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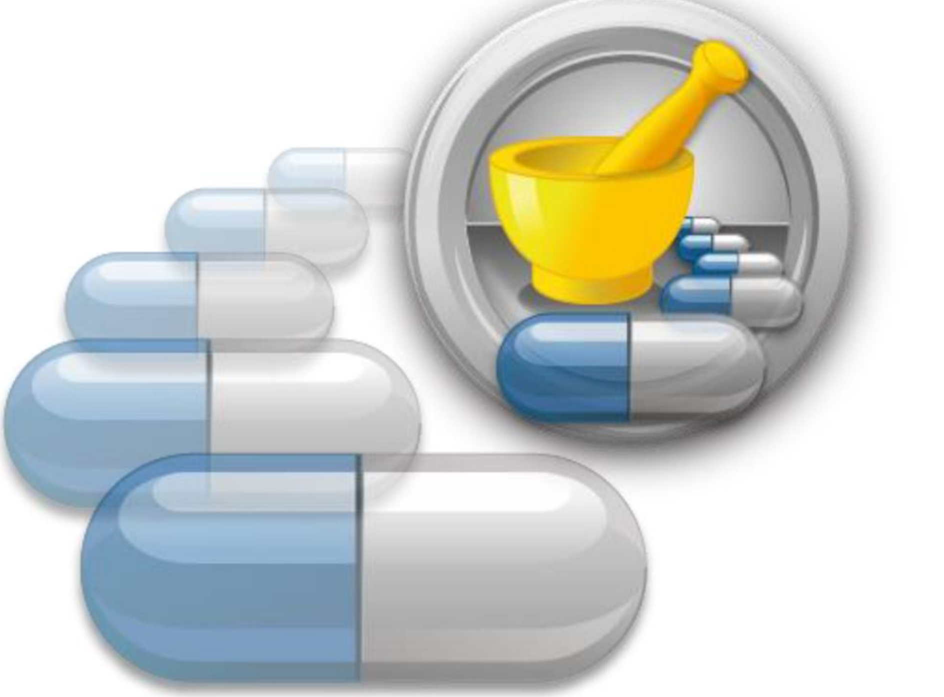

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Introduction

This manual is intended for system administrators of PharmaSuite at a customer's site. The following chapters describe the methods of integrating custom hardware, best practices for managing user accounts of a client operating, system, controlling access to the system, and monitoring features. You will learn how to connect custom scales, printers, and scanners to the system, define access rights, create users, user groups, and assign access rights to them, export and import master recipes, master workflows, and building blocks, import equipment classes and entities from an external source, configure the device identifier, localize each as unit of measure for Recipe Designer - Device, and which event sheets are used for various purposes.

The system administrators need to be familiar with the FactoryTalk® ProductionCentre functions for controlling access to the system, maintaining list objects, and using event sheets.

Typographical Conventions

This documentation uses typographical conventions to enhance the readability of the information it presents. The following kinds of formatting indicate specific information:

Bold typeface Designates user interface texts, such as

- window and dialog titles
- menu functions
- panel, tab, and button names
- box labels
- object properties and their values (e.g. status).

Italic typeface Designates technical background information, such as

- path, folder, and file names
- methods
- classes.

CAPITALS	Designate keyboard-related information, such as - key names - keyboard shortcuts.
`Monospaced typeface`	Designates code examples.

Extension and Naming Conventions

This section describes how to control efforts for migrating your PharmaSuite installation to upcoming versions. If you cannot observe the guidelines for technical reasons, please report the issue to your dedicated delivery team of Rockwell Automation or your system integrator.

PharmaSuite artifacts fall into two main groups: building blocks and PharmaSuite core artifacts.

- When you wish to modify a **building block**, use a copy of the building block. For details, see "Technical Manual Developing System Building Blocks" [A1] (page 81).
- When you wish to modify a **PharmaSuite core artifact**, the extension strategy depends on the artifact itself.
  Modify **DSX objects** and copy **all other PharmaSuite artifacts** (e.g. XML configurations for services).

In all cases, please follow the guidelines to control the migration effort (page 3).

Guidelines to Control the Migration Effort

Please ensure that you observe the guidelines listed below.

1. Retain the published API
   The published API of PharmaSuite is accessible via the PharmaSuite start page ("PharmaSuite-related Java Documentation" [C1] (page 82)).
   - If you adapt PharmaSuite on Java level, you must only use the published PharmaSuite Java API.
     Published interfaces will only be changed if necessary. Changes to these interfaces and classes will be announced in future release notes.
   - Avoid using methods and classes that are not published, classes from the implementation package (...*impl*...), or Pnuts functions from any PharmaSuite subroutine.
     These classes and functions may change in future versions of PharmaSuite without notification.

2. Rather modify than copy
   Whenever you wish to extend/modify any object of PharmaSuite in Process Designer (DSX objects), just override the object, except for the following objects:

   - For the **Application** object **Default Configuration**, apply the mechanism of nested configurations in order to reduce a potential migration effort (see chapter "Managing Configurations" in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81)).
   - For **FSMs** (flexible state models), structural changes (i.e. changes to states and transitions) are not allowed in order to enable a later system migration. Modifications of semantic properties can be applied to the standard FSM. They do not impact a system migration.

   When you migrate your PharmaSuite installation to another version, PharmaSuite Update and Migration displays a warning if a standard object was changed. Subsequently, you can decide whether to adapt your extension, ignore the changes delivered with the new version, or replace your extension with the new version (if applicable).

3. Mark your objects
   When naming your artifacts (e.g. objects in Process Designer, classes, interfaces, methods, functions, building blocks), use specific prefixes for your objects. The main purpose of the naming conventions is to prevent naming conflicts with deliverables from other vendors or with other versions.

   - Define and make use of a vendor code consisting of up to three uppercase letters as prefix (e.g. MYC for the My Company vendor code).
     The **X_** and **RS_** prefixes are reserved for PharmaSuite and PharmaSuite-specific product building blocks, respectively.
   - Do not reuse any of the prefixes of PharmaSuite objects in Process Designer in order to avoid conflicts during migration.
   - This guideline also applies to UDA definitions and column names of application tables.
   - Additional conventions apply to building blocks (page 5).

If you do not observe the guidelines, an update process during system migration may fail due to conflicts.

Building Block-specific Conventions

Besides the general conventions (page 3), additional conventions apply to building blocks related to vendor code, version number, and length restrictions:

1. Vendor code
   - It must be appended to the name of a phase or parameter class used in the UI (enclosed in round brackets).
   - It must be used as prefix for the AT definitions.
   - The package name must also contain a vendor reference. You can either use the vendor code or write out the company's full name.
2. Version number
   - The version number consists of two components, an integral part to refer to a major version and a fractional part to refer to a minor version, e.g. 2.1.
   - It must be appended to the name of the phase or parameter class used in the UI and to the base name used for the generated artifacts.
   - For the UI, the version number is enclosed in square brackets, e.g. [2.1].
   - Internal names must not contain brackets and dots, since Java does not allow the usage of these characters. Therefore, the last four characters are reserved for the version number, with digits 1 and 2 representing the major version and digits 3 and 4 representing the minor version. The format is xxyy, e.g. 0201 for version [2.1], 0100 for version [1.0], or 0113 for version [1.13].
3. Length restrictions
   - The maximum length of the **name** of a phase or parameter class used in the UI is 64 characters.
   - The maximum length of the **base name** of a phase building block or parameter class is 18 characters (14 for the name, 4 for the version).

Examples:

- **Hello World** phase of **My Company** with vendor code **MYC** in version **2.1**

```
<Name>Hello World Phase (MYC) [2.1]</Name>
<PhaseLibBaseName>HelloWorld0201</PhaseLibBaseName>
<ATDefinitionPrefix>MYC</ATDefinitionPrefix>
<PackageName>com.mycompany.phase.helloworld</PackageName>
```

- **My Parameter** parameter class of **My Company** with vendor code **MYC** in version **1.0**

```
<Name>My Parameter (MYC) [1.0]</Name>
<ParamClassBaseName>MyParam0100</ParamClassBaseName>
<ATDefinitionPrefix>MYC</ATDefinitionPrefix>
<PackageName>com.mycompany.parameter.myparam</PackageName>
```

Oracle Database Data Types: varchar2 and nvarchar2

When you define text fields for FactoryTalk ProductionCentre application tables or UDAs, you should be aware that there are significant differences between the **varchar2** and **nvarchar2** data types used by Oracle databases.

- The maximum field length for both database data types is restricted to 4000 bytes.
- A field of the **nvarchar2** data type works as expected: For a 4000 characters text field, you can only insert the maximum of 2000 2-byte UTF8 characters or 1300 3-byte UTF8 characters. PharmaSuite text input fields check the number of bytes.
- For an Oracle 11 database, a field of the **varchar2** data type can only handle 1000 2-byte UTF8 characters or 667 3-byte UTF8 characters. In this case, PharmaSuite text input fields check the byte length and prevent the database exception "ORA-01704: string literal too long".

TIP

Previous versions of FactoryTalk ProductionCentre (prior to 9.3) and PharmaSuite (prior to 5.0) contained **varchar2** database data type definitions instead of **nvarchar2**. Therefore a migrated PharmaSuite system may contain **varchar2** definitions and the maximum length of a **varchar2** database field may be defined in maximum number of **bytes**. In this case, if a text does not only contain 1-byte UTF8 characters, the **byte** length is greater than the **char** length and can cause a "value too large exception" (ORA-01401: inserted value too large for column, ORA-12899: value too large for column).
For this reason, we recommend to migrate all **varchar2** fields to **nvarchar2** fields. A migrated FactoryTalk ProductionCentre database should have the same database schema as the database of a newly installed FactoryTalk ProductionCentre system and only contain **nvarchar2** database data type field definitions.

Integrating Custom Hardware

PharmaSuite provides interfacing to several qualified scales, printers, and barcode scanners. In case it is required to interface with equipment that has not been certified for use with PharmaSuite, integration and testing of those pieces of equipment can be done by qualified system integrators.

Regarding printers, we expect all standard Windows printer drivers to function correctly with PharmaSuite. We recommend, however, to verify and test printers and drivers before using them in a production environment.

Barcode scanners must be able to emulate keyboard input to be suitable for use with PharmaSuite.

Integrating New Scales

Before you can use a scale with PharmaSuite you need to configure the scale itself:

- Mettler Toledo SICS protocol-based scale (page 9)
  - AB, AG, PB, PL, PG, PR, SB, SG, SR (with built-in RS232 (V.24) interface)
  - XP (with non-built-in RS232C (V.24) interface)
  - ICS4_5, XP, XS (with built-in Ethernet 10Base-T (RJ45) interface)
- Mettler Toledo SICS protocol-based terminal (page 10)
  - IND780 (with built-in RS232 (V.24) serial port)
  - IND890 (with built-in Ethernet 10Base-T (RJ45) interface)
- Mettler Toledo scale terminal
  - ID1 [Plus/Minus], ID2, ID3[s] (MMR protocol-based) (page 13)
  - ID5 and ID7 (MMR protocol-based) (page 14)
  - IND (MMR protocol-based) (page 15)
- Mettler Toledo scale interface
  - GD12 (IDNet protocol-based) (page 18)
- Sartorius xBPI protocol-based scale (page 19)
- Sartorius SBI protocol-based scale (page 20)

and to define and configure the scale equipment entity in PharmaSuite (page 22).

As a first step, identify the exact make and type of the scale, with which type of interface it connects to a PC, and which communication protocol it uses. Typically you will find this information in the scale manual or on the manufacturer's website. PharmaSuite provides drivers for Mettler Toledo [D1] (page 82) and Sartorius [D2] (page 82) scales that

- can be connected to a PC by serial RS232 (V.24) or (if available) Ethernet network (TCP/IP) interfaces and
- use one of the following communication protocols:
  - SICS, MMR, or IDNet (Mettler Toledo)
  - SBI/xBPI (Sartorius)
    and are included in the range of supported scale families.

Support for some features, such as identification by serial number, calibration, blocking of scales keyboard, and transfer of nominal value depends on

- the scale driver
- the scale type
- the setup of the scale
- the configuration of the scale equipment entity
- how the scale is used by the Dispense application.

TIP

If you need to operate scales for which there is no scale driver provided by PharmaSuite, please refer to the PharmaSuite documentation. In particular, see chapter "Adding New Scale Drivers" in Volume 2 of the "Technical Manual Configuration and Extension" [A2] (page 81).

Configuring Scales

To configure the new scale, proceed as described in the section that applies to your scale type.

Mettler Toledo SICS Protocol-based Scales

To connect Mettler Toledo scales that use the SICS communication protocol, proceed as follows:

- Configuration of scales with a built-in RS232 (V.24) interface (METTLER AB, AG, PB, PL, PG, PR, SB, SG, SR):

  1. Change the interface mode from **Printer** to **Host**.
  2. Set the parameters as follows:

Parameter	Value
Communication	7 data bits
Communication	1 stop bit
Communication	Even parity
Communication	2400 baud
Hardware handshake	None

- Configuration of scales with non-built-in RS232C (V.24) interface (METTLER XP).
  Set up the interface mode of the scales as follows:

Parameter	Value
Host	RS232 fix
Communication	7 data bits
Communication	1 stop bit
Communication	Even parity
Communication	2400 baud
End of line	<CR> <LF>
Charset	Ansi/Win
Continuous mode	off
Output format	MT-SICS setting
Handshake	None

- If only one scale is connected per COM interface, type **0** (zero) in the **Terminal number** property of the scale configuration data of the scale equipment entity in Data Manager - Equipment.

  TIP - NON-DEFAULT COMMUNICATIONS SETTINGS
  See "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).
  TIP - SICS LEVEL
  See "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).
  TIP - MULTIPLE SCALES
  Mettler industrial terminals typically allow to connect to more than one scale. If the terminal supports the MMR protocol, use the IND driver. Otherwise, if the terminal supports the SICS protocol, use the SICS driver. Be aware that some terminals have no standard SICS command to switch between multiple scales connected to the same terminal. This does not apply to the IND780 or IND890 terminal, see section "Mettler Toledo SICS Protocol-based Terminals" (page 10).

- Configuration of scales with a built-in Ethernet 10Base-T (RJ45) interface (e.g. METTLER ICS4_5, XP, XS with Ethernet card/option)
  Set the parameters of the scales as follows:
  (**Communication - COM2** (use the COM# assigned to Ethernet not to RS232C))

Parameter	Value
Mode	Dialog
Parameter Ethernet	Contact your network administrator for the following values: DHCP, Local IP, Subnet mask, Gateway
TCP mode	TCP mode: Server, Local port: 4305, Disconnect timeout: 0

Please make a note of the values of **Local IP** and **Local port**, you will need them during the scale configuration in Data Manager - Equipment.

Mettler Toledo SICS Protocol-based Terminals

To connect Mettler Toledo terminals (e.g. IND780 or IND890, see also [D3] (page 82), [D7] (page 82)) that use the SICS host communication protocol, proceed as follows:

- Configuration of IND780 terminals with a built-in RS232 (V.24) serial port COM1 or COM2 in the Terminal Setup Mode:

  1. Select **Communication\Connections/X4** and insert a connection for the respective port (e.g. **COM1** or **COM2**) with **Assignment=SICS**, and **Trigger** = **None**, and **Template** = **None**.

2. Select **Communication\Interfaces\Serial/X4** and modify the communication parameters for the respective serial port (COM1 or COM2) as follows:

Parameter	Value
Data bits	7 data bits
Interface/Hardware	RS-232
Parity	Even parity
Baudrate	2400 baud
Flow control/Handshake	None
Character set	1252
String/Frame	<CR><LF>

- Configuration of IND890 terminals with a built-in Ethernet 10Base-T (RJ45) interface
  Set the parameters of the terminal as follows:
  (**Communication\Connections – insert a connection for Port ENet**)

Parameter	Value
Port	Enet
Hardware	Ethernet
Assignment	SICS
Trigger	None
Timeout	0 seconds
Template	None

Set the parameters of **Communication\Network\Ethernet\Settings** as follows:

Parameter	Value
DHCP, IP address, Subnet mask, Gateway address	Contact your network administrator for the values.
Primary port	1701

Please make a note of the values of **IP address** and **Primary port**, you will need them during the scale configuration in Data Manager - Equipment.

- Terminals allow to connect to more than one weighing platform. The scale identifier number (1..5) must be provided as the **Terminal number** property of the scale configuration data of the scale equipment entity in Data Manager - Equipment. If only one scale is connected per COM interface, type **0** (zero) for the property.

TIP - NON-DEFAULT COMMUNICATIONS SETTINGS

See "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).

TIP - SICS LEVEL

See "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).

TIP - MULTIPLE SCALES AT THE SAME TERMINAL

SNS n is the SICS command to switch between multiple scales connected to the same terminal. However, this command is currently supported only by IND780 with the latest firmware level. Alternatively, **AW 010 n** is the equivalent SICS command supported by IND890 with a firmware level v1.30 or higher. If your terminal does not support the commands and you have more than one scale connected to such a terminal, we recommend to set up the MMR protocol and use the IND driver instead. If this is also not supported, a customer specific driver is needed.

TIP - ETHERNET COMMUNICATION

Even though IND780 has a built-in Ethernet port it cannot be configured for connections using the SICS protocol.
However, IND890 supports running the SICS protocol over Ethernet.

TIP - DISABLING KEYBOARD OF TERMINAL VS. SCALE

IND780 and IND890 allow to disable the keyboard of the terminal through the driver. PharmaSuite will automatically disable the keyboard while it uses a scale, if the **Disable scale keyboard** and **Scale keyboard lockable** properties are set in the scale configuration data of the scale equipment entity in Data Manager - Equipment.
We recommend this setting to prevent changes to the weighed value that are not controlled by PharmaSuite e.g. zeroing or taring directly at the terminal.
If, however, scales connected to the terminal have a keyboard of their own (e.g. Laboratory scales connected via SICS on COM2) this keyboard will not be disabled. We recommend to either disable this keyboard at the scale itself, block it mechanically, or train the operators to not use it.

TIP - ENABLING DELTATRAC/SMARTTRAC GRAPHICAL DISPLAY

The terminal supports a weighing aid in the form of a bar graph or +/- display to visualize the deviation of the actual weight against the target value and its tolerance values. PharmaSuite can control this automatically after taring if
1) the **Send nominal value** property is set in the scale configuration data of the scale equipment entity in Data Manager - Equipment and
2) this feature has been set up in IND780 (SmartTrac size other than **none** must be selected at **Setup** > **Terminal** > **Display**, SmartTrac graphic display type must be selected for the scale at **Setup** > **Application** > **Operation** > **Target** > **Scale #**). IND890 has the DeltaTrac feature always enabled.

TIP - SCALE CALIBRATION AND ADJUSTMENT
This SICS level 3 functionality is not supported by IND780 or IND890.

Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals

The following tips apply to Mettler Toledo SICS protocol-based scales and terminals:

TIP - SERIAL NUMBER OF THE TERMINAL VS. ACTIVE SCALE
Terminals and scales support to query for their serial numbers. After the scale has been selected successfully, PharmaSuite checks if the serial number of the connected scale or terminal corresponds to the serial number defined in the basic data of the scale equipment entity in Data Manager - Equipment. If the serial number of the connected scale is not available (e.g. for an old IDNet weighing bridge), the serial number of the terminal is used instead for the check.

TIP - NON-DEFAULT COMMUNICATIONS SETTINGS
If the default communications settings listed above cannot be used, configure the driver to use non-default communications settings. For this purpose, in Process Designer, open the **ScaleDrivers List** object and locate the **SICS** item. **SICS** uses the default settings as listed above. When you add other items with a "qualifier" indicated by a slash (/) after the name (e.g. **SICS/2400-7-EVEN-1-NONE**), the same driver will be loaded, but it will use the qualifier indicated after the slash in the name (e.g. **2400-7-EVEN-1-NONE**) to set the communications settings.
The qualifier can consist of several options in the following order: **baud rate**, **number of data bits**, **parity**, **stop**, and **flow**. The values of the **parity** options are **NO**, **EVEN**, and **ODD**, the values of the **flow** option are **NONE**, **HARDWARE**, and **XONXOFF**. The options are separated by a dash (**-**) or an underscore (**_**).
Examples: **SICS/2400** runs with 2400 baud and the default settings of the other options. With **SICS/2400-7-EVEN** you specify baud, data, and parity and use the default settings of the other options.
SICS/9600-8-No-1-NONE is a pre-configured name of the SICS driver intended for SICS-based scales or terminals using the factory default setting of the device.
We recommend to specify each option. Make sure to restart PharmaSuite for Production Execution after having saved the changed list in order to make the changes effective.

TIP - SICS LEVEL
The PharmaSuite scale driver expects that the scale has implemented at least SICS level 0 and 1. A scale that has implemented only a subset of the SICS level-1 commands (e.g. TAC command is not supported), does not provide the complete functionality expected by the scale driver.
To retrieve the SICS levels with their versions and the SICS commands implemented by your scale, activate the INFO log level to log the replies to the I0, I1, I2, and I3 commands (see section "Troubleshooting Scale Communication" (page 23)).

Mettler Toledo Scale Terminals ID1 [Plus/Minus], ID2, and ID3[s] (MMR Protocol-based)

This section applies to the ID1 [Plus/Minus], ID2, and ID3[s] Mettler Toledo Industrial Scale Terminals, which use the MMR communication protocol.

To configure scale terminals with a built-in RS232C (V.24) interface, set the parameters as follows:

Parameter	Value
Communication	7 data bits
Communication	1 stop bit
Communication	Even parity
Communication	2400 baud
Hardware handshake	NONE
Mode	Dialog

For details how to configure the driver to use non-default communication settings, see TIP - NON-DEFAULT COMMUNICATIONS SETTINGS in section "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).

The ID1 multirange scale terminal provides a CL 20mA output via Interface 101 and an RS232C (V.24) interface via Interface 102. These interfaces are used to connect to a computer. ID3s corresponds to ID1 with numeric keyboard. Interface 301 is used for 20mA and Interface 302 for RS232C (V.24). Only one weighing header can be connected to an ID1 terminal. Unlike ID1, ID3 has a numeric keyboard.

DeltaTrac can be controlled if plus/minus weighing is configured for the terminal and a nominal value and range are transmitted to the scale.

To populate the bar diagram of the terminal with the current nominal value after taring, set Optical weighing-in aid for ID1/ID3 in the master mode.

Parameter	Value
PlusMinus weighing	YES
Application	Weighing-in to target weight
Display	Normal or difference between set weight and actual weight
LED	LED-analog display as lighting trunking

TIP

The serial number and calibration features are not supported.

Mettler Toledo Scale Terminals ID5 and ID7 (MMR Protocol-based)

This section applies to the ID5 and ID7 Mettler Toledo Industrial Scale Terminals, which use the MMR communication protocol.

To configure scale terminals with a built-in RS232C (V.24) interface, set the parameters as follows:

Parameter	Value
Communication	7 data bits
Communication	1 stop bit
Communication	Even parity
Communication	2400 baud
Hardware handshake	NONE
Mode	Dialog

For details how to configure the driver to use non-default communication settings, see TIP - NON-DEFAULT COMMUNICATIONS SETTINGS in section "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).

For ID5 terminals, the settings listed above correspond to the factory preset state. The interface parameters preset for the ID7 terminal, however, differ from them and have to be adjusted accordingly.

An ID5 multirange scale terminal must be provided with an RS232 (V.24) or 20 mA current loop interface by means of installing the options 082, 084, or 089 in module slots 1 or 2, which connect to the computer. By using a GD31 multiplexer you can connect up to three weighing headers to an ID5 terminal. For this purpose, the individual scales are arranged with multiple ID5 scale equipment instances at the same work center and the same COM interface, but have different terminal numbers "1", "2", or "3" maintained in the scale configuration data of the scale equipment entity in Data Manager - Equipment.

This terminal class can connect to more than one weighing bridge per terminal. Each scale requires its individual scale equipment entity in Data Manager - Equipment using the same COM port but different terminal numbers.
DeltaTrac can be controlled if plus/minus weighing is configured for the terminal and a nominal value and range are transmitted to the scale.

TIP

The serial number and calibration features are not supported. A dosage control module DOSPac or other modules such as FORMPac that can optionally be built into an ID5 terminal are not supported by the driver.

METTLER TOLEDO SCALE TERMINAL IND (MMR PROTOCOL-BASED)

This section applies to the IND Mettler Toledo Industrial Scale Terminals, which use the MMR communication protocol.

- To configure a scale terminal with a built-in RS232C (V.24) interface, set the parameters as follows:

Parameter	Value
Communication	7 data bits
Communication	1 stop bit
Communication	Even parity
Communication	2400 baud
Mode	Dialog
Dialog Mode	MMR
Hardware handshake	No handshake
AUTOMATIC CONTINUOUS TRANSMISSION	NO AUTO TRANSMISSION
STRING FRAMING	CR Yes, LF Yes, <STX>---<ETX> No, BLOCK CHECK CHAR No

The settings listed above do not correspond to the factory preset state (8 bits / 1 stop bit/ no parity, 9600 Baud). Thus the settings need to be adjusted accordingly. For details how to configure the driver to use non-default communication settings, see TIP - NON-DEFAULT COMMUNICATIONS SETTINGS in section "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13). For an IND terminal, it is also necessary to setup the MMR communication protocol for use with the host communication.

EXAMPLE CONFIGURATION OF IND690 TERMINALS

To configure an IND690 terminal with a built-in RS232C (V.24) interface, set the parameters as follows (assumption: connection port of the IND690 terminal to the PC is COM1):

Parameter	Value
Mode->Interfaces->COM1->RS232->Communication	---
BITS/CHAR	7
STOP BITS	1
PARITY	Even
BAUDRATE	2400
Hardware handshake	NONE

Parameter	Value
Mode->Interfaces-> COM1->RS232->MODE-> DIALOG MODE->MMR	---
HANDSHAKE	NO HANDSHAKE

To connect scales to the terminal, e.g. an IDNET-based scale (= scale_1) with an integrated scale processor on COM2 and a SICS-based scale (=scale_2) on COM3, set the parameters on the IND690 terminal as follows (assumption: COM2 of the terminal has an IDNET interface, COM3 of the terminal has a SICS interface):

Parameter (connect scale_1 to IND690)	Value
Mode->Scale->(CH:1)	---
all parameters	keep standard values

Parameter (connect scale_2 to IND690)	Value
Mode->Scale->(CH:2)	---
all parameters	keep standard values
Mode->Interfaces-> COM3->RS232-> SICS-SCALE-> Communication	---
BITS/CHAR	7
STOP BITS	1
PARITY	EVEN
BAUDRATE	2400
Hardware handshake	NONE

The IND scales terminal has an RS232C (V.24) or 20 mA current loop interface (typically labeled COM1/RS232C built in), which connects to the computer. By using the appropriate optional interface modules you can connect up to four weighing headers to an IND terminal. For this purpose, the individual scales are arranged with multiple IND scale equipment instances at the same work center and the same COM interface, but with different terminal numbers "1", "2", or "3" maintained in the scale configuration data of the scale equipment entity in Data Manager - Equipment. For further information on scale equipment entities, please refer to the "Data Manager User Documentation" [C2] (page 82).

This terminal class can connect to more than one weighing bridge per terminal. Each scale requires its individual scale equipment entity in Data Manager - Equipment using the same COM port but different terminal numbers.
DeltaTrac can be controlled if plus/minus weighing is configured for the terminal and a nominal value and range is transmitted to the scale.

- To configure an IND scale terminal with a built-in Ethernet 10Base-T (RJ45) interface (e.g. Ethernet 960 card), set the parameters as follows:
  (**Master mode - Interfaces - COM4** (use the COM# assigned to Ethernet))

Parameter	Value
Ethernet Mode	Dialog 1 Dialog Mode - MMR Dialog Mode - MMR- Handshake - No Handshake Dialog Mode - MMR- Autorepeat - No Autorepeat Dialog Mode - MMR- Transfer String - Standard Setting
Ethernet Communication	Standard settings
Ethernet IP, Subnet & Gateway address	Contact your network administrator for the following values: IP, Subnet mask, Gateway

To configure the TCP parameters, open a browser and navigate to the configured IP address. Then open the **Setup** menu (SETUP Port 0 (High-Speed Serial) - TCP/IP Mode Local Port) and set the port number (default: 8000).

Please make a note of the value of **IP**, you will need it during the scale configuration in Data Manager - Equipment.

TIP

The serial number feature is supported. The number is taken over from the terminal, not from the scale attached to the terminal.

The calibration feature is not supported.

Mettler Toledo Scale Interface GD12 (IDNet Protocol-based)

To connect Mettler Toledo scale interfaces that use the IDNet communication protocol, you need to be aware that configuration of the adapter is not possible since the parameters of the built-in RS232C (V.24) interface are fixed with the following settings:

Parameter	Value
Communication	7 data bits
Communication	2 stop bits

Parameter	Value
Communication	Even parity
Communication	9600 baud
Hardware handshake	NONE

This adapter connects to one weighing bridge.

TIP

The serial number and calibration features are not supported.

Sartorius xBPI Protocol-based Scales

To connect Sartorius scales that use the xBPI communication protocol, proceed as follows:

- Configuring the RS232 (V.24) interface:
  - Select xBPI as interface protocol, e.g. for the ISI-10 or Combics terminal.
  - Based on the factory settings, the following settings must be configured in the setup menu (If all segments light up during the closing operation, press the ENTER key):
    Type the factory default password **202122** and set **S-3.1 COM XBPI-232** as the system value when the computer is connected to the serial interface 3 of the ISI-10 terminal (S3).
    In this case, the following configuration is strictly defined for the xBPI protocol and a setting is not necessary or possible, neither at the scale nor in Data Manager - Equipment. If only one scale is connected to the terminal, type **0** (zero) in the **Terminal number** property of the scale configuration data of the scale equipment entity in Data Manager - Equipment. Otherwise, type the number (1..3) of the respective scale connected to the terminal.
  - Set up the interface mode of the scales as follows:

Parameter	Value
Communication	8 data bits
Communication	1 stop bit
Communication	odd parity
Communication	9600 baud
Hardware handshake	no

- Configuring the RS485 interface:
  Sartorius scales using the xBPI protocol (e.g. IS platforms) will be connected to weighing work station PCs with RS485 interface via a point-to-point configuration (half duplex) to bypass greater distances (20..1000 m).
  Change the **RS232C** interface (e.g. YD052IS) of the scale to **RS485**, e.g. with YD051IS (*Sartorius data interface RS485 with 12-pin round connector, order no. 69IS 009*).
  Networking several weighing platforms with an RS485 bus system/party-line configurations with more than one scale connected to the RS485 bus are not supported.
- Configuring the Ethernet 10Base-T (RJ45) interface:
  - The optional UniCOM interface is required.
  - Configure the parameters in the Combics **Setup** menu as follows:

Parameter	Value
Data Protocol Ethernet	Contact your network administrator for the following values: Source IP, Source name, List port, Subnet mask, Gateway
Data Protocol Ethernet Protocol	TCP
Data Protocol Ethernet Mode	XBPI

  Please make a note of the values of **Source IP** and **List port**, you will need them during the scale configuration in Data Manager - Equipment.
- Some terminals allow to connect to more than one weighing platform. The scale identifier number (1..3) must be provided as **Terminal number** property of the scale configuration data of the scale equipment entity in Data Manager - Equipment. If there is only one scale connected per COM interface, type **0** (zero) for the property.

SARTORIUS SBI PROTOCOL-BASED SCALES

These scales are provided with an RS232 (V.24) interface. They must be configured with the corresponding setup settings for continuous display without stoppage and long data format.
Only scales that have a **zeroing key** (**T** key) as well as an **F** key, which can be assigned to the tare memory function, can be tared through the PharmaSuite - Dispense application.
Only those scales with a numeric keyboard can be supplied with manual tare values by the Dispense application (called **applicative tare 2** by Sartorius). This requires knowing

whether and which *data input option* and *keyboard overlay* are installed. Otherwise, the PharmaSuite - Dispense application is unable to tare the scale and the scale cannot be used.

- Configuration of the RS232 (V.24) interface:

Parameter	Value
Communication	7 data bits
Communication	1 stop bit
Communication	even parity
Communication	2400 baud
Hardware handshake	no

For details how to configure the driver to use non-default communication settings, see TIP - NON-DEFAULT COMMUNICATIONS SETTINGS in section "Tips Specific to Mettler Toledo SICS Protocol-based Scales and Terminals" (page 13).

Example: Scale menu settings for QC 7 CCE-S

The settings are similar for other families.
Default settings are marked by an asterisk (*).
Use the **SBI4QC** scale driver.

```
9 - - 1 Factory defaults
5 1 5 2400 Baud
* 7 Bit
5 2 4 Even parity
*5 3 1 1 stop bit
*5 4 2 Hardware handshake with 2 characters after CTS
6 1 4 Autoprint regardless of stability
6 2 1 Print stoppable
*7 2 2 With ID code for data output (22 character format)
7 1 2 Automatic output of the application parameters
7 3 2 Automatic output of tare memory data
2 2 2 Program tare memory
```

Example: Scale menu settings for Sartorius Masterpro series in SBI mode

Typically, the scales of the Masterpro series (e.g. Sartorius LA 2200) will be used in XBPI and not in SBI mode and use the XBPI driver instead.
The settings are similar for other families.
Default settings are marked by an asterisk (*).
Use the **SBI4LA** scale driver.

```
9 - - 1 Factory defaults
5 1 5 2400 Baud
* 7 Bit
5 2 4 Even parity
*5 3 1 1 stop bit
```

```
*5 4 3  Flow Control - HW
5 5 1 Interface mode - SBI
6 1 4 Autoprint regardless of stability
6 2 1 Print stoppable
6 4 2 Tare after Print
Application F4=Tare <br>
Container Tare off <br>
Lineformat: GLP With ID code for data output (22 character format)
```

Example: Scale menu settings for Sartorius Basic plus and LE, CP, GC, or GP series

The scales (e.g. Sartorius BP410) have a **TARE** key for zeroing and an **F** key for taring (if set up correctly). They do not support a **tare preset** natively, instead, it is emulated within the driver. If **tare preset** is activated, the scale display will nevertheless continue to show gross not net weight.
The settings are similar for other families.
Default settings are marked by an asterisk (*).
Use the **SBI4BP** scale driver.

```
9 9 1 Factory defaults
5 1 5 2400 Baud
* 7 Bit
5 2 4 Even parity
*5 3 1 1 stop bit
*5 4 2 Hardware handshake with 2 characters after CTS (use proper cable!)

6 1 4 Autoprint regardless of stability
6 2 2 Print not stoppable
6 4 1 Data output without automatic taring
7 1 2 Automatic output of the application parameters
7 2 2 With ID code for data output (22 character format)
7 3 2 Automatic output of tare memory data
2 1 6 Application program tare memory / net total
```

- Other scale families that use the Sartorius SBI protocol
  The available drivers are supported, not qualified.
  - Sartorius AC, IC, RC, MC series
    Use the **SBI4AC** scale driver.
  - Sartorius LP series
    Use the **SBI4LP** scale driver.

Defining Scale Equipment Entities

Scale equipment entities are defined in Data Manager - Equipment. It is essential that the key data of a scale (ranges, precision, unit of measure, supported features), which is given in the technical manual of the scale, matches the data you provide in Data Manager - Equipment. For further information on how to create a new scale equipment entity in Data Manager - Equipment and the available scale properties, please refer to the "Data Manager User Documentation" [C2] (page 82).

- The **Terminal number** is typically **0** unless more than one scale is connected through the same terminal. In that case the **Terminal number** corresponds to the scale number **1, 2,** ... at the terminal.
- In order to use an Ethernet connection to the scale, the **Connection port** has to be left blank. Then you can provide the **TCP server address** and the **TCP port** of the scale.

The scale locale is set to **en_US** by default as required for the scale driver communication. There is no relation to the locale-related settings of the scale or of PharmaSuite.

TIP

The interface settings are pre-defined by the scale drivers.

Testing Scale Commands

We recommend to test all scale commands with the **Get weight** phase of the Dispense package. The phase covers the three weighing-related features zeroing, taring, and weighing.
In Workflow Designer, build a workflow with the phase and execute the workflow in PharmaSuite for Production Execution.

Troubleshooting Scale Communication

If the communication does not work properly, as a first step check the hardware setup and the settings at the terminal. For this purpose, shut down PharmaSuite for Production Execution and start Microsoft HyperTerminal (Windows XP: Programs | Accessories | Communication) or another Terminal program (e.g. freeware PuTTY tool).
Open a new connection on the respective COM port and set it up with the communication parameters defined for your connection. For an Ethernet-based communication, open the connection via TCP/IP Winsock to the respective Telnet server IP address and IP port of the scale.
A Terminal program allows you to establish a connection to the scale interface, to see the messages sent by the terminal, to type commands to be sent to the terminal, and to check if the terminal is responding in the expected way. Only if the test is successful, does it make sense to continue the test with PharmaSuite for Production Execution.

JAR-based scale drivers allow you to trace the communication sent to and received from the serial port. To activate trace logs add the following lines to the *PC_MES\commons\base\config\log4j_ftps.properties* property file:

```
log4j.logger.com.rockwell.mes.services.eqm.ifc.scales=DEBUG
log4j.logger.com.rockwell.mes.services.eqm.ifc.scales=INFO
```

Typically, the result will be written to a log file in the following directory of the local client machine:
c:\.FTPC\<MES-PS-HOST>\ProductionCentre\logs\PlantOpsClient\

For a customized PharmaSuite system, proceed as follows:

1. Copy the *log4j_custom.properties* property file from the root folder in *custom-ssb-ftps.jar.jar* located at *c:\Users\<Windows User>\AppData\Roaming\Rockwell Automation\FactoryTalk ProductionCentre\jars\ShopOps\*.
2. To activate trace logs add or modify the following lines:
```
log4j.logger.com.rockwell.mes.services.eqm.ifc.scales=DEBUG
log4j.logger.com.rockwell.mes.services.eqm.ifc.scales=INFO
```
3. Save the file as *log4j_custom_local.properties* to *c:\Users\<Windows user>\AppData\Roaming\Rockwell Automation\FactoryTalk ProductionCentre\logs\PlantOpsClient\* of the client machine on which you wish the traces to be enabled.

TIP

It is not required to restart PharmaSuite for Production Execution since the file is dynamically watched for changes every 10 seconds.

For more information, see chapter "Logging and Debugging" in Volume 4 of the "Technical Manual Configuration and Extension" [A7] (page 81).

Integrating New Label Printers

PharmaSuite supports printers with MS Windows-compatible drivers.

Check, if the manufacturer of the label printer delivers MS Windows drivers for it or if MS Windows itself supports the label printer by its own driver. Use the MS Windows hardware wizard to install the driver.

If the PharmaSuite application is not configured to display a print dialog for printer selection, the print job will be sent to the printer set as **Default Printer** in the Windows system. Therefore, it is essential that at least one printer is configured as a **Default Printer**.

To configure label printing in PharmaSuite, adapt the **Equipment/defaultLabelPrinter**, **Equipment/equipmentEntityLabel.showPrinterSelection**, **LabelDesign/defaultPrinter**, and **LabelDesign/simpleWeighingLabel.reprint.showPrinterSelection** configuration keys. For details, see chapter "Configuration Keys of PharmaSuite" in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81).

The size of the PharmaSuite product labels is 4 x 5 inches (width x height).

Integrating New Barcode Scanners

PharmaSuite supports all keyboard-emulating barcode scanners, provided they can be configured to send a defined prefix and suffix.

Contrary to the integration of scales, there is no need for a specific device driver when using a barcode scanner. PharmaSuite expects that the MS Windows driver of the barcode scanner is able to emulate keyboard input. Moreover, it must be possible to configure the scanning device to send a defined prefix and suffix whenever a barcode is scanned. A prefix or suffix in this context is a keystroke that is sent before or after the data that has actually been scanned.

To make a scanner available for use with PharmaSuite, proceed as follows:

1. Connect the scanner to the computer.
   Usually, MS Windows will recognize the scanner as human interface device and install a suitable driver for it. For details, please refer to your scanner manual.

2. Configure the scanner prefix/suffix.
   Before you start configuring your scanner, we recommend to delete all currently configured scanner settings.
   In the default configuration, the prefix is the F4 function key, and the suffix is <CR> (carriage return). Very often you have to scan a specific barcode that is indicated in the scanner's symbology chart before scanning a prefix. For details on how to configure the prefix and suffix, please refer to your scanner manual.
   Prefix and suffix can be adjusted during system configuration. For further information, please refer to the PharmaSuite documentation. In particular, see chapter Configuration Keys of PharmaSuite in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81).
   When using a 2D barcode scanner, you have to configure the Data Matrix symbology of your scanner.

   > **TIP**
   > It may be necessary to adjust the scanner's keyboard input language to the setting made in the Windows operating system to ensure that all special characters are transmitted correctly.

3. Test the scanner within the application.
   Scanning of a sublot barcode can be tested in PharmaSuite for Production Execution with the **Inventory Correction - Filter Sublots** pre-defined workflow step.
   Scanning of a batch barcode can be tested in PharmaSuite for Production Execution with the **Identify material** phase in the Dispense application.
   Scanning of a 2D barcode can be tested in PharmaSuite for Production Execution when executing orders or workflows.

Creating Labels for Scales, Printers, and Containers

The Dispense application of PharmaSuite realizes a scanner-driven usability concept for scales, printers, and containers. Whenever during processing a communication with a scale, printer, or another piece of equipment is required, the operator can scan the barcode of the respective piece of equipment either to identify it or trigger actions (e.g. taring, printing).

The equipment barcodes printed on the labels must consist of the following data:

- Scale
  `<barcode of the scale as maintained in the basic data of the scale equipment entity>`
- Printer
  `!printer`
- Target (to close the target)
  `!closetarget`

Best Practices for Managing User Accounts of a Client Operating System

This chapter provides best practices related to the management of user accounts of a client operating system in the context of terminal services. Please observe the instructions to establish an appropriate system configuration.

PharmaSuite clients are Java-based and run in a client operating system (e.g. MS Windows). A client operating system can be hosted directly on a physical machine (a device like a PC, tablet, scanner) or it can be hosted on a terminal services host. For this reason, a user has to log in to the client operating system first with his operating system-specific user account before accessing a PharmaSuite client.

FactoryTalk ProductionCentre supports various client configurations with different file location settings (see section "Changing the Default Configuration" in "Technical Manual Installation - Enterprise Edition" [A6] (page 81)). If no FactoryTalk ProductionCentre download location has been configured, all client operating system users on the same machine share the same download directory (*c:\.FTPC*) to store their user-specific files, e.g.

- *~options.dat* keeps the station information or
- PharmaSuite client log files.

The following scenarios affect the user account configuration.

Scenario 1: Different client operating system users on one machine.

- Use case: With terminal services, the sessions of different users are hosted on the same host.
- Issue: All client operating system users on the same machine share the same file locations and files.
- Required change of installation configuration: Set the *clientHome* property to the user's profile directory to keep user-specific files separate.

Scenario 2: One client operating system user runs multiple PharmaSuite clients on different devices in different sessions.

- Use case: Devices need to be shared among different PharmaSuite users. This applies to mobile devices (e.g. scanners, tablets) that support an automatic generic system login. After the generic login, a terminal services session is automatically started to run a PharmaSuite client.
- Issue: All sessions share the same file locations and files despite the setting of the *clientHome* property.
- Recommend best practice: Configure an own device-specific user for each device. As a consequence, a terminal services session uses its own device-specific FactoryTalk ProductionCentre download location and each session can be mapped to its device and vice versa.

Managing Users and Access Rights

This chapter describes the methods of configuring access rights to PharmaSuite.

PharmaSuite provides client-side access control mechanisms. It means that some parts and functionalities of the system can only be accessed by users with suitable access rights. To make use of these mechanisms and grant or deny access to the system, users, user groups, and access rights have to be defined and assigned to each other. Each of these objects can be configured to match custom user requirements, including information about who is allowed to access a certain feature. Users and user groups are configured in Process Designer of FactoryTalk ProductionCentre.

For information on managing users and access rights, please refer to the FactoryTalk ProductionCentre documentation. In particular, see sections "Access Privileges", "Users", "User Groups" in "Process Designer Online Help" [B1] (page 81).

TIP

We highly recommend to handle the expiration and change of passwords with care. An operational procedure (SOP) needs to be in place to ensure that

- a password does not expire while a user is logged into any PharmaSuite client and
- a password is not changed while a user is logged into any PharmaSuite client.

We highly recommend to handle the expiration of users with care. An operational procedure (SOP) needs to be in place to ensure that

- a user does not expire while he is logged into any PharmaSuite client.

Users and Access Rights

Each person accessing the system has to be represented by a **User** object that uniquely identifies the user. Each user has a password to allow authentication.

Depending on his or her role in the production process, a user can belong to several user groups. User groups represent high-level groups of functionality a user is allowed to perform. The assignment between users and user groups can either be done by assigning users to a user group or the other way round by assigning user groups to a user.

A user group can have several access rights, which are explicitly defined for the user group. Users inherit the access rights of the user groups to which they are assigned. Access rights refer to applications as a whole or to system functions in a very granular sense and are thus linked to the launch of an application or to interaction elements on the

user interface, such as Production Management Client task pane entries, menu functions, or toolbar actions.
For example, a user may have the right to perform a status transition because he is a member of the **Qualified Person** group. He may not have the right to execute batch processing, because he does not belong to the **Dispensing Operator** group. The assignment between user groups and access rights is created by assigning user groups to access rights, not vice versa.

Each PharmaSuite user must be assigned to the **MinimalAccess** group to start PharmaSuite applications. Other groups may be required, depending on the actions the user is to perform.

Access rights are fully configurable in Process Designer.

TIP

PharmaSuite has a default set of user groups and access rights, which can be viewed and accessed in Process Designer. During the initial configuration of the system the default set can be adapted to specific customer requirements by defining new rights, groups, and assignments between groups and rights, as well as assignments between rights and functions (i.e. GUI elements). The latter can be achieved, for example, by modifying the XML configurations of the appropriate Production Management use cases.

In order to add new users correctly to the PharmaSuite system, the mapping of rights to user groups and of user groups to user roles must be available.

Users that are no longer needed cannot be deleted once they have been used, thereby supporting uniqueness over time.

For an overview of the available access rights, please refer to chapter "Managing Electronic Signatures and Access Rights" in [A2] (page 81).

Users and User Groups Overview

The following table provides an overview of the default set of PharmaSuite users and user groups:

User group	User		
	pecadmin	pmcadmin	shopopsserver
Application Administrator	Yes	Yes	No
DispensingOperatorGroup	Yes	No	No
LogisticalOperatorGroup	Yes	No	No
Master Data Administrator	No	Yes	No
MinimalAccess	Yes	Yes	Yes
Qualified Person	Yes	Yes	No
Recipe Author	No	Yes	No
Supervisor (Process Order)	Yes	No	No

User group	User		
	pecadmin	pmcadmin	shopopsserver
Supervisor (Shop Floor)	Yes	No	No
WIPOperatorGroup	Yes	No	No
Workflow Author	No	Yes	No

Creating and Configuring Users

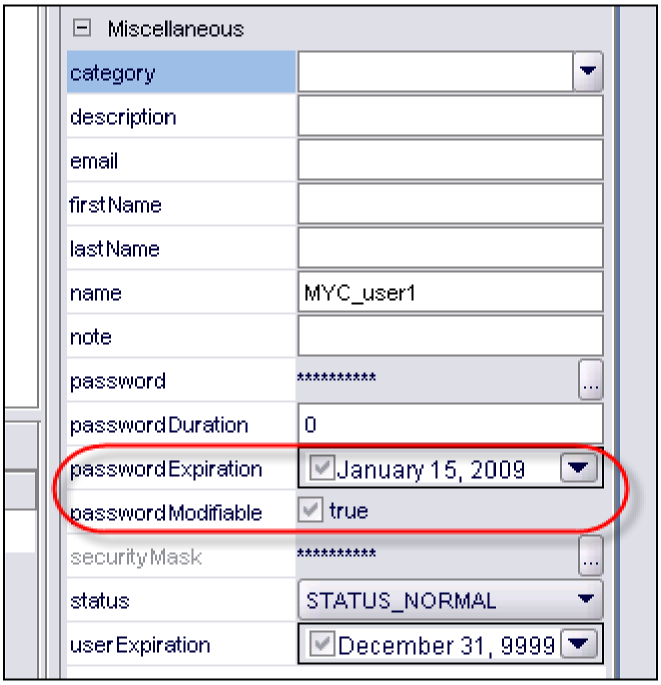
To create and configure a user, proceed as follows:

1. In Process Designer, right-click the **Users** node and select the **New User** function.
2. Define the following properties: **category**, **description**, **email**, **firstName**, **lastName**, **name**, **note**, **password**.
3. Click the **Add** button and assign the **MinimalAccess** user group.
4. Assign other user groups as required.
5. Save and close the new user.

You can force a user to change his password when he logs in for the first time. To achieve this behavior, make the following additional settings to the user object:

1. Re-open the newly created user.
2. Set the password expiration to the current date (or a date in the past).

3. Allow the password to be modifiable.



⊟ Miscellaneous

category	
description	
email	
firstName	
lastName	
name	MYC_user1
note	
password	**********
passwordDuration	0
passwordExpiration	☑ January 15, 2009
passwordModifiable	☑ true
securityMask	**********
status	STATUS_NORMAL
userExpiration	☑ December 31, 9999

Figure 1: Settings for forced password change

4. Save and close the user.

Creating and Configuring User Groups

To create and configure a user group, proceed as follows:

1. In Process Designer, right-click the **User Groups** node and select the **New User Group** function.
2. Define the properties as required (e.g. **name** and **description**).
3. Assign users as required.
4. Save and close the new user group.

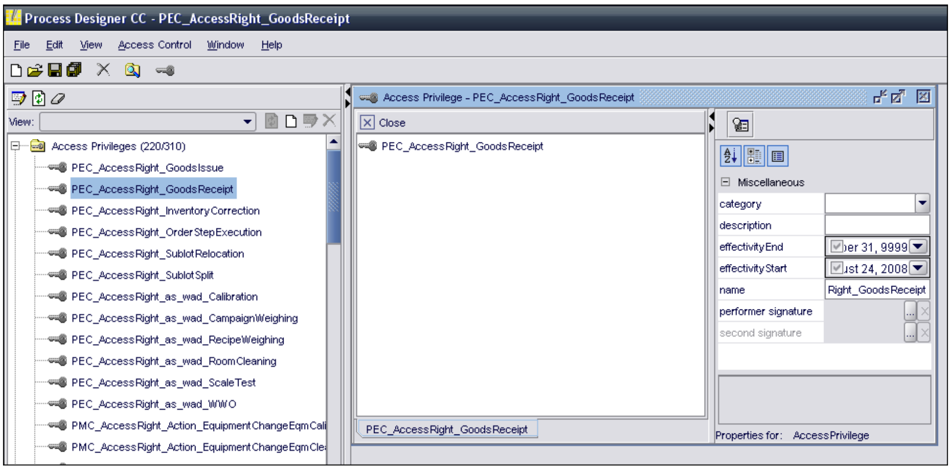
Creating and Configuring Access Rights

Access rights and electronic signatures are both defined by means of access privileges. Access rights only require a basic set of attributes to be configured. Since they are more likely to require adjustments than signatures with their significant GxP-relevance, they can be changed by system administrators.

> **TIP**
>
> Please be aware that changes to existing access rights will affect the rights of all users that belong to a group with the changed access right.

To configure an existing access right or create a new one representing the access right's definition, proceed as follows:

1. In Process Designer, expand the **Access Privileges** node and either open an existing or create a new access privilege.
2. Only for a new access privilege:
   Define the properties as required (**name**, **description**, and **category**).


Process Designer CC - PEC_AccessRight_GoodsReceipt
File
Edit
View
Access Control
Window
Help
View:
Access Privileges (220/310)
PEC_AccessRight_GoodsIssue
PEC_AccessRight_GoodsReceipt
PEC_AccessRight_InventoryCorrection
PEC_AccessRight_OrderStepExecution
PEC_AccessRight_SublotRelocation
PEC_AccessRight_SublotSplit
PEC_AccessRight_as_wad_Calibration
PEC_AccessRight_as_wad_CampaignWeighing
PEC_AccessRight_as_wad_RecipeWeighing
PEC_AccessRight_as_wad_RoomCleaning
PEC_AccessRight_as_wad_ScaleTest
PEC_AccessRight_as_wad_WWO
PMC_AccessRight_Action_EquipmentChangeEqmCali
PMC_AccessRight_Action_EquipmentChangeEqmCle
Access Privilege - PEC_AccessRight_GoodsReceipt
Close
PEC_AccessRight_GoodsReceipt
PEC_AccessRight_GoodsReceipt
Miscellaneous
Properties for: AccessPrivilege

category	
description	
effectivityEnd	☑)er 31, 9999
effectivityStart	☑ ıst 24, 2008
name	Right_GoodsReceipt
performer signature	
second signature	

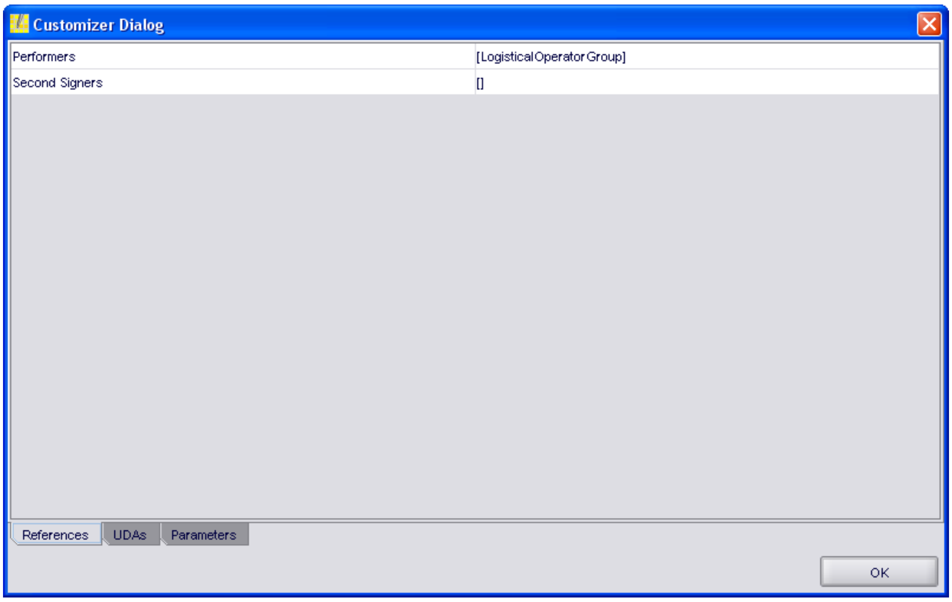
Figure 2: Access rights configuration in Process Designer

3. Open the **Customizer** dialog for the selected access privilege to set performers/signers and User Defined Attributes (UDAs).

> TIP
> In the context of PharmaSuite, there is no need to create parameters for access privileges.

4. In the **References** tab, select the **Performers** box. The user groups listed there have the access right, which means they are allowed to access functionality protected by this right.

> TIP
> Unless you have assigned at least one performer to your access privilege, you cannot save the access privilege.

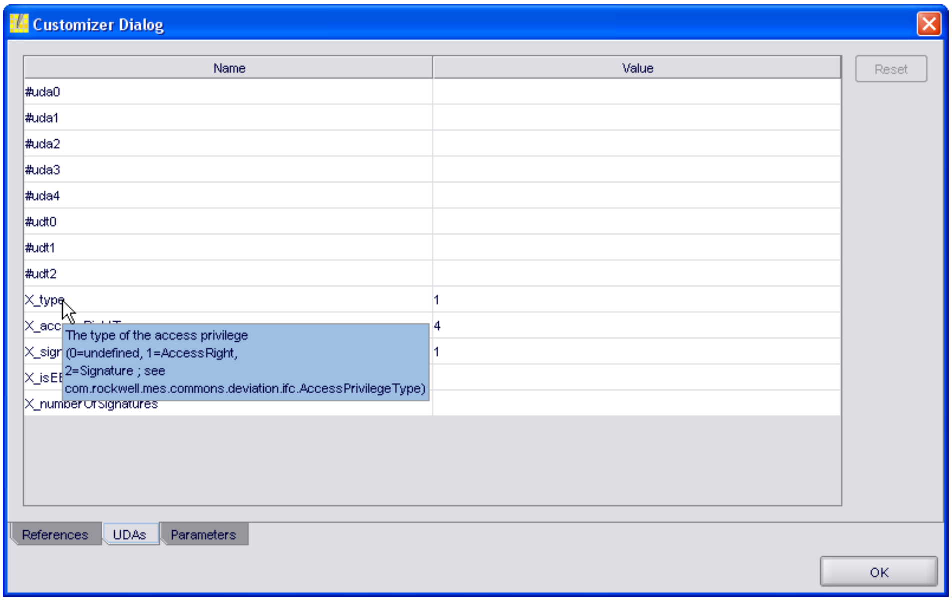


Performers	[LogisticalOperatorGroup]
Second Signers	[]

Figure 3: Customizer: References tab

5. Navigate to the **UDAs** tab and set the value of the **X_type** access privilege type to **1** (**AccessPrivilegeType.ACCESSRIGHT**). This value indicates that the access privilege represents an access right. Setting this value is mandatory in PharmaSuite.

TIP
The value setting of **2** would represent an electronic signature (**AccessPrivilegeType.SIGNATURE**).



Name	Value
#uda0	
#uda1	
#uda2	
#uda3	
#uda4	
#udt0	
#udt1	
#udt2	
X_type	1
X_acc	4
X_sigr	1
X_isEE	
X_numberOfSignatures	

The type of the access privilege
(0=undefined, 1=AccessRight,
2=Signature ; see
com.rockwell.mes.commons.deviation.ifc.AccessPrivilegeType)

Figure 4: Customizer: UDAs tab

6. In the **UDAs** tab, set the value of the **X_accessRightType** access privilege type in order to define the type of the access right. This setting has an informative purpose only. Select one of the available values:
    - 0 (EnumAccessRightType.UNDEFINED)
      Defines access rights for starting either modes (read-only or read/write) of a PharmaSuite client (e.g. Recipe and Workflow Designer, Data Manager) or for certain master data objects supporting access rights during execution (e.g. stations).
    - 1 (EnumAccessRightType.USE_CASE)
      Defines access rights for special use cases in the Production Management Client.
    - 2 (EnumAccessRightType.ACTION)
      Defines access rights for special actions of use cases in the Production Management Client.
    - 3 (EnumAccessRightType.DATA_HANDLER)
      Defines access rights for special data handlers of use cases in the Production Management Client.
    - 4 (EnumAccessRightType.ACTIVITY_SET)
      Defines access rights for special actions in the Production Execution Client.
    - 5 (EnumAccessRightType.CONFIDENTIAL_OBJECT)
      Defines access rights to protect the intellectual property of recipes, workflows, orders, and related data from unauthorized access in Recipe and Workflow Designer, the Production Management Client, the Production Execution Client, and the Production Response Client.
7. If desired, in the **UDAs** tab, set the value of the **X_isWorkcenterRelevant** access privilege type to **1**. This value indicates that the access privilege is available as a selectable access privilege for stations in Data Manager - Work Center.
   For this purpose, the value of the **X_accessRightsType** access privilege type must be set to **0**.
8. Click the **OK** button to close the **Customizer** dialog.
9. Save and close the access privilege.

TIP

During system configuration, access privileges can be assigned to a range of functions. Examples on how to assign access privileges to system functions such as

- Application start
- Station-specific login
- Activity set start

- PMC Client actions
- PMC Client data handler
- Multi-reference (filter) selector
- Flexible State Model (status transitions)
- Flexible State Model (version graphs)
- Electronic signatures (exception management)

are provided in "Technical Manual - Configuration and Extension" [A2] (page 81), along with more detailed information about the specific functions.
For an overview of the available access rights, please refer to chapter "Managing Electronic Signatures and Access Rights" in [A2] (page 81).

Creating Access Rights for Confidential Objects

The concept of confidential objects protects the intellectual property of recipes, workflows, building blocks, orders, ERP BOMs, and related data from unauthorized access.

To set up your PharmaSuite installation for the maintenance of protected objects, proceed as follows:

- Create access rights of the CONFIDENTIAL_OBJECT access rights type.
- Assign the users/user groups who are allowed to maintain confidential objects to the access rights of the CONFIDENTIAL_OBJECT access rights type.

The users (users of the user groups) can maintain confidential master recipes and master workflow.

Consider also the setting of the **AccessPrivilege/ConfidentialObject.Modifiable.WhenCreatingRecipeStructure** configuration key (see "Configuration Keys of PharmaSuite" in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81)).

Chapter 6

Exporting and Importing Master Recipes, Master Workflows, and Building Blocks

This section contains general information about the export and import of master recipes, master workflows, and building blocks, provides guidelines (page 39) how to perform exports and imports, instructions how to adapt the processes (page 46), and technical details (page 49).

Developing a master recipe or master workflow is an ambitious task and should be carefully planned. Thorough testing is essential before they can be approved. It is a good practice to manage their development life-cycle across multiple PharmaSuite instances (e.g. development system, test system, productive system). For this purpose, master recipes, master workflows, and building blocks need to be transferred from a source system to a target system.

The **PharmaSuite Export/Import Utility** tool exports and imports your master recipes, master workflows, and building blocks maintained with the PharmaSuite Recipe and Workflow Designer.
For objects that are protected by an access privilege: The system only allows to export objects whose access privilege matches the access privilege of the logged-in user.

To export and import a master recipe, master workflow, or building block, perform the following steps:

1. On the source system, start the **PharmaSuite Export Utility** tool (page 40).
2. Provide the required configuration parameters and start the export.
3. The system displays the result of the export and stores a log file at the specified location.
   We recommend to check both.
4. Close the **PharmaSuite Export Utility** tool.
5. If required, copy the exported BML file (Batch Markup Language) to the location expected by the import.
6. On the target system, start the **PharmaSuite Import Utility** tool (page 42).
7. Provide the required configuration parameters and start the import.
8. The system displays the result of the import and stores a log file at the specified location.
   We recommend to check both.

9. Close the **PharmaSuite Import Utility** tool.

Prerequisites

To enable a successful data transfer between two PharmaSuite systems, the following preconditions must be fulfilled:

- Both the source and target system must be of the same (maintenance) release. Examples: source = x.y and target = x.y is supported, source = x.y and target = x.y MRz is not supported.
- Any master data object (e.g. material/part, work center, station, access privilege, equipment class, equipment property type) that is referenced in the source system by the master recipe, master workflow, or building block to be exported must be available in the target system with the same attributes (e.g. identifier, description, version).
  This also applies also:
  - Equipment entities that are assigned to referenced equipment classes; therefore they are to be used during execution.
  - Equipment property types that are referenced by a relevant equipment class or entity.
- Any system building block and parameter class that is referenced by a master recipe, master workflow, or building block to be exported must have been deployed to the target system before they can be imported.
- Custom building blocks that have been used during recipe and workflow authoring are not required to be available in the target system. See "Deep copy vs. Shallow copy" in section "Technical Details" (page 49).
- The versions of the underlying B2MML schemas must be identical.
- The schema version of the BML files to be imported must match the expected schema version of the PharmaSuite release. Otherwise a warning will be logged.

Transferred Data

The **PharmaSuite Export/Import Utility** tool exports and imports the following data:

- All data related to a master recipe, master workflow, or building block, including version, status, and MFC data.
  (Although BOM data is exported for convenience reasons, it is not imported but restored from the MFC-related data during the import process of a recipe with valid MFC data.)

- All data related to a building block, including version and status.
- Status transition and version history of the master recipe or master workflow.
  The data is exported to a B2MML file and imported into the **X_VersionHistory** application table.
  The data is cumulated if more than two PharmaSuite instances are used during the recipe or workflow life-cycle. Both status transition and version history of the current (local) system and the history data related to the exporting system are displayed in the corresponding dialog of Recipe and Workflow Designer.
- Checksum of the exported data.
  The import process uses a checksum to ensure that the transferred data is genuine. The checksum is not stored in the database.
  If the checksum is verified and does not match, the import is canceled to prevent the import of manipulated data.

Working with the PharmaSuite Export/Import Utility

The **PharmaSuite Export/Import Utility** tool requires a set of configuration parameters specifying the export (page 40) and import (page 42), respectively. They can be provided in the following ways:

- In the **PharmaSuite Export/Import Utility** tool.
- In the *ExportConfiguration.xml* and *ImportConfiguration.xml* configuration files.
  The configuration files and their corresponding schema definition (*ExportConfiguration.xsd*, *ImportConfiguration.xsd*) can be found in the **apps-recipeb2mml-ifc.jar** FactoryTalk ProductionCentre **Library** object.
  Extract the files from the JAR file, adapt them according to your needs, and copy them to the locations specified with the *Configuration file* parameter in **PharmaSuite Export/Import Utility** tool.
  In the examples below, the red colored values must be adapted.

Example of ExportConfiguration.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Sample Recipe B2MML Export Configuration File -->
<FTPSMasterRecipeExport
  xmlns="http://www.rockwellsoftware.com/FTPS/B2MMlExportConfiguration"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.rockwellsoftware.com/FTPS/B2MMlExportConfiguration
                     ../config/ExportConfiguration.xsd ">
  <SourceRecipeElement
    recipeElementType="Master Recipe"
    recipeElementName="MYC First Recipe"
    recipeElementVersion="2" />
  <SourceFTPSInstance URL="jnp://SourceAppServer:1099"
    username="MYC login" password="MYC password" />
  <OutputFiles outputDirectory="C:\MYC exports"
    recipeOutputFilename="MYC First Recipe.bml"
    configOutputFilename="MYC First Recipe.xml"
    logOutputFilename="MYC First Recipe.log" />
</FTPSMasterRecipeExport>
```

Example of ImportConfiguration.xml

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Sample Recipe B2MML Import Configuration File -->
<FTPSMasterRecipeImport
  xmlns="http://www.rockwellsoftware.com/FTPS/B2MMLImportConfiguration"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.rockwellsoftware.com/FTPS/B2MMLImportConfiguration
                     ../config/ImportConfiguration.xsd ">
  <TargetFTPSInstance URL="jnp://TargetAppServer:1099"
    username="MYC login" password="MYC password" />
  <InputFile inputDirectory="C:\MYC imports" recipeInputFilename="MYC First Recipe.bml"
                            ignoreXMLSignature="false" />
  <TargetRecipeElement targetType="Master Recipe" />
</FTPSMasterRecipeImport>
```

TIP

Parameters specified in the **PharmaSuite Export/Import Utility** tool override the corresponding specification of the configuration file.
If a parameter is not specified, the corresponding value from the configuration file is taken.

Exporting a Master Recipe, Master Workflow, or Building Block

To export a master recipe, master workflow, or building block, proceed as follows:

1. In Process Designer on the source system, run the **FTPSExportUtility** form to start the **PharmaSuite Export Utility** tool.
   OR
   In Shop Operations on the source system, open the **FTPSExportUtility** form to start the **PharmaSuite Export Utility** tool.

2. Provide the required configuration parameters.

   - Configuration file
     Optional, not available in the *ExportConfiguration.xml* file.
     Path to the export configuration file.

   - Component type
     recipeElementType in the *ExportConfiguration.xml* file.
     Type of the component to be exported (e.g. Master recipe, Master workflow, Phase).

   - Component ID
     recipeElementName in the *ExportConfiguration.xml* file.
     Identifier of the entity to be exported.

- Version or revision
  recipeElementVersion in the *ExportConfiguration.xml* file.
  Version or revision of the entity to be exported.
- URL
  Only available in the *ExportConfiguration.xml* file.
  IIOP address of the PharmaSuite server.
  Not supported in the current release.
- username
  Only available in the *ExportConfiguration.xml* file.
  Name to log in to the PharmaSuite server.
  Not supported in the current release.
- password
  Only available in the *ExportConfiguration.xml* file.
  Password to log in to the PharmaSuite server.
  Not supported in the current release.
- Output directory
  outputDirectory in the *ExportConfiguration.xml* file.
  Target location (on the local machine) where to save the exported file and the log file. The default is the user's *My Documents* directory.
- Output file
  recipeOutputFilename in the *ExportConfiguration.xml* file.
  Name of the exported file. The default file name is
  <recipeElementName>_<recipeElementVersion>.bml.
  Existing files with this name will be overwritten during export.
- Configuration file template for import
  configOutputFilename in the *ExportConfiguration.xml* file.
  Configuration file that can be used as a template for controlling the import of the exported master recipe, master workflow, or building block into a target PharmaSuite system
  Not supported in the current release.
- Log file
  logOutputFilename in the *ExportConfiguration.xml* file.
  Name of the log file.
  Existing files with this name will be overwritten during export.

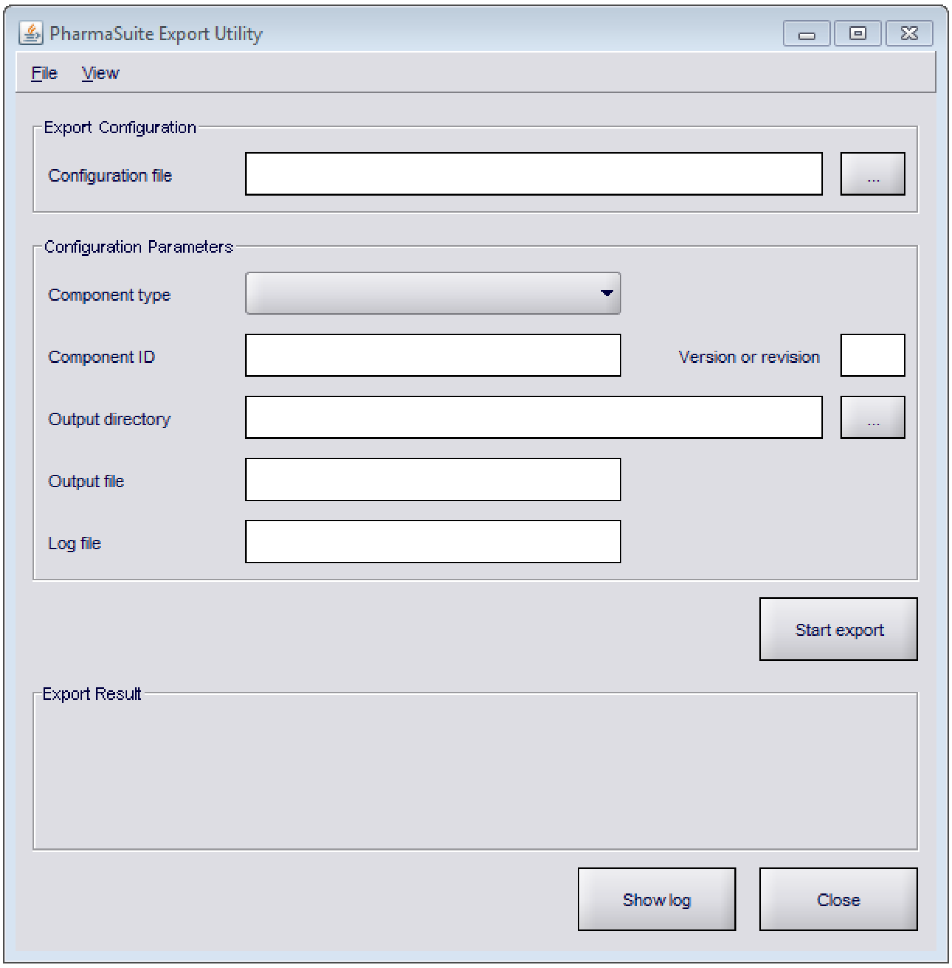


Figure 5: PharmaSuite Export Utility tool

3. Click the **Start export** button.
4. The system displays a summary of the export process in the *Export Result* panel; details are stored in the log file.
   We recommend to check both.
   If the export was successful, the system stores a B2MML file (Business To Manufacturing Markup Language) at the specified location. Continue with the next step.
   If the export was not successful, resolve the issues listed in the log file and repeat the export. For more information, see section "Troubleshooting" (page 45).
5. Close the **PharmaSuite Export Utility** tool.

Importing a Master Recipe, Master Workflow, or Building Block

To import a master recipe, master workflow, or building block, proceed as follows:

1. Make sure, the exported file is accessible from the target machine. If required, copy the file to the location expected by the import.

2. In Process Designer on the target system, run the **FTPSImportUtility** form to start the **PharmaSuite Import Utility** tool.
   OR
   In Shop Operations on the target system, open the **FTPSImportUtility** form to start the **PharmaSuite Import Utility** tool.

3. Provide the required configuration parameters.

   - Configuration file
     Optional, not available in the *ImportConfiguration.xml* file.
     Path to the import configuration file.

   - Component type
     recipeElementType in the *InportConfiguration.xml* file.
     Type of the component to be imported (e.g. Master recipe, Master workflow, Phase).

   - URL
     Only available in the *ImportConfiguration.xml* file.
     IIOP address of the PharmaSuite server.
     Not supported in the current release.

   - username
     Only available in the *ImportConfiguration.xml* file.
     Name to log in to the PharmaSuite server.
     Not supported in the current release.

   - password
     Only available in the *ImportConfiguration.xml* file.
     Password to log in to the PharmaSuite server.
     Not supported in the current release.

   - Input file
     recipeInputFilename and *inputDirectory* in the *ImportConfiguration.xml* file.
     Path and name of the exported file. The default is the user's *My Documents* directory.

   - Log directory
     outputDirectory in the *ImportConfiguration.xml* file.
     Target location where to save the log file. The default is the user's *My Documents* directory.

   - Log file
     logOutputFilename in the *ImportConfiguration.xml* file.
     Name of the log file.
     Existing files with this name will be overwritten during import.

   - Name Maps
     Only available in the *ImportConfiguration.xml* file.

Mapping rules to map object names between the source and target system. Not supported in the current release.

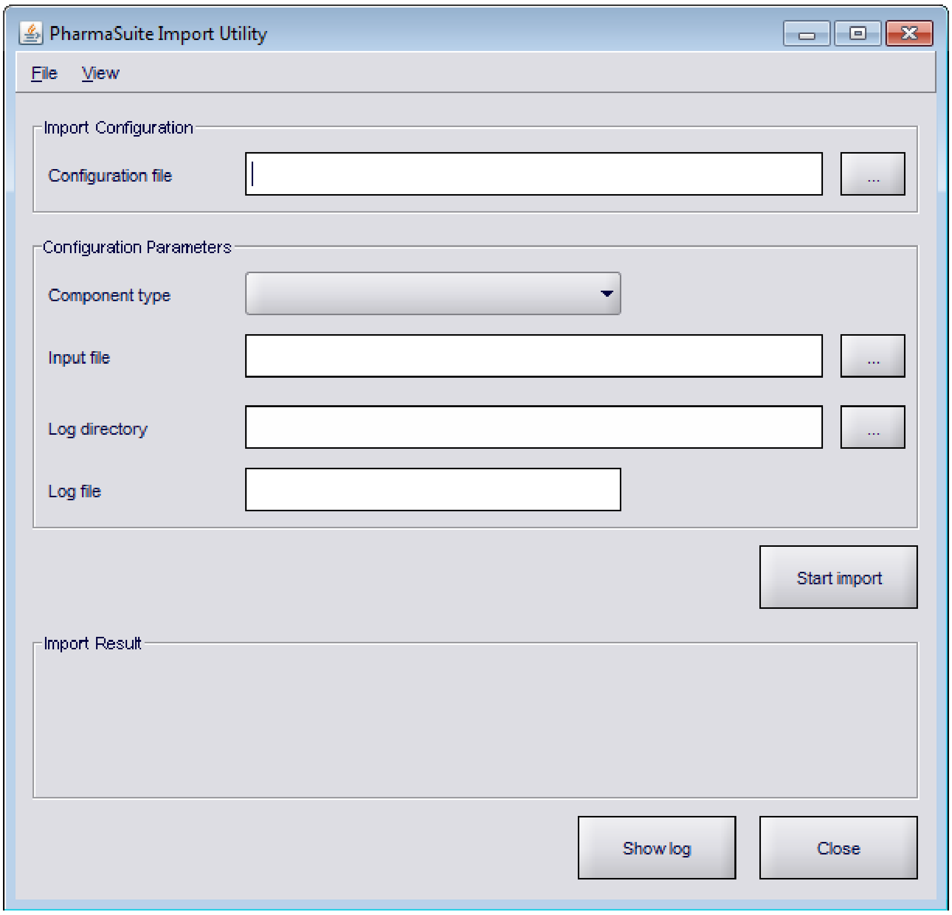


Figure 6: PharmaSuite Import Utility tool

4. Click the **Start import** button.
5. The system displays a summary of the import process in the *Import Result* panel; details are stored in the log file.
   We recommend to check both.
   If the import was successful, the system stores the master recipe, master workflow, or building block in the database. The imported object is ready for use in the target system. Continue with the next step.
   If the import was not successful, resolve the issues listed in the log file. Depending on the issue, you must repeat the import, update data in the Production Management Client or Recipe and Workflow Designer on the source or target system, or repeat the whole process. For more information, see section "Troubleshooting" (page 45).
6. Close the **PharmaSuite Import Utility** tool.

Troubleshooting

The following issues may occur during the export or import process.

Export and import:

- **Cause**: Incomplete configuration
  Required configuration parameters are not specified or invalid.
  - **Effect**: The process is aborted.
  - **Action**: Update the configuration parameters.
- **Cause**: File or path does not exist
  Files or paths specified for the export or import do not exist.
  - **Effect**: The process is aborted.
  - **Action**: Update the configuration parameters and/or create the directories.

Only export:

- **Cause**: Master recipe, master workflow, or building block not found
  Master recipe, master workflow, or building block specified for the export cannot be found.
  - **Effect**: The process is aborted.
  - **Action**: Update the configuration parameters and/or create the master recipe, master workflow, or building block.

Only import:

- **Cause**: Checksum validation failed
  The exported file has been edited manually.
  - **Effect**: The process is aborted.
  - **Action**: Make sure that the file to be imported has not been edited.
- **Cause**: Referenced object does not exist
  An object referenced by an exported master recipe, master workflow, or building block cannot be found in the target database.
  - **Effect**: The process continues and logs the issue in the log file.
    The imported data is not made persistent in the database. It will be deleted when the **PharmaSuite Import Utility** tool is closed.
  - **Action**: Close the **PharmaSuite Import Utility** tool. Make the missing object available in the target database or update the master recipe, master workflow, or building block to be exported. Repeat the export and import process.

TIP
The import fails if a work center assignment parameter references a work center or station object that does not exist in the target system. Under specific circumstances, it may become necessary that the work center assignment parameter is ignored during import. This behavior can be enabled with the **ImportRecipeBuildingBlockIgnoreNonExistingEquipment** configuration key. For details, see "Configuration Keys for Recipe and Workflow Designer", chapter "Configuration Keys of PharmaSuite" in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81).
If a work center assignment parameter is not added due to a missing reference and the exported master recipe or master workflow was in the **Verification** or **Valid** status, the imported master recipe or master workflow is in the **Edit** status. Building blocks in the **Approved** status are in the **Draft** status after the import. Thus they can be updated manually and re-validated.

- **Cause**: Master recipe, master workflow, or building block already exists
  The object to be imported already exists in the target database with the same identifier and version/revision.
  - **Effect**: The process is aborted and logs the issue in the log file.
  - **Action**: The action depends on the data, for example, overlapping periods of validity prevent the import.
- **Cause**: Recipe and Workflow Designer checks failed
  Along with the import process, the specified checks for Recipe and Workflow Designer are executed. One or more checks failed.
  - **Effect**: The imported data is stored in the database and can be updated.
    If the exported master recipe or master workflow was in the **Verification** or **Valid** status, the imported master recipe or master workflow is in the **Edit** status. Thus they can be corrected manually and re-validated or deleted.
  - **Action**: Open the imported master recipe, master workflow, or building block in Recipe and Workflow Designer and review the issue(s) displayed in the Messages window.

Adapting the PharmaSuite Export/Import Utility

The **PharmaSuite Export/Import Utility** tool can be adapted in the following areas:

- checks to be executed by Recipe and Workflow Designer (page 47),
- customer-specific application tables used as parameter attributes (page 47),
- customer-specific parameter attributes (page 49), e.g. material, equipment requirement, or privilege parameters, and
- customer-specific UDAs of a master recipe (page 49).

Checks of Recipe and Workflow Designer

During the import process, Recipe and Workflow Designer performs several checks. They can be adapted according to the description in chapter "Modifying and Adding Checks" in Volume 2 of the "Technical Manual Configuration and Extension" [A2] (page 81).

Customer-specific Application Tables Used as Parameter Attributes

The availability of referenced objects in both the source and target system is a prerequisite (page 38). This ensures that only a reference that can uniquely identify the object is exported. During the import process, the tool checks whether the object already exists in the target system. If so, it creates a matching reference.
It is obvious that the key attribute of the object cannot be used as such a reference since it will be very likely different in both systems.

Application table rows are keyed objects with a unique **name** attribute. Often this key is a system-controlled UUID and thus not necessarily identical for the same object in the source and target system. Only if the **name** attribute is identical in both systems, an import into another PharmaSuite instance can work.
Otherwise and if, for example, the external-speaking unique key requires more than one attribute, the **PharmaSuite Export/Import Utility** tool can be extended.

Example: A process parameter attribute refers to the **X_GHSStatement** object of PharmaSuite. The object's name is a UUID, thus an external-speaking unique key has to be found: **X_ghsIdentifier**.
The extension of the **PharmaSuite Export/Import Utility** tool requires the following tasks:

1. Add support to an additional ATRow (here: **X_GHSStatement**), see *hasATRowReferenceConverter* method below.
2. Add a method to convert the object to an external-speaking key (here: **String**), see *atRowReference2String* method below.
3. Add a method to retrieve the object from an external-speaking key (here: **String**), see *createATRowFilter4AtRowReference* method below.

For this purpose, provide enhanced service classes for the services of the **PharmaSuite Export/Import Utility** tool.

Example: Adapted export service

```
public class ExtendedBatchParameterConverter extends BatchParameterConverter {
  @Override
  protected String atRowReference2String(ATRow atRow) {
    String name = atRow.getATDefinition().getName();
    if (name.equals("X_GHSStatement")) {
      return (String) atRow.getValue("X_ghsIdentifier");
    } else {
      return super.atRowReference2String(atRow);
    }
  }

  @Override
  public boolean hasATRowReferenceConverter(ATDefinition atDef) {
    return atDef.getName().equals("X_GHSStatement") ||
                                   super.hasATRowReferenceConverter(atDef);
  }
}
```

Example: Adapted import service for master recipes/master workflows

```
public class ExtendedMasterRecipeImportBuilder extends MasterRecipeImportBuilder {

  @Override
  public ATRowFilter createATRowFilter4AtRowReference(String atRowReferenceString,
         ATDefinition applicationTable,
         ValueStringType valueStringType) throws DatasweepException {
    ATRowFilter atRowFilter = new ATRowFilter(applicationTable.getName(),
                                  PCContext.getServerImpl());
    if (applicationTable.getName().equals("X_GHSStatement")) {
      atRowFilter =
               atRowFilter.forColumnNameEqualTo("X_ghsIdentifier",
atRowReferenceString);
    } else {
      return super.createATRowFilter4AtRowReference(atRowReferenceString,
                                  applicationTable, valueStringType);
    }
    return atRowFilter;
  }
}
```

TIP

Master workflows use the same import classes as master recipes. To distinguish between master recipes and master workflows apply one of the following options:

- use the *processingType* attribute of the *IMESMasterRecipe* interface or
- overwrite one of the type-related methods (*extractMasterWorkflowAttributes* and *extractMasterRecipeAttributes*) of the *IMasterRecipeImportBuilder* interface.

Register the extended classes by means of the PharmaSuite standard *serviceFactory* mechanism; then

- the *exporter* will create appropriate references for **X_GHSStatement** object in the BML file (Batch Markup Language) of the process parameter and
- during import, the *importer* will check for the existence of **X_GHSStatement** objects and, if applicable, create appropriate references.

Customer-specific Parameter Attributes

Customer-specific parameter attributes are, for example, material, equipment requirement, or privilege parameters.

If you have added customer-specific attributes to your building blocks, ensure that the AT definitions of the respective parameters in both the source and target system have exactly the same customer-specific attributes.
An attribute name must start with a prefix. According to the naming conventions (page 3), **X_** and **RS_** are reserved for PharmaSuite. This ensures that the attribute is recognized as customer-specific and exported and imported automatically.

There are no code changes required unless the attribute stores an object reference which is not supported by default. For details which references are supported by default and how to enhance the **PharmaSuite Export/Import Utility** tool for other object types, see "Customer-specific Application Tables Used as Parameter Attributes" (page 47).

Customer-specific UDAs of a Master Recipe

If you have added customer-specific UDAs to master recipes, ensure that the UDAs are available in both the source and target systems and have the same data type.
An attribute name must start with a prefix. According to the naming conventions (page 3), **X_** and **RS_** are reserved for PharmaSuite. This ensures that the attribute is recognized as customer-specific and exported and imported automatically.

Technical Details

When exporting and importing master recipes, master workflows, and building blocks, you should be familiar with the following technical details:

- Format of the exported file
  The format is based on the S88 industry standard. The required components have been adapted to PharmaSuite-specific needs. Thus, the data is stored in a B2MML XML structure.

- Object locking
  Object locking is not supported. Even if an object is locked for editing by another user, the object can be exported.

  TIP
  Please note that the object can therefore be in an inconsistent or incomplete state.

- Deep Copy vs. Shallow Copy
  The **PharmaSuite Export/Import Utility** tool follows the Shallow Copy concept. Consider a master recipe, master workflow, or building block built of other custom building blocks. The information which custom building blocks are used is stored in the database, displayed in the property window of Recipe and

Workflow Designer, and transferred to the target system. The custom building blocks themselves are not transferred, since there is no Deep Copy.
If the custom building blocks are needed in the target system, each building block must be exported and imported by means of the **PharmaSuite Export/Import Utility** tool.

Chapter 7

Importing Equipment Classes and (Template) Entities from an External Source

The default functions for importing equipment classes and (template) entities are available in Data Manager. They reject an import file and abort the import if the checksum of a file has been changed.

If you need to import an equipment class or (template) entity from an external source without a checksum, use the *IS88EquipmentExportImportService.importEquipment(IEquipmentImportConfigurationBuilder)* method. The *importIgnoreChecksum(boolean)* setter in the *IEquipmentImportConfigurationBuilder* interface can be used in order to ignore a signature, i.e. an XML file can be imported without having a checksum defined.

Chapter 8

Managing Device Identifiers

This chapter describes how a device identifier is generated and how to manage its format depending on the plant infrastructure where the device is located. PharmaSuite uses a device's identifier during execution with the Production Execution Client and displays it in the Cockpit.

The unique default device identifier fits with typical usage scenarios and correlates with

- the computer name (or host name) if a user runs a PharmaSuite application on a physical device directly or
- the client name (or identifier of a remote client) if a user runs a PharmaSuite application using terminal services.

The device identifier is always determined when the Production Execution Client is started. If you have to reuse a terminal server session from another hardware client, you must restart the Production Execution Client in order to get a unique device identifier.

TIP

It is assumed that the plant infrastructure guarantees that the default source of the device identifier is set and managed to be unique and stable.

What Are the Computer and Client Names

The **computer name** is a unique name in a workgroup/domain used to identify the physical machine on a network. However, the computer name cannot be used in all cases. For instance, it cannot be used if an application runs on a terminal server and the computer name is displayed on another physical device. In this case, all applications are hosted by the server, so the computer name is always the same and is equal to the server's computer name. However the **client name** represents the computer name of the physical device accessing the server. Therefore the client name is used as device identifier.

When Terminal Services is used it can easily be recognized if an application runs on a server. For this purpose, check if the SESSIONNAME environment variable exists and is not **Console**. This variable does not exist by default; it is initially created when a computer is accessed remotely and the session is initialized by Terminal Services. If the remote connection is closed and the computer is accessed locally, the variable is reset to **Console**.

Configuring the Device Identifier Pattern for Terminal Services

The pattern of the device identifier is defined with the **commons-base-ifc.jar/DeviceIdentificationPatternTerminalServices** configuration key (see chapter "Configuration Keys of PharmaSuite" in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81)).

By default, when using terminal services, the device identifier correlates to the CLIENTNAME environment variable.

If the default pattern cannot be used to generate a unique device identifier, adapt the value of the configuration key. We recommend to use a combination of the following environment variables:

- COMPUTERNAME: Name of the computer where an application runs.
- SESSIONNAME: When a computer is accessed remotely, the connection is identified by a session; the session name is unique in the context of the computer.
- CLIENTNAME: When a computer is accessed remotely, the client is identified by a client name; name of the client computer.
- USERNAME: Name of the user corresponding to the current account.

TIP

Verify the generated device identifier in the **About** dialog of your PharmaSuite client and the actual values of the related environment variables in the **Installation Details** dialog.

If this configuration approach is not sufficient to provide a unique and stable device identifier, overwrite the *com.rockwell.mes.commons.base.ifc.objectlock.IDeviceIdentificationService* interface with a custom implementation of the generation mechanism.

Example Configuration

In the example configuration, two terminal servers are used to run the PharmaSuite applications. Different physical devices are connected to these two servers. Additionally, PharmaSuite runs on a physical device in a local session.

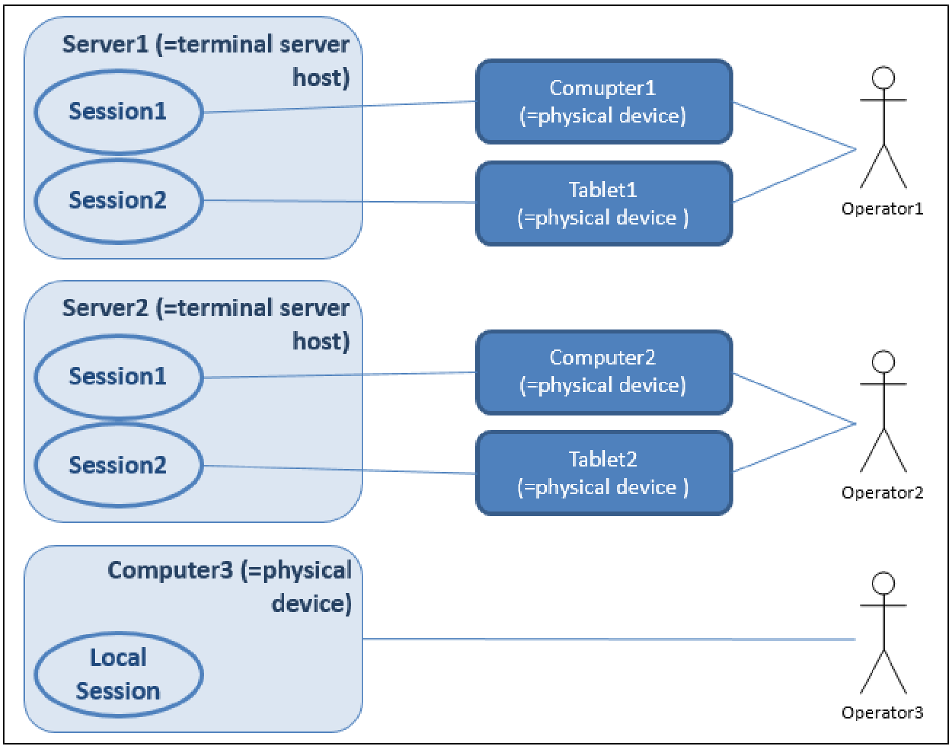

Server1 (=terminal server host)
Session1
Session2
Comupter1 (=physical device)
Tablet1 (=physical device)
Operator1
Server2 (=terminal server host)
Session1
Session2
Computer2 (=physical device)
Tablet2 (=physical device)
Operator2
Computer3 (=physical device)
Local Session
Operator3

Figure 7: Example configuration

The following table shows the result of the default device identifier generation for the example configuration:

Physical device (accessed/used by operator)	Device identifier (Generated)	Environment variables			
		COMPUTERNAME	SESSIONNAME	CLIENTNAME	USERNAME
Computer1	Computer1	Server1	Session1	Computer1	Operator1
Tablet1	Tablet1	Server1	Session2	Tablet1	Operator1
Computer2	Computer2	Server2	Session1	Computer2	Operator2
Tablet2	Tablet2	Server2	Session2	Tablet2	Operator2
Computer3	Computer3	Computer3	N/A or "Console"	N/A	Operator3

Localizing Each as Unit of Measure for Recipe Designer - Device

This section describes the meaning of the **each** unit of measure within PharmaSuite.

For Recipe Designer - Device, the unit of measure of the produced material must be a discrete unit of measure. The **each** (**ea**) unit of measure is the default "discrete" unit of measure of PharmaSuite. That means, that the produced material is measured either in **ea** or a unit that is convertible into **ea**.

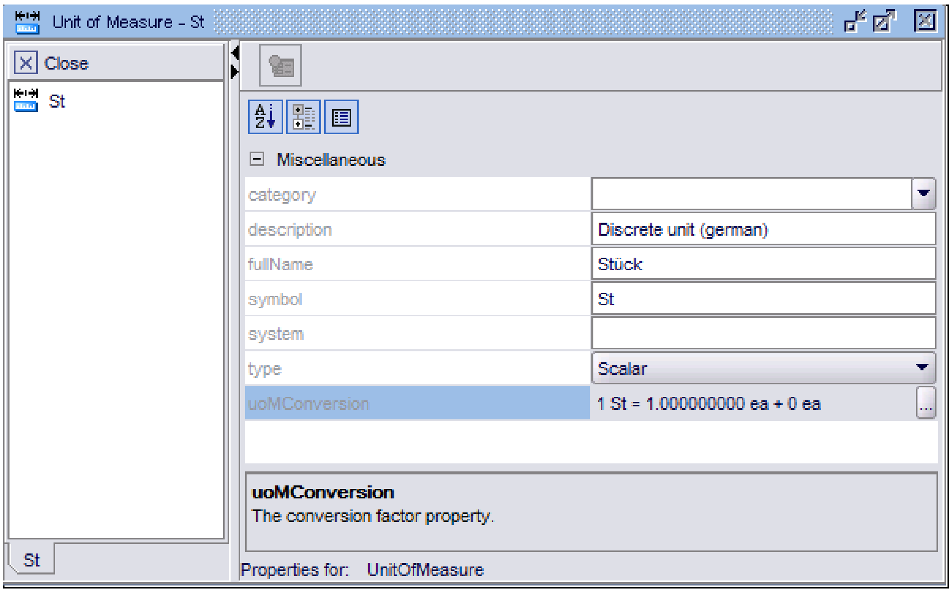
For information on managing units of measure, please refer to the FactoryTalk ProductionCentre documentation. In particular, see section "Units of Measures" in "Process Designer Online Help" [B1] (page 81).

Adding a Localized Discrete Unit of Measure

To create and configure a discrete unit of measure that is convertible into the **ea** unit of measure, proceed as follows:

1. In Process Designer, right-click the **Unit of Measures** node and select the **New Unit of Measure** function.
2. Define the properties as required (e.g. **description**, **full name**, **symbol**).
3. In the **type** option list, select **Scalar**.

4. In the **uomConversion** text box type **1.00 to UoM ea** as conversion factor.



category	
description	Discrete unit (german)
fullName	Stück
symbol	St
system	
type	Scalar
uoMConversion	1 St = 1.000000000 ea + 0 ea

uoMConversion
The conversion factor property.

Figure 8: German localization of each

5. Save and close the new unit of measure.

Chapter 10

Using Event Sheets in PharmaSuite

PharmaSuite uses the concept of event sheets to allow the user to monitor status changes, to execute activity sets, and to run servers. For more information on event sheets, please refer to sections "Using Event Sheets" and "Monitoring the Event Sheet" in "FactoryTalk ProductionCentre Plant Operations Release 10.4 Server Installation Guide - JBoss Advanced" [A4] (page 81) or "FactoryTalk ProductionCentre Plant Operations Release 10.4 Server Installation Guide - JBoss Stand-Alone" [A5] (page 81).

For the JMS communication of the PharmaSuite clients with the Transition server, the EBR server, the Automation Integration server, the Triggered Operation Management server, and the Operation Execution server, PharmaSuite employs the widely used open source messaging server Apache ActiveMQ. The ActiveMQ Java process is typically run as a Windows service. It is the prerequisite for the usage of the **PharmaSuite_Transition_Server**, **PharmaSuite_EBR_Server**, **PharmaSuite_AI_Server**, **PharmaSuite_TOM_Server**, and **PharmaSuite_OE_Server** event sheets.

The following event sheets are available:

- **PharmaSuite_Transition_Server** checks the period of validity of master recipes, master workflows, and batches and sets the status accordingly.
  The execution frequency for each task is encoded in the **cronExpression** property of the corresponding **CalendarEvents** container. For details, see sections "Event Sheets" and "CalendarEvents Container" in "Process Designer Online Help" [B1] (page 81).

  - Master recipe, master workflow (*VersionStatusTransition*): status transition from **Scheduled** to **Valid** and from **Valid** to **Archived**.

  - Batch (*BatchStatusUpdate*): performs the configured transition in case of expiration. For details of the **BatchQuality** flexible state model, see chapter "Configuring Flexible State Models" in Volume 2 of the "Technical Manual Configuration and Extension" [A2] (page 81).

  In addition, the event sheet is responsible for the following tasks:

  - It deletes obsolete procedures of S88 master recipes and master workflows from the database (*deleteObsoleteExpandedReps* calendar event container). When a master recipe or master workflow is deleted in Recipe and Workflow Designer, the procedure (and all its dependent entities, parameters, and activity sets) are not deleted along with it immediately as this process can be very time-consuming. The procedure is only detached and marked for deletion. The event sheet triggers a service call that performs the actual deletion of those procedures.

- It deletes obsolete procedures of S88 control recipes and workflows from the database (*deleteDetachedS88ControlRecipeStructures* calendar event container). When an operation of an exploded S88 order or workflow is reset in the Production Management Client, the procedure (with all its dependent entities and parameters) is not deleted immediately as this process can be very time-consuming. The procedure is only detached and marked for deletion. The event sheet triggers a service call that performs the actual deletion of those procedures.
- In case external exception handling is configured, the event sheet listens for messages from an external QMS (Quality Management System) and processes the messages accordingly.

- **PharmaSuite_EBR_Server**, **PharmaSuite_AI_Server**, **PharmaSuite_TOM_Server**, and **PharmaSuite_OE_Server**
  - **PharmaSuite_EBR_Server** executes activity sets of S88 procedures and unit procedures related to the execution of PharmaSuite control recipes and workflows. In addition, it is responsible for processing incoming messages from a Distributed Control System, in case a DCS is configured to communicate with PharmaSuite.
  - **PharmaSuite_AI_Server** runs the Automation Integration server and communicates with FactoryTalk Live Data.
  - **PharmaSuite_TOM_Server** (Triggered Operation Management server) communicates with the **PharmaSuite_OE_Server** event sheet and manages the states of ETOs (Event-triggered operation).
  - **PharmaSuite_OE_Server** runs the Operation Execution server and supports the execution of EBR operations and phases having no user interface. EBR operations and phases with a user interface are visible in the Production Execution Client.

Chapter 11

Monitoring PharmaSuite and Related Components

This chapter describes how to monitor a PharmaSuite system and related components based on a JBoss application server. Monitoring can be done for the following components:

- FactoryTalk ProductionCentre servers (page 62)
- PharmaSuite services (page 64)
- PharmaSuite clients (page 78)

PharmaSuite provides additional details with its **About** dialog (page 61), the **Administrator Console** tool (OE server operations (page 71), EBR server procedures (page 66), communication connection to OE and EBR server (page 74)), and the **Automation Integration Access Verification** tool (page 74).

For further information, please refer to the following documentation:

- Database-specific information:
  "FactoryTalk ProductionCentre Administrator Release 10.4 User's Guide" [A6] (page 81)
- Monitoring and usage of JDK tools
  Troubleshooting Guide for HotSpot VM [D4] (page 82)
- Monitoring with JConsole
  Using JConsole - Java SE Monitoring and Management Guide [D5] (page 82)

PharmaSuite's About Dialog

The **About** dialog provides general information about the current application (e.g. version, logged-in user, memory consumption) and installation details (e.g. application server, application configuration).
Use this information for monitoring your PharmaSuite installation and the statuses of PharmaSuite services (e.g. AI server, EBR server, ActiveMQ broker).

TIP

For support cases, please provide the displayed installation details for analysis purposes.

Monitoring FactoryTalk ProductionCentre Servers

The following table describes resources to be monitored for various server types. Please note that the given metrics should be considered as basic guidelines. They do not represent a comprehensive list of all circumstances that need to be addressed to prevent production issues.
The code can be mapped to various server types (see below).

Code	Description	Boundary	Action
A	**Monitor CPUs for sustained utilization over 80 %.** On multicore systems even one CPU having high load may indicate a potential problem or runaway process.	**80 %** for one CPU	Identify the process causing the issue.
B	**Monitor** for available **memory > 5 %** of total memory. Running out of memory may cause poor performance or a server to hang.	Available memory **> 5 %**	Identify the process causing the issue.
C	**Monitor** for adequate **network quality, bandwidth, and latency.** Low bandwidth or high latency indicates network congestion and may cause poor performance. TIP Network packets, bandwidth, and latency can be monitored with Windows Performance Monitor.	Network packets: next to **0** errors and discarded packets. Bandwidth: **> 100 Mb/s** Latency: **< 20 ms**	Analyze your network and resolve the issue.
D	**Monitor disk queues for queues longer than 2.** If the queue, per physical disk, is longer than 2, this may indicate that your disks may be a performance bottleneck. TIP Disk queues can be monitored with Windows Performance Monitor.	Queues per physical disk longer than **2.**	Identify the process causing the issue. Check if the corresponding component has performance issues. If so, check the configuration of the component and/or consider to use hardware with better performance.
E	**Monitor** the **JBoss [EAP] service.** If this service is not running, FactoryTalk ProductionCentre is not running.	Service **stopped.**	Restart the JBoss and SOS services.
F	**Monitor** the **JBoss HTTP port.** E.g. with telnet.	**No response** from the port.	Restart the JBoss and SOS services.
G	**Monitor** the **JBoss IIOP port.** E.g. with telnet.	**No response** from the port.	Restart the JBoss and SOS services.
H	**Monitor JBoss logs.** Be familiar with your logs; which messages are routine and which are not.	Error messages.	Depends on error message.

Code	Description	Boundary	Action
I	**Monitor** the available **Java Heap space for JBoss**, running out of heap space is equivalent to running out of free memory.	**< 1 GB**	Restart the JBoss and SOS services. Consider to adapt the maximum heap size.
J	**Monitor** the **Rockwell Shop Operations Server (SOS) service(s).** If this service(s) is(are) not running, SOS is not running.	Service **stopped**.	Restart the SOS service(s).
K	**Monitor SOS log files**. Be familiar with your logs; which messages are routine and which are not.	Error messages.	Depends on error message.
L	**Monitor** the **SOS Jetty ports:** **8084** (PharmaSuite Transition server), **8085** (PharmaSuite EBR server), **8086** (PharmaSuite AI server), **8087** (PharmaSuite TOM server), and **8088** (PharmaSuite OE server). These are the defaults port for SOS. TIP The SOS Jetty ports defined at installation in *ShopOperationsServer.xml* must be used.	**No response** from the port.	Restart the SOS service(s).
M	**Monitor** the available **heap space for Shop Operations Server(s).** SOS runs under a JVM just like JBoss.	See sections "Monitoring PharmaSuite Services" (page 64) and "Monitoring PharmaSuite Clients" (page 78).	Restart the SOS service(s). Consider to adapt the maximum heap size.
N	**Monitor** the **disk space**. Running out of free disk space may cause data loss and computer hangs.	Free disk space **> 10 %**	Free disk space.
O	Offending or runaway processes. These processes may use up system resources.	Depends on the process.	Depends on the process. It may have to be shut down.
P	**System Event Log.** It contains messages from the OS and other applications (e.g. SQL Server).	Warning or error messages.	Depends on message.
Q	**Monitor** the **number of connections** per used ports.	**< 1,000**	Identify the process causing the issue. Fix the connection leak inside the component.

Server type	Codes of monitor resources
JBoss Application server	A, B, C, D, E, F, G, H, I, N, O, P, Q
Rockwell Software Shop Operations Server	A, B, C, D, J, K, L, M, N, O, P
Database server	A, B, C, D, N, O, P

TIP

In case of virtualization, monitoring should be performed for both VM and HW.

Monitoring PharmaSuite Services

The following PharmaSuite-specific services can be monitored:

- PharmaSuite EBR server (page 65)
- PharmaSuite Transition server (page 68)
- PharmaSuite OE server (page 69)
- PharmaSuite TOM server (page 73)
- PharmaSuite ActiveMQ Broker (page 73)
- PharmaSuite AI server (page 74)

We recommend to set up a permanent monitoring solution provided by tools like Hyperic or RHQ which provide built-in support for monitoring Java processes and other system resources.

To monitor the current values of the listed Java services, use JConsole (see [D5] (page 82)).

TIP

Since JConsole itself creates load and consumes memory on the related server, we recommend not to run it permanently but only when needed.

For convenience reason, the *wrapper.conf* files of the Java services already contain a section to configure remote monitoring with JMX including a suggestion for JMX ports. Please keep in mind that remote JMX requires security measures to ensure that unauthorized persons cannot control or monitor your application. For more information on how to secure remote JMX monitoring, see "Monitoring and Management Using JMX Technology - Java SE Monitoring and Management Guide" [D6] (page 82).

The following information applies to all PharmaSuite services when you monitor the available **heap space**: The server throws an OutOfMemory exception when the boundary value is reached. In most cases, the current processing fails and the server does not react anymore. We recommend to pay close attention to this parameter and consider to take preventive action.

Monitoring PharmaSuite EBR Server

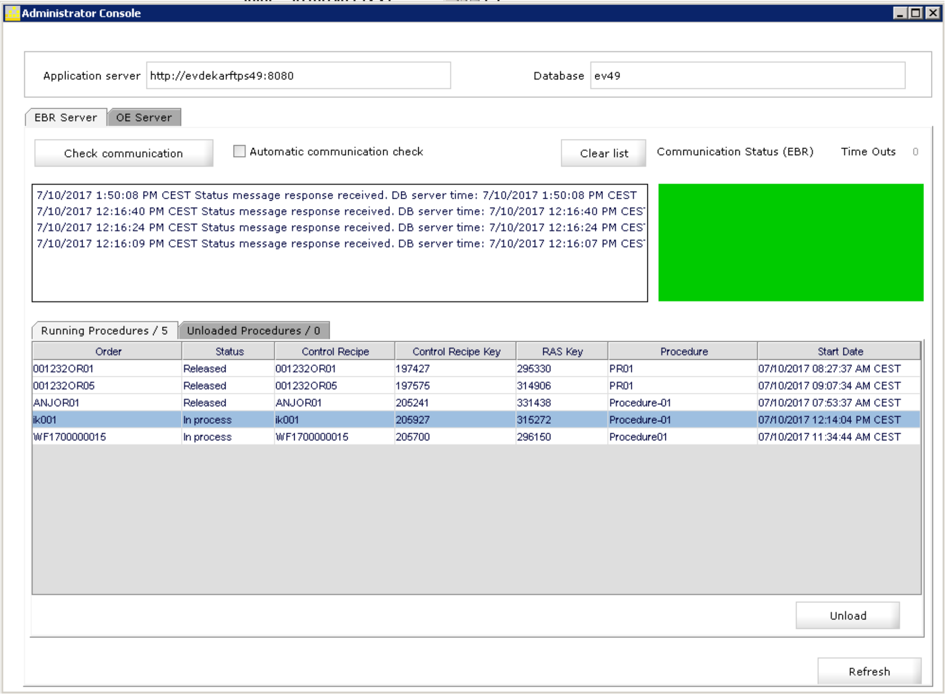
The following items can be monitored.

Description	Boundary	Action
Monitor the available **heap space**. See information related to heap space in section "Monitoring PharmaSuite Services" (page 64).	**< 1024 MB**	Restart the SOS service. Provide a heap dump. Consider to adapt the maximum heap size.
Availability check The availability of this service is checked when the Production Execution Client is started and by cyclical server heartbeat checks within the Production Execution Client. The PharmaSuite **About** dialog also provides details on the availability and response time of the service.	N/A	Restart the SOS service.
Perform sanity and communication checks. Sanity checks can be performed with the **Administrator Console** tool (**Check communication** action, see section "Checking the Communication Connection to the EBR and the OE server" (page 74)). The check involves the messaging infrastructure including the PharmaSuite EBR server SOS service, which requests database server time by accessing the application server.	N/A	Check which component is affected (PharmaSuite ActiveMQ Broker SOS service, PharmaSuite EBR server SOS service, application server, database, or network infrastructure).
Issues with individual orders/workflows are reported to the affected Production Execution Clients or Production Management Clients. However, it can also happen that an issue prevents order steps from being available in the Production Execution Clients when they should be. TIP Procedures of orders and workflows can be unloaded from the EBR server and then loaded again with the **Administrator Console** tool (see section "Unloading and Reloading Procedures" (page 66)).	N/A	Check the error message and the log file of the EBR server.

Unloading and Reloading Procedures

Procedures of orders and workflows running on the EBR server can be unloaded and reloaded later without shutting down the EBR server. This feature allows subject matter experts to correct corrupted processes (orders, workflows), e.g. by modifying entries in the database, while other processes can continue to run on the EBR server.

PharmaSuite provides the **Administrator Console** tool for this purpose. The actions are controlled by one signature class (AC_EBR_ORDER_UNLOAD_AND_LOAD). After the electronic signature has been performed successfully, the system automatically records an "unload procedure"-specific exception for all unit procedures of the order and workflow or adds a "load procedure"-specific comment to the recorded exception. The risk level of the exception can be configured. For details, see chapter "Defining the Risk Level for Exceptions" in Volume 2 of the "Technical Manual Configuration and Extension" [A2] (page 81).



Application server http://evdekarftps49:8080

Database ev49

□ Automatic communication check

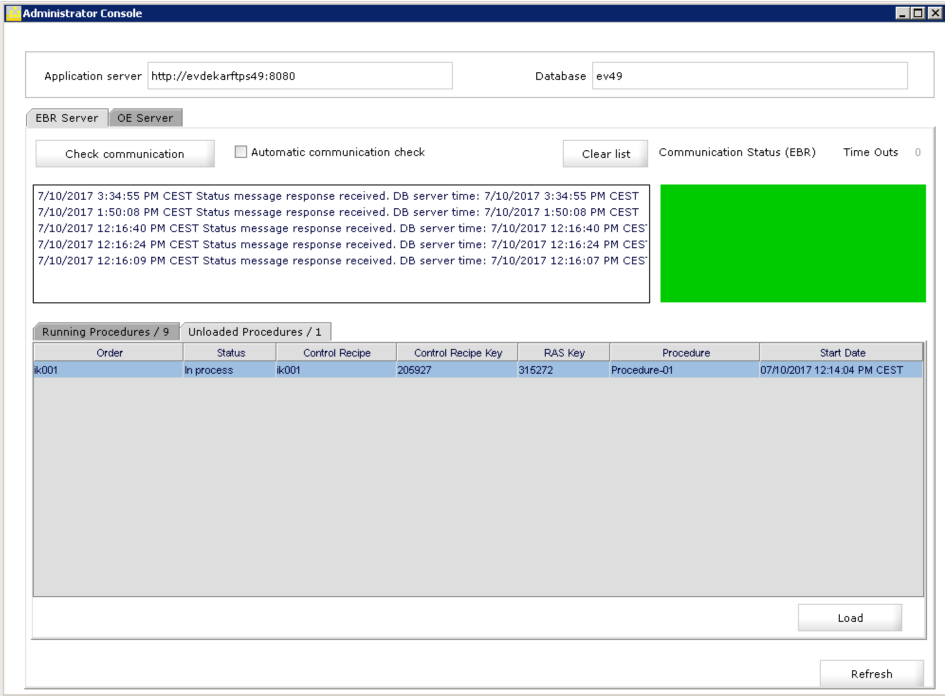
Time Outs 0

```
7/10/2017 1:50:08 PM CEST Status message response received. DB server time: 7/10/2017 1:50:08 PM CEST
7/10/2017 12:16:40 PM CEST Status message response received. DB server time: 7/10/2017 12:16:40 PM CES
7/10/2017 12:16:24 PM CEST Status message response received. DB server time: 7/10/2017 12:16:24 PM CES
7/10/2017 12:16:09 PM CEST Status message response received. DB server time: 7/10/2017 12:16:07 PM CES
```

Running Procedures / 5 | Unloaded Procedures / 0

Order	Status	Control Recipe	Control Recipe Key	RAS Key	Procedure	Start Date
001232OR01	Released	001232OR01	197427	295330	PR01	07/10/2017 08:27:37 AM CEST
001232OR05	Released	001232OR05	197575	314906	PR01	07/10/2017 09:07:34 AM CEST
ANJOR01	Released	ANJOR01	205241	331438	Procedure-01	07/10/2017 07:53:37 AM CEST
ik001	In process	ik001	205927	315272	Procedure-01	07/10/2017 12:14:04 PM CEST
WF1700000015	In process	WF1700000015	205700	296150	Procedure01	07/10/2017 11:34:44 AM CEST

Figure 9: Unload a procedure (order) that is running on the EBR server



Application server: http://evdekarftps49:8080

Database: ev49

□ Automatic communication check

Time Outs: 0

```
7/10/2017 3:34:55 PM CEST Status message response received. DB server time: 7/10/2017 3:34:55 PM CEST
7/10/2017 1:50:08 PM CEST Status message response received. DB server time: 7/10/2017 1:50:08 PM CEST
7/10/2017 12:16:40 PM CEST Status message response received. DB server time: 7/10/2017 12:16:40 PM CES
7/10/2017 12:16:24 PM CEST Status message response received. DB server time: 7/10/2017 12:16:24 PM CES
7/10/2017 12:16:09 PM CEST Status message response received. DB server time: 7/10/2017 12:16:07 PM CES
```

Order	Status	Control Recipe	Control Recipe Key	RAS Key	Procedure	Start Date
ik001	In process	ik001	205927	315272	Procedure-01	07/10/2017 12:14:04 PM CEST

Figure 10: Load a procedure (order) that was unloaded from the EBR server

To use the tool, run the **adminConsole** form to start the **Administrator Console** tool and navigate to the **EBR Server** tab.

To unload a running procedure, proceed as follows:

- Navigate to the **Running Procedures** tab. Select the procedure you wish to unload and click the **Unload** button. The **Administrator Console** tool checks the availability of the EBR server, requests an electronic signature, and instructs the EBR server to unload the procedure. If successful, the procedure is moved to the **Unloaded Procedures** tab. If not, the system displays an error message and the procedure remains in the **Running Procedures** tab.

IMPORTANT - PERSISTENCE

Unloading a procedure is not persistent. With a restart of the EBR server, all unloaded procedures, i.e. orders and workflows, are started normally.
This also means that there can be "unload procedure"-specific exceptions without a corresponding "load procedure"-specific comment in the batch, workflow, or device history report. Such a situation can occur when the EBR server is restarted while a procedure (order, workflow) is unloaded, since the procedure is loaded with the restart of the EBR server.

IMPORTANT - ERROR CORRECTION

How an order or workflow of the unloaded procedure can be corrected depends on the issue. Please always contact the support team and do not attempt to resolve an issue with solutions that were provided for other procedures unless the support team confirms the solution.

IMPORTANT - ACTIONS IN THE PRODUCTION EXECUTION AND PRODUCTION MANAGEMENT CLIENTS

The Cockpit of the Production Execution Client also lists the unit procedures and operations of an unloaded procedure (order, workflow) even though they cannot be processed. If you try to process them, the system displays an appropriate message.

In the Production Management Client, for an unloaded procedure, i.e. its order, order steps, workflow, and workflow steps, actions are not disabled even though they cannot be performed. If you try to perform them, the system displays an appropriate message.

We highly recommend not to process unloaded procedures or to perform any actions on them.

To reload an unloaded procedure, proceed as follows:

- Navigate to the **Unloaded Procedures** tab. Select the procedure you wish to load and click the **Load** button. The **Administrator Console** tool checks the availability of the EBR server, requests an electronic signature, and instructs the EBR server to load the procedure. If successful, the procedure is moved to the **Running Procedures** tab. If not, the system displays an error message and the procedure remains in the **Unloaded Procedures** tab.

Monitoring PharmaSuite Transition Server

The following items can be monitored.

Description	Boundary	Action
Monitor the available **heap space**. See information related to heap space in section "Monitoring PharmaSuite Services" (page 64).	**< 1024 MB**	Restart the SOS service. Provide a heap dump. Consider to adapt the maximum heap size.
Availability check The availability of this service is checked when the Production Execution Client is started and by cyclical server heartbeat checks within the Production Execution Client. The PharmaSuite **About** dialog also provides details on the availability and response time of the service.	N/A	Restart the SOS service.
Monitor the **log files** of the **SOS service**. For details, see **Code K** in "Monitoring FactoryTalk ProductionCentre Servers" (page 62). It is important to review execution timeouts of the **delete detached control recipe structures** action.	N/A	Depends on message.

Monitoring PharmaSuite OE Server

The following items can be monitored.

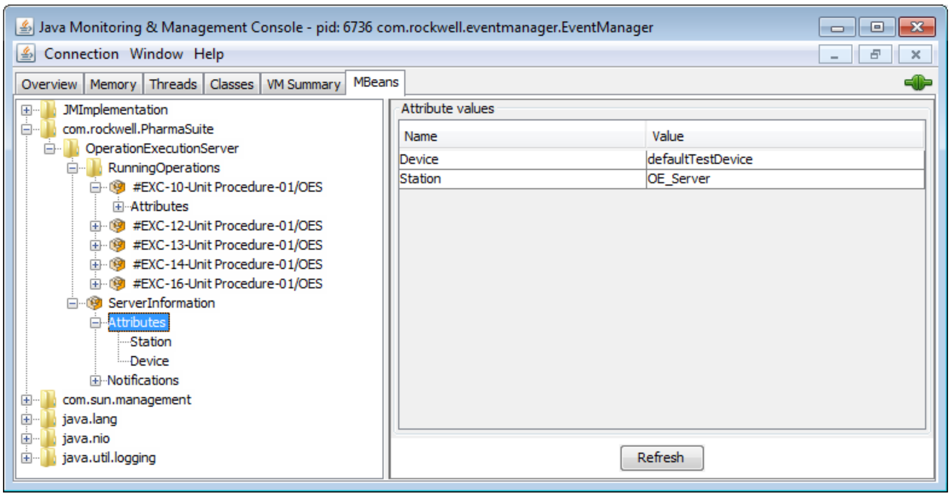
Description	Boundary	Action
Monitor the available **heap space**. See information related to heap space in section "Monitoring PharmaSuite Services" (page 64).	**< 1024 MB**	Restart the SOS service. Provide a heap dump. Consider to adapt the maximum heap size.
Check for the **number of running threads**.	< 300	Verify the settings related to thread pooling (see section "Setting up Shop Operations Servers" in "Technical Manual Installation - Enterprise Edition" [A7] (page 81).
Availability check The availability of this service is checked when the Production Execution Client is started and by cyclical server heartbeat checks within the Production Execution Client. The PharmaSuite **About** dialog also provides details on the availability and response time of the service.	N/A	Restart the SOS service.
Perform sanity and communication checks. Sanity checks can be performed with the **Administrator Console** tool (**Check communication** action, see section "Checking the Communication Connection to the EBR and the OE server" (page 74)). The check involves the messaging infrastructure including the PharmaSuite OE server SOS service, which requests database server time by accessing the application server.	N/A	Check which component is affected (PharmaSuite ActiveMQ Broker SOS service, PharmaSuite OE server SOS service, application server, database, or network infrastructure).

Description	Boundary	Action
Issues on the OE server are reported by error messages to affected Production Execution Clients. If an issue is related to the execution of operations and phases, the system displays the error message at the running Production Execution Clients of the work centers of the unit procedure. If an issue is not related to a specific work center, the system displays the error message at all running Production Execution Clients. TIPS ■ The messages are also sent to a connected JMX client (e.g. JConsole) as notifications, if the user has subscribed. ■ Operations can be held and resumed with the **Administrator Console** tool (see section "Holding and Resuming Operations" (page 71)).	N/A	Check the error message and the log file of the OE server.

Accessing Details of the Server and its Runtime Operations

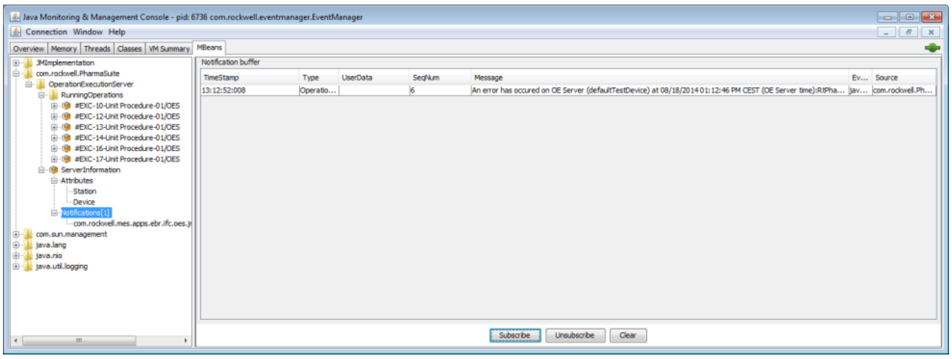
The PharmaSuite OE server uses MBeans (managed bean) to monitor OE server attributes and details of running operations.

The *ServerInformation* MBean provides some OE server attributes (e.g. station, device). If a user has subscribed for notifications, the error messages of the OE server are also available as notifications.
The *RunningOperations* MBean provides details of all running operations (e.g. state, instance count).



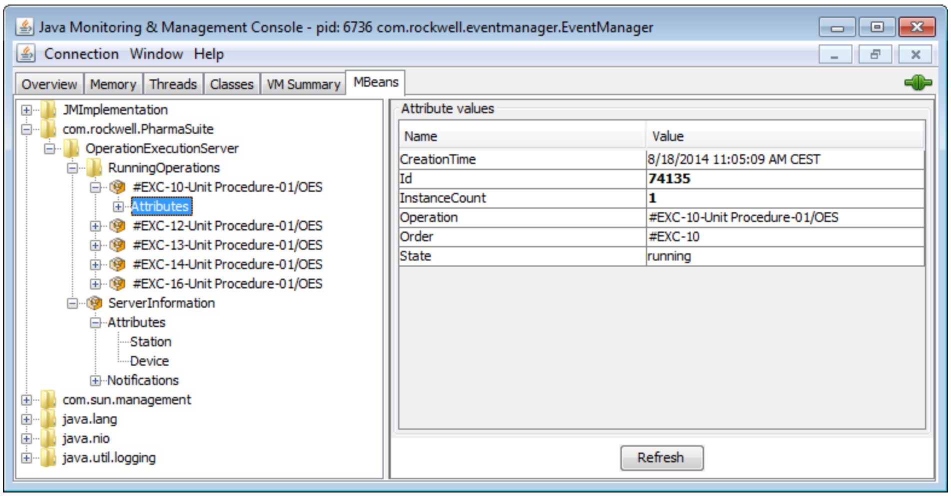
Name	Value
Device	defaultTestDevice
Station	OE_Server

Figure 11: Example: OE server attributes displayed in JConsole as JMX client



TimeStamp	Type	UserData	SeqNum	Message	Ev...	Source
13:12:52:008	Operatio...		6	An error has occured on OE Server (defaultTestDevice) at 08/18/2014 01:12:46 PM CEST (OE Server time):RtPha...	jav...	com.rockwell.Ph...

Figure 12: Example: OE server notifications displayed in JConsole as JMX client

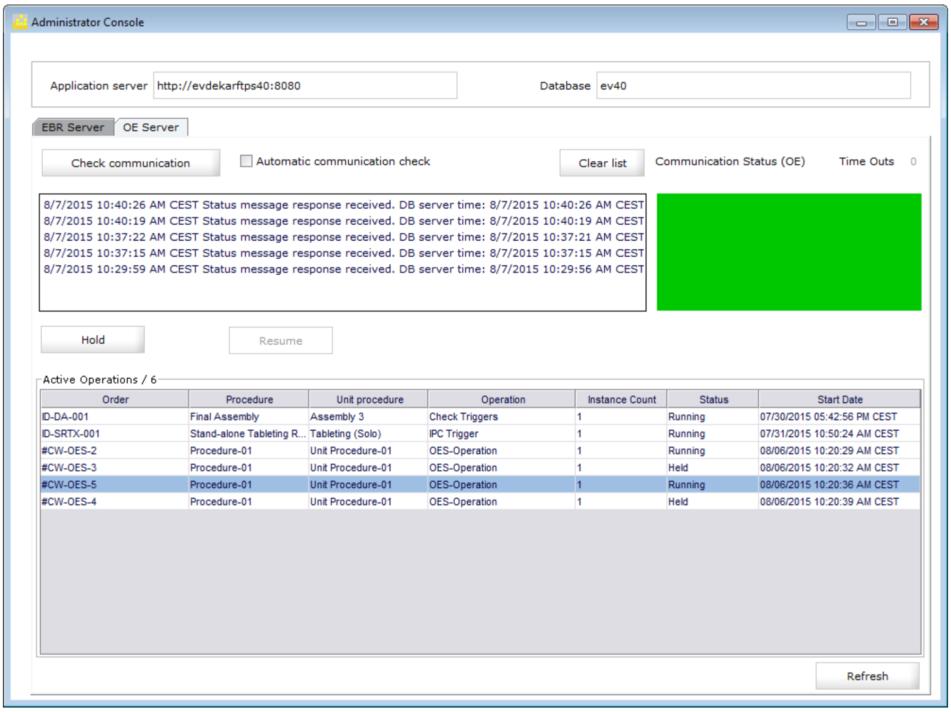


Name	Value
CreationTime	8/18/2014 11:05:09 AM CEST
Id	**74135**
InstanceCount	**1**
Operation	#EXC-10-Unit Procedure-01/OES
Order	#EXC-10
State	running

Figure 13: Example: running operation details displayed in JConsole as JMX client

Holding and Resuming Operations

Operations running on an OE server can be held and resumed later without a shutdown of the OE server. PharmaSuite provides the **Administrator Console** tool for this purpose. The actions are controlled by one signature class (AC_OES_OPERATION_HOLD_AND_RESUME). After the electronic signature has been performed successfully, the system automatically records a "hold operation"-specific exception for the operation or adds a "resume operation"-specific comment to the recorded exception. The risk level of the exception can be configured. For details, see chapter "Defining the Risk Level for Exceptions" in Volume 2 of the "Technical Manual Configuration and Extension" [A2] (page 81).



Application server http://evdekarftps40:8080

Database ev40

☐ Automatic communication check

Communication Status (OE)

Time Outs 0

```
8/7/2015 10:40:26 AM CEST Status message response received. DB server time: 8/7/2015 10:40:26 AM CEST
8/7/2015 10:40:19 AM CEST Status message response received. DB server time: 8/7/2015 10:40:19 AM CEST
8/7/2015 10:37:22 AM CEST Status message response received. DB server time: 8/7/2015 10:37:21 AM CEST
8/7/2015 10:37:15 AM CEST Status message response received. DB server time: 8/7/2015 10:37:15 AM CEST
8/7/2015 10:29:59 AM CEST Status message response received. DB server time: 8/7/2015 10:29:56 AM CEST
```

Active Operations / 6

Order	Procedure	Unit procedure	Operation	Instance Count	Status	Start Date
ID-DA-001	Final Assembly	Assembly 3	Check Triggers	1	Running	07/30/2015 05:42:56 PM CEST
ID-SRTX-001	Stand-alone Tableting R...	Tableting (Solo)	IPC Trigger	1	Running	07/31/2015 10:50:24 AM CEST
#CW-OES-2	Procedure-01	Unit Procedure-01	OES-Operation	1	Running	08/06/2015 10:20:29 AM CEST
#CW-OES-3	Procedure-01	Unit Procedure-01	OES-Operation	1	Held	08/06/2015 10:20:32 AM CEST
#CW-OES-5	Procedure-01	Unit Procedure-01	OES-Operation	1	Running	08/06/2015 10:20:36 AM CEST
#CW-OES-4	Procedure-01	Unit Procedure-01	OES-Operation	1	Held	08/06/2015 10:20:39 AM CEST

Figure 14: Hold and resume operations that are running on the OE server

To use the tool, run the **adminConsole** form to start the **Administrator Console** tool and navigate to the **OE Server** tab.

To hold a running operation, proceed as follows:

- Select the operation you wish to hold and click the **Hold** button. The **Administrator Console** tool checks the availability of the OE server, requests an electronic signature, and instructs the OE server to hold the operation. If successful, the operation status is set **Held**. If not, the system displays an error message and the operation's status remains unchanged.

IMPORTANT
Manually held operations are intentionally **not** started when the OE server starts, they must be resumed manually.

To resume a held operation, proceed as follows:

- Click the **Resume** button. The **Administrator Console** tool checks the availability of the OE server, requests an electronic signature, and instructs the OE server to resume the operation. If successful, the operation status is set to **Running**. If not, the system displays an error message and the operation's status remains unchanged.

Monitoring PharmaSuite TOM Server

The following items can be monitored.

Description	Boundary	Action
Monitor the available **heap space**. See information related to heap space in section "Monitoring PharmaSuite Services" (page 64).	**< 1024 MB**	Restart the SOS service. Provide a heap dump. Consider to adapt the maximum heap size.
Availability check The availability of this service is checked when the Production Execution Client is started and by cyclical server heartbeat checks within the Production Execution Client. The PharmaSuite **About** dialog also provides details on the availability and response time of the service.	N/A	Restart the SOS service.

Monitoring PharmaSuite ActiveMQ Broker

The following items can be monitored.

Description	Boundary	Action
Monitor the available **heap space**.	**< 1024 MB**	Restart the service. Provide a heap dump. Consider to adapt the maximum heap size.
Availability check The availability of this service is checked when the Production Execution Client is started and by cyclical server heartbeat checks within the Production Execution Client. The PharmaSuite **About** dialog also provides details on the availability and response time of the service.	N/A	Restart the service.

Monitoring PharmaSuite AI Server

The following items can be monitored.

Description	Boundary	Action
Monitor the available **heap space.** See information related to heap space in section "Monitoring PharmaSuite Services" (page 64).	**< 1024 MB**	Restart the SOS service. Provide a heap dump. Consider to adapt the maximum heap size.
Availability check The availability of this service is checked when the Production Execution Client is started and by cyclical server heartbeat checks within the Production Execution Client. The PharmaSuite **About** dialog also provides details on the availability and response time of the service.	N/A	Restart the SOS service.
Check if a tag can be read from Live Data via the AI server (see section "Checking the Communication Connection to the AI server" (page 74)).	Tag can be **read without error.**	Check the error message of the **Automation Integration Access Verification** tool. Check the log file of AI server. Resolve the problem. It may be necessary to restart the AI server.

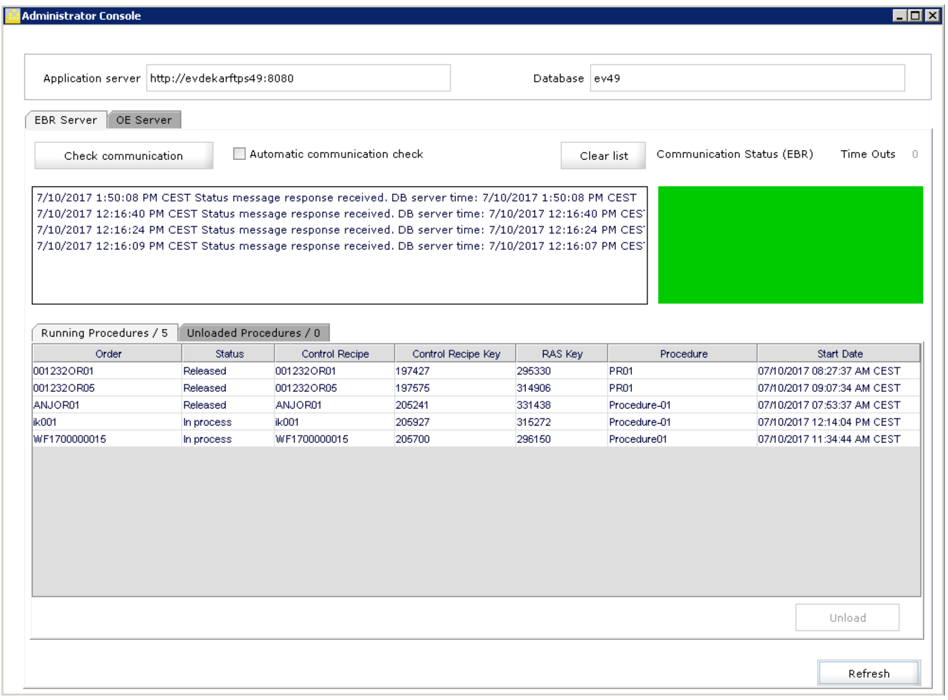
Checking the Communication Connection to the AI Server

The communication connection to the AI server can be checked with the **Automation Integration Access Verification** tool. For more information, see chapter "Setting up the Live Data Infrastructure for PharmaSuite" in "Technical Manual Installation - Enterprise Edition" [A7] (page 81).

Checking the Communication Connection to the EBR and the OE Server

The execution of S88 recipes and workflows in PharmaSuite is realized as a Distributed Execution. Master recipes and master workflows consist of procedures, unit procedures, operations, and phases. A server component (EBR server) runs procedures and unit procedures, and the client runs operations and phases. Additionally, some specific operations run on an OE server.

PharmaSuite provides the **Administrator Console** tool to check the communication connection to the EBR server and the OE server either manually or automatically.



Application server http://evdekarftps49:8080

Database ev49

Time Outs 0

```
7/10/2017 1:50:08 PM CEST Status message response received. DB server time: 7/10/2017 1:50:08 PM CEST
7/10/2017 12:16:40 PM CEST Status message response received. DB server time: 7/10/2017 12:16:40 PM CES
7/10/2017 12:16:24 PM CEST Status message response received. DB server time: 7/10/2017 12:16:24 PM CES
7/10/2017 12:16:09 PM CEST Status message response received. DB server time: 7/10/2017 12:16:07 PM CES
```

Order	Status	Control Recipe	Control Recipe Key	RAS Key	Procedure	Start Date
001232OR01	Released	001232OR01	197427	295330	PR01	07/10/2017 08:27:37 AM CEST
001232OR05	Released	001232OR05	197575	314906	PR01	07/10/2017 09:07:34 AM CEST
ANJOR01	Released	ANJOR01	205241	331438	Procedure-01	07/10/2017 07:53:37 AM CEST
ik001	In process	ik001	205927	315272	Procedure-01	07/10/2017 12:14:04 PM CEST
WF1700000015	In process	WF1700000015	205700	296150	Procedure01	07/10/2017 11:34:44 AM CEST

Figure 15: Check communication connection to the EBR server

To use the tool, run the **adminConsole** form to start the **Administrator Console** tool and navigate to the **EBR Server** or **OE Server** tab, respectively.

The following functions are available:

- To perform a single manual check of the communication connection, proceed as follows:
  - Click the **Check communication** button. The **Administrator Console** tool sends a status request message to the EBR server or OE server. The reply is displayed in the list of status messages received from the EBR server or OE server and the **Communication Status (EBR/OE)** switches to green in case of a successful connection, otherwise the status turns red.
  - Click the **Clear list** button to clear the list of received status messages.
- To perform a repeated automatic check of the communication connection, proceed as follows:
  - Select the **Automatic communication check** checkbox. Every two seconds, the **Administrator Console** tool sends a status request message to the EBR server or OE server. The reply is displayed in the list of status messages received from the EBR server or OE server and the **Communication Status (EBR/OE)** switches to green in case of a successful connection, otherwise the status turns red.

- Unselect the **Automatic communication check** checkbox to stop the automatic check.
- Click the **Clear list** button to clear the list of received status messages.

Debugging PharmaSuite Event Sheets

The **PharmaSuite_OE_Server**, **PharmaSuite_EBR_Server**, **PharmaSuite_AI_Server**, **PharmaSuite_TOM_Server**, and **PharmaSuite_Transition_Server** event sheets can be debugged with a debug configuration from a development environment (e.g. Eclipse). This is especially useful to debug phases that are running on the OE server.

The following prerequisites apply (based on Eclipse):

- An Eclipse workspace is available.
- All jar files located in the *SOS\lib* directory must be added to the class path.
- A FactoryTalk ProductionCentre server to test against has been set up.

To set up a debug configuration in Eclipse, proceed as follows:

1. Create the debug configuration.
    1. In Eclipse, from the **Run** menu, select the **Debug Configurations...** function.
    2. Right-click the **Java Application** node and select the **New** function.
    3. In the **Main** tab, set the **Main class** to **com.rockwell.eventmanager.EventManager**.
    4. Optional, in the **Arguments** tab, set the **VM arguments** as follows:

```
-Xmx1024m
-Dcom.datasweep.plantops.j2eevendor=JBoss
-Duser.language=en -Duser.region=us
-Djboss-ejb-client.reconnectOnAuthenticationFailures=false
-Dsun.locale.formatasdefault=true
-Djava.net.preferIPv4Stack=true
-Dorg.apache.activemq.SERIALIZABLE_PACKAGES=*
-DuiDefaultButtonFollowFocus=false
-DActivitySetContainerWithThreadPool.numberOfThreads=10
```

2. Create the event sheet configuration file.
    1. In your newly created debug configuration, click the **Debug** button in the lower right corner to start the debug configuration.
       Eclipse creates the XML configuration file and displays the path in the **Console** tab.
       Example: `ShopOperationsServer.xml at:`
       `C:\PATH_TO_YOUR_ECLIPSE_PROJECT\ShopOperationsServer.xml`

> TIP
> Usually, some error messages are displayed, but you can ignore them. The xml file is created nevertheless.

3. Adapt the event sheet configuration file.

   1. Open the XML file that was created by the first debug run.
      Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- The values listed below are for advanced users only. See
     the comments below for the functions of the values. All these
     values have an upper limit and can not be less than 1. If the
     value was set out of the range, it will be recognized as the
     default value. Please do not change the other values in this
     file directly. -->
<!-- function-thread-pool-size(int),
     default value:25,   max value:100  -->
<!-- main-processing-queue(int),
     default value:1000, max value:1000 -->
<!-- statistics-history-queue(int),
     default value:1000, max value:1000 -->
<!-- function-thread-processing-queue(int),
     default value:250,  max value:1000 -->
<shop-operations-server-configuration
  history-queue-enabled="true" log-file-count="4"
  ping-server-max-time="900" ping-server-duration="10"
  jetty-port="8084" statistics-enabled="true"
  main-processing-queue="1000" statistics-history-queue="1000"
  function-thread-processing-queue="250"
  function-thread-pool-size="25" log-file-size="2000000">
  <log-level>INFO</log-level>
  <http-uRL>http://localhost:8080</http-uRL>
  <username>admin</username><password>ozew#</password>
  <iiop-uRL>remote://localhost:8080</iiop-uRL>
  <log-folder>C:\Documents and Settings\User\logs</log-folder>
</shop-operations-server-configuration>
```

   2. Adapt the name and port of the server.
      Set up the event sheet to be executed by adding the `<event-sheet-name>` line.
      Always use `SERVER_NAME` instead of `localhost`.
      Example:

```
<shop-operations-server-configuration
  history-queue-enabled="true" log-file-count="4"
  ping-server-max-time="900" ping-server-duration="10"
  jetty-port="8084" statistics-enabled="true"
  main-processing-queue="1000" statistics-history-queue="1000"
  function-thread-processing-queue="250"
  function-thread-pool-size="25" log-file-size="2000000">
  ...
  <http-uRL>http://SERVER_NAME:8080</http-uRL>
  ...
  <iiop-uRL>remote://SERVER_NAME:8080</iiop-uRL>
  ...
  <event-sheet-name>NAME_OF_THE_EVENT_SHEET</event-sheet-name>
</shop-operations-server-configuration>
```

3. Save your changes to the event sheet configuration file.
4. Run your debug configuration to debug the event sheet.

Monitoring PharmaSuite Clients

The following items can be monitored.

Description	Boundary	Action
Monitor the available **heap space.** TIP The PharmaSuite **About** dialog also provides details on the current values.	**< 1024 MB**	Restart the client. Provide a heap dump. Consider to adapt the maximum heap size.
Monitor CPUs for sustained utilization over 80 %. On multicore systems even one CPU having high load may indicate a potential problem or runaway process.	**80 %** for one CPU	Identify the process causing the issue.
Monitor for available **memory > 5 %** of total memory. Running out of memory may cause poor performance.	Available memory **> 5 %**	Identify the process causing the issue.
Monitor disk queues for queues longer than 2. If the queue, per physical disk, is longer than 2, this may indicate that your disks may be a performance bottleneck. TIP Disk queues can be monitored with Windows Performance Monitor.	Queues per physical disk longer than **2.**	Identify the process causing the issue. Check if the corresponding component has performance issues. If so, check the configuration of the component and/or consider to use hardware with better performance.
Monitor the **disk space.** Running out of free disk space may cause data loss and computer hangs.	Free disk space **> 10 %**	Free disk space

Recovery Capabilities within PharmaSuite Clients

The **Production Execution Client** provides certain recovery capabilities to resolve issues during execution that are caused by a faulty or undefined recipe parameter setup (e.g. information flow expressions of a process parameter or transition conditions cannot be calculated by the system). These capabilities require specific access privileges.

- Abort phase execution
  The action column of the Navigator provides the capability to abort the execution of an active phase. When a phase is aborted, the system adds a "Phase execution aborted" exception to the aborted phase and enforces the completion of the phase. The forced completion bypasses all UI extensions (e.g. phase completion signature) and other phase-specific checks that may veto the completion.
  After the phase has been aborted, processing of the operation continues normally. That means the outgoing transition conditions of the aborted phase are evaluated and based on the evaluation successor phases will become active.
- Repair phase data
  The action column of the Navigator provides the capability to repair an active phase, i.e. to terminate the phase, create a new instance of the phase, and enable editing parameter data.
  - Repairing is not available for phases that are explicitly excluded from being repaired with the **PhaseRepairModeBlackList** configuration key. For details, see chapter "Configuration Keys of PharmaSuite" in Volume 4 of the "Technical Manual Configuration and Extension" [A3] (page 81).
  - Repairing is only available as long as no exceptions have been recorded for a phase. This restriction does not include "phase repair mode"-specific exceptions.

  When a phase is being repaired, the system adds a "Phase repair mode started" exception to the terminated phase.
  In contrast to the abort action, after the phase has been terminated, the system does not continue to process its transition conditions. Instead, it creates a new instance of the terminated phase and puts the new instance into the processing context of the operation.
  Before the new instance of the phase is started, the parameter data of the phase is editable in order to repair a misconfiguration. When the editing is confirmed, the system adds a "Phase parameters repaired" exception to the new instance of the phase that includes the original and new parameter data.

> **TIP**
> A repaired phase has a new instance count. Therefore recipes depending on instance count calculations may run into issues when they contain such phases.

The **Production Management Client** provides the capability to force an execution transition in case the transition is stalled during execution of a batch-specific order or a workflow. When an execution transition is forced, the system adds a "Force execution transition" exception to the related operation (force transition between phases), unit procedure (force transition between operations), or the unit procedure that was performed prior to the forced transition (force transition between unit procedures of an order).

Reference Documents

The following documents are available from the Rockwell Automation Download Site.

No.	Document Title	Part Number
A1	PharmaSuite Technical Manual Developing System Building Blocks	PSBB-PM007E-EN-E
A2	PharmaSuite Technical Manual Configuration & Extension - Volume 2	PSCEV2-GR008E-EN-E
A3	PharmaSuite Technical Manual Configuration & Extension - Volume 4	PSCEV4-GR008E-EN-E
A4	FactoryTalk ProductionCentre Plant Operations Release 10.4 Server Installation Guide - JBoss Advanced	PCJBAD IN104A EN E
A5	FactoryTalk ProductionCentre Plant Operations Release 10.4 Server Installation Guide - JBoss Stand-Alone	PCJBSA IN104A EN E
A6	FactoryTalk ProductionCentre Administrator Release 10.4 User's Guide	PCADM-IN104A-EN-E
A7	PharmaSuite Technical Manual Installation - Enterprise Edition	PSEN-IN008E-EN-E

TIP

To access the Rockwell Automation Download Site, you need to acquire a user account from Rockwell Automation Sales or Support.

The following documents are distributed with the FactoryTalk ProductionCentre installation.

No.	Document Title / Section
B1	Process Designer Online Help

TIP

To access the "Process Designer Online Help", use the following syntax: *http://<MES-PS-HOST>:8081/PlantOpsDownloads/docs/help/pd/index.htm*, where <MES-PS-HOST> is the name of your PharmaSuite server. To view the online help, the Apache Tomcat of the FactoryTalk ProductionCentre installation must be running.

The following documents are distributed with the PharmaSuite installation.

No.	Document Title / Section
C1	PharmaSuite-related Java Documentation: Interfaces of PharmaSuite
C2	Data Manager User Documentation: Managing Equipment

TIP

To access the "PharmaSuite-related Java Documentation", use the following syntax: *http://<MES-PS-HOST>:8080/PharmaSuite/javadoc/*, where <MES-PS-HOST> is the name of your PharmaSuite server.
To access the "Data Manager User Documentation", use the following syntax: *http://<MES-PS-HOST>:8080/PharmaSuite/documentationandhelp/index.htm*, where <MES-PS-HOST> is the name of your PharmaSuite server.

The following third-party documentation is available online as reference:

No.	Document Title / Web Site
D1	Mettler Toledo (http://www.mt.com)
D2	Sartorius (http://www.sartorius.com)
D3	Mettler Toledo IND780 Technical Manual: Communication, Configuration, Serial and PLC Interface
D4	Troubleshooting Guide for HotSpot VM (http://docs.oracle.com/javase/7/docs/webnotes/tsg/TSG-VM/html/toc.html)
D5	Using JConsole - Java SE Monitoring and Management Guide (http://docs.oracle.com/javase/7/docs/technotes/guides/management/jconsole.html)
D6	Monitoring and Management Using JMX Technology - Java SE Monitoring and Management Guide (http://docs.oracle.com/javase/7/docs/technotes/guides/management/agent.html#gdenl)
D7	Mettler Toledo IND890 Weighing Terminal User's Guide

Revision History

The following table describes the history of this document.

Changes related to the document:

Object	Description	Document
---	---	---

Changes related to "Introduction" (page 1):

Object	Description	Document
---	---	---

Changes related to "Extension and Naming Conventions" (page 3):

Object	Description	Document
---	---	---

Changes related to "Integrating Custom Hardware" (page 7):

Object	Description	Document
Integrating New Label Printers (page 24)	Label size increased to 4 x 5 inches.	1.0

Changes related to "Best Practices for Managing User Accounts of a Client Operating System" (page 27):

Object	Description	Document
---	---	---

Changes related to "Managing User and Access Rights" (page 29):

Object	Description	Document
Creating and Configuring Access Rights (page 32)	New access rights type: confidential object.	1.0
Creating Access Rights for Confidential Objects (page 36)	New section.	1.0

Changes related to "Exporting and Importing Master Recipes, Master Workflows, and Building Blocks" (page 37):

Object	Description	Document
Exporting and Importing Master Recipes, Master Workflows, and Building Blocks (page 37)	PharmaSuite supports the concept of confidential objects to protect the intellectual property of recipes, workflows, orders, and related data from unauthorized access.	1.0
Customer-specific Application Tables Used as Parameter Attributes (page 47)	Example updated for GHS statements.	1.0

Changes related to "Importing Equipment Classes and (Template) Entities from an External Source" (page 51):

Object	Description	Document
---	---	---

Changes related to "Managing Device Identifiers" (page 53):

Object	Description	Document
---	---	---

Changes related to "Localizing Each as Unit of Measure for Recipe Designer - Device" (page 57):

Object	Description	Document
---	---	---

Changes related to "Using Event Sheets in PharmaSuite" (page 59):

Object	Description	Document
Using Event Sheets in PharmaSuite (page 59)	The **PharmaSuite_EBR_Server** event sheet processes incoming messages from a Distributed Control System, in case a DCS is configured to communicate with PharmaSuite. In case external exception handling is configured, the **PharmaSuite_Transition_Server** event sheet listens for messages from an external QMS (Quality Management System) and processes the messages accordingly.	1.0

Changes related to "Monitoring PharmaSuite and Related Components" (page 61):

Object	Description	Document
Monitoring PharmaSuite EBR Server (page 65)	Boundary of heap space updated to < 1024MB. New item to be monitored: Issues with individual orders/workflows.	1.0
Monitoring PharmaSuite EBR Server Unloading and Reloading Procedures (page 66)	New section.	1.0
Monitoring PharmaSuite Transition Server (page 68)	Boundary of heap space updated to < 1024MB.	1.0
Monitoring PharmaSuite OE Server (page 69)	Boundary of heap space updated to < 1024MB.	1.0
Monitoring PharmaSuite TOM Server (page 73)	Boundary of heap space updated to < 1024MB.	1.0
Monitoring PharmaSuite AI Server (page 74)	Boundary of heap space updated to < 1024MB.	1.0
Monitoring ERP Integration SOS	Section removed.	1.0
Monitoring PharmaSuite Clients Recovery Capabilities within PharmaSuite Clients> (page 79)	New section.	1.0

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