# Connecting the easyE4 to the AWS cloud service


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|---|---|
| Level 3 | 1 – Fundamental – No previous experience necessary<br>2 – Basic – Basic knowledge recommended<br>3 – Advanced – Reasonable knowledge required<br>4 – Expert – Good experience recommended |

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**Original operating instructions**

The German version of this document is the original operating instructions.

All non-German language editions of this document are translations of the original operating instructions.

1. Edition 2024, publication date 07/2024

# Danger!
# Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally retriggered
- Verify isolation from the supply
- Ground and short-circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (IL) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 part 100) may work on this device/ system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE, PES) must be connected to the protective earth (PE) or to the potential equalizing. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 V supply. Only use power supply units complying with IEC 60364-4-41 or HD 384.4.41 S2 (VDE 0100 part 410).
- Deviations of the mains voltage from the nominal value must not exceed the tolerance limits given in the technical data, otherwise this may cause malfunction and dangerous operation.
- Emergency-Stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency switching off devices must not cause restart.
- Built-in devices for enclosures or cabinets must only be run and operated in an installed state, desk-top devices or portable devices only when the housing is closed.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency switching off devices should be implemented
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, etc.).

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# Contents

# 1 Introduction

This application note describes how easyE4 communicates with the AWS cloud and describes best practices and troubleshooting tips.

# 2 What is AWS

AWS is a cloud computing platform that offers extensive functions with more than 200 services.

With easyE4 from hardware version 8, it is possible to communicate with this platform and thus make individual operands available in the cloud. It is also possible to write these from the cloud to the easyE4.

Communication takes place via the "AWS IoT" service. This is a service that connects IoT devices with other devices and the AWS cloud services.

Please refer to the manual to find out how to register the easyE4 in AWS IoT: MN050009EN

## 2.1 Basic information

The easyE4 sends its data to a Thing in the AWS IoT Core via an MQTT protocol. The device shadow is used here, which also has a corresponding effect on the pricing.

To calculate the price, please use the AWS price calculator or contact an authorised AWS partner.

An easyE4 configured with AWS connects to the AWS IoT Core when it is switched on (connection minutes). Data is sent in the RUN state and paused in the STOP state.

## 2.2 Requirements

The hardware requirements are at least easyE4 devices version 8 and the firmware version must be greater than 2.25. At least easySoft V8.25 is required for the AWS connection.

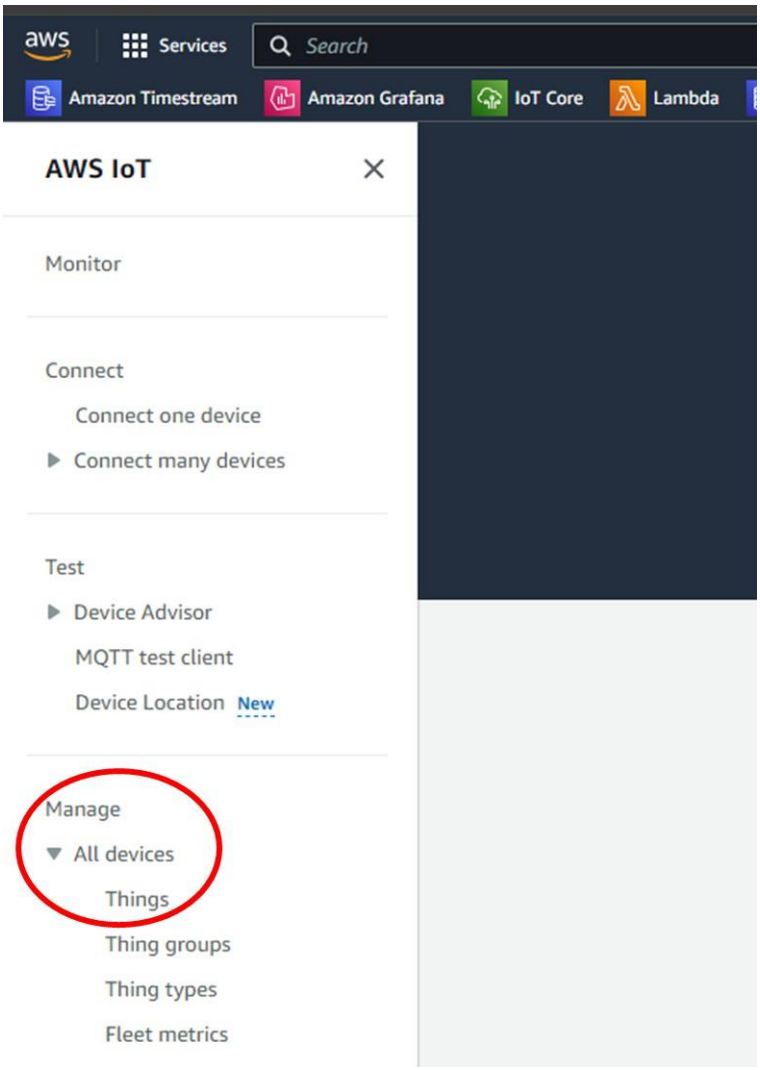
# 3 How do I connect the easyE4 with AWS.

There are 3 ways to register an easyE4 in AWS. These options are described in detail in manual MN050009EN.

For the registration of individual devices, we recommend doing this via easySoft or the web client, as you will be guided through the registration process here.

When registering many easyE4s, we recommend the Python script, as some steps can be automated.

Once the easyE4 has registered successfully, please check your AWS account in the IoT Core to see if you can find the device in the view under Manage → All devices → Things.

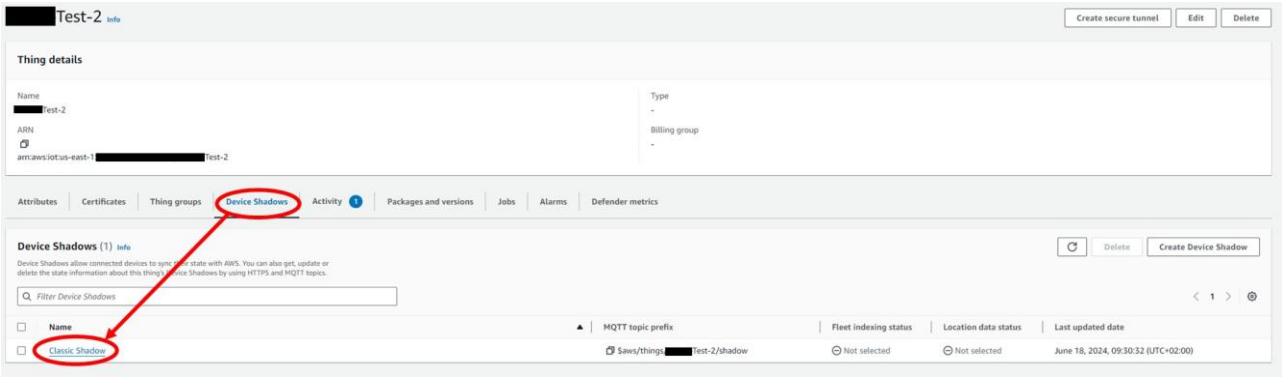



If you replace a device and want to register it with an existing Thing, you can re-register the new device with the corresponding Thing. However, make sure that several easyE4s are not allowed to access a Thing at the same time. A shadow document should only ever be assignable to one easyE4.

## 3.1 Data in AWS

The easyE4 works with the device shadow. Here you can always see the last values of the operands defined in easySoft.

To access the device shadow, you must select your device (Thing) in the IoT Core and then click on the Device Shadows tab.




You will now see a list of the shadows linked to the device (Thing). Click on the shadow name "Classic Shadow" to go to the shadow document.

In the shadow document, you can see that device information is transferred in addition to the configured data:


These values represent the following hardware and software parameters of the easyE4:

- fw_version: active firmware of the easyE4
- build_nr: Build number of the active firmware s_n: Serial number of the easyE4
- serial_num: EPAS number of the easyE4
- prog_name: Name of the active programme in the easyE4

These can be used to manage the devices.

There is also a data point with the name "connected" in the shadow document. Further information on this data point can be found in the Lastwill section.

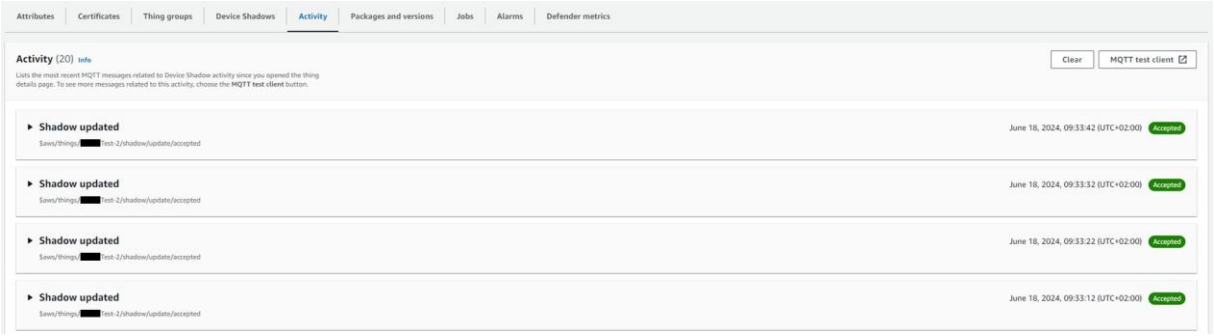
Only the last values received are saved in the shadow. Additional services and rules are required for a history of the data.

For example, the values can be saved in a database. AWS provides several databases. Here you will find instructions with the example of the Timestream database:

https://www.youtube.com/watch?v=z8T4hAERuOg

# 4 Check the communication

To check whether data is being sent from the easyE4 to AWS, you can click on the "Activity" tab in the Thing; all messages relating to this Thing will appear here:




If a new message arrives, this view is updated.

Alternatively, the sent and received MQTT messages can be monitored in the AWS IoT MQTT test client. You can access the MQTT test client by clicking on the "MQTT test client" button in the Activity tab.

## 4.1 Read values of the easyE4

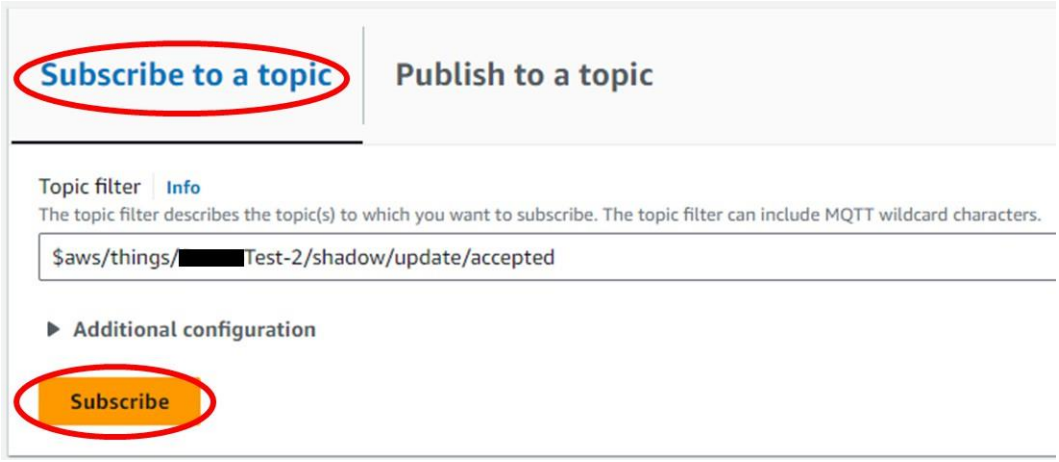
A new tab will now open with the test client in which you can receive messages or create and publish messages.

To see which messages arrive in AWS, the following topic must be "subscribed":

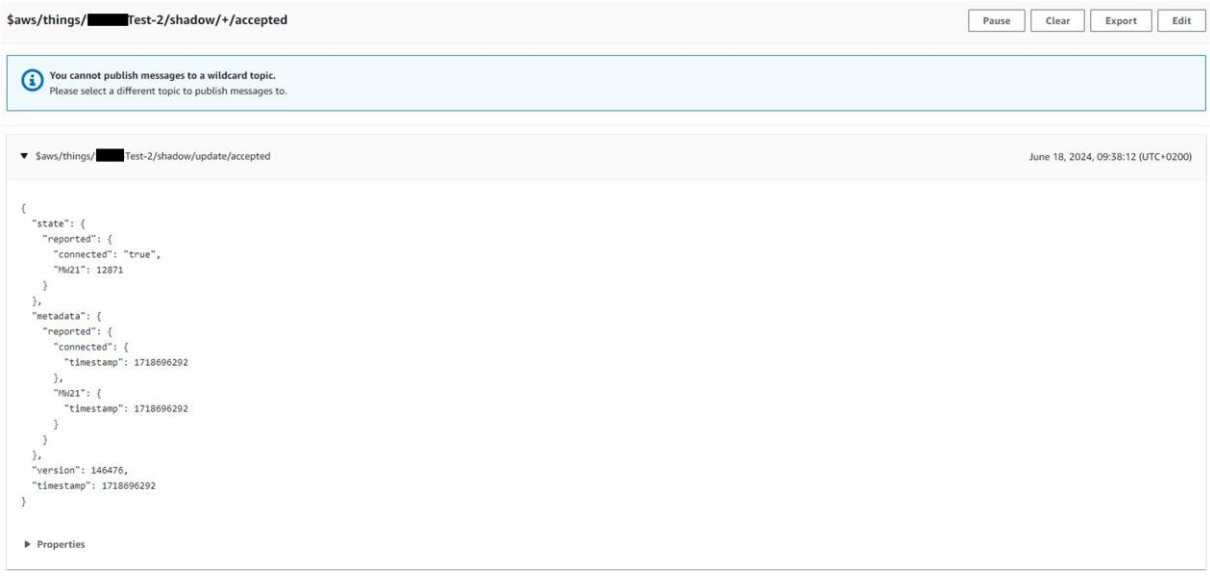
$aws/things/<Thingname>/shadow/update/accepted

Example <Thingname> = easyE4, then:

$aws/things/easyE4/shadow/update/accepted

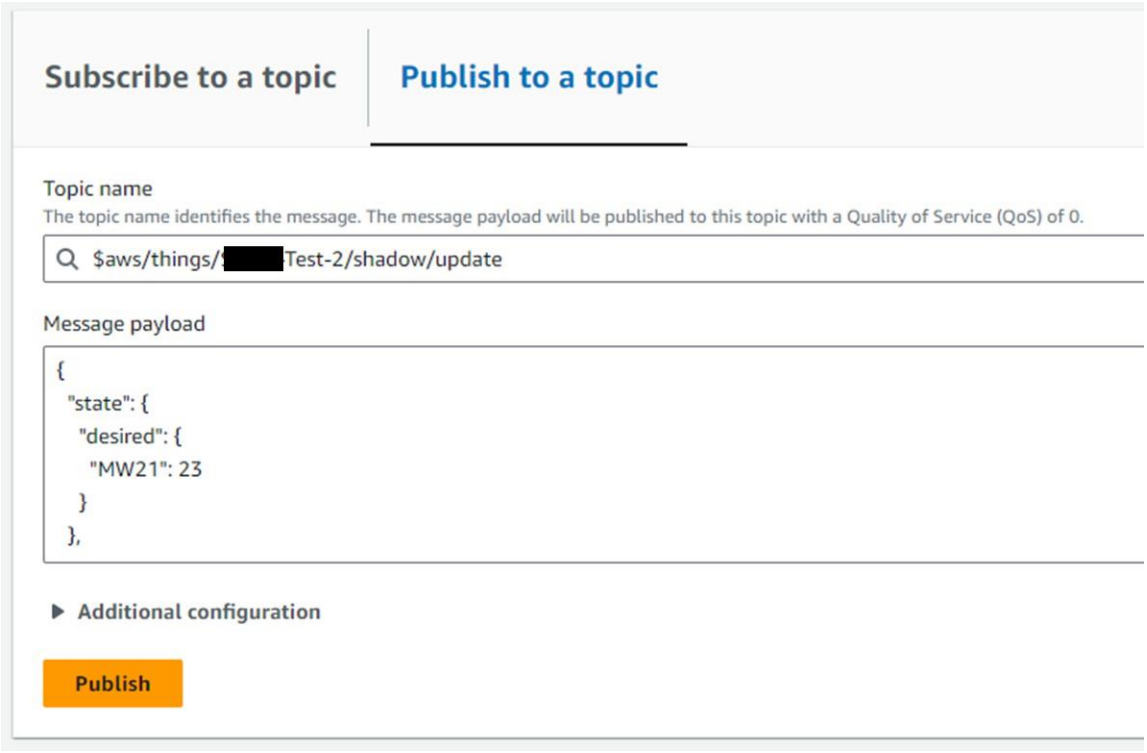



All incoming messages with this topic underneath are now displayed in the message window and the content can be checked by expanding a message.



## 4.2 Write values of the easyE4

To write a value on the easyE4, you must click on the "Publish to a topic" tab. A message can be created here that also contains an object with the identifier "desired".




This message must be "published" to the topic $aws/things/Test-2/shadow/update.

The payload must be structured in JSON format, otherwise the message cannot be processed by easyE4.

Click on "Publish" to publish the message and transfer it to the shadow document.

This change adapts the shadow document and also transfers the difference to the current shadow to the easyE4.

# 5 Lastwill (connection status)

During registration, easyE4 has stored a "Last will and testament" under the topic $aws/things/<THINGNAME>/shadow/ lastwill

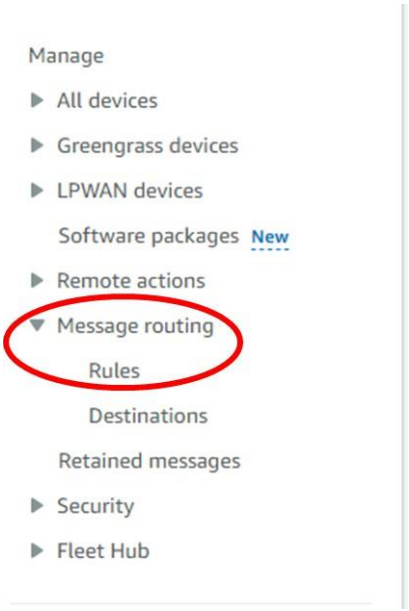
has stored a "Last will". This looks as follows:

```
{
  "state": {
      "reported": {
          "connected": "false"
      }
  }
}
```

This function makes it possible to set the connection status to false if the easyE4 connection is lost. This allows the online status of the easyE4 to be monitored in AWS.

To use this function, you must create a rule.

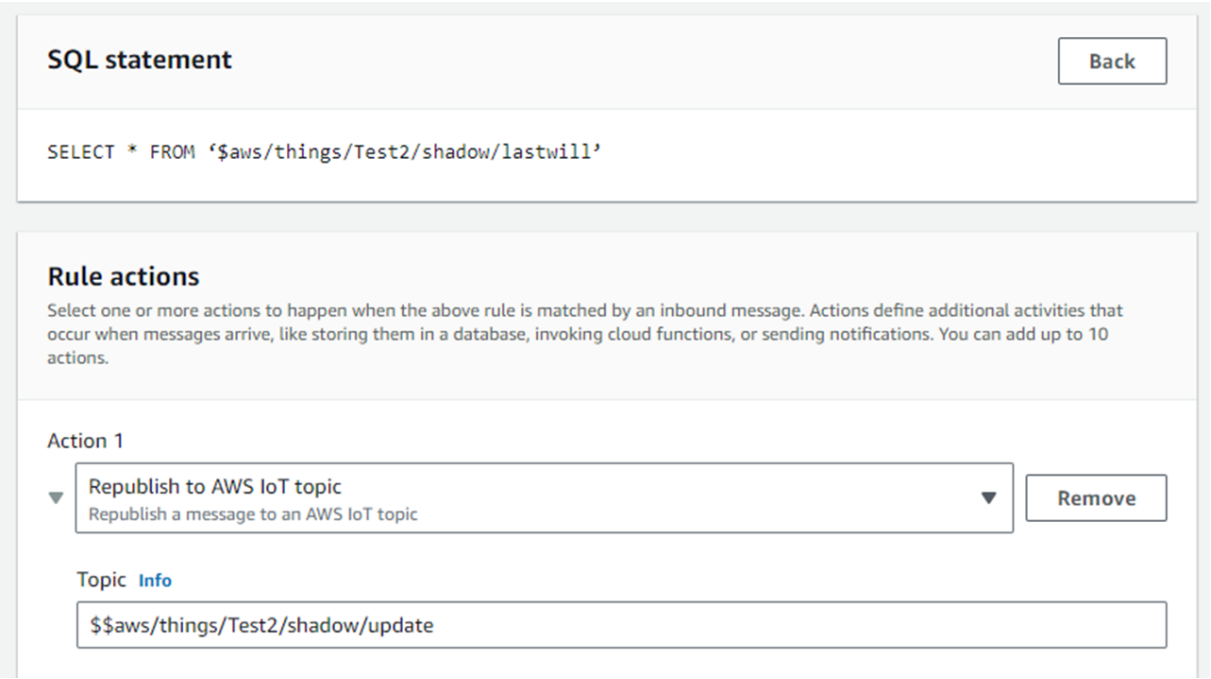
The rules can be found in the IoT Core on the left-hand side under Message routing:




Here you must create a new rule using the "Create rule" button with the following parameters:

SQL command: SELECT * FROM '$aws/things/<THINGNAME>/shadow/lastwill'

Republish to: $$aws/things/<THINGNAME>/shadow/update




You must create an IAM role as an authorisation or select one if it already exists.

Please ensure that the following entry is included in the policy assigned to the role:

{
"Version": "2012-10-17",
"Statement": {
"Effect": "Allow",
"Action": "iot:Publish",
"Resource": "arn:<IHRE Account ID>:topic/$aws/things/<Thingname>/shadow/update"
}
}

In the case of an automatically generated role, the topic is also specified with two $ for a reserved topic ($$) in the policy. You may need to correct this.

Further details on the topic of Lastwill can be found in the AWS documentation:

Using shadows in apps and services - AWS IoT Core

This rule sets the parameter in the device shadow to "false" if the connection between easyE4 and AWS is lost.

# 6 Possible causes of errors when establishing a connection

## 6.1 No Internet connection of the easyE4

Make sure that the easyE4 has an active Internet connection.

## 6.2 Missing DNS server

When using a static IP address in the easyE4, the address of the DNS server must be stored.

## 6.3 Proxy

The connection between the easyE4 and AWS is a certificate-based encrypted connection (mTLS). This means that the certificates must not be exchanged (proxy server). If the easyE4 does not establish a connection with AWS, please contact your IT department in this regard.

## 6.4 Policy

When registering the easyE4 in AWS, a policy is created that authorises the device to communicate with AWS IoT. This policy must contain at least the following entries so that the easyE4 can communicate with AWS IoT:

{"Effect": "Allow", "Action": "iot:Connect",

"Resource": "arn:aws:iot:<Region>:Account>:client/<Thingname>"},

{"Effect": "Allow", "Action": "iot:Subscribe",

"Resource": "arn:aws:iot:<Region>:<Account>:topicfilter/$aws/things/<Thingname>/*"},

{"Effect": "Allow", "Action": "iot:Publish",

"Resource":  "arn:aws:iot:<Region>:<Account>:topic/$aws/things/<Thingname>/*"},

{"Effect": "Allow", "Action": "iot:Receive",

"Resource":  "arn:aws:iot:<Region>:<Account>:topic/$aws/things/<Thingname>/*"}

# 7 Possible application suggestions in AWS

With the successful registration of easyE4 in AWS, you now have the possibility to use the various services of AWS. Possible use cases would be

## 7.1 Create a dashboard:

We recommend this video from the AWS documentation:

https://www.youtube.com/watch?v=z8T4hAERuOg&themeRefresh=1

## 7.2 Monitoring values:

https://www.youtube.com/watch?v=5FYacbAfPOU

# 8 References

| Documentation | RAM05 | LINK |
|---|---|---|
| Manual easyE4 | MN050009EN | DownloadCenter |
| AWS documentantion | 0001 | AWS documentation |

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Eaton Industries GmbH
Hein-Moeller-Str. 7- 11
D-53115 Bonn/Germany


07/2024 AP050027EN

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