

Industry Online Support

364 and 100

NEWS

**Connection of the SIMATIC RTU3041C** via MQTT to MindSphere

SIMATIC RTU3041C / MindSphere / SITRANS store IQ

https://support.industry.siemens.com/cs/ww/en/view/109810580

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# 1 Introduction

# 1.1 Overview

# Starting point

The battery-powered SIMATIC RTU3000C are used to monitor and control outstations that are geographically distributed and not connected to a power supply network. The SIMATIC RTU3000C can store process data and transmit it via mobile radio or via the LAN interface and an external router to a control center or cloud system.

As of firmware V5.0, the SIMATIC RTU3000C acts as an MQTT client and supports cloud connections. The SIMATIC RTU3000C can send topics directly via MQTT to cloud platforms that communicate via MQTT (Publisher) and also receive topics from them (Subscriber).

The communication is aligned with the following cloud systems and supports the following services and functions:

Platform	Service	Function	n RTU
		Publisher	Subscriber
MindSphere (Siemens)	Native MQTT Agent	х	-
AWS (Amazon)	IoT Core	х	х
Azure (Microsoft)	IoT Hub	х	х
IBM Cloud (IBM)	Watson IoT Platform	х	x

Table 1-1

#### Requirement

The SIMATIC RTU3000C is to monitor process data from widely distributed sensors, such as the level of a rainwater overflow basin, and send the current values in a secure manner to a cloud system via MQTT.

The process data should be stored in the cloud system and read out via cloud applications. In the event of critical values, operators should also be informed by e-mail outside planned communication cycles.

To save energy, the SIMATIC RTU3000C shall be in sleep mode a large part of the time and switch to update or communication mode in predefined cycles. Figure 1-1

MindSphere SITRANS store IQ



#### Solution approach

1. The SIMATIC RTU3041C uses a SITRANS LR120 analog level sensor to monitor the level of a rain overflow basin. A digital moisture sensor starts the measurement.

In addition, a digital level sensor (float) is installed, which is activated when a critical level is exceeded.

- 2. At configurable, timed intervals, the RTU switches from sleep mode to update mode to read the inputs and process the program.
- 3. Then the data is sent securely (MQTT via TLS) via Native MQTT to MindSphere and stored there.
- 4. SITRANS store IQ, which is based on Siemens MindSphere, is used to read out the data. If the level exceeds a critical value, the operator is informed via SITRANS store IQ via e-mail.

Note The SIMATIC RTU3000C can also send e-mails or SMS to the operator with the program blocks "Send e-mail" and "Send SMS": (https://support.industry.siemens.com/cs/ww/en/view/109739240).

# 1.2 Principle of operation

#### Implemented functions

The following functions are implemented in the application example:

- Connection of the SIMATIC RTU3041C to MindSphere
- Sending the current data to the MindSphere "Native MQTT" service
- Reading out the data with SITRANS store IQ
- Sending an e-mail via SITRANS store IQ to a defined recipient when a critical level is exceeded or not reached.

#### Diagram

The following figure shows the connection of the SIMATIC RTU3041C to the MindSphere and the sending and reading of the current data: Figure 1-2



- 1. The certificates for the connection of the SIMATIC RTU3041C to MindSphere are managed in the Asset Manager:
  - CA certificate
  - Verification certificate
  - Broker certificate
- 2. The connection of the SIMATIC RTU3041C to MindSphere is configured via the Web Based Management (WBM) of the RTU.

An asset for the SIMATIC RTU3041C is automatically created in the Asset Manager when the MQTT client "MQTTX" first connects to MindSphere.

- 3. The data model for the asset/aspect types and the variables to be sent to MindSphere is created and instantiated via the MQTT client "MQTTX".
- 4. The blocks for monitoring the fill level are displayed and programmed graphically via the WBM of the SIMATIC RTU3041C.
- 5. The current data is sent to MindSphere and read out with SITRANS store IQ.
- 6. The alarm that triggers the e-mail notification is configured directly in SITRANS store IQ.

You can also read out the transmitted data in MindSphere with "Fleet Manager" or "Operations Insight".

## Advantages of the solution

Note

- Easy connection of field devices via DI/AI/DO, HART or Modbus RTU via mobile radio to a cloud system
- Use in locations without power supply incl. data buffering
- Easy configuration via Web Based Management (WBM)

# 1.3 Components used

This application example was created with the following hardware and software components:

Component	Quantity	Item number	Note
SIMATIC RTU3041C From V5.0	1	6NH3112-4BB00-0XX0	It is also possible to use another SIMATIC RTU3000C with firmware V5.0 or higher. used in this example.
			Firmware V5.0: https://support.industry.si emens.com/cs/ww/en/vie w/109810215
Battery module housing	2	6NH3112-3BA00-1XX2	2 pieces per RTU
Battery	4		2 pieces per battery module housing (e.g., SAFT LSH20)
Mobile wireless antenna	1	6NH9860-1AA00	
Antenna ANT895-6ML	1	6GK5895-6ML00-0AA0	For receiving GPS position and time information
SIM card	1		Any mini SIM card with a data option
SITRANS LR120 analog level sensor	1	7ML532	Up to 5 m
Digital level sensor	1		Available from specialist dealers
Digital moisture sensor	1		Available from specialist dealers
SITRANS store IQ	1		MindSphere Store: https://www.dex.siemens .com/mindsphere/step-4- book-apps-and- extras/sitrans-store-iq- entry-package
			DevOps for the product: <u>del.operations.us@siem</u> <u>ens.com</u>
SITRANS Mobile IQ App	1		App Store: Free download
MQTT-Client "MQTTX"	1		To create the data model and map the data     Eree download:
			https://mqttx.app
OpenSSL			Free download: https://www.openssl.or g/source/

Table 1-2

This application example consists of the following components:

Table 1-3

Component	Note
109810580_RTU3041C_MQTT_DOC_V10_de.pdf	This document
109810580_RTU3041C_MQTT_PROJ_V10.zip	Configuration file of the SIMATIC RTU3041C
	Data Model Demo
	Instance Demo

# 2 Engineering

# 2.1 Hardware setup

Chapter 1.3 lists the required hardware components.

The following figure shows the hardware structure of the SIMATIC RTU3041C. Figure 2-1: Circuit diagram SIMATIC RTU



- 1. Insert the SIM card into the SIMATIC RTU3041C.
- 2. Insert two batteries at a time into a battery module housing.
- 3. Mount the SIMATIC RTU3041C and to the left of it the battery module housing on a top-hat rail.
- 4. Connect the digital level sensor to the terminal block X20, DI0.
- 5. Connect the digital moisture sensor to terminal block X20, DI1.
- 6. Connect the SITRANS LR120 analog level sensor (2-wire transmitter) to terminal blocks X40 and X41.
- 7. Connect the antennas to the SIMATIC RTU3041C.
- 8. Connect the battery module housing to the SIMATIC RTU3041C.
- Note You can also operate the SIMATIC RTU3041C with an external power supply instead of batteries. To do this, connect the external power supply with DC 12 to 24 V to terminal block X10 IN.
- **Note** Connection examples for other transmitter types can be found in the operating instructions (Connecting the analog inputs):

https://support.industry.siemens.com/cs/ww/en/view/109750942

The following Table provides an overview of all IP addresses used in this example. Assignment of static IP addresses is assumed.

Table 2-1

Component	IP address	Description
Engineering station	192.168.0.100	
SIMATIC RTU3041C	192.168.0.3	Access to WBM

The subnet mask in all network components is 255.255.255.0.

Note Adjust the IP addresses of the components in your project so that they are on the same subnet.

# 2.2 Configuration and Project Planning

This chapter describes the most important steps of the project engineering for the connection of the SIMATIC RTU3041C to the MindSphere and the sending and reading of the current data:

- Create CA certificates with OpenSSL (<u>Chapter 2.2.1</u>):
  - CA certificate
  - Client certificate
- Manage MQTT certificates in MindSphere (<u>Chapter 2.2.2</u>)
  - Uploading the CA certificate to the MindSphere
  - Uploading the Verification certificate to the MindSphere
  - Downloading the Broker certificate from Mindsphere

Hinweis The verification certificate is created with OpenSSL and then uploaded to MindSphere.

- Create and instantiate data model (<u>Chapter 2.2.3</u>)
- Configure SIMATIC RTU3041C (<u>Chapter 2.2.4</u>) or load supplied configuration file (<u>Chapter 2.2.7</u>)
- Configure SITRANS LR120 (<u>Chapter 2.2.5</u>)
- Read out data with SITRANS store IQ (<u>Chapter 2.2.6</u>).

## Requirements

- You have created a MindSphere account with MQTT native functionality enabled:
  - Login page of the MindSphere tenant
  - User name
  - Password
- You have purchased SITRANS store IQ and set it up in MindSphere.

Note

If you do not have a MindSphere tenant, SITRANS store IQ comes with a MindSphere Base Tenant that provides the necessary resources to run SITRANS store IQ.

- You have the following tools installed on your computer:
  - OpenSSL for the creation of the certificates
  - MQTTX to create and instantiate the asset model.

# 2.2.1 Create CA certificates with OpenSSL

The communication between the SIMATIC RTU3041C and the MindSphere is secured via TLS v1.2. For this purpose, server- and client-side authentication is supported by certificates. The following certificates are required for communication: Table 2-2

Certificate	Description
CA certificate	<ul> <li>Public certificate of the certification authority (CA) used to validate signed user certificates.</li> </ul>
	<ul> <li>The CA certificate is created with OpenSSL.</li> </ul>
Verification certificate	<ul> <li>The verification certificate is created (once) to ensure that client certificates can be derived from the CA certificate uploaded in MindSphere.</li> </ul>
	The verification certificate is created with OpenSSL.
Client certificate	Certificate of the RTU
	With a secured connection via TLS, the authenticity of the RTU is proven to the broker using its own certificate/key.
	The client certificate is created with OpenSSL.

#### Create CA certificate with OpenSSL

- 1. Open the command prompt ("cmd") from the Start menu.
- 2. Change to the folder where the "openssl.exe" file is located with the following command:

cd C:\OpenSSL-Win64\bin

:\Users\: 9>cd C:\OpenSSL-Win64\bin

3. Create a private key for the certification authority (CA) with the following command:

openssl genrsa -out <tenant>.key 2048

```
C:\OpenSSL-Win64\bin>openssl genrsa -out sitrain.key 2048
Generating RSA private key, 2048 bit long modulus
***
e is 65537 (0x010001)
C:\OpenSSL-Win64\bin>
```

- The key is called "<tenant>.key" and is 2048 Bits long.
- <tenant>: Your MindSphere-Tenant

4. Generate the CA certificate that you will need to import later using the following command:

openssl req -x509 -new -nodes -key <tenant>.key -sha256 -days 3650 -out <tenant>.pem -subj

"/C=<Land>/ST=<Stadt>/O=<Unternehmen>/OU=<Abteilung>/CN=<tenant>"

::\OpenSSL-Win64\bin>openssl req -x509 -new -nodes -key sitrain.key -sha256 -days 3650 -out sitrain.pem -subj "/C=de/ bg/O=Siemens/OU=FA/CN=sitrain" :\OpenSSL-Win64\bin>

- The CA certificate is named "<tenant>.pem" and is valid for 3650 days.
- <tenant>: Your MindSphere-Tenant

Enter the following attributes:

- C (Country Name / two-letter code) =<Land>
- ST (State) = <Stadt>
- O (Organization Name) =<Unternehmen>
- OU (Organizational unit Name) =< Abteilung>
- CN (Common name) =<MindSphere-Tenant>

**Note** If the command does not include the above attributes, they will be requested during generation.

Note

The newly generated certificates are automatically stored in the "OpenSSL > bin" folder.

#### Create client certificate for the SIMATIC RTU3041C with OpenSSL

With a secured connection via TLS, the authenticity of the RTU is proven to the broker using its own certificate/key.

#### Requirement

The CA certificate was created with OpenSSL and stored in the "OpenSSL > bin" folder (see <u>Create CA certificate</u>).

#### Procedure

- 1. Open the command prompt ("cmd") from the Start menu.
- 2. Change to the folder where the "openssl.exe" file is located with the following command:

cd C:\OpenSSL-Win64\bin

C:\Users\a 9>cd C:\OpenSSL-Win64\bin

1. Create a private key for the client certificate with the following command:

```
openssl genrsa -out <DeviceName>.key 2048
```

C:\OpenSSL-Win64\bin>openssl genrsa -out RTU_HowTo.key 2048
Generating RSA private key, 2048 bit long modulus
+++
+++
e is 65537 (0x010001)
C:\OpenSSL-Win64\bin>

- The key is named "<DeviceName>.key" and is 2048 bits long.
- <DeviceName>: Device name for the SIMATIC RTU3041C, e.g., "RTU\_HowTo"
- 2. Create a certificate request using the following command:

```
openssl req -new -key <DeviceName>.key -out <DeviceName>.csr -subj
"/C=<Land>/ST=<Stadt>/O=<Unternehmen>/OU=<Abteilung>/CN=<DeviceNa
me>"
```

:\OpenSSL-Win64\bin>openssl req -new -key Rtu\_HowTo.key -out RTU\_HowTo.csr -subj "/C=de/ST=nbg/O=siemens/OU=Fa/CN=RTU owTo" :\OpenSSL-Win64\bin>\_

- The certificate request is called "<DeviceName>.csr".
- <DeviceName>: Devic name for the SIMATIC RTU3041C, e.g. "RTU\_HowTo"

Enter the following attributes:

- C (Country Name/ two-letter code) =<Land>
- ST (State) = <Stadt>
- O (Organization Name) =<Unternehmen>
- OU (Organizational unit Name) =<Abteilung>
- CN (Common name) =<DeviceName>

A CSR (Certificate Signing Request), is a specially formatted and encrypted message. It is sent to the CA for the creation of the client certificate. The CSR confirms the information that the CA needs to be able to issue the certificate.

Note

	3.	Generate the client certificate for the SIMATIC RTU3041C with the following command:
		openssl x509 -req -in <devicename>.csr -CA <tenant>.pem -CAkey <tenant>.key -CAcreateserial -out <devicename>.pem -days 365 -sha256</devicename></tenant></tenant></devicename>
		C:\OpenSSL-Win64\bin>openssl x509 -req -in Rtu_HowTo.csr -CA sitrain.pem -CAkey sitrain.key -CAcreateserial -out Rtu_How To.pem -days 365 -sha256 Signature ok subject=C = de, ST = nbg, O = siemens, OU = Fa, CN = RTU_HowTo Getting CA Private Key
		- " <devicename> csr": The certificate request</devicename>
		<devicename>: Device name for the SIMATIC RTU3041C, e.g. "RTU_HowTo".</devicename>
		<ul> <li><tenant>.pem: CA certificate ("public key" of the CA)</tenant></li> </ul>
		<ul> <li><tenant>.key: Private key for the certification body (CA)</tenant></li> </ul>
		<tenant>: Your MindSphere-Tenant</tenant>
		<ul> <li>"<devicename>.pem": Client certificate (Public Key)</devicename></li> </ul>
Note	Th Mir	e client certificate must be derived from the <u>CA certificate</u> uploaded in ndSphere.
Note	The fold	e newly generated certificates are automatically stored in the "OpenSSL > bin" der.
Note	lf y "D€	ou want to connect further clients to MindSphere repeat steps 1-4 with different eviceName"

# 2.2.2 Manage MQTT certificates in MindSphere

The communication between the SIMATIC RTU3041C and the MindSphere is secured via TLS v1.2. For this purpose, server- and client-side authentication is supported by certificates. A CA certificate must be uploaded to MindSphere for the authentication.

Note

You can upload up to two CA certificates to MindSphere.

#### Requirement

The CA certificate was created with OpenSSL and stored in the "OpenSSL > bin" folder (see <u>Create CA certificate</u>).

## Procedure

- 1. Open the login page to your MindSphere tenant in your internet browser.
- 2. Enter your username and password and log in.
- 3. Start MindSphere "Asset Manager".



4. Upload a new CA certificate

"Connectivity > MQTT Certificates > CA certificates > upload certificate".



- 5. Assign a name to the new certificate.
- 6. Upload the created CA certificate.

Connectivity | Manage MQTT Certificates | Upload Public Certificate

# **Upload Public Certificate**

Manage the certificates for securely connecting the MQTT devices with M

Name *			
RTU_HowTo			
Please enter a name	cate		
Ipload your CA certificate 💿	)		
lpload your CA certificate 🕜	)		
pload your CA certificate ⑦	)		
pload your CA certificate ③ CA certificate * File name	)	Upload	
Ppload your CA certificate ③ CA certificate * File name Please upload your CA certificate by	) r clicking "Upload"	Upload	

Note

bin" (see <u>Create CA certificate</u>). The CA certificate is named "<tenant>.pem".

# **Result:**

After the CA certificate is uploaded, the registration code needed to create the verification certificate is generated.

Connectivity / Manage MOTT Certificates / Up	oload Public Certificate
--	--------------------------

# Upload Public Certificate Manage the certificates for securely connecting the MQTT devices with MindSp

Name	*
RTU_	HowTo
Please e	nter a name for your certificate
load yo	our CA certificate 💿
CA cer	tificate *
-141	
sitrai	opioad
Please u	pload your CA certificate by clicking "Upload"
Please u	pload your CA certificate by clicking "Upload"
Please u load yo Registr 8477	pload your CA certificate by clicking "Upload"  pur verification certificate () ation Code 966047a71ad251b8541c0c6c6a08c76b054091780ef644
Registra Registra	pload your CA certificate by clicking "Upload"  bur verification certificate ③  ation Code  966047a71ad251b8541c0c6c6a08c76b054091780ef64(
Registra Registra Verifica	pload your CA certificate by clicking "Upload"  bur verification certificate ③ ation Code 966047a71ad251b8541c0c6c6a08c76b054091780ef64(  ion code will be seesested after unloading your CA certificate ation certificate *
Registra Verifica	pload your CA certificate by clicking "Upload"  pur verification certificate  ation Code 966047a71ad251b8541c0c6c6a08c76b054091780ef64t  ion code will be censented ofter unloading your CA certificate ation certificate *  ation certificate *
sitrai Please u load yo Registr 8477 Penistra Verifica File r Please u	pload your CA certificate by clicking "Upload"  pur verification certificate (2)  ation Code 966047a71ad251b8541c0c6c6a08c76b054091780ef64t  ion code will be deserved offer unloading your CA certificate ation certificate *  ame Upload pload your verification certificate by clicking "Upload"

7. Copy the registration code.

C	ertificate Details
	Name *
	RTU_HowTo
	Please enter a name for your certificate
	CA certificate * sitrain.pem Upload
	CA certificate * sitrain.pem Upload
	Please upload your CA certificate by clicking "Upload"
U	Please upload your CA certificate by clicking "Upload"  pload your verification certificate ③  Registration Code  8477966047a71ad251b8541c0c6c6a08c76b054091780ef64(  Registration code will be generated after uploading your CA certificate
IJ	Please upload your CA certificate by clicking "Upload"  pload your verification certificate ⑦  Registration Code  8477966047a71ad251b8541c0c6c6a08c76b054091780ef64t  Registration code will be generated after uploading your CA certificate Verification certificate *
J	Please upload your CA certificate by clicking "Upload"  pload your verification certificate ⑦  Registration Code  8477966047a71ad251b8541c0c6c6a08c76b054091780ef64t  Registration code will be generated after uploading your CA certificate Verification certificate *  File name Upload

#### Create verification certificate with OpenSSL

- 8. Open the command prompt ("cmd") from the Start menu.
- 9. Change to the folder where the "openssl.exe" file is located with the following command:

cd C:\OpenSSL-Win64\bin

C:\Users\∉ 9≻cd C:\OpenSSL-Win64\bin

10. Create a private key for the verification certificate with the following command: openssl genrsa -out verificationCert.key 2048

C:\OpenSSL-Win64\bin≻openssl genrsa -out verificationCert.key Generating RSA private key, 2048 bit long modulus	2048
+++	
e is 65537 (0x010001)	

The key is named "verificationCert.key" and is 2048 bits long.

	11. Create a certificate request (CSR) using the following command:
	openssl req -new -key verificationCert.key -out verificationCert.csr -subj /CN=<
	registration code> C:\OpenSSL-Win64\bin>openssl req -new -key verificationCert.key -out verificationCert.csr -subj /CN=8477966047a71ad251b8
	541c0c6c6a08c76b054091780ef6408cf43ad863e42e
	<ul> <li>The certificate request (CSR) is named "verificationCert.csr ".</li> </ul>
	<ul> <li>Common Name (CN) is the <registration code=""> generated after uploading the CA certificate in MindSphere.</registration></li> </ul>
	A CSR (Certificate Signing Request), is a specially formatted and encrypted
Note	message. It is sent to the CA for the creation of the verification certificate. The
	CSR confirms the information that the CA needs to be able to issue the certificate.
	12. Generate the verification certificate that you need to import into MindSphere
	with the following command:
	openssl x509 -req -in verificationCert.csr -CA <tenant>.pem -CAkey</tenant>
	<tenant>.KEY -CACTERTESEMAI -OUT VEHITICATIONCETT.PEM -days / -SNA256</tenant>
	verificationCert.pem -days 7 -sha256 Signature ok
	subject=CN = 8477966047a71ad251b8541c0c6c6a08c76b054091780ef6408cf43ad863e42e Getting CA Private Key
	C:\OpenSSL-Win64\bin>
	- The verification certificate is named "verificationCert.pem".
	<ul> <li><tenant>.key: Private key for the certification body (CA)</tenant></li> </ul>
	<ul> <li><tenant>.pem: CA certificate (Public Key of the CA)</tenant></li> </ul>
	The verification certificate must be derived from the CA certificate uploaded in the
Note	MindSphere.
	The newly generated certificates are automatically stored in the "OpenSSL > bin" folder
Note	
	i ne verification certificate is named "verificationCert.pem".
	13. Change to MindSphere.

14. Upload the created verification certificate to MindSphere.

Connectivity / Manage MQTT Certificates / Upload Public Certificate

# Upload Public Certificate Manage the certificates for securely connecting the MQTT devices with MindSp

Nai	ne *
R	[U_HowTo
Plea	se enter a name for your certificate
loa	l your CA certificate 🕜
CA	certificate *
s	train.pem Upload
Plea	se upload your CA certificate by clicking "Upload"
oa	se upload your CA certificate by clicking "Upload"
Plea	I your verification certificate () istration Code
Plea	se upload your CA certificate by clicking "Upload"  your verification certificate ③  istration Code 477966047a71ad251b8541c0c6c6a08c76b054091780ef64( )
Plea Reg Reg Ver	se upload your CA certificate by clicking "Upload"  I your verification certificate ⑦  istration Code 477966047a71ad251b8541c0c6c6a08c76b054091780ef64()  fication code will be generated after uploading your CA certificate ification certificate *
Plea	se upload your CA certificate by clicking "Upload"  I your verification certificate ⑦  istration Code  477966047a71ad251b8541c0c6c6a08c76b054091780ef64(  fration certificate *  le name  Upload

# **Result:**

The CA certificate was successfully uploaded to MindSphere.

	Asset Manager				
ជា	Connectivity / Manage MQTT Certificates				
(†) 60	Manage MQTT Certific Manage the certificates for securely connecting the	Cates MQTT devices with MindS	phere.		
~ ₽	CA certificates Broker information				
					Upload certificate
	Name	Status	Valid until	Common name	
	EdgeMIndsphere_IEMIndsphereConnector	Active	2032-01-26	dfcskmt	Û
	RTU_HowTo	Active	2032-05-01	dfcskmt	Û

# Broker certificate download

The broker certificate is used to authenticate the broker on the SIMATIC RTU3041C. Download and install the certificate on your SIMATIC RTU3041C:

- 1. Open the login page to your MindSphere tenant in your internet browser.
- 2. Enter your username and password and log in.
- 3. Start MindSphere "Asset Manager".
- 4. Navigate to the menu "Connectivity > MQTT Certificates > Broker information".

	Asset Manager	📒 🥫 MindSphere [-
6	Connectivity   Manage MQTT Certificates	00
© \$3.	Manage MQTT Certificates Manage the certificates for security connecting the MQTT devices with Mindsphere.	Manage MQTT Certificates Broker information
к 4 с	Ch certificaties Beker information consciluty	The MQTT devices must authenticate the broker with the help of a certificate. Please download the provided certificate and install it on ware device.
A 1	ann Missing Carl Carl Carl Carl Carl Carl Carl Carl	

5. Download the Broker certificate.

 ∩	Asset Manager ConsetShip Manage NOT Carificates	🧧 👔 MindSphere 🤅
80 % B ©	Manage MQTT Certificates Manage the certificates for security connecting the MQTT devices with MedSylvere. C4 certificates Beake Information Calcertificates	Manage MQTT Certificates <b>Broker information</b> The MQTT device most authenticate the bester while the height of a certificate. Proce devinced may expected a certificate and install its
	Agents MidT Genificate MidT Genificate Midt Genificate and in automaticate the locator on the MigTT dame. Midd wild add2-bi-12	(in you denoe,

# 2.2.3 Create data model (asset model)

A data model defines the logical subdivision and assignment of the data from the connected device or from MindSphere-internal data sources.

All transferred data is stored in a database in MindSphere, as so-called "TimeSeries".

This data must be referenced to the data model for later processing ("mapping").

Later on, the data model or its variables can be accessed symbolically within MindSphere.

A data model consists of the following components:

Asset

represents a logical unit; derived from "type".

When the MQTT client is connected to MindSphere for the first time, an asset for the client (MQTTX or SIMATIC RTU3041C) is automatically created in the MindSphere Asset Manager.

Asset type

Template for a logical unit; includes "Aspects". It is created via the MQTT client "MQTTX"".

Aspect type

Template for summarized values; contains the variables from the RTU. It is created via the MQTT client "MQTTX"".

The MQTTX client is used to create the data model and map the data.

Note

Note

https://documentation.mindsphere.io/MindSphere/howto/howto-create-data-modelmqtt-agent.html

The following figure shows the data model for this application example. Figure 2-2



Note

The logical division and allocation are made individually according to your specifications.

# Connecting the MQTTX client to MindSphere

- To create the data model, proceed as follows:
- 1. Open the MQTTX program
- 2. Add a new connection.

S MQTTX File Edit View Window Help					
Connections	New Collection	< Back			New
<b>8</b>		General			
		* Name			
		* Client ID	mqtbx_efc14cab		
		* Host	mqtt://	√ broker.emqx.io	
		* Port	1883		
æ		Username			
+ .		Password			
		SSL/TLS			
		Advanced 🔺			

- 3. Give the new connection a name.
- 4. Enter the Client-ID:

"Client-ID"= <tenant>\_<DeviceName>

- <tenant>: Your MindSphere-Tenant
- <DeviceName>: Device name for the SIMATIC RTU3041C, e.g. "RTU\_HowTo".
- 5. Enter the address of the broker "mqtts://" and "mindconnectmqtt.eu1.mindsphere.io".
- 6. Enter the port number "8883".



- 7. Enable the connection with TLS.
- 8. Enable the Self signed option.
- 9. Activate the connection with "SSL Secure".
- Upload the Broker and client certificates and the client key (see <u>Chapter 2.2.1</u>).
- 11. Then click on "Connect".

	Connections	New Collection	K Back	Edit	Coverent
×	e HowTo@native	mqtt.e	General		
			* Name * Client ID	Herb Herb Holy (10) Jords	
			* Host	metter i inindependent aut mindephane in	
			* Port	1883 ÷	
ి			Usemame		
+		0	Reseved SI/TLS Insticate Secure		
			Certificates Client Certi Clie		
					( 💾 ))

# **Result:**

The MQTTX client is connected to the MindSphere.

File Edit V	ew Window Help		- B	×
	Connections New Collection	HowTo 🗟 ෩		
8	• HowTo@nativerrigtt.e	+ New Suborgton 🔤 🔍 Plainted V	Connected	

When the MQTT client first connects to the MQTT broker, an asset "Client-ID" for the client (MQTTX or SIMATIC RTU3041C) is automatically created in the MindSphere Asset Manager:

"Client-ID"= <tenant>\_<DeviceName>

- <tenant>: Your MindSphere-Tenant
- Overlap Control Con

	Asset Manager		
ជា	Assets / Details		
	sitrain	법Q	dfcskmt
ЪĞ	🕂 Create asset		🕪 sitrain
~°	Filter		Core.basicenterprise @ Europe/Berlin @ Performance
쌲	▼ Subtenants		Description Root Asset for dfcskmt tenant
	CP_Exponate	$\bigcirc$	
	DI_Edge	$\bigcirc$	
	PN_Truck	$\bigcirc$	Events 🥕 Last updated: 2022-07-13 10:05:37
	▼ Assets		
	CPU-1516		
	sitrain_edgetrainer	$\bigcirc$	
	sitrain_RTU_HowTo		Aspects 2
	MQTT Device EdgeMindsphere1		

Note

# Create data model

- 1. Add two new subscriptions for MindSphere feedback storage:
  - tc/<tenant>/<Client-ID>/i/amo\_v3/ms
     Obtains the model creation results for the last model request.
  - tc/<tenant>/<Client-ID>/i/amo\_v3/ip

Obtains the instantiation results for the last instantiation request.

"Client-ID"= <tenant>\_<DeviceName>

<tenant>: Your MindSphere-Tenant

<DeviceName>: Device name for the SIMATIC RTU3041C, e.g. "RTU\_HowTo".

File Edit Vi	ew Window Help					
	Connections New Collection	НоwТо 🕿				
×	• HowTo@nativemqtt.e	* Name HowTo		* Client ID ()		
		Password			Keep Alive	
				New Subscription		×
		+ New Subscription	Plaintext ~	* Topic		0
				tc/simatic/simatic_RTU_H		6
				* QoS	Color	
				0 At mos	#2104A3	٥
				Alias		()
						li
					Cancel	Confirm

2. Then click on "Confirm".

## **Result:**

The two subscriptions were created:



- 3. Enter the topic "tc/<tenant>/<Client-ID>/o/amo\_v3/m" for publishing the data model:
  - <tenant>: Your MindSphere-Tenant
  - <Client-ID>= <tenant> <DeviceName> \_
    - <tenant>: Your MindSphere-Tenant
    - <DeviceName>: Device name for the SIMATIC RTU3041C, e.g. "RTU HowTo".

File Edit Vie	ew Window Help							
	Connections	New Collection	HowTo 🙈					
<b>1</b>	HowTo@native	mqtt.e	* Name				* Client ID 🕒	
		,	HowTo				sitrain_RTU_How	То
			Password				Keep Alive	
							60	
			+ New Sub	scription	₫≡	Plaintext V		
ይ			tc/		OoS 0			
+			tc/	csk	QoS 0			
						Payload: JSON V QoS: 0 V 🔿 Re	etain Meta	
5						tc/sitrain/sitrain_RTU_HowTo/o/amo_v3/m		

4. Open the attached file "109810580 Datamodel Demo.txt" with the data model for this application example.

```
{
         "id": "7260fff79745s76555453h78e12684314c2dd83a280",
         "data": {
                  "externalId": "HowTo_Modell_RTU",
                  "typeModel": {
                          beModel": {
    "aspectTypes": [{
        "id": "tenant.HowTo",
        "name": "Aspect_RTU_HowTo",
        "category": "static",
        "scope": "private",
        "variables": [{
            "name": "fillLevelPercent",
            "dataType": "DOUBLE",
            "unit": "%",
            "qualityCode": true
}.
                                   },
                                                                                                           ł
                                             "name": "fillLevel"
                                            "dataType": "DOUBLE",
"unit": "m^3",
"qualityCode": true
                                    },
                                             "name": "maxVolume"
                                             "dataType": "DOUBLE",
"unit": "m^3",
"qualityCode": true
                                    Ъ,
                                             "name": "critFillLevel",
                                             "dataType": "BOOLEAN",
"unit": "",
                                             "qualityCode": true
                                    3
                                 ],

"description": "Aspect of tenant_RTU_HowTo",

"referenceId": "287adc12346a087850e456666976660a6721dfd1170e97d"

"inclose (occo_Chapter 3.1).
```

- 5. Adapt the contents of the file to your application (see Chapter 3.1).
- 6. Copy the content.

- 7. Paste it into the text input window in the MQTTX client.
- 8. Send the data model to the MindSphere.



## **Result:**

\_

The data model was successfully transferred to MindSphere:

Topic: tc/uRTU_HowTo/i/amo_v3/ms QoS: 0	
{"id":"01G6JEH6035QYFS8RNGG7X8M6V","correlationId":"01G6JEH6022HFAVHW4V09JSPKG","requestId":"726	60:
f79745s76555453'	Hot
o_Modell_RTU17" "status":"Success" }	

- 9. Enter the topic "tc/<tenant>/<Client-ID>/o/amo\_v3/i" for the instantiation of the data model:
  - <tenant>: Your MindSphere-Tenant
  - <Client-ID>= <tenant>\_<DeviceName>
    - <tenant>: Your MindSphere-Tenant

<DeviceName>: Device name for the SIMATIC RTU3041C, e.g. "RTU\_HowTo".

S MQTTX File Edit Vie	w Window Help						
	Connections	New Collection	HowTo 🔗				
<b>M</b>	HowTo@nativemqtt.e		* Name		* Client ID 🕒		
			How to				Stitrain_RTU_HowTo
			Fassword				60
			+ New Su	bscription	3	■ Plaintext ∨	
ዊ			tc/		QoS 0		
+			tc/	/dfcsk	QoS 0		
ß						Pavload: JSON V OoS: 0 V tc/sitrain/sitrain_RTU_HowTo/o/amo_v:	Retain Meta

10. Open the attached file "109810580\_Instance\_Demo.txt" for the instantiation of the data model for this application example.

- 11. Adapt the contents of the file to your application (see Chapter 3.2).
- 12. Copy the content.
- 13. Paste it into the text input window in the MQTTX client.
- 14. Send it to the MindSphere.



## **Result:**

- The data model has been successfully created and instantiated:

		100	10.0		
# HowTo@nativemqtt.e	HowTo	- Citer dicit	ent RTU HewTe	0	Username
	Deserved	Torus A			Classe Cassion
	Pasawong	60	vive .		tue
				u.	-
	+ New Subscription	Plaintext v			
ъ	hudenendation. QoS 0	X5YFN9W1P5201X2RQ5YXK", "model1d":*01025 U","message*1"50% completed.","status": 45fe27w")	7X487DIMEIDRIMCHR.7FA4N", "modelEx "InProgress"), "requestId":"bb?b	ternalid":"HowTo_Modell_ 9d834593dd54##6444355m5w	RT 2#7#8
+°	to/dfcskmt/dfcsk CloS 0	2022-05-12 12:31:42:292			
		Topic tc/dfcskmt/dfcskmt_RTU_HowTo/Vanio_rS/ip	QoS 0		
Ð		X5YFN9WJP52DIZZHQ5YXE", "model1 '1"01020 U", "message": "155 completed." utatua"	rrelationId";"0162WX5WVJD90R209F #X48TDDM82DREMORRJFA4W","modelEx ("InFrograms"), "remeatId";"bb%d	TWD1W37N", "data":["id":" iternalId":"NowTo_Model1_ Add14551dd54aa6444351a5w	0162V RT 2=7#8
3		48fe27w*)			
		Topic tc/dfcskmt/dfcskmt_RTU_HowTo/Vamo_v3/ip	QpS: 0		
		18.38.4010500218+204000000000888888	rrelationId":"01G2VX5VVJD90R2C9f	TWOIW37N", "data":{"id":"	0162 <b>v</b>
		<pre>XSYTN9W3952D122RGSYRT","model1 ';"01G2' U","message":"100% completed," 'status" fe27w";</pre>	rx4BTDEN82DBINGHBJBA4H", "modelfx ":"Success"), "requestId": "bb9b9d	cternalid":"NowTo_Modell_ 1834593dd54##6444355a5w2#	RT 7e848
		Topic: tc/dfcskmt/dfcskmt_RTU_HowTo///amo_v3//p	QoS-0		
		7R*, *cos	crelationId": "0102VX5VVJD90RZC9F	WD1W37M", "data":("1d":"	0102V

- The data model with the asset type "Asset\_RTU\_HowTo" and aspect type "Aspect\_RTU\_HowTo" was created under the newly created asset "Client-ID" in the MindSphere:

	Asset Manager		Asset Manager	
俞	Assets / Details	ធា	Assets / Details	
	sitrain 📴 🔿	<ul> <li>Image: Control of the second se</li></ul>	sitrain_RTU_HowTo	dteskmt / dteskmt_RTU_HowTo / RTU_HowTo
		~	Create asset	© RTO_HOWTO @stchmcAscet.RTU.HowTo @ Europesteritis @ Reviewance
- 	Create asset	Å		Description No description available
ŝ	Filter		* Assets	
쁐			RTU_HowTo	
	▼ Subtenants		/ 🏊 )	Events
	CP_Exponate			Last updated: 2022-06-30 09:11:28
	DI_Edge			
	PN_Truck			
	▼ Assets			Aspects Aspects Last updated: 2022-06-30 09:11:28
	CPU-1516			Namo
	sitrain_edgetrainer			Aspect_RTU_HowTo
	sitrain_RTU_HowTo	→		1 0 0
	MQTT Device EdgeMindsphere1			OFFUNE ONLINE STATIC

15. Disconnect from Mindsphere.

	Connections New Collection	HowTo 👌	F 193			● 1 0 2 0 …
8	• HowTo@nativerngtt.e	+ New St	description	E	Paintot	Received Published
				QoS 0	("id":"0100000040000000000000000000000000000	
		120	sk	QoS 0	0", "message":"42.85/14285/142854% completed.", "status":"InProgress"], "requestId":"/260111/9/45s/655 5453h78e1268431402dd83a291")	
					2022-06-28 10.04:32:628	
					Payload: JSON V QoS: 0 V O Retain Meta	
Ch.					tc/dfcskmt/dfcskmt_RTU_HowTo/o/amo_v3/m	
					"ig": "7260FFF79745c76555453n78e12684314c2as83a280",	

# 2.2.4 Configure SIMATIC RTU3041C

This chapter shows you all necessary steps to configure the SIMATIC RTU3041C for the application described here:

Note The supplied project "109810580\_RTU3041C\_MQTT\_PROJ\_V10.zip" contains the finished configuration file ("\*.cfg"), which you can load into your SIMATIC RTU3041C and adapt to your application in just a few steps (see <u>Chapter 2.2.7</u>).

This chapter is for information only.

#### **General configuration**

- 1. Connect the SIMATIC RTU3041C to your PG/PC via a network cable.
- **Note** If you are using multiple RTUs, address conflicts may occur during initial startup because each RTU is assigned the same IP address by default. Therefore, during commissioning, ensure that only one RTU is connected to your network at a time.
  - 2. If necessary, change the IP address of your PG/PC (according to <u>Table 2-1</u>) so that it and the SIMATIC RTU3041C are in the same subnet.
  - In a browser, open the web server of the RTU3041C at the address "<u>192.168.0.3</u>".
  - 4. Log in with the username "admin" and the password "admin".

SIMATIC RTU3041C

	Log in
▶ Log in	Enter your user name and your password. Then click the "Login" button.
	User name
	Password
	Log in

5. Assign a new password.

SIEMENS

- 6. Navigate to the "System" menu.
- 7. Assign a unique station name.
- 8. Then click "Apply".

```
SIEMENS SIMATIC RTU3041C
```

User: admin	System
Log out	
) Start same	General Device info SD card System time
<ul> <li>Start page</li> </ul>	
► System	Station name simatic.rtu
► Diagnos	Station description
Maintenance	Location
	Latitude 0.000000
▶ LAN	Longitude 0.000000
▶ WAN	End session after inactive period (minutes) 10 V
Services	
▶ Security	Apply

- 9. Open the System time tab and select your local time zone.
- 10. Enable "Time-of-day synchronization".
- 11. Select "NTP" as Synchronization method.
- 12. Select the interface via which the RTU will be synchronized.
- 13. Assign the address of the NTP server.
- 14. Then click "Apply".



- Note
  - If you are running multiple RTUs on a network, you must assign a unique IP address. Assign an IP address according to your network settings (e.g., <u>192.168.0.4</u>).

# **Configure LAN**

- 1. To do this, navigate to the "LAN" menu.
- 2. Enter an IP address and subnet mask.
- 3. Then click "Apply".

SIEMEN	15	SIMATIC RT03041C
		LAN
User: admin	Log out	LAN
	<u>coy our</u>	
Start nage		Overview Configuration
▶ System		
Diagnostics		Control of the external router in the communication mode
Diagnostics		Activate the LAN interface in communication mode
Maintenance		Control of external routers Signal unused
N L AN		Lead time before communication mode (s) 0
		Monitoring of external routers Signal unused
🕨 wan ( 🍋 )		
		IP parameter
Services		Specify IP address manually
Security		IP address 192.168.0.3
		Subnet mask 255.255.255.0 (AI)
Users / groups		
Operating mode		Specify DNS server addresses manually
		Preferred DNS server 0.0.0.0
▶ Tags		Alternative DNS server 0.0.0.0
Expansion card		Coosify default router monually
		Default router 0.0.0.0
GPS		Delaur louiel 0.0.0
Program		DHCP server active
MQTT		Apply
Tag tables		
r lag tables		

#### Note

If you have changed the IP address of the SIMATIC RTU3041C, then open the web server of the SIMATIC RTU3041C in a Web browser again under the new IP address.

# **Configure WAN**

- 1. Navigate to the "WAN" menu.
- 2. Open the Mobile wireless settings tab.
- 3. Enable the mobile function interface.
- 4. Enter the PIN of the inserted SIM card.

Log out	
▶ Start page	Overview Mobile wireless settings Wireless cell SMS DynDNS
▹ System	P T C Enable mobile wireless interface
Diagnostics	Lead time before communication most s) 15
▶ Maintenance	PIN of the SIM card
► LAN	Mobile wireless network parameter assignment Global
N WAN	Selection of the mobile wireless standard Automatic
	eDRX interval (s) OFF
> Serv	PLMN 00000 0 for home PLMN of the SIM card
<ul> <li>Security</li> </ul>	Allow roaming

- 5. Enable the mobile data service.
- 6. Enter the APN of your mobile operator. If necessary, enter your username and password.
- 7. Then click "Apply".

Users / groups	<b>0</b>	Enable data service in the mobile wireless network
Operating mode	Lead time before communication (	45
		web.vodatone.de
▶ Tags	Authentication method	No authentication
	User name	
Expansion card	Password	
		Specify DNS server addresses manually
+ GPS	Preferred DNS server	0.0.0.0
▶ Program	Alternative DNS server	0.0.0.0
		Enable answers to ping queries
▶ MQTT		
Tag tables		
	Notifications	
	When changing the IP address	No 🗸
	Recipient group	~
	Logging	
	Signal strength (CSQ / dBm)	OFF 🗸
	Wireless cell identifier (CI)	OFF 🗸
	Data sent (kB)	OFF 🗸
	Data received (kB)	OFF 🗸
		Apply
		( 🍋 ))
#### **Configuring operating modes**

To save energy, the SIMATIC RTU3041C shall be in sleep mode a large part of the time and switch to an update or communication mode in predefined cycles.

- 1. Navigate to the "Operating mode" menu.
- Enter the cycle of the update mode, e.g. "30 seconds" ("30 seconds") for test purposes or "1 hour" ("1 hour") for the application described here.
- 3. Set the communication mode to "Cyclic" and specify the cycle of the communication mode, e.g. "3 minutes" for test purposes or "12 hours" for the application described here.
- Enter how often the mobile wireless interface should be switched on to fetch SMS. This is not necessary for the application described here. Select "No" for this purpose
- 5. Enter the minimum duration of the service mode (e.g., "always" for test purposes or "30 seconds" for the application described here).

Note The SIMATIC RTU3041C dials into the mobile network every 12 hours. If the SIMATIC RTU3041C is to dial into the mobile network more frequently, the power consumption increases.

6. Then click "Apply".



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## Creating variables for programming in the SIMATIC RTU3041C

Before you start programming in the RTU, configure the inputs, outputs and flags.

### **Digital inputs**

- 1. Navigate to the "Tags" menu.
- 2. Open the "Digital inputs" tab.

SIEMENS	SIMATIC RTU3041C							
User: admin	Tags					Next comr	nunication	mode (d
Log out							Next SM	IS chec
	Overview Digital i puts Digital output	ts Digital memory bits	Analog inputs	Analog memory bits	Temperature (internal)	Power supply (external)	Battery	Texts
start page	Active II To	108	Text for ON / Unit	t Text for OF	E / Format Update	cycle	Logging	
▶ System	0 Yes ( ) D	igital input	1	0	1 Hours	/ Yes, also in sleep mode	OFF	
	1 Yes e IL D	igital input	1	0	1 Hours	/ Yes, also in sleep mode	OFF	
▶ Diagnostics	2 No Di	igital input			1 Hours		OFF	
	3 No Di	gital input			1 Hours		OFF	
► Maintenance	4 No Di	igital input			1 Hours		OFF	
	5 No D	inital input			1 Hours		OFF	
▶ LAN		Active						
► WAN	Name	float						
	Type	Digital input		~				
<ul> <li>Services</li> </ul>	Current value	OFF	Read					
<ul> <li>Security</li> </ul>	Update cycle							
y socially	Reduction factor for basic cycle	1 ¥						
▶ Users / groups	Update cycle of this input	- Basic cycle: 1 Hours. - Cycle of the input: 1 Ho	JFS.					
Operating mode	Additional update cycle on value change	Yes, also in sleep mode	~					
	Format							
• Tac	Text for ON	1						
	Text for OFF	0						
	Logging							
▶ GPS	Current value	OFF	~					
▶ Program		Apply						
- TeleControl								

- 3. Click on input 0.
- 4. Enable the "Active" checkbox.
- 5. Assign the name "float".
- 6. Select that an additional update cycle is also performed in sleep mode when the value changes.
- 7. Then click "Apply".



- 8. Click on input 1.
- 9. Enable the "Active" checkbox.
- 10. Assign the name "enableReadFillLevel".
- 11. Select that an additional update cycle is also performed in sleep mode when the value changes.
- 12. Then click "Apply".

SIEMENS	SIMATIC RTU3	041C							
	Tage								
User: admin	ផេដូច							Next comm	Next SM
<ul> <li>Start page</li> </ul>	Overview Digital inp	puts Digital outputs	Digital memory bits	Analog inputs	Analog memory bit	Temperatu	re (internal)	Power supply (external)	Battery
, our page	Active Na	ame Type		Text for ON / Uni	t Text for O	FF / Format	Update o	vole	Logging
➤ System	0 Yes flo	Digital	input	1	0		1 Hours	/ Yes, also in sleep mode	OFF
	1 Yes en	nableReadFillL Digital	input	1	0		1 Hours	/ Yes, also in sleep mode	OFF
Diagnostics	2 No	B Digital	input				1 Hours		OFF
	3 No	Digital	input				1 Hours		OFF
Maintenance	4 No	Digital	input				1 Hours		OFF
	5 NO	Dinita	nout				1 Hours		OFF
► LAN		_							
- WAN			Active						
			IDIerceadrinLevel	~	-				
<ul> <li>Services</li> </ul>		ype Dig	ital input	$\sum$	10				
		alue 🔲	OFF	Read AT	))				
Security		Update cycle		(1.11					
	Reduction fa	actor for basic cycle 1	~						
Users / groups		- B	asic cycle: 1 Hours						
	Updat	te cycle of this input	ycle of the input: 1 Ho	urs.					
<ul> <li>Operating mode</li> </ul>	Additional update cyc	te on value change Ye	s, also in sleep mode	K	-				
		Format							
Tags		Text for ON 1							
		Text for OFF							
Expansion card		Text for OFF 0			9				
		Logging							
▶ GPS		Current value OF	F	~					
Drogram									
· · · · · · · · · · · · · · · · · · ·			Apply N						
<ul> <li>TeleControl</li> </ul>									
100000000			(						
Tag tables									

# **Digital flags**

- 1. Open the "Digital memory bits" tab.
- 2. Click on the 0 memory bit.
- 3. Enable the "Active" checkbox.
- 4. Assign the name "fillLevel90".
- 5. Then click "Apply".

SIEMENS	SIMATIC RTU3041C
User: admin	Tags Next communication mode (cy
Log.out	Next SMS check
	Overview Digital inputs Digital outputs Digital memory bits Analog inputs Analog memory bits Temperature (internal) Power supply (external) Battery Texts
<ul> <li>Start page</li> </ul>	
> Sustam	A Line Hante Course Logging
r system	12 crtFilLevel 0 OFF
▹ Diagnostics	2 7 ppsPosition 0 OFF
	3 1 0 OFF
Maintenance	4 OFF
LAN     WAN     Services     Security     Users / groups     Operating mode	E Active ULL reading Protect value: 0 OFF Formet Format Text for OFF Logning
▶ Tags	Current value OFF 👻
Expansion card	Apply
<ul><li>▶ GPS</li><li>▶ Program</li></ul>	<b>D</b>
▶ TeleControl	

- 6. Click memory bit 1.
- 7. Enable the "Active" checkbox.
- 8. Assign the name "critFillLevel".
- 9. Then click "Apply".

SIEMENS	SIMATIC RTU3041C						
	-						
User: admin	Tags					Next comm	nunication mode (
Log.out							Next SMS chec
	Overview Digital inputs Digital out	Itputs Digital memory bits	Analog inputs	Analog memory bits	Temperature (internal)	Power supply (external)	Battery Texts
<ul> <li>Start page</li> </ul>				L a subset			
	Active Name	Text for ON	Text for OFF	Logging			
▹ System	1 Ver critfill avai	1	0	OFF			
	2 G opsPosition	1	0	OFF			
<ul> <li>Diagnostics</li> </ul>	3 7 7	1	0	OFF			
	4 ( 1 ))			OFF			
Maintenance	5			OFF			
► LAN ► WAN	<b>9</b>	CritFilLevel	0,				
<ul> <li>Services</li> </ul>		le I on A					
▹ Security	Preset va	ilue OFF 🗸 🗸	rite				
	Form	nat					
Users / groups	Text for	ON 1					
	Test for 0						
<ul> <li>Operating mode</li> </ul>	Text for C	AFF 0					
	Loggi	ing					
▶ Tags	Current va	lue OFF	*				
Expansion card		Apply					
<ul><li>▶ GPS</li><li>▶ Program</li></ul>							
TeleControl			/				

## **Analog inputs**

- 1. Open the "Analog inputs" tab.
- 2. Click the analog input 0.
- 3. Enable the "Active" checkbox.
- 4. Assign the name "fillLevel".



- Select the measurement type of your analog level sensor. For the SITRANS LR120 sensor you have to set the measuring mode "Current (2-wire connector)".
- Enter the settling and integration time as well as the smoothing of the signal of your sensor. The following settings are recommended for the SITRANS LR120 sensor:
  - Settling time: 15.000 ms
  - Integration time: 40 ms
  - Smoothing: Weak
- **Note** Note that (settling time + integration time) \* smoothing factor must not be longer than the update mode cycle.



7. Enter the sensor and process values for your application. In this application example, a sensor signal of 20 mA corresponds to a level of 10,000 m<sup>3</sup>.



- 8. Select the digital input "enableReadFillLevel (DI1)" as the "enable signal".
- Note With this setting, the analog input "fillLevel" is only activated and read if the digital input "enableReadFillLevel" is activated. This can significantly reduce power consumption.
  - 9. Enable the "Diagnostics messages" to diagnose the errors.
  - 10. Then click "Apply".

SIEMENS	SIMATIC RTU3041C						
User: admin	Tags				Next comm	unication mode (cyc Next SMS check i	clic / planned): 2021-03-21 03:33:00 (WAN) / Not planned n sleep mode: Check permanently
	Overview Digital inputs Digital output	ts Digital memory bits Analog Inputs	Analog memory bits	Temperature (internal)	Power supply (external)	Battery Texts	
<ul> <li>start page</li> </ul>	Active Name Th	De la	Process value, rance	Unit Format	Update cycle	Measure	Looging (actual value / mean value)
System	D Yes filLevel C	arrent (2-wire connector) / 4 20 mA	0.00 10000.00	[V.2]	1 Hours	30000 ms / 40	OFF / OFF
	1 No V	Nage / 0 5 V	0.00 5.00		1 Hours	0 ms / 40 ms / 5.	OFF / OFF
<ul> <li>Diagnostics</li> </ul>	2 NO V	stage / 0 5 V	0.00 5.00		1 Hours	0 ms / 40 ms / S.	OFF/OFF
Maintenance							
> LAN							
		Active		Updat	e cycle		
> WAN	Name	fiLevel		Reduction factor for bas	Ratic cycle 1 V	<i>27</i>	
<ul> <li>Services</li> </ul>	Measure Measured unrights / monturnment have	Current (Dunite connected)		Update cycle of th	- Cycle of the input	1 Hours.	
	Outrust ninnal / measuring range	4 20 mb			Update on value	change in sleep mo	de
<ul> <li>Security</li> </ul>	Enver surely	ON CON	v.	Value char	ige (%) 0.00		
> Users / groups	Satting time of the sensor (ms)	10000	Chan	ge to reduction factor or	h value :hange		
	Internation time of the sensor (ms)	40.ms			Activate limit valu		
<ul> <li>Operating mode</li> </ul>	Smoothing	West H		Lower limit value (process	value) 0.00		
a Tana	Current sensor value	0.000000 Read			Activate limit valu	ie .	
	Current process unline	0.000000		Upper limit value (process	value) 0.00		
Expansion card	Spacification of the measuring range	0.00000			Activate threshok	đ	
	Present units (internetisting paint ()	4.00		Value char	toe (%) 0.00		
> GPS	Process value (interpolation point f)	0.00		Che	noe to: 1/2 ¥		
» Program	General value (interpolation point 7)	20.00		Channed under	- Basic cycle: 1 Hou	rs.	
	Decrete value (interpolation point 2)	10000 00		Criangeo upoa	- Cycle of the input:	0.5 Hours.	
<ul> <li>TeleControl</li> </ul>	Process value (interpolation point 2)	0.00 10000.00		Program-controlled i	eading		
. The fields	Additional value	0.00 10000.00		Enabli	a signal enableReadFilLeve	al (DI1)	
<ul> <li>Tag tables</li> </ul>	Additional value	Nana			Format		_0
	I copied	1016			Unit	(	N Y
	Contraction	077			Format [V2]		
	Corrent value	077					
	Disease of the second	UPP V					<u> </u>
	Congridance interange	Vire break Cutode the measure Apply					
		ل ا					

## Analog flag

- 1. Open the "Analog memory bits" tab.
- 2. Click the analog memory bit 0.
- 3. Enable the "Active" checkbox.
- 4. Assign the name "maxVolume".
- 5. Select the type "Analog value".
- 6. Enter the maximum fill level of the rainwater overflow tank in cubic meters (m<sup>3</sup>) as the initial value.
- 7. Then click "Apply".



- 8. Click the analog memory bit 1.
- 9. Enable the "Active" checkbox.
- 10. Assign the name "fillLevelPercent".
- 11. Select the type "Analog value".
- 12. Then click "Apply".

SIEMENS	SIMATIC RTU3041C	
User: admin	lags	
Log out		
	Overview Digital inputs Digital outputs Digital memory bits Analog inputs Analog memory bits	Temperature (internal) P
<ul> <li>Start page</li> </ul>		
	Active Name Type Unit Format	Logging
▶ System	0 Yes maxVolume Analog value Liter [V.2]	OFF
	1 Yes fillLevelPe Analog value % [V.2]	OFF
<ul> <li>Diagnostics</li> </ul>	2 Y olstance Analog value [V.2]	OFF
	Analog value [V.2]	OFF
Maintenance	4 Allalog value [V.2]	OFF
LAN WAN Services Security Users / groups	Active     fill.evePercent     Anatog value     Initial value     0.00000     Current value     0.00000     Preset value     Write	
	Format	
► Operating mode	Unit %	
	Format [V.2]	
▶ Tags	Logging	
► Expansion card	Current value OFF	
▶ GPS	Apply	
▶ Program		

- 13. Click on the analog memory bit 2.
- 14. Enable the "Active" checkbox.
- 15. Assign the name "distance".
- 16. Select the type "Analog value".
- 17. Then click "Apply".

SIEMENS	SIMA	TIC RT	U30410	С							
User: admin	Tags										
Log	out										
	Overview	/ Digita	l inputs	Digita	I outputs	Digital memo	ry bits	Analog inputs	Analog men	nory bits	Tempera
<ul> <li>start page</li> </ul>		Active	Name		Type		Unit		Format		
System	0	Yes	maxVo	lume	Analog val	le	Liter		[V.2]		
, system	1	Yes	fillLeve	Pe	Analog val	le	%		[V.2]		
Diagnostics	2	Yes	distanc	e i	Analog val	le			[V.2]		
P Diagnostics	3	No		1	📲 🕑 🖉	le			[V.2]		
Maintonanco	4	No		( M	g val	le			[V.2]		
P maintenance	5	No		6	hter						
► LAN					_						
NAM N					<b>V</b>	Active	9				
P WAAN					Name di	stance (	)				
. Forgioon					Type A	nalog vai	/	~(AI)			
> Services				Initia	al value 0.	000000		<b>1</b>			
Foourity				Curren	t value 0	00000		Re			
security				ounon	it value v.	000000		The			
				Prese	et value			Write			
osers / groups				F	Format						
Onertine					Unit						
Operating mode					Format IV	21					
Taga					i unnar [v	.2]					
• Tays				Lo	ogging						
Expansion cord				Curren	t value O	FF		~			
F Expansion Caru											
L GDS						Apply					
						1400		<b>W</b>			
Program											
, i i ogi ani							C	/			
TeleControl											

### Creating a program in the SIMATIC RTU3041C

To enable the SIMATIC RTU3041C to react appropriately to events, you must create a program. Programming is comparable to "FBD" in the TIA Portal.

## Program comparison of the current level with a critical value

- 1. Navigate to the "Program" menu.
- 2. Assign the name "Critical fill level" to the network.
- 3. Add a new function block (FB1).

Network 1		
Name	Critical fill level	ю́й
Comment	Determine if a critical fill lev	

- 4. Select "Division" as the function.
- 5. Interconnect the parameters as follows:
  - Dividend: fillLevel (AI0)
  - Divisor: maxVolume (AM0)
  - Quotient: fillLevelPercent (AM1)

Critical fill	level				
Nam	e Critical fill level				<b>B</b>
Commen	t Determine if a critic	al fill level is reached			
FB1 Co	mment Calculate the	fill level in percent			*
		Division	Z O		
True	<b>~</b>	⊖ En	Quoti 🎦 )—	-fillLevelPercent	
fillLeve	I (AIO) 🗸 🗸	Joi Gend	Error	-Unused	- C ) 🔼 🎽
maxVo	lume (AM	or Jor			
	( 🛛				Ľ
		1			*

#### 6. Add a new function block (FB2) below it.

itical fill level	_	_	_
Name Critical fill level			Кы Кы
Comment Determine if a crit	ical fill level is reached		
FB1 Comment Calculate th	e fill level in percent Division		
fillLevel (Al0)	Dividend	Error O-	
maxVolume (AMI	Divisor		

7. Select "Limit value switch" as the function.

- 8. Interconnect the parameters as follows:
  - Input: fillLevelPercent (AM1)
  - Output: fillLevel90 (DM0)
  - Limit value 1: 0.9000
  - Limit value 2: 0.8999

\_

tical fill level Send E-Mail Se	and SMS					
Name Critical fill level						<b>B</b>
Comment Determine if a critical fi	Il level is reached					
FB1 Comment Calculate the fill I	evel in percent					(
		Division		•		Į
True	*	- En		Quotient	fillLevelPercent (AM1)	•
fillLevel (AI0)		Dividend		Error -		•
maxVolume (AM0)	*	Divisor				6
						Ļ
						l
FB2 Comment Determine if 90%	of the max, volume a	re reached				0
		Limit value switch		•		ļ
Тпю			Limit value 1 0 0000	Output		[
fill evelPercent (AM1)		laout	Limit value 2 0.8000	Output		
		mpar		0 📐		( 🍋 )
	( 💫 )		(AI)	$\left \right\rangle$		Y

### 9. Add a new function block (FB3) below.

Name, Critical fill level					
Comment Determine if a critical fill level is reache	d				FOR FOR
FB1 Comment Calculate the fill level in percent	-				
	Division		•		
True •			Quotient	fillLevelPercent (AM1)	• <b>^</b>
fillLevel (Al0)	Dividend		Error -		• 🗙
maxVolume (AM0)	Divisor				
					<b>*</b>
FB2 Comment Determine if 90% of the max vol	ime are reached				
	Limit value s	witch	•		<u> </u>
True	En	Limit value 1 0 9000	Output -	fill.evel90 (DM0)	<b>,</b> [ • ]
fillLevelPercent (AM1)	Input	Limit value 2 0.8999	Ouporto		

- 10. Select "Logical OR" as the function.
- 11. Interconnect the parameters as follows:
  - Input 1: float (DI0)
  - Input 2: fillLevel90 (DM0)
  - Output: critFillLevel (DM1)

Comment Determine if a critical f	fill level is reached					
B1 Comment Calculate the fill	level in percent					
		Division		•		6
True	*	- En		Quotient	- fillLevelPercent (AM1)	- • Ľ
fillLevel (AI0)		Dividend		Error	- Signal unused	3
maxVolume (AM0)		Divisor				_
						1
B2 Comment Determine if 90%	6 of the max. volume	e are reached				
		Limit value s	witch	,		
True	*	- En	Limit value 1 0.9000	Output O	fillLevel90 (DM0)	[
fillLevelPercent (AM1)	*	Input	Limit value 2 0.8999			2
						, i
						_
	(	0) 00%				
-b3 Comment Set crit-lillevel i	Thoat is actuated (N	C) or 90% are reached				1
_		Logical OR		×		
True	•	- En		Outpr T	TtFillLevel (DM1)	Ň
float (DI0)	•	Inout 1				- > 🗾
fillLevel90 (DM0)	•				~	
Signal unused	•	1 🛯 🖳				
Signal unused	•	but 4				- 1

12. Negate input 1.

level in percent					-
	Division		•		4
	- En		Quotient	fillLevelPercent (AM1)	- • Ľ
•	Dividend		Error	<ul> <li>Signal unused</li> </ul>	>
	Divisor				5
					2
of the max. volume	are reached				- 1
	Limit value sv	vitch	•		Ē
•	- En	Limit value 1 0.9000	Output O	- fillLevel90 (DM0)	• -
•	Input	Limit value 2 0.8999			
					Ŀ
f float is actuated (NO	C) or 90% are reached				
	Logical OR		•		4
	- En		Output	critFillLevel (DM1)	
	e input 1		Culput	ond meorer (philip	
					6
	( 🍋 )				Ŀ
*					
	level in percent	In percent Division	In percent	level in percent	level in percent

13. Then click "Apply".

Note

### Setting up the connection between the MQTT broker and the SIMATIC RTU3041C

To connect the SIMATIC RTU3041C to MindSphere, proceed as follows:

- 1. Navigate to the "MQTT" menu.
- 2. Open the "MQTT Broker" tab.
- 3. Enter the address of the broker "mindconnectmqtt.eu1.mindsphere.io".
- 4. Select "WAN" as the interface.
- 5. Enter the port number "8883".
- 6. Enter the Client-ID:

"Client-ID"= <tenant>\_<DeviceName>

- <tenant>: Your MindSphere-Tenant
- <DeviceName>: Device name for the SIMATIC RTU3041C, e.g. "RTU\_HowTo".

These values must match the configuration of the SIMATIC RTU3041C (see <u>Chapter 2.2.3</u>)

Enter the topic prefix "tc/<tenant>/" and suffix "/o/mc\_v3/ts".
 <tenant>: Your MindSphere-Tenant

. Chart	Overview MQTT Broker Data points Topics
<ul> <li>Start page</li> </ul>	
System	Z Active
	Broker address mindconnectmqtt.eu1.mindsphere.io
<ul> <li>Diagnostics</li> </ul>	Interface WAN
Maintenance	Port number 8883
	Client-ID sitrain_RTI
→ LAN	Keep-Alive (s) 10
▶ WAN	Clean session
Services	Activate authentication
Security	User name
,	Password
Users / groups	
) Operating mode	Topic prefix tc/sitrain/
oporating moto	Topic suffix /o/mc_v3/ts
Fags	
Expansion card	Secure connection with
r Expansion card	
▶ GPS	Autoenticate broker
Program	Currently used me miniaspherekootCA.pem Delete
	File used apprying -
	Load new file No file selected Search

- 8. Enable MQTT.
- 9. Enable the connection with TLS.
- 10. Activate the authentication of the broker.

	Overview	MQTT Broker	Data points	Topics
<ul> <li>Start page</li> </ul>				
▹ System				Active
Diagnostics		E	Broker address Interface	mind eqt.eu1.mindsphere.io
Maintenance			Port number	8883
+ LAN			Client-ID Keep-Alive (s)	sitrain_RTU_HowTo 10
• WAN				Clean session
> Services				Activate authentication
Security			User name Password	
Users / groups				
• Operating mode			Topic prefix	tc/sitrain/
· Operating mode			Topic suffix	/o/mc_v3/ts
Fags				
Expansion card     GPS				Authe broker

#### Load certificates

1. Upload the broker certificate to the RTU that you downloaded from Mindsphere (Broker certificate).

. Chart a see	Overview MQTT Broker Data points Topics
<ul> <li>start page</li> </ul>	
System	Z Active
	Broker address mindconnectmqtt.eu1.mindsphere.io
, Diagnootioo	Interface WAN
Maintenance	Port number 8883
▶ LAN	Client-ID sitrain_RTU_HowTo
	Keep-Alive (s) 10
▶ WAN	Clean session
Services	Activate authentication
	User name
Security	Password
Users / groups	
	Topic prefix tc/sitrain/
<ul> <li>Operating mode</li> </ul>	Topic suffix /o/mc_v3/ts
▶ Tags	
. Encoder and	Secure connection with TLS
Expansion card	
+ GPS	Authenticate broker
b. Drawnawa	Currentin und file MintCohere BastCA see
riogiani	File used after applying
MQTT	Load new file. No file selected
Tag tables	
- ing mores	

- 2. Activate the authentication of the RTU.
- Upload the client certificate and key (<u>Client certificate/key</u>).
- 4. Then click "Apply".



## **Result:**

The SIMATIC RT	U3041C connects	securely to	the MindSphere	MQTT	broker.
SIEMENS	SIMATIC RTU3041C				

User: admin	TeleControl	
Log out		
▶ Start page	Overview /QTT Broker Data points	Topics
▶ System	Connection status	
	Protocol type	MQTT
Diagnostics	Connection to broke	Yes, with TLS
Maintenance	Broker address	mindconnectmqtf.eu1.mind
	Connected since (dd:hh:mm:ss)	00:17:45:05
▶ LAN	Send statistics	
► WAN	Send buffer - current level	0.00%
	Send buffer - average level	0.00%
Services	Send buller - highest level	0.00%
Security	Number of lost send names	0
5 U.S	Receive statistics	
Osers / groups	Number of lost receive frames	0
Operating mode		
▶ Tans		Reset statistics
1490		
Expansion card		
▶ GPS		
▶ Program		
▶ MQTT		
▶ Tag tables		

5. Open the Data points tab.

**Note** In the "Data points" tab, all projected variables are mapped as data points and grouped according to variable types.

6. Select the "Publish" transfer type for the data points to be transferred to MindSphere.

Note Up to 8 publish topics can be assigned to the data point. The value triggers or topic triggers are used to store the assigned topics in the send buffer in chronological order.

7. Then click "Apply".

	TeleControl	made (surfix Laborat				2022	105-15 09:06:44 Engl	sh
user: aomin	Next communication	Mode (cyclic / planne IC shock is close me	(a). Always connected (w	uni) /		E Stan	Number of active sessi	2
200.005	IVERI OF	no check in sieep mo	de. Always connected			- <u>0100</u>	C 000000	•••
Start page	Overview MQTT Broker Data points Topics							
	Name	Data point type	Type of transfer	Value trigger	Threshold (%)	Threshold (abs.)	Transfer mode	
System	Digital inputs							
	STATUS_ERROR	BOOL	Only internal use	✓ Change	< -		Cyclic	
Diagnostics	STATUS DUN	POOL	Anhu internal una	Change	< -		Cyclic	
	float (DI0)	BOOL	Publish	<ul> <li>o trigger</li> </ul>	¥ -		Change immediately to	comm •
Maintenance	enableReadFillLevel (DI1)	BOOL	Publish	✓ o trigger	¥ -		Change immediately to	comm -
	fillLevel90 (DM0)	BOOL	Only internal use	✓ hange	< -		Cyclic	
LAN	critFilLevel (DM1)	BOOL	Publish	<ul> <li>o trigger</li> </ul>	¥ -	-	Change immediately to	comm
	Analog inputs							
WAN	fillLevel (AI0)	SINGLE_FLOAT	Publish	<ul> <li>o trigger</li> </ul>	✓ 1.00	100.00	Change immediately to	comm
	maxVolume (AM0)	SINGLE_FLOAT	Publish	✓ o trigger	¥ -	0.00	Change immediately to	comm
Services	filLevelPercent (AM1)	SINGLE_FLOAT	Publish	<ul> <li>o trigger</li> </ul>	¥ -	0.00	Change immediately to	comm
	filLevelPercent100 (AM2)	SINGLE_FLOAT	Publish	<ul> <li>o trigger</li> </ul>	¥ -	0.00	Change immediately to	comm
Security	IIILEVEL/W (AWIS)	SINGLE_FLUNI	Only internal use	✓ change	< -	0.00	Cyclic	
second	Counter inputs							
lleare / groupe	STATUS_NEXT_COM_CYCLE	UINT32	Only internal use	✓ Change		-	Cyclic	
o acta / Broupa	MOB_SIG_QUAL	UINT32	Only internal use	✓ Change	< -		Cyclic	
On oracian marks	MOB_CELL_ID	UINT32	Only internal use	✓ Change	< -		Cyclic	
operating mode	MOB_TX_KB	UINT32	Only internal use	✓ Change	< -		Cyclic	
T	MOB_RX_KB	UINT32	Only internal use	✓ Change	< -		Cyclic	
rags	BAT_RES_CHARGE	UINT32	Only internal use	✓ Change	-		Cyclic	
	Digital outputs							
Expansion card	filLevel90 (DM0)	BOOL	Only internal use	¥ -	-		Cyclic	
	critFilLevel (DM1)	BOOL	Only internal use	¥			Cyclic	
GPS	Analog outputs							
	maxVolume (AM0)	SINGLE_FLOAT	Only internal use	¥			Cyclic	
Program	filLevelPercent (AM1)	SINGLE_FLOAT	Only internal use	¥	-		Cyclic	
	filLevelPercent100 (AM2)	SINGLE_FLOAT	Only internal use	¥ -	-		Cyclic	
MQTT	filLevelDiv (AM3)	SINGLE_FLOAT	Only internal use	¥	-		Cyclic	
Tag tables	Apply							

Note

#### **Configure topics**

1. Open the Topics tab.

In the "Topics" tab, you configure the topics that the RTU is to use for MQTT communication.

You can define max. 32 topics. A data point can be assigned to a maximum of 8 topics.

The table lists all 32 possible topics with their current settings.

By clicking on a line you can change the settings of the respective topic.

- 2. By clicking on a line you can change the settings of the respective topic. Structure of the topic name: Topic-Präfix, -Suffix.
- 3. Activate the data points that are to be transferred to MindSphere.
- 4. Use the time trigger with time factor "1".

The data is transferred to the MindSphere every 10 seconds.

- 5. Select the format of the user data to be transferred "Mindsphere generic" ("Mindsphere generic").
- 6. Then click "Apply".



# 2.2.5 Configure SITRANS LR120

### Requirements

In this application example, the SITRANS LR120 is connected to terminal blocks X40 and X41 of the SIMATIC RTU3041C.

To configure the SITRANS LR120 or for test purposes, the device must be permanently powered:

1. The output voltage in the SIMATIC RTU3041C must be assigned with 24 V.

SIEMENS	SIMATIC RTU3041C	
User: admin	Operating mode	
Log out		
	Operating modes Logging Power sup	ply Battery lifetime
<ul> <li>Start page</li> </ul>		20
→ System	External power supply	
Diagnostics		Connected
	Battery module 1	
Maintenance		Connected
+ LAN		Expansion module 1 connected
		Expansion module 2 connected
→ WAN	Battery status	-
) Services		Connect battery
		Disconnect battery
Security	Battery module 2	
) lisers / groups		
r uaciar gioupa		Expansion module 1 connected
Operating mode	Rattery etatue	Expansion module 2 connected
h Taga	Dattery status	Connect battery
r lags		Disconnect battery
Expansion card	Battery switchover	Disconnect Dattery
L CDS	Battery switchover	I lise the preset value
7 61-5	Switchover threshold	80 % of the battery rated voltage
Program	Control outputs	
NOT	Output voltage	24V 💉
1 MIQTI		Supply X10 w
Tag tables		Supply X10 C
		Supply X11 with vonage in update mode
	X11 - Lead time before update cycle	500

- 2. The analog input AI0 must also be read during sleep mode if the value at the input changes
  - Enable "Update on value change in sleep mode"
  - "Enable signal" unused The analog signal is read in with each update cycle.

	Overview Digital inputs Digital output	ts Digital me	mory bits	Analog inputs	Analog	memory bits	Temperatu	re (internal)	Power s	supply (external)	Battery Texts
• start page	Active Name	Type			_	Process valu	e rance	Linit	Format	Undate cycle	Measure
System	0 Yes fill_evel	Current	(2-wire conne	ector) / 4	M	0.00 1000	0.00		[V.2]	10 Seconds	3000 ms / 40
	1 No	Voltage	10.5V			0.00 5.00				10 Seconds	0 ms / 40 ms
Diagnostics	2 No	Voltage	/05V			0.00 5.00				10 Seconds	0 ms / 40 ms
	3 NO	Voitage	/05V			0.00 5.00				10 Seconds	0 ms / 40 ms
Maintenance		·									
LAN		_									
		Active Active						Updat	e cycle		
WAN	Name	fillLevel					Reduction	factor for bas	ic cycle	1 🗸	
. Familian	Measure						Upda	ate cycle of th	is input	Basic cycle: 10 S	econds.
services	Measured variable / measurement type	Current (2-win	e connector)		~				- 9	2 Lindate on value	change in sleep mode
Security	Output signal / measuring range	420 mA			~			1000		Copound On Value	cominge in arbeit mode
	Power supply	ON			~	Chan	en te meluet	Value Charles	198 (70) :		, ,
Users / groups	Settling time of the sensor (ms)	3000				Chan	ge to reduct		change	( 🛀 ))	
	Integration time of the sensor (ms)	40 ms	~								lue
<ul> <li>Operating mode</li> </ul>	Smoothing	Weak	~				Lower limit v	alue (process	s value)	10.00	
There	Current sensor value	0.000000		head						Activate limit val	lue
	Content senses value	0.000000		1040			Upper limit y	alue (process	volue)	9000.00	
Exp	Current process value	0.000000								Activate thresho	id
	specification of the measuring range							Value char	100 (%)	2.50	
GPS	Sensor value (interpolation point 1)	4.00						Chi	inna to:	10 4	
	Process value (interpolation point 1)	0.00							inge iv.	Basic cycle, 10 S	laconde
<ul> <li>Program</li> </ul>	Sensor value (interpolation point 2)	20.00					C	hanged updat	le cycle	Cycle of the input	t 5 Seconds.
MOTT	Process value (interpolation point 2)	10000.00					Program	-controlled r	eading		
- Martin - M	Process value, range	0.00 10000	0.00					Enable	e signal (	Signal unused	N ~
Tag tables	Additional value								Format		0
	Mean value generation	None	~						Unit		
	Logging								Format 1	IV 21	
	Current value	OFF									
	Mean value	OFF									
	Diagnostics message										
	Citightoaca mesauge	P Wire break									
		El Oudrida En	-								
		C4 Conside ele	r measuring ra	inge							
		Ap	iply b	1							

### Configuration

To configure the SITRANS LR120, proceed as follows:

- 1. Download the SITRANS mobile IQ app from the App Store to your mobile device and install the app.
- 2. Enable Bluetooth and location information on your mobile device.
- 3. Launch the app.

SITRA	NS mobile IQ	≡
Bluet	ooth devices	
<b></b> -55dB	SENSOR SITRANS LR120 JNB/M7030000135	Level

## **Result:**

The devices within range appear.

4. Click on the device you want to connect to.

SITRA	ANS mobile IQ		≡
Bluet	ooth devices		
-55dB	SENSOR SITRANS LR120 JNB/M7030000135	Level	

5. Enter the PIN code.

Note

The PIN code was delivered with the device.

After successful PIN entry, the information about the device is displayed.

SITRANS LR12	20 🔻	DISCONNI	ЕСТ Ξ
Device cock	cpit		
Product name SITRANS LR1	120	1	
Tag			
Short tag SENSOR			
Serial number JNB/M70300 5	r 00013	-	
Article numbe 7ML532x-xx 0xx0	er <b>«A06-</b>	FW version 1.1.0	
HW version 1.2.0			
Device stat	us	🗹 Good	
Current val	ues		
Level 0.197 m		Distance 0.453 m	
Confidence 46 dB		Volume 306 m <sup>3</sup>	
Loop current 8.08 mA		Percent of ra <b>25.5 %</b>	inge

6. Go to Setup > Quick commissioning to configure the SITRANS LR120 for your application type.

### 2 Engineering



- 7. Select "Volume" as the operation.
- 8. Select "Liquid" as the material type.
- 9. Select "Plastic tank" as the application.

÷	Setup > Quick c	ommissioning	≡	
	1 Lower cali 2 Upper cali	bration point bration point	5074	
<b>Opera</b> t Volum	t <b>ion</b> e		~	~7
<b>Materi</b> Liquid	al type		~~(	
Applic Plastic	<b>ation</b> tank		~	$\Theta$
Calib	ration		$\langle$	
<b>Lowe</b> 0.65	r <b>calibration poir</b> m	nt	~	
Upper 0 m	r calibration poir	nt	$\sim$	
<b>n</b> Home	Charts	≊≇ Setup	Сору	

10. Enter the lower calibration point (0-60 m).





11. Enter the upper calibration point (e.g. :0 m).



Sets the distance from the sensor reference point to the upper calibration point. Usually corresponds to the full level.



Note

- 12. Select "m3" as the unit.
- 13. Select "Cylinder container" as the container shape.
- 14. Enter as measuring end the initial value of the variable "maxVolume", which you have defined in the RTU project engineering (see <u>Chapter 2.2.4</u>).

← Setup > Quick commissionin	g =
Volume	$\sim$
Material type Liquid	$\sim$
Application Plastic tank	~
Calibration	
Lower calibration point 0.65 m	~
Upper calibration point 0 m	~
Volume	
Units m <sup>3</sup>	
<b>Vessel shape</b> Cylinder vessel	
Range	
Upper range value 1200 m <sup>3</sup>	~
n Al ≈ Home Setup	Сору

After the configuration of the SITRANS LR120

- disable "Update on value change in sleep mode"
- select the digital input "enableReadFillLevel (DI1)" as the "enable signal".
   SIEMENS SMATC RTURATC

L00.	202									Next SMS check in	sleep mode: Check permanently	
	Overvie	w Digita	I inputs Digital co	itputs Digital memory b	Analog inputs	Analog memory bits 1	emperature	(Internal)	Power supply (externa	d) Battery Texts		
<ul> <li>start page</li> </ul>		Artivo	Name	Type		Process value, ranne	Unit	Format	Undate cycle	Maggire	Lonning (artual value (mean value)	
+ System	0	Yes	filLevel	Current (2-wire connecto	/420 mA	0.00 10000.00		[V.2]	1 Hours	30000 ms / 40	OFF / OFF	
	1	No		Voltage / 0 5 V		0.00 5.00			1 Hours	0 ms / 40 ms / S.	OFF / OFF	
<ul> <li>Diagnostics</li> </ul>	2	No		Voltage / 0 5 V		0.00 5.00			1 Hours	0 ms / 40 ms / 5	OFF / OFF	
	· · ·	NO		vonage / 0 5 v		0.00 5.00			1 Hours	ums/aums/s.	OFF / OFF	
<ul> <li>Maintenance</li> </ul>												
> LAN												
				Active				Update	cycle			
> WAN			Na	mo filLevel			Reduction fai	for for basi	: cycle 1 👻			
			Meas	ure			Lindate	cycle of thi	Basic cycle: 11	fours.		
<ul> <li>Services</li> </ul>	Meas	ured varial	tie / measurement t	pe Current (2-wire conne	100	~			Cycle of the ing	ut 1 Hours.		
+ Security		Output si	gnal / measuring ran	spe 4 20 mA		~			Update on va	ue change in sleep moo	0	
			Power sup	ply ON		×		value chan	be (20) 0.01	0		
Users / groups		Setting	time of the sensor in	ms) 30000		Change	an reductio	n naciór on	hange	Y		
		integration	time of the sensor (i	ms) 40 ms 👻								
<ul> <li>Operating mode</li> </ul>			Smooth	ing Weak		La	wer limit val	ie (process	value) 0.00			
+ Taux			Current sensor va	tun 0.000000	Read				Activate Imit	alue		
			Current rencess va	tup (0.000000		U,	oper limit vali	e (process	value) 0.00			
Expansion card	Smach	fication of	the measuring rat	100					Activate three	hold		
		lamone scale	a (internalistica pain	11 4 00				Value chan	pe (%) 0.00			
▶ GPS		remour valu	e (interpolation poin	(1) 4.00				Cha	noe to: 1/2 ¥			
Program		longer unk	e (interpolation poin	2) 20.00			Cha	tehou han	Basic cycle: 11	lours.		
		remote valu	e (merpolation pon	(2) 2000			Cria	iges spear	- Cycle of the ing	ruit: 0.5 Hours.		
TeleControl		ocess valu	e (merpolación pon	(2) 10000.00			Program-o	ontrolled re	ading			
· Res tables			Addition 1	10000.00				Enable	signal enableReadFill	ever (D11)	~_0	
<ul> <li>Tag tables</li> </ul>			Additional va	iue					ormat		- 9	
			mean varue general	son reane V					Unit	(		
			Logg	ing					iormat [V.2]			
			Current va	100 089	~							
			Mean va	100 086	~							
			Usagnostics messi	ige								
				Whre break								
				Cutside the measu	ng range							
				Apply								

Note

# 2.2.6 Project SITRANS store IQ

### Requirements

Note

- You have purchased MindSphere SITRANS store IQ MindSphere Store: <u>https://www.dex.siemens.com/mindsphere/step-4-book-apps-and-extras/sitrans-store-iq-entry-package</u>
- You have set up SITRANS store IQ in MindSphere.

To deploy and set up SITRANS store IQ in your MindSphere tenant, contact the DevOps for the product:

de-l.operations.us@siemens.com

- 1. Open the login page to your MindSphere tenant in your internet browser.
- 2. Enter your username and password and log in.
- 3. Start MindSphere "Asset Manager".



4. Navigate to your newly created asset "Client-ID" ("tenant\_RTU\_How\_To") (see <u>Chapter 2.2.3</u>).

	Asset Manager	
俞	Assets / Details	
	sitrain 🔋 🔍	dfcskmt
ĘÇ	Create asset	🕅 sitrain
Å	Filter	© core.basicenterprise)  © Europe/Berlin)  © Performance
쁆	▼ Subtenants	Description Root Asset for dfcskmt tenant
	CP_Exponate	
	DI_Edge	
	PN_Truck	Events 🥕 Last updated: 2022-07-13 10:05:37
	▼ Assets	
	CPU-1516	
	sitrain_edgetrainer	
	sitrain_RTU_HowTo	Aspects 🧷
	MQTT Device EdgeMindsphere1	

5. Navigate to the child assets.

	-								
	Asset Manager			Asset Manager					
ណ	Assets / Details		ŵ	Assets / Details					
			۲	Clack	dfcskmt / dfcskmt_RTU_HowTo / RTU_HowTo				
00	sitrain	6 Q	63	sitrain_kio_nowio	® RTU_HowTo				
Ę	Create asset		~	U Charles asset	S dickmt.Atter_RTU_HowTo 2 Europeliterin @ Performance				
			æ		Description No description available				
ŝ	Filter			* Assets					
品				RTU_HowTo					
	<ul> <li>Subtenants</li> </ul>								
	CP_Exponate	$\bigcirc$			Events ALLast updated: 2022-06-30 09:11:28				
	DI_Edge	$\bigcirc$							
	PN_Truck	$\bigcirc$							
					Asperts 2				
	▼ Assets				Last updated: 2022-06-30-09:11:28				
	CPU-1516				Name				
	sitrain adaptrainar				Arourt RTII Monifo				
	sinain_eugenainer	$\bigcirc$							
	sitrain_RTU_HowTo	<b>_</b>							
					1 0 0 OFFLINE CONLINE STATIC				
	MQTT Device EdgeMindsphere1								

6. Move the child asset with the data model (see <u>Chapter 2.2.3</u>) to the asset that has access to the SITRANS store IQ.

<b>Ⅲ</b> 俞	Asset Manager		provered by MindSphere [->
● 展 % 晶	C Back sitrain_RTU_HowTo Create asset Filter * Assets RTU_HowTo	decket / decket_dTU_isenfo         Image: startingRTU_HowTo         Image: startingRTU_HowTo         Decorption         No escuption evolution	Share asset
		Events >> Lat updated. 2022-07-05 08-07:11	

Move asset: dfcskmt_RTU_HowTo	×
< Back sitrain	
Filter	
CPU-1516	
dfcskmt_edgetrainer	$\bigcirc$
dfcskmt_edgetrainer	
dfcskmt_RTU_HowTo	$\bigcirc$
MQTT Device EdgeMindsphere1	
MQTT Device EdgeMindsphere2	
MQTT Device EdgeMindsphere3	
MQTT Device EdgeMindsphere4	
MQTT Device EdgeMindsphere5	
MQTT Device EdgeMindsphere6	
MQTT Device EdgeMindsphere7	
PNT-cc716	
Store IQ Demo	$\bigcirc$
	Incel Move

7. Switch to the MindSphere main menu.



8. Start MindSphere SITRANS store IQ.



### **Result:**

The data is read out via SITRANS store IQ.



## **Configure alarm**

When a critical level is exceeded or undershot, an

E-mail sent to a defined recipient via SITRANS store IQ.

The alarm that triggers the e-mail notification is configured directly in SITRANS store  $\ensuremath{\mathsf{IQ}}\xspace.$ 

To configure the alarm, proceed as follows:

1. Start MindSphere SITRANS store IQ.



2. Unfold your newly created SITRANS store IQ demo.



3. Configure an alarm for the variable "critFillLevel".



- 4. Assign a name for the alarm.
- 5. Click on "Next".

Add Alarm Configurat	ion		
<b>O</b>	(*****)	······	
Step 1: Alarm Details	Step 2: Hysteresis	Step 3: Debouncing Time	Step 4: Notification Details
Name*			
FillLevel_Over			
Store IQ Demo RTU	_HowTo		
Priority			
Critical	•		
Process Value			
Aspect_RTU_HowTo   0	critFillLevel		
Value*			
Is True	•		
Description			



- 6. Do not make any selection in the following two windows.
- 7. Click on "Next".

⊘—



8. Select the recipient and the type of message.

<b>S</b>	O		
Step 1: Alarm Details	Step 2: Hysteresis	Step 3: Debouncing Time	Step 4: Notificatior Details
Notify			
Configured Users	SMS	Email	Call
	LO		
	_	_	_



Note

### 2.2.7 Loading the Configuration File

The supplied archive "109810580\_RTU3041C\_MQTT\_PROJ\_V10.zip " contains the ready-made configuration file "109810580\_RTU3041C\_MQTT\_Configuration.cfg", which you can load into your SIMATIC RTU3041C and adapt to your application in just a few steps.

The configuration file can only be loaded from an RTU3041C. For other types, the configuration file must be adjusted manually.

To load the supplied configuration into your SIMATIC RTU3041C, proceed as follows:

1. Connect the SIMATIC RTU3041C to your PG/PC via a network cable.

**Note** Ensure that only one RTU is connected to your network at a time during commissioning, as each RTU is assigned the same IP address at the factory.

- If necessary, change the IP address of your PG/PC (according to <u>Table 2-1</u>), so that it and the SIMATIC RTU3041C are in the same subnet. The factory default IP address "<u>192.168.0.3</u>" is set in the RTU3041C.
- 3. In a browser, open the web server of the RTU3041C at the address "192.168.0.3".
- 4. Log in with the username "admin" and the password "admin".
- 5. Assign a new password.
- 6. Navigate to the "Maintenance" menu.
- 7. Under "Load configuration", click "Search".

SIEMENS	SIMATIC RTU3041C
User: admin	Maintenance
Log out	
► Start page	Configuration Firmware Operating state Online support
▶ System	Load configuration
► Diagnostics	File 109739240_RTU3041C_TCSB_V40.cfg Search
Maintenance	Load on device
→ LAN	Load from SD card
> WAN	
<ul> <li>Services</li> </ul>	Save configuration
<ul> <li>Security</li> </ul>	Save on SD card
<ul> <li>Users / groups</li> </ul>	Compress and encrypt file (optional)
▶ Operating mode	Password to optional encryption
▶ Tags	Save to 1 C
Expansion card	
▶ GPS	
▶ Program	

- 8. Select the downloaded configuration file.
- 9. Confirm with "Ok".

#### 10. Click "Load on device".

SIEMENS	SIMATIC RTU3041C
User: admin	Maintenance
Log.out	
► Start page	Configuration Firmware Operating state Online support
▶ System	Load configuration
► Diagnostics	File 109739240_RTU3041C_TCSB_V40.cfg Search
Maintenance	Load on device
→ LAN	Load from SD card
► WAN	
▹ Services	Save configuration
<ul> <li>Security</li> </ul>	Save on SD card
► Users / groups	Compress and encrypt file (optional)
Operating mode	Password for optional encryption
▶ Tags	Save to PC
Expansion card	
▶ GPS	
▶ Program	

11. The previously set password is overwritten with the password "Siemens123!" stored in the configuration file.

### **General configuration**

- 1. Navigate to the "System" menu.
- 2. Open the System time tab and select your local time zone.
- 3. Enable "Time-of-day synchronization".
- 4. Select "NTP" as Synchronization method.
- 5. Select the interface via which the RTU will be synchronized.
- 6. Assign the address of the NTP server.
- 7. Then click "Apply".



# Configuring operating modes

- 1. Navigate to the "Operating mode" menu.
- 2. Enter the minimum duration of the service mode, e.g. "30 seconds" ("30 seconds") für die hier beschriebene Anwendung.
- 3. Then click "Apply".

SIEMENS	SIMATIC RTU3041C
User: admin	Operating mode
Log out	
. Charles	Operating modes Logging Power supply Battery lifetime
<ul> <li>Start page</li> </ul>	
▶ System	Update mode
Diagnostica	Basic cycle 1 hour 🗸
P Diagnostics	Start time of the update cycle 00:00:00
Maintenance	Start day of the update cycle Monday 🗸
	Additional update cycles 0
▶ LAN	NOTE: For every tag, you can set an individual update cycle with a
▶ WAN	reduction factor.
<ul> <li>Somicos</li> </ul>	Communication mode
F 30111003	Communication mode Cyclic
Security	Basic cycle 12 hours
Lieore / groupe	Start time of the communication cycle 00:00:00
v osers / groups	Start day of the communication cycle Monday
Operating mode	Minimum duration No
. Toga	
	Start test communication mode
Expansion card	
CDS	Sleep mode
V GF3	Turn on mobile wireless interface regularly and check for receipt of SMS message? No
Program	Start time of checking cycle 00:00:00
▶ TeleControl	
10000000	Service mode
Tag tables	Minimum duration 30 seconds
	( ¥) )
	Apply
	↓

# **Configure WAN**

- 1. Navigate to the "WAN" menu.
- 2. Open the Mobile wireless settings tab.
- 3. Enter the PIN of the inserted SIM card.
- 4. Enter the APN of your network operator.
- 5. Then click "Apply".

SIEMENS	SIMATIC RTU3041C
JENERS	01111101110000410

User: admin	WAN	
Log out		
. Céant	Overview Mobile wireless settings W	Vireless cell SMS DynDNS
<ul> <li>start page</li> </ul>		
▶ System		Enable mobile wireless interface
Diserseties		
▶ Diagnosues	PIN of the SIM card	
Maintenance		
	Mobile wireless network parameter	Global
▶ LAN	Selection of the mobile wireless	
▶ WAN	standard	Automatic
	eDRX interval (s)	OFF 🗸
▶ Serv	PLMN	00000 0 for home PLMN of the SIM card
A Socurity		Allow roaming
• Security		
Users / groups		C Enable data service in the mobile wireless network
	APN	web.vodafone.de
Operating mode	Authentication method	No authe
▶ Tags	User name	
	Password	
Expansion card		Specify DNS server addresses manually
N GPS	Preferred DNS server	0.0.0.0
	Alternative DNS server	0.0.0.0
▶ Program		Enable answers to ping queries
TeleCentrel		
▶ TeleControl		
Tag tables	Notifications	
	When changing the IP address	No 🗸
	Recipient group	Administrator SMS 🗸 🗸
	Logging	
	Signal strength (CSQ / dBm)	OFF 🗸
	Wireless cell identifier (CI)	OFF 🗸
	Data sent (kB)	OFF 🗸
	Data received (kB)	OFF 🗸
		Apply
		( 🍋 ))

### Configure MQTT

- 1. Navigate to the "MQTT" menu.
- 2. Open the "MQTT Broker" tab.
- 3. Enter your Client-ID
  - "Client-ID"= <tenant>\_<DeviceName>
  - <tenant>: Your MindSphere-Tenant
  - <DeviceName>: Device name for the SIMATIC RTU3041C, e.g. "RTU\_HowTo".

These values must match the configuration of the SIMATIC RTU3041C (see Chapter 2.2.3)

- 4. Adjust the topic prefix "tc/<tenant>/". <tenant>: Your MindSphere-Tenant.
- 5. Upload your broker certificate (Broker certificate).
- Upload the client certificate and key (<u>Client certificate/key</u>).
- 7. Enable MQTT.
- 8. Then click "Apply".



Note

## **Result:**

The SIMATIC RTU3041C connects securely to the MindSphere MQTT broker.

SIEMENS SIMATIC RTU3041C

User: admin	TeleControl	
Log out		
▶ Start page	Overview //QTT Broker Data points	Topics
▶ System	Connection status	
► Diagnostics	Protocol type	MQTT Ves. with TLS
Maintenance	Broker address	mindconnectmqtt.eu1.mind
▶ LAN	Connected since (dd:hh:mm:ss) Send statistics	00:17:45:05
▶ WAN	Send buffer - current level	0.00%
▶ Services	Send buffer - average level Send buffer - highest level	0.00% 0.00%
▹ Security	Number of lost send frames	0
► Users / groups	Receive statistics	
Operating mode	Number of lost receive frames	0
▶ Tags		Reset statistics
Fransion card		
> GDS		
<ul> <li>Drogram</li> </ul>		
- Program		
▶ MQTT		
▶ Tag tables		

- 9. Open the Topics tab.
- 10. Adjust the Topic "<tenant>\_<DeviceName>":
  - <tenant>: Your MindSphere-Tenant
  - <DeviceName>: Device name for the SIMATIC RTU3041C
- 11. Then click "Apply".

Los and         MOTT Broker         Cata points         Tepics         Net           + Start page         Artive         Topic         Yes and the start of DPF Format         Duality         Topper         Number of DPF Format           + System         1         Yes strate, RTL Heaving         Pladita         Duality         Topper         4         Microphree	SMS check in sleep mode: Always connected
Start page     Overview MCTT Broker Data points Tegics     Adve Table     Adve Table     Adve Table     Topic     Type Quality Tropper Number of DFIs Format     Start Cycle     Adve Mintophres	
s Start page Active Topic Type Quality Topper Number of DPs Format System 1 Yes sitrain_RTU_HowTo Platish QuS1 Scan Cycle 4 Mindsphere	
System     1 Yes sitrain_RTU_HowTo     Yts	
	seneric
2 No Publish QoS1 DP-Trigger 0 JSON gener	c
Diagnostics 3 No     Publish QoS1 DP-Trigger 0 JSON generit	c
4 No Publish CoS1 DP-Trigger 0 JSON gener	c
Maintenance 5 No Publish LoS1 UP-ingger 0 Jourgement 6 No Publish CinS1 UP-Ingger 0 ISON energy	c r
LAN	
Active Digital inputs	
WAN Topic strain_RTU_HowTo 0 toat (D(0) 0 enableReadFillEvel (D(1)	CritFilLevel (DM1)
todesmitistrain_RTU_How)	
( A )) Analog inputs	
Security Type Publish	
Calify DeSt Z Max Volume (AMO) Intelevention (AM2)	
Users / groups Retain Retain	
Operating mode     Use connection establishment trioner	
Tags Ulia connection tarmination triager	
Expansion card Colore unite angles	
factor 1	
· GPS - Basic cycle: 1 Hours.	
- Ingger cycle: 1 Hours.	
Program	
MQTT Format Mindsprere generic	
("timesries":(('timestenp":" A	
Tag tables [[(@DLTa_LINEJING]], "actes . [((@DLTa_DDLTa_LINEJING])" ("det aboint Id":"	
<pre>({NAME})","value":{(VALUE}},"qualityCode":</pre>	
{(QuALITY_CODE_MDSP))){('ALAST_DATA_POINT)},	
("timeseries":[("timestamp":"2022-08- A	
02713:51:03.002","values":	
Output [("dataPoint3":"critFillevel","value":true	
("dataPicture", "value", 0.0000 "o	
Apply	
$\rangle = \forall$	
# 3 Useful Information

## 3.1 Adapt supplied data model (Asset Model)

The supplied archive "109810580\_RTU3041C\_MQTT\_PROJ\_V10.zip " contains the data model "109810580\_Datamodel\_Demo.txt" for this application example, which you can load into MindSphere (<u>Chapter 2.2.3</u>) and adapt to your application in just a few steps.

The model consists of the following components:

- 1. Aspect-Typ "Aspect\_RTU\_HowTo"
  - Create aspect type
  - Define variables
- 2. Asset type "Asset\_RTU\_HowTo"
  - Create asset type
  - Add aspect type
- 3. Asset "Client-ID"
  - Add asset type
  - Instantiate model
- 4. Mapping of the variables of the data source (SIMATIC RTU3041C) to the defined variables



Note

You can also create your own data model and load it into MindSphere.

Note

More information about creating your own data model can be found at the following link:

https://developer.mindsphere.io/howto/howto-create-data-model-mqtt-agent.html

3.

Before you load the supplied data model into MindSphere, adapt it to your application:

- 1. Open the attached file "109810580\_Datamodel\_Demo.txt".
- 2. Replace "tenant" with your own MindSphere tenant.

```
"id": "7268fff79745s76555453h78e12684314c2dd83a280",
"data": {
    "externalId": "HowTo_Model1_RTU",
                                                               "typeModel":
"aspectTy
"id":
                                                                                                                                                               "tenant.Ho
                                                                                                               "id". "tenant.Ho [ro",
"name '- "Ascart. [U] HowTo",
"category": "static",
"scope": "private",
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"name issetCase
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         "parentRefere Lotat" "monet"
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                                                                                                                      parentKerere <u>Calation Property</u>
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### 3.2 Customize included instance demo

The provided archive "109810580\_RTU3041C\_MQTT\_PROJ\_V10.zip " contains the instantiation of the data model "109810580\_Instance\_Demo.txt" for this application example.

Before you load the provided instance demo into MindSphere, adapt it to your application:

- 1. Open the supplied file "109810580\_Instance\_Demo.txt".
- 2. Adjust the "Id". Enter the "Id" of your data model in this field.
- 3. Adjust the "modelExternalId". Enter the name (externalId) of your data model in this field.
- 4. Enter the name of the created aspect type in the "name" field.
- 5. Enter the AspectId and the name of the created aspect type in the "value" field.



Note

The data entered in the instance demo must match the corresponding data in the data model.

# 4 Appendix

### 4.1 Service and support

#### **Industry Online Support**

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

support.industry.siemens.com

#### **Technical Support**

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.

Please send queries to Technical Support via Web form:

support.industry.siemens.com/cs/my/src

#### SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

siemens.com/sitrain

#### Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

#### Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android: support.industry.siemens.com/cs/ww/en/sc/2067

## 4.2 Industry Mall



The Siemens Industry Mall is the platform on which the entire siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing processing – directly and independently of time and location: <u>mall.industry.siemens.com</u>

## 4.3 Application support

Siemens AG Digital Factory Division Factory Automation Production Machines DF FA PMA APC Frauenauracher Str. 80 91056 Erlangen, Germany

mailto: tech.team.motioncontrol@siemens.com

# 4.4 Links and literature

Table 4-1

No.	Торіс		
\1\	Siemens Industry Online Support https://support.industry.siemens.com		
\2\	Link to the article page of the application example https://support.industry.siemens.com/cs/ww/en/view/109810580		
\3\	SIMATIC: TeleControl - RTU - RTU3030C/RTU30x1C https://support.industry.siemens.com/cs/ww/en/view/109750942		
\4\	Sales and delivery release Firmware V5.0 for SIMATIC RTU3000C with cloud connection incl. download https://support.industry.siemens.com/cs/ww/en/view/109810215		
\5\	SITRANS LR120, HART https://support.industry.siemens.com/cs/ww/en/view/109776478		
\6\	MindSphere MindConnect MQTT Broker https://developer.mindsphere.io/concepts/concept-mindsphere-mqtt-broker.html		
\7\	Managing CA Certificates using UI https://developer.mindsphere.io/howto/howto-managing-ca-certificates.html		
\8\	Creating Data Model from MQTT Agent https://developer.mindsphere.io/howto/howto-create-data-model-mqtt-agent.html		

# 4.5 Change documentation

Table 4-2

	Version	Date	Change
	V1.0	08/2022	First version