

echocollect



Version: E-140205-01

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2 About this document



Read this manual before starting

For damages due to improper connection, implementation or operation Softing refuses any liability according to our existing guarantee obligations.

The following conventions are used throughout Softing customer documentation:

Keys, buttons, menu items, commands and other elements involving user interaction are set in bold font and menu sequences are separated by an arrow

Open **Start** → **Control Panel** → **Programs**

Buttons from the user interface are enclosed in brackets and set to bold typeface

Press **[Start]** to start the application

Coding samples, file extracts and screen output is set in Courier font type

MaxDlsapAddressSupported=23

Filenames and directories are written in italic

Device description files are located in C:
*\StarterKit\delivery\software\Device
Description files*

3 Conventions used

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*\StarterKit\delivery\software\Device
Description files*

4 Install the configuration software

Insert the installation CD in your CD-drive. Follow the instructions and install the following software:

- **NetCon**: For the device configuration
- **atvise builder**: For creating visualization projects (optional).



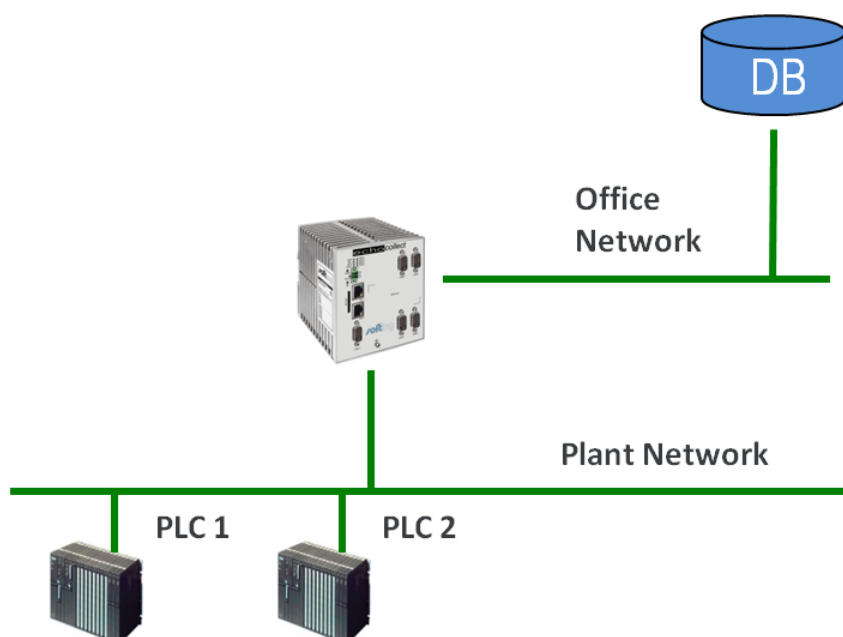
During the installation, the atvise builder setup tries to acquire the activation license online automatically. Make sure that you have direct internet connection during the installation. Otherwise, contact Softing support to receive the offline activation code.

5 Introduction echocollect

This tutorial describes the method of configuring echo in the standard data acquisition use case, i.e. the data is polled from the PLC by the echo and stored in the Database. This will be demonstrated in the following example: echo is connected with PLCs through the plant network and with a MySQL database (DB) through the office network. If a specific value in the S7-300 PLC is changed, echo will poll selected values from the PLC and write them into the database. Additionally, a logging functionality on a SD card (in the device) is described as well.

Moreover, some further functionality of the echo is explained as well.

The topology of the devices is as follows:



First, the echo must be connected in the networks and its network parameters need to be set-up. This step must be done only at the beginning and is common for all the next steps.

To configure a specific data acquisition in the echo (assuming it is already connected in the networks), only three steps are required:

1. Defining the source connection (**PLC1** in our example)
2. Defining the destination connection (**DB** in our example)
3. Selecting the data that shall be transmitted and the trigger

Additionally, this tutorial will guide you through another important functions of the device as well.

6 Configuration parameters overview

The following table summarizes the values for the network parameters and the placeholders used in the tutorial. Personalize the values to your own application.

6.1 IP settings

Let's assume two separated networks in this example:

- The Office Network (where the database is located): 192.168.2.0 / 24
- The Production Network (where the PLC is located): 192.168.1.0 / 24

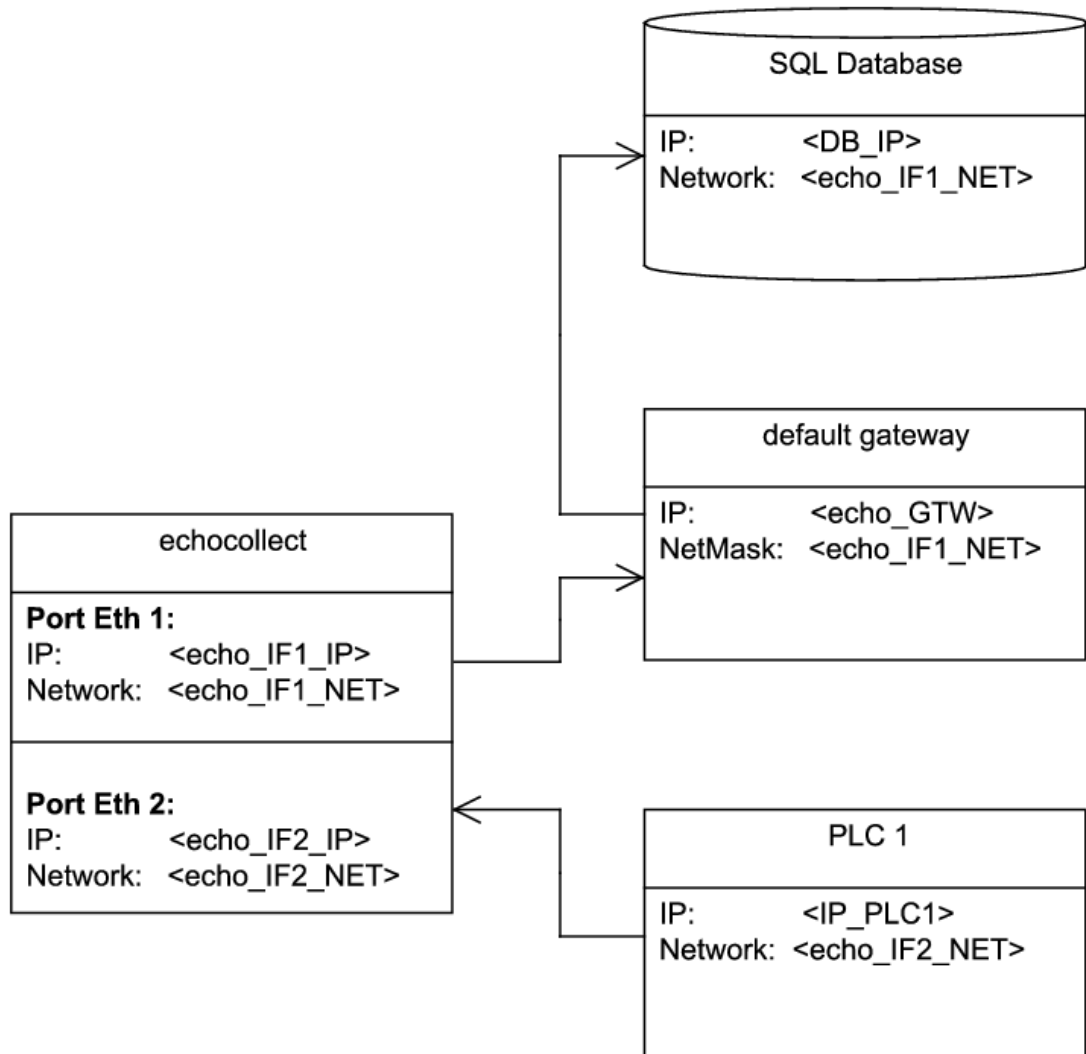
Settings	Placeholders	Exemplary values
Database IP	<DB_IP>	192.168.25.169
Database name (schema)	<DB_name>	echo_db
Database table name	<DB_table>	product_info
echo Eth 1 port IP	<echo_IF1_IP>	192.168.2.14
echo Eth 1 port network mask	<echo_IF1_NET>	255.255.255.0
echo Eth 2 port IP	<echo_IF2_IP>	192.168.1.15
echo Eth 2 port network mask	<echo_IF2_NET>	255.255.255.0
Default gateway	<echo_GTW>	192.168.2.126
DNS Server	<echo_DNS>	192.168.2.126
PLC 1 IP	<PLC1_IP>	192.168.1.241



We recommend printing out this table and referring to it when reading the following text.

6.2 Network Topology

Following a topology example. Values in angle brackets are placeholders:



7 MySQL Database

7.1 MySQL Browser

1. Connect to your <DB_name> database using MySQL Browser or a similar tool and log in.



You may need to contact your network administrator to get the settings and access rights for the database.

2. Open the existing table <DB_table> or create a new one.
3. Create the table columns (time_stamp, ID, Name, etc.).
4. For details refer to the following figure:

Query 3 product_info - Table

Table Name: Schema: **echo_db**

Collation: Engine:

Comments:

Column Name	Datatype	PK	NN	UQ	BIN	UN	ZF	AI	Default
time_stamp	VARCHAR(20)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
ID	VARCHAR(45)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Name	VARCHAR(45)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NULL
Length	VARCHAR(45)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NULL
Width	VARCHAR(45)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NULL
Pressure	FLOAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NULL
Temperature	FLOAT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NULL

Column Name: Data Type:

Collation: Default:

Comments:

☒ Primary Key ☒ Not Null ☐ Unique

☐ Binary ☐ Unsigned ☐ Zero Fill

☐ Auto Increment

Columns Indexes Foreign Keys Triggers Partitioning Options

7.2 Direct SQL Query

Alternatively, you can directly use the SQL query on the database, using code such as:

```
CREATE TABLE `echo_db`.`product_info` (  
  `time_stamp` VARCHAR(20) NOT NULL ,  
  `ID` VARCHAR(45) NOT NULL ,  
  `Name` VARCHAR(45) NULL ,  
  `Length` VARCHAR(45) NULL ,  
  `Width` VARCHAR(45) NULL ,  
  `Pressure` FLOAT NULL ,  
  `Temperature` FLOAT NULL ,  
  PRIMARY KEY (`time_stamp`) )  
COMMENT = 'test table for echo collect\n';
```

Now, your table is ready for data acquisition.

8 Connect to the device with NetCon

8.1 Start NetCon

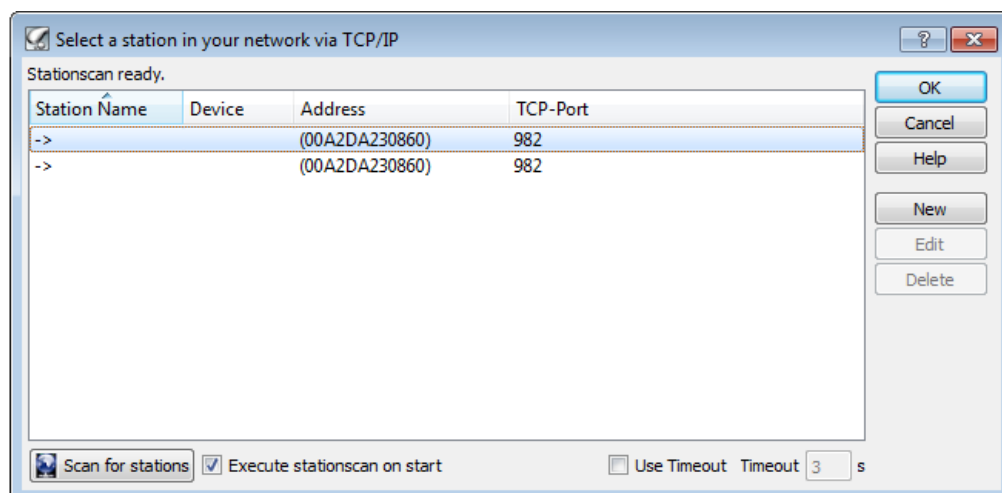
1. Start the configuration tool by opening the NetCon echo program.



2. Select your preferred language and click **[Configuration via TCP/IP]**.

8.2 Scan for stations

1. After starting the configuration tool, the following dialog is opened and displays the echo device(s). If the device scan has not been started automatically, click on **[Scan for stations]**.



2. When the station scan is finished, select your echo device and confirm with **[OK]**.
3. If your device is not detected automatically, possible causes might be:
 - Your device is disconnected (check the front LEDs)
 - Your device is connected behind a router
 - You use a firewall that blocks ports 997 or 982 (TCP+UDP)
 - If you use configuration over H1, make sure that you installed the protocol driver

8.3 IP address for device setting

1. Assign an IP address to the new device.
2. Open the **Station Parameters** window and enter the desired name of the device and the network parameters:

IP Address	<echo_IF1_IP>
Subnet Mask	<echo_IF1_NET>
DNS Addresses (optionally)	<echo_GTW>
Router Addresses (optionally)	<echo_DNS>

3. Alternatively, you have the possibility to use the DHCP service. It is also possible to set the access password for the device:

Station Parameters

Station Name: Eco_214

Password of the Station:

Password Confirm on Edit:

MAC (Ethernet) Address: 00 A2 DA 23 08 60

TCP/IP Station Parameter

☐ Use DHCP

IP Address: 192.168.2.14

Subnet Mask: 255.255.255.0

Domain Name:

Maximum three Domain Server Addresses

DNS Addresses: 192.168.2.126

Maximum three Router Addresses

Router Addresses: 192.168.2.126

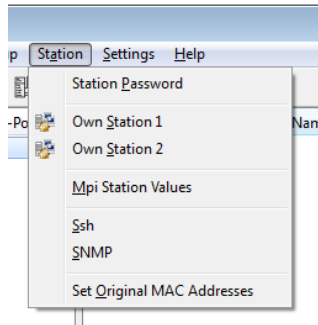
Buttons: OK, Cancel, Help

4. Confirm with **[OK]**. Now the device has the specified IP address.
5. If you then perform a new station scan, the device will appear in the station list under the selected name.

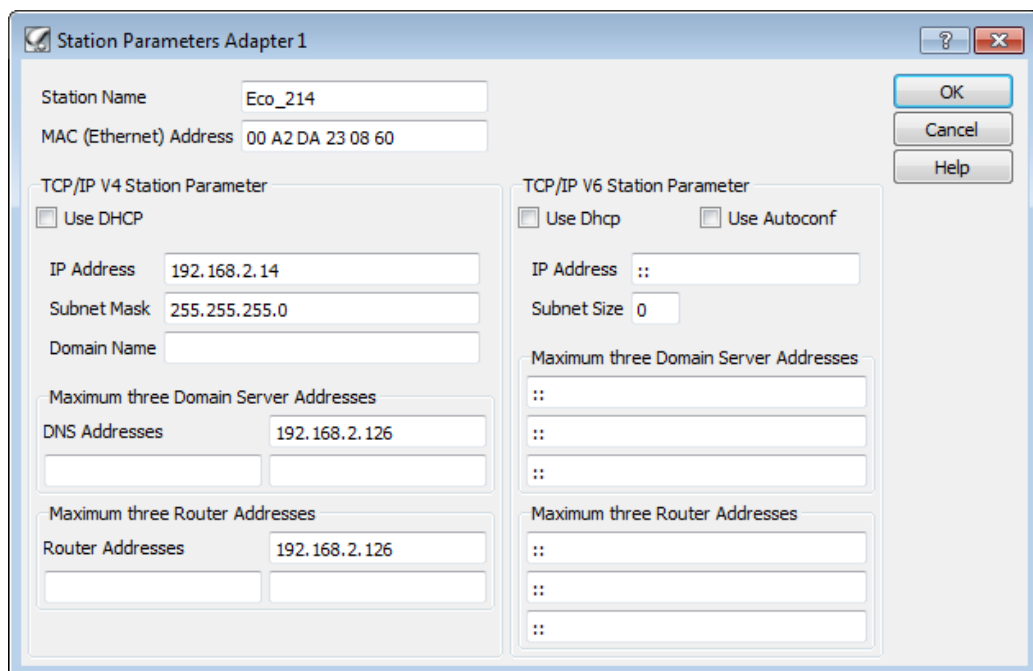
9 IP settings

echo has two independent network adapters in order to separate the office and manufacturing network.

1. In order to set the IP addresses of the first network interface (office network), open the main NetCon echo window.
2. Select **Station** → **Own Station 1**:



3. In the opened window you can specify the <echo_IF1_IP>, <echo_IF1_NET>, <echo_GTW> and <echo_DNS>:



4. For the second network interface (production network) select from the NetCon echo main menu **Station** → **Own Station 2**.
5. Configure <echo_IF2_IP> and <echo_IF2_NET> as follows:

Station Parameters Adapter 2

Station Name:

MAC (Ethernet) Address:

TCP/IP V4 Station Parameter

☒ Use DHCP

IP Address:

Subnet Mask:

Domain Name:

Maximum three Domain Server Addresses

DNS Addresses:

Maximum three Router Addresses

Router Addresses:

TCP/IP V6 Station Parameter

☐ Use Dhcp ☐ Use Autoconf

IP Address:

Subnet Size:

Maximum three Domain Server Addresses

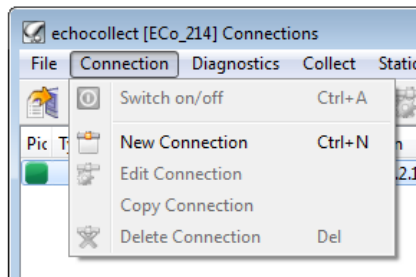
Maximum three Router Addresses

Buttons: ? X OK Cancel Help

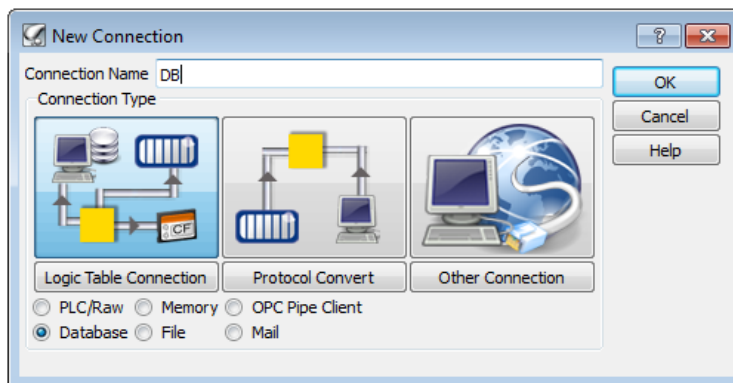
10 Add a database connection

10.1 New connection

1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **Connection** → **New Connection**:

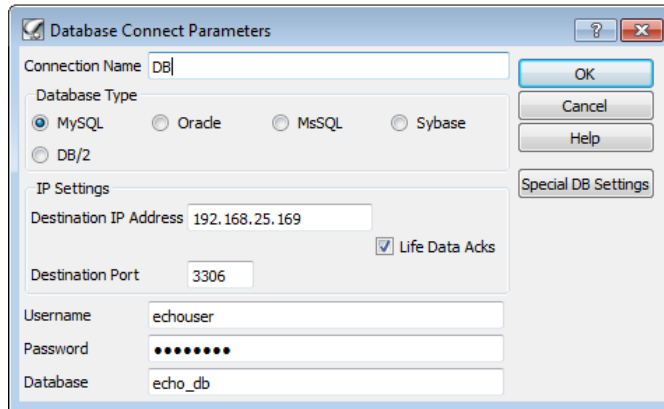


3. Enter the desired name of the connection and select **Logic Table Collection** → **Database**:



10.2 Database connect parameters

1. Now select the type of the database ("MySQL" in our example).
2. Type in the IP address of the host computer <DB_IP>, the database's username and password and the name of the database <DB_name>:

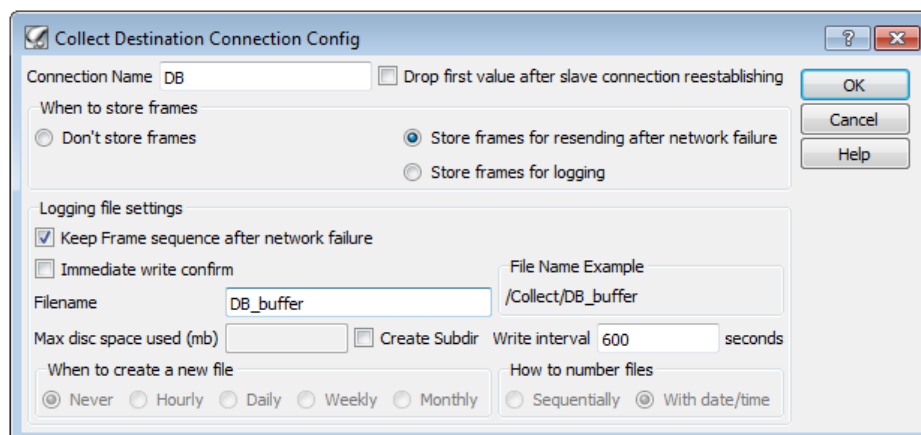


10.3 Collect destination connection configuration

1. In the following window, you can specify if you want to buffer the data in case the connection to the database is lost. If you want to use this feature, select **Store frames for resending after network failure**.
2. Activate the option **Keep frame sequence after network failure** if you want to keep the written entries in the database order according the timestamps.
3. Specify the desired file name for the buffer. The data is buffered in the echo RAM memory and stored on the SD card only at specific intervals.



Keep in mind that lower values will reduce the amount of data that the SD card can store due to frequent writing cycles.

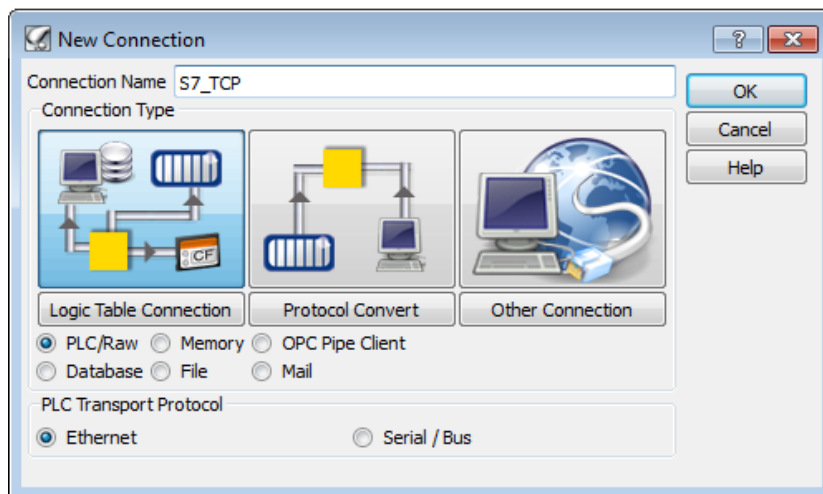


4. Complete with **[OK]**.

11 Add a PLC connection

11.1 New connection

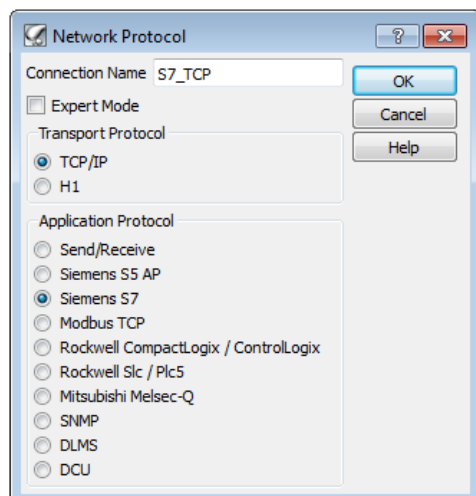
1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **Connection** → **New Connection**.
3. Enter the desired connection name and select **Logic Table Collection** → **PLC/Raw** → **Ethernet**



4. Confirm with [OK].

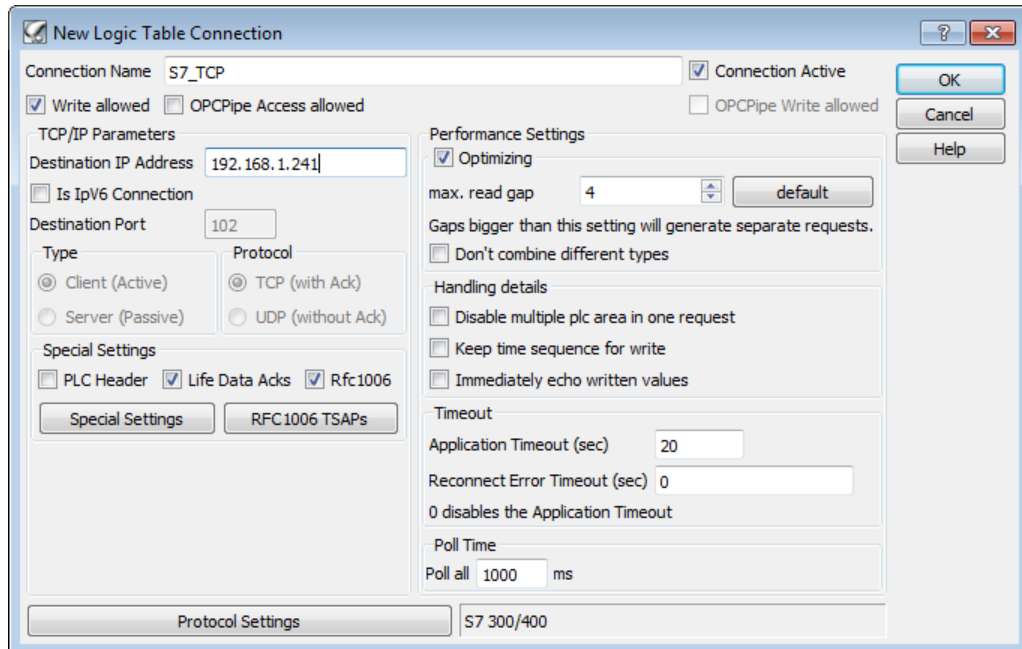
11.2 Network protocol

1. Select the network protocols for your PLC.
2. In the example select **TCP/IP** and **Siemens S7**:



11.3 New logic table connection

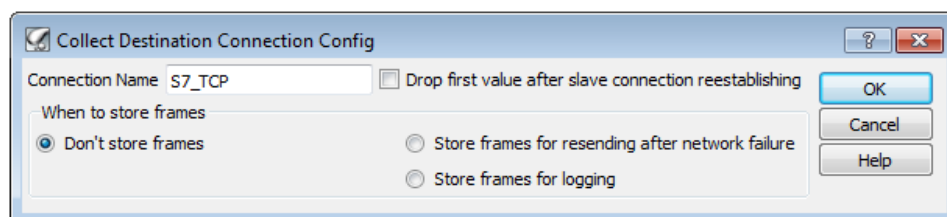
1. Use <PLC1_IP> as **Destination IP Address**.
2. If you are not sure about the advanced settings, use the default settings as shown below:



3. You can disable the write access in the PLC by deactivating **Write allowed**.
4. If you need to access the PLC over OPC DCOM Tunnel (OPCPipe), activate **OPCPipe Access allowed**.
5. The RFC1006 Setting is the default Siemens TCP/IP communication channel (port 102).
6. If you need to specify TSAP details, click on the **[RFC1006 TSAPs]** button.
7. The **Poll Time** specifies how often the echo communicates with the PLC.
8. Confirm the settings with **[OK]**.

11.4 Collect destination connection configuration

1. For communications between the PLC and the echo, frame buffering is not needed. Therefore activate **Don't store frames**:

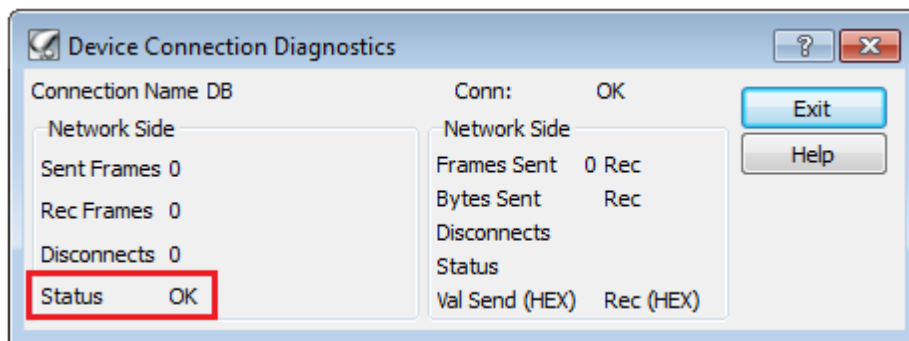


2. Confirm with **[OK]**.

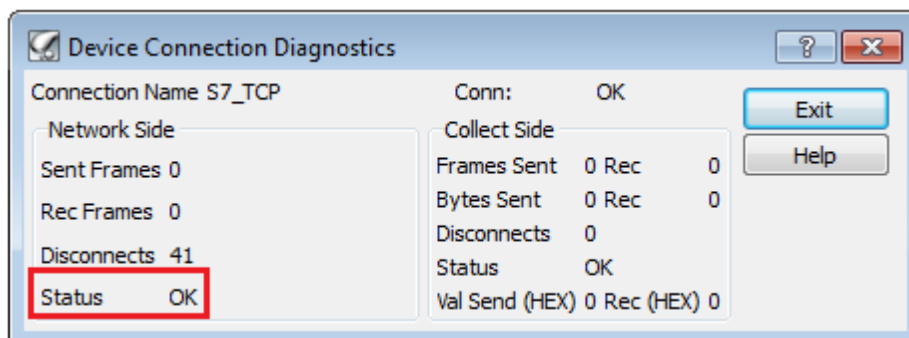
12 Connection diagnostics

After having configured the connections, you can verify the status of each connection.

1. To do so, open the main NetCon echo window in the connections list.
2. Select the desired connection with a left mouse click.
3. From the NetCon echo main menu select **Diagnostics** → **Show one Connection**
4. For the database connection, a window similar to the following appears:



5. For the PLC connection, a window similar to the following appears:



6. In both cases, the value for **Status** should display **OK**.
7. If the status is not ok, check the connection and the device configuration.



Possible causes for a connection problem might be

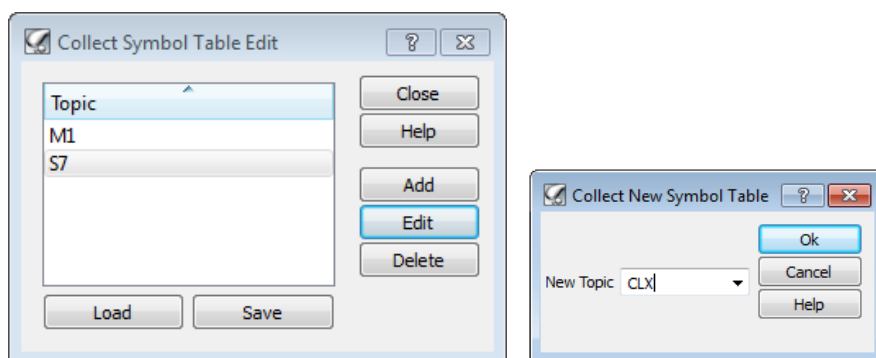
- wrong IP configuration
- wrong firewall or router setting
- wrong credentials, rights or settings for the database access
- other network connection issues

Consult your network administrator to solve these problems.

13 Define Collect Symbol Table

It is possible to define, import (for S7 controllers) or browse (for CLX controllers) symbolic names for the PLC items. This is done in the Collect Symbol table.

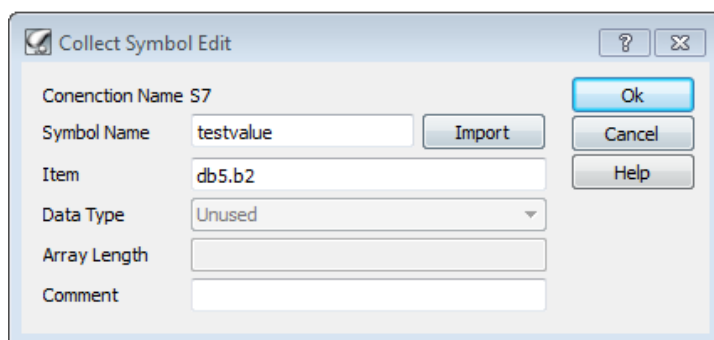
1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **Collect → Collect Symbol Table**.
3. When calling up for the first time, a window is opened where you can select the relevant connection.
4. If no connection is shown, click the **[Add]** button.



5. Select the PLC connection (**New Topic**) and complete with **[OK]**.

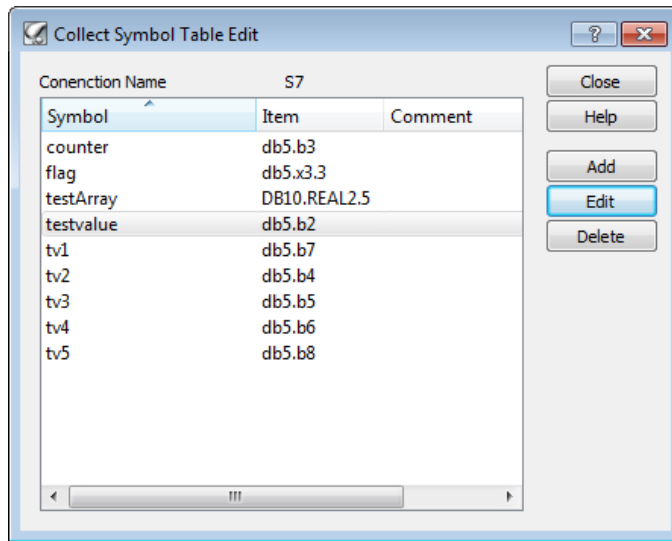
13.1 Add and edit symbols

1. When calling up for the first time, a window is opened automatically where you can add a new item.
2. If no window appears, click the **[Add]** or the **[Edit]** button.



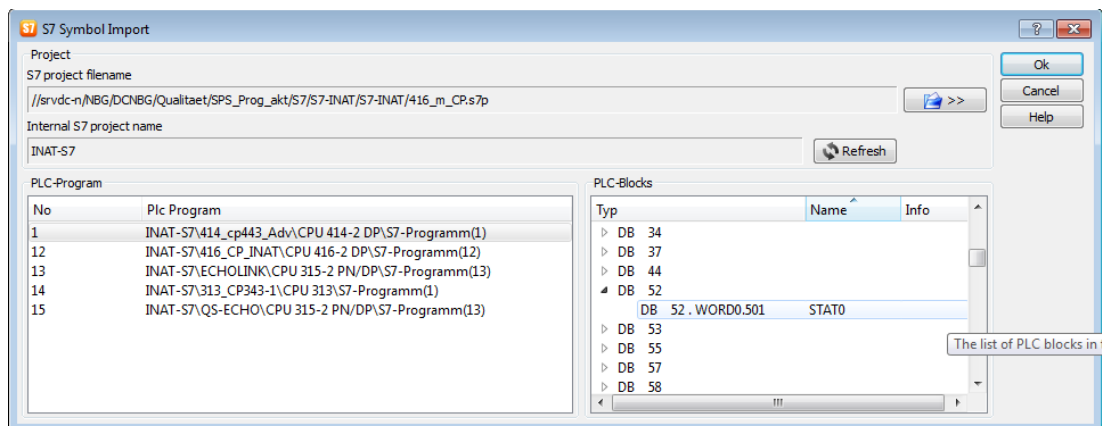
3. Here you can manually define the symbol name and the item, using the item syntax. Refer to the integrated help for the item syntax specification.
4. If you use Siemens S7 or Rockwell CLX controller, you can import or browse the item definition as described below.
5. Complete with **[OK]**.

- The window containing the overview of all defined symbols for the specific connections is opened:



13.2 S7 symbol import

- Alternatively, you can import the symbol definition from your S7 project using the **[Import]** button in the window for adding new symbols.
- A new window is opened:

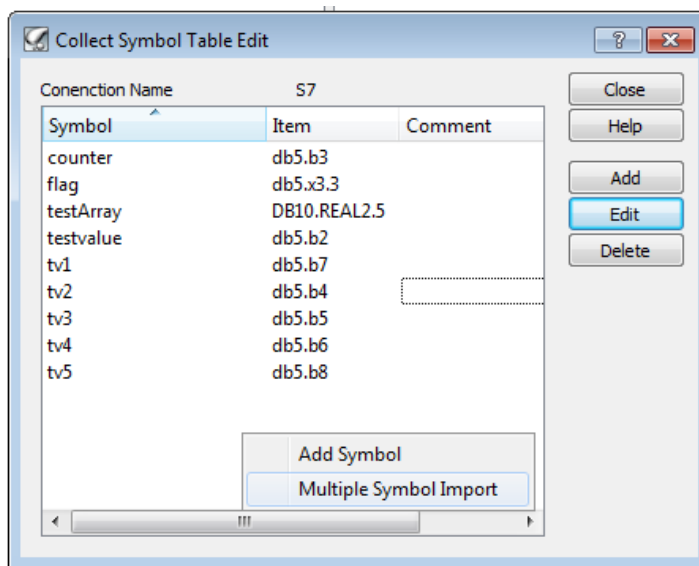


- Select the desired symbol for import and complete with **[OK]**.

13.3 Import multiple symbols

You can also import multiple symbols in a single step:

- Go back to the **Collect Symbol Table Edit** table window.
- Right-click on the list and select **Multiple Symbol Import**:

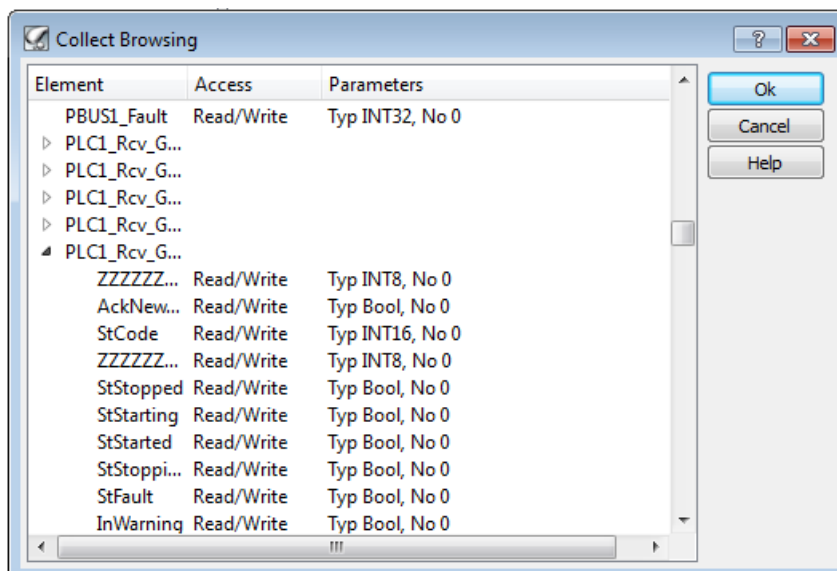


3. An S7 Symbol Import window appears. Here you can open the S7 project file and select multiple symbols to import.
4. Confirm with **[OK]**.

13.4 CLX browsing

It is possible to browse online for symbols that are stored in a Rockwell CLX controller and to add the selected symbols to the symbol table.

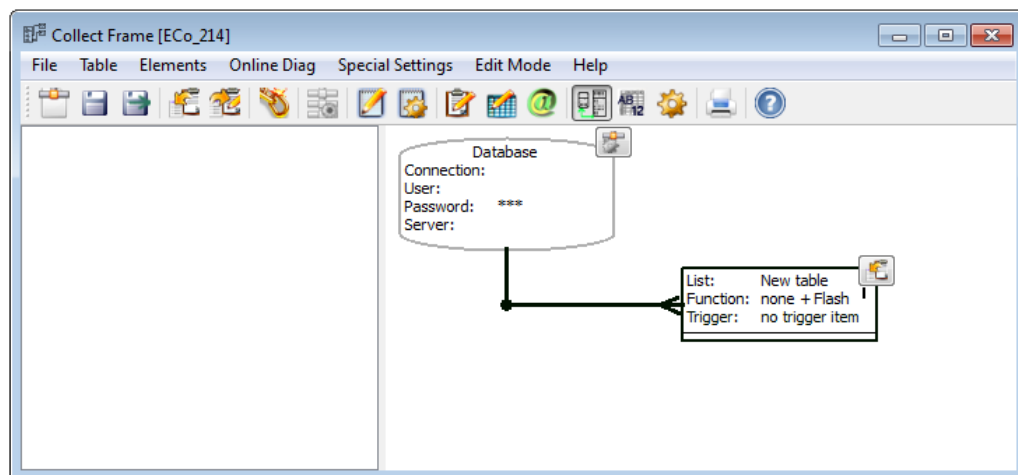
1. Use the **[Import]** button in the window for adding new symbols to order the browsing dialog:



2. Select the desired symbol to import and confirm with **[OK]**.

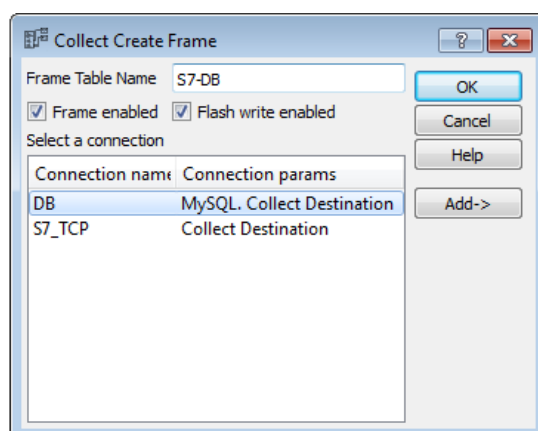
14 Configure Collect Table

1. The next step is to define
 - what data will be read from the PLC and stored in the DB and
 - the trigger of this operation (i.e. when this action is to be performed).
2. Open the main NetCon echo window.
3. From the the NetCon echo main menu select **Collect** → **Collect Frame Table**
4. A new **Collect Frame** window is opened:

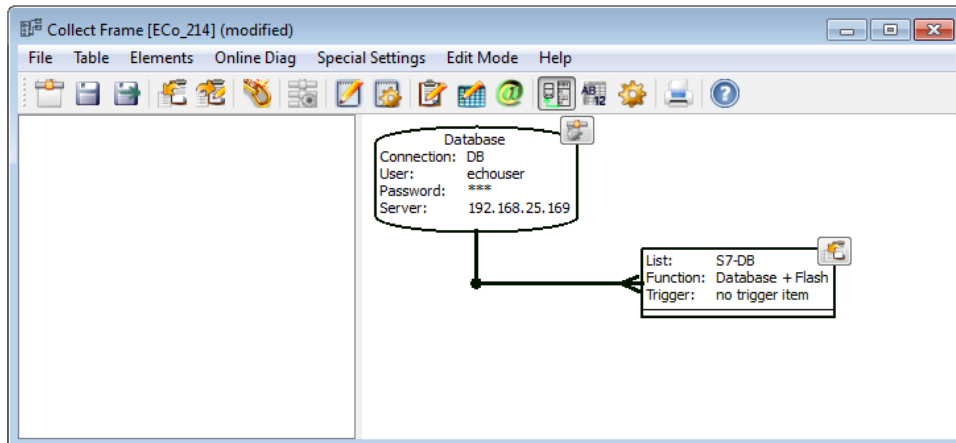


14.1 New Collect Frame Table

1. To add a new table, select from the Collect Frame window **Table** → **Add Table**.
2. A new window with possible destinations appears.
3. Enter the desired name of the frame table (**S7-DB** in our example) and select the database as destination connection (DB):




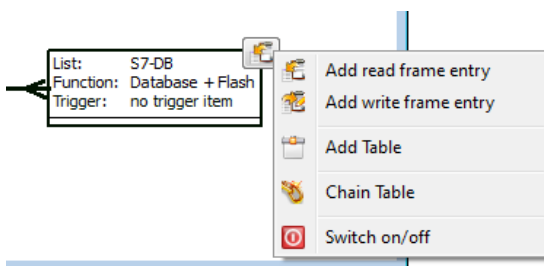
4. If you want to use the SD card logger functionality (described in [SD Card Logger](#)) for this connection, the setting **Flash write enabled** must be activated here.
5. Confirm with **[OK]**.
6. The destination connection with its parameters will now be displayed in the **Collect Frame** window:




7. The left cylindrical-shaped block represents the destination database. The rectangular block in the middle defines relationships between the source (PLC) and destination (database) items.

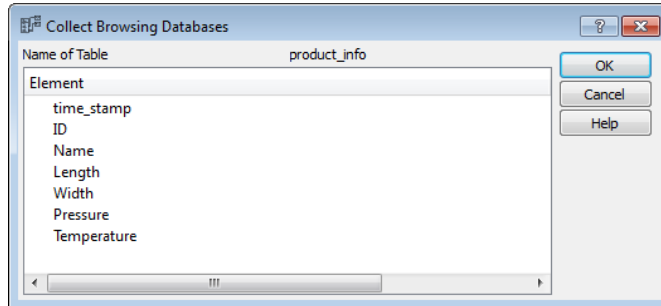
14.2 Add read frame entry - for time stamps

1. Now you need to select the items that will be read from the PLC and written in the database.
2. Right-click on the  icon in the upper right corner of the **S7-DB** block, and select **Add read frame entry** from the context menu:

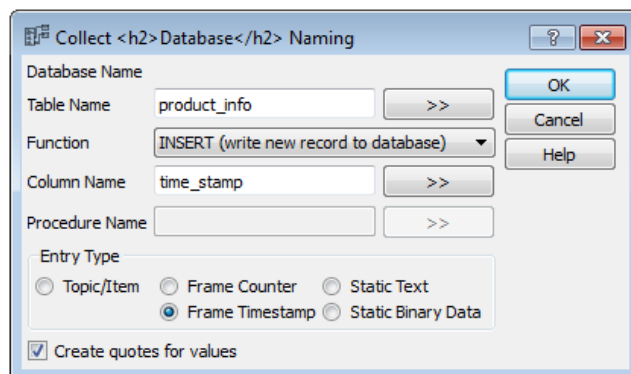


A left-click on the icon will select the **Add read frame entry** command without displaying the context menu.

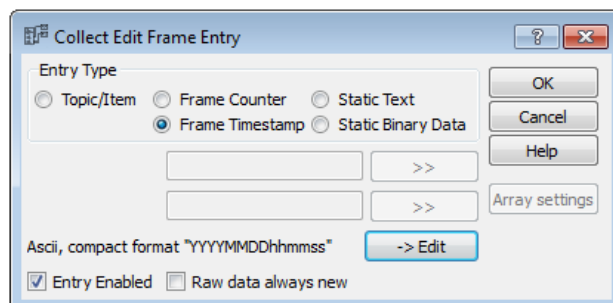
3. A new window is opened allowing you to define the column where you want data to be written to.
4. If the connection to the database is active, you can directly select the values with the  buttons. A window with lists of values is opened:



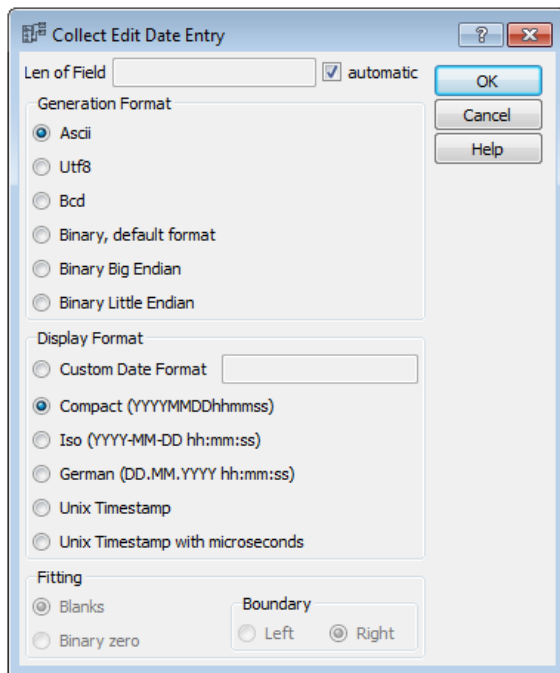
5. Select **product_info** from the field **Table Name**. This is your database table.
6. Select **time_stamp** from the field **Column Name**. This is the column in your table where data will be written to.
7. Select the **INSERT** function in order to write new records to the database.
8. In order to use the time of the echo internal real time clock as the time-stamp when the frame was generated, select **Frame Timestamp** as **Entry Type**.



9. Click **[OK]**.




10. Now you have the possibility to define a specific format for the timestamp. Use the  button to open the **Collect Edit Date Entry**. We will use the default compact ASCII format here.

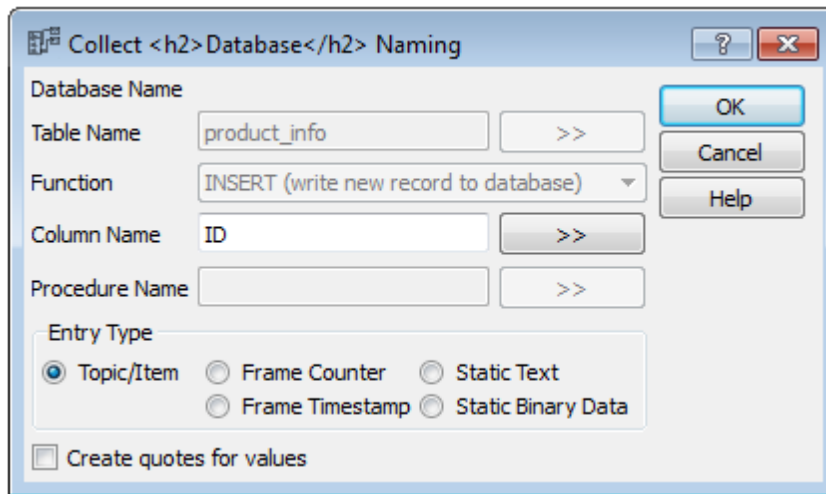
**Note**


Make sure the used format of the item is always compatible with the value type of the column in the target database.

14.3 Add read frame entry - for ID

In a similar way, let's define the next item that will be written to the database. We want to read the value of the db5.b1 item from the S7 PLC and store it under the "ID" column in the database.


1. Right-click on the  icon in the upper right corner of the **S7-DB** block and select **Add read frame entry** from the context menu:



2. Select **ID** for the **Column name**.
3. Select **Topic/Item** as **Entry Type** allowing to read the values from the PLC.
4. Click **[OK]**.
5. Now you need to define the source connection (Topic) and the source memory location (Item) you want to read from the PLC.
6. You can use the  button for selecting the Topic and the Item.
7. In the pop-up window for the Topic, select the **S7_TCP** source.
8. For **Item** enter the desired source memory location. In our example, we will use **db5.b1**.



Note

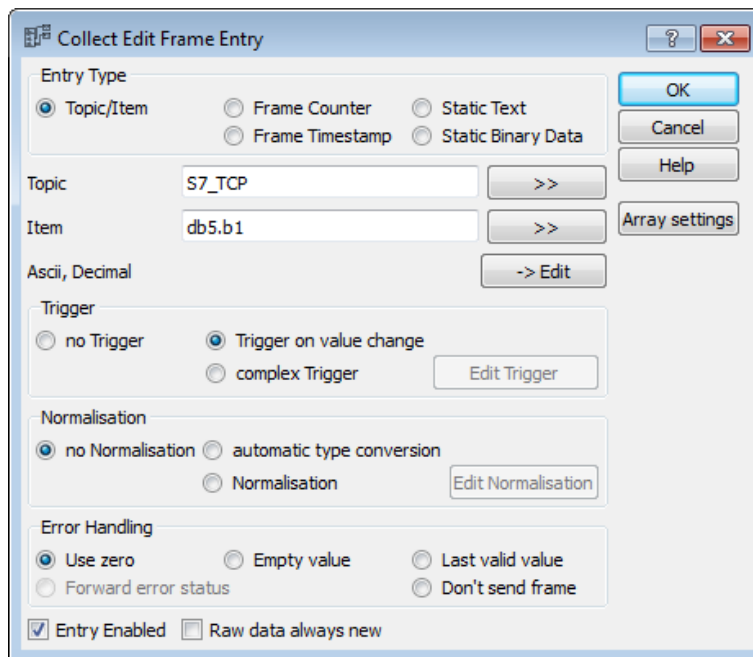
If you have already defined symbols in the echo symbol table (i.e. if you have imported symbols from an S7 project, used CLX browsing or defined symbols manually), you do not need to enter the item name and you can use the  button for selecting the desired symbol.

9. Set the trigger on **value change**. This means that the new value is updated in the database as soon as the value of the item changes.

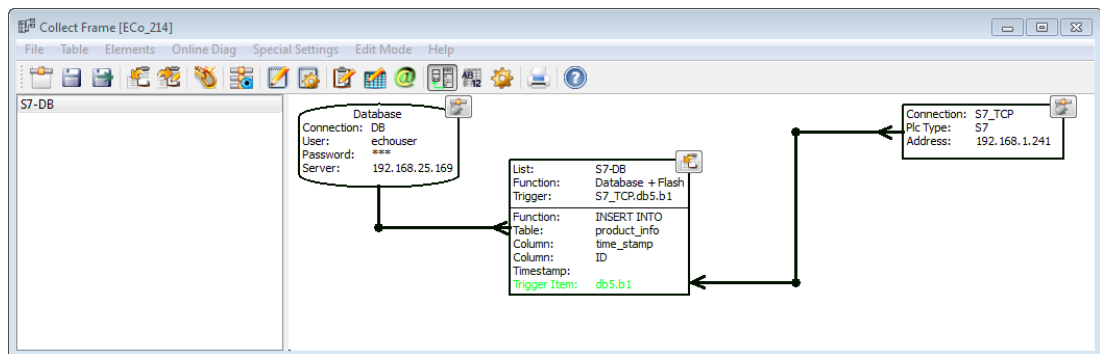


Note

You can change this default trigger behavior in the Collect Table menu with **Special Settings → Trigger Settings**.



10. The **Collect Frame** window should look similar to the following window:



11. Save the table in the **Collect Frame** menu with **File → Save**

12. Now your table is active and the echo is ready to write to the database.

14.4 Add additional read frame entries

If desired, repeat the previous steps to add additional items that you want to read from the PLC and write to the database.

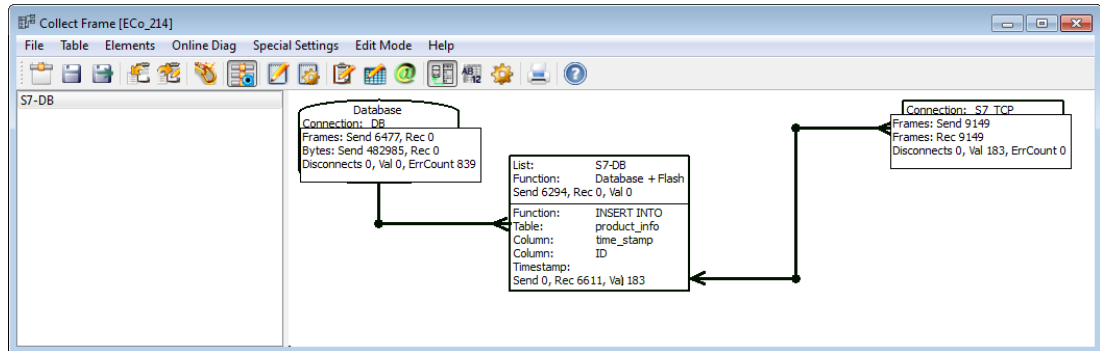
14.5 Exit collect table editor

To exit, select from the **Collect Frame** menu **File → Save and Exit** or press the key **Esc**.

15 Online Frame Table Diagnostics

The functionality of the collect table and the state of the connections can be verified using the integrated online diagnostics.

1. Activate **Online Frame Table Diagnostics**.
2. Open the **Collect Frame** menu. Select **Online Diag → Online Diagnostics**.
3. The **Collect Frame** window looks similar to the following screenshot:



The meaning of the diagnostic fields is as follows:

- Database
 - Send/receive frames to/from the database
 - Send/receive bytes to/from the database
 - Number of access attempts when the DB was disconnected
 - Last written value
 - Error counter
- Frame List (for each item)
 - Send/receive items to/from the PLC
 - The last valid value
- Connection (source)
 - Send/receive frames to/from the PLC (updated within the polling time)
 - The last value read
 - Failures due to Disconnected source
 - Last read value
 - Error counter

**Note**

In case the error counter is increasing, check the device log to find the problem. Open the **Collect Frame** menu. Select **Online Diag → Logger**.

The diagnostic counters are reset to zero when the collect frame table is saved.

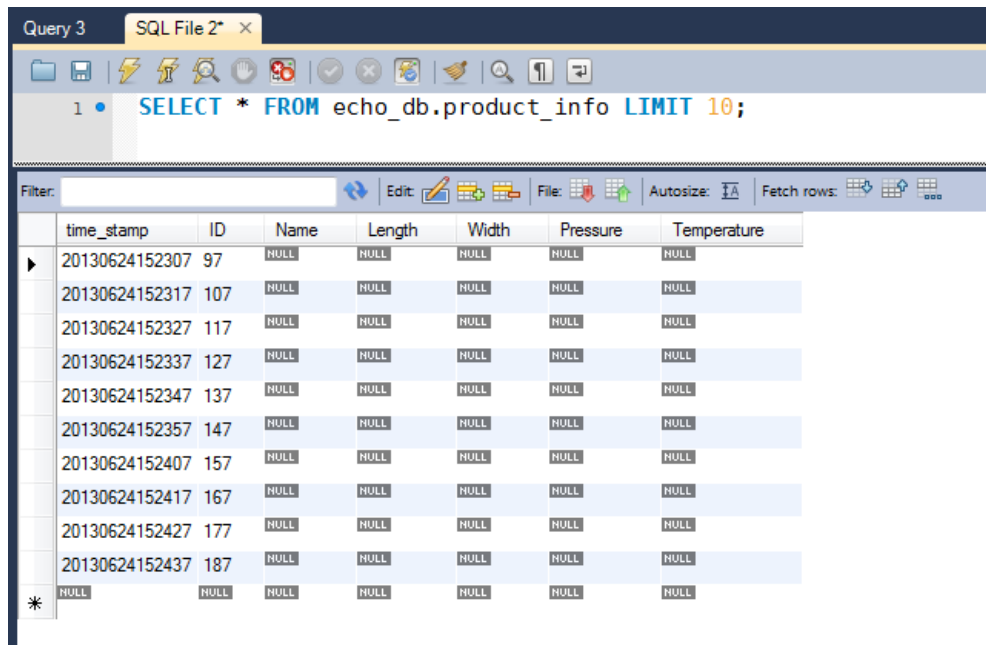
16 Database check

The database should now contain the data acquired from the PLC.

1. Query the database using the following script:

```
SELECT * FROM echo_db.product_info LIMIT 10;
```

2. You will get the first 10 entries in the database:



	time_stamp	ID	Name	Length	Width	Pressure	Temperature
▶	20130624152307	97	NULL	NULL	NULL	NULL	NULL
	20130624152317	107	NULL	NULL	NULL	NULL	NULL
	20130624152327	117	NULL	NULL	NULL	NULL	NULL
	20130624152337	127	NULL	NULL	NULL	NULL	NULL
	20130624152347	137	NULL	NULL	NULL	NULL	NULL
	20130624152357	147	NULL	NULL	NULL	NULL	NULL
	20130624152407	157	NULL	NULL	NULL	NULL	NULL
	20130624152417	167	NULL	NULL	NULL	NULL	NULL
	20130624152427	177	NULL	NULL	NULL	NULL	NULL
	20130624152437	187	NULL	NULL	NULL	NULL	NULL
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL



Note

In our example only the columns **time_stamp** and **ID** were used. Therefore the other columns are empty.

17 SD Card Logger

The echo can store the acquired data on a removable SD card. This functionality is especially beneficial in cases where storing into a database is not possible (e.g., no network connection) or in mobile machinery.

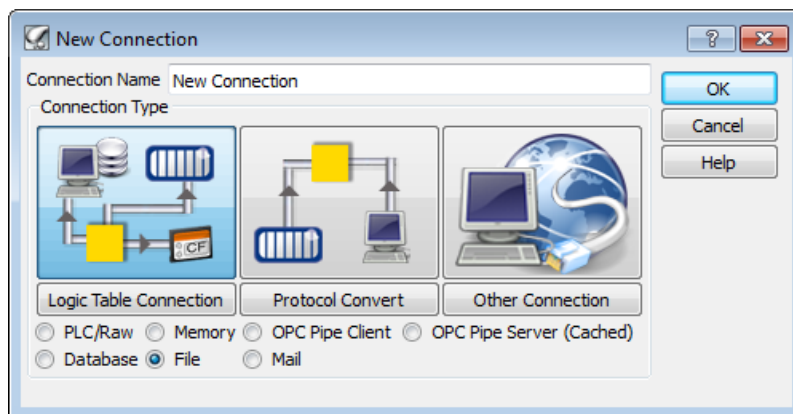


Note

SD Card Logger is an optional feature to be paid separately.

17.1 Add file connection

1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **Connection → New Connection**
3. Enter the desired name of the connection (in our example **SD**) and select **Logic Table Collection → File**



4. Confirm with **[OK]**.
5. A **Collect Destination Connection Config** window is opened:

6. Enter the desired file name (in our example **logger_file**) and select **Store frames for logging** as we want to store all frames.
7. Specify the write interval (10 seconds in our example), i.e. how frequently the data will be written to the SD card. (Data is buffered in the RAM in-between).



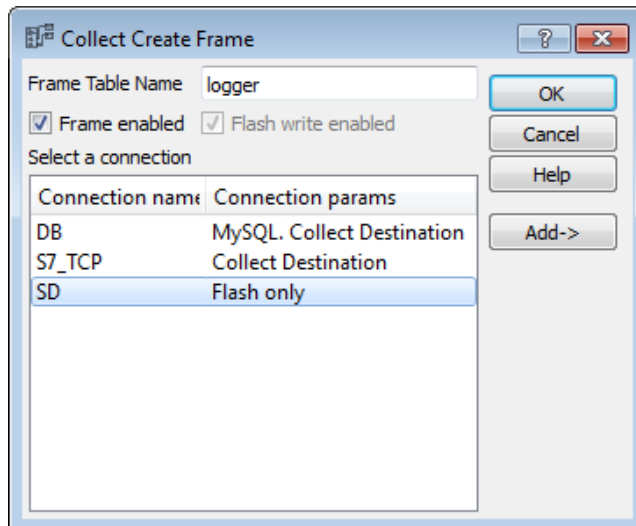
Note


When you save to an SD card (flash drive), the number of writes is limited. The fewer writes you record, the longer the lifetime of the flash drive will be.

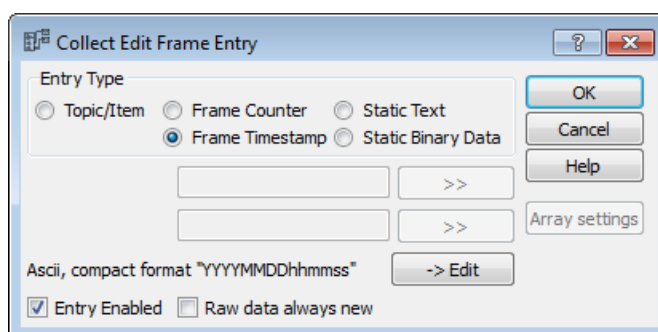
8. Additionally, the **File Upload** option allows you to store a data file on a remote server over the network.
9. Complete with **[OK]**.

17.2 Create collect frame table for logging

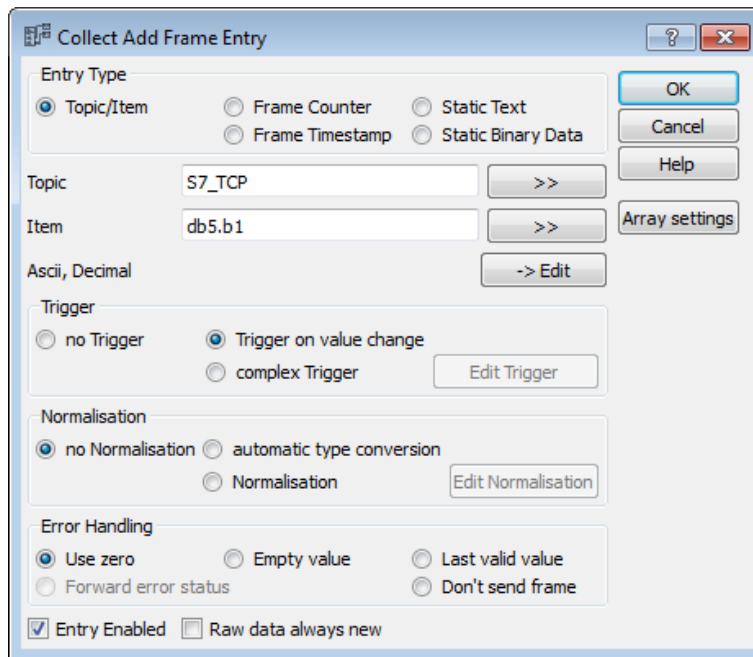
1. Next step is to define what data will be stored in the file on the SD card.
2. Create a new collect frame table. Open the NetCon echo main menu. Select **Collect** → **Collect Frame Table**
3. Then open the Collect Frame menu and select **Table** → **Add Table**
4. Let's name the frame table as "logger" and select **SD** as the destination connection:



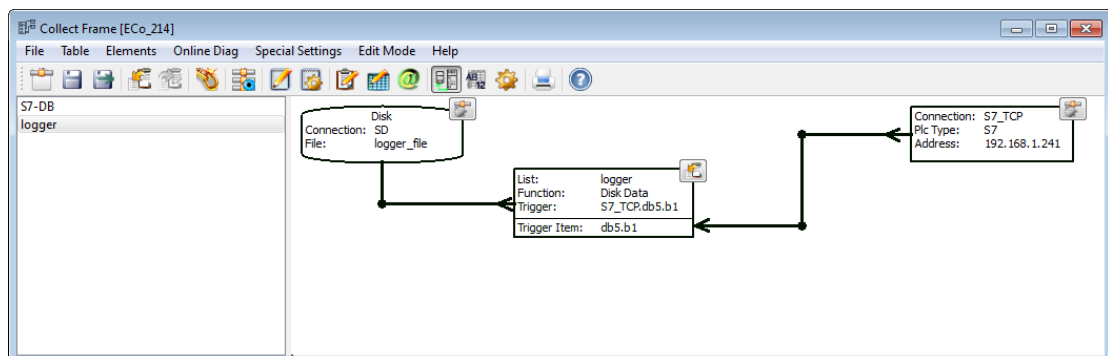
5. Click **[OK]**.
6. Now, similarly to the database example, add a read frame entry in the frame table. To do so, right-click on the  icon in the upper right corner of the frame table list block and select **Add read frame entry** from the context menu.
7. Add the timestamp as the first read frame entry:



8. Click **[OK]**.
9. Add a new read frame entry and select the topic **S7_TCP**.
10. Define the item with **db5.b1** (in our example) that will be read from the PLC and written to the logger file.
11. Activate **Trigger on value change**.



12. The corresponding collect frame table should look similar to the following screenshot:



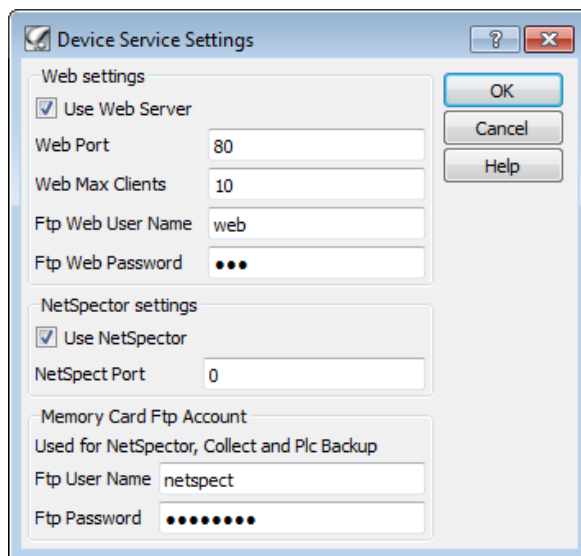
13. Save the collect frame table and exit the collect frame editor.
14. Your table is active now and the echo is writing the data to the file on the SD-card.

18 FTP access

The integrated FTP server offers access to the content of the SD card over a network. This functionality is especially useful to read the logging files.

18.1 Setup FTP access

1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **Settings** → **Service Settings**.
3. The following window is opened:

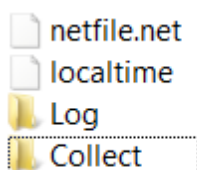


4. In section **Memory Card FTP Account** you can define your own ftp user name and password. In our example we will use **netspect** for both.
5. Save with [OK].

18.2 Accessing the log file through FTP

The logged data is now available via the FTP protocol.

1. Use the <echo_IF1_IP> address with the specified user name and password. In this example, it is: **ftp://netspect:netspect@192.168.2.14/**
2. Access the files using Windows Explorer or any FTP client. The following files and folders appear:



3. Open the *Collect* folder to access the log file.
4. To access the log file directly, you can also use this format: **ftp://netspect:
netspect@192.168.2.14/Collect/logger_file.dat**
5. The data is stored in German *.csv format, as shown in this example:

```
20130624171950;188  
20130624172000;198  
20130624172010;208  
20130624172020;218  
20130624172030;228  
20130624172040;238  
20130624172050;248
```

**Note**

The German *.csv format uses semicolons (;) whereas the US English format uses commas (,).

You can use Notepad or Excel to open the log files.

19 OPCpipe connection

It is possible to connect the echo directly with an OPC DA client (e.g. a SCADA system) using the "OPCpipe" DA tunnel, which is integrated in the device.



Note

The OPCpipe client is required on the client PC. Make sure that it is properly installed.

OPCpipe client is an optional feature to be paid separately.

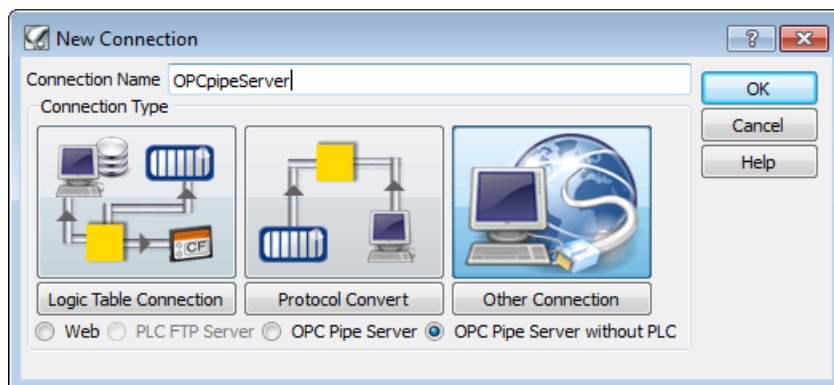
19.1 Enable OPCpipe server within echo

1. Create a new OPCpipe Server connection by selecting **Other Connection** and choosing **OPC Pipe Server without PLC**.

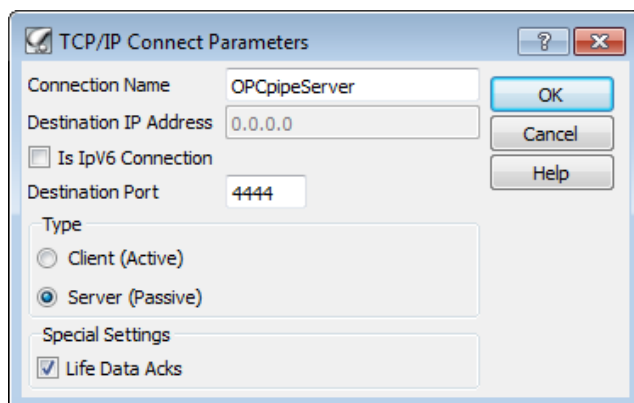


Note

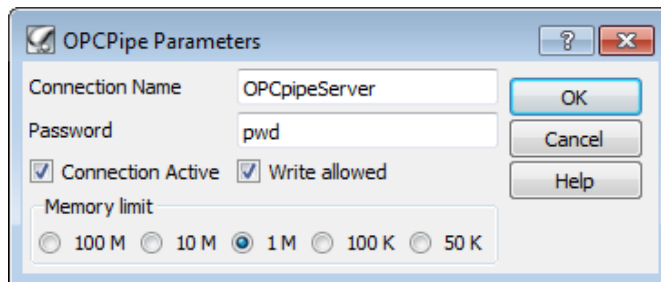
For the OPC Pipe Server without PLC you do not need to specify the target PLC connection in the echo. If you prefer using the OPC Pipe Server option for legacy reasons, make sure that you have defined the target connections in the echo.



2. Click **[OK]**.
3. As OPCpipe Server is passive, you do not need to specify the IP address:



4. Click **[OK]**.
5. Choose the password (**pwd** in our example) for the connection and set the same memory limit that you use in your client (1M recommended):



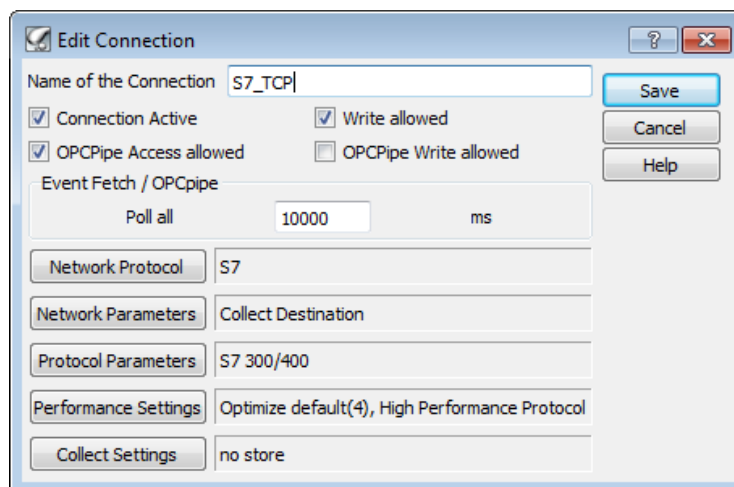
6. Confirm with **[OK]**.
7. Now the pipe is active and should be visible in the list of connections in the main NetCon echo window.



Note

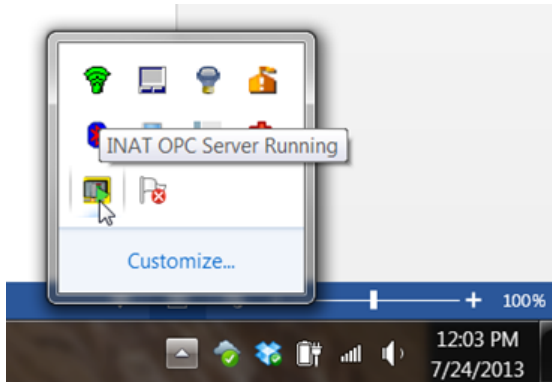
Make sure to enable OPCpipe access in all the relevant PLC connections. From the main NetCon echo window, right-click on the PLC connection and select **Edit Connection**.

The following options must be activated:

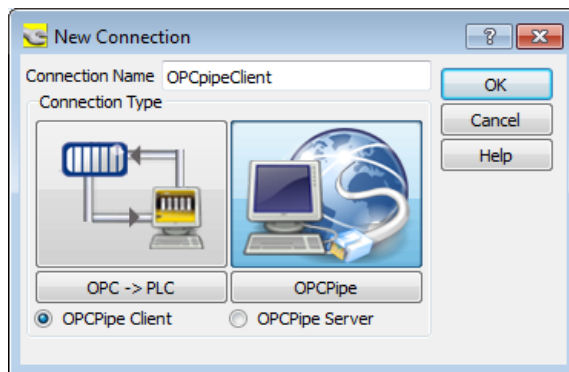


19.2 Configure OPCpipe-client

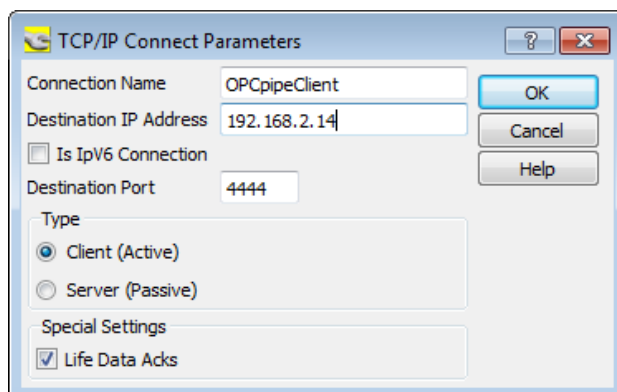
The INAT OPC Server should already be running. You can check its status in the windows tray:



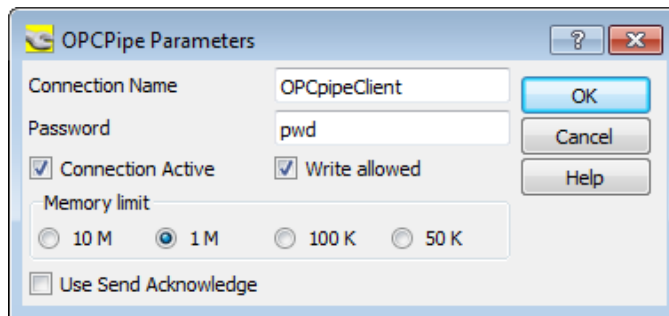
1. Right-click on the icon in the tray and select **Server Status → NetCon OPC** to open the configuration tool.
2. An **Access Paths** window is opened.
3. Here you need to create the OPCpipe client access path. Select **Access Paths → Connection → New Access Path**.
4. Enter **OPCpipeClient** as a connection name. Select the **OPCPipe** option and choose the **OPCPipe Client** connection:



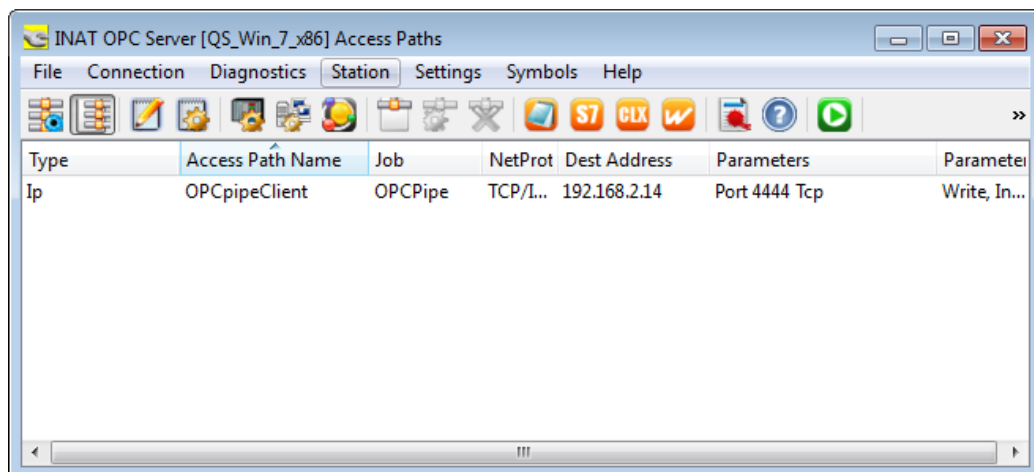
5. Click **[OK]**.
6. Enter **<echo_IF1_IP>** and make sure that the **Client (Active)** connection type is selected:



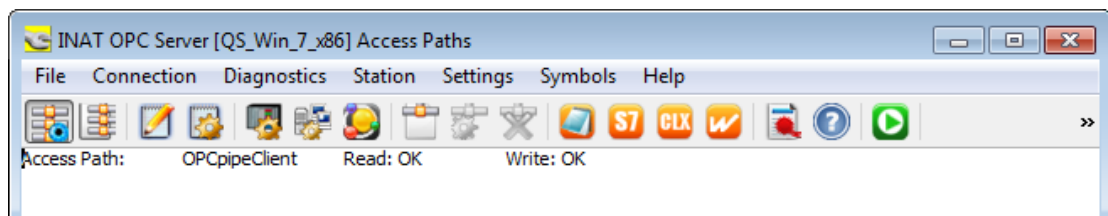
7. Click **[OK]**.
8. In the next window, use the same password and memory limit as you have set in the echo OPCpipe configuration:



9. Click **[OK]**.
10. You need to restart the OPCpipe client now. Select the **Access Paths** menu, then **File → Restart Server**. The OPCpipe client window should now show the pipe connection:

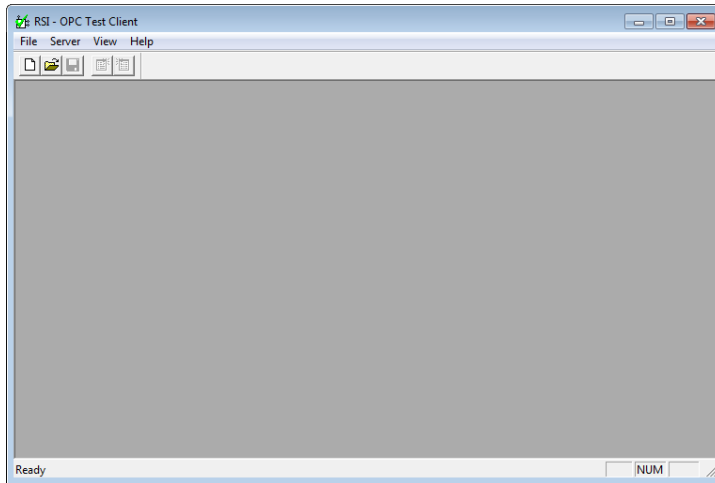


11. To check the connection open the Access Paths menu and select **Diagnostics → Show Diagnostics**.
12. The read and write states should be **OK**. Otherwise check the connection and the OPCpipe configuration.



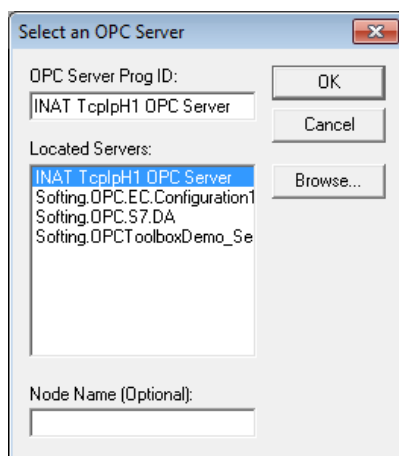
19.3 Test the OPCpipe connection

You can test the OPCpipe connection with the installed "OPC Test Client" tool from the Windows start menu:



Select new server connection

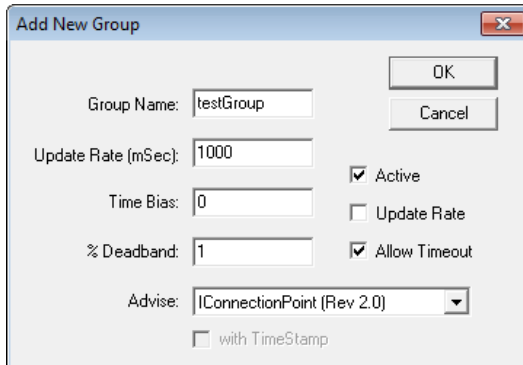
1. Open the OPC Test Client main menu and select **File → New**.
2. Choose the **INAT TcplpH1 OPC Server**:



3. Confirm with **[OK]**.

Add a new group

1. Open the OPC Test Client main menu and select **Group → Add Group...**
2. Enter the group name and click **[OK]**:



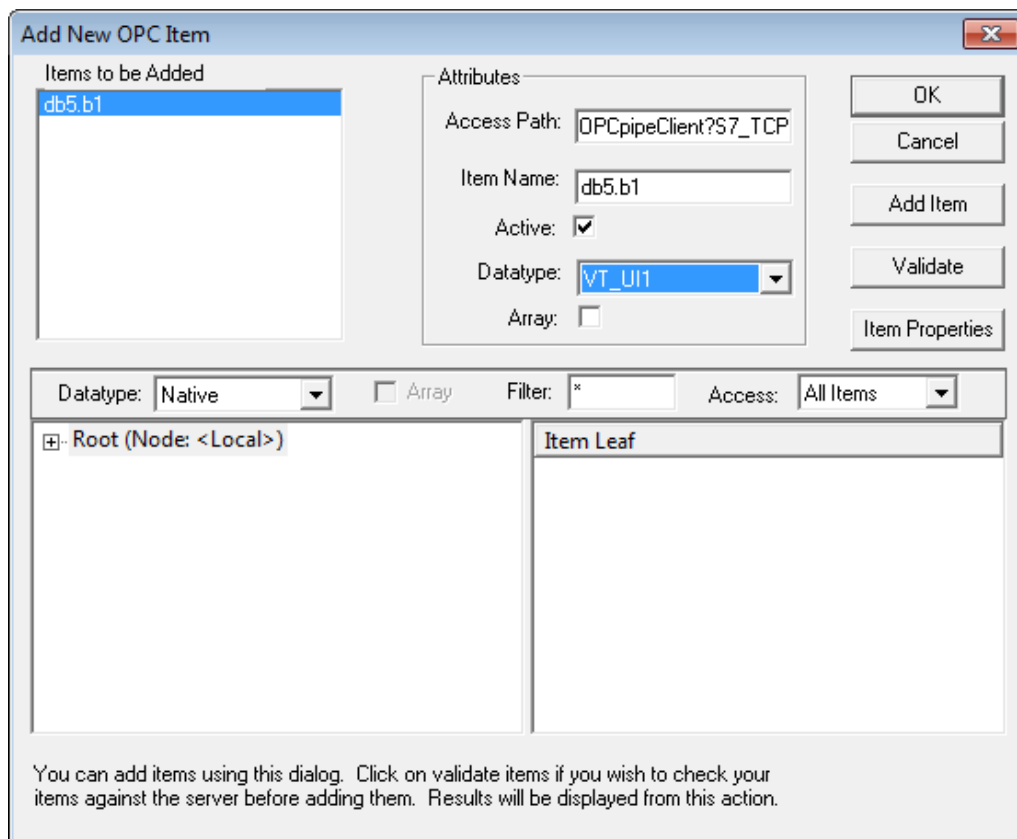
Add new item

1. Open the OPC Test Client main menu and select **Item → Add Item...**
2. Define the PLC variable (or a symbol item in your echo) that you want to access.
3. For the **Access Path** use the syntax <OPCpipe client connection name>?<PLC connection name>, in our example **OPCpipeClient?S7_TCP**
4. For the **Item Name** use the item syntax for you PLC connection, in our example **db5.b1**
5. Now select the data type (Datatype) of the item. In our case we will use **VT_UI1**



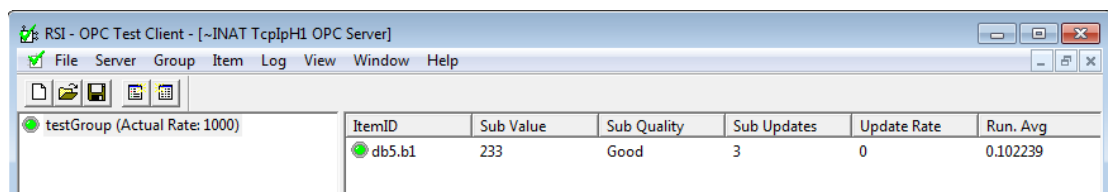
Refer to the echo manual (section 6) for an extended description of the item syntax.

6. The **Add New OPC Item** window should look like this:



The 'Add New OPC Item' dialog box is shown. It has a title bar with a close button. The main area is divided into two panes. The left pane, 'Items to be Added', contains a list with 'db5.b1' selected. The right pane, 'Attributes', contains the following fields: 'Access Path' (OPCpipeClient?S7_TCP), 'Item Name' (db5.b1), 'Active' (checked), 'Datatype' (VT_UI1), and 'Array' (unchecked). To the right of the 'Attributes' pane are buttons for 'OK', 'Cancel', 'Add Item', 'Validate', and 'Item Properties'. Below the panes is a section with 'Datatype: Native', 'Array' (unchecked), 'Filter: *', and 'Access: All Items'. Below this is a tree view showing a hierarchy: 'Root (Node: <Local>)' expanded, showing 'Item Leaf'. At the bottom, a message states: 'You can add items using this dialog. Click on validate items if you wish to check your items against the server before adding them. Results will be displayed from this action.'

7. Confirm with **[OK]**.
8. The connection is now established and you should be able to see the current value (**Sub Value**) of the item in the main window:



The 'RSI - OPC Test Client' window is shown. It has a menu bar with 'File', 'Server', 'Group', 'Item', 'Log', 'View', 'Window', and 'Help'. Below the menu bar is a toolbar with icons for file operations. The main area is divided into two panes. The left pane shows a tree view with 'testGroup (Actual Rate: 1000)' expanded. The right pane is a table with the following data:

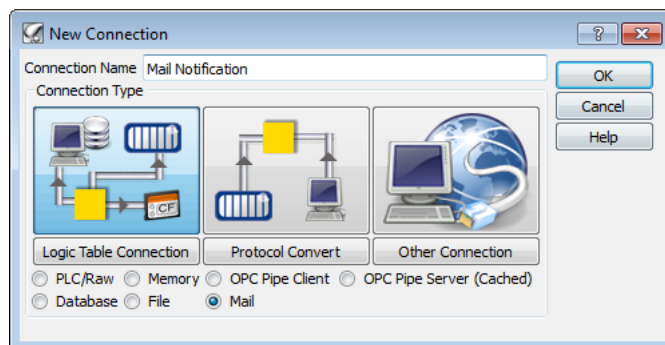
ItemID	Sub Value	Sub Quality	Sub Updates	Update Rate	Run. Avg
db5.b1	233	Good	3	0	0.102239

20 E-mail notification

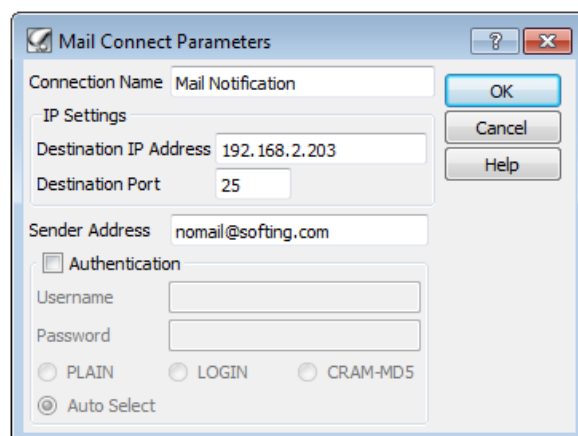
The configuration of the echo e-mail notification functionality is described in this section. As an example, the echo will be set up to send an e-mail every time the value of the DB1.B0 item in the S7-300 PLC changes.

20.1 Configure the connection to the e-mail (SMTP) server

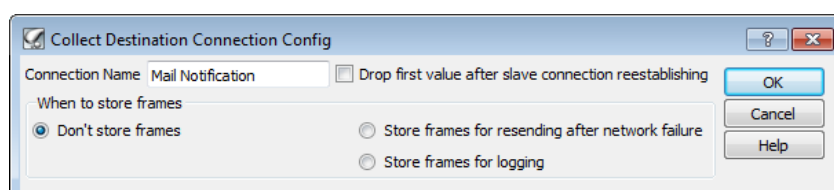
1. Open the NetCon echo main menu and select **Connection → New Connection**.
2. Enter the desired connection name (**Mail Notification** in our example) and select **Logic Table Connection → Mail**.



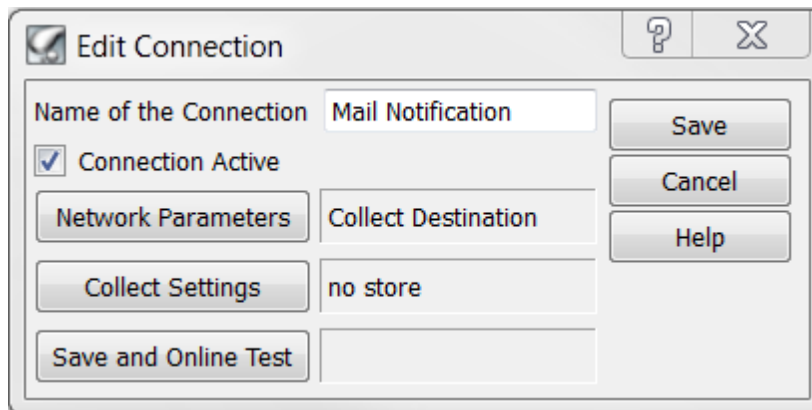
3. Click **[OK]**.
4. Enter the IP address of the user's e-mail server (**192.168.2.203** in our example), the SMTP port number (**25** is usually the default) and the sender's e-mail address (nomail@softing.com in our example). If authentication is required, enter the username, password and the authentication type. Use **Auto Select** if you are unsure:



5. Click **[OK]**.
6. The following window is opened:



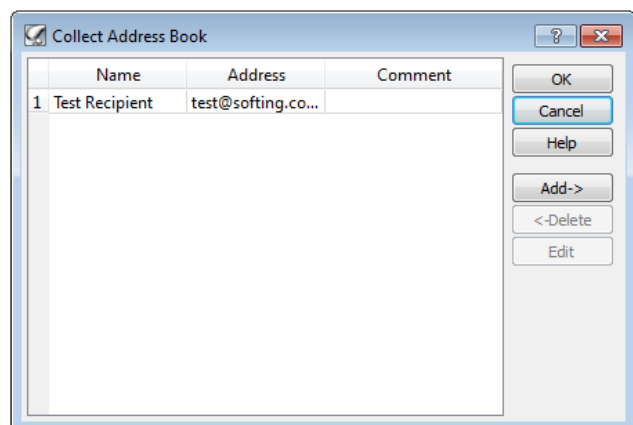
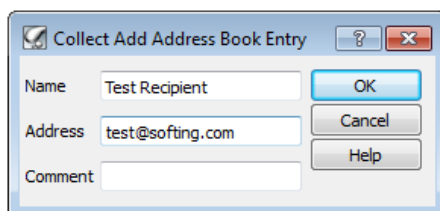
7. It is possible to save the e-mail message for delayed sending, in case that the connection to the e-mail server is temporarily lost. If this functionality is desired, check **Store frames for resending after network failure**, otherwise select **Don't store frames** and confirm with **[OK]**.
8. Now the e-mail connection is set up and should appear in the connection list in the main window.
9. To test the connection, double-click it and the following window is opened:



10. Click **Save and Online Test**. If the connection settings are OK, proceed with the **[Save]** button. If errors show up, verify the server settings and authentication in the **Network Parameters**.

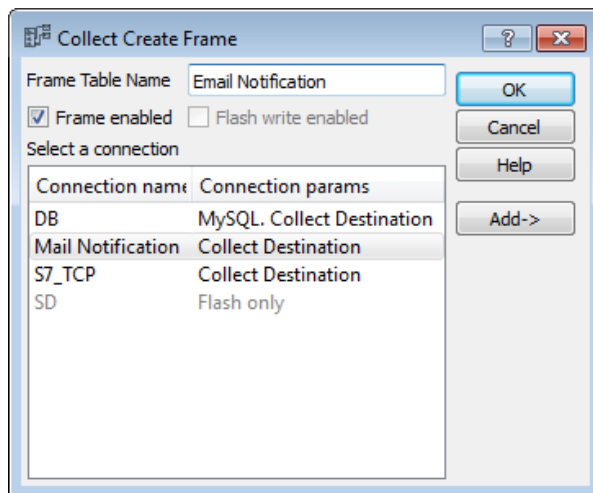
20.2 Define the e-mails in the recipient address book

1. Open the NetCon echo man window.
2. From the NetCon echo main menu select **Collect** → **Collect Mail Address Book**.
3. In the window, click the **[Add->]** button to open the dialog for adding a new e-mail recipient. This window is opened automatically, if no e-mail recipient is defined yet.
4. Enter the name and the e-mail address of the recipient, and add a short note (optional). Save the entries by clicking **[OK]**.
5. When all the recipients are defined, close the collect address book by clicking **[OK]**.

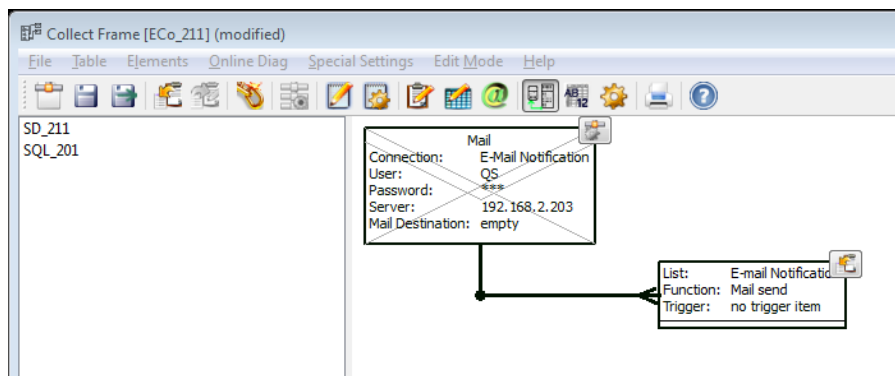


20.3 Add the e-mail connection as the destination in the collect frame

1. Open the collect frame editor. To do so, open the NetCon echo main menu, then select **Collect → Collect Frame Table**.
2. Add a new frame table. Open the Collect Frame menu and select **Table → Add Table**.
3. Enter the desired table name (**Email Notification** in our example) and select the e-mail destination connection:



4. A new frame table will be generated:



5. Now assign the data that should be sent in the body of the email. Right-click the icon of the "E-mail Notification" block and select the **Add read frame entry** from the context menu.
6. A **Collect Add Frame Entry** window is opened, similar to the database example. Here we will use the following settings:

Section Entry Type: **Topic/Item**

Section Topic: Click the [**>>**] button and select the desired connection. In this tutorial we will use the **S7_TCP**.

7. Confirm with **[OK]**.

Section Item: the desired item from the PLC (**db1.b0** in our example).

Section Trigger: **Trigger on value change**

8. Leave all other settings on default:

The screenshot shows the 'Collect Add Frame Entry' dialog box. It has several sections: 'Entry Type' with radio buttons for 'Topic/Item', 'Frame Counter', 'Static Text', 'Frame Timestamp', and 'Static Binary Data'; 'Topic' and 'Item' text fields with '>>' buttons; 'Ascii, Decimal' with a '-> Edit' button; 'Trigger' with radio buttons for 'no Trigger', 'Trigger on value change', and 'complex Trigger'; 'Normalisation' with radio buttons for 'no Normalisation', 'automatic type conversion', and 'Normalisation'; 'Error Handling' with radio buttons for 'Use zero', 'Empty value', 'Last valid value', 'Forward error status', and 'Don't send frame'; and checkboxes for 'Entry Enabled' and 'Raw data always new'. Buttons for 'OK', 'Cancel', 'Help', and 'Array settings' are on the right.

9. Confirm with **[OK]**.

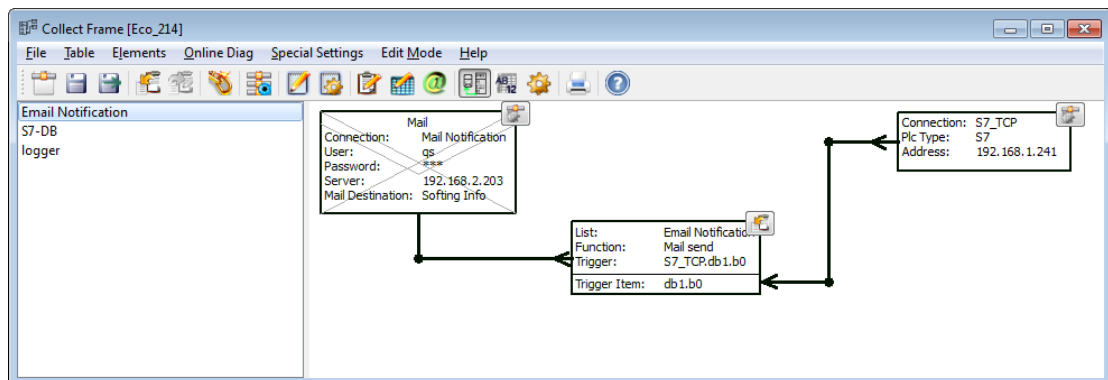
20.4 Assign the desired recipient from the recipient address book

1. To specify the e-mail target open the Collect Frame menu and select **Special Settings → Mail Target**
2. In the **Select Address** window activate **Use Mail Targets**, enter the desired mail subject (or leave the field empty for the frame name as subject) and choose the desired recipient from the address book:

The screenshot shows the 'Select Address' dialog box. It has a 'Use Mail Targets' checkbox which is checked. Below it is a 'Mail Subject' text field containing 'test email'. A note says 'Leave empty to use the frame name as subject.' Below that is a section 'Select recipient address' containing a table with columns 'Name', 'Address', and 'Comment'. The first row is 'Softing Info' with address 'info@S...' and is selected with a checkmark in the first column. Buttons for 'OK', 'Cancel', and 'Help' are on the right.

Name	Address	Comment
<input checked="" type="checkbox"/> Softing Info	info@S...	

3. Click **[OK]**.
4. The collect frame window will look like this:



5. Save the collect frame table.
6. You can use the online diagnosis in order to verify the connections.
7. Close the **Collect Frame** window.

21 Enabling OPC-UA Server

In order to set-up the integrated OPC Unified Architecture (UA) server, you need to add an **OPC UA Server** connection.

The integrated OPC-UA Server will provide then the items that are defined in the symbol table.

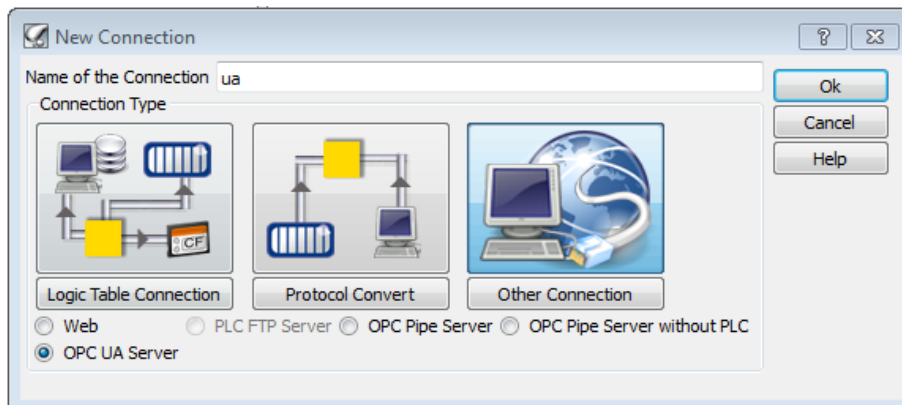


Note

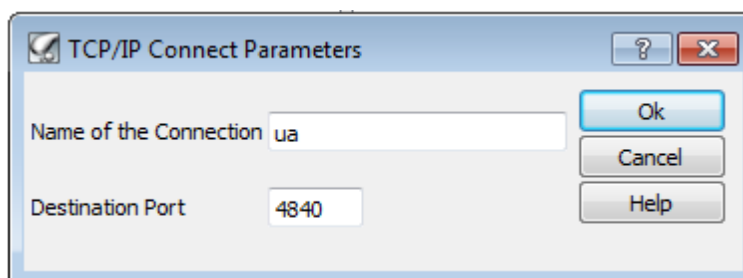
OPC-UA is an optional feature to be paid separately.

21.1 New connection

1. Open the NetCon echo main window. From the NetCon echo main menu select **Connection → New Connection**.
2. In the opened window select **Other Connection → OPC UA Server**.



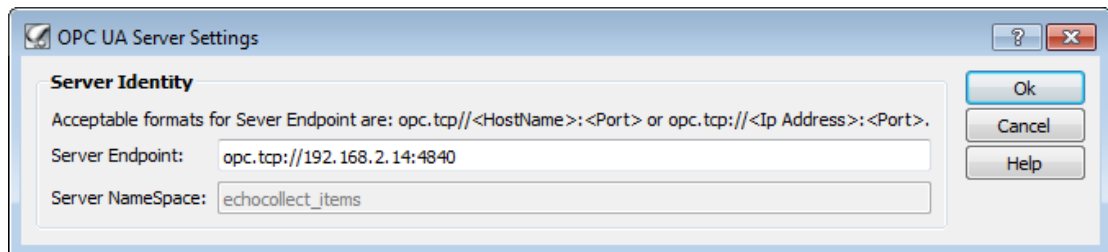
3. Click **[OK]**.
4. Enter the desired name of the connection (in our example **UA**) and the destination port (default 4840).



5. Confirm with **[OK]**.

21.2 Server Endpoint

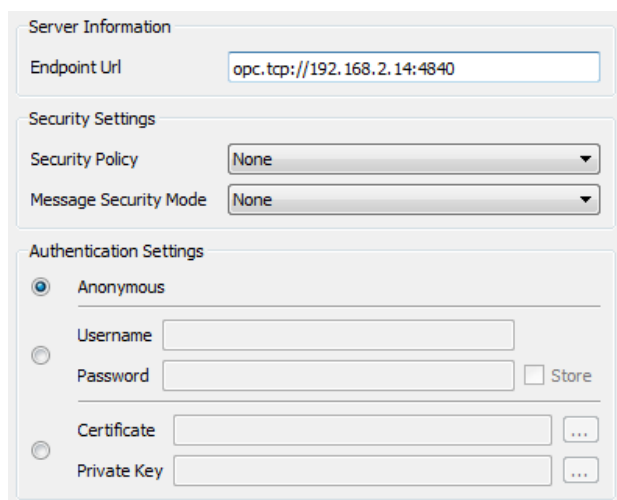
1. Define the Server Endpoint. By default, the Server Endpoint consists of the IP address of the echo device and the OPC UA server destination port.
2. Write down the server endpoint for the configuration of the OPC UA client.



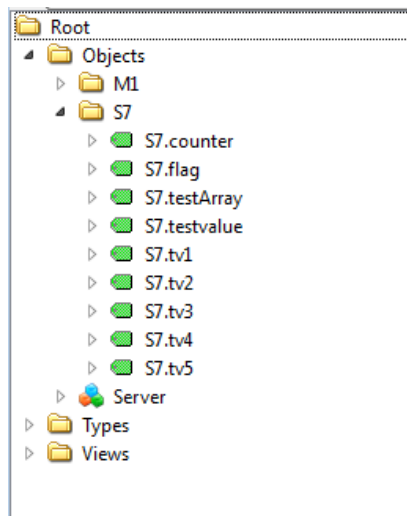
3. Confirm with [OK]. The OPC UA server in the echo can now be used.

21.3 Test with an OPC UA Client

1. Optionally, you can test the OPC UA Server with any OPC UA client.
2. Create a new connection in the client. Use the Endpoint definition from above and select anonymous authentication:



3. When you connect, you will be able to access the symbols, as defined in the collect symbol table:



22 Configuration backup

There are two ways to back up your configuration of the echo:

1. [Store configuration on the SD card](#)
and
2. [Store configuration on a PC](#)

22.1 Store configuration on the SD card

1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **Settings → Parameter in Flash**.
3. Confirm the message with **[OK]**. The parameters will be stored on your SD card.
4. When the echo is restarted and any saved configuration is present on the inserted SD card, this configuration will be automatically loaded and the configuration on the device will be overwritten.

22.2 Store configuration on a PC

1. Open the NetCon echo main window.
2. From the NetCon echo main menu select **File → Store Device Data in File**.
3. Now you need to name the file and choose the location where it should be saved.
4. To restore the saved configuration open the NetCon echo main menu and select **File → Load File in Device**.

23 Design HMI with atvise builder

This chapter describes the design of the customized HMI and how to store it in the echo device.

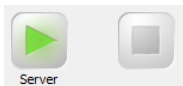
23.1 Make sure the atvise server is running

The atvise server is running locally on the PC and is necessary to create or modify the visualization projects and distribute them in the echo devices. Be aware that it is necessary to keep the server project files in order to perform any later changes. It is not possible to re-create a project from the data in the echo device.

The atvise server starts automatically during Windows startup and the atvise icon appears green:



If the application is not started, open the Windows start menu to start the atvise project console. Then start the atvise server with the start button:



If the start problem remains, refer to the integrated help for troubleshooting.



We recommend changing the destination of your project files. To do so,

1. stop the current project,
2. then right click the atvise server icon and select **Project Console** → **Settings** → **Add Project**.

In case the server was not activated properly during the installation process, please contact the Softing support.

23.2 Open the atvise builder

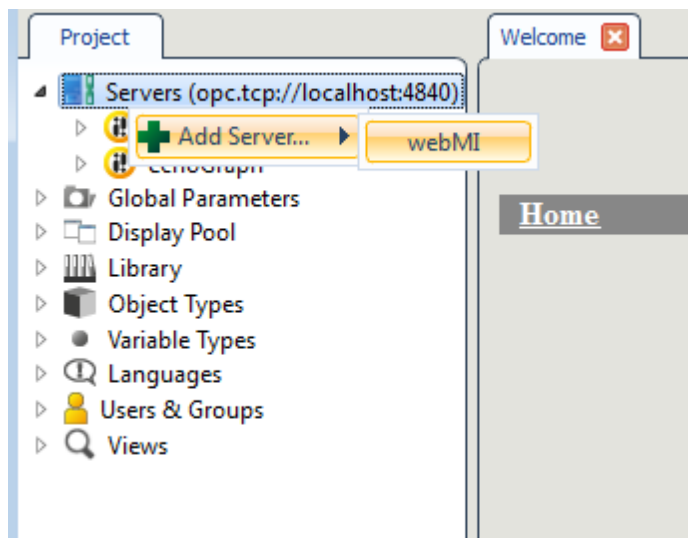
1. Open atvise builder with Windows **Start** → **Atvise** → **Tools** → **Atvise Builder**.
2. Alternatively, you can also start the atvise builder from the atvise project console.

23.3 Connect to the atvise server

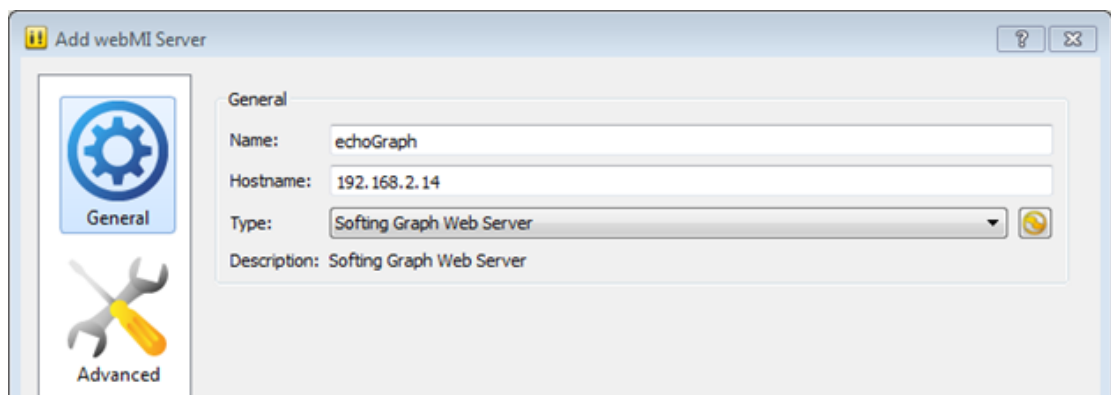
1. Connect to the local atvise server with **Builder** → **Connect to server**.
2. Use the pre-defined address **opc.tcp://localhost:4840**

23.4 Add new atvise server

1. Right click on the item **Servers** in the Project tree and select **Add Server** → **Atvise**.



2. In the following dialog under the group **General** type the desired server name.
3. For Hostname use the host name or the IP address of the echo device. This will be referenced as **<echo_IP_address>** in the table below.
4. Select **Softing Graph Web Server** from the **Type** list:



5. If you defined another user name and password for the echo FTP server in your echo device, change the settings in the group "Advanced". In this specific case, use the following syntax:

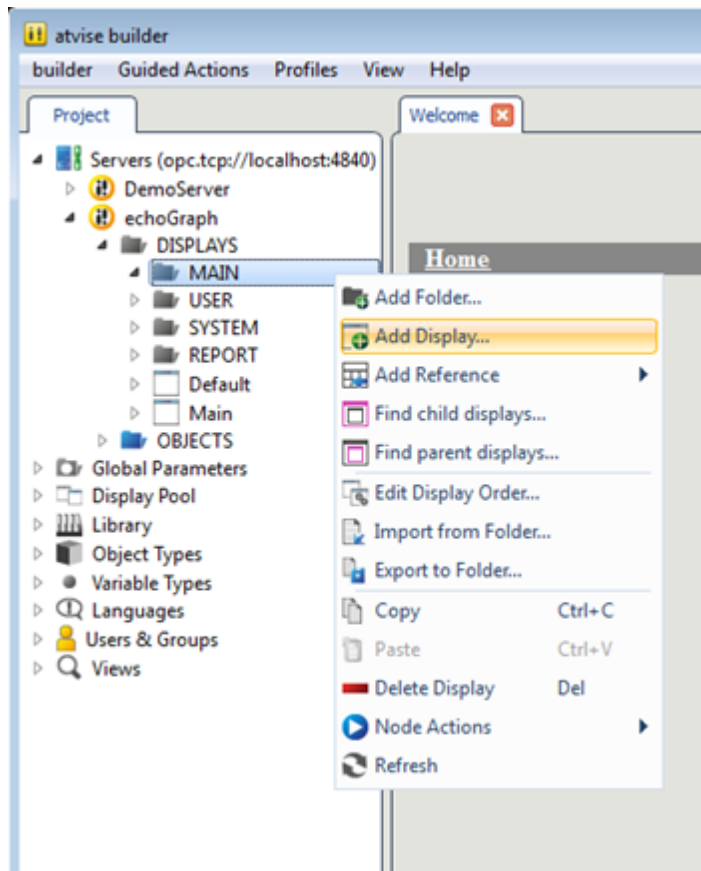
Url:	http://<echo_IP_address>
Config Source:	http://<echo_IP_address>/variables.xml
Config Target:	ftp://<user_name>: <user_password>@<Echo_IP_address>/config
Data Root Target:	ftp://<user_name>: <user_password>@<Echo_IP_address>/wwwroot

23.5 Import symbols

In order to import symbols from the echo symbol table (directly from the device), right-click on the server name (here echograph) and select **Acquire Datapoints**. The items from the echo device will be imported and you will be informed about the result through a dialog. The items will be imported under the node "OBJECTS".

23.6 Add a new display

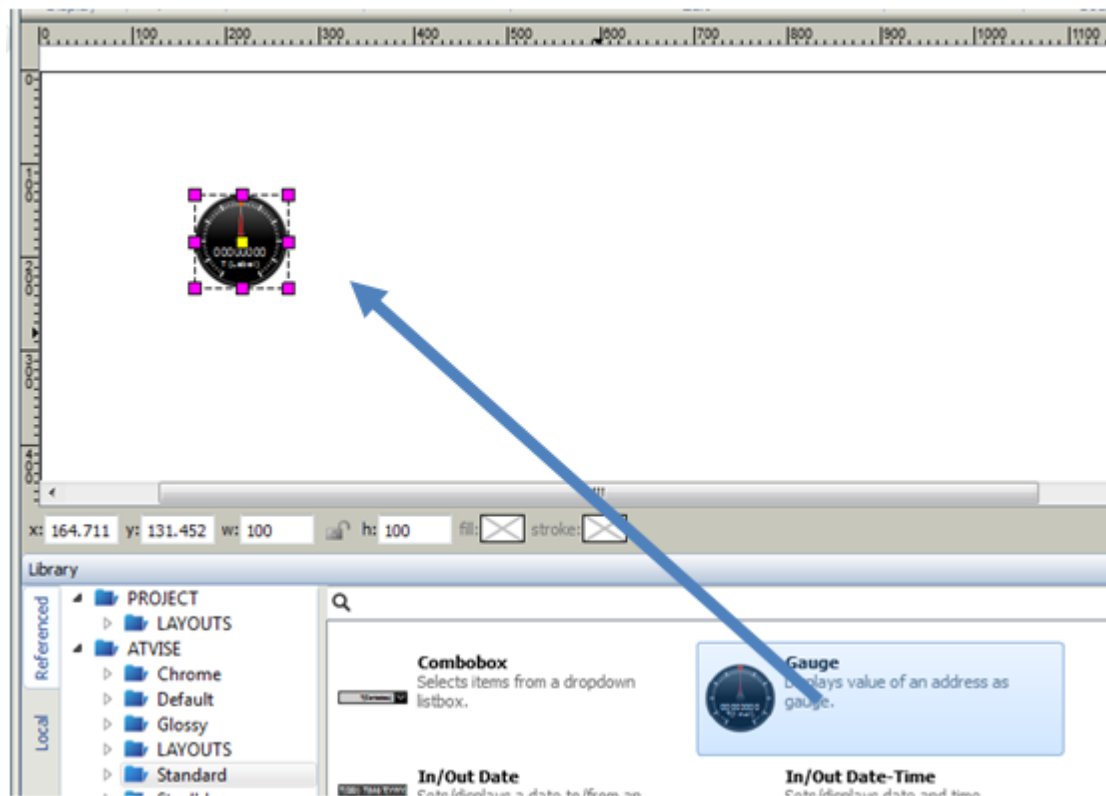
1. Select folder **DISPLAYS**.
2. Then right-click **MAIN** and select **Add Display...** from the context menu:



3. A dialog is opened. Enter the desired display name (**display1** in our example).

23.7 Add a new visual object

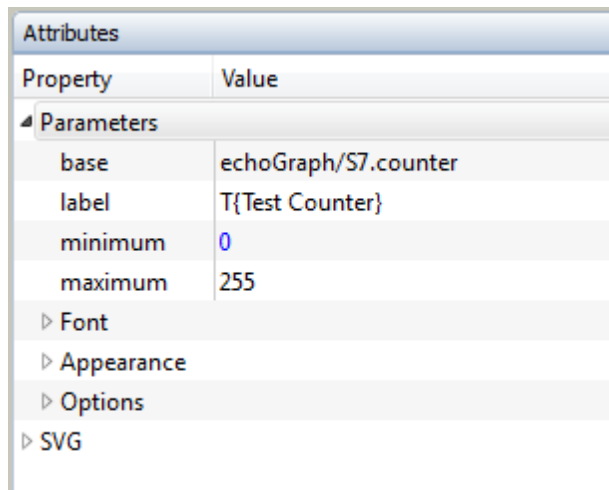
1. Add the desired objects onto your display-page. These objects could be either custom defined (refer to the atvise help for detailed information) or you can use the default library of the standard objects.
2. The following example shows how to add a standard gauge that shows the real time value of an item from a PLC.



3. Drag the Gauge symbol from the frame library onto the main editor canvas.
4. Modify the position and size of the object by using the small violet rectangles around the object.

23.8 Modify the object parameters

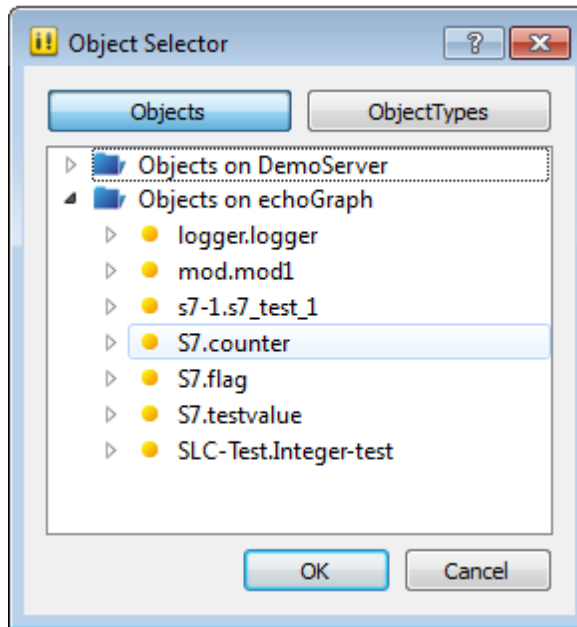
1. Select the Gauge object with a link-click. On the right side of the editor, an **Attributes** frame is opened. All the object parameters and the link to the data in the echo device are defined here:



2. The meaning of the Parameter attribute fields is as follows:

base	The variable to display in the form of the echo item syntax.
label	The text label of the object
minimum	Desired minimum value of the item (e.g. 0 for a unsigned byte variable)
maximum	Desired minimum value of the item (e.g. 255 for a unsigned byte variable)

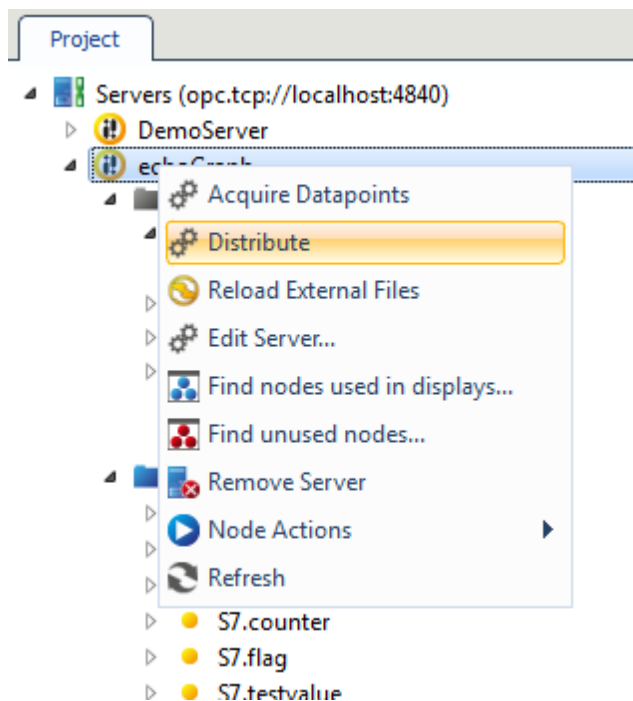
If you added your desired items into the echo symbol table, you do not need to manually write the item syntax for each variable. When you click on the base value input field and click on the **['...']** button, a new window of the imported symbols is opened where you can select your items directly:



If you want to change the appearance of the object, refer to the atvise builder help for details.

23.9 Upload your project into the echo device

1. Save your project.
2. Then right-click on the server name and select **Distribute**:

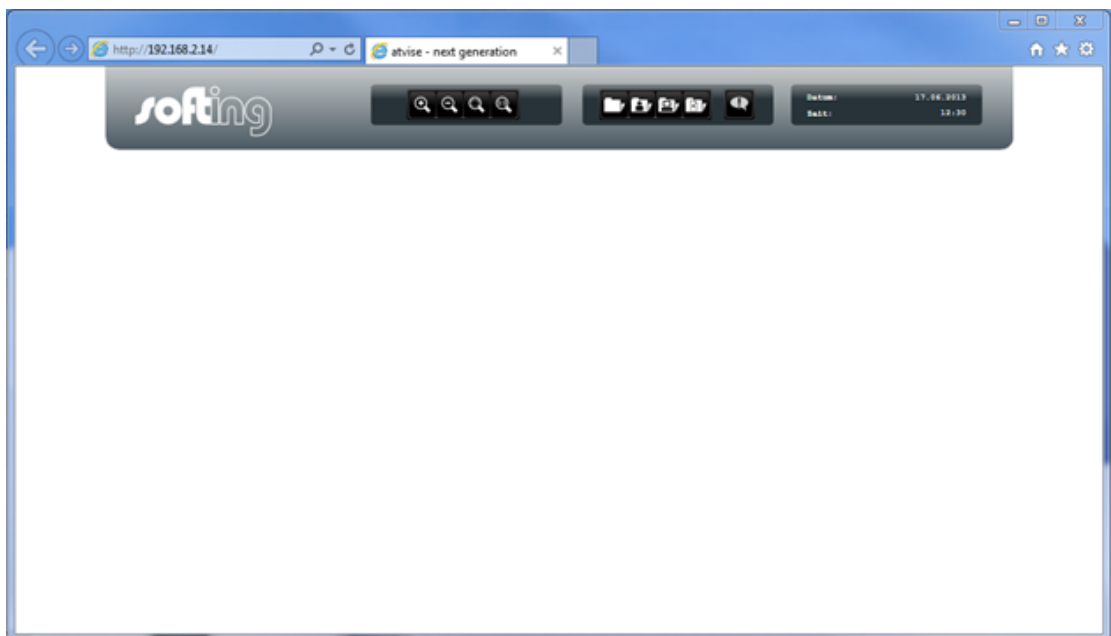


3. A window with a progress bar appears. The visualization will be generated and uploaded directly into your echo device. Make sure that you define the project files properly in the server definition as described below.
4. To add more objects in your visualization, simply add them from the library and define their attributes accordingly.

Additional examples are described in the atvise builder help. If you follow these, keep in mind that you always need to use the item syntax or use the acquired datapoints (items) from your echo device.

23.10 Use your visualization

1. Open your web browser.
2. Enter **http://<Echo_IP_address>** in your address bar (URL). The main web page of your visualization is opened:



3. Now select the display by hovering the mouse over the display folder symbol.
4. Click on the desired display (**display1** in our example):



5. Your visualization will be displayed.
6. In order to create more complex projects, refer to the tutorials in the integrated help of the atvise builder.



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