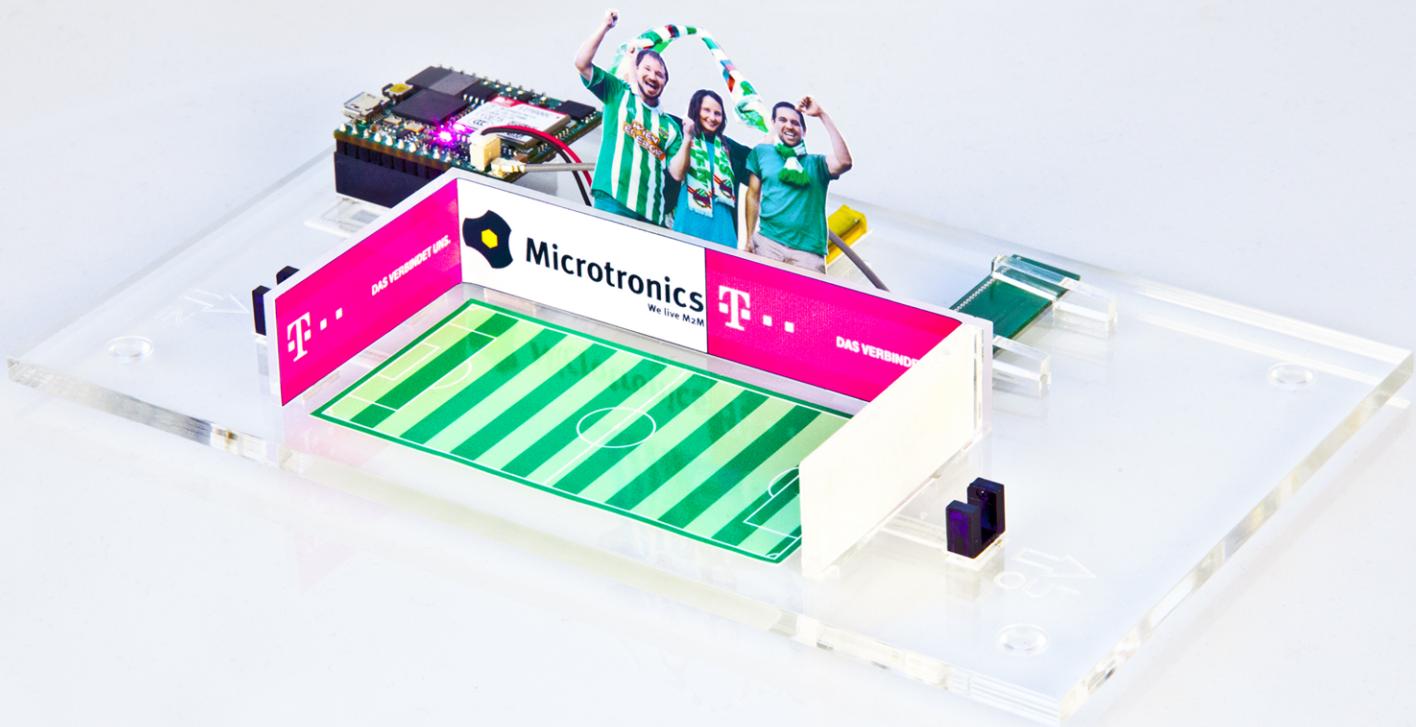


T...

Tutorial Smart Stadium

Applications for the Internet of things quickly realized



Tutorial

The following tutorial uses the example of a "Smart Stadium" to demonstrate how you can use the IoT Box to quickly create an application for the Internet of Things. This tutorial is split into four phases:

- Phase 1: Configuration of a report
- Phase 2: Activation of additional script functions
- Phase 3: Changing the use case
- Phase 4: Creating a site using an application template

You will learn how to load a previously compiled script via the interface of the T-Mobile IoT Box Portal into the IoT Box , obtain a basic overview of how to handle configuration parameters and learn how to display data on the T-Mobile IoT Box Portal using reports.

1.1 Prerequisites

You will require the following components for this tutorial:

- PC with Microsoft operating system and up-to-date browser (recommended: Google Chrome, Mozilla Firefox)
- IoT Box (order from: <https://business.t-mobile.at/kleinunternehmen/iot-box/>)
- USB cable A-connector to micro-B-connector
- "Smart Stadium" demo setup (order from: tbd)
- T-Mobile IoT Box Portal account
- Additional files for this tutorial (can be downloaded at: http://support.microtronics.at/tutorial/Smart_stadium_additional_files_TMA.zip)

1.2 Detailed description

During phase 1, a new site is initially created and the application script required for communication with the "Smart Stadium" is loaded in the IoT Box . The "Smart Stadium" is equipped with two light barriers to determine the number of people who enter and leave the stadium. In a second step, a report is configured to display the number of people who enter the stadium on the interface of the T-Mobile IoT Box Portal. The "online" connection type is selected and the measurement is completed every 10 sec. to achieve a fast reaction time.

In phase 2, the "Smart Stadium" obtains the additional function of displaying the number of people who have left the stadium and the number of people currently still in the stadium. The connector is modified for this purpose to release additional measurement channels provided by the application script. Application scripts for the IoT Box can have practically any number of configuration parameters and measurement channels. Their data type can also be selected freely within certain limits. The connector is designed to inform the T-Mobile IoT Box Portal of this setup so that the measurement data and configurations can be used in conjunction with the server interface (reports, visualisations, graphics, etc.).

In phase 3 the use case is changed Instead of the number of people who enter and leave the stadium, the amount of energy that the stadium consumes and feeds in is recorded. The connector is remodified more extensively for this purpose.

Phase 4 demonstrates how, within a short period of time, you can use the application templates to create a site that has the same functionality as the one created during phase 1-3. However, the time that is saved during creation significantly restricts the configuration options.

Step-by-step instructions

2.1 Phase 1: Configuration of a report

1. Log into the T-Mobile IoT Box Portal (iot-box.m2mdata.t-mobile.at).

192.168.1.101 | not logged in

de | en

Log in with your user name and password:

user name
password

Log in

Password forgotten?

Login on the T-Mobile IoT Box Portal

2. You are now in the "Site/applications" area of the T-Mobile IoT Box Portal.

Smart Stadium Workshop

log off Username

Sites / Applications | Users | Alarms | Statistic | Service | My details

ManagedService

- Reports

Pages: 1 (Total 0)

(no entries)

Sites / Applications

Connection | Application

Filter: off Order: Name Page Length: 12

"Sites/applications" area where all of the available sites are displayed.

3. Create a site. Select "rapidM2M" as the "Site type/application".

Smart Stadium Workshop

Sites / Applications | Users | Alarms | Statistic | Service | My details

ManagedService

- Reports

Pages: 1 (Total 0)

(no entries)

Sites / Applications

Connection | Application

Page Length: 12

1

2

3

4

Creating the site

1 "Add new site/application" symbol	3 Input window for creating a new site
2 Input window for selecting the site type	4 "Create" button

4. Link the site/application with the IoT Box by selecting the serial number and assigning the site a name. Then complete the process of creating a site by clicking the "Save" button. The serial number is on the IoT Box.

The screenshot shows the 'Smart Stadium Workshop' software interface. The main window title is 'Smart Stadium Workshop'. In the top right corner, there are links for 'log off', 'Username', 'Help', and 'back'. The left sidebar has a 'rapidM2M' section with a minus sign and a 'Site' section with a plus sign. Under 'Site', there are fields for 'Customer*', 'Name*', 'Device S/N:', 'Application template:', and 'Tags'. The 'Device S/N:' dropdown is open, showing '(not assigned)' and '8616940347XXXXXX'. The 'Application template:' dropdown also shows '(not assigned)'. Below these are sections for '+ Comment', '+ Control', '+ Alarm settings', '+ Calculated channels', and '+ Basic settings'. At the bottom of the window are 'cancel' and 'save' buttons. A circled '1' points to the 'Site' tab in the sidebar, a circled '2' points to the 'Name*' field, a circled '3' points to the 'Device S/N:' dropdown, and a circled '4' points to the 'Basic settings' section.

Linking the device and site

1 Name of the site (freely selectable)	3 List of devices that have not yet been linked with a site
2 Device assignment	4 "Save" button to complete the process

5. The newly added site is now displayed in the list of sites.

The screenshot shows the 'Smart Stadium Workshop' software interface. The main window title is 'Smart Stadium Workshop'. In the top right corner, there are links for 'log off', 'Username', 'API', 'Data export', 'Help', and a search icon. The left sidebar has a 'ManagedService' section with a minus sign and a 'Reports' section with a plus sign. Under 'Reports', there is a 'Pages: 1 (Total 0)' message. The main area is titled 'Sites / Applications' with a minus sign and a 'Reports' icon. It shows a table with one row: 'Smart Stadium' (rapidM2M: 8616940347XXXXXX (NO DATA)'. There are edit and delete icons next to the site name. At the bottom of the table are filter, page, and search controls. A status bar at the bottom right shows '6.4.2018 12:34:29 SER UTC+2,00'. On the right side, there are icons for 'Connection' and 'Application'. Numbered callouts point to specific elements: '1' points to the edit icon, '2' points to the delete icon, '3' points to the serial number '8616940347XXXXXX', '4' points to the site name 'Smart Stadium', '5' points to the 'Sites / Applications' header, '6' points to the status bar, '7' points to the tabs, and '8' points to the 'Connection' and 'Application' icons.

"Sites/applications" area where all of the available sites are displayed.

1 Opens the input screen for configuring the site
2 Deletes the site/application.
3 Serial number of the device linked to the site. The input screen for configuring the device is opened by clicking on the serial number .
4 Name of the site/application. The input screen for configuring the site/application is opened by clicking on the name .
5 List of sites/applications
6 Status of the measurement instrument. In addition to the status symbol, additional symbols are displayed depending on the current operating state.
7 Tabs to switch between the display of the connection-specific and application-specific control elements
8 Connection- or application-specific control elements of the site/application

6. Click on the name of the site in the list of sites/applications to open the input screen for configuring the site.
7. In the input screen for configuring the site, click on "Control" to display the input fields for uploading a compiled script and for configuring the data structure (i.e. the connector). Set the parameters as follows and exit the input screen by clicking the "Save" button. Following the saving process, the configuration parameters and measurement channels specified by the connector can be used on the interface of the T-Mobile IoT Box Portal.

The screenshot shows the 'Smart Stadium Workshop' configuration interface. The 'Control' section is highlighted. Step 1 points to the 'Comment' link. Step 2 points to the 'Machine-Logic type' dropdown, which is set to 'Pawn'. Step 3 points to the 'Machine-Logic source' dropdown, which is set to 'Upload a compiled Machine-Logic'. Step 4 points to the 'Durchsuchen...' (Browse...) button. Step 5 points to the file content area where the 'Smart_Stadium.amx' file is displayed.

Input screen for configuring the site/application, "Control" section

1	"Control" configuration section
2	Selection of the script type Select "Pawn" here. <i>Note: The "Script source" parameter is only displayed following this selection.</i>
3	Specification of whether the script should be edited directly on the T-Mobile IoT Box Portal or whether a previously compiled script should be used. Select "Upload a compiled script" here. <i>Note: The "Upload file" parameter is only displayed following this selection.</i>
4	Button to open the dialog to select the script binary file (*.amx) to be uploaded Select the "Smart_Stadium.amx" file located on the USB stick that you received from the workshop tutor.
5	Input field to configure the connector that enables the data generated and configurations provided by the script to be used in connection with the interface of the T-Mobile IoT Box Portal Copy the entire content of the "Datastructure.txt" file, that is also located on the USB stick, into this field.

8. Open the input screen to configure the site again by clicking on the name of the site in the list of sites.

- In the input screen for configuring the site, click on "Basic settings" to display the input fields for the record interval, transmission interval and connection type. Set the parameters as follows and exit the input screen by clicking the "Save" button.

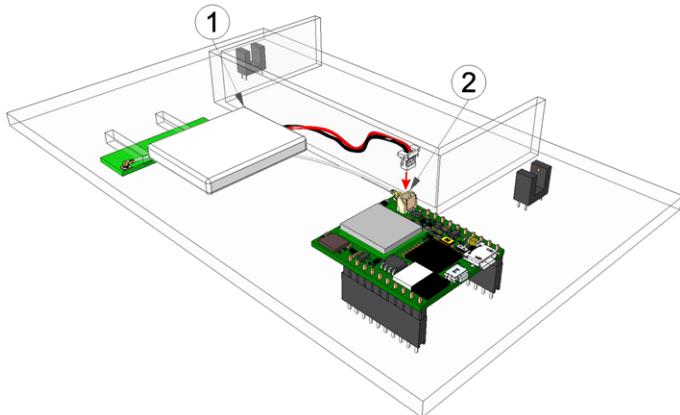
The screenshot shows the configuration interface for a site named "Smart Stadium Workshop". The "Basic settings" section is highlighted. The "Record Interval" is set to 10 sec, "Transmission Interval" is set to 60 min, and "Transmission Mode" is set to "Online".

Input screen for configuring the site/application, "Basic settings" section

1	"Basic settings" configuration section
2	Time between measurement data recordings Select "10 sec." here.
3	Time between transmissions (only applies to the "Interval" and "Wakeup" connection types) Select "60 min." here.
4	Selection of the connection type Select "online" here. The device does not disconnect the connection and continuously transmits the measurement data.

- Connect the rechargeable battery to the rechargeable battery connection of the IoT Box . If a script has not been loaded in the IoT Box yet, the green LED then starts to flicker to indicate that a connection is being established.

Note: Before connecting the rechargeable battery, ensure that no objects made of bare metal are in the vicinity of the IoT Box as these could cause a short circuit.

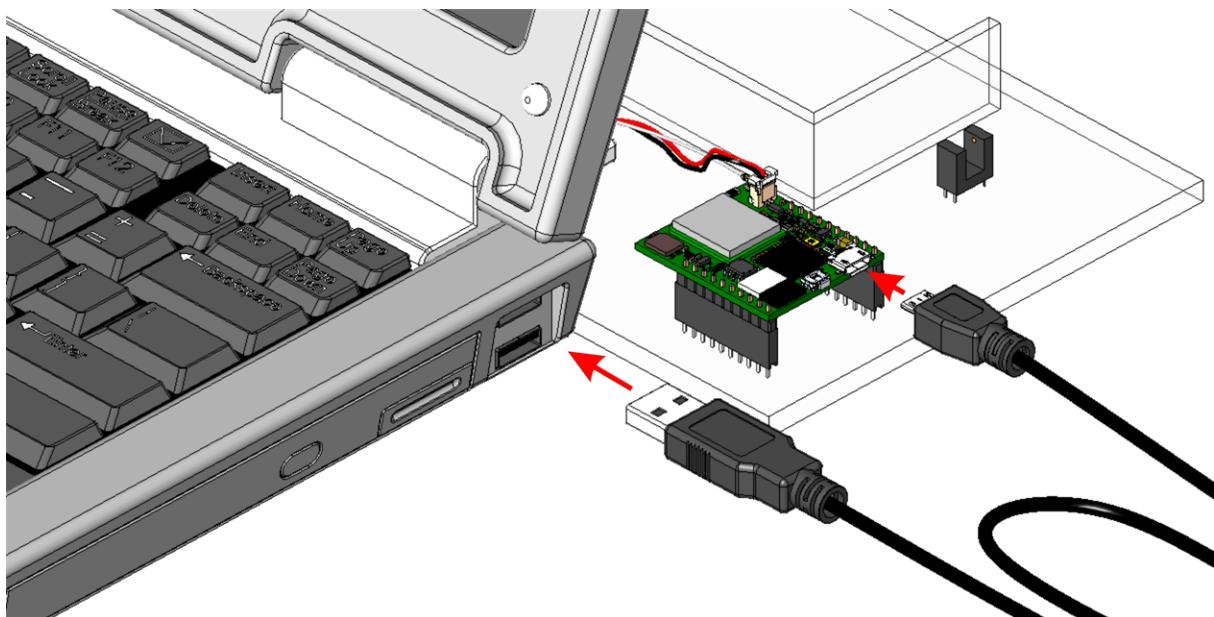


Connecting the rechargeable battery to the IoT Box

1	Li-Po rechargeable battery
2	Rechargeable battery connector of the IoT Box

11. By selecting the "online" connection type, the IoT Box maintains a permanent connection to the T-Mobile IoT Box Portal and continuously transfers the measurement data which means that the energy consumption is high. Therefore connect the IoT Box to the USB interface on your PC to charge the rechargeable battery during the workshop.

Important note: Please be aware that the sensitive electronic components of the IoT Box can be damaged if they come in contact with static electricity.



Connecting the power supply

12. Click on the wakeup symbol in the list of sites/applications to send a wakeup SMS to the IoT Box , which will establish an immediate connection to the T-Mobile IoT Box Portal. The status LED of the IoT Box starts to flicker following receipt of the SMS to indicate the connection establishment.

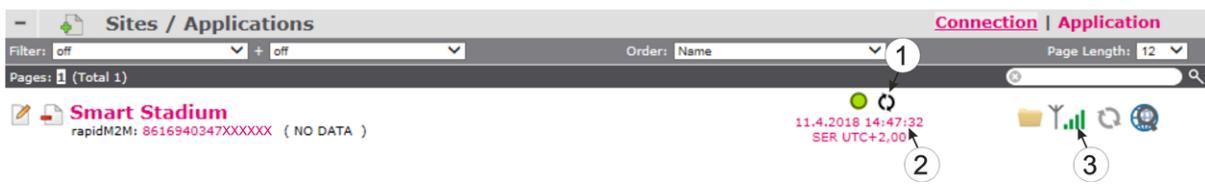
A screenshot of a web-based application titled "Smart Stadium Workshop". The top navigation bar includes links for "log off", "Username", "Sites / Applications", "Users", "Alarms", "Statistic", "Service", and "My details". Below the navigation is a toolbar with "ManagedService", "Reports", "API", "Data export", and "Help". The main content area has a search bar and a message "Pages: 1 (Total 0) (no entries)". Underneath is a table header for "Sites / Applications" with columns for "Name", "Order", "Page Length" (set to 12), and a search input. The table body contains one entry: "Smart Stadium" with a rapid2M: 8616940347XXXXXX status (NO DATA). To the right of the table are icons for "Connection | Application", a date/time stamp (11.4.2018 14:15:59 SER UTC+2,00), and connectivity status indicators (Wi-Fi, signal strength, battery).

"Sites/applications" area where all of the available sites are displayed.

- 1 Sends a wakeup SMS to the IoT Box to instruct it to establish an immediate connection to the T-Mobile IoT Box Portal

Note: As soon as the script has been transferred from the site to the IoT Box , this symbol is deactivated as the IoT Box switches to online mode and thus maintains a permanent connection to the T-Mobile IoT Box Portal.

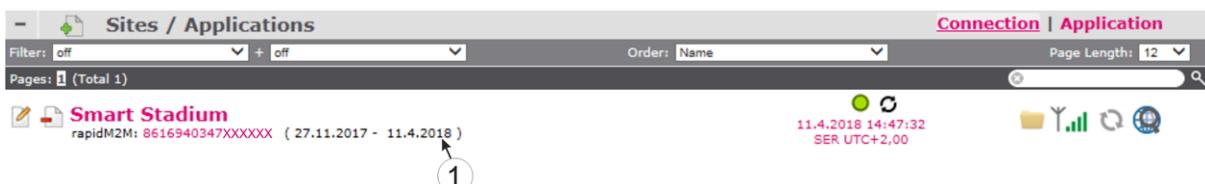
13. Wait until the list of sites/applications indicates that the IoT Box is connected to the T-Mobile IoT Box Portal (rotating arrows). This can take up to two minutes.



List of sites/applications

- | | |
|----------|---|
| 1 | Indicates that the IoT Box is connected to the server and is transmitting data. This symbol is hidden when the connection is disconnected. |
| 2 | Information regarding the time of the communication between the measurement instrument and server <ul style="list-style-type: none"> Measurement instrument is connected to the server and is transferring data: Time the last connection was established Measurement instrument is currently not connected to the server: Time of the last disconnection |
| 3 | The symbol indicates the signal strength. A click on the symbol displays information about the radio cell used for the last connection and the radio cells taken into account during the last positioning. |

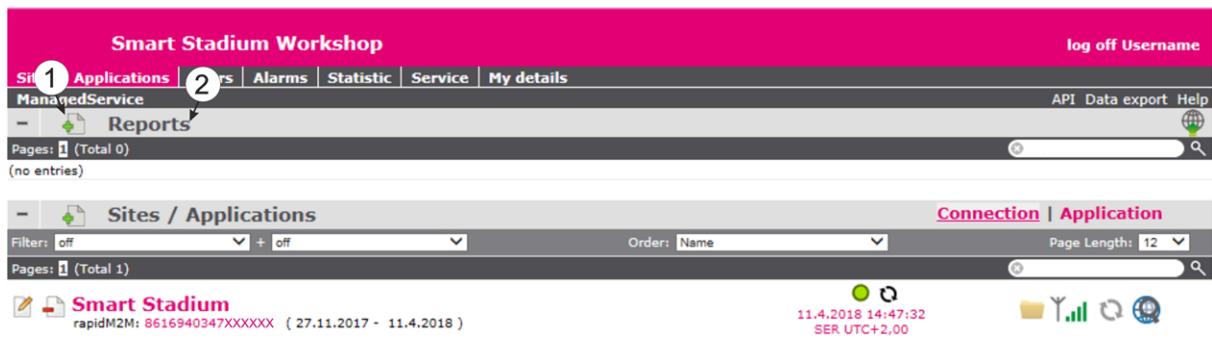
14. The measurement values are now already recorded and are immediately transmitted to T-Mobile IoT Box Portal due to the "online" connection type. As soon as the first data record has been received, the time period for which the data is available is shown in the area for displaying the available data period instead of "NO DATA".



List of sites/applications

- | | |
|----------|--------------------------------------|
| 1 | Display of the available data period |
|----------|--------------------------------------|

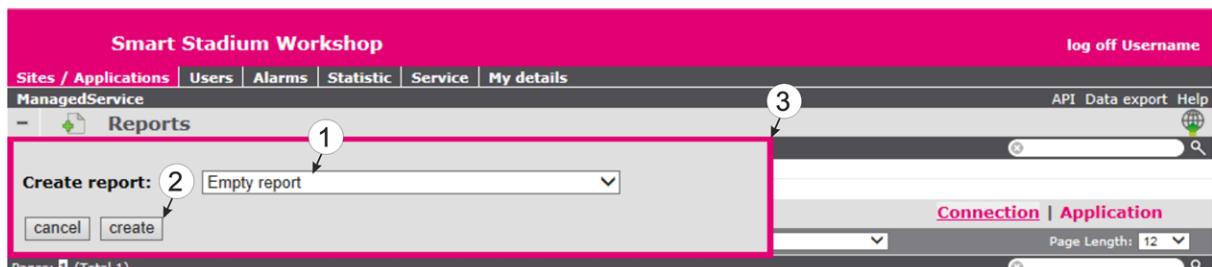
15. Create a report to display the measurement values.



"Sites/applications" area where all of the available sites are displayed.

1 Opens the input screen for creating a new report	2 List of reports
---	--------------------------

Select "Empty report" in "Create report".



Selecting a report template

1 Dropdown list of available report templates	3 Input window for selecting the report template
2 "Create" button	

16. Configure the "Last values" display elements as follows. This ensures that the last measurement value of the "IN" measurement channel is displayed next to the name of the report in the list of reports. By clicking the "Save" button, you will return to the "Sites/applications" area where all of the available sites are displayed.

	Site	Channel	Type	Min	Max
1	Smart Stadium	IN	Digits	---	---

Input screen for the basic configuration of the report

1	Freely selectable name for the report
2	Configuration of the "Last measurement values" display elements that are shown next to the name of the report in the list of reports
3	Selection of the site. The element can obtain its data from different sites. All of the current customer's sites are available to be selected.
4	Site channel that should be displayed
5	Selection of the type of display element to be used

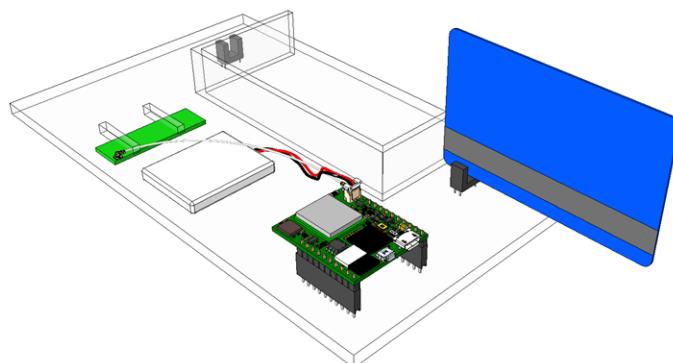
17. The current measurement value is now displayed directly next to the name of the report. The measurement values are updated every ten seconds.



"Sites/applications" area where all of the available sites are displayed.

- | | |
|---|---|
| 1 | Opens the input screen for the basic configuration of the report |
| 2 | Clicking on the name of the report will open the input screen to configure and select the elements. |
| 3 | Display elements for the last measurement value of a measurement channel (max. four per report). The site, channel and type of display element is selected in the basic configuration of the report . |

The measurement value is increased each time the light barrier marked "IN" is interrupted. You can, for example, use a business card as illustrated in the following.



Interrupting the light barrier

2.2 Phase 2: Activation of additional script functions

1. Click on the name of the site in the list of sites/applications to open the input screen for configuring the site.
2. In the input screen for configuring the site, click on "Control" to display the input fields for uploading a compiled script and for configuring the data structure (i.e. the connector). In the input field for configuring the connector, scroll down to the "**//== Measurement Channel: OUT**" marking.

The screenshot shows the configuration interface for a site named 'Smart Stadium Workshop'. The 'Control' section is highlighted. A file named 'Smart_Stadium.amx' is uploaded, and its content is displayed in a code editor. Three specific points are circled and numbered: 1) 'Comment' (the heading for the code editor), 2) the 'Machine-Logic source' input field, and 3) the marking '**//== Measurement Channel: OUT**' in the code editor.

```
136 //Note: the key for the split tag is located at position 0
137 byteofs = 1
138 //The measurement value should be rounded off to two decimal p
139 decpl = 0
140 //Data type: 32Bit unsigned
141 type = u32
142 </field>
143
144 //== Measurement Channel: OUT
145 <field>
146 //Data field 1 should be used for the counter reading of the o
147 name = ch1
148 alias = Output_counter
149 title = OUT
150 byteofs = 5
151 decpl = 0
152 type = u32
153 view = 99
154 </field>
155
156 //== Measurement Channel: People on site
157 <field>
158 //Data field 2 should be used for the difference (in-out).
159 name = ch2
160 alias = Difference
161 title = People on site
162 byteofs = 9
163 decpl = 0
164 type = s32
165 view = 99
166 </field>
167 </table>
```

Input screen for configuring the site/application, "Control" section

1	"Control" configuration section
2	Input field to configure the connector that enables the data generated and configurations provided by the script to be used in connection with the interface of the T-Mobile IoT Box Portal
3	" //== Measurement Channel: OUT " marking

3. Change the "view" attribute from 99 to 1 for both of the "OUT" and "People on site" measurement channels to ensure that both of these measurement channels can be used in the interface of the T-Mobile IoT Box Portal. Then exit the input screen by clicking the "Save" button.

```

Control
Machine-Logic type: Pawn
Machine-Logic source: Upload a compiled Machine-Logic
File upload: Durchsuchen...
last uploaded file: Smart_Stadium.amx (11.4.2018 14:33:19)
current size of the Machine-Logic binary file: 3953 bytes
136 //Note: the key for the spirit tag is located at position 0
137 byteofs = 1
138 //The measurement value should be rounded off to two decimal p
139 decpl = 0
140 //Data type: 32Bit unsigned
141 type = u32
142 </field>
143
144 //== Measurement Channel: OUT
145 <field>
146 //Data field 1 should be used for the counter reading of the o
147 name = ch1
148 alias = Output_counter
149 title = OUT
150 byteofs = 5
151 decpl = 0
152 type = u32
153 view = 1
154 </field>
155
156 //== Measurement Channel: People on site
157 <field>
158 //Data field 2 should be used for the difference (in-out).
159 name = ch2
160 alias = Difference
161 title = People on site
162 byteofs = 9
163 decpl = 0
164 type = s32
165 view = 1
166 </field>
167 </table>

```

The code shows configuration for two measurement channels. Line 153 (circled) sets the 'view' attribute to 1 for the 'OUT' channel. Line 165 (circled) sets the 'view' attribute to 1 for the 'People on site' channel.

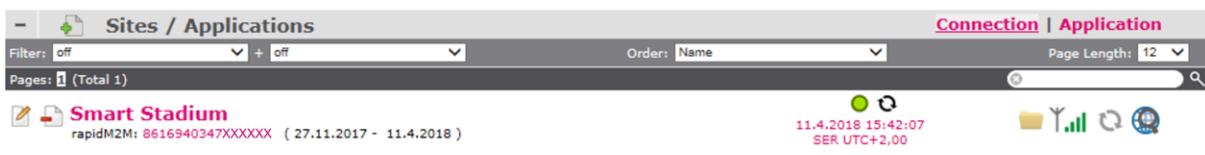
Input screen for configuring the site/application, "Control" section

- | | |
|----------|--|
| 1 | view attribute of the "OUT" measurement channel

Select "1" here. |
| 2 | view attribute of the "People on site" measurement channel

Select "1" here. |

4. Click on the symbol to open the input screen for the basic configuration of the report that is always located next to the name of the corresponding report in the list of reports.



"Sites/applications" area where all of the available sites are displayed.

- | | |
|--------------------------|---|
| 1 List of reports | 2 Opens the input screen for the basic configuration of the report |
|--------------------------|---|

5. Adjust the configuration of the "Last values" display elements as follows. In addition to the last measurement value of the "IN" measurement channel, the "OUT" and "People on site" measurement channels, that are available due to the changes to the connectors, are displayed next to the name of the report in the list of reports.

	Site	Channel	Type	Min	Max
1	SmartScale	IN	Digits	---	---
2	SmartScale	People on site	Circular scale	0	10
3	SmartScale	OUT	Digits	---	---

Smart Stadium Workshop

Report

Name*: Report

Comment:

Type: normal

1 Table of contents: off

Latest values

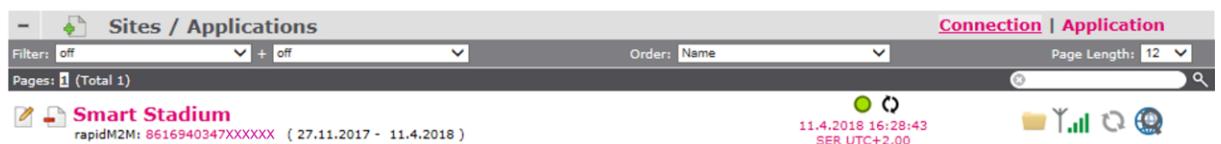
Site: 1 Smart Stadium	Channel: IN	Type: digits		
Site: 2 Smart Stadium	Channel: People on site	Type: round scale	Min: 0	Max: 10
Site: 3 Smart Stadium	Channel: OUT	Type: digits		

2 3 4 5 6

Input screen for the basic configuration of the report

- 1 Configuration of the "Last measurement values" display elements that are shown next to the name of the report in the list of reports
- 2 Selection of the site. The element can obtain its data from different sites. All of the current customer's sites are available to be selected.
- 3 Site channel that should be displayed
- 4 Selection of the type of display element to be used
- 5 Lower end of the scale of the display element (only for scale and bar elements)
- 6 Upper end of the scale of the display element (only for scale and bar elements)

6. The current measurement values of the "IN", "People on site" and "OUT" channels are now displayed directly next to the name of the report.



"Sites/applications" area where all of the available sites are displayed.

- | | |
|---|--|
| 1 | Last measurement value of the "IN" measurement channel |
| 2 | Last measurement value of the "People on site" measurement channel (difference between "IN" and "OUT") |
| 3 | Last measurement value of the "OUT" measurement channel |

2.3 Phase 3: Changing the use case

1. Click on the name of the site in the list of sites/applications to open the input screen for configuring the site.
2. In the input screen for configuring the site, click on "Control" to display the input fields for uploading a compiled script and for configuring the data structure (i.e. the connector). In the input field for configuring the connector, scroll down to the "**//== Input Channel Settings**" marking and change the attributes as follows:

Note: The "units" and "vscale" attributes are optional and will need to be added first.

```
last uploaded file: Smart_Stadium.amx (11.4.2018 14:33:19)
current size of the Machine-Logic binary file: 3953 bytes
67 //===
68 //== Input Channel Settings
69 //===
70 <table>
71     //Configuration block 8 could be used
72     name = config8
73     //Title of the config. section displayed on the server
74     title = Input Channel Settings
75     view = 1
76
77     //==== Configuration Parameter: Pulse value for the IN counter
78     <field>
79         //Parameter 0 should be used for the pulse value of the input
80         name = field0
81         //Alternative field name that can be used by the REST-API
82         alias = Input_Pulse_Value
83         //Title of the parameter displayed on the server
84         title = Pulse value for the IN counter
85         //Position in config block 8 where the parameter is saved
86         byteofs = 0
87         //Decimal places
88         decpl = 2
89         //Data type: 32Bit unsigned
90         type = u32
91         //Unit to be used to enter the value for the parameter
92         units = kWh
93         //Conversion factor
94         vscale = 0.01
95         //Default value is 1
96         default = 1
97     </field>
```

Input screen for configuring the site/application, "Control" section

- | | |
|---|--|
| 1 | Input field to configure the connector that enables the data generated and configurations provided by the script to be used in connection with the interface of the T-Mobile IoT Box Portal |
| 2 | "//== Input Channel Settings" marking |
| 3 | view attribute of the "Input Channel Settings" configuration block
Select "1" here. |
| 4 | Number of decimal places that should be displayed.
Select "2" here. |
| 5 | Freely selectable string that is displayed as the unit for the configuration parameter in the "Input Channel Settings" section. It does not have a direct impact on the value.
Select "kWh" here. |
| 6 | The value entered via the "Input Channel Settings" section is first multiplied by this factor before the T-Mobile IoT Box Portal continues to use it.
Select "0.01" here. |

3. In the input field for configuring the connector, scroll further down to the "///== Configuration Parameter: Pulse value for the OUT counter" marking and change the attributes as follows:

Note: The "units" and "vscale" attributes are optional and will need to be added first.

```

99    //== Configuration Parameter: Pulse value for the OUT counter
100   <field>
101     //Parameter 1 should be used for the pulse value of the output
102     name      = field1
103     alias     = Output_Pulse_Value
104     title     = Pulse value for the OUT counter
105     byteofs   = 4
106     decpl    = 2
107     type      = u32
108     units     = kWh
109     vscale    = 0.01
110     default   = 1
111   </field>
112 </table>

```

The screenshot shows a configuration interface with a code editor. The code is a snippet from a Machine-Logic file. Numbered circles (1-4) point to specific parts of the code:

- Circle 1 points to the line: `//== Configuration Parameter: Pulse value for the OUT counter`
- Circle 2 points to the line: `decpl = 2`
- Circle 3 points to the line: `units = kWh`
- Circle 4 points to the line: `vscale = 0.01`

Input screen for configuring the site/application, "Control" section

1	"//== Configuration Parameter: Pulse value for the OUT counter" marking
2	Number of decimal places that should be displayed. Select "2" here.
3	Freely selectable string that is displayed as the unit for the configuration parameter in the "Input Channel Settings" section. It does not have a direct impact on the value. Select "kWh" here.
4	The value entered via the "Input Channel Settings" section is first multiplied by this factor before the T-Mobile IoT Box Portal continues to use it. Select "0.01" here.

4. In the input field for configuring the connector, scroll further down to the "///= Measurement Channel: IN" marking and change the attributes as follows.

Note: The "units" and "vscale" attributes are optional and will need to be added first.

```

<?xml version="1.0" encoding="utf-8"?>
<Machine-Logic type="Pawn">
  <Machine-Logic source="Upload a compiled Machine-Logic">
    <File upload="last uploaded file: Smart_Stadium.amx (11.4.2018 14:33:19)">
      <Durchsuchen...>
    </File upload>
    <current size of the Machine-Logic binary file: 3953 bytes>
    <Machine-Profile>
      <1> //==== Measurement Channel: IN
      <2> <field>
          <name> ch0 </name>
          <alias> Input_counter </alias>
          <title> IN </title>
          <byteofs> 1 </byteofs>
          <decpl> 2 </decpl>
          <type> u32 </type>
          <3> <units> kWh </units>
          <vscale> 0.01 </vscale>
        </field>
      <4> //==== Measurement Channel: OUT
      <5> <field>
          <name> ch1 </name>
          <alias> Output_counter </alias>
          <title> OUT </title>
          <byteofs> 5 </byteofs>
          <decpl> 2 </decpl>
          <type> u32 </type>
          <6> <units> kWh </units>
          <vscale> 0.01 </vscale>
          <view> 1 </view>
        </field>
      <7>
    </Machine-Profile>
  </Machine-Logic>
</Machine-Logic type="Pawn">

```

Input screen for configuring the site/application, "Control" section

1	"//==== Measurement Channel: IN" marking
"IN" measurement channel	
2	Number of decimal places that should be displayed. Select "2" here.
"OUT" measurement channel	
3	Freely selectable string that is used as the measurement channel unit by all of the server display elements. It does not have a direct impact on the value. Select "kWh" here.
4	The measurement value is multiplied by this factor before being processed any further by the server. Select "0.01" here.
"OUT" measurement channel	
5	Number of decimal places that should be displayed. Select "2" here.
6	Freely selectable string that is used as the measurement channel unit by all of the server display elements. It does not have a direct impact on the value. Select "kWh" here.
7	The measurement value is multiplied by this factor before being processed any further by the server. Select "0.01" here.

5. In the input field for configuring the connector, then scroll further down to the "**//==== Measurement Channel: People on site**" marking and change the attributes as described in the following. Then exit the input screen by clicking the "Save" button.

Note: The "units" and "vscale" attributes are optional and will need to be added first.

```

165 //==== Measurement Channel: People on site
166 <field>
167   //Data Field 2 should be used for the difference (in-out).
168   name      = ch2
169   alias     = Difference
170   title    = Energy used
171   byteofs  = 9
172   decpl    = 2
173   type     = s32
174   units    = kWh
175   vscale   = 0.01
176   view     = 1
177 </field>
178 </table>
179 </>
```

Input screen for configuring the site/application, "Control" section

1	"//==== Measurement Channel: People on site" marking
2	Freely selectable title for the measurement channel that is used by all of the server display elements Select "Energy used" here.
3	Number of decimal places that should be displayed. Select "2" here.
4	Freely selectable string that is used as the measurement channel unit by all of the server display elements. It does not have a direct impact on the value. Select "kWh" here.
5	The measurement value is multiplied by this factor before being processed any further by the server. Select "0.01" here.

6. Click on the name of the site in the list of sites/applications to open the input screen for configuring the site.

7. In the input screen for configuring the site, click on "Input Channel Settings" to display the input fields for configuring the counters. This configuration section is only available once the changes to the connector have been implemented. If not specified otherwise by the workshop tutor, set the parameters as follows and exit the input screen by clicking the "Save" button.

Smart Stadium Workshop

Site

Customer*: Smart Stadium Workshop

Name*: Smart Stadium

Device S/N: 8616940347XXXXX

Application template: (not assigned)

Tags: +

Comment

Control

1 Basic settings

– Input Channel Settings

Pulse value for the IN counter: 1,25 kWh

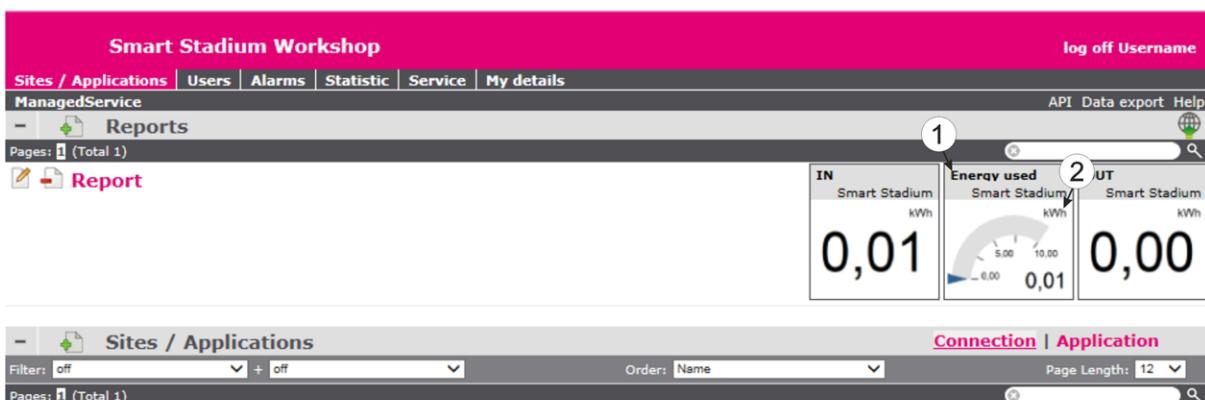
Pulse value for the OUT counter: 0,75 kWh

3

Input screen for configuring the site/application, "Basic settings" section

- | | |
|---|---|
| 1 | "Input Channel Settings" configuration section |
| 2 | Pulse value of the input counter (metered measurand of a pulse)
Select "1.25" here. |
| 3 | Pulse value of the output counter (metered measurand of a pulse)
Select "0.75" here. |

8. By making changes to the connector, the title of the middle display element and the unit of all of the display elements shown next to the name of the report have changed in comparison to phase 2. The values that are displayed now have exactly two decimal places. The existing meter readings were converted by being multiplied by 0.01. The counter readings can be reset by pressing and holding the button of the IoT Box for min. 3 sec.



"Sites/applications" area where all of the available sites are displayed.

- | | |
|---|--|
| 1 | Title of the measurement channel assigned in step 5 |
| 2 | Measurement unit of the measurement channel stipulated in step 5 |

2.4 Phase 4: Creating a site using an application template

If you only have one IoT Box available, the assignment between this one and the previous site will have to be deallocated. This is completed in the first two steps.

1. Click on the name of the site in the list of sites/applications to open the input screen for configuring the site.
2. Cancel the link between the IoT Box and the previous site by selecting the entry "(not assigned)" from the dropdown list for the device serial number and exit the input screen by clicking the "Save" button.

Smart Stadium Workshop

rapidM2M

- Site

Customer*: Smart Stadium Workshop
Name*: Smart Stadium
Device S/N: (not assigned)
Application template: (not assigned)
Tags: +

+ Comment

+ Control

+ Basic settings

+ Input Channel Settings

+ Alarm settings

+ Calculated channels

+ Basic settings 2

cancel apply save copy

Cancelling the link between the device and site

1 Device assignment	1 "Save" button to complete the process
---------------------	---

3. Create another site. This time select the "[Tutorial] Smart Stadium" application template as the "Site type/application".

Smart Stadium Workshop

Sites / Applications | Users | Alarms | Statistic | Service | My details

ManagedService

- Reports

Pages: 1 (Total 1)

Report

IN Smart Stadium kWh 0,01 Energy used Smart Stadium kWh 0,01 OUT Smart Stadium kWh 0,00

1 2 3

Sites / Applications

Site type / Application: [Tutorial] Smart Stadium

cancel create multiple Create >>

Connection | Application

Page Length: 12

1 "Add new site/application" symbol	3 Input window for creating a new site
2 Input window for selecting the application template	4 "Create" button

4. Link the newly created site/application with the IoT Box by selecting the serial number and assign a name to the site. Then complete the process of creating a site by clicking the "Save" button. The serial number is on the IoT Box. Following the saving process, the configuration parameters and measurement channels specified by the connector in the template can be used on the interface of the T-Mobile IoT Box Portal.

Linking the device and site

1 Name of the site (freely selectable)	3 List of devices that have not yet been linked with a site
2 Device assignment	4 "Save" button to complete the process

5. Two sites are now displayed in the list of sites.

"Sites/applications" area where all of the available sites are displayed.

1 Site created from the "[Tutorial] Smart Stadium" application template
2 Site based on the "rapidM2M" site type

6. Click on the name of the site created from the application template, that is located in the list of sites/applications, to open the input screen for configuring the site.

7. In the input screen for configuring the site, click on "Input Channel Settings" to display the input fields for configuring the counters. If not specified otherwise by the workshop tutor, set the parameters as follows and exit the input screen by clicking the "Save" button.

Note: The "Control" configuration section is not available as both the application script and the associated connector are copied from the application template and are configured via the management of the application templates.

Smart Stadium Workshop

[Tutorial] Smart Stadium

Site

Customer*: Smart Stadium Workshop

Name*: [Tutorial] Smart Stadium

Device S/N: 8616940347XXXXX

Application template: [Tutorial] Smart Stadium

Tags: +

Comment

1 Basic settings

2 Input Channel Settings

Pulse value for the IN counter: 1,25 kWh

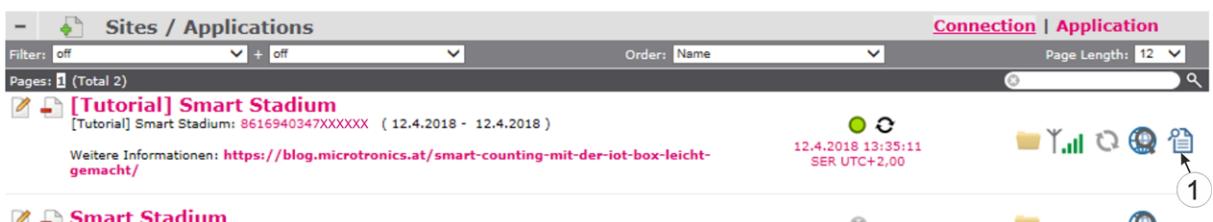
Pulse value for the OUT counter: 0,75 kWh

4

Input screen for configuring the site/application, "Basic settings" section

- | | |
|---|---|
| 1 | "Input Channel Settings" configuration section |
| 2 | Pulse value of the input counter (metered measurand of a pulse)
Select "1.25" here. |
| 3 | Pulse value of the output counter (metered measurand of a pulse)
Select "0.75" here. |

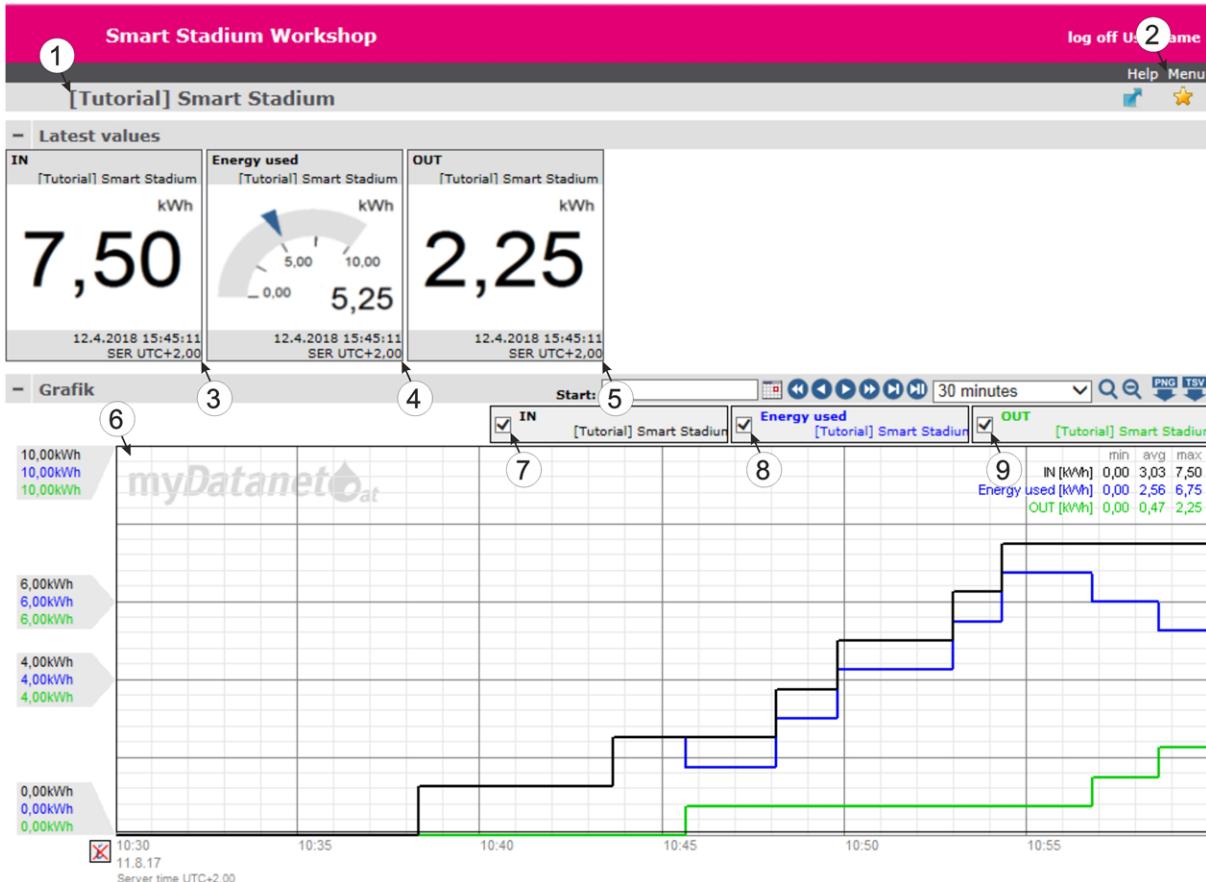
8. The application template also includes a link to a report template that enables the measurement data to be displayed without any additional configuration.



"Sites/applications" area where all of the available sites are displayed.

- | | |
|---|--|
| 1 | Opens the report template used to display the measurement data |
|---|--|

9. Click on the symbol to display the measurement data to call up the visualisation.



Display of the measurement data

1	Name of the site/application for which the data is being displayed
2	Closes the display of the measurement data and returns to the "Sites/applications" area
3	Last measurement value of the "IN" measurement channel
4	Last measurement value of the "Energy used" measurement channel (difference between "IN" and "OUT")
5	Last measurement value of the "OUT" measurement channel
6	Measurement value graphic (displays the measurement values over time)
7	Checkbox to display and hide the "IN" measurement channel
8	Checkbox to display and hide the "Energy used" measurement channel
9	Checkbox to display and hide the "OUT" measurement channel

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