# Luna 2.6: Manual

Date: 11/06/2018

# Table of Contents

## Luna package overview

Luna comes with 3 main components:

- Luna console application (Luna.exe)
- Luna service application (Luna.Service.exe)
- Luna service installer application (Luna.Setup.exe)

# 1 Luna console application

The Luna.exe starts Luna using the configuration files located in the [Luna main installation folder]\configs\

Several instances of Luna.exe may be started simultaneously but, all the instances use the same configurations.

Use Luna.exe to test the configuration as well as network connectivity.

# 2 Luna service application

Luna.Service.exe is used to run Luna as service.

When starting the Luna.Service.exe directly, a Luna instance is starting which behaves similar to the Luna console application.

To install the Luna service, use the Luna.Setup.exe service installer application.

It is recommended to not start the Luna.Service.exe manually but use the Windows service facilities to start Luna as a service, as described in chapter "**Luna service installer**".

# 3 Luna service installer application

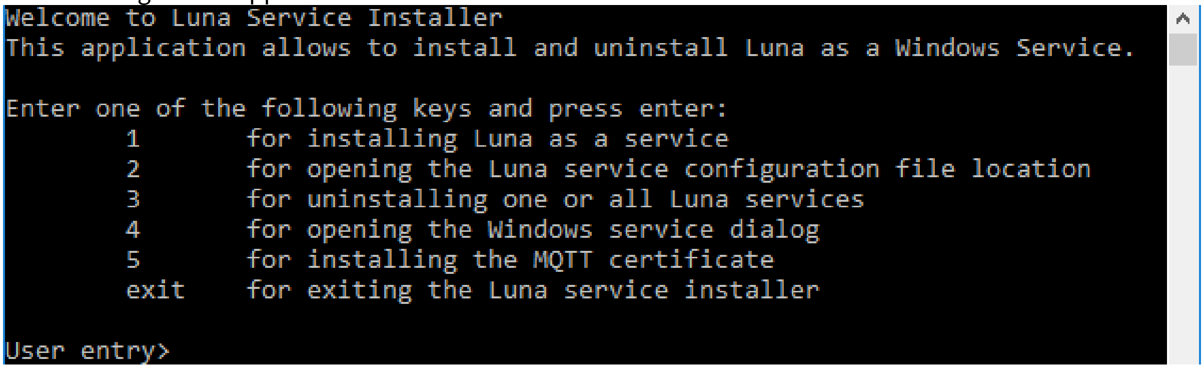
Luna 2.5 introduces the Senseforce Luna service installer application. The following features are provided by the Luna service installer:

- Install several Luna services (by using a single Luna main installation)
- Manage the configurations of several Luna services
- Uninstall one/all Luna services
- Open the Windows service dialog
- Installation of the Senseforce MQTT certificate

# 4 **Luna service installer**

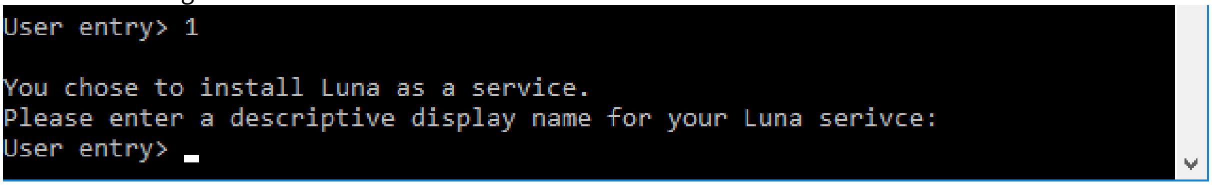
## 4.1 Installing a Luna service

1. Start the Luna.Setup.exe as administrator (starting as administrator is mandatory. Right-Click on Luna.Setup.exe and choose "Run as administrator")
   The following screen appears:



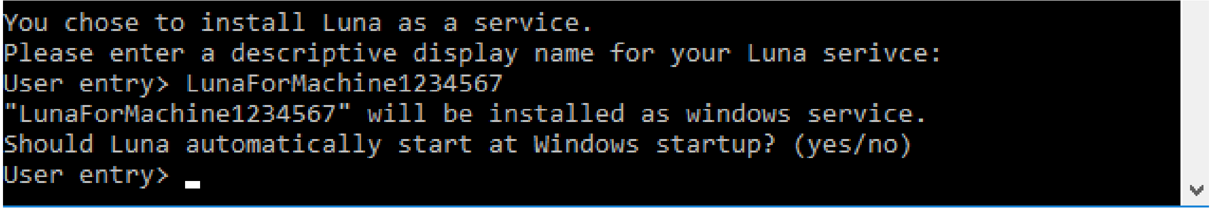
```
Welcome to Luna Service Installer
This application allows to install and uninstall Luna as a Windows Service.

Enter one of the following keys and press enter:
        1       for installing Luna as a service
        2       for opening the Luna service configuration file location
        3       for uninstalling one or all Luna services
        4       for opening the Windows service dialog
        5       for installing the MQTT certificate
        exit    for exiting the Luna service installer

User entry>
```

2. Press "1" (without "") and press Enter to confirm your selection.
   The screen changes to:



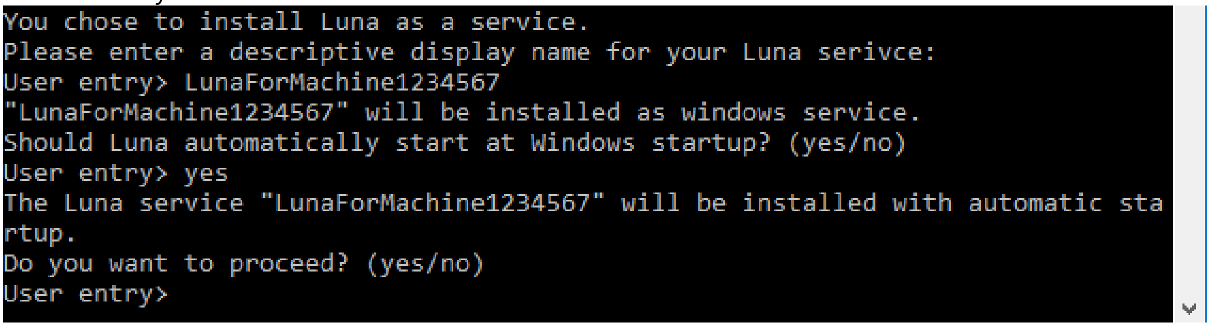
```
User entry> 1

You chose to install Luna as a service.
Please enter a descriptive display name for your Luna serivce:
User entry> _
```

3. Enter a descriptive service name. To ease up the subsequent configuration for the Luna services, please choose service names which uniquely identify what the task of this Luna service is.
   Example: LunaForMachine1234567
   Press enter to confirm your service name entry.



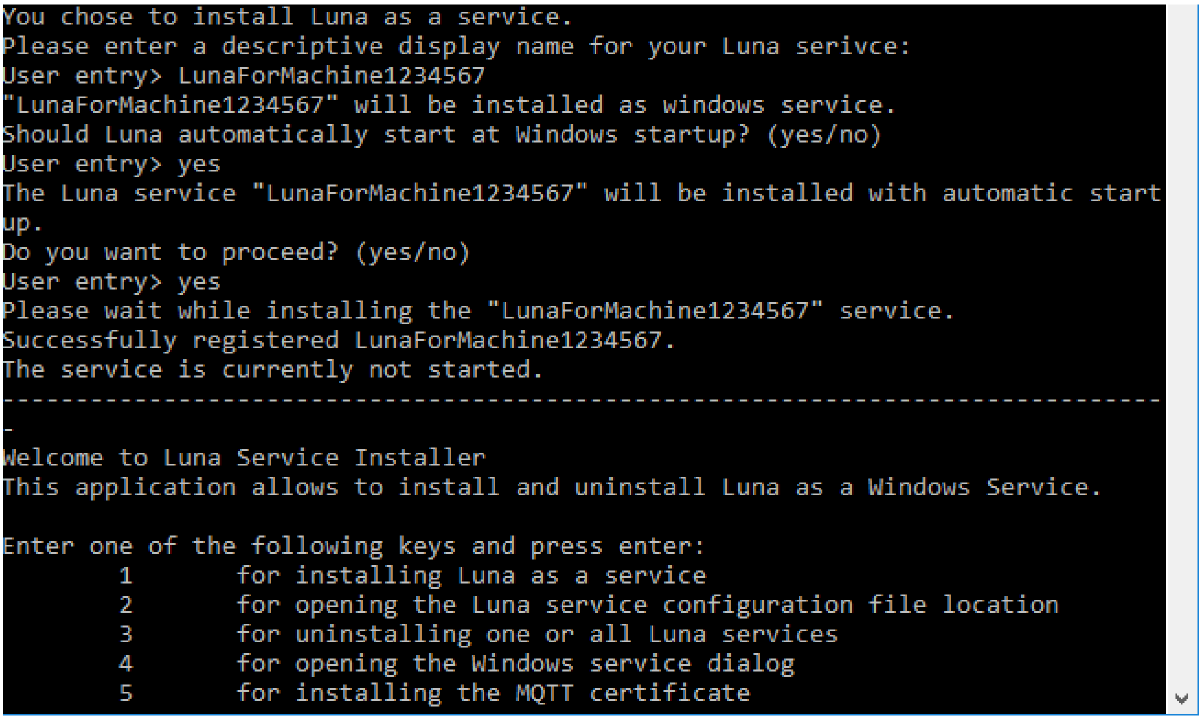
```
You chose to install Luna as a service.
Please enter a descriptive display name for your Luna serivce:
User entry> LunaForMachine1234567
"LunaForMachine1234567" will be installed as windows service.
Should Luna automatically start at Windows startup? (yes/no)
User entry> _
```

4. The service installer asks you whether the Luna service should be started automatically at Windows startup (recommended option: yes)
   Enter yes or no and confirm with enter.
5. A final summary of your service settings is presented, by asking to finally confirm your selection. Press yes and confirm by enter to start the installation.



```
You chose to install Luna as a service.
Please enter a descriptive display name for your Luna serivce:
User entry> LunaForMachine1234567
"LunaForMachine1234567" will be installed as windows service.
Should Luna automatically start at Windows startup? (yes/no)
User entry> yes
The Luna service "LunaForMachine1234567" will be installed with automatic sta
rtup.
Do you want to proceed? (yes/no)
User entry>
```

6. After installation, the installation results are presented. The service installer automatically navigates back to the main menu after installation.

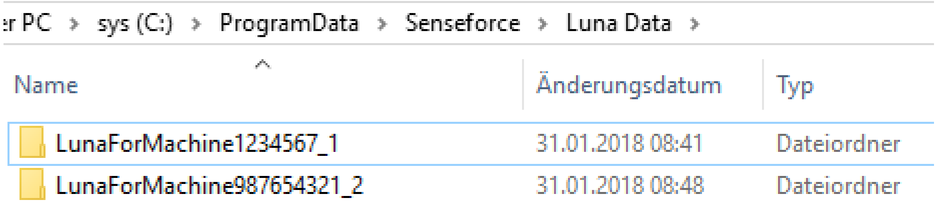


```
You chose to install Luna as a service.
Please enter a descriptive display name for your Luna serivce:
User entry> LunaForMachine1234567
"LunaForMachine1234567" will be installed as windows service.
Should Luna automatically start at Windows startup? (yes/no)
User entry> yes
The Luna service "LunaForMachine1234567" will be installed with automatic start
up.
Do you want to proceed? (yes/no)
User entry> yes
Please wait while installing the "LunaForMachine1234567" service.
Successfully registered LunaForMachine1234567.
The service is currently not started.
-------------------------------------------------------------------------------
-
Welcome to Luna Service Installer
This application allows to install and uninstall Luna as a Windows Service.

Enter one of the following keys and press enter:
        1       for installing Luna as a service
        2       for opening the Luna service configuration file location
        3       for uninstalling one or all Luna services
        4       for opening the Windows service dialog
        5       for installing the MQTT certificate
```

Please note, that the service is not automatically started after installation.

When installing a Luna service, the service is registered in the Windows service facilities. Additionally, a Luna configuration environment is created for every Luna service installed.
The Luna service configuration folders are placed in C:\ProgramDate\Senseforce\Luna Data\[YourServiceName_ID] (Please note, that the ID is automatically generated).

For every installed service a separate folder is created.



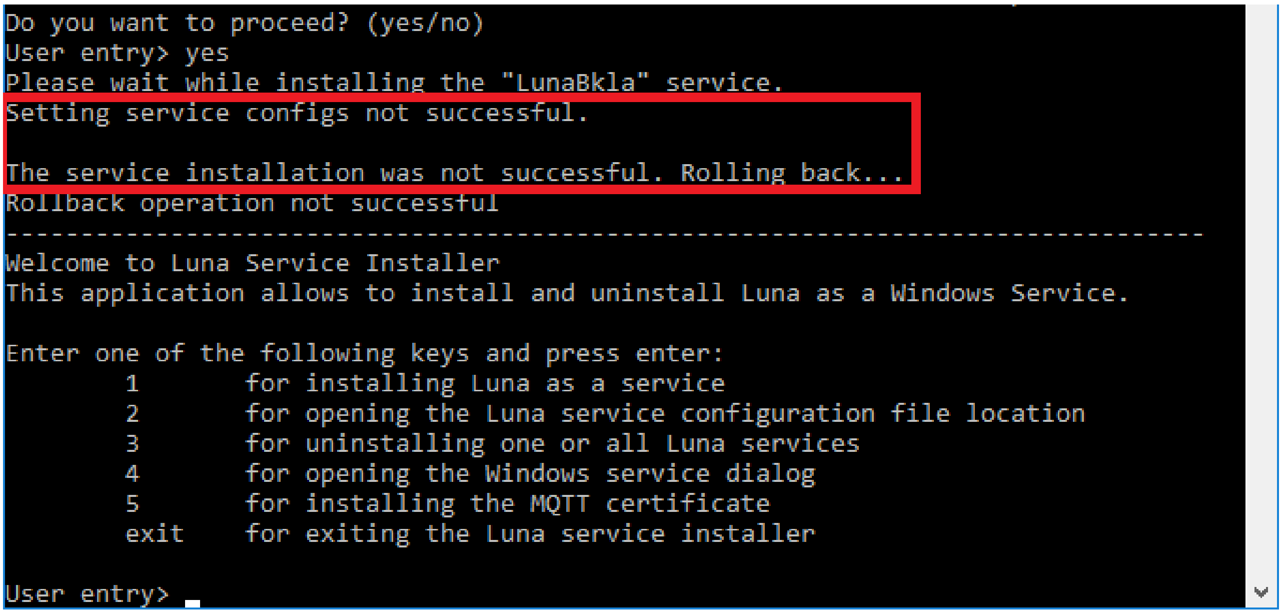
| Name | Änderungsdatum | Typ |
|---|---|---|
| LunaForMachine1234567_1 | 31.01.2018 08:41 | Dateiordner |
| LunaForMachine987654321_2 | 31.01.2018 08:48 | Dateiordner |

A default set of configurations is automatically placed in the configuration folder.

Do not rename the folders, as the folder names are critical to uniquely identify the configurations for the Luna services

## 4.1.1 Troubleshooting

If the service installation fails, the following information is presented:



```
Do you want to proceed? (yes/no)
User entry> yes
Please wait while installing the "LunaBkla" service.
Setting service configs not successful.

The service installation was not successful. Rolling back...
Rollback operation not successful
--------------------------------------------------------------------------------
Welcome to Luna Service Installer
This application allows to install and uninstall Luna as a Windows Service.

Enter one of the following keys and press enter:
        1       for installing Luna as a service
        2       for opening the Luna service configuration file location
        3       for uninstalling one or all Luna services
        4       for opening the Windows service dialog
        5       for installing the MQTT certificate
        exit    for exiting the Luna service installer

User entry>
```

The single-most reason for not succeeding in installing Luna as service is not starting the Luna.Setup.exe as administrator.

## 4.2 Open the Luna service configuration file locations

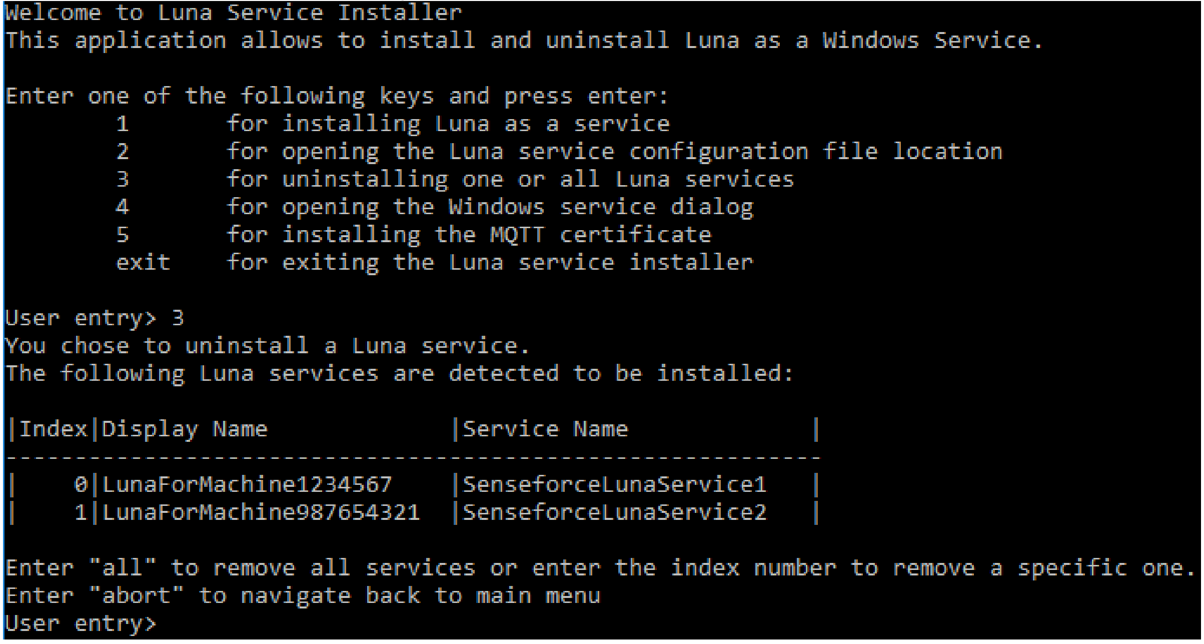
To easily manage the Luna service configurations, the Luna service installer application provides an easy method to locate the configuration files for the Luna services.

Simply press "2" (without "") and confirm with enter in the Luna service installer main menu. A Windows Explorer Window is automatically opened, pointing to the Luna service configuration folders.

## 4.3 Uninstalling a Luna service

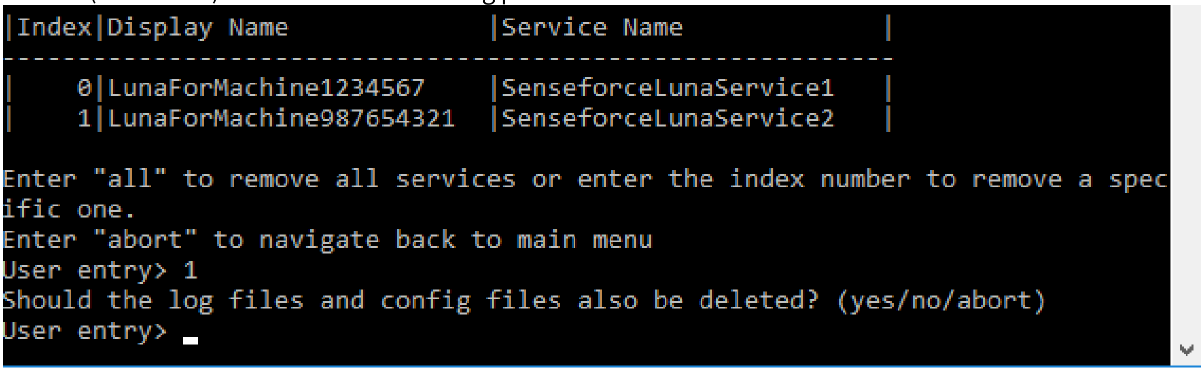
1. To uninstall a previously installed Luna service, press "3" (without "") and confirm with enter in the Luna service installer main menu.
   (Please note that the Luna service installer application needs to be started with administrator privileges).

A list of all installed Luna services is presented.



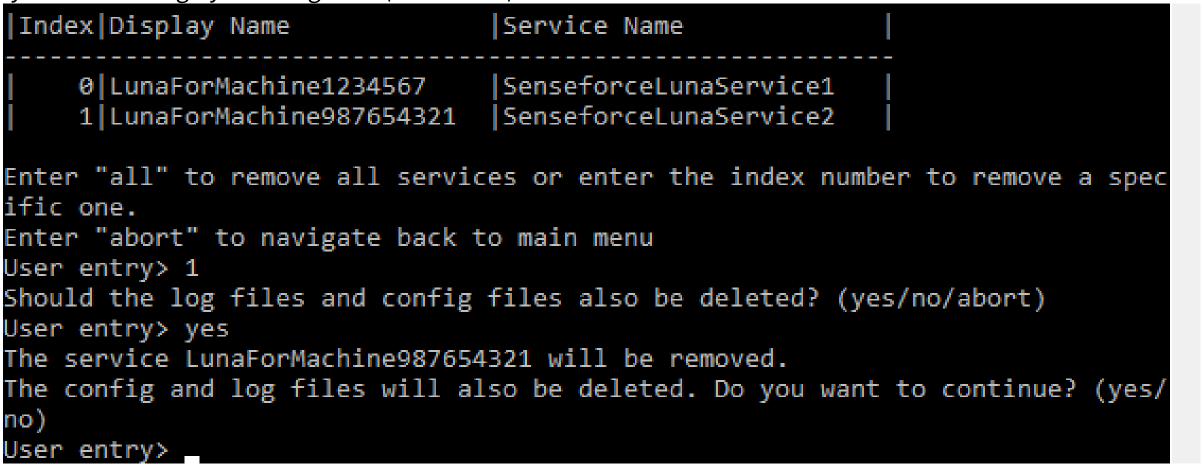
```
Welcome to Luna Service Installer
This application allows to install and uninstall Luna as a Windows Service.

Enter one of the following keys and press enter:
        1       for installing Luna as a service
        2       for opening the Luna service configuration file location
        3       for uninstalling one or all Luna services
        4       for opening the Windows service dialog
        5       for installing the MQTT certificate
        exit    for exiting the Luna service installer

User entry> 3
You chose to uninstall a Luna service.
The following Luna services are detected to be installed:

|Index|Display Name             |Service Name            |
-----------------------------------------------------------
|    0|LunaForMachine1234567    |SenseforceLunaService1   |
|    1|LunaForMachine987654321  |SenseforceLunaService2   |

Enter "all" to remove all services or enter the index number to remove a specific one.
Enter "abort" to navigate back to main menu
User entry>
```

2. Enter "all" (without "") and press enter to confirm uninstalling all the listed Luna services. If only one of the listed services should be removed, press the Index-number of the service and confirm with enter.
    a. Alternatively enter "abort" (without "") to navigate back to main menu
3. Next step is to select whether to also delete the configuration and log files of the selected service. Enter "yes" (without "") to also delete these files. Enter "no" (without "") to not delete these files. Enter "abort" (without "") to abort the uninstalling process.



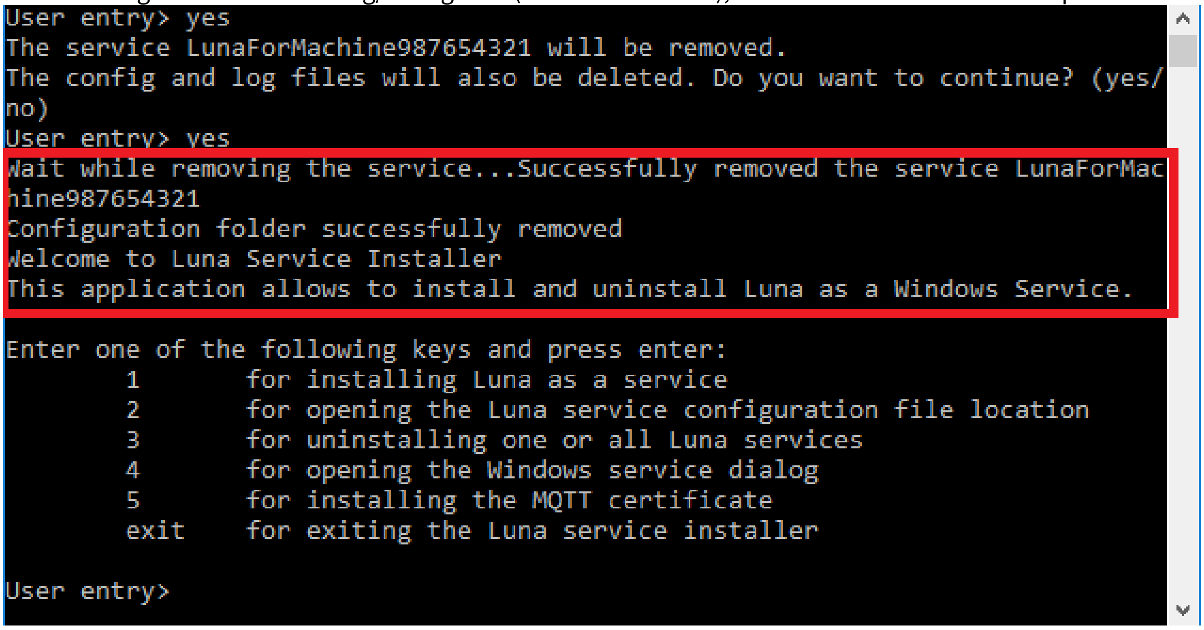
```
|Index|Display Name             |Service Name            |
-----------------------------------------------------------
|    0|LunaForMachine1234567    |SenseforceLunaService1   |
|    1|LunaForMachine987654321  |SenseforceLunaService2   |

Enter "all" to remove all services or enter the index number to remove a spec
ific one.
Enter "abort" to navigate back to main menu
User entry> 1
Should the log files and config files also be deleted? (yes/no/abort)
User entry> _
```

4. Finally, your selections are summarised and you are asked to finally confirm the uninstallation by entering "yes" or aborting by entering "no" (without ""):



```
|Index|Display Name              |Service Name           |
-----------------------------------------------------------
|    0|LunaForMachine1234567     |SenseforceLunaService1  |
|    1|LunaForMachine987654321   |SenseforceLunaService2  |

Enter "all" to remove all services or enter the index number to remove a spec
ific one.
Enter "abort" to navigate back to main menu
User entry> 1
Should the log files and config files also be deleted? (yes/no/abort)
User entry> yes
The service LunaForMachine987654321 will be removed.
The config and log files will also be deleted. Do you want to continue? (yes/
no)
User entry>
```

5. After deleting the services and log/config-files (if chosen to do so), the uninstallation results are presented:



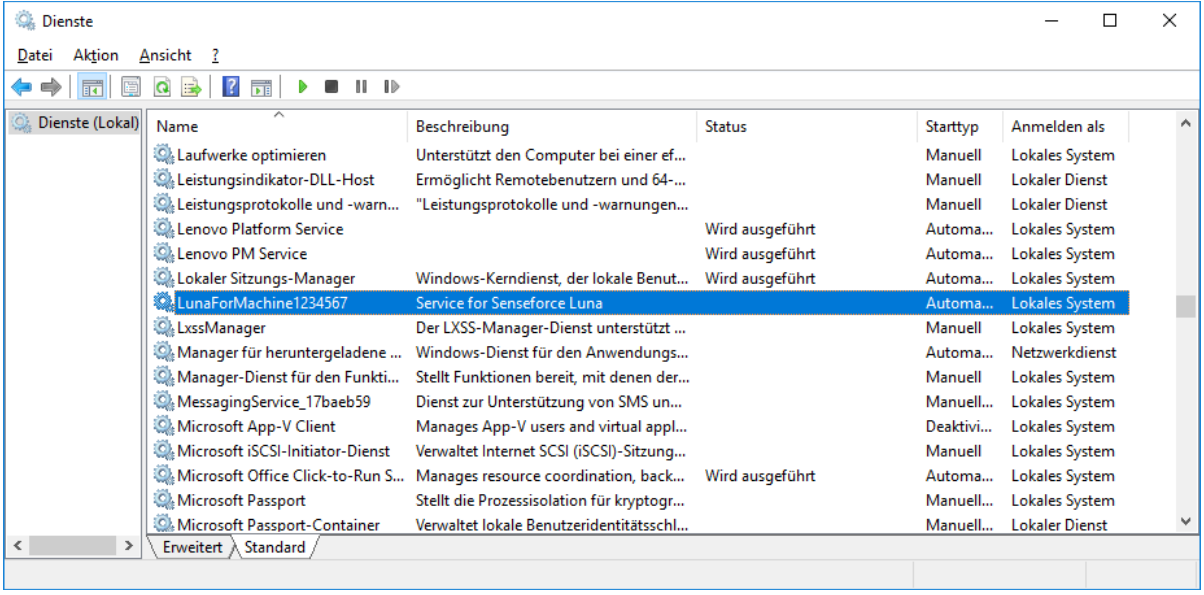
```
User entry> yes
The service LunaForMachine987654321 will be removed.
The config and log files will also be deleted. Do you want to continue? (yes/
no)
User entry> yes
Wait while removing the service...Successfully removed the service LunaForMac
hine987654321
Configuration folder successfully removed
Welcome to Luna Service Installer
This application allows to install and uninstall Luna as a Windows Service.

Enter one of the following keys and press enter:
        1       for installing Luna as a service
        2       for opening the Luna service configuration file location
        3       for uninstalling one or all Luna services
        4       for opening the Windows service dialog
        5       for installing the MQTT certificate
        exit    for exiting the Luna service installer

User entry>
```

**Please note, that uninstalling the Luna services may take up to 60 seconds per service.**

## 4.4 Starting/Stopping an installed Luna service

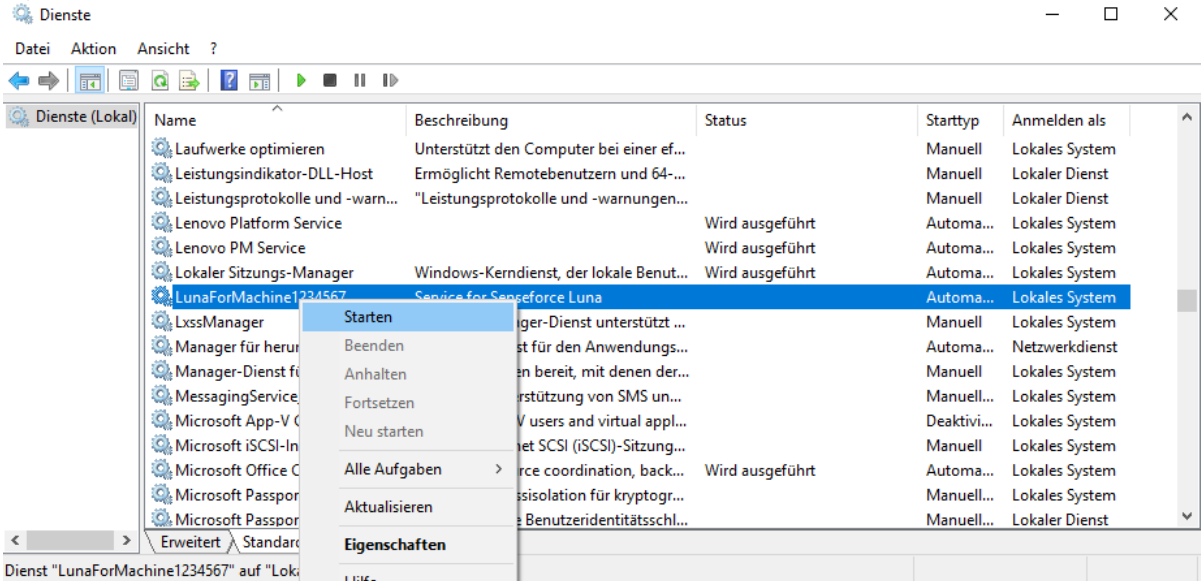
1. To start or stop a Luna service open the Windows service environment by entering "4" (without "") in the Luna service installer application and confirming with enter.

The Windows service environment is opened.



| Name | Beschreibung | Status | Starttyp | Anmelden als |
|---|---|---|---|---|
| Laufwerke optimieren | Unterstützt den Computer bei einer ef... | | Manuell | Lokales System |
| Leistungsindikator-DLL-Host | Ermöglicht Remotebenutzern und 64-... | | Manuell | Lokaler Dienst |
| Leistungsprotokolle und -warn... | "Leistungsprotokolle und -warnungen... | | Manuell | Lokaler Dienst |
| Lenovo Platform Service | | Wird ausgeführt | Automa... | Lokales System |
| Lenovo PM Service | | Wird ausgeführt | Automa... | Lokales System |
| Lokaler Sitzungs-Manager | Windows-Kerndienst, der lokale Benut... | Wird ausgeführt | Automa... | Lokales System |
| LunaForMachine1234567 | Service for Senseforce Luna | | Automa... | Lokales System |
| LxssManager | Der LXSS-Manager-Dienst unterstützt ... | | Manuell | Lokales System |
| Manager für heruntergeladene ... | Windows-Dienst für den Anwendungs... | | Automa... | Netzwerkdienst |
| Manager-Dienst für den Funkti... | Stellt Funktionen bereit, mit denen der... | | Manuell | Lokales System |
| MessagingService_17baeb59 | Dienst zur Unterstützung von SMS un... | | Manuell... | Lokales System |
| Microsoft App-V Client | Manages App-V users and virtual appl... | | Deaktivi... | Lokales System |
| Microsoft iSCSI-Initiator-Dienst | Verwaltet Internet SCSI (iSCSI)-Sitzung... | | Manuell | Lokales System |
| Microsoft Office Click-to-Run S... | Manages resource coordination, back... | Wird ausgeführt | Automa... | Lokales System |
| Microsoft Passport | Stellt die Prozessisolation für kryptogr... | | Manuell... | Lokales System |
| Microsoft Passport-Container | Verwaltet lokale Benutzeridentitätsschl... | | Manuell... | Lokaler Dienst |

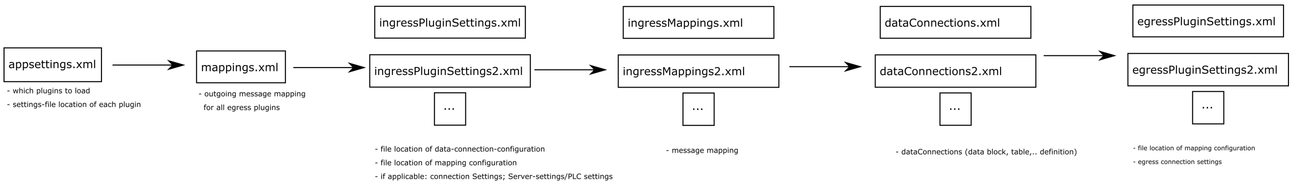
2. Navigate the service which should be started/stopped.
3. Right-click on the service and select "Start" or "Stop"



| Name | Beschreibung | Status | Starttyp | Anmelden als |
|---|---|---|---|---|
| Laufwerke optimieren | Unterstützt den Computer bei einer ef... | | Manuell | Lokales System |
| Leistungsindikator-DLL-Host | Ermöglicht Remotebenutzern und 64-... | | Manuell | Lokaler Dienst |
| Leistungsprotokolle und -warn... | "Leistungsprotokolle und -warnungen... | | Manuell | Lokaler Dienst |
| Lenovo Platform Service | | Wird ausgeführt | Automa... | Lokales System |
| Lenovo PM Service | | Wird ausgeführt | Automa... | Lokales System |
| Lokaler Sitzungs-Manager | Windows-Kerndienst, der lokale Benut... | Wird ausgeführt | Automa... | Lokales System |
| LunaForMachine1234567 | Service for Senseforce Luna | | Automa... | Lokales System |
| LxssManager | ger-Dienst unterstützt ... | | Manuell | Lokales System |
| Manager für herur | t für den Anwendungs... | | Automa... | Netzwerkdienst |
| Manager-Dienst fi | n bereit, mit denen der... | | Manuell | Lokales System |
| MessagingService | rstützung von SMS un... | | Manuell... | Lokales System |
| Microsoft App-V ( | V users and virtual appl... | | Deaktivi... | Lokales System |
| Microsoft iSCSI-In | et SCSI (iSCSI)-Sitzung... | | Manuell | Lokales System |
| Microsoft Office C | rce coordination, back... | Wird ausgeführt | Automa... | Lokales System |
| Microsoft Passpor | sisolation für kryptogr... | | Manuell... | Lokales System |
| Microsoft Passpor | Benutzeridentitätsschl... | | Manuell... | Lokaler Dienst |

Dienst "LunaForMachine1234567" auf "Lok

# 5 **Configuration Workflow**


appsettings.xml
- which plugins to load
- settings-file location of each plugin
mappings.xml
- outgoing message mapping
for all egress plugins
ingressPluginSettings.xml
ingressPluginSettings2.xml
...
- file location of data-connection-configuration
- file location of mapping configuration
- if applicable: connection Settings; Server-settings/PLC settings
ingressMappings.xml
ingressMappings2.xml
...
- message mapping
dataConnections.xml
dataConnections2.xml
...
- dataConnections (data block, table,.. definition)
egressPluginSettings.xml
egressPluginSettings2.xml
...
- file location of mapping configuration
- egress connection settings

**The configuration files are located either:**

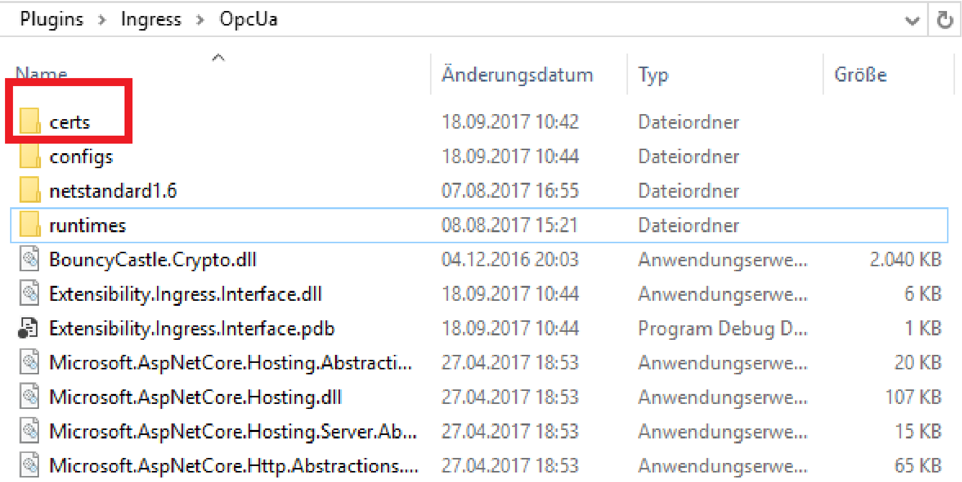
- In the Luna main installation folder for the Luna console application, or
- In the Luna service configuration folder, as described in chapter **"Luna service installer"**

# 6 Ingress Plugin Configuration

## 6.1 OPC UA Plugin

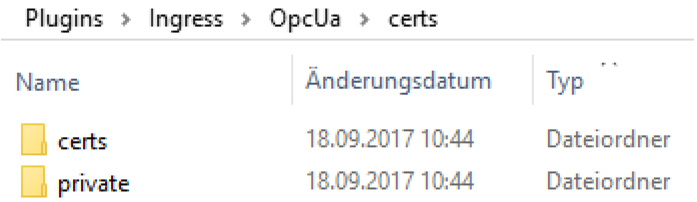
### 6.1.1 Certificate configuration

1. Make sure that the OPC UA Ingress Plugin contains the application certificate in the plugins root folder.



Plugins › Ingress › OpcUa

| Name | Änderungsdatum | Typ | Größe |
|---|---|---|---|
| certs | 18.09.2017 10:42 | Dateiordner | |
| configs | 18.09.2017 10:44 | Dateiordner | |
| netstandard1.6 | 07.08.2017 16:55 | Dateiordner | |
| runtimes | 08.08.2017 15:21 | Dateiordner | |
| BouncyCastle.Crypto.dll | 04.12.2016 20:03 | Anwendungserwe... | 2.040 KB |
| Extensibility.Ingress.Interface.dll | 18.09.2017 10:44 | Anwendungserwe... | 6 KB |
| Extensibility.Ingress.Interface.pdb | 18.09.2017 10:44 | Program Debug D... | 1 KB |
| Microsoft.AspNetCore.Hosting.Abstracti... | 27.04.2017 18:53 | Anwendungserwe... | 20 KB |
| Microsoft.AspNetCore.Hosting.dll | 27.04.2017 18:53 | Anwendungserwe... | 107 KB |
| Microsoft.AspNetCore.Hosting.Server.Ab... | 27.04.2017 18:53 | Anwendungserwe... | 15 KB |
| Microsoft.AspNetCore.Http.Abstractions.... | 27.04.2017 18:53 | Anwendungserwe... | 65 KB |



Plugins › Ingress › OpcUa › certs

| Name | Änderungsdatum | Typ |
|---|---|---|
| certs | 18.09.2017 10:44 | Dateiordner |
| private | 18.09.2017 10:44 | Dateiordner |

→

2. Copy public Senseforce Luna certificate (the public .der -file in the certs/certs - folder) to the OPC UA Server's trusted certificate folder (→ do not distribute the private .pxf - file!)
    a. Default OPC UA server trusted certificate folder is in CommonApplicationData/OPC Foundation/CertificateStores/UA Applications/certs (**on the OPC UA server computer**)
        i. CommonApplicationData for Windows: C:/ProgramData
        ii. CommonApplicationData for (most?) unix: /usr/share (or the assemblies runtime location)

3. Copy the the OPC UA Server certificate to the Luna OPC UA trusted certificate folder. (Configured in the Luna opcapplicationconfiguration.xml file)
    a. Default folder: CommonApplicationData/OPC Foundation/CertificateStores/UA Applications/certs
    b. Default behavior to get the server certificate:
        i. Start Luna with OPC UA Plugin (and therefore try to connect to the server)
        ii. Luna will automatically place the server certificate in the rejected certificates folder (configured in the Luna opcapplicationconfiguration.xml file - default: CommonApplicationData/OPC Foundation/CertificateStores/RejectedCertificates/certs).
        iii. Manually copy the server certificate from Rejected to Trusted folder (of course only when you trust the certificate).

### 6.1.2 Configuration overview:

The following files are located in the OPC-UA plugin's config folder (**\configurations\InputPlugins\OPCUA**)

- DataMappings.xml (configures, how to build the messages from incoming opc data)
- opcapplicationconfiguration.xml (configures overall opc ua specific settings. Default settings are good for most applications)
- opcsubscriptions.xml (configures the opc ua subscriptions)
- OpcUaSettings.xml (basic plugin settings)

## DataMappings.xml

The default configuration is appropriate for most applications. Make sure to note the "IngressKey"-setting (default: OPCUA). This key is needed for the outgoing message mapping configuration.

The following variable substituation settings are available:

$(Timestamp) → timestmap reported by OPC UA server

$(DataType) → data type of the OPC UA variable

$(StartNodeId) → start node identifier of the OPC UA variable

$(SubscriptionName) → name of the OPC UA subscription

$(DisplayName) → display name of the OPC UA variable

$(RelativePath) → relative OPC UA path of the OPC UA variable

$(StatusCode) → status code of the OPC UA variable

$(Data) → data value of the OPC UA variable

## opcapplicationconfiguration.xml

Default settings are good for most (all) applications. Only for (very) experienced OPC UA experts.

## opcsubscriptions.xml

Use the Senseforce OPC UA Server Browser[1] to browse your OPC UA server for data to subscribe and save the subscription as "`opcsubscriptions.xml`" into the OPC UA plugin's `configs`-folder.

## OpcUaSettings.xml

All the default settings may be appropriate for most applications, except the "`EndpointUrl`".

- **EndpointUrl**: Set `EndpointUrl` to the OPC UA servers endpoint address.
- **VariableNameRegex**: Optional setting to create the variable name from OPC UA namespace. By default, the OPC UA displayname-setting is used to generate the variable name. If more information is needed, set this setting to a valid regular expression to create the variable name from the OPC UA "StartNodeId-Identifier".

If the OPC UA server requires Username and Password, set it by uncommenting the lines UserName and Password in the default configuration file (remove the "<!--" and " → ")

Also the file location and file name of the log-file as well as the other plugin-specific settings files can be specified here. Please note that the specified settings filenames and paths must correlate with the physical files.

[1] https://confluence.senseforce.io/display/SEN/Senseforce+OPC+UA+Server+Browser

### 6.1.3 Configuration remarks

1. **opcapplicationconfiguration.xml:** The ApplicationCertificate → StoreType has to be set to *Directory* (which is default) (basically also *X509Store* would be allowed but is currently not supported by Luna)

## 6.2 S7Net Plugin

### 6.2.1 Configuration manual:

The following files are located in the S7Net plugin's config folder (**\configurations\InputPlugins\S7Net**)

- DataDefinition.xml (configures the memory area and location of the S7 data to read)
- DataMappings.xml (configures, how to build the messages from incoming S7 data)
- S7Settings.xml (basic plugin settings)

#### S7Settings.xml

Set the `IpAdress, Rack, Slot` and CPU-type of the S7 PLC to read data from.
Supported CPU-types are: `S7200, S7300, S7400, S71200, S71500`

Also the file location and file name of the log-file as well as the other plugin-specific settings files can be specified here. Please note that the specified settings filenames and paths must correlate with the physical files.

**DataMappings.xml**

The default configuration is appropriate for most applications. Make sure to note the "IngressKey"-setting (default: S7Data). This key is needed for the outgoing message mapping configuration.

#### DataDefinition.xml

Configure the memory blocks to read. The following parameters must be configured:

- **S7MemoryType:** The type of memory to read. Allowed: DataBlock, Input, Output, Memory, Timer, Counter
- **S7MemoryAdress:** Address of the memory to read. If DB1 should be read: 1; If T45 should be read: 45
- **StartByteAdress:** Address of the first byte which should be read. If DB1.DBW200 should be read: 200

  **Example:** if Datablock `DB10.DBW200` should be read, set configuration as follows: S7MemoryType = DataBlock; S7MemoryAdress = 10; StartByteAdress = 200
  (Please note that there is a typo in the configuration at the moment: Adress has to be written with one d...)

- **PollingTimeMs:** Polling period in milliseconds. The above configured data is read every PollingTimeMs milliseconds.
- **DisplayName:** Name for the datablock. Is used only for internal purposes. If more than one Block is defined, this name must be unique to ensure functionality.
- **ByteCount:** Bytes to read starting from "StartByteAdress".

The following parameters are optional to configure

- **OnlySendChanges:** Specifies whether every read data is sent or only if the data has changed. Default value: false
- For each variable to read, the following parameters must be configured:
  - **Type**: Setup the variables type: Bit (1 Bit), Byte (1 Byte), Word (2 Byte), DWord (4 Byte), Int (2 Byte), DInt (4 Byte), Real (4 Byte), String

Consecutive Types of Bit are treated as stored in one byte. For example three bit in a row are treated as byte0.0, byte0.1, byte0.2; 9bit in a row are treated as byte0.0-byte0.7 and byte 1.0

    - **Name**: Define the variables name. Must be unique.
- The following Variable-Parameters are optional:
    - **DeltaToIgnore**: If "OnlySendChanges" is set to true, the "DeltaToIgnore" sets how much the value has to change to be labeled as a change (eg. 3599 means, that changes up to 3599 (incl.) are ignored) (Default: 0 (every recognible change is sent))
    - **IsTimestamp**: Specifies whether this variable should be used as timestamp. If no timestamp is defined, LUNA uses the system time when a read operation is finished for timestamping. (Default: false)
    - **OnlySendChanges**: Specifies that this single variable should differ from the global "OnlySendChanges"-setting. (Default: global OnlySendChanges setting)
    - **Filter**: Defines filter for the variable (eg. setting Comparer to "Greater" and Value to "30" only transmits this variable if it is > 30)
        - **Comparer**: Set the filter compare logic ("Greater", "Less", "Equal", "NotEqual", "GreaterOrEqual", "LessOrEqual") - note, the settings are case sensitive.
        - **Value**: setting the filter threshold
    - **MathOperations**: Allows to define simple mathematical calculations for the variables. A list of several operations may be defined. Please note, that the operations are applied from top to bottom.
        - **MathOperation:** Several operations may be defined inside an MathOperations block (note singular and plural)
            - **Operation**: Mathematical operation to select (Add, Subtract, Divide, Multiply, Power); Case sensitive!
            - **Value**: Numeric value applied to the operation

**Remark**: Counting all the specified bytes in the variable section must sum up to the "ByteCount"-setting. (Eg. Variables with following types: Bit, Bit, Bit, Byte, Byte, DWord = (1 (3 consecutive bit are in one byte) + 1 (Byte) + 1 (Byte) + 1 (as the next type is bigger than a byte and therefore must start at an even memory areay) + 4 (DWord) = 8

# 6.3 MSSQL Plugin

## 6.3.1 Configuration manual:

The following files are located in the MSSQL plugin's config folder (**\configurations\InputPlugins\SQL**)

- DataDefinition.xml (configures the tables and columns to read from an sql server)
- DataMappings.xml (configures, how to build the messages from incoming sql data)
- SqlSettings.xml (basic plugin settings)

### mssqlsettings.xml

Set the server's configuration:

- **ServerAddress**: Address of the sql server to connect
- **ConnectionTimeoutS**: Connection Timeout in seconds. Use at least 15s
- **Database**: Database-name to connect to
- **Security**: Valid values: true, false; If true, the current windows user is used for authentication, otherwise username and password must be granted
- **PacketSize**: May be varied between 512 and 32767; Default: 8192
- **Password**: Password for server connection
- **UserId**: Username for server connection

- **WorkstationId**: Some identifier which is used to identify the connection.

Also the file location and file name of the log-file as well as the other plugin-specific settings files can be specified here. Please note that the specified settings filenames and paths must correlate with the physical files.

## DataMappings.xml

The default configuration is appropriate for most applications. Make sure to note the "IngressKey"-setting (default: Table-Name which is specified in dataConnections.xml). This key is needed for the outgoing message mapping configuration.

## DataDefinition.xml

Configure the tables and columns to read.

The following global parameters must be configured:

- **Name**: Table to read
- **PollingTimeS**: Polling period in seconds. The configured sql query is executed every PollingTimeS seconds.
- **NumberToRead**: Number of rows to read within one polling interval
- **OrderDir**: Order direction: ASC (ascending) or DESC (descending)
- **OderBy**: Column used for ordering

The following global parameter is optional:

- **OnlySendChanges**: Specifies whether every read data is sent or only if the data has changed. Default value: false

The Columns-Section allows to specify which columns should be read and which filters should be active:
For each column, the following parameter is mandatory:

- **Name**: Name of column to read

For each column, the following parameter are optional:

- **IsTimestamp**: Specifies whether this variable should be used as timestamp. If no timestamp is defined, LUNA uses the system time when a read operation is finished for timestamping. (Default: false) If several columns are marked with IsTimestamp, the last defined column is used as global message timestamp.
- **IsLastReadId**: If set to true, this column is used to determine whether a row was already read. For example if column "Id" is used as lastReadId, the last read Id value is persisted in the PersistLastId-file (see below). The next reading attempt starts where the "Id"-column is greater than the persisted value.
  Only one lastReadId should be configured. If more columns are marked as lastReadId, only the first one is used for lastReadId-logic. DateTime and Int/Long-columns can be used for last read id definition.
  - Using timestamps as last read id: Using datetime-columns as last read id needs the column to be marked with the "IsTimestamp" - flag as well as with the "IsLastReadId"-flag. If several columns are marked with IsTimestamp, the last defined column is used as global message timestamp.
- **FilterOnly**: If set to true, the column is only used for filtering, but the values are not actually read.
- **Filter**: The filter specifies which rows should be selected for the reading process. The filter contains the following elements to configure:
  - **Condition**: Allowed values: OR, AND; All conditions which are set to AND must be met to read the row. One out of all conditions which are marked as OR must met to read the row.
  - **Operator**: Specifies the filter operator. Allowed: Equal, Greater,
    Less, GreaterOrEqual, LessOrEqual, NotEqual
  - **FilterName**: Specifies for what to filter.

  Filter example: Filter for column "Jippy": Condition = AND, Operator = Greater, FilterName = 13 → Only rows are selected which "Jippy"-values are greater than 13.
  For filters it is possible to define a "MandatoryCondition:

- **MandatoryCondition**: If a filter is marked with MandatoryCondition = true, this filter condition is used to determine UNTIL which rows the data should be read.
  Example: All conditions are met until row 8. This condition is set as mandatory condition. Therefore, rows 1 to 7 are read, but not 8, 9 and 10. If the mandatory condition is not set, row 1 to 7 and 9, 10 would be read.

  | Id | Col1 | Col2 | Col3 |
  |---|---|---|---|
  | 1 | condMet | condMet | condMet |
  | 2 | condMet | condMet | condMet |
  | 3 | condMet | condMet | condMet |
  | 4 | condMet | condMet | condMet |
  | 5 | condMet | condMet | condMet |
  | 6 | condMet | condMet | condMet |
  | 7 | condMet | condMet | condMet |
  | 8 | **condNotMet** | condMet | condMet |
  | 9 | condMet | condMet | condMet |
  | 10 | condMet | condMet | condMet |

- **MandatoryConditionSkipTimeMs**: Setting this element to a value greater 0 allows to skip the "MandatoryCondition", if the timestamp of the mandatory condition is less than (now - MandatoryConditionSkipTimeMs). Eg. setting this element to 86400000 (= 1 day) specifies, that if the mandatory condition is not met after one day, this line will be read no matter how "MandatoryCondition" is defined. Note, that the maximum value equals 2,147,483,647 = 24 days.

- **MathOperations**: Allows to define simple mathematical calculations for the variables. A list of several operations may be defined. Please note, that the operations are applied from top to bottom.
  - **MathOperation:** Several operations may be defined inside an MathOperations block (note singular and plural)
    - **Operation**: Mathematical operation to select (Add, Subtract, Divide, Multiply, Power); Case sensitive!
    - **Value**: Numeric value applied to the operation

## 6.4 Schilknecht REST Plugin

### 6.4.1 Configuration manual:

The following files are located in the S7Net plugin's config folder (**\configurations\InputPlugins\Rest_Schildknecht**)

- DataMappings.xml (configures, how to build the messages from incoming REST data)
- RestSettings.xml (basic plugin settings and definition of response message)

## 6.4.2 RestSettings.xml

The following settings should be configured to ensure plugin operation

- **Url**: Endpoint for REST call
- **Method**: Define the REST method. Allow: GET, POST, PUT, DELETE. Be aware, that each request is repeated periodically
- **PeriodSecs**: Period in which the REST request is repeated, in seconds
- **Username**
- **Password**
- **ResponseDefinitions**: define how the response message looks like. Please be aware, that the REST Schildknecht plugin assumes, the response is in JSON-array format; For each entry in the JSON-array, a ResponseDefinition must be defined. The below example demonstrates a response with three entries. A response may look like [[entry1, entry2, entry3], [entry1, entry2, entry3],....]
  - **DataType**: Select the datatype of the response entry: Allowed: Double, Integer, Long, Boolean, String, Timestamp
  - **OnlySendChanges**: Boolean flag which defines, whether only a changed value should be transmitted. (eg. reading1 was 81 and reading2 was also 81 results in only one transmission; if the next reading equals to 82, this value is transmitted again)
  - **TimestampFormat**: If DataType Timestamp is used and the timestamp format is not either in unix milliseconds or in standardized teimstamp format ("2018-01-01 10:21:12.234"), define the timestamp format
  - **Name**: Define the name of the response entry. Used for message creation
  - **IsLastReadId**: If IsLastReadId is set to true, this entry is used, to determine, which was the last received message. Always the last received entry is persisted on file system and is used to determine, how the next REST request is assembled, in terms of window definition
  - **PersistLastReadId**: Define FileName and FilePath of the file where the last read id is persisted. Make sure to provide read/write permissions
  - **Filter**: Defines filter for the variable (eg. setting Comparer to "Greater" and Value to "30" only transmits this variable if it is > 30)
    - **Comparer**: Set the filter compare logic ("Greater", "Less", "Equal", "NotEqual", "GreaterOrEqual", "LessOrEqual") - note, the settings are case sensitive.
    - **Value**: setting the filter threshold
  - **MathOperations**: Allows to define simple mathematical calculations for the variables. A list of several operations may be defined. Please note, that the operations are applied from top to bottom.
    - **MathOperation:** Several operations may be defined inside an MathOperations block (note singular and plural)
      - **Operation**: Mathematical operation to select (Add, Subtract, Divide, Multiply, Power); Case sensitive!
      - **Value**: Numeric value applied to the operation
- **Selects**: Define the "Select"-section of the query-string
  - **Select**: For every select-statement add a select xml tag. (Eg. if your select-statement should look like "select:["ch1", "ch2"]", enter <selects><select>ch1</select><select>ch2</select></selects>
- **UntilMax**: Define the maximum "until"-string used in the querystring (eg. if you want to read at must until 22nd of August 2018, chose <UntilMax>20180822</UntilMax>

Also the file location and file name of the log-file as well as the other plugin-specific settings files can be specified here. Please note that the specified settings filenames and paths must correlate with the physical files.

DataMappings.xml

The default configuration is appropriate for most applications. Make sure to note the "IngressKey"-setting (default: RestData). This key is needed for the outgoing message mapping configuration.

# 7 Egress Plugin Configuration

## 7.1 Mqtt Plugin

### 7.1.1 Configuration manual

The following file is located in the Mqtt plugin's config folder (**\configurations\OutputPlugins\Mqtt**)

- MqttSettings.xml (basic plugin settings)

The following parameters must be configured (the other parameters in configuration should stay default):

- **Username**: username for connection to Senseforce Mqtt broker
- **Password**: password for connection to Senseforce Mqtt broker
- **Topic**: the mqtt topic the messages should be sent to. Default Senseforce format: tenant/machine. Do not add further topic-levels (eg. tenant/machine/newlevel is prohibited). Also do not add compression information to the topic. Compression is handled automatically.
- **Compression**: select either `LZ4` or `Disabled`. `LZ4` enables compression for the mqtt messages.
- **MaxReconnectBuffer**: Defines the maximum number of data which are cached in case of connetion loss. At the moment, new incoming messages are thrown away if message buffer is full and connection not available. (Default is appropriate)
- **MaxInflightBuffer**: Defines how many messages may be stored internally. Theoretically, a total number of "MaxReconnectBuffer" + "MaxInflightBuffer" may be stored in memory.  (Default is appropriate)
- **NumberOfMessagesToCombine** and **MessageCombineCounter**: Messages arriving from ingress plugins are batched until the NumberOfMessagesToCombine is reached or the MessageCombineCounterMs are elapsed. Then they are sent.
- **PersistMessagesOnFileSystem**: Defines, whether incoming messages should be written to the hard disk, if the MQTT-connection is interrupted.
- **PersistencePath**: Path to persist the incoming messages. Also used, to persist the MQTT-id which is used internally for reconnect handling. Make sure, to allow read operations to the set path.
- **EnableServerCertAuth**: If set to true, Luna evaluates the server-side MQTT certificate and compares it with the locally stored certificate. If Luna trusts the server certificate, the connection is established, otherwise not. Set this setting to false, if you want to connect with brokers other then the Senseforce broker.

### 7.1.2 Certificate configuration (→ Certificates are handled automatically for Luna 2.5 and newer. This step is deprecated)

To allow secure connection to Senseforce it is required to install the Senseforce MQTT certificate on your computer (local computer, Trusted Root Authorities certificate store).

Use the Luna service installer application to install the certificate as described in chapter **"Luna service installer".**

# 8 **Core configuration**

The following files are used to configure the main application

- appsettings.xml (location: top config folder)
- EventDefinition.xml (location: **\configurations**)

## 8.1 Configuration manual

### 8.1.1 appsettings.xml

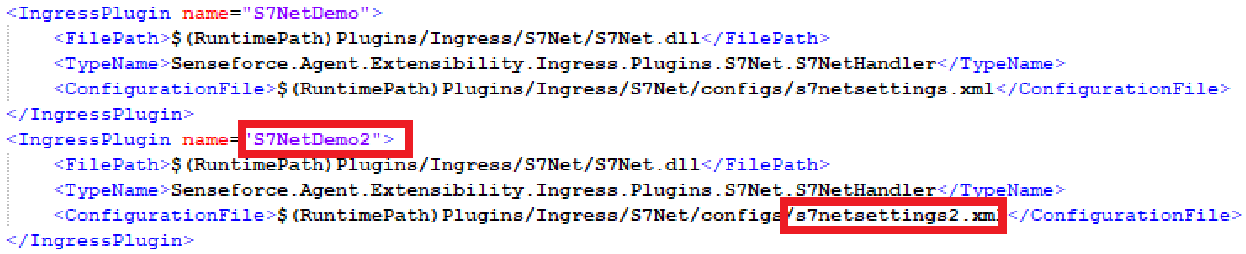
Allows to configure the plugins to load and whether or not the offline mode should be initialized.

**Mode**: Choose either **`Live`** or **`Offline`**

- **Live:** The default Luna mode. In live mode, the data are collected via the configured Ingress Plugins and are sent via Egress Plugin (mqtt-plugin).
- **Offline:** In offline mode, the data are read via Ingress Plugins, but the data are not sent via Egress Plugin. This mode may be used during first installation of Luna to check whether the data connections are configured appropriately.
  If **`Debug`** is chosen as LogLevel for the Mqtt-Plugin, the read data are written to the mqtt log file, allowing easy check for correct data reading process.
  If an mssql-plugin is configured as Ingress Plugin, the "LastReadId" is not persisted during offline mode.

The default configuration loads an S7Net, MsSql, OpcUa, Sqlite and Mqtt plugin. If one or more of the plugins are not needed, delete the correlating "IngressPlugin" or "EgressPlugin"-Block.
If more than one instance of a plugin should be loaded, simply copy one of the "IngressPlugin" or "EgressPlugin" - blocks. Do not adjust the filepath and typename - setting, but make sure to have different "ConfigurationFile"-settings for all plugins.

Example: If you want to load two S7Net-plugins, the configuration may look similar to the below image:



```
<IngressPlugin name="S7NetDemo">
    <FilePath>$(RuntimePath)Plugins/Ingress/S7Net/S7Net.dll</FilePath>
    <TypeName>Senseforce.Agent.Extensibility.Ingress.Plugins.S7Net.S7NetHandler</TypeName>
    <ConfigurationFile>$(RuntimePath)Plugins/Ingress/S7Net/configs/s7netsettings.xml</ConfigurationFile>
</IngressPlugin>
<IngressPlugin name="S7NetDemo2">
    <FilePath>$(RuntimePath)Plugins/Ingress/S7Net/S7Net.dll</FilePath>
    <TypeName>Senseforce.Agent.Extensibility.Ingress.Plugins.S7Net.S7NetHandler</TypeName>
    <ConfigurationFile>$(RuntimePath)Plugins/Ingress/S7Net/configs/s7netsettings2.xml</ConfigurationFile>
</IngressPlugin>
```

**Make sure, that the plugin name configuration is unique for each plugin**

**FilePath**:

- **Mqtt-Plugin**: $(RuntimePath)Plugins/Egress/Mqtt/Mqtt.dll
- **S7Net-Plugin**: $(RuntimePath)Plugins/Ingress/S7Net/S7Net.dll
- **MsSql-Plugin**: $(RuntimePath)Plugins/Ingress/MsSql/MsSql.dll
- **OPCUA-Plugin**: $(RuntimePath)Plugins/Ingress/OpcUa/OpcUa.dll
- **SQLITE-Plugin**: $(RuntimePath)Plugins/Ingress/Sqlite/Sqlite.dll
- **Rest_Schildknecht-Plugin**: $(RuntimePath)Plugins/Ingress/Rest_Schildknecht/Rest_Schildknecht.dll

**TypeName**:

- **Mqtt-Plugin**: Senseforce.Agent.Extensibility.Egress.Plugins.Mqtt.MqttHandlerTpl

- **S7Net-Plugin**: Senseforce.Agent.Extensibility.Ingress.Plugins.S7Net.S7NetHandler
- **MsSql-Plugin**: Senseforce.Agent.Extensibility.Ingress.Plugins.MsSql.MsSqlHandler
- **OPCUA-Plugin**: Senseforce.Agent.Extensibility.Ingress.Plugins.OpcUa.OpcUaHandler
- **SQLITE-Plugin**: Senseforce.Agent.Extensibility.Ingress.Plugins.Sqlite.SqliteHandler
- **Rest_Schildknecht-Plugin**: Senseforce.Agent.Extensibility.Ingress.Plugins.Rest_Schildknecht.RestSchildknechtHandler

### 8.1.2 EventDefinition.xml

Configures the mapping for the outgoing messages.

The following parameters must be configured:

- **TargetPlugins**: Define the egress plugins, which should send the messages. Use the plugin name configured in appsettings.xml
- **IngressKey**: Defines which incoming messages should be processed by the according mapping. Use the IngressKey defined in the ingress plugins configuration file.
- **Timestamp** (default is appropriate)
- **Version** (for dynamic event, default is appropriate; For ordinary events, the version must match with the version id of the correlating event schema which can be defined using the Senseforce Rocket web app).
- **Id** (only for non-dynamic events, default is appropriate)