Kepware connection to Factbird

## Overview

### Capturing PLC data using Kepware

Factbird captures, manages, and analyzes production data from multiple sources such as sensors, PLCs, cameras, MES, and ERP systems.

One method of capturing data from PLCs and other process equipment and analyzing it in the Factbird manufacturing intelligence cloud software is by using Kepware. Kepware facilitates the transfer of data from various brands of PLCs to the Factbird cloud software. The PLC data, such as units produced, current temperature, stop codes, and batch information, is analyzed and visualized in real-time in the Factbird cloud software, which is accessible from anywhere, anytime.

#### **Setup overview**

The setup process does not require Factbird to be on-site. Factbird provides the necessary information for the customer to establish a connection to the Factbird Cloud. The customer installs and sets up Kepware on their Windows server, establishes the connection, and configures the data in the Factbird Cloud software.



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## Installing and connecting Kepware to physical devices

### Installing Kepware

Required software:

- KEPServerEX setup program
- Java Runtime (32-bit)

Download and install KEPServerEX on a Windows server. For instructions on purchasing and downloading, please refer to https://www.ptc.com/en/products/kepware.

- 1. Start the KEPServerEX setup program.
- 2. Select "Modify" the installation options.

Select the operation you wish to perform.			
Modify	Change which application features are installed. Displays the Select Features dialog, which lets you configure individual feature		
O Repair	Reinstall missing or comut files, registry keys, and shortcuts. Preferences stored in the registry may be reset to default values.		
O Remove	Removes KEPServerEX 6 from your computer.		

3. Click "Communication Driver" under "Communications Server" and add the desired drivers.

4. Select "IoT Gateway" under "Plug-Ins", then press "Next," and complete the installation.



Java Runtime

- 1. The Kepware IoT component requires Java. Since Kepware is a 32-bit program, the Java version must also be 32-bit. Download the Windows Offline version from: <u>https://www.java.com/en/</u> <u>download/manual.jsp</u>.
- 2. Install or update Java as needed.

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#### Create a channel and select drivers for the channel

- Channels define the protocol and drivers being used.
- All devices assigned to a channel will use the channel's settings.
- 1. Start the KEPServerEX.
- 2. Go to "Project", "Connectivity" and "New Channel".
- 3. Choose the drivers from the dropdown menu.

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- Project	Channe / Driver	Connection	Sharing	Virtu	
2 Click to State New Chann	o add a channel.				3
日 柴 loT Gateway				- 1	Add Channel Wizard
X Add Agent					
					Select the type of channel to be created:
				- 1	Semens S7 MPI
				- 1	Semena S5 (3964R) Semena S5 (AS51)
				- 1	Siemens S7 MPI Siemens S7 Plus Ethernet
				- 1	Siemens 37-200 Siemens TCP/IP Bhemet Siemens TCP/IP Server Ethernet
				- 1	Sinato/TI 505 Ehernet Sinato/TI 505 Seral
				- 1	Sinulator SIXNET EtherTRAK
				_	SNMP Second Code
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#### Select devices for the drivers

- 1. Right-click the created channel and add a "**New Device**". (Devices are actual PLCs)
- 2. The device is added to the channel; configure the settings by following the Wizard. This will depend on the customer's physical machines and setup.



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### Create and define tags

1. Click "**New Tag**" from the created device. Configure the settings by following the Wizard. This will depend on the customer's physical machines and setup.



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<b>6</b>	Property Groups			
<u> </u>	(III) General	Name	ProdCounter	
Τ	El Sealing	Description		
	Scaling	Data Properties		
L .		Address	RAMP(5000.0.20.1)	
	222	Data Type	Default	
		Client Access	Read/Write	
		Scan Rate (ms)	100	
-				

## Configuring the IoT Gateway to connect to Factbird

#### The information needed for this step will be provided by Factbird to the customer

- Certificate and Private Key Pair: One pair is needed for each Kepware instance.
- Unique ID (described as "uuid" in this document): Typically, 1 to 2 UUIDs will be provided. One UUID is for the Input type, linked to one IoT Agent. This will be one "device" in Factbird software, and multiple "sensors" and "lines" can be created under one device. The other UUID is for the Event type, linked to another IoT Agent, such as stop codes.
  - Input type: process data e.g., units produced, current temperature, other process data
  - Event type: event data e.g., stop code, machine state

#### Important information

If there is an existing connection to a cloud, the installation steps will differ, as there may already be a certificate in place that should not be replaced by a certificate issued by Factbird. In that case, please contact Factbird before proceeding with this step.



#### Add certificates to IoT Gateway

- 1. Right-click on the Kepware icon in the system tray and select "Settings".
- 2. Go to "IoT Gateway" tab, and click "Manage Certificate".



	Config	uration	Run	time Process
Runtime Options	Event Log	Progl	D Redirect	User Manager
onfiguration API Service	Certificate	Store	Service Ports	IoT Gateway
Port: 57212	Default			
Use the latest installe     Use the JRE at:     Advanced Settings	d JRE. The JRE wi	ll be locate	d at runtime.	

3. Click "**Import New Certificate**", and import the certificate (<certid>-certificate.pem.crt) provided by Factbird.



4. Import the private key (<certid>-private.pem.key) provided by Factbird, and press "OK".



5. On the "Private Key Password" page, click "OK" without entering a password.



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#### Create a new Agent under IoT Gateway

Typically, 1 to 2 Agents need to be created. One Agent for the **Input** type, such as units produced, the other Agent is for the **Event** type, such as stop codes. Different **uuid** is used for each Agent.

I.e., one **Agent** for units produced uses one **uuid**, and the other **Agent** for stop codes uses another **uuid**.

- 1. Start the KEPServer 6 Configuration.
- 2. To add a new IoT Gateway agent, click "Add Agent" under "IoT Gateway"
- 3. Enter a name (as desired) and select "MQTT Client" as the type.

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7			
2	□ — 崇 IoT Gateway		
	& Add Agent		
			 _

Enter the nam	e and choose the type of Agent to create.	
Agent		
3 Name:	Factbird	
Type:	MQTT Client V	
$\square$	REST Client	

Fill out the MQTT Client - Broker page

- 4. "**URL**" ssl://a3f8k0ccx04zas-ats.iot.eu-west-1.amazonaws.com:8883 (if you are using Factbird private cloud, the URL is different. Please contact Factbird)
- 5. "**Topic**":

5a. In case of **Input** type plc/input/<uuid>

5b. In case of **Event** type plc/event/<uuid>

Please note that the UUIDs for Input type and Event type are distinct.

URL:	ssl://a3f8k0ccx04zas-ats.iot.eu-west-1.amazonaws.com:8883
Topic:	plc/input/ <uuid></uuid>
ublish	
QoS:	1 (At least once) V Timeout (s): 5
Rate (ms):	10000
O Wide For	mat (every tag in every publish)
Narrow F	format
Max eve	nts per: 1000 🚔

6. Leave the "Publish" section as default.

- 7. Set the "Client ID" to the uuid for the agent.
- 8. Repeat steps 2 through 5 with the other **uuid** to create an additional **Agent**.





#### **Configure security for Agent**

- 1. Open the "Properties" of an Agent and go to the "Security" section.
- 2. Enter the **uuid** in the "**Client ID**" field.
- 3. Set "TLS Version" to v1.2.
- 4. Enable "Client Certificate".

If you have created 2 Agents, configure security for both. Please note that the "**Client ID**" (uuid) is unique for each agent.

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Project	tivity I2dfa77 way	Server Tag / State	Data Type	Scan Rate (ms)	Sen
- S Fact	bir 🚰 New IoT Ite G New IoT Ite Disable	ems			
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**Kepware connection to Factbird** 

### Add IoT item for tags to be published to Factbird under Agent

1. Click "New IoT Items" or "New IoT Item" and use "Tag Browser" to select tags. You need to set up an IoT item for each tag you want to send to Factbird Cloud.

- 2. "Scan Rate": defines how often Kepware reads the value.
  - We recommend a rate between 1 and 5 seconds, depending on the use case.
  - 5000 ms means it reads every 5 seconds.
- 3. Publish section:
  - 3a. In case of **Input** type, e.g. unit produced Select "Every scan"





5. Click "OK"

## Configuring how tags are handled in Factbird Cloud

**1**a

#### Set up tags of Input type in Factbird Cloud

This step applies to tags of Input type, e.g., units produced

The device is created by Factbird and can be viewed in the Factbird cloud application.

- 1. Log into Factbird, go to "Administration" section, and select "DEVICES" tab.
- 2. Click "Add sensor".

X1 PLC simula	ation - ID 02dfa77 🧪	1 C			
STATUS		HARDWARE ID 02dfs77f6abe4e459a11bd0758b40387		TYPE PLC	
Device Config					
SENSORS	Q. Search				D SENSOR
	Tag name 🛧	Name		Description	Actions
			No sensors		

- 3. Fill out "Set up sensor" page.
  - a. Tag name: Use the same as the "Server tag" of the IoT Item in Kepware software.
  - **b. Name:** Choose a name as desired.
  - c. Permitted Groups: Select as desired.

•		IoT Item	
Add new sensor	^	a Server Tag:	NX1.02dfa77Sy
Tag name * NX1.02dfa77Sy Name * Production Counter		Scan Rate (ms): Publish Only on I Deadt	Data Changes
Description Permitted Groups Select additional groups that may access this sensor		Every sc     Enabled	OK Cancel Help
ociece additional groups that may access and sensor	CREATE SENSOR		Kepware software
	DONE	2	

FACTBIRD

### Kepware connection to Factbird

Set up tags of Event type to automate stop registration in Factbird Cloud This step applies to tags of Event type, e.g., stop code \*Before proceeding, ensure that stop causes are created from the "REGISTER STOPS" page and that the Stop Finder is enabled.

1. Go to "Main sensor settings" and click the "STOPS MAPPING" tab.

Manage sensor setting	js							×
BASIC INFORMATION SENSOR SETUP	Create unique mappings I Drag your mouse over the headers loon will immediately delete the m	between PLC met a to see an explanation. laoping.	ssages and stop causes . Clicking the + icon will immediate	ly save the mapping, and citi	king the delete			
SPEEDS	Mapping tag	Value 🛛	Stop cause @	Priority @	Look back	Look forward		
STOPS			None	1	0	0	~	
STOPS MAPPING								
MISSING DATA ALARMS								
					ARD CHANGES	VUPDATE SER	NSOR CONFIGURAT	101

- 2. Fill out the chart
  - a. "Mapping tag": <uuid>-<tag name>
    - i. <uuid>: Provided by Factbird
    - ii. <Tag name>: Use the same as the "Server tag" of the IoT Item in Kepware software.
  - b. "Value": e.g., True, 1, 2, 3. If the value is 1, register "machine jam"
  - c. Select "**Stop cause**". Stop causes need to be created in advance. Refer to the User manual for instruction on creating stop causes.

BASIC INFORMATION	Create unique mappings between PLC messages and stop causes Drag your mouse over the headers to see an explanation. Clicking the + icon will immediately save the mapping, and clicking the delete							
SENSOR SETUP	icon will immediately delete	the mapping.						
SPEEDS	Q Search by tag,	, value and stop cau	se					
	Mapping tag @	Value @	Stop cause @	Priority @	Look back Ø	Look forward		
DATA			None	1	0	0	7	
STOPS	a	b	C				-	
STOPS MAPPING		1	Glass Breakage Entry - Unpla.	- 1	0	30	1	
		1	Vial Stuck - Unplanned down	- 1	0	30	1	
LINE SETUP								
MISSING DATA								

FACTBIRD

d. In the "**Priority**" column, the default is 1 for all stops. This means there is no priority of some stop causes over others. If you choose to set a stop cause priority higher than 1, that stop cause will be able to overwrite stop causes with a lower priority.

e. "Look back/Look forward": When a stop tag is received from the machine, the Factbird system looks for stops within the range of the value. E.g. in case "Look forward" is set to 30, the system will apply the stop cause to a stop found from the time the tag is received and 30 seconds forward in time. If there is no stop when the tag is received or within the next 30 seconds, the stop tag will be discarded.

f. Finally press the check mark (~) to save the configuration for your first stop tag.

Perform the above actions for each new stop tag you want to trigger stop causes with.

anage sensor settin	gs							>
BASIC INFORMATION SENSOR SETUP	Create unique mappings be Drag your mouse over the headers t icon will immediately delete the ma	etween PLC mes o see an explanation. oping.	ssages and stop causes Clicking the + icon will immediately sa	ve the mapping, and	I clicking the delete			
	Q Search by tag, value	and stop cause						
SPEEDS	Mapping tag @	Value @	Stop cause Ø	Priority @	Look back L	ook forward		
DATA			None	d	0	e	<b>f</b>	
STOPS	02dfa77f6abe4e459a11bd0.	1	Glass Breakage Entry - Unpla	L	U	- 0		
STOPS MAPPING	02dfa77f6abe4e459a11bd0.	. 1	Vial Stuck - Unplanned down	1	0	30		
LINE SETUP				1	0	30	<b>···</b>	
MISSING DATA ALARMS								
				ХD	ISCARD CHANGES	VUPDATE SE	NSOR CONFIGUR	RAT

#### Splitting stops:

"**Split stop**" in "**Priority**" drop down: By default, only the first stop tag will be applied to the stop (unless a higher priority stop is received). When "Split Stop" is activated, receiving that stop cause will instead divide the ongoing stop and apply this new stop cause to the remaining duration of the stop.

Example of splitting a stop: an ongoing stop is registered as "cleaning," and now the second cause, "lunch break," needs to be registered.

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Manage sensor settings									×
BASIC INFORMATION SENSOR SETUP	Create unique mappings between PLC messages and stop causes Oragiver mease over the headors to see an exploration. Clicking the - icon will immediately save th meedianly effect the mapping.	c mapping	and clicking the delets icon will						
spilling	Search by tag, value and stop cause							Q,	
DATA	Mapping tag Ø	Value Ø	Stop cause Ø	Prior Ø	ity Look back Ø	Look forward Ø			
STOPS	New	Ne	None	1.6	0	0	~		
STOPS MAPPING	12345678abode-Machine1Stop	n.,	Deleted Stop Cause	Split :	stop	10	1		
LINE SETUP	12345678abode-Machine1Stop	1	Power failure - Machines	2		10	1		
MISSING DATA ALARMS				3					
			× DISCAR	5	• •	POATE SENS	SOR CO	NFIGUR	апон