

#### CONPROSYS

## **Technical Guide**

## Microsoft Azure Data Transmission Procedure

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|   |    |   |    |   |    |

| Introduction                 | 3  |
|------------------------------|----|
| Overview                     | 5  |
| Practices                    | 16 |
| Customer Support and Inquiry | 66 |
| Index                        | 68 |



### CONTEC CO., LTD.

### **Table of Contents**

| Introduction   | 3 |
|--|---|
| 1. Related Manuals                                     | 4 |
| Overview   | 5 |
| 1. Overview  | 5 |
| 2. Preconditions                                       | 7 |
| 3. Advance Preparation                                 | 3 |
| 1. Task 1: Installing Microsoft Azure Storage Explorer | 3 |
| 2. Task 2: Installing Device Explorer1                 | 3 |
| Practices10  | 6 |
| 1 Details of Practices                                 | 7 |

| т. | Details of Flactices   | エ /               |
|----|--|-------------------|
| 2. | Practice 1: Accessing Microsoft Azure  | 18                |
| 3. | Practice 2: Transmitting Data from the Device to Azure IoT Hub                                 | 21                |
|    | 1. Task 1: Creating an Azure IoT Hub   | 21                |
|    | 2. Task 2: Registering the Device (CONPROSYS) in IoT Hub                                       | 26                |
|    | 3. Task 3: Transmitting Measurement Data from the Device (CONPROSYS) to Azure IoT              | Hub29             |
| 4. | Practice 3: Checking the Azure IoT Hub Communication Status                                    | 35                |
|    | 1. Task 1: Checking the Data Reception Status (Data Transmission from CONPROSYS) v<br>Explorer | vith Device<br>35 |
|    | 2. Task 2: Checking Data Transmission from the Azure IoT Hub                                   | 37                |
| 5. | Practice 4: Storing the Data in Azure Storage  | 38                |
|    | 1. Task 1: Creating an Azure Storage Account   | 38                |
|    | 2. Task 2: Storing the Data in BLOB Storage Using Azure Stream Analysis                        | 43                |
|    | 3. Task 3: Checking After the Data is Stored   | 52                |
| 6. | Practice 5: Visualizing the Data in Power BI   | 55                |
|    | 1. Task 1: Accessing Power BI Portal   | 55                |
|    | 2. Task 2: Transmitting Data to Power BI   | 56                |
|    | 3. Task 3: Displaying the Data in Power BI   | 63                |
|    |  |                   |

### 

| 1. Se | ervices6 | 7 |
|-------|----------|---|
|-------|----------|---|

## Introduction

This section introduces various manuals related to the product that you will use. As necessary, use these manuals before using the product.

### **1.Related Manuals**

The manuals related to the product are listed below.

Read them as necessary along with this document.

### Must Read the Followings.

| Name                           | Purpose  | Contents How to get   |  |  |
|--------------------------------|--|---|--|--|
| Product Guide                  | Must read this after opening the package.                | This lists the product configuration and describes the precautions.       | Included in the package<br>(Printed matter)  |  |
| Setup Manual                   | Read this when setting up the product.                   | This describes the required items for setup and configuration procedure.  | Download from<br>the Contec<br>website (PDF) |  |
| Reference Manual<br>(Hardware) | Read this when operating the product.                    | This describes the hardware aspects such as functions and settings.       | Download from<br>the Contec<br>website (PDF) |  |
| Reference Manual<br>(Software) | Read this when setting up the<br>"CONPROSYS WEB Setting" | This describes how to set each<br>function of "CONPROSYS WEB<br>Setting". | Download from<br>the Contec<br>website (PDF) |  |

### Download Manuals

Download the manuals accordingly from the following URL.

Download

https://www.contec.com/download/

## Overview

This section explains items, such as the overview and preconditions for performing practices using this guide.

### **1.Overview**

This guide explains the methods of actually creating resources on the Microsoft Azure, collecting data transmitted from CONPROSYS, processing real-time data, storing data and visualizing data.

| Product name | Role   |  |  |
|--------------|--|--|--|
| CONPROSYS    | Collect information from the sensors, etc., and transmit the collected information to the IoT Hub. |  |  |

#### Microsoft Azure Services

| Azure Services   | Role  |  |  |
|------------------|---|--|--|
| IoT Hub          | Transmit/receive data between devices (e.g., CONPROSYS) and Azure |  |  |
| Stream Analytics | Process real-time data, convert data and extract features         |  |  |
| Blob Storage     | Store measurement data  |  |  |
| Power BI         | Visualize measurement data  |  |  |

\* This guide shows examples of linkage between CONPROSYS and Azure.

### **2.Preconditions**

Please prepare the following accounts required by this guide in advance.

### Azure Subscription and Microsoft Account

An activated Azure subscription and a Microsoft account are required.

### 

Be sure to purchase and activate an Azure subscription before starting the practices in this guide. For the procedures for purchase and activation of a Microsoft Azure subscription, see "Microsoft Azure subscription application - Service usage step by step".

https://docs.microsoft.com/en-us/azure/architecture/

\* For details on the rate structures and rate plans of Microsoft Azure, visit the following website: http://azure.microsoft.com/en-us/pricing/overview/

### Account to Access the Power BI Website

An account to access the Power BI website is required.

To register (sign up) for the Power BI website, register your "e-mail address", "password" and "name" from the following URL:

https://powerbi.microsoft.com/en-us/

You cannot use your personal e-mail address to register an e-mail address here.

(An e-mail address used in a company/organization must be entered)

### CONPROSYS Operating Procedures

Regarding the procedures for data linkage with Microsoft Azure, the configuration of the basic settings of CONPROSYS, task scripting settings and monitoring settings are explained. These explanations assume that you understand the operation methods of these settings to some degree. For the detailed setting methods, see the "**Reference Manual (Software Edition)**".

### **3.Advance Preparation**

### 1. Task 1: Installing Microsoft Azure Storage Explorer

Install Microsoft Azure Storage Explorer. Access the URL (http://storageexplorer.com/) and download Microsoft Azure Storage Explorer. Click "Free download for Windows" displayed at the center of the screen.



2 Select [Save] for "StorageExplorer.exe".

Do you want to run or save StorageExplorer.exe (46.3 MB) from download.microsoft.com? Bun Save 👻 Cancel

**3** Click the downloaded "StorageExplorer.exe" to install it.



**4** Select "I accept the agreement", and then click [Install].



**5** Select the installation folder, and then click [Next >].

| 🚰 Setup - Microsoft Azure Storage Explorer   | —        |           | ×    |
|--|----------|-----------|------|
| Select Destination Location<br>Where should Microsoft Azure Storage Explorer be installed? |          |           | Ð    |
| Setup will install Microsoft Azure Storage Explorer into the f                             | ollowin  | g folder. |      |
| To continue, click Next. If you would like to select a different folder,                   | click Br | owse.     |      |
| C:¥Program Files (x86)¥Microsoft Azure Storage Explorer                                    | E        | Browse    |      |
| At least 148.0 MB of free disk space is required   |          |           |      |
| Acteast 146.0 Mb of free disk space is required.   |          |           |      |
| < Back Next  | :>       | Ca        | ncel |

**6** Select the Menu folder, and then click [Next >].

| Setup - Microsoft Azure Storage Explorer                                      | _       |           | ×      |
|---|---------|-----------|--------|
| Select Start Menu Folder<br>Where should Setup place the program's shortcuts? |         |           |        |
| Setup will create the program's shortcuts in the following St                 | art Me  | enu folde | er.    |
| To continue, click Next. If you would like to select a different folder,      | click B | Browse.   |        |
| Microsoft Azure Storage Explorer  |         | Browse.   |        |
|   |         |           |        |
|   |         |           |        |
|   |         |           |        |
|   |         |           |        |
| Don't create a Start Menu folder  |         |           |        |
|   |         |           |        |
| < Back Next   | t >     |           | Cancel |

### Microsoft Azure Data Transmission Procedure

### **7** The installation starts.



#### Click **[Next >]** to complete the installation.

8

| 🚰 Setup - Microsoft Azure Sto | rage Explorer — 🗆 🗡  |
|-------------------------------|--|
|                               | Completing the Microsoft Azure<br>Storage Explorer Setup Wizard  |
|                               | Setup has finished installing Microsoft Azure Storage Explorer<br>on your computer. The application may be launched by<br>selecting the installed shortcuts. |
|                               | Click Finish to exit Setup.  |
|                               | ✓ Launch Microsoft Azure Storage Explorer  |
|                               | Next >   |



**9** Microsoft Azure Storage Explorer starts. If you are using a Proxy, be sure to configure the "Proxy Settings".

| Microsoft Azure Storage Explorer  |              | – 🗆 X  |
|---|--------------|--|
| Edit Help   |              |  |
| Microsoft Azure   |              |  |
| ¢ A ⊕ O   |              | Microsoft Azure Storage Explorer - Proxy Settings 🛛 🛛 🗙  |
| Search for resources  |              |  |
| Collapse All<br>1+ Quick Access<br>(Local and Attached)<br>E Storage Accounts |              | Proxy Settings <ul> <li>Do not use proxy</li> <li>Use custom proxy settings</li> <li>URL:</li> <li>Port:</li> <li>Use a username and password</li> </ul> |
| Actions Properties  | 9            | Username:  |
|   | Activity Log | Password:  |
| What do you like about this tool?<br>What don't you like or feel is missing?  |              | OK Cancel  |

**10** Register a user for Microsoft Azure.

- 1. Click the user icon.
- 2. Click [Add an account].
- 3. When the Azure login screen is displayed, enter the account information "e-mail address".
- 4. Enter the **"password".**
- 5. Click [Sign in].

| Image: Starting Products       Referred         File       Est: View Help         DD/OBSR       Referred         (1) white resources       x         (1) white resources       x         (1) white resources       x         (2) white resources       x         (2) white resources       x         (2) white resources       x         (2) white resources       x         (3) white resources       x         (4) white resources       x         (5) white resources       x         (1) white resources       x         (2) white resources       x         (2) white resources       (2) white resources         (2) white resources       (2) white resources         (2) white resources       (2) white resources         (3) white resources       (2) white resources         (4) white resources       (2) white resources         (2) white resources       (2) white resources         (3) white resources       (2) white resources         (4) white resources       (2) white resources         (5) white resources       (2) white resources         (4) white resources       (2) white resources         (5) white resources       (2) white resources< | Notes: 11.0 x Ature Storage Explorer - Connect X Ature Storage Explorer - Connect X Ature Account or service? Ature Account or service? Ature Account or service? Ature Account or ashared access signature UR connection string or a shared access signature UR torage account name and key |
|---|--|
| Sign in to your account -<br>Microsoft Azure  Microsoft Sign in   Email, phone, or Skype   Rext No account? Create one! Can't access your account?  | X Sign in to your account - X<br>Microsoft Azure<br>Microsoft<br>admin@contecconprosys.onmicrosoft.com<br>Enter password<br>(4)<br>Back Sign in<br>Forgot my password  |

**11** After the registration is completed, click the user icon, select the displayed subscription, and then click **[Apply]**.

| 🚰 Microsoft Azure Storage Explorer |  |  |  |  |  |  |
|------------------------------------|--|--|--|--|--|--|
| <u>F</u> ile <u>E</u> d            | it <u>V</u> iew <u>H</u> elp                                   |  |  |  |  |  |
| ·                                  | ACCOUNT MANAGEMENT   |  |  |  |  |  |
| $\sim$                             | Show resources from these subscriptions:                       |  |  |  |  |  |
| X                                  | 商 株式会社コンデック Remove   |  |  |  |  |  |
| 出                                  | @  |  |  |  |  |  |
| Y                                  | <ul> <li>All subscriptions</li> <li>Microsoft Azure</li> </ul> |  |  |  |  |  |
|                                    |  |  |  |  |  |  |
|                                    | Add an account   |  |  |  |  |  |
|                                    | Apply Cancel   |  |  |  |  |  |
|                                    |  |  |  |  |  |  |

**12** The information of storage accounts under the Azure user is displayed.

| 🔠 Microsoft Azure Storage Explorer |  |  |  |  |  |  |
|------------------------------------|--|--|--|--|--|--|
| <u>F</u> ile <u>E</u> di           | it <u>V</u> iew <u>H</u> elp                     |  |  |  |  |  |
| ·:-                                | EXPLORER   |  |  |  |  |  |
| 0                                  | Search for resources × $\wp$                     |  |  |  |  |  |
| $\sim$                             | Collapse All Refresh All                         |  |  |  |  |  |
| ж                                  | ⊒¥ Quick Access                                  |  |  |  |  |  |
| Y                                  | <ul> <li>(Local and Attached)</li> </ul>         |  |  |  |  |  |
|                                    | <ul> <li>Cosmos DB Accounts (Preview)</li> </ul> |  |  |  |  |  |
|                                    | <ul> <li>Data Lake Store (Preview)</li> </ul>    |  |  |  |  |  |
|                                    | ▶  |  |  |  |  |  |
|                                    | 🔺 🔊 Microsoft Azure ( 🛛 @                        |  |  |  |  |  |
|                                    | ✓  |  |  |  |  |  |
|                                    |  |  |  |  |  |  |

This completes the installation of Microsoft Azure Storage Explorer.

### 2. Task 2: Installing Device Explorer

Install Device Explorer.

**1** Access the URL (https://github.com/Azure/azure-iot-sdks/releases), and then click the installer "SetupDeviceExplorer.msi" of Device Explorer to download it.

| Downloads                 |         |
|---------------------------|---------|
| T SetupDeviceExplorer.msi | 2.66 MB |
| Source code (zip)         |         |
| Source code (tar.gz)      |         |

**2** Run the downloaded "SetupDeviceExplorer.msi".



**3** Start the installation, and then click **[Next >]**.

| 🕞 DeviceExplorer   |  | -  | _                          |                                   | ×           |
|--|--|--|----------------------------|-----------------------------------|-------------|
| Welcome to the DeviceExp   | olorer Setup   | Wizard   |                            |                                   |             |
| The installer will guide you through the computer.   | he steps required  | I to install Device                                      | Explo                      | prer on y                         | our         |
| WARNING: This computer program i<br>treaties. Unauthorized duplication or<br>result in severe civil or criminal penal<br>possible under the law. | is protected by co<br>distribution of this<br>Ities, and will be p | ppyright law and<br>program, or any<br>prosecuted to the | intern<br>/ porti<br>e max | ational<br>on of it, r<br>imum ex | nay<br>dent |
|  | Cancel   | < Back   |                            | Next :                            | >           |

**4** Specify the installation folder, and then click **[Next >]**.

| 岁 DeviceExplorer   |                         |
|--|-------------------------|
| Select Installation Folder   |                         |
| The installer will install DeviceExplorer to the following folder.                     |                         |
| To install in this folder, click "Next". To install to a different folder, enter it be | elow or click "Browse". |
| <u>F</u> older:  |                         |
| C:¥Program Files (x86)¥Microsoft¥DeviceExplorer¥                                       | Browse                  |
|  | Disk Cost               |
| Install DeviceExplorer for yourself, or for anyone who uses this co                    | mputer:                 |
| Everyone   |                         |
| Just me  |                         |
| Cancel < Back  | Next >                  |

**5** The installation is confirmed. Click **[Next >]**.

| 😸 DeviceExplorer  | - C <b>X</b> |
|---|--------------|
| Confirm Installation  |              |
| The installer is ready to install DeviceExplorer on your computer.<br>Click "Next" to start the installation. |              |
|   |              |
|   |              |
|   |              |
| Cancel < Back   | Next >       |

**6** Complete the installation, and then click **[Close]**.



## **Practices**

This section provides explanations for matters, such as how to access Azure and how to transmit data from CONPROSYS.

### **1.Details of Practices**

This guides explains the following practice details.

- Practice 1: Accessing Azure, and creating a resource group.
- Practice 2: Creating an Azure IoT Hub, and transmitting data from CONPROSYS.
- Practice 3: Checking the received information of Azure IoT Hub using Device Explorer. Also, transmitting data from Device Explorer to CONPROSYS.
- Practice 4: Storing the IoT Hub data in BLOB storage using Stream Analytics. Also, checking the stored information using Microsoft Azure Storage Explorer.
- Practice 5: Visualizing the IoT Hub data in Power BI using Stream Analytics.

You will learn the method of expanding the following system configuration on Azure through the five practices.



### 2. Practice 1: Accessing Microsoft Azure

This practice explains how to access Microsoft Azure and how to create a resource group.

#### [Reference] Tips for starting the Web browser

If more than one Microsoft accounts or Azure accounts are used, you may not be able to sign in to Azure Portal successfully due to the problems of the browser cache.



1 Access the Azure Portal (https://portal.azure.com/) using the Web browser, enter **the Microsoft account** and **password** on the displayed Azure sign-in screen, and then click the [Sign in] button to log in to Azure Portal.

| Microsoft                        | Microsoft                  |                       |    |
|----------------------------------|----------------------------|-----------------------|----|
| Sign in to Microsoft Azure       | admin@conteccor            | Enter the password he | re |
| Next                             |                            |                       |    |
| No accol ine!<br>Can't acc it?   | Back<br>Forgot my password | Sign in               |    |
| Enter the Microsoft account here |                            |                       |    |

**2** When you log in, the following Azure Portal screen is displayed. (Indication details vary depending on the status of the service you are using.)

| Microsoft Azure        | ₽ Sear   | ch resources, services, and           | l docs      |                        | >                          | Д.           | >_                | <u>نې</u>  | 0  | 0           | ₽       | admin@con<br>क्रिडी | itecconpr               |
|------------------------|--|---------------------------------------|-------------|------------------------|----------------------------|--------------|-------------------|------------|----|-------------|---------|---------------------|-------------------------|
| Create a resource      | ダッシュボード 〜  | + 🛪 坐 🖉                               | a 2         | ð 🗊                    |                            |              |                   |            |    |             |         |                     | •                       |
| i≡ All services        | All resources<br>all subscriptions                           |                                       | Quick       | start tutori           | ials                       |              |                   |            |    | ex01<br>WEB | l con   |                     | contecdemo              |
| — 🛨 Favorites —————    |  | 🖏 Refresh                             |             |                        |                            |              |                   |            |    |             |         |                     |                         |
| Dashboard              |  | loT Hub                               |             | Window<br>Provision V  | s Virtual N<br>Vindows Ser | lachines     | 12<br>rver. Share | Point VM   | ls |             |         |                     |                         |
| All resources          | I FAQ_TEST   | Web App Bot                           | _           |                        |                            |              |                   |            |    |             |         |                     |                         |
|                        | faqtest-9db7   | App Service                           |             | Linux Vir              | tual Mach                  | ines 🛛       |                   |            |    | Runn        | ing     | <b>5</b>            | Available               |
| Resource groups        | Ex01CON  | App Service                           | -           | Provision L            | Jbuntu, Red                | Hat, CentO   | s, suse, c        | oreOS VIV  | 1s | FAQ         | TEST    |                     |                         |
| 🔇 App Services         | CONTEC-DEMO001   | loT Hub                               |             |                        |                            |              |                   |            |    | WEB /       | APP BOT |                     | STREAMING JOB           |
| 👼 SQL databases        |  | Stream Analytics job                  | 0           | Create Wel             | b Apps using               | .NET, Java,  | Node.js,          | Python, Pl | HP |             |         |                     |                         |
| 🖷 SQL data warehouses  | ws-spseminar000Plan1   | Machine Learning Stu                  |             |                        |                            |              |                   |            |    |             |         |                     |                         |
| 🧷 Azure Cosmos DB      |  | See more                              | <i>&lt;</i> | Function<br>Process ev | s ⊠<br>ents with a s       | erverless co | ide archite       | ecture     |    |             |         |                     |                         |
| Virtual machines       |  |                                       |             |                        |                            |              |                   |            |    |             |         |                     | CONTEC-DEN              |
| 💠 Load balancers       |  |                                       | SQL         | SQL Data<br>Managed r  | abase 🖄<br>elational SQ    | L Database   | as a Servi        | ce         |    |             |         |                     | AZURE IOT HUB<br>Active |
| Storage accounts       | Service Heal   | th                                    |             |                        |                            |              |                   |            |    |             |         |                     |                         |
| <∞> Virtual networks   | Personalized guidance and su<br>in Azure services affect you | upport when issues<br>u. Learn more 🖄 |             | Marketpl               | ace                        |              |                   |            |    |             |         |                     |                         |
| Azure Active Directory |  |                                       |             |                        |                            |              |                   |            |    |             |         |                     |                         |
| 🔗 Monitor 🗸 🔹          |  |                                       |             |                        |                            |              |                   |            |    |             |         |                     | *                       |

**3** First, create one resource group from the Azure Portal.

\* The resources that you will create in the subsequent tasks are put in this resource group. From the Hub menu, click **[Resource groups]**, and then **[Add]**.

| Microsoft Azu      | re     |  |                             | ${\cal P}$ Search resources, services, a |               |           | Q     | >_ | <u>نې</u> | $\odot$ | 0    | Ŗ       | admin@ | contecconpr<br>転会社コンテック | ;    |         |
|--------------------|--------|--|-----------------------------|--|---------------|-----------|-------|----|-----------|---------|------|---------|--------|-------------------------|------|---------|
| + Create a resourc | e      | Home > Resou<br>Resource g<br>株式会社コンテッ | irce groups<br>groups<br>ック |  |               |           |       |    |           |         |      |         |        |                         | *    | ×       |
| i∃ All services    |        | + Add ≣≣                               | Edit columns                | Ů Refresh │ ♦ Assign Tags                |               |           |       |    |           |         |      |         |        |                         |      |         |
| - 🛨 FAVORITES      |        | Subscriptions                          | Microsoft Azur              | e  | 1.0.00        |           |       |    |           |         |      |         |        |                         |      | i.      |
| 🔙 Dashboard        | -      | 7 items                                | e                           |  | All locations |           |       |    |           | 5       | ×    | No grou | ping   |                         | ~    | 18      |
| All resources      |        |  |                             |  |               | SUBSCRIPT | ION   |    |           |         | LOCA |         |        |                         |      |         |
| Resource group     | 5      | 🗌 🌔 c                                  | ONTEC_DEMO                  |  |               | Microsoft | Azure |    |           |         | Japa | n West  |        |                         |      |         |
| 🔕 App Services     |        | 🗌 🌘 ec                                 | dgetest                     |  |               | Microsoft | Azure |    |           |         | Japa | n West  |        |                         |      | -       |
| 👼 SQL databases    |        | - (1) B                                | (01CON                      |  |               | Microsoft | Azure |    |           |         | Japa | n West  |        |                         |      | 4<br>80 |
|                    |        |  | AQ_TEST                     |  |               | Microsoft | Azure |    |           |         | Japa | n West  |        |                         |      | -       |
| SQL data waren     | ouses  |  | отс                         |  |               | Microsoft | Azure |    |           |         | East | US 2    |        |                         |      | 2       |
| 🧟 Azure Cosmos D   | В      |  | intime                      |  |               | Microsoft | Azure |    |           |         | Japa | n East  |        |                         |      | -       |
| Virtual machines   |        |  | EST                         |  |               | Microsoft | Azure |    |           |         | Japa | n West  |        |                         | •••• | -1      |
| 🚸 Load balancers   |        |  |                             |  |               |           |       |    |           |         |      |         |        |                         |      |         |
| E Storage account  | s      |  |                             |  |               |           |       |    |           |         |      |         |        |                         |      |         |
| 💮 Virtual networks | (i     |  |                             |  |               |           |       |    |           |         |      |         |        |                         |      |         |
| Azure Active Dir   | ectory |  |                             |  |               |           |       |    |           |         |      |         |        |                         |      |         |
| Monitor            |        |  |                             |  |               |           | _     | _  | _         | _       | _    | _       |        |                         | _    |         |

**4** Enter the setting items, and create a resource group.

| Resource group<br>Create an empty resource group | □ × |
|--|-----|
| * Resource group name<br>CONTEC_DEMO_2           | ~   |
| * Subscription<br>Microsoft Azure                | ~   |
| * Resource group location<br>Japan West          | ~   |
|  |     |
|  |     |
|  |     |
|  |     |
|  |     |
|  |     |
| Create   |     |

| Setting item            | Setting details                       |
|-------------------------|---------------------------------------|
| Resource group name     | Enter [CONTEC_DEMOxxx] * Set any name |
| Subscription            | Select [Microsoft Azure]              |
| Resource group location | Select [Japan West]                   |

### **3.Practice 2: Transmitting Data from the Device to Azure IoT Hub**

This practice explains how to create an Azure IoT Hub and how to transmit measurement data from the device (CONPROSYS) to the IoT Hub.

### 1. Task 1: Creating an Azure IoT Hub

**1** Create one IoT Hub from the Azure Portal. From the Hub menu, click **[Create a resource]**, **[Internet of Things]**, and then **[IoT Hub]**.



2 Enter the following setting details in the IoT Hub, and then click the **[Review + create]** button.

| Home > New > IoT hub  |   |  |
|---|---|--|
| loT hub   |   |  |
| Microsoft   |   |  |
|   |   |  |
| Basics Size and scale Revie   | w + create  |  |
| Create an IoT Hub to help you connect,  | , monitor, and manage billions of your IoT assets. Learn More       |  |
| PROJECT DETAILS   |   |  |
| Select the subscription to manage depl<br>organize and manage all your resource | oyed resources and costs. Use resource groups like folders to<br>s. |  |
| * Subscription <b>1</b>   | Microsoft Azure   |  |
| * Resource Group <b>0</b>   | Create new 💿 Use existing   |  |
|   | CONTEC_DEMO V   |  |
| * Region <b>1</b>   | Japan West 🗸 🗸  |  |
| * IoT Hub Name  | CONTEC-DEMO002  |  |
|   |   |  |
|   |   |  |
|   |   |  |
|   |   |  |
|   |   |  |
|   |   |  |
| Review + create Next: Size  | and scale » Automation options                                      |  |
|   |   |  |

| Setting item               | Setting details                                      |
|----------------------------|--|
| IoT Hub Name               | Enter [CONTEC-DEMOxxx] * Set any name                |
| Price and scale tier       | S1 - Standard  |
| Number of S1 IoT Hub units | 1  |
| Device-to-cloud partition  | 4 partitions   |
| Subscription               | Select [Microsoft Azure]                             |
| Resource Group             | Check "Use existing", and then select "CONTEC_DEMO". |
| Region                     | Select [Japan West]                                  |

**3** When you click the notification icon, a notification stating "Deployment in progress...." is displayed.



**4** If you wait for a while after the deployment is started, a notification stating that the creation of the IoT Hub is completed is displayed.



**5** From the Hub menu, click **[Resource groups]**, select the resource group you have created, and then click **[Overview]**. You can view the created IoT Hub resources.

| Microsoft Azure        | ✓ Search resource  | s, services, and docs         | ×   | Q            | >_                  | <u>نې</u>          | $\odot$  | 0      | Ŗ       | admin@contec<br>株式会社:                   | conpr<br>コンテック | 9        |
|------------------------|--|-------------------------------|-----|--------------|---------------------|--------------------|----------|--------|---------|---|----------------|----------|
| Create a resource      | Home > Resource groups > CONTEC_DEMO<br>Resource groups 《 メ ×<br>株式会社コンテック | CONTEC_DEMO<br>Resource group |     |              |                     |                    |          |        |         |   |                |          |
| ∃ All services         | 🕂 Add 🗮 Edit columns \cdots More   |                               | ~ « | +            | Add                 | Edit               | column   | s 💼    | Delete  | resource group 🛛 🖸                      | Refresh        | → ма     |
| ★ FAVORITES            | Filter by name   | (🐑 Overview                   |     | Subs<br>Micr | criptior<br>osoft A | i (change)<br>zure |          |        |         | Subscription ID<br>6f47b915-696d-4d8f-9 | 967f-9017e3.   | 2        |
| 🛄 Dashboard            | NAME 🗇   | Activity log                  |     | Click        | here to             | add tag            | Js       |        |         |   |                |          |
| All resources          | CONTEC_DEMO  | Access control (IAM)          |     |              |                     |                    |          |        |         |   | *              | -        |
| Resource groups        | edgetest   | 🛷 Tags                        |     | Filt         | er by n             | ame                |          |        |         | All types                               |                | <u> </u> |
| 🔇 App Services         | FAQ_TEST   | SETTINGS                      |     | 1 of         | 6 items             | selected           | <b>V</b> | Show h | idden t | ypes <b>O</b>                           | ,              | TYPE     |
| 👼 SQL databases        | 😭 ютс  | 📣 Quickstart                  |     | -            |                     | CONTE              | C DEM    | 2      |         |   |                |          |
| 🚔 SQL data warehouses  | runtime  | Q Resource costs              |     | -            | *                   | CONTE              |          | 01     |         |   |                | Stream   |
| Azuro Cormor DB        | TEST   | Deployments                   |     |              | -                   | contect            | lemo     |        |         |   | 4              | Storage  |
| Azure Cosinos Do       |  | Policies                      |     | -            | £,                  | CONTE              | C-DEM    | 0001   |         |   | I              | loT Hu   |
| Virtual machines       |  | E Properties                  |     |              | εX.                 | CONTE              | C-DEM    | 2002   |         |   | i              | loT Hul  |
| 🚸 Load balancers       |  | Locks                         |     |              |                     | contect            | demo1    |        |         |   | 3              | Storage  |
| Storage accounts       |  | Automation script             |     |              |                     |                    |          |        |         |   |                |          |
| 💮 Virtual networks     |  |                               |     |              |                     |                    |          |        |         |   |                |          |
| Azure Active Directory |  | MONITORING                    |     |              |                     |                    |          |        |         |   |                |          |

**6** When you select and click the created IoT Hub, the setting screen of the IoT Hub is displayed.



7 Then, select [Shared access policies] from the Setting menu, and then click [iothubowner].

| Search (Ctrl+/)        | « | 🕂 Add                         |   |
|------------------------|---|-------------------------------|---|
| X Overview             | - | IoT Hub uses permissions to g | rant access to each IoT hub endpoint. Permissions limit the access to an IoT hub based on |
| Activity log           |   | functionality.                |   |
| Access control (IAM)   |   | 0                             |   |
| P Tags                 |   | Policy                        | PERMISSIONS   |
| Events                 |   | service                       | service connect   |
| TTINGS                 |   | device                        | device connect  |
| Shared access policies |   | registryRead                  | registry read   |
| Pricing and scale      |   | registryReadWrite             | registry write  |
| Operations monitoring  |   | iothubowner                   | registry write, service connect, device connect   |
| - IP Filter            |   |                               |   |
| Certificates           |   |                               |   |
| Properties             |   |                               |   |
|                        |   |                               |   |

8 Copy and make a note of the value of [Connection string-primary key] from [Shared access keys].

(Click the copy icon on the right to save it to the clipboard)

| iothubowner X  |
|--|
| 📙 Save 🗙 Discard 👌 Regen key 💼 Delete  |
| Access policy name<br>iothubowner<br>Permissions<br>✓ Registry read<br>✓ Registry write<br>✓ Service connect<br>✓ Device connect<br>✓ Device connect<br>✓  |
| Shared access keys<br>Primary key ①<br>fJKPXECMxtgwtfX3cB1ka0NiHfEo7C3bOopmNeyzw14=<br>Secondary key ①<br>SHP+yuHIBTzHPo3wXZIDUAM94jISgsCpWHjDy7vc<br>Connection string—primary key ①<br>HostName=CONTEC-DEMO001.azure-devices.net;SharedAccess<br>Connection string—secondary key ①<br>HostName=CONTEC-DEMO001.azure-devices.net;SharedAcce |

### 2. Task 2: Registering the Device (CONPROSYS) in IoT Hub

**1** Using the Device Explorer tool, register the device (CONPROSYS) so that it can access the IoT Hub you have created. First, select [All apps] from the Start menu, click [Azure IoT Hub] and [Device Explorer], and then start the Device Explorer tool.

| Azure IoT Hub   | ^ |
|-----------------|---|
| Device Explorer |   |

**2** After the Device Explorer tool is started, paste the [Connection string-primary key], which you copied in Task 1 of Practice 2, into [IoT Hub Connection String] under the [Configuration] tab, and then click the [Update] button.

| Device Explorer | Twin                              |                               |                              | -3 | > |
|-----------------|-----------------------------------|-------------------------------|------------------------------|----|---|
| Configuration   | anagement Dat                     | a Messages To Device Call M   | lethod on Device             |    |   |
|                 |                                   |                               |                              |    |   |
| Connection Inf  | ormation                          |                               |                              |    |   |
| HostName=C      | ONTEC-DEMO001                     | 37U/P-                        |                              |    |   |
| devices.net,SI  | aredAccessKeyN                    | ame=iothubowner;SharedAccessk | Key=wstFJLZo0raGEUT1nVg9ZX8f |    |   |
| nQTS75cwzUi     | 15A1p16Uk=                        |                               |                              |    |   |
|                 |                                   |                               |                              |    |   |
|                 |                                   |                               |                              |    |   |
| Protocol Gate   | way HostName                      |                               |                              |    |   |
| FIDIOCOLGAIE    | way nosuvanie.                    |                               |                              |    |   |
| Lindate         |                                   |                               |                              |    |   |
| Update          |                                   |                               |                              |    |   |
| Shared Acces    | e Signature                       |                               |                              |    |   |
| Kay Name        | Solghattie                        |                               |                              |    |   |
| KeyName         | iothubowner                       |                               |                              |    |   |
| Key value       | wstFJLZo0raGEU                    | IIInVg9ZX8fnQIS75cwzUn5A1p16  | SUK=                         |    |   |
| ardor           | CONTEC-DEMO                       | J01.azure-devices.net         |                              |    |   |
| raiger          | Construction of the second second | (arrest)                      |                              |    |   |
| TTL (Days)      | 365                               |                               | Generate SAS                 |    |   |
| TTL (Days)      | 365                               | ×                             | Generate SAS                 |    |   |
| TTL (Days)      | 365                               | A V                           | Generate SAS                 |    |   |
| TTL (Days)      | 365                               | A T                           | Generate SAS                 |    |   |
| TTL (Days)      | 365                               | A Y                           | Generate SAS                 |    |   |
| TTL (Days)      | 365                               |                               | Generate SAS                 |    |   |

**3** After a while, a message saying, "Settings updated successfully" is displayed. Click the [OK] button.



**4** Open the [Management] tab, and then click the [Create] button.

| - Device Explore                         | er Twin    |         |                    |               |              |                 |              |
|--|------------|---------|--------------------|---------------|--------------|-----------------|--------------|
| Configuration                            | Management | Data    | Messages To Device | Call Method o | n Device     |                 |              |
| Actions<br>Create<br>Devices<br>Total: 0 | Re         | fresh   | Update             | Delete        | SAS          | Token 1         | Twin Props.  |
| ld                                       | Prir       | maryKey | SecondaryKey F     | PrimaryThumbl | SecondaryThu | ConnectionStrir | ConnectionSt |
| *  |            |         |                    |               |              |                 |              |

Enter any value in [Device ID], and then click the [Create] button.

5

\* Use the automatically generated values for [Primary Key] and [Secondary Key].

| Create Device  |                       |                     | —          |          | × |
|----------------|-----------------------|---------------------|------------|----------|---|
|                | Device Authentication | s 🔿 X509            |            |          |   |
| Device ID:     | CONTEC105             |                     |            |          |   |
| Primary Key:   | cv8y4VodFHWpFtIAYYZ   | oOGVQbk+7OaiG6oi0Lv | Z0Y9c=     |          |   |
| Secondary Key: | gkqTENOjatooaMaGwOZ   | fvThEJFVMEIOUXo66N  | 16w2wlc=   |          |   |
|                | 🗌 Auto Generate ID    | $\checkmark$        | Auto Gener | ate Keys |   |
|                | Create                | Cancel              |            |          |   |

**6** When "Device Created" is displayed, click the **[Done]** button.

| 🛃 Device Created   | —                          |                      | ×  |
|--|----------------------------|----------------------|----|
| ID=CONTEC105<br>PrimaryKey=bto/4wPpEZ8SkOvZDk2MICaPJCD<br>SecondaryKey=wcCpGnk0gCAWYzcqjfn7LXQDY | Ivs6YbXbhfi<br>′1uZIOuvBjG | EdZNuU=<br>IcqicLQFk | <= |
| Done   | ]                          |                      |    |

**7** Select and right-click the device you have created, and then click [Copy connection string for selected device].

\* Make a note of the connection string you copied here because it will be used in the subsequent procedure.

| Configur | ation Manag          | gement          | Data               | Messages To Devic            | e Call Method or   | Device  |                               |               |             |
|----------|----------------------|-----------------|--------------------|------------------------------|--|---|-------------------------------|---------------|-------------|
| Action   | 5                    |                 |                    |                              |  |   |                               |               |             |
| Cr       | eate                 | Refr            | resh               | Update                       | Delete   | SAS 1   | Token                         | Twin Props.   | 3           |
| Device   |                      |                 |                    |                              |  |   |                               |               |             |
|          | 26                   |                 |                    |                              |  |   |                               |               |             |
| Total    | 1                    |                 |                    |                              |  |   |                               |               |             |
| Total:   | 1                    |                 |                    |                              |  |   |                               |               |             |
| Total:   | 1<br>Id              | Prim            | naryKey            | SecondaryKey                 | PrimaryThumbf  | SecondaryThu  | ConnectionStr                 | ir Connectio  | onS         |
| Total:   | 1<br>Id<br>CONTEC105 | Prim<br>5 bto/4 | naryKey<br>IwPpEZ  | SecondaryKey                 | PrimaryThumbf  | SecondaryThu  | ConnectionStri<br>HostName=C. | ir Connectio  | onS         |
| Total:   | I<br>Id<br>CONTEC105 | Prim<br>bto/4   | naryKey<br>IwPpEZ( | SecondaryKey<br>3 wcCpGnk0gC | PrimaryThumbf<br>Copy data for al  | SecondaryThu<br>device  | ConnectionStri<br>HostName=C  | ir Connectio  | onS         |
| Total:   | 1<br>Id<br>CONTEC105 | Prim<br>5 bto/4 | naryKey<br>IwPpEZ  | SecondaryKey<br>8 wcCpGnk0gC | Primary Thumbf<br>Copy data for al<br>Copy data for se                   | SecondaryThu<br>device<br>lected device                         | ConnectionStr<br>HostName=C   | ir Connectio  | onS<br>cteo |
| Total:   | 1<br>Id<br>CONTEC105 | Prim<br>5 bto/4 | naryKey<br>IwPpEZ  | SecondaryKey<br>3 wcCpGnk0gC | Primary Thumbł<br>Copy data for al<br>Copy data for se<br>Copy connectio | SecondaryThu<br>device<br>lected device<br>n string for selecte | ConnectionStr<br>HostName=C   | ir Connection | onS         |

The Device Explorer tool performs various functions of IoT Hub, such as adding devices, using the Azure IoT service library. When you add a device using Device Explorer, the corresponding connection string is displayed.

### 3. Task 3: Transmitting Measurement Data from the **Device (CONPROSYS) to Azure IoT Hub**

### Preparation of CONPROSYS

Configure the following settings according to your environment so that you can transmit data from CONPROSYS to the Azure IoT Hub on the Internet. (For details, see the "Reference Manual (Software Edition)".)

- 1 Azure IoT Hub transmission/reception settings
- Click [Menu]→[Setting]→[Azure IoT Hub] to open the setting screen.
- Paste the "device connection string", which you copied from Device Explorer in Task 2, into • [CONNECTION\_STRING], and then click the [Set] button.

| Menu 🗄 🖃   | Azure IoT Hub   |
|--|---|
| > Status > Maintenance   | Setting > Azure IoT Hub   |
| Monitoring Edit     Monitoring View     Task Edit              | CONNECTION_STRING     IdgwtfX3cB1ka0NIHfEo7C3bOopmNeyzw14=       Retry Data Transfer Number     100 |
| <ul> <li>Return To The Top</li> <li>日本語</li> <li>中文</li> </ul> | Auto Backup     Disable        Set     Reset  |

\* After setting, execute [Menu]→[Exit]→[Save and Reboot].

**2** Creating Azure IoT transmission processing task

Data transmission from CONPROSYS to the Azure IoT Hub is performed with task scripting at any timing. The following are the examples (procedures) of task scripting of data transmission to the Azure IoT Hub.

When you click [Menu]→[Task Edit], the task editing screen is displayed.

| Menu 🕀 🖶          | Task editing screen   |  |
|-------------------|---|--|
| > Setting         | (←) → C û (① 10.1.1.101/task/task.htm?lang-en                     | ···· ♥ ☆ Q 特示 III ( 図 =<br>English ▼ 80% ▼ = |
| > Status          | Components  | Property Value                               |
| > Maintenance     | Output     Input String     Output String                         |  |
| Monitoring Edit   | Operice Status     System Info     Calculation                    |  |
| Monitoring View   | - Calculation<br>- Calc Constant<br>- Set Constant                |  |
| Task Edit         | Caic Formula     Flow Control     Determine                       |  |
| Return To The Top | - Determine(Str)<br>- Jump<br>- Label                             | Comment                                      |
| ■ 日本語             | Subroutine  |  |
| ■ 中文              | - Timer<br>- Calendar<br>- Wait                                   |  |
| Help              | String Operation     Cale String     Add FixedStr     Cale String |  |
| > Exit            | - Num2Str<br>- Split String                                       |  |

#### Transmission Task Scripting Examples

• Create the file to be transmitted using "Log" and "Log String" parts of the processing task.



Create the task scripts described above, and perform [File]→[Save task...].

Before restarting and shutting down CONPROSYS, save the settings by executing [Menu] $\rightarrow$ [Exit] $\rightarrow$ [Save] or [Save and Reboot].

The following explains the details of each task process.

(1) Execute once every minute. \* In the example, the process goes to the subsequent step at 00 seconds every minute.

| Property | Value    |  |  |
|----------|----------|--|--|
| Hour     | *        |  |  |
| Min      | *        |  |  |
| Sec      | 00       |  |  |
| Action   | one time |  |  |
| True     | Down     |  |  |
| False    | Left     |  |  |
| ×X       | 0        |  |  |
| ↓ Υ      | 0        |  |  |

#### (2) Write the key character string "DateTime" to File00 (CSV file).

| Property          | Value       |  |  |  |
|-------------------|-------------|--|--|--|
| Target file       | File00      |  |  |  |
| Str               | Fixed Value |  |  |  |
| Fixed value (str) | DateTime    |  |  |  |
| Append char       | Comma(,)    |  |  |  |
| Next step         | Down        |  |  |  |
| * X               | 0           |  |  |  |
| Υ                 | 1           |  |  |  |

#### (3) Write the key character string "TAG00" to File00 (CSV file).

| Property          | Value       |  |  |
|-------------------|-------------|--|--|
| Target file       | File00      |  |  |
| Str               | Fixed Value |  |  |
| Fixed value (str) | TAG00       |  |  |
| Append char       | Comma(,)    |  |  |
| Next step         | Down        |  |  |
| → X               | 0           |  |  |
| ↓ Y               | 2           |  |  |

#### (4) Write CR+LF (line feed code) to File00.

| Property    | Value    |  |  |
|-------------|----------|--|--|
| Target file | File00   |  |  |
| Value       | CR+LF    |  |  |
| Append char | Comma(,) |  |  |
| Next step   | Down     |  |  |
| → X         | 0        |  |  |
| ↓ γ         | 3        |  |  |

(5) Write the date data, which is the value, to File00.

| Property    | Value    |  |  |
|-------------|----------|--|--|
| Target file | File00   |  |  |
| Value       | DateTime |  |  |
| Append char | Comma(,) |  |  |
| Next step   | Down     |  |  |
| → X         | 0        |  |  |
| ↓ Y         | 4        |  |  |

(6) Write the value of TAG00 to File00.

| Property    | Value    |  |  |
|-------------|----------|--|--|
| Target file | File00   |  |  |
| Value       | TAG00    |  |  |
| Append char | Comma(,) |  |  |
| Next step   | Down     |  |  |
| → X         | 0        |  |  |
| ↓ Υ         | 5        |  |  |

(7) Write CR+LF (line feed code) to File00.

| Property    | Value    |  |  |
|-------------|----------|--|--|
| Target file | File00   |  |  |
| Value       | CR+LF    |  |  |
| Append char | Comma(,) |  |  |
| Next step   | Down     |  |  |
| → X         | 0        |  |  |
| ↓ γ         | 6        |  |  |

(8) Convert the details of File00 into JSON format, and transmit them to the Azure IoT Hub.

| Property    | Value  |  |  |
|-------------|--------|--|--|
| Target file | File00 |  |  |
| Next step   | Right  |  |  |
| → X         | 0      |  |  |
| Υ           | 7      |  |  |

(9) Delete the transmitted File00 (CSV file).

| Property  | Value  |  |  |  |  |
|-----------|--------|--|--|--|--|
| Operation | Delete |  |  |  |  |
| From      | File00 |  |  |  |  |
| Next step | Down   |  |  |  |  |
| X         | 1      |  |  |  |  |
| ↓ Y       | 7      |  |  |  |  |

### **3** Assigning Transmitted Data

In the task scripting examples stated previously, the method of transmitting the value of "TAG00" was described.

The original purpose of CONPROSYS is to transmit information, such as input information, judgment information and information acquired from PLCs. However, we will change the transmitted data (TAG00) using the Monitoring (HMI) function to simplify the operation check.

The following explains the method of changing the value of "TAG00" using the Monitoring (HMI) function.

• When you click [Menu] $\rightarrow$ [Monitoring Edit], the monitoring editing screen is displayed.

| Menu              |  |
|-------------------|--|
| Setting           |  |
|                   |  |
| > Status          |  |
|                   |  |
| Maintenance       |  |
|                   |  |
| Monitoring Edit   |  |
|                   |  |
| Monitoring View   |  |
|                   |  |
| - To all T dia    |  |
| Task Edit         |  |
|                   |  |
| Return To The Top |  |
|                   |  |
| ■ 日本語             |  |
|                   |  |
|                   |  |
| = 42              |  |
|                   |  |
| Help              |  |
|                   |  |
| > Exit            |  |
|                   |  |

• Add the display parts to the monitoring screen.

| $\leftrightarrow$ $\rightarrow$ C $\triangle$                     | 10.1.1.101/viewer/edit.htm?lang=en |      |    |    |    |     |
|---|------------------------------------|------|----|----|----|-----|
| File Edit View  | Options                            | Help |    |    |    |     |
| Components  |                                    |      |    |    | =  |     |
| - 💽 Video<br>- 🐼 Html frame                                       |                                    | 0    | 25 | 50 | 76 | 100 |
| - 🔤 Button<br>- 🍯 Switch<br>- 🍯 On Delay Switch<br>- 🚀 Text Input | Ш                                  |      |    |    |    |     |
| - Slider<br>- Checkbox<br>- Radio Button                          |                                    |      |    |    |    |     |

• Drag the parts from the tree on the left to position. Add the parts as shown in the figure below.

| 0     | 25 | 50 | 75 | 100 |
|-------|----|----|----|-----|
| Label |    |    |    |     |
| Label |    |    |    |     |

· Add two pieces of "Slider" and "Label".

• Set the display parts parameters.

You can set them in the parameter window on the right by selecting each display part. Configure the following link settings. Click the settings button to configure the link settings. Open the device tree to configure the settings.

|                | Property Layer          |                     |                        |          |                          |
|----------------|-------------------------|---------------------|------------------------|----------|--------------------------|
|                | 🏟 🔲 id=Layer0.SliderH.0 |                     |                        |          | Set the link to "TAG00." |
| ++             | Name                    | Value               | Link                   | 10       | Set the IO to "out".     |
| 0 25 50 75 100 | 💰 IonValueChange        | float Value         | CONPROSYS:TAG:TAG00    | out      |                          |
| Label          |                         |                     |                        |          |                          |
|                |                         |                     |                        |          |                          |
| Label          | Property Layer          |                     |                        | _        |                          |
|                | id=Layer0.Label         | H.0                 |                        | <u> </u> | Set the link to "TAG00." |
|                | Name                    | Value               | Link IC                |          | Set the IO to "in".      |
|                | T Text                  | Label               | CONPROSYS:TAG:TAG00 in |          |                          |
|                | 🗲 IonTextFormat         | string FormatedText | out                    |          |                          |
|                |                         |                     |                        |          |                          |
|                |                         |                     |                        |          |                          |
|                | Property Layer          |                     |                        |          | Set the link to "TAG01 " |
|                | 🔅 📋 id=Layer0.Labe      | IH.1                | /                      |          | Set the link to TAGOI.   |
|                | Name                    | Value               | Link I                 | 0        | Set the IO to "in".      |
|                | T Text                  | Label               | CONPROSYS:TAG:TAG01 in |          |                          |
|                | IonTextFormat           | string FormatedText | out                    |          |                          |

- To save the page: Select [File]→[Save page as].
- Please overwrite/save it to "user¥Page1.page". ("user¥Page1.page" is the initial startup page.)



Confirm that the "TAG00" variable can be changed.
 Click [Menu]→[Monitoring View]. The screen you created above is displayed.



\* Please check the changes in the "TAG00" value according to the changes in the slider.

### 4.Practice 3: Checking the Azure IoT Hub Communication Status

In this practice, we will check the communication status between the Azure IoT Hub and CONPROSYS using "Device Explorer".

### 1. Task 1: Checking the Data Reception Status (Data Transmission from CONPROSYS) with Device Explorer

**1** Starting Device Explorer Select [All apps] from the Start menu, click [Azure IoT Hub] and [Device Explorer], and then start the Device Explorer tool.



\* If the Device Explorer tool started in Task 2 of Practice 2 is still running, please continue to use it as is.

2 Viewing the received data

Select the [Data] tab, and then click the [Monitor] button.

\* The status set in Task 2 of Practice 2 is assumed to remain.

| Dence Explore | r Twin               |                           |                                     |                     |      | 3 |
|---------------|----------------------|---------------------------|-------------------------------------|---------------------|------|---|
| Configuration | Management Data      | Messages To Devic         | e Call Method on Device             |                     |      |   |
| Monitoring    |                      |                           |                                     |                     |      |   |
| Event Hub     | CONTEC-DEMO          | 001                       |                                     |                     |      | ] |
| Device ID     | CONTEC105            |                           |                                     |                     | ~    | Ľ |
| Start Time    | 07/27/2017 09        | :58:48                    |                                     |                     |      | ] |
| Consume       | Group: \$Default     |                           | Enable                              |                     |      |   |
| Mon           | itor                 | Cancel                    | Clear                               |                     |      |   |
|               |                      |                           |                                     |                     |      |   |
| Event Hub D   | ata                  |                           |                                     |                     |      |   |
| Receiving e   | vents                | NTEC1051 Data:U"Data      | Time"-"201707270959" "Temperature"- | "0" "Humidity"-"0"  | 11   |   |
| 2017/07/27 1  | .53.00> Device. [COI | NITEC105], Data [[ Date   | Time . 201707270355 , Temperature . | U, Humidity . U     | п,   |   |
| 2017/07/271   | 0:00:00> Device: [CC | JATEC TUSJ, Data.[{ Date  | eTime":"201707271000","Temperature" | . U , Humidity . (  | )"}] |   |
| 2017/07/271   | 0:00:00> Device: [C( | JNTECTOS, Data. ({ Date   | aTime":"201707271000","Temperature" | . U , Humidity . (  | )"}] |   |
| 2017/07/271   | 0:00:00> Device: [C( | JNTEC 105], Data. [{ Date | Time":"201707271000","Temperature"  | . u , riumidity . t | )"}] |   |
| 2017/07/271   | 0:00:00> Device: [C( |                           | Time"."201707271000"."Temperature'  | . u , numiaity . t  | )"}] |   |
| 2017/07/271   | 0:00:00> Device: [C( | JNTECTUS), Data {{ Data   | "Time"."201707271000","Temperature  | . u , Humidity . t  | )"}] |   |
| 2017/07/271   | 0:00:00> Device: [C( | nn eo noj, Dala ({ Dal    | "Time"."201707271000","Temperature  | . u , numony . t    | )"}] |   |
| 2017/07/271   | 0:00:00> Device: [C( | nn eo noj, Dala ({ Dal    | "Time"."201707271000","Temperature  | . u , numony . (    | )"}] |   |

You can view the information transmitted from CONPROSYS in the "Event Hub Data" section. Click the [Cancel] button to stop the monitoring status.

#### Viewing CONPROSYS Transmitted Log

Click [Menu] $\rightarrow$ [Status] $\rightarrow$ [Log] to view the log at the time of execution of the final transmission to the Azure IoT Hub in "Azure log".

| Menu 🗄 🖃  | Log   |
|---|---|
| > Network   | Status > Log  |
| <ul> <li>Device</li> <li>Data Transfer</li> </ul> | Data Transfer log ?   |
| Azure IoT Hub                                     | Logfile does not exist  |
| = Time  |   |
| Service   | Azure log 😢   |
| = Mail<br>= FTP                                   | ISENDCSV:/home/contec/data/min_azure/20180517155500_azurefile00.csv<br>og:_confirmation[0] received for message tracking id = 0 with result = IOTHUB_CLIENT_CONFIRMATION_OK |
| ✓ Status  | : SEINDACK OK   |
| System  |   |
| Modbus Data View                                  | NTP server comming  |
| = File View                                       | 17 May 15:52:40 ntpdate[1585]: step time server 133.243.238.244 offset 1526536682.076432 sec  |
| E Log   |   |
| > Maintenance                                     | Mail Send Ioo 🖻   |

When successfully transmitted, "!SENDACK:OK" is displayed.

#### **Viewing Resend Files**

When the transmission fails, you can view the resend files by clicking [Menu] $\rightarrow$ [Status] $\rightarrow$ [File View], selecting [Resend Folder (Azure)], and then clicking the [Get] button. The resend files are stored as converted transmitted data (JSON format).

| Menu 🗄 🖃         | File View                      |                     |              |        |
|------------------|--------------------------------|---------------------|--------------|--------|
| > Network        | Status > File View             |                     |              |        |
| Device           | Folder                         | Recend Folder (Azu  | ro)          | ×      |
| Data Transfer    | T Older                        | Resend Folder (Azu  |              |        |
| Azure IoT Hub    | Cot                            |                     |              |        |
| Time             | Gel                            |                     |              |        |
| Service          | File Name                      | Update Time         | Size (bytes) | Delete |
| Mail             | 19700101091200 azurefile00 csv | 1970/01/01 09:12:00 | 24           | Delete |
| FTP              |                                | 2018/05/17 15:17:00 | 27           | Delete |
| ✓ Status         | 20100317131700 azürenie00.csv  | 2016/03/17 13.17.00 | 37           | Delete |
| System           |                                |                     |              |        |
| Modbus Data View |                                |                     |              |        |
| File View        |                                |                     |              |        |
| Log              |                                |                     |              |        |
| > Maintenance    |                                |                     |              |        |

### 2. Task 2: Checking Data Transmission from the Azure IoT Hub

**1** Send a message from "Azure IoT Hub" to CONPROSYS using "Device Explorer". With CONPROSYS, TAG variables can be written by sending a message as shown in the example below.

#### **Message Operation Methods**

- Display the [Message to Device] tab in "Device Explorer".
- Select the device that you want to check the operation in [Device ID:], and write the data in "Message:".
- Click the [Send] device button to send data to the device.

## When you write the following data in "Message:", 1 is assigned for the value of TAG01.

{"TAG01":"1"}

| Device Explore                 | er Twin  | 末  | o × | 1   |    |    |    |        |  |
|--------------------------------|--|--|-----|-----|----|----|----|--------|--|
| Configuration                  | Management Data Messages To Device   | Call Method on Device  |     |     |    |    |    |        |  |
| Send Messa                     | age to Device:   |  |     |     |    |    |    |        |  |
| IoT Hub:                       | CONTEC-DEMO001   |  |     |     |    |    |    |        |  |
| Device ID:                     | CONTEC105  |  | ~   |     |    |    |    |        |  |
| Message:                       | {"TAG01":"11"]   |  |     |     |    |    |    |        |  |
|                                | Add Time Stamp Monitor Fee   | dback Endpoint   | 1.1 |     |    |    |    |        |  |
| Properties:                    |  |  |     |     |    |    |    |        |  |
| Ke                             | у  | Value  |     |     |    |    |    |        |  |
| •                              |  |  | _   |     |    |    |    |        |  |
|                                |  |  |     | l r |    |    |    |        |  |
|                                |  |  | _   |     |    |    |    |        |  |
| Se                             | end Clear  |  |     |     |    |    |    |        |  |
| Output                         |  |  |     |     | 0  | 25 | 50 | 75 100 |  |
| Sent to Devic                  | ce ID: [CONTEC105], Message."("TAG01"."1")",   | message ld: 5046b494-aad4-4c90-a1f2-28d38ec0d538   | 2   |     |    |    |    |        |  |
| Sent to Devic                  | ce ID: [CONTECTOS], Message: { TAG01" 1 }.<br>ce ID: [CONTECTOS], Message: { "TAG01" 1 }.  | message ld: 20be72e4-d31b-49e2-ba39-fda0191292b0   | 5   |     |    |    |    |        |  |
| Sent to Devic<br>Sent to Devic | ce ID: [CON1EC105], Message:"["TAG01"-"10"]<br>ce ID: [CONTEC105], Message:"["TAG01"-"11"] | , message ld: /ec2a9c3-953e-4405-ac75-te3c50/1e39<br>, message ld: a12da834-e008-4f06-b647-d20b427b7aa | a   |     | 1  |    |    |        |  |
|                                |  |  |     |     |    | •  |    |        |  |
|                                |  |  |     |     | 11 |    |    |        |  |
|                                |  |  |     |     |    |    |    |        |  |
|                                |  |  |     | J L |    |    |    |        |  |

You can view the changes in TAG01 value on the monitoring screen you created in Task 3 of Practice 2.

\* The message is sent from "Azure IoT Hub" at the time when the data is received from the device. In this practice, the message is received and applied at the time when the data is sent from CONPROSYS at one-minute cycle.

### 5.Practice 4: Storing the Data in Azure Storage

This practice explains how to store the measurement data received by the IoT Hub in the storage using Microsoft Azure Stream Analytics.

### 1. Task 1: Creating an Azure Storage Account

**1** From the Hub menu, click **[Create a resource]**, **[Storage]**, and then **[Storage account]**.

| Microsoft Azure       |                          | ∕⊃ Sear | ch resources, services, and doc        | s ×                  |
|-----------------------|--------------------------|---------|--|----------------------|
| <                     | Home > New               |         |  |                      |
| + Create a resource   | New                      |         |  | □ ×                  |
| i≡ All services       | ♀ Search the Marketplace | е       |  | ·                    |
|                       | Azure Marketplace        | See all | Featured                               | See all              |
| 🔲 Dashboard           | Get started              |         | Storage account                        | - blob, file, table, |
| All resources         | Recently created         |         | Quickstart tutorial                    |                      |
| 📦 Resource groups     | Recently created         |         | Azure File Sync (p                     | preview) (preview)   |
| 🔇 App Services        | Compute                  |         | Quickstart tutorial                    |                      |
| SQL databases         | Networking<br>Storage    |         | Data Lake Store<br>Quickstart tutorial |                      |
| 🙀 SQL data warehouses | Web                      |         |  |                      |

2 Enter the name of your storage account, and specify [Resource manager] for the deployment model to use.

| Create storage account   | ×    |                                 |
|--|------|---------------------------------|
| The cost of your storage account depends on the usage and the options you choose below. Learn more | Ĵ    | Enter any storage account name. |
| * Name <b>1</b>  | 4    |                                 |
| .core.windows.net  | - 11 |                                 |
| Deployment model <b>1</b><br>Resource manager Classic  |      |                                 |

The length of the storage account name is from **3 to 24 characters**, and **only numbers and lowercase letters** can be used. The storage account name must be a single name within Azure. The Azure Portal indicates whether or not the selected storage account name has already been used. **3** Select **[general purpose]** for the storage account type, and specify **[Standard]** for the default for "Performance". Select **[Locally-redundant storage (LRS)]** for "Replication". Select **[Disabled]** for "Storage service encryption (blobs and files)" and "Secure transfer required".

| Account kind <b>1</b><br>Storage (general purpose v1)                    | ~ |                             |
|--|---|-----------------------------|
| * Location   |   |                             |
| Replication <b>0</b>   |   | Select "LRS" from the list. |
| Locally-redundant storage (LRS)  | ~ |                             |
| Standard Premium   |   |                             |
| <ul> <li>Secure transfer required ①</li> <li>Disabled Enabled</li> </ul> |   |                             |

4 Select a subscription for which you want to create a new storage account, select **[Use existing]** for "Resource group" and then select the resource group name you created. Select the geographical location of the storage account. Click **[Create]** to create a storage account.

| * Location   |   |
|--|---|
| Japan West 🗸 🗸   |   |
| Replication <b>0</b><br>Locally-redundant storage (LRS) V    | Select "Japan West" from the list.  |
| Performance  Standard Premium                                |   |
| * Secure transfer required <b>1</b><br>Disabled Enabled      |   |
| * Subscription<br>Microsoft Azure                            | Select "Use existing", and then select the "Resource group name" you created.                                   |
| * Resource group<br>Create new O Use existing<br>CONTEC_DEMO | If there are more than one subscriptions, select<br>the Azure subscription for which the account is<br>created. |

**5** After a while, a notification stating that the creation is completed is displayed.



6 From the Hub menu, select [Resource groups], click the resource group name you created in Practice 1 from the list of default resource groups, confirm that a new storage account has been created, and then click Storage account.

| Create a resource     | Home > Resource groups > CONTEC_DEMO<br>CONTEC_DEMO<br>Resource group |  |                               |             |
|-----------------------|---|--|-------------------------------|-------------|
| ∃ All services        |   | Add 📰 Edit columns 💼 Delete resource group 🕐 Refresh                                 | → Move   ♦ Assign Tags        |             |
|                       | (*) Overview  | ubscription (change) Subscription ID<br>Ilcrosoft Azure 6f47b915-696d-4d8f-967f-9017 | Deployments<br>e3 5 Succeeded |             |
| Dashboard             | Activity log  | igs (change)<br>lick here to add tags  |                               |             |
| III resources         | Access control (IAM)  |  | *                             |             |
| (i) Resource groups   | 🖉 Tags  | Filter by name All types   | ✓ All locations               | ~           |
| App Services          | 1<br>SETTINGS   | of 5 items selected Show hidden types 🛛  | TYPE 🗘                        | LOCATION 10 |
| 🗟 SQL databases       | 📣 Quickstart  |  | Stream Analytics job          | Janan West  |
| 📬 SQL data warehouses | Resource costs  | contecdemo   | Storage account               | Japan West  |
| 🥒 Azure Cosmos DB     | Deployments   |  | IoT Hub                       | Japan West  |
| Virtual machines      | Policies  |  | loT Hub                       | Japan West  |
|                       | E Properties  | ✓ 🧮 contecdemo1  | Storage account               | Japan West  |
| Load balancers        |   |  |                               |             |

Click [Overview] under Storage account, and then click [Blobs] under Services. 7



8 Click [Container] to add a container.



**9** Under New container, enter any value for [Name], and then select [Private] for [Public access level].

| New container                 |              |
|-------------------------------|--------------|
|                               |              |
| * Name                        |              |
| contecdemo                    | $\checkmark$ |
| Public access level <b>1</b>  |              |
| Private (no anonymous access) | $\sim$       |
| OK Cancel                     |              |
|                               |              |

**10** You can view the container you created in the list of Blob service.

| Home > Resource groups > CONTEC_DEMO > contecdemo1 > Blob service |
|---|
| Blob service<br>contecdemo1                                       |
| ← Container     ひ Refresh   |
| Storage account<br>contecdemo1                                    |
| Status<br>Primary: Available                                      |
| Location<br>Japan West  |
| Subscription (change)<br>Microsoft Azure                          |
| Subscription ID<br>6f47b915-696d-4d8f-967f-9017e3c7c056           |
| Tags (change)   |
| Click here to add tags  |
|   |
| NAME  |
| contecdemo  |
|   |

Select the storage account you created, and then click **[Access keys]**. Copy and make notes of the "Storage account name" and **"key1"**. (Click the copy icon on the right to save it to the clipboard)

| Home > Resource groups > CONTEC_I           | > contectemo1 - Access keys   |     |   |
|---|---|-----|---|
| contecdemo1 - Access key<br>Storage account |   | *   | × |
| Ø Search (Ctrl+/)                           | Use access keys to authenticate your applications when making requests to this Azure storage account. Store your access keys securely   | y - |   |
| Overview                                    | tor example, using Azure Key Vault - and don't share them. We recommend regenerating your access keys regularly. You are provided access keys so that you can maintain connections using one key while regenerating the other.        | two |   |
| Activity log                                | When you regenerate your access keys, you must update any Azure resources and applications that access this storage account to use<br>new keys. This action will not interrupt access to disks from your virtual machines. Learn more | the |   |
| Access control (IAM)                        | Storage account name  |     |   |
| Iags  | contecdemo1   | Ð   |   |
| $oldsymbol{X}$ Diagnose and solve problems  | kev1 Č)   |     |   |
| Storage Explorer (preview)                  | Key   |     |   |
| SETTINGS                                    | YqfW1Pb55jRK4QdNcqme6Pu6nAj/GoUWWUL0UrmOLkFyWTAh3VuiTgTvw1eDy8xTG+78ZndZnAEhzswYg5XHPg==  | Ð   |   |
| 📍 Access keys                               | Connection string DefaultEndpointsProtocol=https://couutName=contecdemo1:/AccountKey=YqfW1Pb55jRK4QdNcqme6Pu6nAj/GoUWWUL0Urm  | Ð   |   |
| Configuration                               | (3 Sved   |     |   |
| Encryption                                  | Key   |     |   |
| Shared access signature                     | jHrOTu8dOmCnILXVvjyg65ysOvP0jc32v4MN8hWv4aYdJDf1rYljdSes2FzYKwlU+9U9Cxom0xyR8Z2Yf9MaiQ==  | D   |   |
| Firewalls and virtual networks              | Connection string DefaultEndrointsProtocollabttns:AccountName#contecdemo1:AccountKeu#Hr0Tu840mColl XVvivn65vsDvPDir32v4MM8bWv4a   |     |   |
| HI Properties                               | очнителировно током-пирадисоцитионе-соптеснено поссоциткеу-ратотокосопистисту удорухот орозе чинтотичиа   | 41  | 1 |

| Intitled - Notepad                                   | -     |        | ×      |
|--|-------|--------|--------|
| Eile Edit Format View Help                           |       |        |        |
| Storage Account Name : contecdemo1                   |       |        | $\sim$ |
| Key1 :   |       |        |        |
| YqfW1Pb55jRK4QdNcqme6Pu6nAj/GoUWWUL0UrmOLkFyWTAh3Vui | TgTvw | 1eDy8x | т      |
| G+78ZndZnAEhzswYg5XHPg==                             |       |        |        |
|  |       |        | ~      |

### 2. Task 2: Storing the Data in BLOB Storage Using Azure Stream Analysis

1 In the Azure Portal, click []]\*New, [Internet of Things], and then [Stream Analytics job].



**2** After specifying the following values, click **[Create]**.

| New Stream Analytics job                                       |                                 |
|--|---------------------------------|
| * Job name   | Enter any Job name.             |
| Subscription     Microsoft Azure                               | Select the Subscription to use. |
| * Resource group<br>Create new  Use existing<br>CONTEC_DEMO  V | Select "Use existing".          |
| * Location<br>Japan West<br>Hosting environment                | Select "Japan West".            |
| Streaming units  |                                 |
|  |                                 |
| Pin to dashboard Create Automation options                     |                                 |

**3** After a while, a notification stating that the creation is completed is displayed.



4 Click [Resource groups] to display the list of resource groups. Select the resource group name you created in Practice 1.

| Microsoft Azure       | $ {\cal P}$ Search resources, services, and docs                |
|-----------------------|---|
| Create a resource     | Home > Resource groups > CONTEC_DEMO CONTEC_DEMO Resource group |
| i∃ All services       |   |
| FAVORITES             | Subscription (change)     Microsoft Azure                       |
| Dashboard             | Activity log Click here to add tags                             |
| All resources         | Access control (IAM)  |
| Resource groups       | Tags  |
| 🗞 App Services        | Select the resource group name you created in Practice 1.       |
| 👼 SQL databases       | 🔹 Quicksta  |
| 🔓 SQL data warehouses | Resource costs     A CONTEC_DEMO1                               |
| 🧭 Azure Cosmos DB     | Deployments     Contecdemo                                      |
| - Nictual machines    | Policies CONTEC-DEMO001   |

**5** When the list of resource group items is displayed, select the Stream Analytics you created.

| Search (Ctrl+/)   | *    | 🕂 Add 🛛 📰 Edit columns 🛛 🛅 Delete resource group  | p 🕐 Refresh → Move 🛛 🧳 Assign   | Tags   |
|---|------|---|---|--|
| ) Overview  | -    | Subscription (change) Subscription ID<br>Microsoft Azure 6f47b915-6960<br>Tags (change)   | D Deployments<br>d-4d8f-967f-9017e3 5 Succeeded   |  |
| Activity log  |      | Click here to add tags  |   |  |
| Access control (IAM)  | -    |   | *   |  |
| • Tage  | - 11 | Filter by name All types  | ✓ All locations   | ~  |
|   | _    | 6 items Show hidden type Select the   | Stream Analytics job you  | ı created  |
| TINGS<br>Quickstart   |      | 6 items Show hidden type Select the   | Stream Analytics job you  | a created.   |
| TINGS<br>Quickstart<br>Resource costs                           |      | 6 items Show hidden type Select the NAME to CONTEC_DEMO   | Stream Analytics job you<br>Stream Analytics job<br>Stream Analytics job  | J created.<br>Japan West<br>Japan West   |
| TINGS Quickstart Resource costs Deployments                     |      | 6 items Show hidden type<br>NAME 14<br>CONTEC_DEMO<br>CONTEC_DEMO1<br>Contecdemo  | Stream Analytics job you<br>Stream Analytics job<br>Stream Analytics job<br>Storage account                       | J created.<br>Japan West<br>Japan West<br>Japan West                             |
| INGS<br>Quickstart<br>Resource costs<br>Deployments<br>Policies |      | 6 items Show hidden type<br>NAME CONTEC_DEMO<br>CONTEC_DEMO1<br>Conteccdemo<br>CONTEC-DEMO01  | Stream Analytics job you<br>Stream Analytics job<br>Stream Analytics job<br>Storage account<br>IoT Hub            | Japan West<br>Japan West<br>Japan West<br>Japan West                             |
| TINGS Quickstart Resource costs Deployments Policies Properties |      | 6 items Show hidden type<br>NAME 14<br>CONTEC_DEMO<br>CONTEC_DEMO1<br>CONTEC_DEMO01<br>CONTEC-DEMO001<br>CONTEC-DEMO001<br>CONTEC-DEMO002 | Stream Analytics job you<br>Stream Analytics job<br>Stream Analytics job<br>Storage account<br>IoT Hub<br>IoT Hub | Japan West<br>Japan West<br>Japan West<br>Japan West<br>Japan West<br>Japan West |

6 Stream Analytics setting/management screen is displayed. Before starting a job, it is necessary to configure input/output to the job and queries, etc. Click **[Inputs]** tile under Job Topology.

|  | « 🕨 Start 🔳 Stop 💼 Dele                  | ete  |          |
|--|--|--|----------|
| • Outline  | Created                                  |  |          |
|  | Resource group (change)                  | Send feedback  |          |
| Activity log   | Status                                   | Created  |          |
| Access control (IAM)   | Created                                  | Wednesday, May 16, 2018, 2:35:50 PM  |          |
| / Taos   | Japan West                               | STATED   |          |
| •  | Subscription (change)<br>Microsoft Azure | Click Inputs tile.   |          |
| X Diagnose and solve problems                                      | Subscription ID                          |  | ļ        |
|  | 6f47b915-696d-4d8f-967f-90176            | esc/c056 Cloud   |          |
| SETTINGS   |  | A  |          |
| Locks  | Inputs                                   | â<br>Query   | Edit que |
| Locks  | Inputs<br>O                              | Query<br>1 SELECT  | Edit que |
| ETTINGS  Locks  OB TOPOLOGY  | Inputs<br>O<br>Empty                     | Query<br>1 SELECT<br>2 1 TITO  | Edit que |
| ETTINGS  Locks  Stopology  Inputs                                  | Inputs<br>O<br>Empty                     | Query<br>1 SELECT<br>2 *<br>3 INTO<br>4 [YourOutputAlias]  | Edit que |
| ETTINGS  Locks  DB TOPOLOGY  Inputs  Functions                     | Inputs<br>O<br>Empty                     | Query<br>2 *<br>3 INTO<br>4 [YourOutputAlias]<br>5 FROM<br>6 [YourInputAlias]  | Edit que |
| ETTINGS    Locks  OB TOPOLOGY   Inputs  Functions  Query  Universe | Inputs<br>O<br>Empty<br>Outputs<br>O     | Query<br>2<br>3<br>SELECT<br>2<br>4<br>[YourOutputAlias]<br>5<br>FROM<br>6<br>[YourInputAlias]<br>3<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | Edit que |

7 On the displayed **[Inputs]** item screen, click the **[+Add stream input]** button on the upper left, and then select [IoT Hub] to add an input item.

| Home > Resource groups ><br>Inputs | CONTEC_DEMO > CONTEC_DEMO1 > Inputs |        |
|------------------------------------|-------------------------------------|--------|
| Add stream input                   | Add reference input                 |        |
| NAME                               | SOURCE TYPE                         | SOURCE |
| Empty                              |                                     |        |
|                                    |                                     |        |
|                                    |                                     |        |
|                                    |                                     |        |

| Home > CONTEC_DEMO1 > Inputs<br>Inputs |        |               |  |  |  |
|--|--------|---------------|--|--|--|
| ➡ Add stream input                     | Add re | ference input |  |  |  |
| Event Hub                              |        | SOURCE TYPE   |  |  |  |
| loT Hub                                |        |               |  |  |  |
| Blob storage                           |        | Stream        |  |  |  |
|  |        |               |  |  |  |

8 When the new input setting dialog box is displayed, enter the following setting details, and then click the **[Save]** button.

| IOT HUD<br>New input   | Enter the alias. Example: input                        |
|--|--|
| * Input alias  |  |
| Provide IoT Hub settings manuality   | Select "IoT Hub".                                      |
| Select IoT Hub from your subscriptions   | Select Microsoft Azure                                 |
| Subscription<br>Microsoft Azure  | v  |
| IoT Hub <b>1</b><br>CONTEC-DEMO001   | Select the IoT Hub you created in Task 1 of Practice 2 |
| Endpoint 0   |  |
| Messaging  |  |
| Messaging<br>Shared access policy name 0   | Select "Messaging".                                    |
| Messaging<br>Shared access policy name <b>1</b><br>iothubowner   | Select "Messaging".                                    |
| Messaging<br>Shared access policy name <b>1</b><br>iothubowner<br>Shared access policy key <b>1</b>                                    | Select "Messaging".<br>Select "iothubowner".           |
| Messaging Shared access policy name iothubowner Shared access policy key   | Select "Messaging".<br>Select "iothubowner".           |
| Messaging Shared access policy name  iothubowner Shared access policy key  Consumer group  Loading                                     | Select "Messaging".                                    |
| Messaging Shared access policy name  iothubowner Shared access policy key  Consumer group  Loading  * Event serialization format  JSON | Select "Messaging".<br>Select "iothubowner".           |

**9** If you wait for a while after the input test is started, a notification stating that the creation is completed is displayed.



**10** In the input list, the newly created input is listed.

| Home > Resource gro | ups > CONTEC_DEMO > CONTEC_DEMO1 > Inputs |         |             |  |
|---------------------|---|---------|-------------|--|
| 🕂 Add stream inpu   | t 🕂 Add reference input                   | Added.  |             |  |
| NAME                | SOURCE TYPE                               | SOURCE  |             |  |
| input               | Stream                                    | loT Hub | Sample data |  |
|                     |   |         |             |  |
|                     |   |         |             |  |

**11** Stream Analytics setting/management screen is displayed. Click [Outputs] tile under Job Topology.

| Home > Resource groups > CONTEC_DEMO > CONTEC_DEMO1 Stream Analytics job | CONTEC_DEMO1  |  | * ×        |
|--|---|--|------------|
|  | 🕨 Start 🔳 Stop 💼 Delete                                     |  |            |
| Overview     Activity log  | Created<br>Resource group (change)<br>CONTEC_DEMO           | Send feedback<br>UserVoice                                     |            |
| Access control (IAM)   | Status<br>Created<br>Location<br>Japan West                 | Created<br>Wednesday, May 16, 2018, 2:35:50 PM<br>Started<br>- |            |
| <ul> <li>Tags</li> <li>Diagnose and solve problems</li> </ul>            | Subscription (change)<br>Microsoft Azure<br>Subscription ID | Last output<br>-<br>Hosting environment                        |            |
| SETTINGS   | 614/b915-696d-4d81-96/1-901/e3c/c056                        | Cloud<br>*   |            |
| Locks  | Inputs  | Query  | Edit query |
| JOB TOPOLOGY   | 1 →   | 1 SELECT<br>2 *  |            |
| 🗄 Inputs   |   | 4 [YourOutputAlias]  |            |
| Functions  | Outputs   | 6 [YourInputAlias]   |            |
| <> Query   | 0 🕞   |  |            |
| ⊡• Outputs   | Empty   |  |            |
| CONFIGURE  |   |  |            |
| 4  |   |  | • •        |

12 On the displayed [Outputs] item screen, click the [+Add] button on the upper left, and then select [Blob storage] to add an output item.

| Add   |                   |
|---|-------------------|
| ME  | SINK              |
| pty   |                   |
|   |                   |
|   |                   |
|   |                   |
| Home > CONTE                                | DEMO1 > Outputs   |
| Home ≻ CONTE<br>Outputs                     | DEMO1. >: Outputs |
| Home > CONTE<br>Outputs                     | DEMO1 > Outputs   |
| Home > CONTE<br>Outputs<br>Add<br>Event Hub | DEMO1 > Outputs   |

**13** When the new output setting dialog box is displayed, enter the following setting details, and then click the **[Save]** button.

| Blob storage<br>New output                  |   |
|---|---|
|   | Enter the alias. Example: output                          |
| * Output alias                              |   |
| output 🗸                                    |   |
|   |   |
| Provide Blob storage settings manually      | Select "Blob storage".                                    |
| Select Blob storage from your subscriptions |   |
| Subscription                                |   |
| Microsoft Azure                             |   |
|   |   |
| * Storage account 🖲                         | Select the storage account you created in Task 1 of       |
| contecdemo 🖌                                | Practice 3. If the storage account is not displayed, see  |
|   | the supplement on the following page.                     |
| * Storage account key                       |   |
| •••••                                       |   |
| * ~   |   |
| Container                                   |   |
|   |   |
| Contectiento V                              | Select the container you created in Task 1 of Practice 3. |
| Path pattern                                |   |
|   |   |
|   |   |
| Date format                                 |   |
| YYYY/MM/DD 🗸                                | (   |
|   |   |
| Time format                                 | The file path used to locate your blobs within the        |
|   | choose to specify one or more instances of the            |
| *   | following 2 variables: {date} {time} Example 1:           |
| • Event serialization format 🖲              | cluster1/logs/{date}/{time} Example 2:                    |
| CSV V                                       | cluster1/logs/{date}                                      |
| Delimiter <b>f</b>                          |   |
|   |   |
|   |   |
| Encoding 0                                  | Select "LITE-8"   |
| UTF-8                                       | Select UTFO.  |
|   |   |
|   | •   |
|   |   |
| Save  |   |
|   |   |

\* <Supplement> If the storage account cannot be loaded automatically, select [**Provide Blob storage settings manually**], and then enter the "Storage account name" and "Storage account key" you have copied in advance.

| Subscription   | ~                   |             |             |                   |            |  |
|--|---------------------|-------------|-------------|-------------------|------------|--|
| microsoft Padre  |                     |             |             |                   |            |  |
| * Storage account 0  |                     |             |             |                   |            |  |
| contecdemo   | ~                   |             |             |                   |            |  |
| * Characteristic   |                     |             |             |                   |            |  |
| Storade account key  |                     |             |             |                   |            |  |
|  |                     |             |             |                   |            |  |
|  |                     |             |             |                   |            |  |
|  |                     | -           |             |                   |            |  |
| StorageAccessKey tyt - Notenad   |                     | -           |             | _                 |            |  |
| StorageAccessKey.txt - Notepad Ella Edit Format View Halo  |                     | -           |             | _                 |            |  |
| StorageAccessKey.txt - Notepad File Edit Format View Help Storage Account Name : contecdemo1   |                     | -           |             | -                 |            |  |
| StorageAccessKey.txt - Notepad File Edit Format View Help Storage Account Name : contecdemo1   | UUF#ULKFyWTHnJVu11g | Ivwiebyöxi  | J∙782nd2nHE | —<br>125WYgəanii' |            |  |
| StorageAccessKey.txt - Notepad File Edit Format View Help Storage Account Name : contecdemo1 Gui : YojWirbobjKkeyakcomeoruonHj/oodWHUL | UUFMULKFyWTHNJVUITg | I vwTeDy8X1 | o∙78ZndZnHL | —<br>nzswygoxiii/ | <b>g==</b> |  |

**14** After a while, a notification stating that the connection test has succeeded is displayed.



**15** In the output list, the newly created "output" is listed.

| ł | Home > Resource groups > CONTEC_DEMO > CONTEC_DEMO1 > Outputs Outputs |              |  |
|---|---|--------------|--|
|   | - Add   |              |  |
|   | NAME  | SINK         |  |
|   | output  | Blob storage |  |
|   |   |              |  |

**16** Then, click **[Edit query]** under Job Topology.

| Inputs           | Qu | Lery Edit query                                   |
|------------------|----|---|
| 1<br>input       |    | 1 SELECT<br>2 *<br>3 INTO<br>4 [output]<br>5 FROM |
| Outputs 1 output |    | 6 [input]   |

**17** Edit the details of the query. Stream Analytics supports the simple declarative query model, which describes conversions for real-time processing. To archive all events, add the following details to the code editor.



**18** Click the [Save] button, and then [Yes].



**19** After a while, a notification stating that the setting has been saved is displayed.



**20** On the Stream Analytics setting/management screen, click [Start].



**21** When the Start job screen is displayed, select "Now" for Job output start time, and then click the [Start] button.

| Start job<br>CONTEC DEMO1      | × |
|--------------------------------|---|
| Job output start time <b>O</b> |   |
| Custom                         |   |
|                                |   |
|                                |   |
|                                |   |
|                                |   |
|                                |   |
|                                |   |
|                                |   |
|                                |   |
|                                |   |
| Start                          |   |

**22** A notification stating that it is starting the streaming job is displayed, and the streaming job status is "Starting".

| ritouncations   | Dismiss: Inf    | ormational Completed Al |               |               |  |
|---|-----------------|-------------------------|---------------|---------------|--|
| Starting Streaming  | reaming job     | Running                 |               |               |  |
|   |                 |                         |               |               |  |
| ma X Basaura arauna X 60  | NTEC DEMO & COL |                         | _             |               |  |
| me > Resource groups > CO<br>CONTEC_DEMO1<br>Stream Analytics job | NTEC_DEMO > CON | ITEC_DEMO1              |               |               |  |
| me > Resource groups > CO<br>CONTEC_DEMO1<br>Stream Analytics job |                 | NTEC_DEMO1              | The status is | s "Starting". |  |

**23** After a while, a notification stating that the streaming job has been started successfully is displayed, and the status will be "Running".

| Create a resource | Forme > CONTEC_DEMO1<br>CONTEC_DEMO1<br>Stream Aualtics jab | Notifications<br>Dismiss: Informational Completed All   | × |
|-------------------|---|---|---|
| E All services    | Ø Search (CDrl+/) « Start ■ Stop 	 Delete ④ Overview        | Streaming job started successfully. 3:24 PM<br>Started Streaming job 'CONTEC_DEMO1' successfully. |   |
| 🕒 Dashboard       | Activity loa  |   |   |
|                   | The status is "St   | tarting".   |   |

### 3. Task 3: Checking After the Data is Stored

Access the data stored in Blob storage using the Microsoft Azure Storage Explorer tool.

**1** Start the Microsoft Azure Storage Explorer tool, and connect to the Azure account. \* This operation is unnecessary if already connected.

| Edit View Help<br>EXPLORER<br>Click the account icon.<br>Collapse An<br>Manage Accounts<br>(Locar and Attached)<br>Storage Accounts |         |
|---|---------|
| EXPLORER<br>Click the account icon.<br>Collapse An<br>Manage Accounts Iccess<br>(Locar and Attached)<br>I Storage Accounts          |         |
| Click the account icon.<br>Collapse An<br>Manage Accounts icess<br>(Locar and Attached)<br>(Cocar and Attached)<br>Storage Accounts |         |
| Manage Accounts Coss<br>(Locar and Attached)<br>Storage Accounts  |         |
| Manage Accounts Ccess Cocar and Attached) Cocar and Attached Storage Accounts   |         |
| <ul> <li>Cocar and Attached)</li> <li>Storage Accounts</li> </ul>   |         |
| ▶   |         |
|   |         |
|   |         |
|   |         |
| O Show resources from these subscriptions:  | _       |
| Add an account Click "Add an account".  |         |
| H Apply Cancel  |         |
| Т   |         |
|   |         |
|   |         |
| Connect to Azure Storage  | _       |
| Add an Azure Account Click "Add an Azure Account".  |         |
| Azure   |         |
| Use a shared access signature (SAS) URI or connection string  |         |
| ) Use a storage account name and key  |         |
|   |         |
|   |         |
|   |         |
|   |         |
|   |         |
|   |         |
|   |         |
| Next Sign in Care Click "Sig  | ın in." |

Microsoft Azure Data Transmission Procedure



2 On the Microsoft Azure Storage Explorer management screen, click the container name you created in **Task 1 of Practice 3** from the list of Blob Containers to confirm that the file in CSV format has been stored.



#### **3** Click [Download] to download the file.



# 6.Practice 5: Visualizing the Data in Power BI

### 

In Practice 5, we will use the resources developed in Practices 1 to 3. It is necessary to complete Practices 1 to 3 before starting Practice 5.

### 1. Task 1: Accessing Power BI Portal

**1** Access Power BI Portal (https://powerbi.microsoft.com/en-us/) using the Web browser, and then click **[Sign in]** on the upper right.

|   | -            |                                       | × |
|---|--------------|---------------------------------------|---|
| 🗲 💮 InPrivate 🎑 https://powerbi.microsoft.com/en-us/ 🖉 🖓 🖓 🖓 🖉 Power Bl   Interactive Data Vi × 📑 |              | $\bigcirc \bigcirc \bigcirc \bigcirc$ | 0 |
| Microsoft Power BI Products Solutions Partners Learn  | Sign in Sigr | n up free                             | ^ |

2 Enter the Power BI account and password on the sign-in screen, and then click the [Sign in] button to log in to Power BI.



**3** After logging in to Power BI, the following screen is displayed.

|   | Power Bl  | 8 | /ly Works   | pace > C | CONTEC_DEMO  | )        |          |          |           |              |        | ~       | Ē      | ø    | Ŧ          | ?      | Ð     | 8 |
|---|-----------|---|-------------|----------|--------------|----------|----------|----------|-----------|--------------|--------|---------|--------|------|------------|--------|-------|---|
| = |           |   | File $\vee$ | View 🗸   | Reading view | 🗒 Expl 🗸 | A Text b | Ø Shap…∨ | 🖭 Butto 🗸 | G Visual int | eracti | ~ 0     | Refre  | 🗇 Du | plicate th | nis pa | 🔓 Sa. |   |
| ☆ | Favorites | > |             |          |              |          |          |          |           |              | V      | /ISUALI | ZATION | 5    | > FIE      | ELDS   |       | > |

### 2. Task 2: Transmitting Data to Power BI

**1** Reopen the Stream Analytics setting screen you created in Task 2 of Practice 3. Click **[Resource groups]**, select the resource group name you created in Practice 1 from the list of resource groups, and then click the Stream Analytics you created.

|   | Power BI       | 🕒 Rec | cent                   |             |              | ₽ \$ ± ? ●                       |
|---|----------------|-------|------------------------|-------------|--------------|----------------------------------|
| = |                |       | Search content         |             |              | Showing 15 item(s) Most recent ∨ |
| ☆ | Favorites      | >     | NAME                   | ACTIONS     | LAST ACCESS  | LOCATION                         |
| © | Recent         | >     | .⊪ ☆ CONTEC_DEMO       |             | 3 months ago | My Workspace                     |
| ₽ | Apps           |       |                        |             | -            |                                  |
| ٨ | Shared with me |       | ulu ☆ bbbbb            |             | 3 months ago | My Workspace                     |
| Ð | Workspaces     | >     | <b>.ılı</b> ☆ PoCDEMO  | 261 8       | 4 months ago | My Workspace                     |
| 8 | My Workspace   | ~     | <b>.lı</b> ☆ data_test | L L I 🛛 🖓 🎡 | 5 months ago | My Workspace                     |
|   |                |       | Ø ☆ test               | 263         | 5 months ago | My Workspace                     |

2 Click the [Stop] button, and then [Yes] to confirm it.

| Home > Resource groups > CONTEC_DEM<br>CONTEC_DEMO1<br>Stream Analytics job | o) < co | ONTEC_DEMO | 91         |   |
|---|---------|------------|------------|---|
| Search (Ctrl+/)   | «       | ▶ Start    | Stop       | 💼 Delete                                  |
| <ul> <li>Overview</li> </ul>  |         | Stop Str   | reaming jo | de  |
| Activity log  |         | Are you    | sure you w | ant to stop Streaming job 'CONTEC_DEMO1'? |
| Access control (IAM)  |         | Yes        | N          | 0   |
| 🧳 Tags  |         |            |            |   |

**3** After a while, the status changes to Stopped.

| Home > Resource groups > CONTEC_DEMO > CONTEC_DEMO1 Stream Analytics job | CONTEC_DEMO1                           | Notifications X<br>Dismiss: Informational Completed All |
|--|--|---|
|  | 🕨 Start 🔳 Stop 💼 Delete                | Streaming job stopped successfully. 3:21 PM             |
| A Quantian   | 3 Stopped                              | Stopped Streaming job 'CONTEC_DEMO1' successfully.      |
| Activity log   | Resource group (change)<br>CONTEC_DEMO |   |

4 After stopped, click [Outputs] tile under Job Topology.

| Inputs<br>1<br>input   |    |
|------------------------|----|
| Outputs<br>1<br>output | C) |

**5** On the Outputs screen, click **[+Add]**, and then select [Power BI].

| Home > Resource groups > CONTEC_DEMO > CONTE<br>Outputs |                    | × |
|---|--------------------|---|
| ➡ Add   |                    |   |
| Event Hub   | SINK               |   |
| SQL Database  | Blob storage       |   |
| Blob storage  | and a second group |   |
| Table storage   |                    |   |
| Service Bus topic                                       |                    |   |
| Service Bus queue                                       |                    |   |
| Cosmos DB   |                    |   |
| Power BI  |                    |   |
| Data Lake Store   |                    |   |

6 When the New output screen is displayed, enter the item [Output alias], and then click [Authorize].

|  | :  | Enter the Output alias. Exa  | mple: outputtop | owerbi |
|--|--|--|-----------------|--------|
| * Output                                     | alian  |  |                 |        |
| outputp                                      | owerbi   | ~  |                 |        |
|  |  |  | ·               |        |
| Group wor                                    | rkspace  |  |                 |        |
| Authoriz                                     | e connection to load w   | orkspaces 🗸  |                 |        |
| * Dataset                                    | name   |  |                 |        |
|  |  |  |                 |        |
| *  |  |  |                 |        |
| lable na                                     | me   |  | 1               |        |
|  |  |  |                 |        |
|  |  |  |                 |        |
| Authorize                                    | connection   |  |                 |        |
| You'll need                                  | d to authorize with Pow  | er BI to configure your output   |                 |        |
|  |  |  |                 |        |
| settings.                                    |  |  |                 |        |
| settings.                                    |  |  |                 |        |
| settings.                                    | orize  |  |                 |        |
| settings.<br>Autho<br>Don't have             | orize<br>e a Microsoft Power BI a  | account yet?   |                 |        |
| Settings.<br>Autho<br>Don't have<br>Sign up  | e a Microsoft Power BI a   | account yet?   |                 |        |
| Settings.<br>Autho<br>Don't have<br>Sign up  | e a Microsoft Power Bl a   | account yet?   |                 |        |
| Settings.<br>Autho<br>Don't have<br>Sign up  | e a Microsoft Power Bl a<br>Note: You are grantin  | account yet?<br>g this output permanent access   | to              |        |
| Settings.<br>Autho<br>Don't have<br>Sign up  | e a Microsoft Power BI a<br>Note: You are grantin<br>your Power BI dashbo  | g this output permanent access<br>bard. Should you need to revoke  | to              |        |
| Settings.                                    | Note: You are grantin<br>your Power BI dashbc<br>this access in the futu<br>following:   | g this output permanent access<br>ard. Should you need to revoke<br>re you can do one of the                       | to              |        |
| Settings.<br>Author<br>Don't have<br>Sign up | orize<br>e a Microsoft Power BI a<br>Note: You are grantin<br>your Power BI dashbc<br>this access in the futu<br>following:  | g this output permanent access<br>bard. Should you need to revoke<br>re you can do one of the                      | to              |        |
| Autho<br>Don't have<br>Sign up               | Note: You are grantin<br>your Power BI dashbo<br>this access in the futu<br>following:<br>1. Change the user ac  | g this output permanent access<br>bard. Should you need to revoke<br>re you can do one of the<br>count password.   | to              |        |
| Autho<br>Don't have<br>Sign up               | Note: You are grantin<br>your Power BI dashbo<br>this access in the futu<br>following:<br>1. Change the user ac<br>2. Delete this output.                                      | g this output permanent access<br>bard. Should you need to revoke<br>re you can do one of the<br>scount password.  | to              |        |
| Settings.<br>Author<br>Don't have<br>Sign up | Note: You are grantin<br>your Power BI dashbo<br>this access in the futu<br>following:<br>1. Change the user ac<br>2. Delete this output.                                      | g this output permanent access<br>bard. Should you need to revoke<br>ire you can do one of the<br>scount password. | to              |        |
| Settings.<br>Author<br>Don't have<br>Sign up | orize<br>e a Microsoft Power BI a<br>Note: You are grantin<br>your Power BI dashbc<br>this access in the futu<br>following:<br>1. Change the user ac<br>2. Delete this output. | g this output permanent access<br>bard. Should you need to revoke<br>re you can do one of the<br>scount password.  | to              |        |

7 When the Microsoft Azure login screen is displayed, enter the account information to log in to Power BI, and then click [Sign in].

| Microsoft Sign in  |   | admin@contecco                               | Enter the password. |  |
|--|---|--|---------------------|--|
| someone@example.com<br>Next<br>Can't access V<br>Enter the e-mail address. | • | Enter password<br>Back<br>Forgot my password | Sign in             |  |

8 After login succeeded, the following screen is displayed. Select "My workspace" for [Group workspace], and then enter [Dataset name] and [Table name]. After entering, click [Save].

| Power Bl<br>New output   | ×                                     |
|--|---------------------------------------|
| * Output alias<br>outputpowerbi ✓  |                                       |
| Group workspace V  | Select "My workspace".                |
| * Dataset name<br>CONTEC_DEMO  | Enter the Dataset name (CONTEC_DEMO). |
| * Table name<br>CONTEC_DEMO  | Enter the Table name (CONTEC_DEMO).   |
| Currently authorized as  |                                       |
| You'll need to authorize with Power BI to configure your output settings.  |                                       |
| Authorize  |                                       |
| Note: You are granting this output permanent access to your Power BI dashboard. Should you need to revoke this access in the future you can do one of the following: |                                       |
| <ol> <li>Change the user account password.</li> <li>Delete this output.</li> </ol>   | <b>*</b>                              |
| Save   |                                       |

**9** The Output test starts. After a while, a notification stating that the newly created output "outputpowerbi" has been added successfully is displayed.



**10** You can confirm that [outputpowerbi] has been added in the Output list.

| Home > Resource groups > CONTEC_DEMO > CONTEC_DEMO1 > Outputs |              |
|---|--------------|
| Outputs   |              |
|   |              |
| Add   |              |
|   |              |
| NAME  | SINK         |
| output  | Blob storage |
|   |              |
| outputpowerbi   | Power BI     |
|   |              |
|   |              |

**11** On the Stream Analytics management screen, click [Edit query].

| Inputs                                  | <br>Query                               | Edit query |
|---|---|------------|
| 1<br>input                              | 1 SELECT<br>2 *<br>3 INTO<br>4 [output] |            |
| Outputs<br>2<br>output<br>outputpowerbi | 5 FROM<br>6 [input]                     |            |



\* The data transmitted from CONPROSYS is handled as character string data in Azure. Therefore, the data format needs to be changed in order to handle it as numeric data. The "CAST" statement is used to change the data format.

**13** On the Query setting screen, click the **[Save]** button. When a message saying "The changes you made will be saved" is displayed, select **[Yes]**.

| Home > Resource groups > CONTEC_DEMO > CONTEC_DEMO1 > CONTEC_DEMO1 |  |  |  |  |
|--|--|--|--|--|
| CONTEC_DEMO1<br><sup>Query</sup>                                   |  |  |  |  |
| R Save C Discard C Test  |  |  |  |  |
| Save<br>The changes you made will be saved.                        |  |  |  |  |
| Yes No   |  |  |  |  |

**14** After a while, a notification stating that the change in the query has been saved successfully is displayed.



**15** To start the Stream Analytics that has been "Stopped", click [>Start].



**16** Select "Now" for Job output start time, and then click [Start].

| Start job<br>contec_demo1 | × |
|---------------------------|---|
| Job output start time 🚯   |   |
| Now Custom                |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
|                           |   |
| Start                     |   |

**17** The status of Stream Analytics is **"Starting"**. After a while, a notification stating that the streaming job has been started successfully is displayed.

| CONTEC_DEMO1                           | Notifications                          | × |
|--|--|---|
|  | Dismiss: Informational Completed All   |   |
| ▶ Start ■ Stop 💼 Delete                | Starting Streaming job     Running     | - |
| f Starting                             | Starting Streaming job 'CONTEC_DEMO1'. |   |
| Resource group (change)<br>CONTEC_DEMO |  |   |
| Status<br>Starting                     |  |   |

### **18** The status is "Running".



### 3. Task 3: Displaying the Data in Power BI

- 1 Select [DATASETS] on the lower left of the Power BI Web screen to confirm that the dataset name you created earlier has been added in the list. (The dataset name you created in **Task 2** of **Practice 4**)
- **2** Then, click the dataset name to move to the report creation screen.



**3** When you click the **"Polygonal line"** icon in the visualizations list, a line graph is displayed on the operation screen.



**4** When the table is displayed under Fields, select the items "Datetime" and "TAG00".



**5** In the line graph, **"TAG00**" is displayed with **"Time"** on the horizontal axis.



**6** Operate the slider of "TAG00" on the CONPROSYS Monitoring screen. After that, you can confirm that the change in "TAG00" has been applied in Power BI.

| lag big vaniser<br>Like   |      |
|---|------|
| las -   |      |
| um -  |      |
|   | 1040 |
| -   | 0    |
|   |      |
| -   |      |
|   |      |
| <ul> <li>Anteria</li> </ul> |      |
|   |      |





8 Enter the report name, and then click the [Save] button.

| Save your report              |      | ×      |
|-------------------------------|------|--------|
| Enter a name for your report: |      |        |
|                               |      |        |
|                               | Save | Cancel |

**9** The saved reports are listed under Reports of the Menu.



### **A**CAUTION

After the transmission is completed, click [Stop Device] from the "Main" tab of the simulator.

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| S CONTEC                   | Sealers   | Parameter | Second 4 | Contractility - 2kg | ar y A | ner Con TOG + | â 🔝 |   |
|----------------------------|-----------|-----------|----------|---------------------|--------|---------------|-----|---|
| day's Northan              |           |           |          |                     |        |               |     |   |
| Downloads                  |           |           |          |                     |        |               |     |   |
| Product Name Model,        | Keywords. |           |          |                     |        |               |     |   |
|                            |           |           |          |                     |        |               |     | < |
| Calipoly                   |           |           |          |                     |        |               |     |   |
| File Type                  |           |           |          |                     |        |               |     |   |
| C Brane - Mahar<br>Branete |           | - and     |          | - 1041 Jan          | - 2    | - constr      |     |   |
|                            |           |           | ٩,       | and .               |        |               |     |   |
|                            |           |           |          |                     |        |               |     |   |
|                            |           |           |          |                     |        |               |     |   |

## Index

### **Revision History**

| MONTH YEAR | Summary of Changes |
|------------|--------------------|
| June 2018  | The First Edition  |
|            |                    |
|            |                    |
|            |                    |
|            |                    |

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