How-To Guide
SAP Extended Warehouse Management
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SAP Plant Connectivity Configuration Guide for SAP Extended Warehouse Management
Connecting External Devices to a Material Flow System
# Document History

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1 Business Scenario

1.1 Introduction

SAP Extended Warehouse Management (SAP EWM) contains functions and features for controlling material flow in your warehouse. This functionality is delivered with the Material Flow System (MFS) component of SAP EWM. An important part of a working MFS is the robust and fast data exchange between MFS in SAP EWM and external data sources such as programmable logic controllers (PLCs) or rack feeders. For this purpose, SAP provides SAP Plant Connectivity (PCo). This guide describes how you can set up PCo agents for transferring data between SAP EWM and the outside world.

2 Background Information

2.1 Some Facts About SAP Plant Connectivity

With SAP Plant Connectivity (PCo), SAP provides a software component that enables the exchange of data between an SAP system and the industry-specific standard data sources of different manufacturers, for example, process control systems, plant historian systems, and statistical process control (SPC) systems. The exchange of data described above is depicted in the following figure:

2.1.1 Vertical Integration with SAP Plant Connectivity

With PCo, you can receive tags and events from the connected source systems in production either automatically or upon request and forward them to the connected SAP systems. The data exchange between the external data sources and PCo is carried out using PCo agents and agent instances. Note that an agent is a NET-DLL Assembly component that can set up a connection between a data source and PCo. An agent instance is a user-defined configuration of an agent that enables the data flow.
2.1.2  Basic Processes in SAP Plant Connectivity

PCo supports the following processes:

- Notification process
  The notification process enables you to monitor production facilities and record any sudden, undesired events (such as rule violations or changes in measurement readings) and report them to a destination system.
- Query process
  The query process enables you to query specific source system tags from a destination system (such as SAP Manufacturing Integration and Intelligence (SAP MII)). This data can then be displayed on a dashboard, for example.

The processes described above are depicted in the following figure:

You can use a combination of a notification process and a query process for Web service handling.

2.1.3  Features

2.1.3.1  Plant Connectivity Management Console

The PCo Management Console is the central administrative tool for setting up PCo. You can create and configure the following elements in the PCo Management Console:
- Source system
- Destination system
- Agent instance
- Notification or versioned notification
The following are further PCo functions:

- Sending of notification messages that are based on real-time events on the shop floor
- Running of queries in shop floor systems
- Alias management to simplify the process of browsing for certain tags

2.1.3.2 Monitoring

- Monitoring and administration
  The PCo Remote Client is available for the monitoring and administration of your PCo systems in production. The Remote Client is a snap-in of the Microsoft Management Console (MMC 3.0), which is provided by SAP together with PCo. With the Remote Client, you can monitor all PCo systems with their individual agent instances at a glance, as well as start and stop the agent instances.
- Active monitoring
  During productive operation, all agent instances can be monitored automatically so that outages in the communication connection can be reported immediately.

2.1.4 Further Sources of Information

This configuration guide focuses on connecting the Material Flow System (MFS) component of SAP Extended Warehouse Management (SAP EWM) with the warehouse data sources using the socket agent of PCo. But PCo allows you also to connect weighing systems of the warehouse with SAP EWM using different PCo agent types. Installation of PCo is described in the appendix of this document.

For more information about the various possibilities that PCo offers, see the following:


3 Prerequisites

- SAP EWM 7.02 and higher with a properly configured material flow system (MFS)
- SAP Plant Connectivity (PCo) 15.0 and higher installed on a Microsoft operating system
  The details are as follows:
  - For information about installing PCo 15.0, see the installation guide for SAP Plant Connectivity on SAP Help Portal at http://help.sap.com/pco.
  - PCo is a Windows-based application developed in C#, which builds on the .NET-Framework. PCo uses Web Service technology.
  - To be able to implement PCo, you must first have installed .NET Framework 4.0 and higher.
  - PCo requires Visual C++ Redistributable for Visual Studio 2012 Update 1 as a Microsoft runtime library. This is installed when PCo is installed.
PCo uses the Microsoft SQL Compact Server in version 4.0 to store the agent's configuration data. This is installed when PCo is installed.

If PCo is used in the notification process, the queues for the messages are managed using the Microsoft Message Queue (MSMQ). This Windows component is activated automatically when PCo is installed.

If the source system works with OPC interfaces, you need to download the corresponding OPC software from the manufacturer or the OPC Foundation.

To troubleshoot PCo, use the PCo Management Console to examine the logs for the agent instance. You can use the Windows Application Event Log to view additional errors and warnings.

**Important**

Follow the recommendation of SAP Note [2120484](#) to maintain the configuration settings for the socket agent. This SAP Note also contains templates for an easier setup of the required PCo data.

### 3.1 Necessary Technical Data of SAP Extended Warehouse Management

For the next steps you need to get technical data about the SAP Business Suite system which is to be connected with PCo:

- **SAP Gateway-Host Machine Name**
  Remote Function Call (RFC) gateway is installed on a machine of your SAP system landscape. This machine acts as a gateway host and allows the establishment of RFC connections between PCo and SAP systems.

- **Description of SAP Gateway Service**
  Enter the name of the SAP gateway service or the port number if the gateway service is not defined in a service file.

- **Definition SAP Router**
  SAP Router allows communication through the firewall. Enter the parameters of the SAP Router-
  Parameter in the following format: `/H/hostname//S/portnumber/H/`

- **Logon Information for SAP EWM System:**
  - Address of SAP application server
  - System number of SAP EWM system
  - Client
  - Name and password of SAP user, which is used for RFC communication and execution of SAP EWM
  - System ID, message server, and logon group (in case load balancing is used for maintaining the PCo target system of the SAP EWM system)

### 4 Step-by-Step Procedure

The following steps are required to configure SAP Plant Connectivity (PCo) and SAP Extended Warehouse Management (SAP EWM):

1. Creating the Remote Function Call (RFC) destination (SAP EWM)
2. Creating the source system for the socket agent (PCo)
3. Creating the destination system for SAP EWM (PCo)
4. Creating the PCo socket agent instance (PCo)
5. Creating the notification for the PCo socket agent (PCo)
6. Starting the PCo socket agent (PCo)

### 4.1 Creating the Remote Function Call Destination (SAP EWM)

A unique link between the PCo agent instance and the SAP EWM system is established using a corresponding RFC destination. Create the RFC destination as follows:
1. Start transaction SM59 in the SAP system.
2. Choose the TCP/IP Connections folder and create a new entry.
3. Choose the Technical Settings tab page.
4. In the Activation Types screen area, choose the Registered Server Program checkbox and enter the program ID.

You must maintain the same program ID in the corresponding PCo agent instance (in the Program ID field in the RFC Server Settings screen area on the Query Ports tab page).

The steps above are shown in the following figure:

5. Enter Default Gateway Value as the start type of the external program.
6. Enter Default Gateway Value as the CPI-C timeout.
7. Enter the system data of your SAP Gateway system in the Gateway Host and Gateway Service fields.

You do not need to maintain any other settings for the moment. The Logon & Security tab page provides settings to enable secure network communication (SNC).

### 4.2 Creating the Source System for the Socket Agent (PCo)

1. Start the PCo Management Console and choose the Add Source System button, as shown in the following figure:

   The Add Source System dialog box is displayed.
2. In the Source System Type, enter Socket Agent.
3. Maintain a name and description for the PCo source system for the programmable logic controller (PLC), as shown in the following figure:
4. Choose the **OK** button and save your changes.
The system opens the **Socket** tab page. The entry for the new source system appears in the **Source Systems** section, as shown in the following figure:

![Socket Tab Page](image)

### 4.2.1 Maintaining Settings for the Socket

#### 4.2.1.1 **Socket** Tab Page

1. Deselect the **Remove Terminator When Receiving Data** checkbox.
   Do not change the default values of other parameters or maintain communication ports, as shown in the following figure:

![Socket Tab Page](image)

2. Choose the **Reliable Connection** tab page.

   ![Reliable Connection Tab Page](image)

   **Note**
   For more information about creating source systems, see SAP Library for PCo on SAP Help Portal at [http://help.sap.com/pco](http://help.sap.com/pco). In SAP Library, choose **Source System** -> **Socket Source System**.

#### 4.2.1.2 **Reliable Connection** Tab Page

1. In the **Max. Number of Retries** field and the **Retry Interval** field, enter **0**, as shown in the following figure:
2. Save your changes

4.3 Creating the Destination System for SAP EWM (PCo)

1. Choose the Add Destination System button, as shown in the following figure:

The Add Destination System dialog box is displayed.

2. In the Type field, enter RFC Destination.

3. Maintain a name and description for the PCo destination for the PLC, as shown in the following figure:

4. Choose the OK button and save your changes.

The entry for the new destination appears in the Destination Systems section, as shown in the following figure:

The system opens the RFC Client Settings tab page.

4.3.1 Maintaining Settings for RFC Client

Enter the details of the SAP EWM system that you created the RFC destination for previously, as follows:

1. Start transaction SM59 for the application server.

2. If the SAP EWM system is a single application server, specify the parameter for the application server.

Alternatively, activate the load distribution options by setting the Activated parameter. Then enter the parameters system ID, message server, and logon group accordingly.
3. Enter the following details:
   - **SAP Router**: Leave blank
   - **System Number**: [EWM system number]
   - **Client**: [Logon client of EWM system]
   - **User**: [SAP logon user]
   - **Password**: [SAP logon password] for assigned SAP user
   - **Type**: SAP EWM

   Do not change the default values of other parameters.

4. Save your changes.

5. Choose the **Check Connection** and **Simulate System Call** buttons to check the proper logon to the SAP EWM system: Connection check and simulation of system call return success messages

4.4 Creating the PCo Socket Agent Instance

1. Choose the **Add Agent Instance** button as displayed in the following figure:

   ![Add Agent Instance](image1.png)

   The system displays the **Add Agent Instance** dialog box.

2. Choose the source system that you previously created.

3. Maintain a name and description for the agent instance, as displayed in the following figure:

   ![Agent Instance Settings](image2.png)

   For more information about creating source systems, see SAP Library for PCo on SAP Help Portal at [http://help.sap.com/pco](http://help.sap.com/pco). In SAP Library, choose **Destination System -> RFC Destination: RFC Client Settings Tab.**
4. Choose the OK button and save your changes. The system opens the Host tab page.

4.4.1 Host Tab Page

4.4.1.1 General Settings Section

Set the log level to Verbose for the first connectivity tests to record messages of all log levels. Then you get enough information for the diagnosis of connectivity problems between the PCo agent and the SAP EWM system. Once a stable connection has been achieved, set the log level to Error. This improves the performance of PCo. Therefore the log level should be Error when PCo is used in a productive environment.

4.4.1.2 Host Settings Section

Here you can determine if the PCo agent is executed as a Windows service or a Windows process (EXE). Windows processes require that a corresponding user is logged in the system. The Windows processes stop when the user logs out. Windows services do not require that a corresponding user is logged in.

1. Deselect the Run Host as an Executable checkbox. As PCo agents should run for a very long time, it is favorable to run them as Windows services.

2. Keep the default value for the service user name (\localsystem).
   If another service user is to be entered, set the parameters for the service user name and the service user password. The service user must be a Windows user with the authorization to start the PCo socket agent as a Windows service.

   The automatic start mode forces the starting of the PCo agent instance when the operating system starts. This is very helpful after the operating system has to be restarted.
4.4.1.3 Notification Message Queue and Dispatch Settings Section

1. Keep the default settings and do not select the following checkboxes, as displayed in the following figure:
   - Process Notification Messages Exactly Once in Order
   - Keep Copies of Queued Notification Messages in Journal Queue
   - Make Queued Notification Messages Recoverable

2. Go to the Query Ports tab page.

4.4.2 Query Ports Tab Page

1. Select the SAP EWM RFC Server checkbox and enter the following details:
   - Program ID: Enter your program ID, which is defined for your RFC destination (NN_MFS_PCO_CONN).
   - SAP Gateway Host and SAP Gateway Service: Enter the corresponding values of your RFC destination, as displayed in the following figure:

2. Save the settings and an entry for the new PCo agent instance appears in the Agent Instances section, as displayed in the following figure:

3. Choose the Test Gateway Registration button and the testing gateway registration displays a success message, as displayed in the following figure:
4.5 Creating the Notification for the PCo Agent

1. Mark your PCo agent instance and choose the Add Notification button as displayed in the following figure:

The Add Notification dialog box displays, as shown in the following figure:

2. Do the following:
   - Make sure that the agent instance name is the same as the marked PCo agent.
   - Maintain a name and description for the notification.
   - Do not select the Template checkbox.

3. Choose the OK button and the notification appears as a child node under the selected PCo agent instance, as displayed in the following figure:

4. Select the notification node and go to the Trigger tab page.

4.5.1 Trigger Tab Page

1. Select the Enabled checkbox.
2. In the Trigger Type field, enter Always as displayed in the following figure:

![Trigger Type field](image)

3. Select the notification node and go to the Message Delivery tab page.

### 4.5.2 Message Delivery Tab Page

1. In the Max. Number of Retries field and the Retry Interval field, enter 0.
2. In the Failed Messages Persistence field, enter KeepLast.
3. In the Lifetime field, enter the minimum value (1 minute).
4. In the Message Bundling section, deselect both checkboxes (as of PCo 15.0).
   
   The settings above are displayed in the following figure:

![Message Delivery Tab](image)

5. Select the notification node and go to the Destinations tab page.

### 4.5.3 Destinations Tab Page

1. Choose the New Destination button as displayed in the following figure:
The system displays the *Add Destination* dialog box.

2. In the *Destination System Type* field, enter the destination that you maintained previously.

3. Add a name and description for your destination to which the notifications are to be sent, as displayed in the following figure:

4. Choose the *OK* button and save your changes.

**Note**


### 4.6 Starting the PCo Socket Agent

1. Select your PCo agent instance and chose the *Start Agent Instance* button as displayed in the following figure:

The status icon of the PCo agent instance changes from a white square to a green circle, as displayed in the following figure:

2. Check the PCo log files as follows:
   a. Go to the *Log* tab page.
   b. Choose the *Refresh* button.
   c. Search for log entries indicating errors (*Event Type column: value Error*), as displayed in the following figure:
4.7 Testing RFC Connectivity from SAP EWM to PCo Socket Agent

1. Log on to the SAP EWM system.
   - Make sure that you choose the application server you entered as the gateway host.
   - Go between the current application server and other application servers using transaction SM51.
2. Choose your RFC destination (type: T[TCP/IP])
   Use transaction SM59 or on the SAP Easy Access screen choose Tools -> Administration -> Administration -> Network -> RFC Destinations.
3. Choose the Connection Test (Ctrl+F3) button as shown in the following figure:

   The following result list containing transfer data and transfer times appears:

   If the RFC connection cannot be established, the RFC connection check fails as displayed in the following figure:
4.8 Checking for Errors

Check that the following issues do not occur:

- PCo agent instance is inactive/stopped
  
  Restart the PCo agent instance using the PCo Management Console.

- Log file of PCo agent instance contains errors
  
  PCo error message text in PCo log contains the phrase "registration... not allowed", This indicates that there are insufficient security settings for external programs and the system administrator has to adjust the settings. For hints about setting up the proper registration, see SAP Note 1789575.

- Current application server is not used as the gateway host in the RFC destination and PCo agent instance
  
  Start transaction SM51 and double-click on the appropriate application server entry in the result list, as displayed in the following figure: