At code-editor

- · create assembly references
- · define input and output parameters
- you already find the basic methods you can program
- · there are tools for OPC access and writing log messages

The script plug-in allows you to describe complex issues in the transfer object and triggers; For example, to perform conversions or to trigger complex database queries.

At the top of the menu bar you will find the "Rename script" button (blank sheet with pen) to change the previous name of your script.

□ NOTE

Note: In larger application scenarios, the router will be part of an overall strategy, eg. For example, where code carrying business logic is deposited. Even with smaller projects, it makes sense to consider whether z. B. Conversions in the router or stored procedures in the database are made.

IDisposable

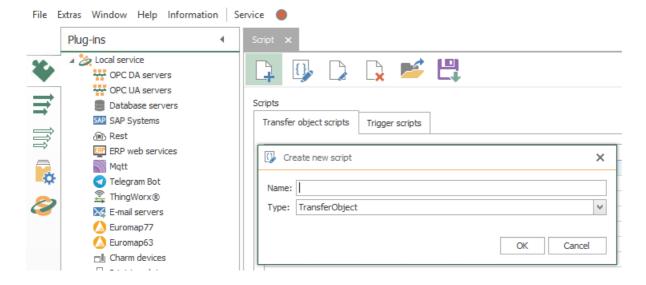
We recommend that you include the IDisposable interface in the script. This allows you to free memory, e.g. when you open ports or start threads in the script. Open ports or running threads will be closed or terminated at the end of the script. Write the required code in the corresponding method.

```
public void Dispose()
{
   // your code
}
```

The Dispose method is called when:

- · you publish the script after changes
- Sie das Script ohne Veränderungen veröffentlichen
- after deleting a connection, you publish it
- the plug-in is stopped (this always happens when publishing)

Creating scripts



- 1. Open the plug-in by double-clicking "Script" at the plug-in menu. You receive the list of transfer object scripts and trigger scripts on two tabs.
- 2. Choose "Add script" to create a new script and specify name and type. When you create a new script, the script opens automatically in the script editor. Or double-click on an existing entry to open the script in the script editor.
- 3. Program your script (see below). Remember to compile and save.

Transfer objects and triggers are then available for connection configuration.

Transfer object script

When you create a new script of type transfer object, there are three predefined methods available:

Methods in the transfer object

Method	Description
Initialize	The method is called once when the OPC router is started.
Write	The method is called after another transfer object has written data to this transfer object. So it is the code that is executed when this object serves as the destination of a data transfer.
Read	The method is called before another transfer object reads data from this transfer object. So it's the code that gets executed when that object serves as the source of a data transfer.

You use the "Settings - Edit parameters" menu to create the parameters and variables. You can set the following properties for the parameters:

Properties of parameters

Name	Name of parameter
Array	Yes
Type of parameter	Data type
Direction of parameter	 Output: Output parameters. In connection configuration, this parameter can serve as the source of a data transfer. Both: The parameter is both input and output parameters. None: Variable that is not visible to the connection designer and is used only within the script.

When you create a new script, the editor automatically opens for editing.

Trigger Script

When you create a new script of type "Trigger", there are three predefined methods available:

Methods in the trigger object

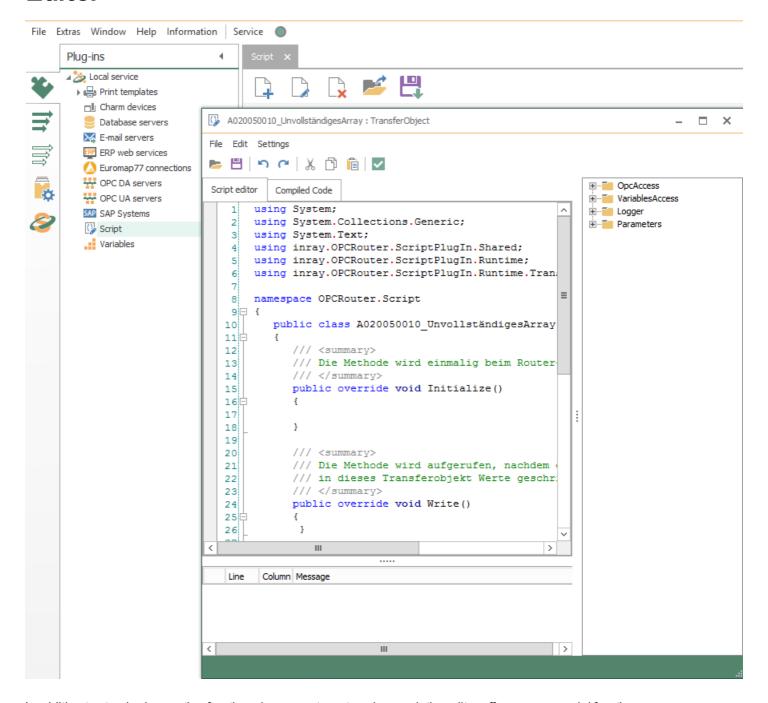
Method	Description
Initialize	The method is called once when the OPC router is started. Here you specify at least the "query interval", the interval in which it is checked whether the trigger condition is correct.
CheckTrigger	Method in which the trigger condition is stored. It is called cyclically in the "query interval" (see above). The method returns back true or false. At true the data transfer is triggered.
ResetTrigger	The method is called after successful data transfer. The parameter is automatically transferred (bool transferError) (true = transfer error). In this method, an error handling can also be programmed.

Use the "Settings - Edit parameters" menu to set the parameters. The script trigger only knows input parameters, so you can not specify a direction here.

The parameter value is defined in the connection configuration. It is not dynamic at runtime. If you need actual values at runtime, you would need to program corresponding OPC accesses or database queries in the trigger. The input parameters make it possible to use the same script in different connections, which basically require different properties (table names, access paths, etc.).

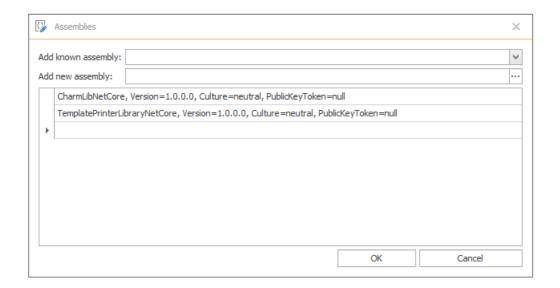
When you create a new script, the editor automatically opens for editing.

Editor



In addition to standard operating functions (copy, paste, cut, undo, save), the editor offers some special functions:

- Menu "File Save externally": Saves the script as an XML file with header data, code, and parameter definitions. Opening such XML files and thus importing scripts is also possible.
- Menu "Settings Assembly references": Here you can add new assemblies. To do this, click to select an assembly. Once you have selected a new assembly, it is added to the dependency storage. The assembly can then be selected for all future scripts. To select an assembly, click the drop-down menu at "Add known assembly".



□ NOTE

Note: If you want to use the assemblies in the scripts, they must still be included in the code with using.

- Menu "Settings Edit parameter": Here you create required parameters and variables (s. Transfer object script und Trigger).
- Menu "Settings Edit comment": The comment is displayed in the script list of the plug-in.
- "F6" key compiles and tests the program for errors.

The right-hand part of the window contains a graphic programming aid for OPC access, variables from the OPC router configuration, log messages and parameters.

 Double-click an entry and the prepared line of code will be inserted. Entries can be written as a string (in quotation marks) or as a predefined variable.

OpcAccess.Read

Reads the value of an OPC item.

```
Object <myValue\> = OpcAccess.Read("<itemPath\>", "<OPCServerName\>")
```

- Return: Object
- ItemPath: Access path and name of the item
- OPCServerName: Name of the OPC connection in the router project

OpcAccess.ReadMultiple

Reads out the value of several OPC items.

```
List<string> <|ltemNames\> = new List<string> ();

<|ltemNames\>.Add ("<|temPath.ltemName1\>");

<|ltemNames\>.Add ("<|temPath.ltemName2\>");

...

Dictionary<string,object> <MyValues\> = OpcAccess.ReadMultiple(<|ltemNames\>, "<OPCServerName\>");
```

- Return: Dictionary <string>
- IltemNames: Access paths and names of the items as a list
- OPCServerName: Name of the OPC connection in the router project

OpcAccess.Write

Writes a value to an OPC item.

OpcAccess.Write ("<|temPath\>", <objValue\>, "<OPCServerName\>")

- · Return: none
- ItemPath: Access path and name of the item
- · objValue: value to be written
- OPCServerName: Name of the OPC connection in the router project

OpcAccess.WriteMultiple

Writes several values into several OPC items.

```
Dictionary<string,object> <dicltemsToWrite\> = new Dictionary<string,object> ();
  <dicltemsToWrite\>.Add("<|temPath.ltemName1\>", <Value1\>);
  <dicltemsToWrite\>.Add("<|temPath.ltemName2\>", <Value2\>);
  ...
OpcAccess.WriteMultiple(<dicltemsToWrite\>, "<OPCServerName\>")
```

- · Return: none
- dicItemsToWrite: Dictionary with items and values
- · OPCServerName: Name of the OPC connection in the router project

OpcAccess.Browse

Offers the possibility to perform a browse (object search) for OPC DA and UA connections.

ItemPath: Access path and name of the item

ServerName: Name of the OPC connection in the router project

Various queries are at your disposal:

```
OpcAccess.Browse(ItemPath, ServerName).Select(e => e.DisplayName).ToArray()
```

Return: Specifies the names of the tags from this OPC path.

OpcAccess.Browse(ItemPath, ServerName).Select(e => e.NodeKind.ToString()).ToArray()

Return: The type of tags from this OPC path.

OpcAccess.Browse(ItemPath, ServerName).Select(e => e.Identifier).ToArray()

Return: The name of the tags with full path.

OpcAccess.Browse(ItemPath, ServerName).Select(e => e.HasChildren).ToArray()

· Return: If the tags still have child objects.

VariablesAccess.Read

Reads out the value of a variable of the OPC router project. What is meant here are only variables created via the variable plug-in, ie no placeholders in templates, mail objects or similar. If the variable does not exist, NULL is returned.

Object <myValue\> = VariablesAccess.Read("<VariableName\>")

- · Return: Object
- VariableName: Variable name in the OPC router project

VariablesAccess.Write

Assigns a value to a tag of the OPC router project. What is meant here are only variables created via the variable plug-in, ie no placeholders in templates, mail objects or similar. If the variable does not exist, it will be recreated.

VariablesAccess.Write("<VariableName\>", Value)

- · Return: none
- VariableName: Variable name in the OPC router project
- Value: Value assigned, Object

Log

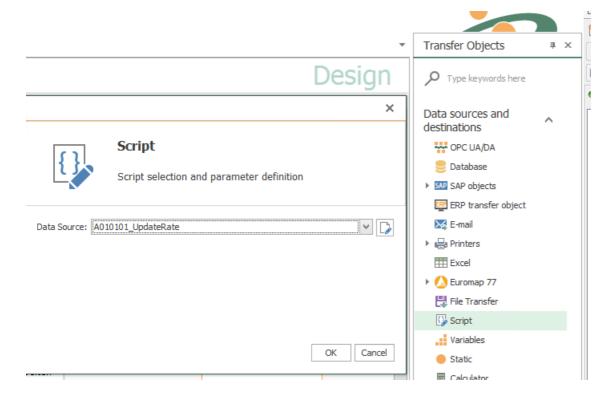
Schreibt eine Nachricht in die Logdatei

Log("<strMessage\>", MessageType.<LogLevel\>)

- Return: none
- strMessage: message to be written
- LogLevel: to be written log level. If the corresponding log level is deactivated, it will not be recorded either. MessageType.All logs in any case, regardless of the router configuration.

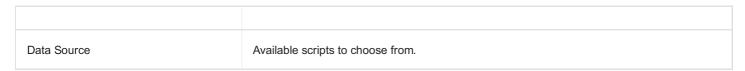
Transfer object

You use the self-programmed scripts in the data transfer with the transfer object "script". The scripts must be of the transfer object type in the Plug-in-configuration.



Create a script transfer object within the connection as explained.

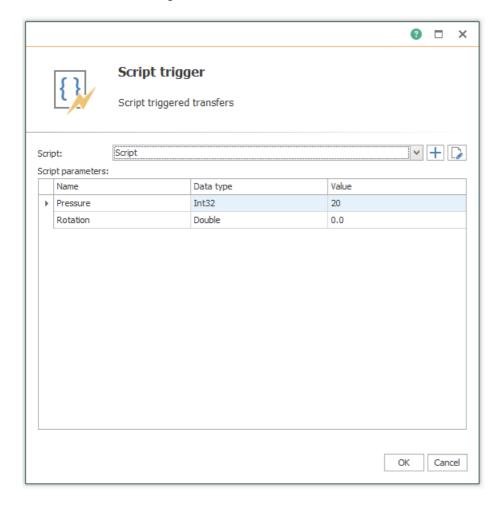
After double-clicking on the transfer object, set the following properties:



The input and output parameters of the script are now available to you as elements of the transfer object.

Script trigger

The script trigger triggers a data transfer if the CheckTrigger method returns true. In the script trigger, the programmer can define input parameters that must be set here, in the connection configuration (with value or template variable). They can not be filled dynamically at runtime. If the script trigger requires dynamic values, these must be determined in the trigger itself (e.g. with OpcAccess.Read). Script triggers can also be used with variables in templates and transferred to instances. Attention: No values can be output in the initialization area. The parameters are reset there before the transfer. Conversion from the OPC Router 3.x can be carried out including variables and values.



The individual properties are:

Script	Trigger script being executed.
Script parameters	Input parameters defined in the script. All parameters must be provided with a value or a template variable.

Messaging

Here all plug-ins are listed, which are used for communication or for sending messages.

telegram

email

E-Mail

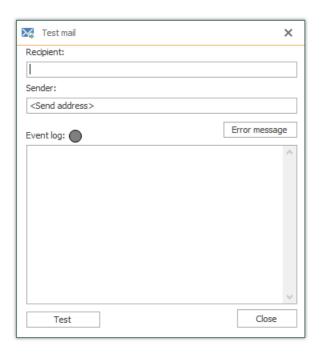
The e-mail plug-in connects the OPC router to a random number of accessible mail server. You just have to state the login information for the mail (outbox) server. Details to mailing are projected later in the connection.

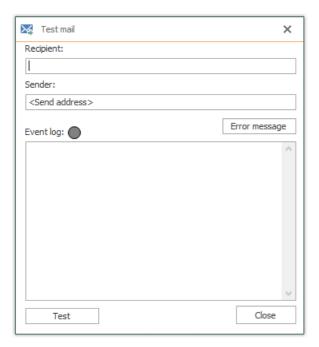
As far as a firewall is between the OPC router and the mail server, please check fthe authorization.

The mail server plug-in regularly supports SMTP- and NT athentification, SSL is optional.

The regular handling:

- 1. Open the plug-in via doubleclicking on "E-mail servers" at the plug-in-menu.
- 2. Choose "Add new set of access data" or double click on the existing entry.
- 3. Do the needed settings (see part "Plug-in").
- 4. With "Sen test mail" you can send a mail, to test the settings. Another window pops up. Fill in an email address and click "Test". The process log is shown in the dialouge, if sending fails, you can gain further information from the "Error Message". Confirm with "OK".





5. Confirm with "OK".

□ NOTE

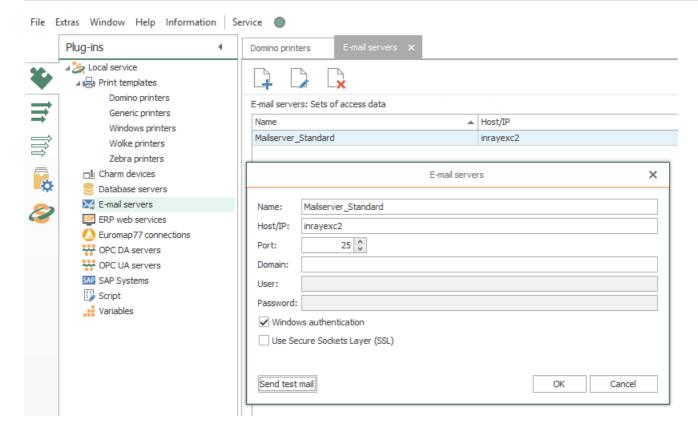
Note: The test mail is sent in the language that was set in the management.

The Mail server is ready to be used in connection projection.

Plug-in

The following properties are to be set in the configuration of the E-Mail-Plug-in:

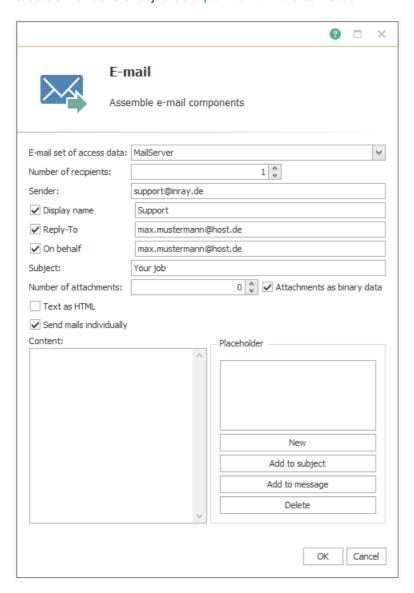
Name	Random name, under which this mail-server is shown in the connection projection.
Host/IP	IP-address or hostname of the mail-server
Port	Port on the server, which is used for the mail traffic (standard: 25, for SSL: 465).
Domain	Domain, on which the User is registrated (for logging in on a mailserver with NT-authentification).
User	Username for logging in to the mail server (SMTP- or NT-authentification).
Password	Password for logging in to the mail server (SMTP-or NT-authentification).
Windows authentication	Uses alternatively the user, under which the router service runs (Standard: "System").
Use Secure Sockets Layer (SSL)	Uses SSL encoding. The mail server needs to support this, the needed Port needs to be set up.



With the button "Send test mail" you can check your entries.

E-mail Transfer Object

An e-mail object is a possible transfer destination. The needed e-mail (SMTP) server has to be configured as plug in instance. Create a mail transfer object as explained within the connection.



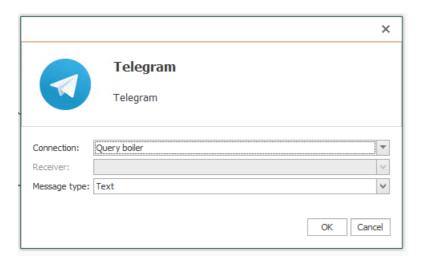
Set up the following properties after double clicking the transfer object:

E-mail set of access data	Here the SMTP server are available as configured instances of the OPC plug in.			
Number of recipients	Enter the number of receivers here. The transfer object will create that number of elements, which are filled from you during run time with e mail addresses e. g. from variables or a data base table. With a dynamic data base filter you can figure the receivers flexible.			
Sender	Addresser of the e-mail, has to be in format of an e mail address (name@domain.xx).			
Display name	This name is displayed as the sender.			
Reply-To	Enter an e-mail address if a reply e-mail from the recipient should not be sent to you but to another recipient.			
On behalf	Enter the email address of the person on whose behalf you wrote the email.			

Subject	Subject line in the e mail. You can also create placeholders for a dynamic subject line in the subject. Create a new placeholder and then add [%PlaceholderName%] to the subject of the email.				
Number of attachments	Provides a corresponding number of file path / name elements in the transfer object, which you can either dynamically fill via a constant object or at runtime. This file(s) will then be sent as attachments				
Attachments as binary data	The attachments are converted to binary data. A line for the file name and one for the file content will then be displayed in the transfer object in the workspace.				
Text as HTML	Gives out the mail in HTML format.				
Send mails individually	An e-mail is sent to each recipient individually, so that the individual recipient cannot see to whom the e-mail was still sent. Even if an e-mail address does not work, all other recipients can still receive their message.				
Content	Text in the e-mail. Fill in Placeholders via drag & drop, which are filled from you during runtime.				
Placeholder	Define any variables, which are filled from you during runtime, e. g. with process values or messages. Create a new placeholder with "New". Mark a placeholder and add it to the text with "Add". You can also add via double click or drag & drop.				

Telegram Transfer Object (worktitle)

Create a telegram object within the connection as described.



Set the following properties after double-clicking the object:

Connection	Select your telegram connection from the drop-down menu.
Receiver	Select the receiver for receiving the telegram from the drop-down menu.
Message type	Select the message type with which the message of the telegram is to be transmitted, e.g. text message or voice message.

Telegram Edit Transfer Object (worktitle)

You can use the Telegram Edit transfer object to customize messages. To do this, specify the ChatlD and the MessageID. Additionally, specify the text that should be displayed after the change.

Connection	Select your telegram connection from the drop-down menu.
Message type	Select the message type with which the message of the telegram is to be transmitted: • Text • Photo • Audio • Voice • Document

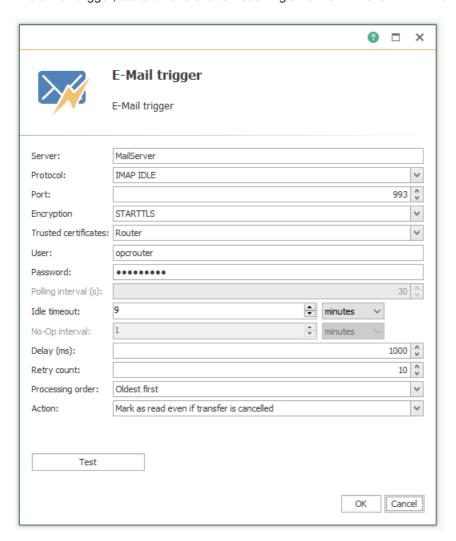
Telegram Delete Transfer Object (work title)

With the Delete transfer object you can delete messages. To do this, pass the ChatlD and the MessageID. If the button in the keyboard is pressed, the message will be removed.

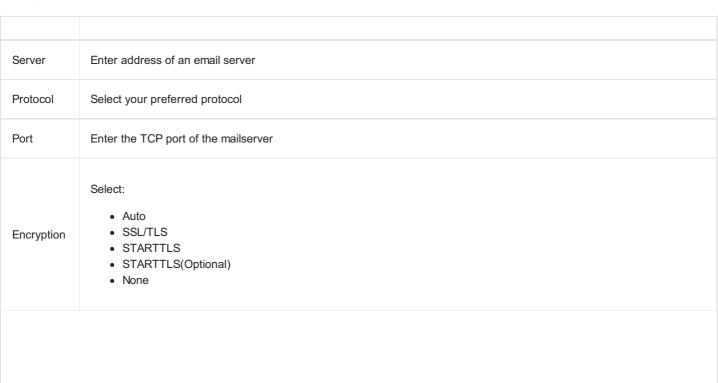
Connection	Select your telegram connection from the drop-down menu.

E-mail trigger

The e-mail trigger, starts a transfer after receiving an e-mail. Emails in MIME format are also processed.



The options are:



Trusted certificates	Set which certificates should be trusted: Router Windows All(unsafe)			
User	Enter a username			
Password	Enter a password			
Polling interval	Select the interval to check for new mails			
ldle timeout	The connection is kept open by the router for a set period of time. If no e-mails are received, the time restarts. If an e-mail is received during this period, the timeout is terminated immediately. Attention: This function must be supported by the e-mail server.			
No-Op timeout	The OPC Router waits for a set period of time. After that it will be checked whether e-mails have been received or not. If not the period will be restarted. Note: If the e-mail server supports Idle, you do not need this function.			
Retry count	Count of retries before a transfer gets cancelled			
Processing order	Select which emails are processed first			
Action	Select whats happening to the emails after the transfer			

Telegram

The operation is standard:

- 1. Open the plug-in by double-clicking on "Telegram Bot" in the "Plug-ins" menu.
- 2. Choose "Add" or double-click an existing entry.
- 3. Make the necessary settings (see section "Plug-in").
- 4. Confirm with "OK".

You can now set up telegram bots.

Plug-in

You set the following properties in the configuration of the Telegram Bot plug-in:

Name	Assign a free unique name for your connection.

Part: Plug in

Bot access token	The Access Token is provided by the "BotFather":1. Go to the Telegram program and select BotFather from the contacts. 1. Go to the Telegram program and select BotFather from the contacts. 2. Ask for a new bot with the command /newbot. 3. The BotFather will now ask you for a name for your bot. This name can be defined by you 4. The BotFather then asks for a username. This must always end with _bot. e. g. Temperature_bot 5. If the name is not yet occupied, the BotFather will send you a confirmation and the AccessToken, which you can copy into the properties at the Plug-in area. 6. Enter the other properties and confirm your entries with "OK".
Maximum file size	The maximum file size indicates (in MB) how large received files may be before the transfer is aborted automatically.

The BotFather was made to administrate your Telegram bots. With the BotFather you can create, edit or delete bots. If you already created a bot, the BotFather can tell you the AccessToken. You can ask the BotFather for your AccessToken whenever you want. The account, which has created the bot, is the inalienable owner of the bot. This section is for information, you do not need to enter anything in this area.

Part: BotFather

	If you want to show users automatic suggestions of possible commands, proceed as follows:
	1. Send "/setcommands" by the botholder to the BotFather.
Help	2. Send @BotUsername to the BotFather.
text	Copy the help text from the "BotFather" section in the Telegram plug-in of your OPC router and send it to the BotFather.
	4. Repeat the process after adding, deleting or changing telegram triggers.

Telegram Bots are always displayed publicly and can be accessed by any Telegram user. Internal authentication filters out unauthenticated users before triggers are initiated.

Users can be authenticated manually after writing to the bot (/start) or by authenticating themselves with a previously generated confirmation code.

Authentication	 Select the desired authentication method: Authentication method "None": Telegram bots are always public and everyone can send request to the bot. No further settings need to be made. Authentication method "Intern": The internal user authentication filters unauthorized users before they uses any
method	trigger. Users can get authorized manually after a request (/start) or they can send an authorization code which was already generated. Note: Messages can only be sent to users who have already sent at least one message to the bot. Messages to be sent to all will be sent to all registered users (even those who are not authenticated). However, a maximum of
	30 messages per second may be sent (Limit Telegram API).

Section: Authentication

Authentication method	 None: None authentication (not recommended) Internal: user can be managed in the plug-in FAS Login: Sign in via the FAS-Login 	

For Authentication method Internal

Section: Known users

Known	List of known users. You can remove a user from the list using the "Delete user" button. You can use the "Deny permission" or "Allow permission" buttons to deny or allow permissions to known users.

Section Registration key

Registration key	Displays the known registration keys. Use the "Delete registration code" and "Create validation code" buttons to remove registration keys from the list or add new ones.

For authentication method FAS-Login

Section: Database

Provide the database instance where the FAS login database is deployed.

Section: E-mail

Provide the email instance which should be used to send the authorization emails.

Enter here the sender address.

Edit the E-mail text of the Registration email.

Confirm your entries with "OK".

Folgende Edit Bots sind hilfreich:

- /setname change a bot's name
- /setdescription change bot description
- /setabouttext change bot about info
- /setuserpic change bot profile photo
- /setcommands change the list of commands
- /deletebot delete a bot
- /setjoingroups the bot may be added in groups
- /setprivacy the bot may see/read messages in groups

Transfer Objects

Overview

telegram_transfer_object.md

telegram_edit_transfer_object.md

telegram_delete_transfer_object.md

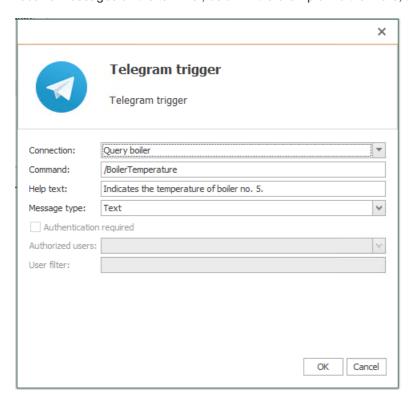
Wolke Printer Plug-in

Plug-in

Name	Name of the print template.
Label name	Name of the label. Note: The label name must match the label name assigned by the printer.
Comment	Assign a comment to the layout.
Name	Assign a name to the field. Note: The field name must match the field name in the printer. Incorrectly written field names will be ignored by the printer.
Default value	Assign a default value to the field.

Trigger

Through the trigger you can add new commands to the plug-in. With the Telegram trigger it is also possible, through a command, to receive messages on the terminal, below in the example. Furthermore, the trigger can output a written message.



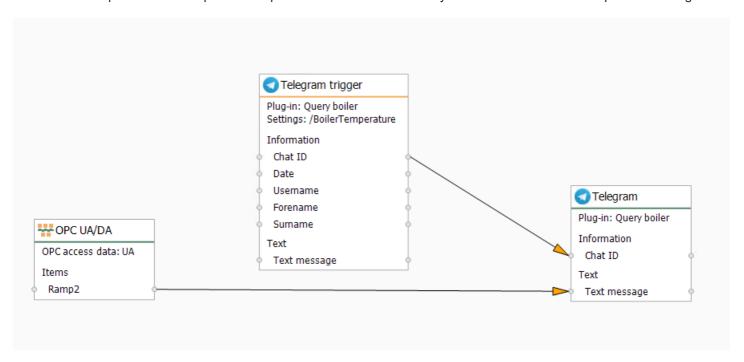
Set the following properties after double-clicking the trigger object:

Connection	Select a connection from the drop-down menu.
Command	Type a command < Command>
Help text	Enter a help text here, which is then displayed together with the command. Note: The help text is required because otherwise the commands cannot be passed to the bot.
Message type	Select a message type from the drop-down menu, e.g. Text message, Voice messageThe message type "Any file" can be sent any file format (text, images, videos, etc.).
Authentication required	Activate the checkbox if you want to allow only authorized users to receive the messages.
Authorized users	Select allowed users from the drop-down menu.
User filter	Here you have the possibility to enter a filter to select specific users.

You can receive any form of a file with the Telegram trigger. To send a file from the OPC Router to Telegram, you need the Telegram Transfer Object. To send a file to the OPC Router, e.g. an image, you have to enter the trigger command as description. However, the file name of the image is not sent and you have to give the file a new name if you want to save the file.

Example Telegram Connection

In our small example the boiler temperature is queried. The data is collected by the OPC router and can be queried via telegram.



To display the boiler temperature on a remote web-enabled device, proceed as follows:

- 1. Go to the link of your bot that you received together with the AccessToken from BotFather.
- 2. Enter the command /start.
- 3. If you click on /help, the BotFather gives you all possible commands.
- 4. Select the command /BoilerTemperature.
- 5. The boiler temperature and the help text will then be displayed on your device.

Printer

With the printer plug-in you can compile document templates within the OPC Router, which are filled with values during runtime and which can be printed with a printer installed on the local computer or in network.

The following printer plug-ins are available next to the Windows printer plug-in:

- · Domino printer plug-in
- Plug-in for generic printers
- · Wolke printer plug-in
- · Zebra printer plug-in
- · Videojet printer plug-in

The following steps are to be done:

- Create the document template in the plug-in configuration
- Selection of the printer and filling in the values to the template variables in the connection projection

Creating the document template

- 1. Open the corresponding printer plug-in (Domino, Zebra, Wolke, generic printer) in the area "Print templates" in the plug-in-menu.
- 2. Choose "Add new label" or double click on the existing headword, to change a template.
- 3. Enter a name for the print template and enter a comment if necessary. To submit a cloud printer label, you must also enter the label name.
- 4. Determine the data for the print template.
- 5. Confirm your entries with "OK".

The document template can be used for projecting a connection now.

Domino and Zebra Printer Plug-in: The fields replace the strings in the {} before the label is sent to the printer. Either the default value from the table is specified or a connection e.g. read out via a script.

Plug-in generic printer: When configuring, either the default value from the table is specified or a connection is made. E.g. read out via a script

Plug-in Videojet printer: No print template is defined here, only the default values for various labels that can be sent to the print template available in the printer. In the "Videojet Update Printer" transfer object, you can select a label from the drop-down menu in the "Label" corresponding field.

Define printer templates

Template variables become dynamic or static at run-time with values, e.g. from the PLC or batch and order data from the database filled. At this point, you define the required placeholders and, if desired, assign default values.

- 1. Assign names in the table for the label fields. Simply click on the next free line. To delete fields, go to the corresponding line and right-click to delete a line.
- 2. If necessary, give your label fields a default value.
- 3. Define your label printing by the fields in the print template. Here you have the option to drag & drop individual fields into the print template. You can also right-click the boxes and select "Add label field" or select the field, place your cursor in the correct place in your print template and click the "Insert Field" button.
- 4. Confirm your entry with "OK".

To delete a	nrint templat	e selectitin	the list and	an to the butto	on "Delete Label	at the ton
TO acicic a	print templat	c, 30100t it ii i	tile list and	go to the butte	III DOIGIG Labor	at the top.

In order to give a new print name a new name, mark it in the list and click on the "Rename Label" button at the top.

With button "Insert control character" you can also insert control characters for Domino-, Zebra and generic printers in the label description. The control characters are highlighted in black.

Transfer object

The print starts with triggering. The template is set up in the transfer object; printer and variable content are to be set up during runtime. Create a printer transfer object within the connection as explained.

Windows Printer

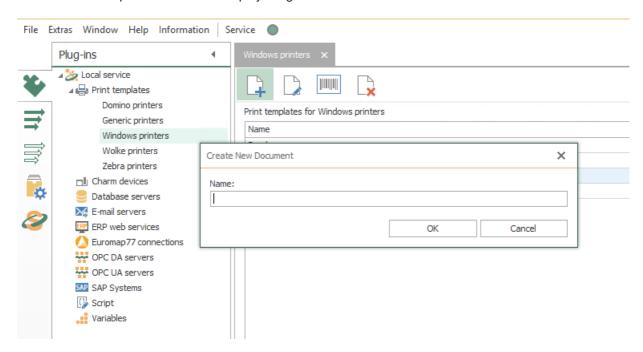
With the printer plug-in you can compile document templates within the OPC router, which are filled with values during run time and which can be printed with a printer installed on the local compter or in network. The following steps are to be done:

- Create the document template in the plug-in configuration
- · Selection of the printer and filling in the values to the template variables in the connection projection

Creating the document template

- 1. Open the plug-in via double cklicking on "Print templates" at the plug-in-menu.
- 2. Choose "Add document template" or double click on the existing headword, to change a template.
- 3. Fill in a name for the document template.
- 4. Create the template with the integrated designer (see part "Designer").
- 5. Close the editor with the button "Close Window" on the windows title bar. Confirm the save request.

The document template can be used for projecting a connection now.



Interactive Printers

The OPC router runs? as Windows application non stop in the background of the server. An interaction with the user is not planed. That means, that printers, which need user feed (e. g. PDF output, XPS output with "Save As...-Dialouge" can't be used: In this case the user would have to make the feed with every print initialised by the router.

Depending on the Windows version state displays of the printer (status of ink/ toner) react differently as well, when called by a service. Test your projecting carefully. If necessary allow interaction between service and desktop in the service administration, to make user feeds possible. This is explicit recommended just for testing, not for producing:

- 1. Open the service administration with "System Control Administration Services".
- 2. Open the OPC router via double click.
- 3. Activate the property "Allow Data Transfer Between Service And Desktop" on the tab "Log In".
- 4. Confirm with "OK".
- 5. Restart the service.

If you should test your label design e. g. with Windows XPS Writer, you shouldn't save the XPS data in the suggested directory, but choose one directly on the root (e. g. C:\Label Testing), this avoids access conflicts.

Transfer object

Windows printer

Set the following properties after double clicking the transfer object for generic printer:

Document	Document template, created in the Plug in Configuration
Specify number of copies	It can now be set to request multiple copies for one-sided documents. Only 1 (!) print job is sent for this! Whether the document is printed single-sided or double-sided must be specified in the printer driver. So labels can be printed on the front and back side if necessary.
Static printer	 activated: The printer is set up during creating time and is not be changed during run time. activated: The printer is set up during creating time and is not be changed during run time. deactivated: The printers name has to be defined during run time (from variable, data base or similar).
Parallel printing	Activate this option if you want to print on different printers parallel.
Printer	Enter the port of your static printer.

The transfer object gives you all placeholders from the document template. Are these template variables not be filled in the transfer object, the router uses the standard value from the template.

Should you call the printer dynamically, please pay attention to the correct spelling of the printers name- it has to be equal to name given in Windows.

Designer

You will find the Template Designer at the top of the printer plug-in menu next to the buttons for creating and editing new labels with the template designer

- · you define the size of a document,
- you define the template variables with standard values,
- you place the elements "Text", "Image", "Rectangle" and "Barcode". Elements from the type "Text" and "Barcode" can be seized with template variables.

Define document size

You can define the document size in the menu at "Settings - Document Size" or select the sizes available on the printer of your choice.. The second option is especially useful, when you allready know what printer you'll use. On the other hand, you don't fix on a printer by choosing the second option, to e. g. set up a DIN standard with Microsofts XPS printer. Stating the size is in millimeters.

- 1. So choose the option "User Defined Size" or "Supported Size".
 - · User-defined size: Fill in the document size.
 - Supported size: Choose a printer and document size.
- 2. Confirm with "OK".
- 3. If necessary, select "Landscape" by "Settings".

Define Template Variables

Template variables are filled during run time, e. g. from the controlling or batch- and task data from the data base. At this point, you define the needed placeholder and state standard values, if wanted. The values can be printed as text or barcodes.

- 1. Choose the button "New placeholder".
- 2. Assign a name and confirm with "OK".
- 3. The template variable is shown in the list. Assign a standard value, if wanted.
- 4. Repeat the steps 1 to 3 for all needed placeholders.
- 5. If you want to remove a variable, click on the name in the list and delete or rename it.

Place Elements

From the following elements can be chosen:

- Text: Free text and placeholder in combination. Size and position of the frame, font -type, -size and -colour are to be setted.
- Rectangle: A frame of free size and position. Frame colour, -type and -width are to be setted as well as the fill in colour.
- Barcode: Free definable Barcode. Size and position, encryption, content (text, numbers and placeholders) are to be setted. The alignment can also be configured for a barcode and/or a barcode text.
- Image: Image data in free position and size, to be chosen from the data system.
- Choose the button "New Element" and the type in the opening list.
- The element will be placed in the upper left corner. Slide it to the desired position with the mouse or state the coordinates exactly in the property menu or simply by drag and drop.
- Define the size of the element. To do this, click on the element frame and drag it to the desired size, or state the size exactly in the property menu.
- Define the other properties.

☐ TIP

Tip: With "Insert placeholder" (Text and Barcode) you fill in a defined template variable to the relevant place. Don't change the syntax.

☐ TIP

Tip: In the colour definition you can assign besides the value for red, green and blue, the value "alpha", to set up lucency (0 = invisible, 255 = not translucent, for text and frames).

Test print, save and close

- Use the button "Print (test)", to print a test on a configured printer.
- A memory query appears if you want to close your input window via the window button.
- Use the button "Close", to close the designer and go back to the router configuration.

Changing existing templates

Via double clicking an entry in the plug-in configuration you can change the chosen template at all times.

□ WARNING

Attention: Don't change variable names and don't delete template variables, which allready are used in the connection projection. The router can't use placeholders manipulated like that and gives out a defective label (e. g. with standard value).

Generic Printer

To define a print template, create a new plug-in for the generic printer.

Name	Assign a name for the print template.
Comment	Write a comment for the print template.
Encoding	Set the encoding for the print template.

Fields

Name	Assign a name for the field.
Default value	Set the value of the field.

Label

To add a field to the label, click "Insert field".

If you want to add a new field, click on "Insert field" and then on "Add new field".



You can add control characters with "Insert control character".

Transfer object

Generic printer

Set the following properties after double clicking the transfer object for generic printer:

Label	Document template, created in the Plug-in Configuration
Static printer selection	 activated: The printer is set up during creating time and will not be changed during run time. deactivated: The printers name has to be defined during runtime (from variable, data base or similar).
IP	Enter the IP address of your static printer.
Port	Enter the port of your static printer.
Timeout	Time (in ms) that the connection setup may take before a connection error is returned.

The transfer object provides all placeholders from the document template. If these template variables are not filled in the transfer object, the OPC Router uses the default values stored in the template.

If you bind the printer dynamically, make sure to enter it's exact name as it is used in Windows too.

■ NOTE

Note: You can also enter a host from outside into the IP address field. To do this, create a constant with the IP of the printer, for example, and drag an arrow to the IP address field.

Domino

Name	Name of the print template
Comment	Enter a comment here.
Encoding	Choose between the different encodings here. Note: The encoding of the OPC router should match the encoding of the printer. Please contact the manufacturer if you have questions about the printer encoding.
Wait for Response from the printer	Please do not check this box if you have a Domino printer model that does not send a response that printing was successful.
Model	Choose between the following models: • Domino Printer A • Domino Printer M The difference lies in the communication protocols. If you have any questions about the protocols, please contact the manufacturer.
Use label layout saved on the printer	Check this box if you have already created a layout for the printer.
Label no.	If you have already designed a layout, enter the label no. of the layout here.

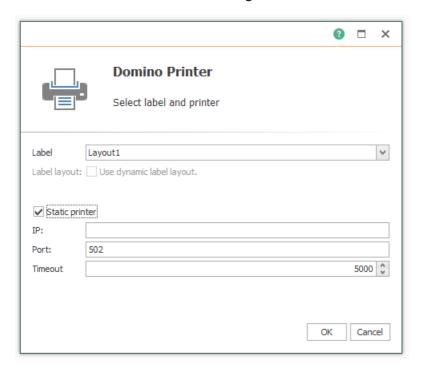
Fields

Name	Name of the field
Default value	Enter the default value for the field here.
Field length	Specify the length of the field here.

Label

Uncheck "Use label layout saved on printer" if you do not have a layout yet. Enter the appropriate commands for the desired layout here if you have not yet created one. Use the "Control characters" button to add new control characters to the label. This The commands in the <> are converted to special characters.

Printer Transfer object



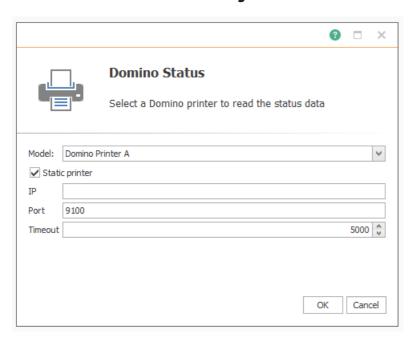
Set the following properties after double clicking the transfer object for Domino printer:

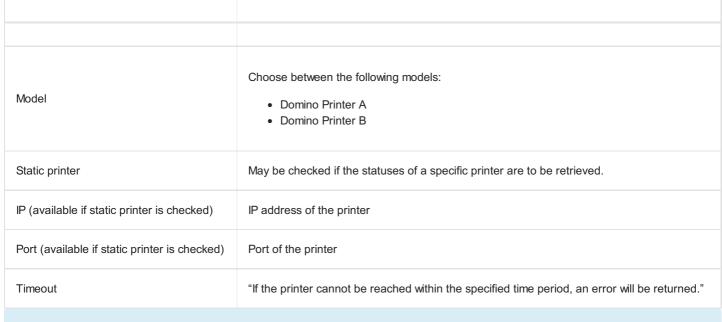
Label	Document template, created in the Plug in Configuration
Static printer selection	 activated: The printer is set up during creating time and is not be changed during run time. deactivated: The printers name has to be defined during run time (from variable, data base or similar).
IP (available if static printer is checked)	Enter the IP address of your static printer.
Port (available if static printer is checked	Enter the port of your static printer.
Timeout	Time (in ms) that the connection setup may take before a connection error is returned.

The transfer object gives you all placeholders from the document template. Are these template variables not be filled in the transfer object, the router uses the standard value from the template.

Should you call the printer dynamically, please pay attention to the correct spelling of the printers name- it has to be equal to name given in Windows.

Status Transfer object



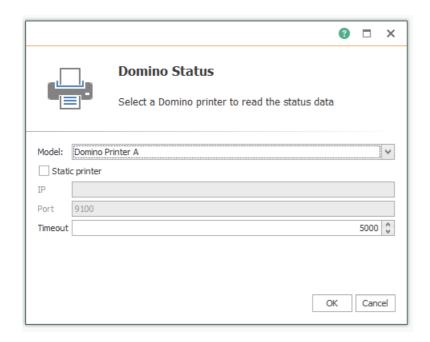


□ NOTE

Note: You can also enter a host from outside into the IP address field. To do this, create a constant with the IP of the printer, for example, and drag an arrow to the IP address field.

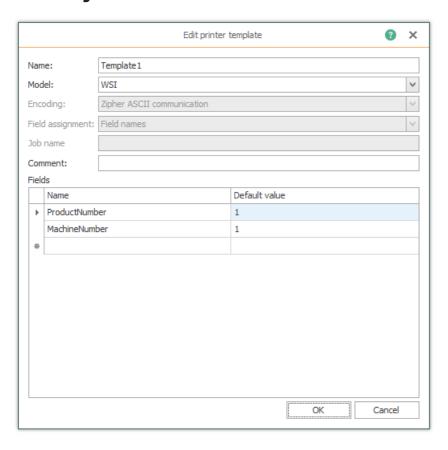
Domino status

To query the status of the printer you can set the Domino status transfer object.



Model	Select the printer to query the status.
Static printer	Set this checkbox if you want to define a printer directly in the transfer object.
IP	Enter the IP of the Domino printer here. Note: Only available if Static printer is checked.
Port	Enter the port of the printer here. Note: Only available if Static printer is checked.
Timeout	Define here from when a timeout should be set if the printer is not reachable.

Videojet



Name	Name of the template
Model	Select one of these models: • WSI • Zipher
Encoding	 Following allocations are possible: Zipher ASCII communication Zipher Unicode communication Note: Only available if you select Zipher as model.
Field assignment	Following allocations are possible: • No field names • Field names • Line and field names Note: Only available if you select Zipher as model.
Job name	Enter her the name of the job Note: Only available if you select Zipher as model.

Comment	Enter a comment for the template.

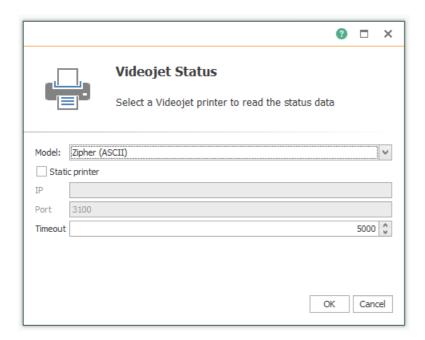
Fields

Name	Name of the field
Default value	Default value for the field

Transfer Objects

Videojet Status

You can read out the status of the printer via the status transfer object.



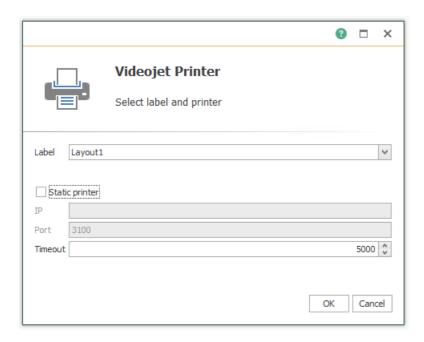
Model	Select the printer model here.
Static printer	Set this checkbox if you want to define a printer directly in the transfer object.
IP	Define the static IP address of the printer here. Note: This field is only available if you have selected the Static Printer field.
Port	Define the static port of the printer here. Note: This field is only available if you have selected the Static Printer field.
Timeout	Define here from when a timeout should be set if the printer is not reachable.

Videojet Printer

The printer transfer object can be used to select the print template that is defined in the plug-in. You can connect the printer via a static IP address.

□ NOTE

Note: You can also enter a host from outside into the IP address field. To do this, create a constant with the IP of the printer, for example, and drag an arrow to the IP address field.



Label	Select here the Layout
Static printer	Set this checkbox if you want to define a printer directly in the transfer object.
IP	Enter the IP of the Videojet printer here. Note: Only available if Static printer is checked.
Port	Enter the port of the printer here. Note: Only available if Static printer is checked.
Timeout	Define here from when a timeout should be set if the printer is not reachable.

Videojet message printer

The transfer object for the Videojet message printer overwrites the currently selected label and refills it with the transferred text elements.

After double-clicking the Videojet message Printer transfer object, set the following properties:

Static printer	 activated: The printer is set up during creating time and is not be changed during run time. deactivated: The printers name has to be defined during run time (from variable, data base or similar).
IP	Enter the IP address of your static printer.
Port	Enter the port of your static printer.
Timeout	Time (in ms) that the connection setup may take before a connection error is returned.

This command will overwrite the selected message on the Videojet printer.

In this transfer object, you can enter values corresponding to the predefined fields:

- FONT NUM to specify the font size of the text element.
- · HORC for horizontal alignment of the text element.
- · VERC for vertical alignment of the text element.
- ATTRIB for selecting various printer-specific attributes.
- MESSAGE TEXT to enter your freely selectable text on the label.
- Label = Name of the label to be overwritten.

How the individual entries must be made is described in the documentation of your Videojet printer in the MESSAGE DATA Field Format section.

Array input also allows you to create several text elements.

Videojet update printer

The Videojet update printer transfer object selects an existing label in the printer and fills the specified printer variables with values.

After double-clicking the Videojet update printer transfer object, set the following properties:

Etikett	Select a label from the drop-down menu. If you do not assign any values to the transfer object, the default values that you specified for this label in the Videojet printer plug-in will be used.
Statischer Drucker	 activated: The printer is set up during creating time and is not be changed during run time. deactivated: The printers name has to be defined during run time (from variable, data base or similar).
IP	Enter the IP address of your static printer.
Port	Enter the port of your static printer.
Timeout	Time (in ms) that the connection setup may take before a connection error is returned.

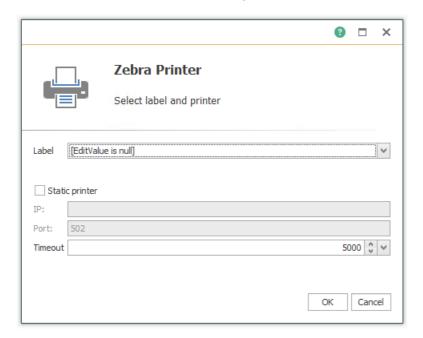
You can assign values to the fields of the transfer object and trigger the printer using the "Label" area.

Zebra

Plug-in

Name	Assign a name for the template.
Comment	Enter a comment.
Encoding	Select the encoding. Note: The selected encoding must match that of the printer. Please contact the manufacturer of the printer for more information.
Name	Assign a name for the field.
Default value	Assign a default value for the field.
Label	The commands for the label are displayed here.
Insert field	Add new fields.
Insert control characters	Add commands which will be displayed in the label.

Printer transfer object



Set the following properties after double clicking the transfer object for Zebra printer:

Label	Document template, created in the Plug-in Configuration
Static printer selection	 activated: The printer is set up during creating time and is not be changed during run time. deactivated: The printers name has to be defined during run time (from variable, data base or similar).
IP	Enter the IP address of your static printer.
Port	Enter the port of your static printer
Timeout	Time (in ms) that the connection setup may take before a connection error is returned.

The transfer object gives you all placeholders from the document template. Are these template variables not be filled in the transfer object, the router uses the standard value from the template.

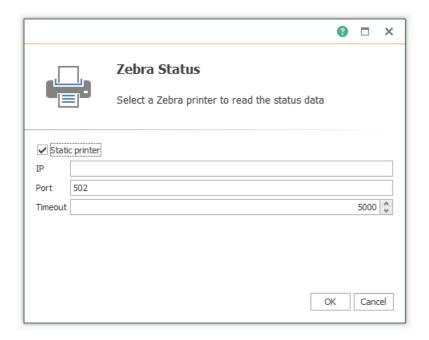
Should you call the printer dynamically, please pay attention to the correct spelling of the printers name- it has to be equal to name given in Windows.

Zebra Transfer Objects

□ NOTE

Note: You can also enter a host from outside into the IP address field. To do this, create a constant with the IP of the printer, for example, and drag an arrow to the IP address field.

The transfer object can be used to read various printer states such as the state of the connection or the presence of the paper roll.



Set the following properties after double clicking the transfer object:

static printer	May be checked if the statuses of a specific printer are to be retrieved.
IP	IP address of the printer
Port	Port of the printer
Timeout	"If the printer cannot be reached within the specified time period, an error will be returned."

IP and port are only available if "static printer" is checked.

Additional interfaces

Overview over additional interfaces:

xml_xpath_transfer_object.md

csv_transfer_object.md

excel_transfer_object.md

json

file

XML/XPath transfer object

XML transfer objects are available as sources and destinations. XPath queries allow elements to be extracted from XML files or written to XML files. A plug-in configuration is not necessary, you can directly configure the transfer object within the connection as described.

After double-clicking on the transfer object, set the following properties:

Section: X-Path Elements

Name	Name where the query appears in the transfer object.
X-Path Expression	Valid X-Path query, in the simplest case the path to the node (see below).
XML Mode	Indicates if only the content of the query result or the enclosing tag will be output (e.g. Heinrich Mann or <author>Heinrich Mann</author> . When writing to the object (Create XML), only content must always be specified because the structure is already established. By writing at the object (create XML), only content must always be specified because the structure is already established.

X-Path Placeholder

Name of parameter	Name of the parameter
Default value	Default value of the placeholder

Section: Namespaces and Prefixes

Prefixes	Unique prefix
Namespace	Namespace

When importing the XML code at design time, all existing namespaces are entered. Use the checkbox to mark the namespace that should be used as the default for the XPath queries. If a standard is defined, formulate the X-Path queries without a prefix, this will be added automatically. In the source code, you have to specify the prefixes always,.

Section: XML Code

The multiline field is for entering XML code. At design time you can use it to check your X-Path expressions. Then you can delete the code if you dynamically pass the XML code at runtime (transfer object as source) or first generate (transfer object as destination). Of course, you can also leave static code here if that meets your requirement.

XML documents as source

As a transfer source, the XML object extracts content from XML code based on the configured X-Path queries.

- The XML code is either set statically at design time or submit at run time to the element "XML".
- The results are read from the X-Path query elements.

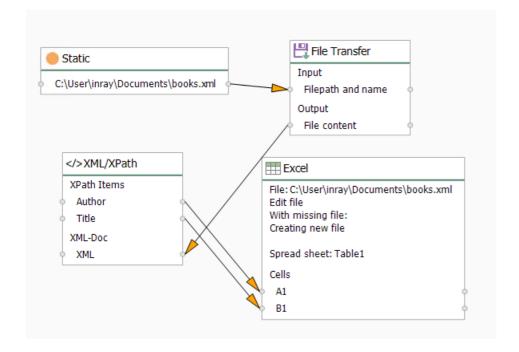
For example, the following code is supplied from a file:

Then two X-Path expressions would supply the author and title of the books:

- Name: "Author", X-Path expression "/catalog/book/author"
- Name: "Title", X-Path expression "/catalog/book/title"

On the Internet you will find different documentations about the possibilities of X-Path, these are just the simplest (e.g. by http://www.w3schools.com/xsl/xpath_syntax.asp; Restriction: Any nodes must be initiated with "//").

For this example, the configuration looks like this:



- 1. The path and name of the file are transferred from a constant object to the file transfer object. The name could also be determined dynamically from a database.
- 2. The file transfer object transfers the contents of the XML file to the XML element in the XML object. At design time no code was deposited here, only the two described X-Path expressions.
- 3. The query results are written to an Excel file. Every other data destination is just conceivable (e.g. database INSERTS). Since several lines are expected, the write mode is "attache rows" in the Excel object.

XML document as destination

As a transfer target, the XML object creates XML code based on the configured X-Path queries.

• The XML code can be transferred further, e.g. to a database. To create an XML file, a script would be required.

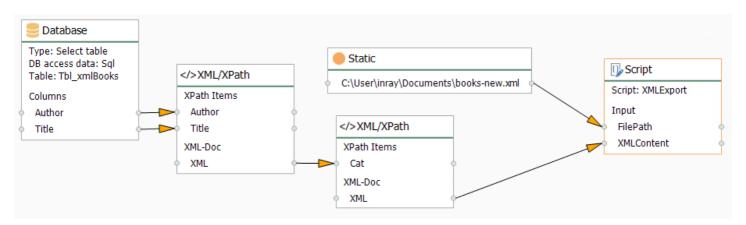
For example, it comes from a table:

Author	Title
J.R.R. Tolkien	The Hobbit
Joanne K. Rowling	Harry Potter and the Philosopher's Stone

From this, an XML file with the known structure is to be generated.

- Name: "Author", X-Path expression "/catalog/book/author"
- Name: "Title", X-Path expression "/catalog/book/title"

For this example, you need two staggered XML objects. The first one will transform the result set into individual XML elements, the second will group the elements into one document:



- 1. The data records have to be written by query from a database and transferred to the X-Path elements of the first XML transfer object.
- 2. The XML object generates the XML code. The XML object contains the well-known X-Path expressions:
 - o Name: "Author", X-Path expression "book/author"
 - o Name: "Title", X-Path expression "book/title"

as well as the basic structure

```
<book>
<author></author>
<title></title>
</book>
```

Important is the property XML output = "Multiple XML documents", so that each record from the database becomes its own element.

The structure could also be passed dynamically at runtime. E.g. from a text file or from a database.

3. The code is passed from the XML element to the X-Path element of the second XML transfer object. This object contains only the XML declaration and the root element:

```
<?xml version="1.0"?>
<catalog>
</catalog>
```

With the X-Path query / catalog and the property XML output "One XML document"

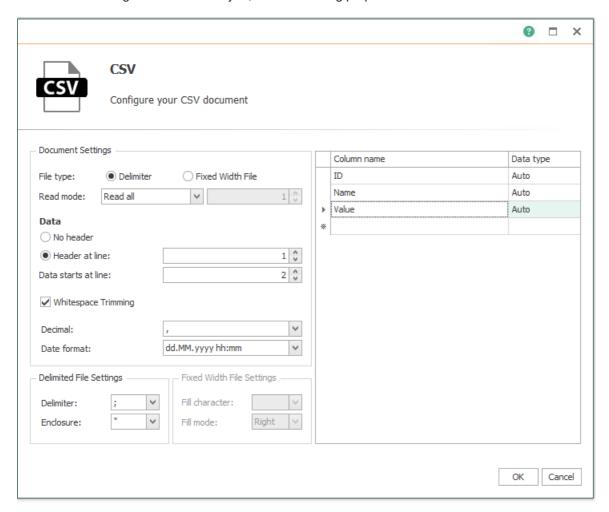
4. The code can be transferred further. Here, a script transfer object is used to create a file. File path (type: string) and XML content (type: array, string) are passed as input parameters:

```
public override void Write()
{
    StringBuilder stb = new StringBuilder();
    stb.AppendLine("<?xml version=\"1.0\"?>");
    foreach(string xml in XMLContent)
    {
        stb.AppendLine(xml.Substring(xml.IndexOf("?>")+2));
    }
    System.IO.File.WriteAllText(FilePath, stb.ToString());
}
```

CSV transfer object

CSV transfer objects can read, analyse and write strings. There is no plug-in configuration required. You can directly configure the transfer object within the connection as described.

After double-clicking on the transfer object, set the following properties:



Attention: The CSV transfer object can only read and write CSV strings. To read and write CSV files you need to use the File Read and File Write transfer object additionally to the CSV transfer object. Select Delimiter if your data is seperated by a defined delimiter like a semicolon. Select Fixed Width File if the columns has a defined, fixed width. Select which part of the CSV string you want to read Read Read all: Reads the whole document Read first n: Reads the first rows of the CSV document. (Select the amount of rows) Read last n: Reads the last rows of the CSV document. (Select the amount of rows) Header Select if the document has got a header. Also select the line number of the header

Data starts at	Select the number of the row where the data starts.
Decimal	Select the sign which is used in decimal digits.
Date format	Select the date format. You can also create your own format.
Delimiter	Select the delimiter of you CSV string.
Enclosure	Select the enclosure of your CSV document.
Fill character	Select the sill character. This character is user if you have selected Fixed Width File and it is the character which is used for unused space.
Fill mode	Select where the fill character should fill up the empty spaces.

On the right side you can define the data fields of the CSV string.

The names of the data fields need to match to the header names. You don't need to define every value of the header. If you have a CSV string with fixed file width, the field size need to match the field size of the csv string.

Excel transfer object

Excel transfer objects can be used as source and destination. You can write data in defined boxes or read the out. You can also write several data sets from the data base into several lines in the Excel table. A plug in configuration is not necessary, you can project the transfer object as explained directly in the connection.

Set the following properties after double clicking the transfer object:

Section: File

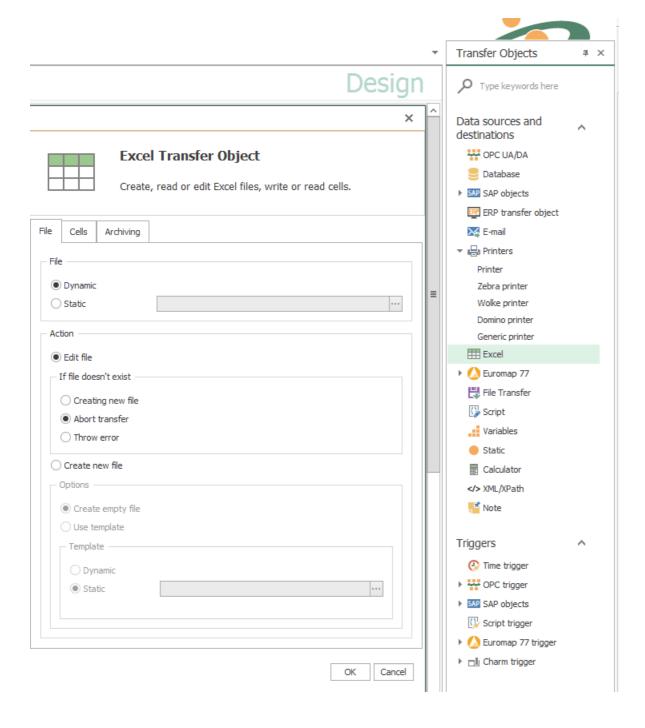
File	Dynamic
Action	Edit File

Section: Cells

Spread Sheet	Dynamic
Cells	Here state the cells in the usual format "Column/Line", e. g. A1. The following writing modes are available Update Cell: Overwrites the chosen cell with a new value. Insert Cell: Adds a new cell to the chosen position. All other cells are moved down. Append Cell: Finds the first empty cell under the chosen position and fills in the content. This option can be used to, e. g. write the result of an SQL Select (means several data sets) into the table.

Section: Archiving

Archiving	Activate, to save the Excel file in the state is has before transferring. Note: If transfers are triggered every second, an archive file is created every second, too. This option is obviously smarter used, if for example a daily statistic is needed. The archive files name includes date and time of the archiving (not: the creation of the original file).
Archive Folder	Dynamic



JSON transfer objects

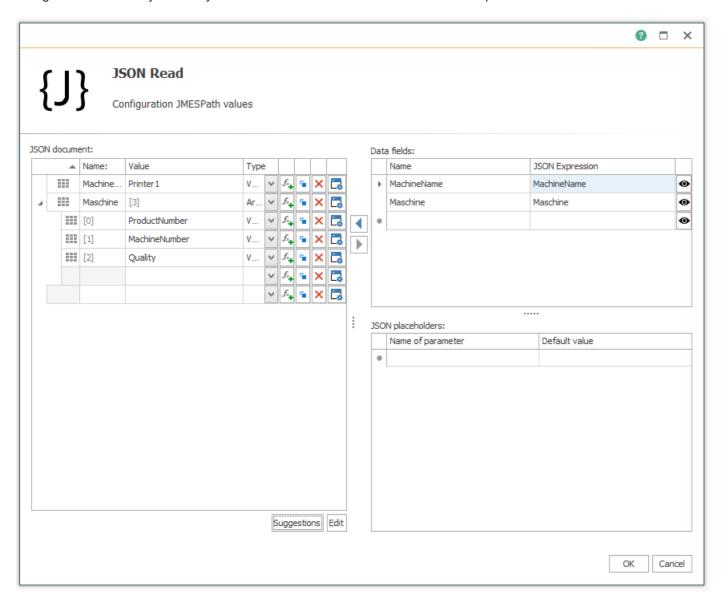
Overview over transfer objects:

json_write_transfer_object.md

json_read_transfer_object.md

JSON Read

With the JSON transfer object as a simple data exchange format, you can evaluate, change or create formatted texts or data in JSON. Create a JSON transfer object within the connection as described. A plug-in configuration is not necessary. You can configure the transfer object directly within the connection as described. The JSON expression is "JMESPath".



After double-clicking on the transfer object, set the following properties:

JSON document	In this area you can define the JSON to read. The button "Edit" is for editing the raw/source data of the JSON. The button "suggestions" searches the connection for already executed sessions and JSON files. If a JSON document was found, you can take it as template.
Data fields	You can add data fields to read data of the JSON elements through the runtime. Click a value of the JSON document and use the "right arrow" or the "F+" button to add a field from the JSON.
JSON placeholders	JSON placeholders are made to add variables inside the JSON document. Inside of the JMES path expression, the variables are written in curly brackets. For example: {MyPlaceholder}

A tree structure is defined in the editor of the JSON tree as follows:

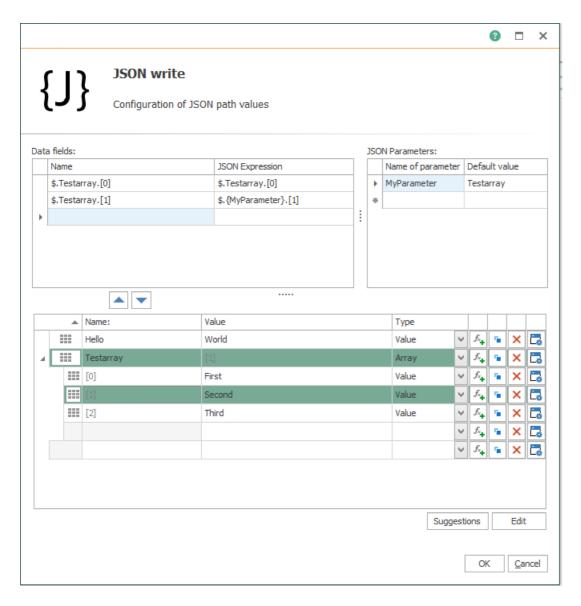
```
{
    "key":"value",
    "some":[
    {"name":"one","value":1},
    {"name":"two","value":2},
    {"name":"three","value":3}
    ]
}
```

JSON Write Transfer Object

With the JSON transfer object as a simple data exchange format, you can evaluate, change or create formatted texts or data in JSON. Create a JSON transfer object within the connection as described. A plug-in configuration is not necessary. You can configure the transfer object directly within the connection as described. The JSON expression is "JSONPath".

Here you will find an overview of the most important JSONPath syntax elements compared to the XPath elements:

XPath	JSONPath	Description
1	\$	The parent object/element
	@	Element in current context
1	.or []	Specification for child elements
//		Recursive descent
*	*	Placeholder. All objects/elements regardless of their name are selected.
0	0	Subscript operator for element collections.
0	?()	Executes a filter (script) expression.



After double-clicking on the transfer object, set the following properties:

Data fields	Enter the JSON items directly or select entries from the JSON tree and use the "arrow up" or "F+" button to add. The names of the items can be freely assigned and serve as help during project planning. The items can be written and read during a transfer.
JSON Parameters	If necessary, enter additional parameters for default values here. During the transfer, the placeholder "{parameter}" is replaced by the given value (\$.some[0].value). If nothing was passed, the default value is used.
JSON	The JSON Tree is the standard JSON document during a transfer. This can be read and written to. You can click on the "Edit" button and enter your tree structure or you can create the JSON structure through the Ul. The button "suggestions" searches the connection for already executed sessions and JSON files. If a JSON document was found, you can take it as template.
Fill values	 Fill array values on all levels Fill array values only within the same array. Duplicate document when an array is written to the data field

A tree structure is defined in the editor of the JSON tree as follows:

```
{
    "key":"value",
    "some":[
    {"name":"one","value":1},
    {"name":"two","value":2},
    {"name":"three","value":3}
    ]
}
```

File

Overview:

file_transfer_object

file_trigger_object.md

Transfer objects

Overview over transfer objects:

file_write_transfer_object.md

file_delete_transfer_object.md

file_read_transfer_object.md

File Read

File Read transfer objects can move files and make file contents available. File paths can be selected from a database or as a constant. You can directly configure the transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

Tab: Source

Dynamic or static	File source static or dynamic path. Dynamic paths can get defined by an connection arrow and it can change through the runtime.
Abort if file not found	Activate to abort the transfer if the file was not found.
Read binary	Select this option if you want to read a binary file like *.doc, *.jpg, * .xlsx,
Read Text, Encoding	Select if you want to read a simple text file and select the files encoding.

Tab: Target

Move file after transfer	Activate this property and select a folder to save the file in the state before the transfer operation. Attention: If transfers are triggered every second, a new archive file is created every second. This option is therefore more suitable if, for example, daily statistics are created. The file name of the archive file contains the date and time of archiving (not the creation date of the original application file). Format: yyMMdd_hhhmmss_fileName.
Dynamic or static	Dynamic or static target path. For static target path, select the file name to read the file content.

File Write

File Write transfer object can read and manipulate files. File paths can be selected from a database or as a constant. You can directly configure the transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

Tab: Output path

Dynamisch oder Statisch	File target static or dynamic path. Dynamic paths can get defined by an connection arrow and it can change through the runtime.

Tab: Existing file

Action	Overwrite: Will overwrite existing files. Throw error: Creates an error if the file is existing. Append: For simple text files, the contend can get appended to the existing contend. Move existing: Moves existing files to a target folder.

Tab: File settings

Dynamic or static filename	Select a static or dynamic file name. Dynamic file names can get defined by a connection arrow and it can change through the runtime.
Prepend UTC Timestamp	Activate if you want to prepend the UTC timestamp to the file. For example the file "test.txt" gets renamed to "20191204_095646_test.txt".
Write binary	Select this option if you want to write a binary file like *.doc, *.jpg, * .xlsx,
Write text	Select if you want to write a simple text file and select the files encoding.

File Delete

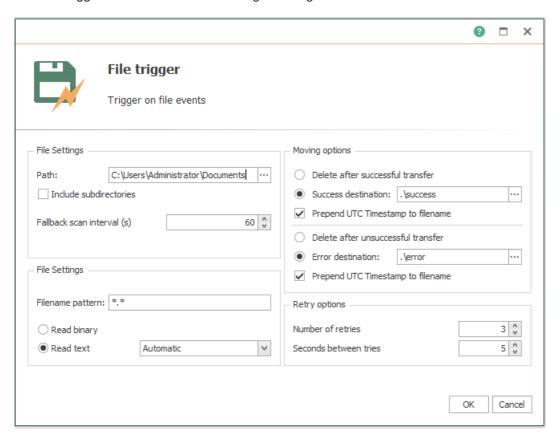
File Delete transfer object can delete files. File name patterns can be selected from a database or as a constant. You can directly configure the transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

Path	Select the path where the OPC Router should delete files
Name pattern	Select a static or dynamic file name pattern. Dynamic file name pattern can get defined by a connection arrow and it can change through the runtime. You can use placeholders like *.
Include subdirectories	Activate if the OPC Router also have to delete files inside the subdirectories.
Delete unrestricted	Deletes all the files for the name pattern.
Files older tha	Only delete files older than selected timespan.

File trigger

The File Trigger executes a transfer if a file gets changed or created.



After double-clicking on the transfer object, set the following properties:

Path	Select the path to observe.
Fallback scan interval	The OPC Router gets notifications if files get changed or being created. If it misses a notification, it will observe the directory additionally in this interval.
Filename pattern	Define a filename pattern. You can use placeholders like *.
Read binary	Select this option if you want to read a binary file like *.doc, *.jpg, * .xlsx,
Read Text, Encoding	Select if you want to read a simple text file and select the files encoding.

Target options

Delete after successful transfer	Deletes the file which triggered the trigger after a successful transfer.
Success destination	Moves the file which triggered the trigger in a special folder
Prepend UTC Timestamp to filename	Activate if you want to prepend the UTC timestamp to the file. For example the file "test.txt" gets renamed to "20191204_095646_test.txt".

Delete after error transfer	Deletes the file which triggered the trigger if a transfer aborts for some reason
Error destination	Moves the file which triggered the trigger in a special folder if the transfer gets an error
Prepend UTC Timestamp to filename	Activate if you want to prepend the UTC timestamp to the file. For example the file "test.txt" gets renamed to "20191204_095646_test.txt".
Number of retries	If the OPC Router can't access the selected file, it can retry for n times.
Seconds between tries	Select the time between the retries.

Additional functions

Overview over additional functions:

cron_trigger_object.md

time_trigger_object.md

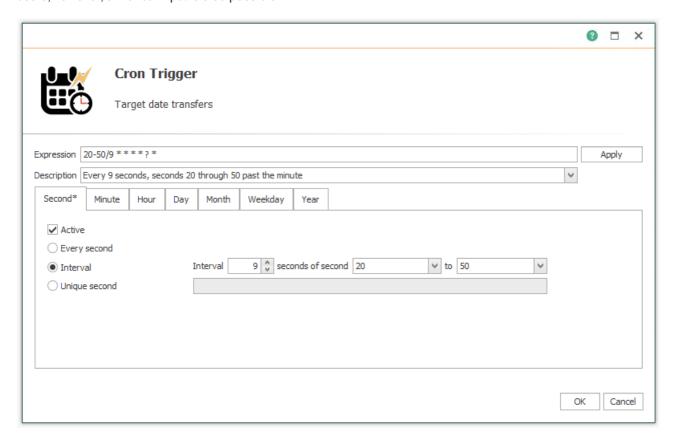
note_transfer_object.md

text_replace_transfer_object.md

calculator_transfer_object.md

Cron trigger

The cron trigger triggers scheduled transfers. In the property mask, you can arrange the appointments as needed. For advanced users, however, a manual input is also possible.

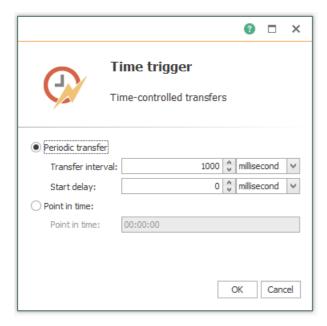


The individual properties are:

Expression	Display of timed transfers after selection of properties. Here is also the possibility of manual input. After entering, confirm with the "Apply" button.
Description	Display of the expression in text form. The display changes automatically when the selection and entries are changed. Here you can choose between different expression proposals.
Active	After selecting an area (second, minute, hour, day, month, weekday, year), activate the checkbox to activate the trigger. Which areas are activated is shown in the tab by an asterisk *. You can define specific details by simply entering a number. For example, if 5 is entered for specific hours, then the transfer will only be triggered directly at 5 o'clock. Several specific inputs can be separated by a comma.

Time trigger

The time trigger triggers data transfers at variably intervals in a time-controlled interval. If a transfer is to be carried out once a day, you can also specify a fixed time.



The individual properties are:

Option: Periodic transfer	The transfer will be triggered at the specified interval.
Transfer interval	The interval at which the transfer is triggered. If start delay = 0, the first transfer after router start will not be triggered until the interval has elapsed. Default always as an integer, no decimal places. As units therefore milliseconds, seconds, minutes or hours are to be selected. The router always calculates the new interval after the end of the last transfer, so that at setting "1 s" a transfer will not be triggered every second, but 1 second after the end of the previous transfer.
Start delay	Start delay after which the interval count starts after the router has started. The first transfer thus takes place after elapse of start delay + transmission interval. Default always as an integer, no decimal places. As units therefore milliseconds, seconds, minutes or hours are to be selected.
Option: Point in time	The transfer will be triggered once a day at the set time.
Point in time	Time at which the transfer is triggered.

Note transfer object

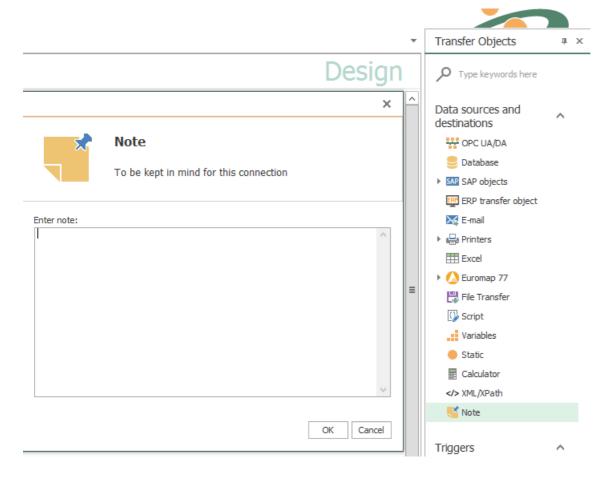
In extensive projects, especially when several colleagues work together, the comment on the connection is quickly no longer sufficient to keep track.

Use the object "Note" to attach one or more detailed comments to a connection, e.g. a documentation for the configuration. To view or edit the note, double-click on your note transfer object. In this way, you also provide extensive comments clearly.

Times are given in the e-mail and in the PDF file as system time, but in CSV as UTC.

The note can not be used as a data source or destination.

Create a Note object within the connection as explained.



After double-clicking on the object, set the following properties:

Enter note	any text

Text Replace transfer object

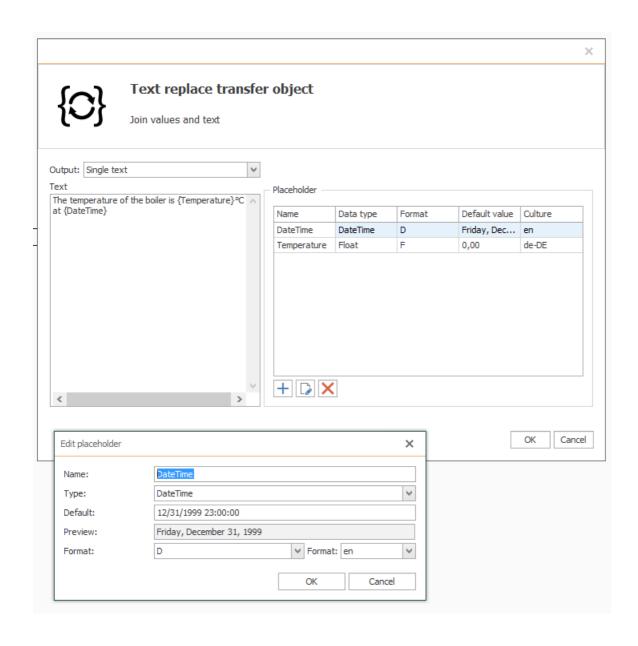
The "Text replace" transfer object is used to transfer texts using connections in order to combine values and texts.

After double-clicking the transfer object, set the following properties:

Output	 Choose between SingleText and Array: Output "Array": Depending on the length of the largest input array, the same number of strings is created in the output array. Output "SingleText": Regardless of the amount of data entered, only 1 string is output at a time. The data is summarized accordingly.
Text	Enter your text here. You can enter placeholders by double-clicking on the corresponding entry in the placeholder list to the right.
Placeholder	At this point, enter a new placeholder using the plus sign or edit a selected placeholder using the corresponding button. Use the red cross to remove a placeholder.

Define placeholder

Name	Enter a unique name for the placeholder.
Data type	Specify the data type of the placeholder, for example, String, DateTime.
Default Value	Enter a default value if required.
Preview	The preview shows you the form in which a value will be displayed.
Format	Selection of a format for the data types Int64, Float or DateTime,
Culture	Select the culture to get the corresponding spelling. For example, commas or dots are set differently depending on the selected culture.



Calculator transfer object

You can use all available (numerical) values as input for calculations. You then use the results as a data source in the further transfer. Create a computer transfer object within the connection as explained.

After double-clicking on the transfer object, set the following properties:

- 1. Use the button "New" to add as many placeholders as your formula requires. These placeholders are filled later with values of OPC items, from database tables, from variables ...
- 2. Compose the formula.
 - The placeholders are simply entered or accepted by double-clicking.
 - Use the normal mathematical symbols for connection (+-*/()).
 - Functions apply to the immediately following placeholder, otherwise please set brackets (e.g. sqrt(A+B) = Square root of the sum of A and B).
 - Rounding functions: Via the "Round up" or "Round down" button (rounds up to whole numbers)
 - Concatenate function = concatenate strings: The values must be marked with "" in the formula e.g.
 CONCATENATE("A","B").
 - · Additional functions via the button "Further".
- 3. Use the "Test" button to open another dialog. Enter values for the placeholders here and check the formula.
- 4. If all right, confirm both dialogues with "OK".

The computer transfer object is now available in the connection. Connect variables, OPC items, database fields, etc. with the placeholders and use the result as a data source.

FAQ

Overview of chapter sections:

troubleshooting

connection_projecting

how_i_can

best_practice

Error Diagnostics

There is – even with all coverage – always the possibility, that a connection doesn't "work". In most cases, these are not real errors, but only trivia, which can show while connecting foreign systems. In the following we collected several snares – and are always thankful for additions and hints.

Hardly any problems show, if router, OPC- and data base server run on the same computer. In the distributed system the right DCOM configuration is important for the OPC server, data base server allow or forbid even the remote access.

■ NOTE

Note: Use in any case the tests offered in the management: "Test Connection" for the data base access data and "Test" for the mail server access. The OPC link works, if you can browse the OPC server in the management (see below). Please note, that configuration and service may run under a different user context and act differently.

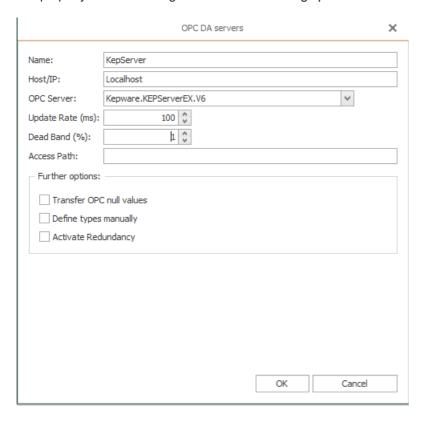
In the Basic Set Ups the log levels "Error" and "Warning" should be activated as recommended. In case of a runtime error, call the log data with the tray icon and analyze the error message.

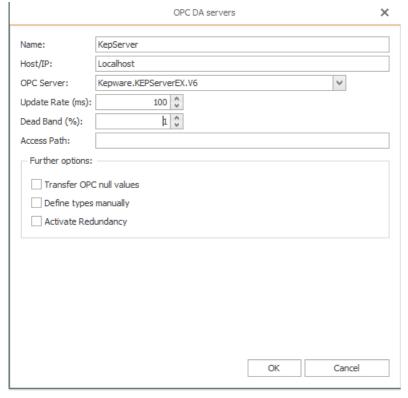
OPC Links

Sources for errors, which limit the access on local OPC server, are not known yet. However accessing distributed OPC server can be tricky.

Connection can't be set up - remote only

The property "OPC-Server" gives out <error browsing opc-servers>.





Check if the DCOM Configuration is correct:

• Does the configuration environment run under the same user, who has DCOM access to the OPC server?

- Are the components OPC Enum and OPC server on the destinated computer cleared for the user?
- Is DCOM in general activated on the destinated computer?
- Are the local firewalls shut down on all computers involved?
- Of course the destinated computer is switched on and accessable!

Connection is set up, but the OPC link doesn't show in the OPC transfer object.

The OPC server could be linked in the configuration, but the OPC link doesn't show up within the connection projecting in the OPC transfer object, or an error is given out.

• You have to save the OPC link with the "OK" button, before you can use it.

Tag browser isn't able to connect with the OPC server

As far as the OPC link was configurated without problems, check if the OPC server has just been switched off manually, or has been initialised.

• Is the computer with the OPC server switched on an accessable?

No data transfer can be done during run time

The connection could be projected easily during concept time. During run time there is no transfer. Call the log data with the tray icon. Search for the error message at the end of the data. Does it look like this?

16.07.10 14:49:06.194 [Error:OPCConnectionManager] Wasn't able to connect<ltem\> (E_INVALID_ITEM_NAME)

Most likely you've written the item name incorrectly, or your OPC server interprets the property Access Path wrong, which is
deposited in the OPC link. Choose the item in the tag browser and/or configurate a link without Access Path for testing.
Check if your OPC server runs without problems.

Error message in log data:

16.07.10 15:19:34.886 [Error:NoChannel] Timeout connect OPC Server!

In distributed systems: Is the computer with the OPC server switched on and accessable?

Error message in log data:

16.07.10 15:16:24.694 [Error:OPCConnectionManager] Wasn't able to connect to OPC server <OPC-Server\> on <IP\>.

(Message: CoCreateInstanceEx: Access denied)

If the connections runs during concept time, most likely the router configuration runs under the right user, but the router service
doesn't. Check if the router service runs under the user, who has DCOM rights on the OPC computer.

Database connections

Not all database systems can be handled here. But maybe one or the other clue will come up with the solution for "your" system.

Connection does not materialize – local and remote

The "Test Connection" button returns an error. The error message often gives the correct hint.

- Is the server named correctly? For example, for MySQL or MS SQL the specification of the IP is sufficient, but for MS SQL Express the instance must be named, e.g.:: localhost\SQLEXPRESS
- Is the name of the database spelled correctly? Does the user have access rights to the database? For example, in MS SQL, the databases are assigned to each logon. Ask your database administrator!
- MS SQL: Is the correct authentication set for the user (SQL and Windows on access with user / password)?
- Username and password are correct? Spend attention to upper and lower case!
- Integrated security is enabled. The connection test is not meaningful. Integrated security uses the local Windows or domain
 user where the program was started to log in. In the configuration environment, this is usually the username with which you
 logged on to the computer, by contrast, the router service runs under system default (sufficient for local access to MS SQL,
 not for remote access).
- Are the required services started (MS SQL: SQL Server and SQL Server Browser, via Server Configuration Manager or Control Panel - Administrative Tools - Services).

Connection does not materialize – only remote

The "Test Connection" button returns an error. The error message often gives the correct hint. In addition to the above points, you have to check:

- Is the network connection active? Can you ping the database machine ("Start Run ping </P>")? Ask your network administrator!
- Are the firewalls of the involved computers switched off? We recommend deactivating the Windows firewalls of the
 participating computers. Otherwise, please ensure correct port release. Ask your network administrator to allow unrestricted
 communication between the router and the database server.
- Is the server named correctly? For example, for MySQL or MS SQL the specification of the IP is sufficient, but for MS SQL Express the instance must be named, e.g.: 192.168.5.184\SQLEXPRESS or Rechnername\SQLEXPRESS
- Allows the database to allocate remote connections (e.g. in MS SQL this must be activated for the respective user)?
- Are the corresponding protocols activated? (MS SQL: Enable Named Pipes or TCP / IP in Network Configuration and Native Client Configuration in Server Configuration Manager depending on connection)?

Connection is established but no tables are visible (MS SQL)

The button "Test connection" returns OK. However, tables can not be selected in the configuration of the transfer object.

- Does the user have the appropriate rights to the database? "Listing tables" may not be allowed to the user, depending on the role.
 - At "Login Properties" of the corresponding login in the user mapping for the required database assign to
 "db_datareader" and "db_datawriter". Attention: "db_owner" is required to run stored procedures.. Ask your database administrator.
 - Of course, the user can also be assigned administrator rights on the database or on the system (e. g. the role "sysadmin"). But this should only happen for a short time for troubleshooting

Stored Procedures can not be executed. (MS SQL)

- Does the user have the appropriate rights to the database?
 - At "Login Properties" of the corresponding login in the user mapping for the required database "db owner"

Stored Procedures are canceled.

- Are Command Time-out of the connection and Time-out of the corresponding connection set correctly?
 - Changing the time out of the corresponding database in Storage.
 - Increase the value of Time-out of the corresponding database in Storage.

Connection is established, but the database connection does not appear in the database transfer object.

The connection test was successful, but the database connection in the connection configuration in the database transfer object does not appear or an error is returned.

• You must save the database connection via the "OK" button before it is available.

At runtime, no data transfer occurs

The connection could be easily made at design time. At runtime, the status display indicates a connection error. Open the log file via the tray icon. Look for the error message at the bottom of the file. Look for the error message at the bottom of the file.

14.07.10 17:33:42.228 [Error:::SqlConstantConnection]
Error while opening the sql connection: System.Data.SqlClient.SqlException:
Error logging in for the user 'NT-AUTORITÄT\ANONYMOUS-ANMELDUNG'

If you access the database server remotely and have "built-in security" enabled, you must not run the service as a system
user. Configure the service so, that it runs at the domain user.

SQL-Selects

No data transfer from the database - but also no transfer error

Your connection should read data from the database. You have configured a DB object with SQL Select and Filter for this. The OPC router status does not show an error, but no data is transmitted at the set time.

• In the DB transfer object, there is the tab "Query". Set the option here "With empty SELECT - Return read error". If the cause for the failed transfers is an empty SELECT result, the status will now display an error.

Creating diagnosis

Create a diagnostic report with the router surface

Using the menu "File - Creating diagnosis", you can select different areas that should be taken into account for the diagnosis and placed in a folder as a complete package.

E-Mail Settings

Save as	Enter the path where the diagnostic report will be saved.
Project files	Activate the checkbox if the project configuration is to be exported.
Runtime database	Activate the checkbox if you want to create a backup at runtime for the diagnostic report.
State database	Activate the checkbox if you want to make a backup of the status of the database for the diagnostic report.
Log files	Activate the checkbox if you want to include the log files for the report.
Include windows event log	Select the checkbox if you want the windows event log to be included in the report.
Include devices	Enable the checkbox if the device data should be included in the report.
Logfile of last days	Activate the checkbox if you want to include the log files of the last X days for the report.

The file is packed in the desired directory and can be opened with any zip program.

Connections

After having configured all plug-ins needed, you can start defining connections. As only one Router project can be loaded as runtime configuration, you want to project all connections within one single project file. You may, however, sort the connections into different folders (=connection group) (similar to Windows Explorer). Every single connection or connection group can be activated or deactivated so that it is executed (or not executed) during runtime.

□ CAUTION

Important: We recommend to backup a productive configuration before editing. Thus, you can revert to a running project should any error occur after editing.

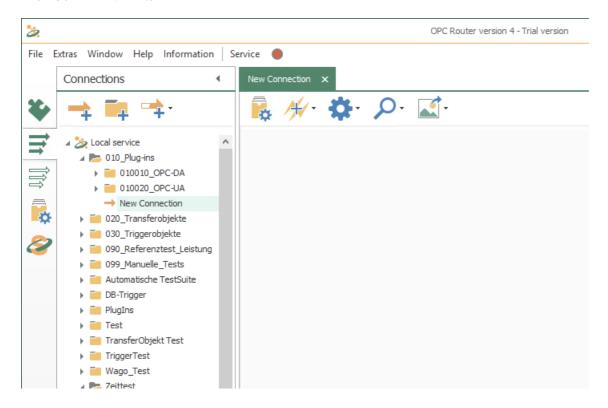
□ TIP

Tip: You can move the drawing area in all areas with the middle mouse button held down.

Creating Connections

To create a connection, go to the Snap-in area and select the connections snap-in:

- 1. Go to the "New Connections" button.
- 2. Insert a name. The name has to be unique within the project.
- 3. Confirm with "Enter".



The connection has been created and opened in main window. Existing connections can be opened by double-click in the project configuration tree. The currently called element is displayed in bold in the directory tree.

□ NOTE

Note: Right-clicking on Local Service will also bring you to the Settings area.

Creating Connection Groups

A connection group combines several connections. Groups can be nested as required, e. g. like folders in Windows Explorer. (De)activation of a group (de)activates every single connection of that particular group. You can, however, e. g. deactivate a group and reactivate single connections within that group afterward.

To create a connection group, go to the connection snap-in

- 1. Go to the connection button "New folder".
- 2. Insert a name. The name has to be unique within the project.
- 3. Confirm with "Enter".

Manage Connections and Connection Groups

You can copy, paste, move, rename or delete connections and connection groups, similar to Windows Explorer. However, only one object can be edited at once. Selection of multiple elements is not possible.

- 1. Select the connection (group) to be edited.
- 2. Choose the desired action

- o from the menu "Connections"
- o from the connection's context menu (right mouse click)
- 3. The following actions are possible:
 - Copy: You can create connection groups, connections, template instances, templates with the right mouse button "Copy" and "Paste".
 - o Delete: After selecting the right mouse click on the connection, go to the action "Delete" and confirm with "Enter".
 - Rename: After having selected "Rename" enter a new name and confirm with "Enter".
 - Move: Move by copying the element and delete the original afterward or drag & drop with mouse.

If you right-click a parent folder in the tree structure and select "Expand All" or "Collapse All" from the menu, all subfolders and their connections are displayed or hidden.

Pop-up-Menu

Above the connections area you will find another pop-up menu:



- The "Set connection productive" button activates the selected connection.
- Use the "Trigger shortcut" button to select whether the links in your connection should be AND or OR links.
- With the "Connection properties" button you can select the form in which the transferred values are to be recorded. You can also define a timeout: Time (in ms) that the connection setup may take before a connection error is returned.
- With the "Zoom" button you can enlarge or reduce the size of your connection.
- With the "Export View" button, you can export your connection as an image file or copy it to the clipboard as an image or XML. The images can be saved as Bitmap, PNG, JPEG or GIF.
- With the "Connection arrow add mode" button you can create single or multiple connection arrows. Arrows are used to
 connect the source and target objects. If several arrows are to be created at the same time, an attempt is made to link all
 data points of the target and source objects using their data point names. The icon changes depending on which mode you
 have selected.
 - 1. "Create a single connection": This is the default selection. You only need to draw a single connecting arrow. If you hold down the Ctrl key in this mode and drag a connection arrow, several connection arrows will be created once.
 - 2. "Create multiple connection arrows": In this mode several connection arrows are drawn. While dragging an arrow, only one arrow is displayed. As soon as the arrowhead is placed on a transfer object, the other arrows are created automatically. If the arrowhead points to an Input Transfer Object Item and either the original Transfer Object Item or the target Transfer Object Item does not get an automatic arrow, this arrow is also added, even if the objects do not match. This can be prevented by dragging the arrow onto the header of a transfer object.
 - 3. "Create multiple connection arrows once": Behaves like the "Create multiple connection arrows" mode. After dragging an arrow, the system returns to the "Create a single connection" mode.
- With the "Item sorter" button you can activate automatic sorting of the connection arrows. This causes the system try to
 arrange the connection arrows so that they do not overlap. This is only a display option. The items are not "really" moved, but
 only displayed in a different position. The option can therefore be activated and deactivated without hesitation. This option
 has no effect on how the connection is processed.

Activate/Deactivate

It is required to save all connections in one single project file. You can, however, deactivate connections or connection groups within this file.

Activate/Deactivate Connections

- 1. Go to the Snap-in bar "Go productive".
- 2. Select all connections and / or connection groups that you want to activate by selecting a checkmark next to the connections / connection groups.
- 3. Click on button "Go productive".

Activate/Deactivate Connection Groups

- 1. Go to the Snap-in bar "Connections".
- 2. Right-click on the connections you want to activate / deactivate.

This command de/activates all connections and subgroups of this group. You can open the connection group and reactivate single connections or subgroups if necessary.

If you right-click on the folder of your connections, you can activate or deactivate all connections in your folder at once via the menu with the properties "Activate all connections" or "Deactivate all connections".

How to project

A connection contains three transfer objects at least: a source, a destination and a trigger that triggers the transfer should its conditions occur. You can define a free number of sources and destinations which can be accessed in multiple steps. You can define several triggers as will. Triggers might be linked with AND or OR, triggering either if all conditions occur or if at least one condition occurs.

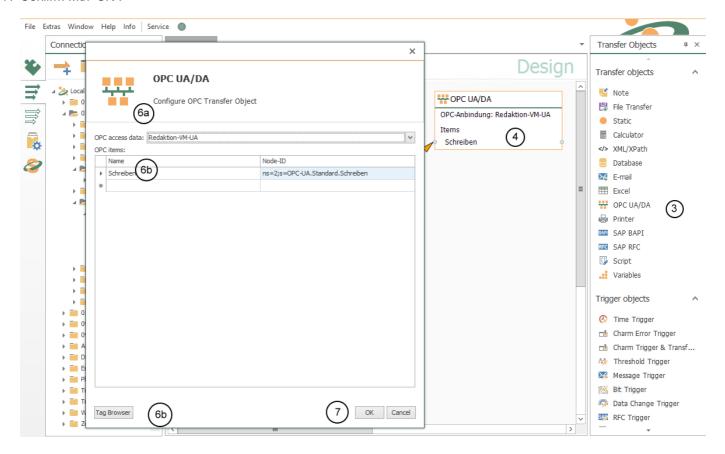
The transfer objects may be found in the right-hand toolbox.

Right mouse-click on a transfer objects with in project allows editing, copying, pasting, cutting, deleting.

■ NOTE

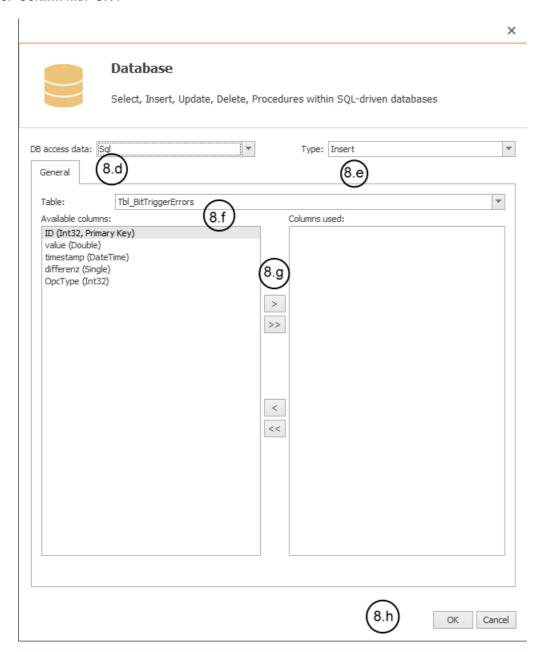
Note: To project a connection, all plug-ins needed have to be configured.

- 1. Create a new connection.
- 2. Give your connection a suitable name.
- 3. Choose the transfer object you want to define as source from the toolbox "Transfer Objects" (e. g. "OPC UA/DA" if you want to read data from an OPC Server).
- 4. Place the source in the connection (main window) per drag and drop.
- 5. Open the transfer object with double-click.
- 6. Set the properties. The properties of the transfer objects are explained in the next chapters.
 - 1. Selection of the OPC connection.
 - 2. Alternatively: Enter data points' name or open the tag browser.
 - 3. Transfer data points to the transfer object by double-clicking.
- 7. Confirm with "OK".



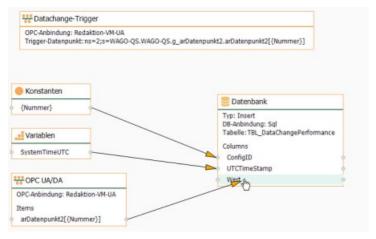
- 8. Project a destination, e. g. a database transfer object.
 - 1. Choose the DB transfer object from toolbox "Transfer Objects".
 - 2. Place it within projection area.

- 3. Open transfer object with double-click.
- 4. Choose a set of DB access data.
- 5. Choose a type for this transfer object. If database servers as destination, that would be either INSERT or UPDATE. Choose INSERT in this case.
- 6. Choose the table you want to write to.
- 7. Choose the columns you want to write to. Sort with "Up" and "Down" to keep the overview in the configuration.
- 8. Confirm with "OK".



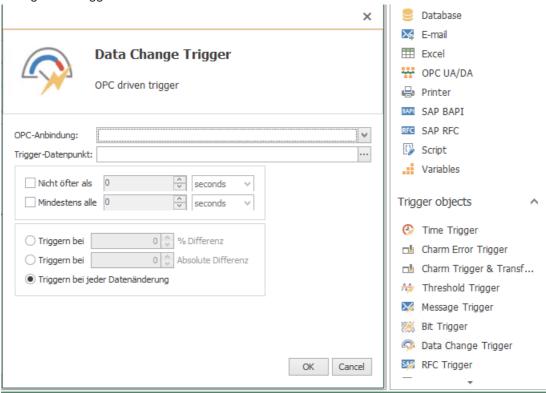
Tip: Copy/Paste is possible in the projection of the transfer objects.

1. Drag connections arrows between transfer object items of the source and of the destination. Click onto the source's item, hold mouse button down, drag over destination item. Drop by releasing mouse button. Finished! You can delete a connection arrow by right-clicking the arrow and clicking "Delete". At this point you also have the possibility to delete several connection arrows at once. To do this, go to the entry "Delete several" and select an option.



2. Configure a trigger:

- 1. Choose a trigger from the toolbox.
- 2. Place it within projection area.
- 3. Open with double-click.
- 4. Configure the trigger.



■ NOTE

Tip: Press "Shift" to drag all columns from a transfer object to a single column of the other transfer object.

Working with templates

Many congenial connections are at best be projected with the template function. A typical example is the collection of dial count in a database, wich e. g. only differ by OPC item and the ID of the collection of data. With templates you work as follows:

1. You create a template using the snap-in "Templates", in which you configure all immutable parts of the connection. At the adjustable parts define template variables. That can be OPC items, names or columns of tables, names of access data, constants or just parts of these names. The examples in the following parts illustrate your possibilities.

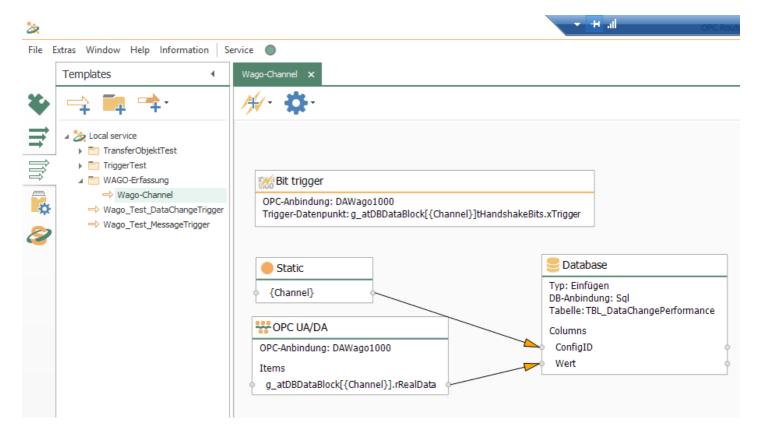
□ NOTE

Note: To avoid errors in the configuration, the template variables are type-safe. A combination of multiple template variables or template variables with characters (e.g. g_atDBDataBlock[{Variable})] is only in type "string" possible.

- 1. From this template you create connections by going to the snap-in "Connections" and selecting the button "Create instance".
 - Either you create a single instance after another. You only fill in the value of the template variables and you are done.
 - Or you have a list of template variables and their values created in a CSV data. In that case you only have to import the CSV data. The OPC Router 4 offers a simple table editor to create the list without external program.
- 2. Make instances productive.

Create Templates

The following example assumes that OPC Server and data base are correctly connected. In this example the tags within the OPC Server are projected custom-fit, so that only one template variable is necessary, to collect the data.



- In the snap-in "Templates", select the "New template" button or right-click on an existing entry and select there "New template".
- Name it, e. g. like here "Wago Channel".
- Define the connection properties for the template. The Properties will be applied for all instances.
- Project the connection. In this example we want to collect data from a Wago controller The OPC Server is projected to name
 the items (tags) identically and to put them into different access paths. This path is to be created as template variable. So
 you have to place an OPC transfer object in the template and open it via double click. It opens a window for editing template
 variables at the same time.
- Create a template variable Channel. To do that, click "Add" in the template variable dialouge and state Name ("Channel") and Type ("Integer").
- Fill in the properties. First insert the template variable via drag & drop. It is integrated into the transfer object with the correct syntax. Then add the static string.

OPC Access Data	<name access="" configuration="" data="" from="" of="" plug-in="" the=""></name>
OPC-Items	g_atDBDataBlock[{Channel}].rRealData

- Close the OPC transfer object.
- Project a data base transfer object for recording. At this point a table TBL_Values is to be used for collecting. The test series
 is defined by the field ConfigID, the time stamp is given from the data base.

DB-Access Data	<name access="" configuration="" data="" from="" of="" plug-in="" the=""></name>

Туре	Insert
Table	TBL_DataChangePerformance
Used Columns	ConfigID, Value

- Project a constant value with the value Channel. The constant must be of type Auto, so that at runtime the string can be
 converted to an integer (the ConfigID column is expected to do so).
- Connect the constant value to the ConfigID and the item with the value.
- Project a Bit Trigger, to start the transfer. Activate either reset bit or insert a response bit, depending on the PLC program.

OPC-Item	g_atDBDataBlock[{Channel}].tHandshakeBits.xTrigger

With this the template is ready. You can sort templates to groups just like normal connections.

Handling template variables in objects

Template variables can be added

- via the "Add" button in the object dialogs.
- via the buttons with the blue plus sign next to the individual fields. This creates and enters a new variable of the correct type.

The button with the red minus sign removes the template variables from the fields.

Existing template variables are drag & drop into the corresponding field.

Template variables with OPC-UA

Please note for the projection:

- If the OPC data access is a template variable itself, the router can't recognize the specification. It only states the property
 ltem. If you create a connection from the template and the OPC data access is a OPC-UA data access, the Node ID must be
 stated under Item.
- Are the data accesses from OPC-Triggers (Bit, Datachange, Message, Grenzwert) template variables, the Node ID has to be stated as well, while creating a connection from the template.

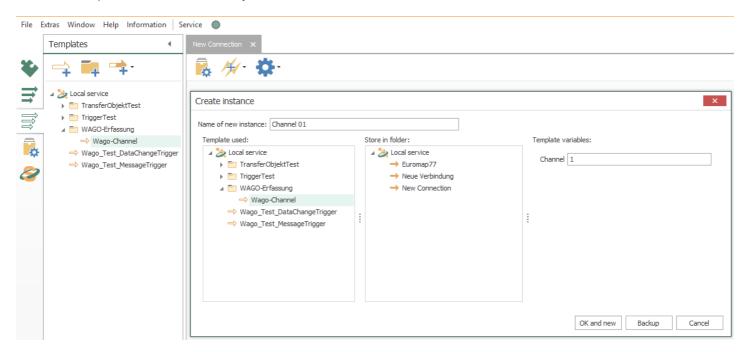
Create templates from connections

You can generate a template from a connection:

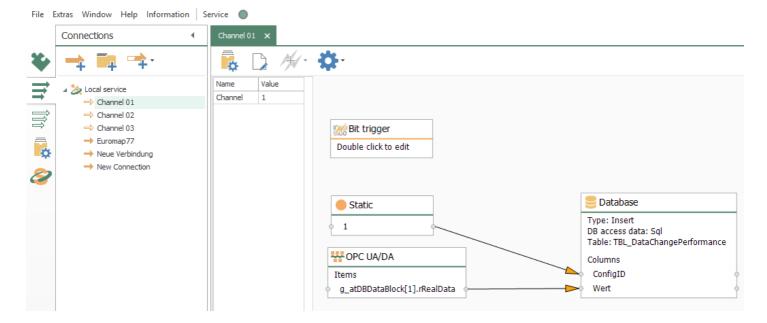
- 1. In the snap-in pane, select a connection.
- 2. Right-click to select "Create template from connection".
- 3. Give the new template a unique name and confirm with "OK".
- 4. If you activate the "Open template directly" checkbox at the bottom of the window, the template will be opened after it has been created.

Creating Instances

To use the template for the data transfer, you have to create instances, thus actual connections.



- 1. Select in the snap-in-menu "Templates" and choose "Create Instance".
- 2. Name the template, e. g. "Aquisition_Ch1"
- 3. Select the desired template.
- 4. Select the desired storage location.
- 5. Within the connection you can't change anything, you just have to state the value for the variables. In this case everything is done by entering "1". So just put in the "1" and close the connection.
- 6. Create a connection for channel 2, 3, 4, 5 ... the same way.
- 7. Make the instances productive.



The instances have been created, the data points are named correctly. The "Edit" button allows you to subsequently change the values of the template variables. You can also override some connection settings.

□ WARNING

Attention: For template variables with relative time specifications (eg intervals in the time trigger), the time unit must also be written (ms, s, m, h, d, month, year).

□ NOTE

Note: If you change the template later, the instances will be adjusted.

If a template has been selected and you select "New instance" the name "New instance" is preset and variables and template displayed.

Creating Instances from Data

If you want to create many links from a template, you can

- import a prepared Excel or CSV file
- · or create a corresponding table in the OPC router itself

Please note, that the names of the template variables have to be the same in CSV data and router template, and that in CSV data columns are seperated with a semicolon ";". The CSV data is structured as follows:

InstanceName	Variable1	Variable2	
Connection Group.Connection Name1	Value	Value	Value
Connection Name2	Value	Value	Value
Connection Group.Sub Group1.Connection Name3	Value	Value	Value
	Value	Value	Value

There are the following time-offsets:

- 1ms for milliseconds
- 1s for seconds
- 1m for minutes
- 1h for hours
- 1d for days

There must be no space between the number and the unit.

Stating a Connection Group is optional. You can spread the connections like this to several groups and sub groups.

- 1. In the "Templates" or "Connections" snap-in, select the "Create Instance" drop-down button and then "Create Multiple Instances".
- 2. Select the template to use
- 3. Select the destination folder.
- 4. Enter the values or open your CSV file.
- 5. Determine whether existing connections will be retained or over-written.
- 6. Select the "Create instance" button.
- 7. Make the new instances productive.

□ NOTE

Note: If you change the template later, all instances will be adjusted.

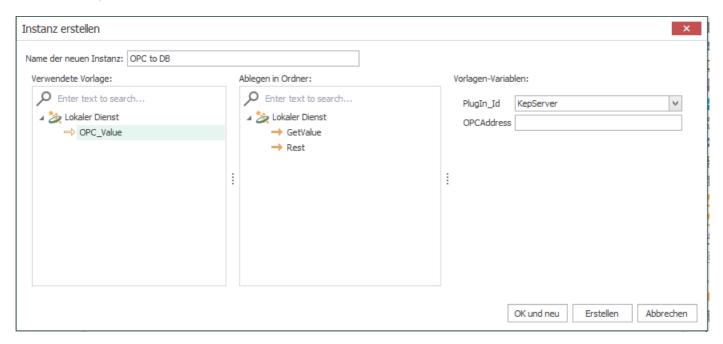
Creating dynamic instances

WARNING

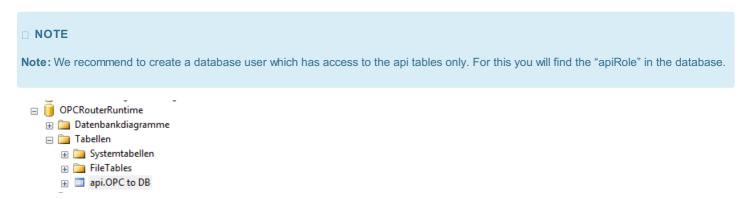
Attention: Dynamic instances are tables which are created in external MS SQL tables.

If you want to generate dynamic connections please select the "Connections" snap-in and use the option "create instance" point "create dynamic instance"

If you selected like described, you will see a dialog and you can, like you know from normal instances, select a name and default values for the dynamic instance.



If you entered everything you need, confirmed with "Create" and published the dynamic instance you will get a new table in the database. These tables will use the "api" schema. The table is named like the instance you created. Please do not change this name!



Within these tables you will find a database field for every variable of your instance. Additional you will find the fields [ID], [OpcR_Changed] and [InstanceName]. To create a new connection you need to insert a new row to this table and fill out the variables and the [InstanceName] field. If you didn't entered a value for a variable, the default value will be selected automatically.

	ld	OpcR_Changed	InstanceName	Plugln_ld	OPCAddress
	1	2019-03-20 14:0	Dynamisch 1	2089	ns=2;s=Production.Line1.Temperature
	2	2019-03-20 14:0	Dynamisch 2	2089	ns=2;s=Production.Line1.Preassure
Þ-W	NULL	NULL	NULL	NULL	NULL

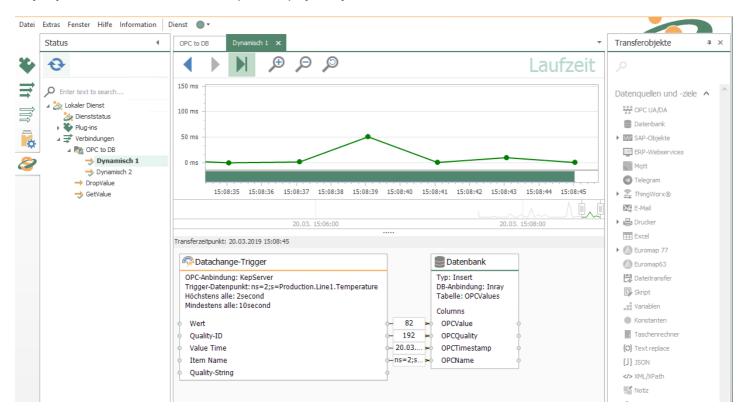
Note: As you can see in the picture, some connections need a Plugln_ld. You will find the IDs of your plugins by using the view "api.View PluglnInstances" of the "OPCRouterRuntime" database.

The columns [ID] and [OpcR_Changed] are filled out by the OPC Router, the value of [InstanceName] needs to be unique and is the name of your connection. You can use backslashes within the instance name to create folders for the runtime.

□ WARNING

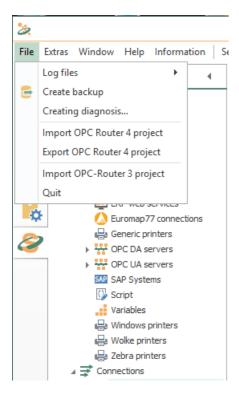
Attention: The created connections are active immediatley and don't need to get publishes again!

Maybe you need to refresh the State snapin to display the dynamic instances.



Export OPC Router 4 project

You open the "Export OPC Router 4 project" function in the menu bar under "File".

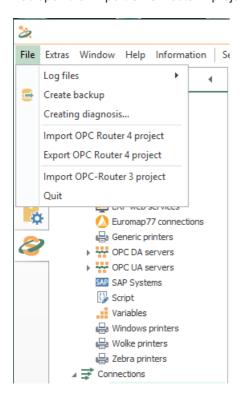


Select a file to export to and select all the connections and connections you want to export. If you select templates and connections, the corresponding structures are automatically selected as well.

Confirm your selection with "OK".

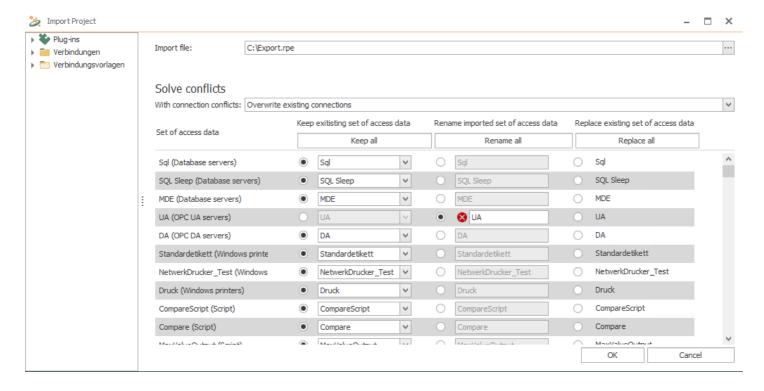
Import OPC Router 4 project

You open the "Import OPC Router 4 project" function in the menu bar under "File".



Select a file to import and resolve the conflicts of the bindings in the opening mask. Only connections in the conflict list are displayed, connections are automatically renamed and a consecutive number is added. In order to solve conflicts, you have the opportunity to eliminate all conflicts together in the mask that opens. Depending on which button you select, the appropriate selection is made for all conflicts. Of course you can continue to make individual decisions for individual connections, the respective button then "overwrites" each time previously selected option:

- Select "Keep all" if you want to use the application you are currently using.
- Choose "Rename all" if you want to keep your existing connection and want to receive the imported connection in parallel. Select a name for it until the red circle with the cross disappears.
- Choose "Replace all" if your existing connection is to be replaced by the imported connection.



Confirm your selection with "OK".

If connections cannot be carried out sensibly during the import, you get a message "Update import project" with the message "You can import this project if you apply following changes". If you accept the offered changes, confirm with the "Import with changes" button.

How can I ...

Overview of this chapter:

read_current_value.md

read_new_current_value.md

read_not_transferred_values.md

... read out a current data set?

To read out a current data set from a data base table, sort the table descending from the time stamp field ans transfer just one data set. The data base has to be polled in the necessary range with a time trigger. In this model the current data set is submitted with every call, read more in the Next Chapter.

Of course you can set up optional strain criterions, e. g. B. if the table has several lists of measurement readings.

Model 1: Time Stamp Sorting without Filter

Required fields/columns:

<time stamp=""></time>	Time stamp from type date/time, from which is sorted
<values></values>	Column(s) with relevant values

Project a data base transfer object with the following properties:

Data base access data	<your access="" base="" configuration="" data="" from="" in="" plug="" the=""></your>
Туре	Select

Tab: General

Table	<table data="" includes="" which="" your=""></table>
Available Columns/Used Columns	<all value-columns=""></all>

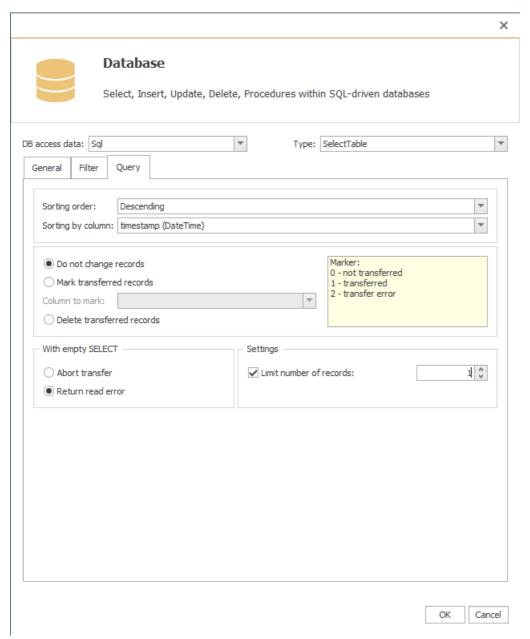
Tab: Filter (Query, Update, Delete)

Filter	No more filters in this model

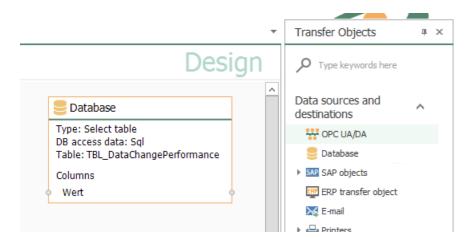
Tab: Query

Sorting order	Descending (new value on top)
Sorting by column	<time stamp-column=""></time>
Do not change records	Activate if the records are not to be changed
Mark transferred records	Activate if transferred datasets are to be used. In the column for marking the corresponding data records can be selected
Delete transferred records	Activate if transferred records should be deleted.

Abort transfer	on demand
Return read error	on demand
Limit number of records	1 (just the first data set = the latest shall be transferred)



Your transfer object looks in the connection! like shown in the next image. In the example the column value was used as the value column. It can be used now as data source. The sorting can't be seen in the connection projecting:



Project another time trigger with the necessary range, e. g. 10 seconbds. Then every ten seconds the latest data set from the table is transferred, no matter if it was allready transferred before.

Model 2: Time Stamp Sorting with another filter

In this model the table has several test series, which are each defined with a ConfigID. There has to be projected another filter.

Required fields/columns:

<time stamp=""></time>	Time stamp from type date/time, from which is sorted
ConfigID	ID of the test series
<values></values>	Column(s) with relevant values

Project a data base transfer object with the following properties:

Data base access data	<your access="" base="" configuration;<="" data="" from="" in="" plug="" td="" the=""></your>
Туре	Select

Tab: General

Table	<table, contains="" data;<="" td="" which="" your=""></table,>
Available Columns/Used Columns	<all value-columns=""></all>

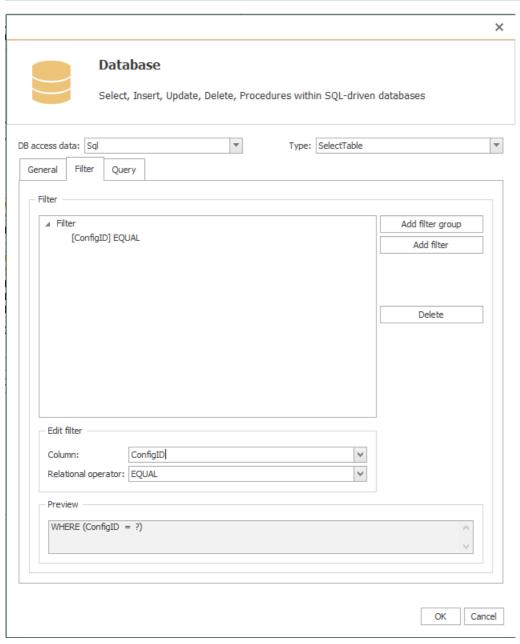
Tab: Filter

Filter	"Add Filter" creates a new filter.
Filter/Filter group bearbeiten	Column: ConfigID Relational Operator: EQUAL

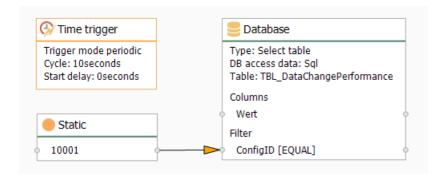
Preview	Here should be stated: WHERE (ConfigID = ?)

Tab: Query

Sorting by Columns	<time column="" stamp=""></time>
Order of Sorting	Descending (new value on top)
Reducing the number of data sets to	1 (just the first data set = the latest shall be transferred)
Error with empty select	on demand
Cancel transfer with empty select	on demand



Your transfer object looks like the one in the image. Remeber to fill in a value on the filter, e. g. with a constant object. The data base transfer object with the filter needs a two step transfer. The first step (blue arrow) defines the filter, the second (green) reads out the value. Because the data destination is variable, it's not mentioned any further here.



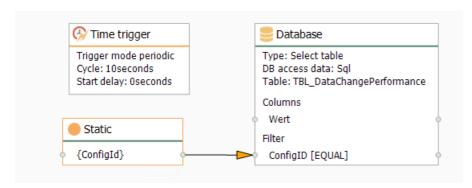
Project another time trigger with the necessary range, e. g. 10 seconds. Then every ten seconds the latest data set from the table will be transferred, no matter if it allready was transferred before or not.

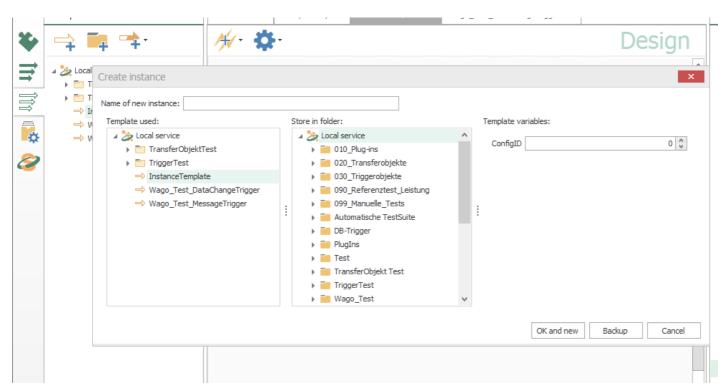
Model 3: Time Stamp Sorting with anonther filter from a Template

Model 2 can be used as a projection over a connection template.

- 1. Don't project a connection, but a connection template with the same settings for the data base transfer object, as you did in model 2.
- 2. In the constant object you don't fill in the value, but a template variable [\$ConfigID\$].
- 3. Project a time trigger, as you did in model 2.
- 4. Create an instance from the template and fill in the value for the ConfigID.

This way you create quite simply connections for all existing test series (=ConfigIDs): One instance per ConfigID. Image above: Template; Image below Instance.





... Reading Out a New, Current Data Set?

In the preceding example the current data set from the table or the filtered result was transfered cyclicly. The following shows, how the current data set is transfered just when it's new, thus when it hasn't been transfered before. For this you need a second column beside the time stamp column, in which a succeeded data transfer is recorded. This example includes an additional filter (ConfigID used as ID of the test series) and a filter on the column Transfer, to filter just data sets which hasn't been transfered before. Just as the example before this connection could be realised alternatively as a template/instance. Shown here is just the simple model.

Required fields/columns:

<time stamp=""></time>	Time stamp from type date/ time, from which is sorted
<transfer></transfer>	Column, in which a successfull transfer is shown (type: int, standard value: 0)
ConfigID	ID of the test series
<value></value>	Column(s) with the values of interest

Project a data base transfer object with the following properties:

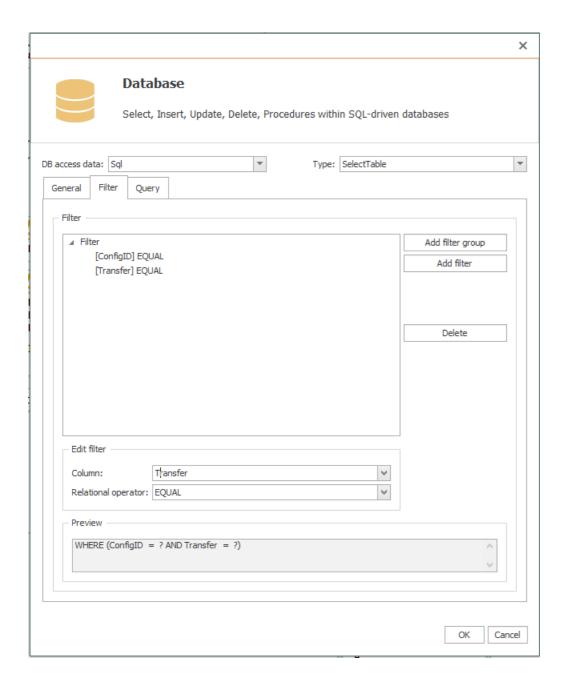
Data Base Access Data	<your access="" base="" configuration="" data="" from="" in="" plug="" the=""></your>
Туре	Select

Tab: General

Table	<table, data="" includes="" which="" your=""></table,>
Available Columns/ Used Columns	<all columns="" value=""></all>

Tab: Filter

Filter	"Add Filter" creates a new filter. You need 2 filters. The connections AND is standard.
Edit Filter/ Filter Group	Column: ConfigID Compare Operator: EQUAL Column: Transfer Compare Operator: EQUAL
Preview	Here should be given out now: WHERE (ConfigID = ? AND Transfer = ?)



Tab: Query

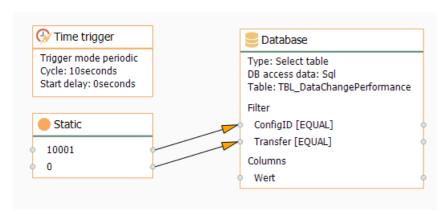
Sorting by Columns	<time column="" stamp=""></time>
Sorting Order	Descending (latest value on top)
Reduce number of data sets to	1 (just the first data set = just the latest is to be transfered)
Error With Empty Select	deactivated. If no new, current data set is available, that shouldn't be counted as an error.
Cancel Transfer with Empty Select	activated. Nothing is transfered, if no new, current data set is available.

This transfer object thus filters the data from the ConfigID to enter and the transfer code. For the transfer code you have to enter "0". Create a constant object with:

Required constants

<configid></configid>	ID of the test series
0	for not transfered data sets

Connect the ConfigID value to the filter detail ConfigID and the 0 to the filter detail Transfer:



Project a time trigger, which polls the data base cyclic.

After transferring the OPC Router gives out "1" the column Transfer, with transfer error "2". In this projecting only the new, current data set is transfered with Transfer = 0.

□ NOTE

Note: If the data comes into the data table faster, than the time trigger polls, it can happen, that the transfered data set is not current any more, because data sets are left out. Scale the needed precision and the needed ressources from the data base server. For data base server using a notification service you can use a script trigger, which starts the transfer as soon as the information comes from the data base server. But there would be another lag because of the cycle time of the OPC Router (max. 50 ms in the standard setting). If you want to have every data set available, you should read out all data sets, which havn't been transfered.

... Read Out All Data Sets, Which Haven't Been Transferred?

To read out all data sets which havn't been transferred from a table, you need a column, in which the OPC Router can mark a successfull transfer. You start a request with a filter on this transfer column.

Required fields/columns:

<transfer></transfer>	Column, in which a successfull transfer is shown (Type: int, standard value: 0)
<values></values>	Column(s) with values of interest

Project a data base transfer object with the following properties:

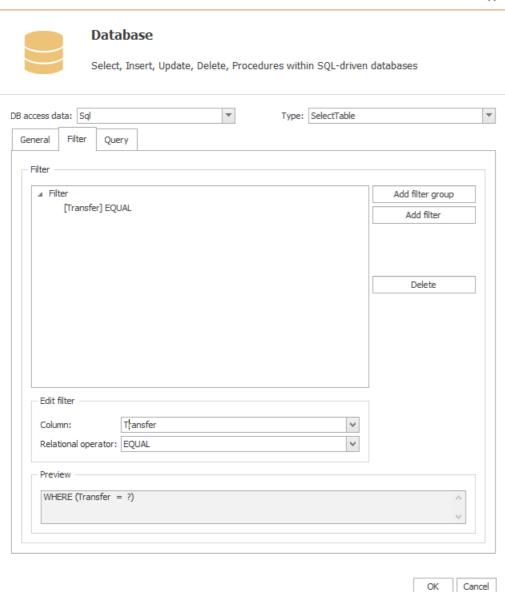
Data Base Access Data	<your access="" base="" configuration="" data="" from="" in="" plug="" the=""></your>
Туре	Select

Tab: General

Table	<table, data="" includes="" which="" your=""></table,>
Available Columns/ Used Columns	<all columns="" value=""></all>

Tab: Filter

Filter	"Add Filter" creates a new filter.
Edit Filter/ Filter Group	Column: <transfer> Compare Operator: EQUAL</transfer>
Preview	Here should be stated now: WHERE (Transfer = ?)



Tab: Query

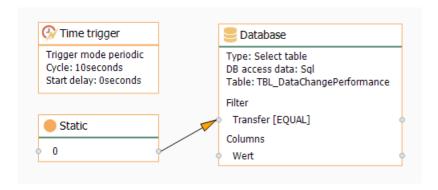
Sorting by Columns	as needed
Order of Sorting	as needed
Reducing the number of data sets to	deactivated. All data sets with <transfer> = 0 shall be transfered.</transfer>
Error with empty select	deactivated. If no new, current data set is available, it should be no mistake.
Cancel transfer with empty select	activated. Nothing is transfered, if no new data set is available.

This transfer object filters the data by the transfer code. For the transfer code you have to enter "0". Create a constant object with:

Required constants

0	for data sets which havn't been transfered

Connect the 0 to the filter element Transfer:



Project a time trigger, which pollst the data base cyclicly.

After the transfer the OPC Router writes "1" the column Transfer, with transfer errors "2". With this projecting the new data sets with Transfer = 0 are transfered. Of course you can project more filters, as e. g. the ID of the test series from the previous example.

Best Practice

At the most places the projection with OPC router is intuitive.	But there are some things t	that you should be aware.	This will help
prevent against data loss and helps to enhance the system's	performance		

Project development

Do not use more than five transfer steps for a connection

Troubleshooting and further development more easily if the transfers remain clear. In the case of necessary repetitions, you also avoid performance degradation. (e. g. erroneous transfers). With "transfer step", the number of arrows is not meant: To a single step may well include many individual transfers. "Transfer step" defines the timing of transfers, which you will see by sweeping the arrow with the mouse.

Connection templates avoid labor

If you know by planning a project already that you require many (more than 10) similar connections, which differ e. g. only by an ID and some data point addresses, you should deal with the concept of connection templates. Place the connection template with variables in the snap-in "templates" and you can create similar compounds with button "Create instance".

OPC transfers

Datachange and threshold trigger for analog values.

Datachange and threshold trigger you have to use if you want to transfer a single analog value. Trigger item and transfer item are identically. The transfer begins immediately after the occurrence of the trigger condition. If the transfer object includes one more to transmitted items, it can happen values will be transfer where the contents do not belong together.

Bit and message trigger for OPC telegrams

Bit and message trigger you have to use for OPC telegrams, if you want to read a number of related items. The OPC router wait here another read cycle before the items will be read in OPC transfer object to make sure that the PLC can write the values. From PLC side the trigger should be written on the end anyway.

To record values of message trigger

Draw the value of the message trigger on. So you can track, if any records were not transferred or twice. PLC side is to be increased, the data point for the message trigger for new data by the value 1.

Bit trigger always with reply bit

Use the bit trigger always with reply bit. If the data point at the PLC within a read cycle changes twice, the OPC router does not realize it. The PLC must react to the missing of response from the router. Standard practice: A bit can only be written by one side, that means the PLC sets the trigger data point back after receiving the response. The OPC router sets the response data point back even after a defined period of time.

Databases

Select always with filter

Use SQL Select only with filters (WHERE clause) to avoid loading the entire table into memory. In conjunction with transfer marks, you filter e.g. after << 1

Mark transferred records

Mark transferred records. In your tables, keep columns in which the OPC router can mark transferred data records ("Transfer flag" not transferred, transferred, transfer error). The transfer flag columns should be set to the default value of 0 and should not be allowed to assume NULL, so that a correct assignment to the three statuses is always guaranteed.

Index transfer flag

To improve performance, the transferflag column should be indexed as follows:

• If the OPC router is to filter for transferflag = 0:

```
CREATE NONCLUSTERED INDEX [IX_TransferTable_Transferflag] ON [dbo].[TransferTable]
(
[Transferflag] ASC
)
WHERE ([Transferflag]=(0))
GO
```

• If the OPC router is to filter for transfer flag <> 1:

```
CREATE NONCLUSTERED INDEX [IX_TransferTable_Transferflag] ON [dbo].[TransferTable]
(
[Transferflag] ASC
)
WHERE ([Transferflag]<>(1))
GO
```

Sort select results

Sort the table in ascending order after the transfer flag. So first the untransferred records are transferred; erroneous individual transfers are only attempted again at the end of the transfer. For performance optimization you can filter for the transfer flag column (transfer flag = 0 or = 2). A correspondingly filtered index can be created in the database for this purpose.

Database design

Database tables should be meaningfully indexed:

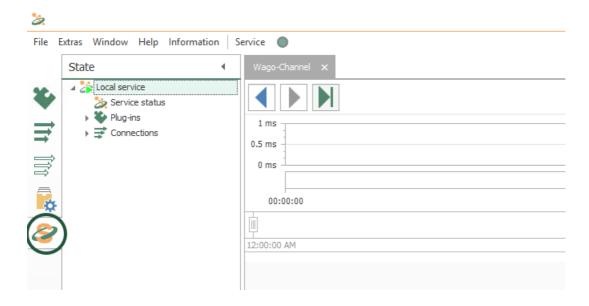
- Columns within which you search frequently should be indexed.
- When indexed columns of existing records are updated frequently, the index gradually becomes fragmented and needs to be rebuilt on a regular basis. Otherwise, performance losses would be the result.

Further information, including the use of diagnostic scripts, can be found in the in-commissioning manual, which can be found on the installation source at Additionals/Doku.

Status Indication

In the snap-in bar is the button for the status area.

After clicking on the button and a connection the status window opens:

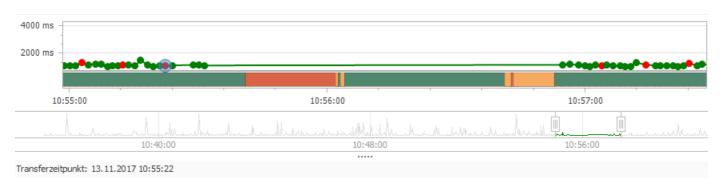


■ NOTE

Note: Folders that are empty or contain only deactivated connections are shown crossed out.

The Status Window

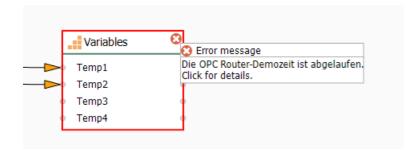
The status chart provides detailed information about the individual data transfers. The status chart can be started via the corresponding snap-in in the left margin.



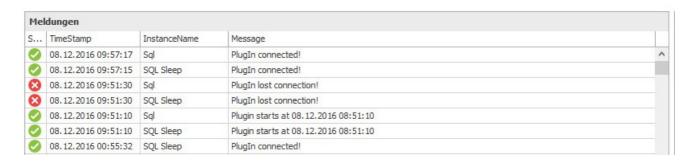
- · You can limit the period to be displayed by moving the sliders under the status chart accordingly.
- Green transfer points represent the individual transfers that were in order and the transfer values are stored in the short storage. The lead time is defined in the settings. If you click on a transfer point where the lead time has expired, the message "Transfer values can not be displayed because the lead time of the values has expired". The red transfer points, however, indicate erroneous transfers and are kept permanently in the Long Storage.
- If you click on a transfer point, it will be shown in light blue and the data will be displayed under the status chart. With the arrow
 keys you can jump back and forth between the transfer points after marking a point.
- If you move the mouse to a transfer point, the execution time is displayed.
- Above the status chart, you will find the buttons "Previous Transfer" and "Next Transfer" to display the transfer next to the previously selected transfer. With the button "Switch to live view", you can observe the progress of the individual transfers.
- Above the status type you will also find buttons for the zoom functions (zoom in, zoom out and Reset zoom). The zoom can
 also be changed with the mouse wheel.
- In the status view, you cannot double-click on the individual elements. This is also indicated by the cursor, which turns into a

forbidding sign when you move the mouse over an element in the status view.

- If strings or arrays are too long, the preview of the transferred value is shortened at the end the value is nevertheless transferred completely. The length can be adjusted in the settings under "Maximum number of characters in the status display". The default value is 1000 characters."
- Errors are indicated by the red marking in the status chart and if you move the mouse over the transfer object field under the status chart, you will get detailed information about the error:



- The status bar changes color when an error occurs, a warning appears, or the connection is broken. The status bar turns orange (checking the connection) when the connection is checked and shown in red if the connection is not present (error in the plug-in). If everything is OK, the status bar will turn green (Ready).
- · You can also view the messages of the plug-ins at Status snap-in.
- When you switch from status to plug-in snap-in, you automatically enter the edit mode of the open connection.
- In the status snap-in in the plug-in tree, select a connection and display the messages for it:



When the OPC router shuts down, all connections get the status "Shutdown" In the history, the status then appears in red.

In the status tree, you can start the transfer of a connection manually by right-clicking. It is not necessary for a trigger to be present in the connection. The manually started transfers are displayed in blue in the chart. In addition, it is recorded who started this transfer.

With a right mouse click you can make the pop-up menu Export view visible in the connection area of your status display. This menu allows you to export your connection as an image or copy it to the clipboard. On the screen, however, only the connection with the transferred values is displayed and not the status diagram. The images can be saved as Bitmap, PNG, JPEG or GIF.

Escalation levels for status recording

The OPC Router now detects when too many status data are recorded or the database memory is almost full. In order to prevent full RAM memory, the OPC Router automatically initiates ever-increasing countermeasures. The transmission of user data is NOT adjusted by these measures! The measures only affect the status records of the OPC router. The recording of the user data should be ensured. In the basic settings of the OPC router, you set how far the OPC router is allowed to fill the status databases.

The following escalation levels are available:

- Escalation level 0:
 - Normal behavior
- Escalation level 1:
 - Ring buffer exceeded batch size

- Status database filled to 60%
- o Action: No more transfer values of successful transfers log (only for spam connections)

• Escalation level 2:

- o Ring memory batch size exceeded by three times
- Status database filled to 80%
- o Action: No more transfer values from successful transfers

• Escalation level 3:

- o Ring buffer size exceeded by six times
- Status database filled to 90%
- o Action: No longer log transfer values

• Escalation level 4:

- o Ring memory batch size exceeded by ten times
- Status database filled to 100%
- o Action: Disable status recording of transfers completely

If the status recording has been disabled, there is a warning in the progress bar. If the recording has been completely deactivated at escalation level 4, the affected period will be shaded in gray.

Network configuration

It is common, that the systems connected by the OPC router are not installed on the same computer. This isn't a problem for the router. However vulnerable to errors is the correct Windows configuration of the computers involved. Start a distributed router project in any case together with your network administrator. Projecting and starting your system is by the way also a service of inray.

Basically we recommend to notice following:

- Deactivate the Windows firewalls of the computers involved. Especially, if OPC server and OPC router run on different
 computers using the firewall is not possible just like that, because of the dynamic port placing with DCOM. If deactivating the
 firewalls isn't an option at all, please contact inray.
- Ask your network administrator to allow the communication between the systems involved. Often there are special approvals
 needed, if the linked server are not within the same network as the OPC router. (e. g. sending email over an external mail
 server).
- · Create a user,
 - o who is logged in to your Windows domain
 - · who has administration rights on the computer with the OPC router
 - o under whom the OPC router service is started
 - who gains the DCOM approvals on the computer with the OPC server
 - who is also logged in over the Windows authentification as user on the MS SQL or Oracle.

User Account for Service

Changing the user account settings for a windows service.

If inray software should access other computers (e. g. with OPC servers or databases), the executing component, a Windows service as a rule, must log on this/these computer/s. It is recommended to create a Windows user within the Windows domain shared by all computers involved – especially if OPC is converned (DCOM, see below). This user should have administrative rights on the inray computer to use configuration environments as well.

- 1. Open services administration via "Control Panel Administrative Tools Services".
- 2. Open service to be configured by double-click (OPCRouterService, FAS-Service, inMOVE-Service)
- 3. On tab "Log on", choose option "This account".
- 4. Via "Browse", select a user (object name). Important: With "Locations", select your Windows domain, not the local computer.
- 5. When having selected the user, click "OK". You're back in configuration dialog. Set the password.
- 6. Confirm with "Apply". Windows tries to log on your domain.
- 7. If logging on fails, change the user from
 User>@<domain>\cuser> and retry. No error means "succeeded"
- 8. Confirm with "OK".
- 9. Restart service.



Distributed OPC Servers/DCOM

Requirements for a working DCOM c.

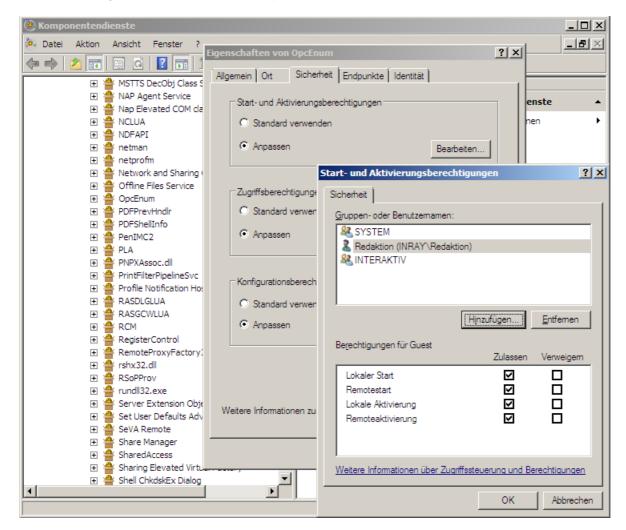
If inray software should access OPC servers that are not installed loacally (on the "inray" computer), a correct DCOM configuration on the computer with OPC servers ("OPC" computer) is necessary. Requirements:

- a user account (Windows user) within the domain shared by the two computers (NT authentication). inray services will run under this user account. Should, however, no domain user be available, each of the computers needs a local user with exactly the same account name and password.
- the Windows firewall on both computers has to be deactivated (dynamic ports under DCOM!). Should this be impossible, please contact inray.

DCOM Configuration

Short manual to configure DCOM.

Please note that this configuration has to be processed for objects both "OPCEnum" and each OPC server to connect. You need administrative rights on the OPC server's computer.



- 1. Open component service via "Start Run dcomcnfg".
- 2. Navigate to "Component Services Computers My Computer DCOM Config".
- 3. Open component "OPCEnum" (Right-click Properties).
- 4. Set the options as follows:

Tab: General

Authentication Level		Connect
Tab: Security		
Launch and Activation Permissions	Customize – "Edit": Add in dialog "Launch and Activation Permission at this point, s. above). All four permissions should be allowed.	on" your Domain-User (which should be added

Access Permissions	Customize – "Edit": Add in dialog "Access Permission" your Domain-User (which should be added at this point, s. above). Both permissions should be allowed.
Configuration Permissions	Customize – "Edit": Add in dialog "Configuration Permission" your Domain-User (which should be added at this point, s. above). Both permissions should be allowed.

- 1. Confirm with "OK".
- 2. Set options accordingly for each OPC server. You'll find KEPServerEx filed under "Kepware Communications Server".
- 3. Check whether DCOM is allowed on your computer by default: "Component Services Computer My Computer", "Right-click properties", Tab "Default Properties"
- 4. Close Component Services.

Distributed databases

Accessing non-local data bases with the OPC Router is not much of a challenge. Indeed administrating the rights on the data base servers is the part which could trouble you. Therefore call to your data base systems documentation.

Basically we recommend to notice following:

- Does the data base allow remote access? Does this have to be assigned to every single user?
- Does the log in procedure have to be defined (Windows-/NT-authentification or user/password)?
- Does the access to every single data base or table have to be assigned to the user?
- Do the needed functions have to be assigned explicit to the user?
- Is the needed port in the firewall open(we recommend to deactivate local firewalls)?
- Depending on the data base system the property Server/Data of the data base access data includes a different declaration (s. "Storage").

Distributed mail server

The mail server should normally not be installed locally. Basically accessing is not different as from any other e-mail program. This counts as well for mail server installed within the company network as for external ones e. g. installed server from the internet provider. The access data can be asked from your network administration.

Basically we recommend to notice following:

- The mail server must accept SMTP- or NT authentication as log in procedure.
- Does your network administrator have to explicit allow accessing an external mail server?