



## **INTEGRATION MES - WMS**

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**TECHNICAL MANUAL**

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## Introduction

This manual provides instructions for installing and configuring the integration of a Manufacturing Execution System (MES) and a Warehouse Management System (WMS). Specifically, it describes how to set up FT PharmaSuite® to communicate in an integrated environment with FT Warehouse Management.

It is intended for system integrators and administrators who execute the installation. They need to have basic knowledge on how to execute PowerShell scripts and profound background knowledge of the following components:

- PharmaSuite
- Warehouse Management
- ActiveMQ
- Tomcat

In the following, the manual describes the supported system versions for integration, the installation of the integration component, and the required configuration.

## Typographical Conventions

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

<b>Bold typeface</b>	Designates user interface texts, such as <ul style="list-style-type: none"><li>■ window and dialog titles</li><li>■ menu functions</li><li>■ panel, tab, and button names</li><li>■ box labels</li><li>■ object properties and their values (e.g. status).</li></ul>
<i>Italic typeface</i>	Designates technical background information, such as <ul style="list-style-type: none"><li>■ path, folder, and file names</li><li>■ methods</li><li>■ classes.</li></ul>

CAPITALS

Designate keyboard-related information, such as

- key names
- keyboard shortcuts.

Monospaced  
typeface

Designates code examples.

## List of Abbreviations

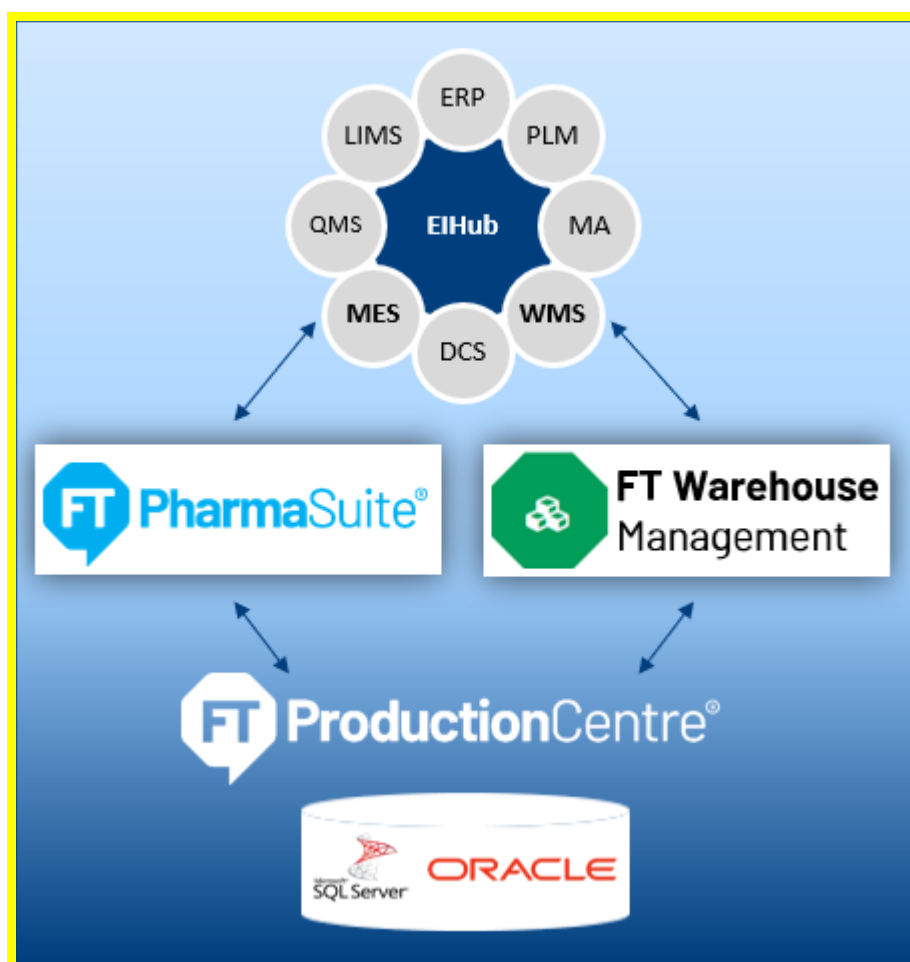
In this document, the following abbreviations are used:

Abbreviation	Definition
B2MML	Business to Manufacturing Markup Language
DCOM	Distributed Component Object Model
DCS	Distributed Control System
ESB	Enterprise Service Bus
JAR	Java Archive
JMS	Java Message Service
MES	Manufacturing Execution System
MSB	Manufacturing Service Bus
S88	ANSI/ISA-88 standard
S95	ANSI/ISA-95 standard
SOAP	Simple Object Access Protocol
URL	Uniform Resource Locator
XML	Extensible Markup Language
XSD	XML Schema Definition

## Architecture of an Integrated MES - WMS Environment

The integration of an MES and a WMS is achieved through EIHub. The reference implementation connects PharmaSuite and Warehouse Management.

The figure below illustrates the sample scenario.



*Figure 1: Sample scenario with PharmaSuite and Warehouse Management*

The communication from PharmaSuite to Warehouse Management maps synchronous messages to the RESTful API of Warehouse Management.

The communication from Warehouse Management to PharmaSuite exchanges synchronous messages by means of ActiveMQ queues.

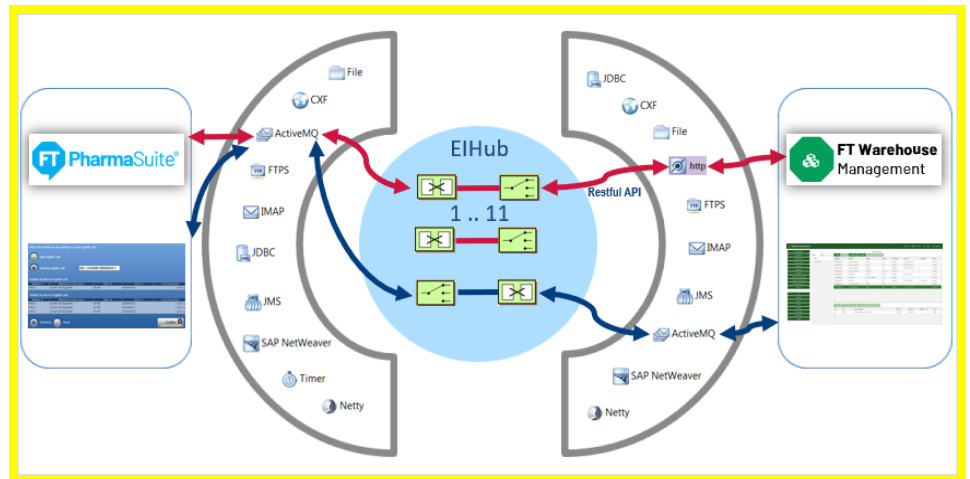


Figure 2: Sample integration of PharmaSuite and Warehouse Management

PharmaSuite message Reply	Queue name	Warehouse Management RESTful API call and HTTP method	Use case		
			Inven- tory WF	Load LU	Dispense , Material Tracking
ChangeSublotsCreated RespondSublotsCreated	CHANGE_ SUBLOTS_ CREATED_REQUES T	sublots/created PUT	✓		✓
ChangeSublotsDeleted RespondSublotsDeleted	CHANGE_ SUBLOTS_ DELETED_REQUES T	sublots/consume PUT	✓		✓
ProcessCreateLogisticUnit AcknowledgeCreateLogisticUnit	PROCESS_CREATE_ LOGISTIC_UNIT_ REQUEST	logisticunits POST		✓	
GetLogisticUnit ShowLogisticUnit	GET_LOGISTIC_ UNIT_REQUEST	logisticunits GET		✓	
ProcessPrintLogisticUnitLabel AcknowledgePrintLogisticUnitLabel	PROCESS_PRINT_ LOGISTIC_UNIT_ LABEL_REQUEST	printers/ printlogisticunit POST		✓	
ProcessReprintLogisticUnitLabel AcknowledgeReprintLogisticUnitLabel	PROCESS_ REPRINT_ LOGISTIC_UNIT_ LABEL_REQUEST	printers/ printlogisticunit POST		✓	
GetSublotsOfLogisticUnit ShowSublotsOfLogisticUnit	GET_SUBLOTS_ OF_LOGISTIC_ UNIT_REQUEST	logisticunitpayload s GET		✓	✓

PharmaSuite message	Queue name	Warehouse	Use case		
ProcessMoveLogisticUnit AcknowledgeMoveLogisticUnit	PROCESS_MOVE_ LOGISTIC_UNIT_ REQUEST	logisticunits/<LU id>/relocateToLogi sticUnit PUT		✓	
ChangeSublotQuantityAdjusted RespondSublotQuantityAdjusted	CHANGE_SUBLOT_ QUANTITY_ ADJUSTED_ REQUEST	sublots/update PUT			✓
ProcessMoveSublotsToLogisticUnit AcknowledgeMoveSublotsToLogisticUnit	PROCESS_MOVE_ SUBLOTS_TO_ LOGISTIC_UNIT_ REQUEST	sublots/relocate PUT		✓	
ProcessAddSublotToContainer AcknowledgeAddSublotToContainer	PROCESS_ADD_ SUBLOT_TO_ CONTAINER_ REQUEST	sublots/relocate PUT			✓
ProcessRemoveSublotFromContainer AcknowledgeRemoveSublotFromContai ner	PROCESS_REMOVE_ _SUBLOT_FROM_ CONTAINER_ REQUEST	Not implemented, since not used by PharmaSuite			
ChangeSublotQualityStatusChanged RespondSublotQualityStatusChanged	CHANGE_SUBLOT_ QUALITY_ CHANGED_ REQUEST	sublots/<sublotid> /qualityStatusChan ged PUT			

PharmaSuite sends a message via an ActiveMQ queue to EIHub. EIHub decides in the route which RESTful API call from Warehouse Management needs to be executed and sends the result as a reply back to PharmaSuite. If Warehouse Management needs to perform a load check against PharmaSuite equipment, it sends the *ProcessEquipmentTriggerGraphTransition* message to the *WH\_LogisticUnitLoadControlTrigger\_Request* ActiveMQ queue. EIHub routes the message to PharmaSuite via the *PROCESS\_TRIGGER\_GRAPH\_TRANSITION\_REQUEST* ActiveMQ queue and retrieves the *replyAcknowledgeEquipmentTriggerGraphTransition* message that is returned to Warehouse Management with the result.

The corresponding XML schemas are defined in *RAWarehouseCommunication.xsd* and *RAExternalEQM.xsd* and provided with the *fps-b2mml-v0600-10.1.0.X.jar*. The schema is compliant with the S88/S95 standards and based on the B2MML standard schema.

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## Installation and Configuration

Before installing EIHub, make sure you have a suitable installation of FactoryTalk ProductionCentre, FT PharmaSuite and FT Warehouse Management.

- For detail information on installing FactoryTalk ProductionCentre, please refer to the FactoryTalk ProductionCentre Plant Operations Release 10.4 Server Installation Guide - JBoss Advanced [A2] (page 9).
- For detail information on installing PharmaSuite, please refer to the PharmaSuite Technical Manual Installation [A1] (page 9).
- For detail information on installing Warehouse Management, please refer to the Warehouse Management Implementation Guide [A4] (page 9).

### Installing EIHub

The general installation, security, and configuration steps for EIHub are described in the "Enterprise Integration Hub - For PharmaSuite Installation and Configuration Guide" [A3] (page 9). Instead of or in addition to selecting the PharmaSuite feature, please select the PharmaSuite / FT Warehouse Integration feature.

After installing EIHub, prepare and deploy the required WAR files. Proceed as follows:

1. You need a system with Java software installed and JAVA\_HOME environment variable configured correctly.
2. Create a temporary folder *<temp folder>* in that system.
3. Copy the following WAR file of the EIHub package to *<temp folder>*:
  - *<EIHub\_install>\EIHub\_Warehouse\_Integration\eihub-camel-pharmasuite-warehouse-<version>.war*
4. From the download package, copy the following files to *<temp folder>*:
  - *eihub-camel-pharmasuite-warehouse-<new-version>.zip* and
  - *updateWarfile.ps1*
5. Execute the *updateWarfile.ps1* script. You will need to open PowerShell as administrator and if necessary, adjust the execution policy.

6. The script will generate *eihub-camel-pharmasuite-warehouse-<new-version>.war* file in *<temp folder>*. You will need this file for the deployment. It can be deleted afterwards.
  7. Copy the following WAR files to *<EIHub\_install>\tomcat\webapps*
    - *<temp folder>\eihub-camel-pharmasuite-warehouse-<new-version>.war*
    - *<EIHub\_install>\hawtio\eihub-hawtio-offline-<version>.war*
- TIP**  
Please note that Hawtio is only required for monitoring purposes.
8. If necessary, adapt the configuration of EIHub (page 8).
  9. Install, configure, and start the Tomcat service described in the "Enterprise Integration Hub - For PharmaSuite Installation and Configuration Guide" [A3] (page 9).

## Configuring EIHub

The EIHub configuration is located in the *eihub-pharmasuite-warehouse.properties* file located in

*<EIHub\_install>\EIHub\_Warehouse\_Integration\eihub-camel-pharmasuite-warehouse-<version>.war > WEB-INF > classes*. If the preconfigured values are not useable, they can be adapted within the *custom-eihub-pharmasuite-warehouse.properties* file available at the same location.

Please make sure to provide the following information. If customizing, include it in the *customeihub-pharmasuite-warehouse.properties* file:

- The PharmaSuite and FactoryTalk ProductionCentre messaging URLs have to be configured. Please refer to the example provided under the **#JMS Provider Connection URL** comment in the *eihubpharmasuite-warehouse.properties* file:  

```
ps.activemq.brokerURL=failover://(tcp://localhost:61646)
ftpc.activemq.brokerURL=failover://(tcp://localhost:61616)
```
- The Warehouse Management system REST URL, user name, and password have to be configured. Please refer to the example provided under the **#Warehouse REST services related settings** comment in the *eihub-pharmasuite-warehouse.properties* file:  

```
wh.server.url=//localhost:8080/FTPCApps/rest/
wh.server.user=admin
wh.server.pwd=admin1
```

Property encryption is supported by the *camel-jasypt* component.



## Reference Documents

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

No.	Document Title	Part Number
A1	PharmaSuite Technical Manual Installation	PSES-IN010B-EN-E
A2	FactoryTalk ProductionCentre Plant Operations Release 10.4 Server Installation Guide - JBoss Advanced	PCJBAD IN104A EN E
A3	Enterprise Integration Hub - For PharmaSuite Installation and Configuration Guide	EIHPS-IN041A-EN-E
A4	Warehouse Management Implementation Guide	WH-IN002C-EN-E

**TIP**

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

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## Revision History

The following tables describe the history of this document.

Changes related to the document:

Object	Description	Document
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Changes related to "Introduction":

Object	Description	Document
Integration MES - WMS Introduction (page 1)	Updated Introduction section.	1.0

Changes related to "Architecture of an Integrated MES - WMS Environment" (page 3):

Object	Description	Document
Architecture of an Integrated MES - WMS Environment (page 3)	Added PharmaSuite messages: 1. ProcessRemoveSublotFromContainer AcknowledgeRemoveSublotFromContainer 2. ChangeSublotQualityStatusChanged RespondSublotQualityStatusChanged Added location of XML schemas.	1.0

Changes related to "Installation and Configuration" (page 7):

Object	Description	Document
Installation and Configuration (page 7)	Added reference to Warehouse Management Implementation Guide.	1.0
Installing ElHub (page 8)	Added instruction on preparation and deployment of WAR files.	1.0

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