The Innovator of Aluminum

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Introduction to Electric Control

SiO Controller
This controller is designed for people who are using electric automation on the factory floor for the first time.

SiO2, a slim and compact karakuri controller.
The new SiO controller is centered around our commitment to simplifying electric automation. By utilizing the world standard e-CON connector, you can join input/output devices simply by plugging them in. The programming software’s multiple-choice format makes navigating the operating system easier than ever. Anyone can use the SiO2 controller.
**Simple and Effective**

*What is SiO (Simple Input Output) Controller?*

SiO Controller is a simple input/output control system launched by SUS in June, 2016. Here, we give an overview in the format of Question and Answer.

**Q1** What can you do with SiO Controller?

**A** Look at the ON/OFF status of an input device to send ON/OFF commands to an output device.

First, set the input conditions on SiO Controller. When the sensor detects these conditions, it sends a command to the output device.

**Q2** What kind of places and situations can SiO Controller be used in?

**A** SiO is ideal for making simple work site improvements or automating kara-kuri, especially in cases where PLC would be considered over-engineering.

When designing a system that uses electric controls in a factory setting, it used to be common to use a PLC (programmable logic controller) regardless of the task. But, by using SiO Controller, you can easily make small scale improvements that don’t require a full PLC.

**Q3** What types of SiO Controllers are there?

**A** SUS offers two types of SiO Controllers for different applications.

- **SiO-C**
  - 8 Inputs/8 Outputs
  - Connector: Flat Cable
  - While maintaining a small size of 60 mm × 73 mm × 22 mm, the SiO-C is capable of connecting 8 inputs and 8 outputs. Our line-up includes 3 types with differing installation mechanisms (GF connector/DIN rail/fastening screws). SUS also offers an e-CON connector terminal block (SUC-162) as an additional option.

- **SiO2**
  - 6 Inputs/4 Outputs
  - Connector: e-CON
  - This model has the minimum number of inputs and outputs. An e-CON connector terminal block is built into the main unit, so devices can be connected just by plugging them in. The housing is made from aluminum extrusion. The same protrusions as the GF Green Frame are installed on the side in addition to a DIN rail slot on the back.

More new models are in development! Keep your eyes open for future SiO Units.

**Q4** Do you need in-depth knowledge of electricity or controllers to use SiO?

**A** No special knowledge or experience is required. Even people making a program for the first time can use it easily.

**Multiple-Choice Simple Programming**

Use “SiO Programmer,” the dedicated software for Windows, to set output conditions. Even new users can easily create programs just by answering a few multiple-choice questions. SiO Programmer also has a simulator function, so you can check operations even before connecting to SiO Controller.

**SiO Program + Debug**

When control is done with the same specs

- Control program + Debug
- Wiring = Labor Cost (8 hours) $480

- **SiO Program + Debug**

When control is done with the same specs

- Control program + Debug
- Wiring = Labor Cost (5 hours) $200

**Just Plug In.**

We use the industry standard e-CON connectors, eliminating the need for difficult wiring work. SUS also offers optional input/output devices with an e-CON connector already installed. Connecting the devices is easy: just plug them in!”

*Options are necessary for SiO-C.*
Example 01
You want to know when a work piece has gotten stuck.

[Operation Flow]
1. The sensor doesn't detect a work piece for 60 seconds.
2. The light turns on.
3. After ten seconds, the light turns off.

[Necessary Parts]
- SiO2
- Sensor (Input)
- Light (Output)

Example 02
You can't have someone waiting on the inspection line at all times, so you only want to send someone when the work arrives.

[Operation Flow]
1. The sensor detects the work piece.
2. The light turns on.
3. After ten seconds, the light turns off.

[Necessary Parts]
- SiO2
- Sensor (Input)
- Light (Output)

Example 03
You want an alert when daily shipment goals are met.

[Operation Flow]
1. The sensor detects and counts work pieces to be shipped.
2. When half of the goal is reached, the "50% Complete" light turns on.
3. When the target number of work pieces is reached, the "Goal Met" light turns on.

[Necessary Parts]
- SiO2
- Sensor (Input)
- Light (Output)

Example 04
You need to regularly add materials to a machine, but often forget.

[Operation Flow]
1. The sensor does not detect material for ten seconds.
2. The light turns on.
3. After ten seconds, the light turns off.

[Necessary Parts]
- SiO2
- Sensor (Input)
- Light (Output)
**Example 05**

You want to know if assembly is being completed within the set assembly time.

**Operation Flow**
- A worker presses the button switch when production starts.
- The light turns on after three minutes.
- Data is recorded about whether assembly finishes in time or not.

**Necessary Parts**
- SiO2
- Start Button (Input), End Button (Input)
- Light (Output)

**Example 06**

You want to call the factory leader.

**Operation Flow**
- A worker presses the button.
- The light turns on.
- After ten seconds, the light turns off.

**Example 07**

You want to notify people of the work progress using lights.

**Operation Flow**
- Press the work switch.
- The green light turns on (red light is off).
- Press the stop switch.
- The red light turns on (green light is off).

**Necessary Parts**
- SiO2
- Switch (Input)
- Stacked Lamp (Output)

**Example 08**

You want to know how much time has elapsed using lights.

**Operation Flow**
- Press the start switch.
- A new lamp turns on every ten seconds.
- The lamp turns off after 50 seconds or when the stop switch is pressed.

**Necessary Parts**
- SiO2
- Switch (Input)
- Stacked Lamp (Output)
Lifter

Keeping the containers at a consistent height.

Raising the containers to the height of the level sensor.
Take out one container and the next will be raised until it reaches the height of the level sensor.
When the lifter is empty, the entire unit will lower.

Operation Procedure
1. Remove the top container
2. The power unit raises the lifter
3. The level sensor turns ON
4. The power unit turns OFF
5. The container present sensor turns OFF
6. The power unit lowers the lifter

Connections (Wiring Places)
Level Sensor
IN1

Container Present Sensor
IN2

Power Unit
OUT1: Power Unit Go Forward Order
OUT2: Power Unit Go Backward Order

Program Input

<table>
<thead>
<tr>
<th>IN1</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Duration Time(s) 1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level Sensor</td>
<td>ON</td>
<td>OFF</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>Container Present Sensor</td>
<td>IN1</td>
<td>OFF</td>
<td>IN2</td>
<td>OFF</td>
</tr>
</tbody>
</table>

I/O Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Input Part</th>
<th>No.</th>
<th>Output Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Level Sensor</td>
<td>Q1</td>
<td>Power Unit Go Forward Order</td>
</tr>
<tr>
<td>12</td>
<td>Work Piece Present Sensor</td>
<td>Q2</td>
<td>Power Unit Go Backward Order</td>
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<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
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<tr>
<td>15</td>
<td></td>
<td>Q5</td>
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<td>16</td>
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<td>18</td>
<td></td>
<td>Q8</td>
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Part Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Product Name</th>
<th>Model</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>SiO2 Basic Kit 1</td>
<td>SiO-110</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Power Unit</td>
<td>XAK-P06</td>
<td>1</td>
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<tr>
<td>3</td>
<td>AC Adapter</td>
<td>CTP-401P</td>
<td>1</td>
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<tr>
<td>4</td>
<td>Output Cable for the Power Unit</td>
<td>SUC-191</td>
<td>1</td>
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<tr>
<td>5</td>
<td>Photocell Sensor (Reflective)</td>
<td>SUC-195</td>
<td>2</td>
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<tr>
<td>6</td>
<td>Equipment Rack Set</td>
<td>GTFU2003220</td>
<td>1</td>
</tr>
</tbody>
</table>
Transport

Spacing the containers with electric stoppers.

Sensors determine whether a work piece is present, then the containers move forward one by one using electric stoppers.

Operation Procedure
1. Sensor 1 confirms that there is no container
2. Sensors 2 and 3 confirm that there are containers
3. The electric stoppers lower
4. Sensor 1 confirms that there is a container
5. The electric stoppers rise

Connections (Wiring Places)

- IN1: Sensor 1
- IN2: Sensor 2
- IN3: Sensor 3
- OUT1: Electric Stopper 1 (Operating Mode: 3)
- OUT2: Electric Stopper 2 (Operating Mode: 3)

Program Input

- IN1: Sensor 1
- IN2: Sensor 2
- IN3: Sensor 3
- OUT1: Electric Stopper 1 Go Backward Command
- OUT2: Electric Stopper 2 Go Backward Command

I/O Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Input Part</th>
<th>No.</th>
<th>Output Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>I1</td>
<td>Sensor 1</td>
<td>O1</td>
<td>Electric Stopper 1 Go Backward Command</td>
</tr>
<tr>
<td>I2</td>
<td>Sensor 2</td>
<td>O2</td>
<td>Electric Stopper 2 Go Backward Command</td>
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<tr>
<td>I3</td>
<td>Sensor 3</td>
<td>O3</td>
<td></td>
</tr>
<tr>
<td>I4</td>
<td></td>
<td>O4</td>
<td></td>
</tr>
<tr>
<td>I5</td>
<td></td>
<td>O5</td>
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<td>I7</td>
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<td>O7</td>
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</tr>
<tr>
<td>I8</td>
<td></td>
<td>O8</td>
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Part Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Product Name</th>
<th>Model</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SiO2 Basic Kit 1</td>
<td>SiO-K10</td>
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<tr>
<td>2</td>
<td>Electric Stopper</td>
<td>XAK-5550</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>AC Adapter</td>
<td>CIF-401P</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Output Cable for the Electric Stopper</td>
<td>SUC-197</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Photoelectric Sensor (Reflective)</td>
<td>SUC-195</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>Equipment Rack Set</td>
<td>GFU28034Z210</td>
<td>1</td>
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</table>
## Product Name

<table>
<thead>
<tr>
<th></th>
<th>SiO-C</th>
<th>SiO2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Item No.</strong></td>
<td>XAC-035</td>
<td>XAC-046</td>
</tr>
</tbody>
</table>

## Power-Supply Voltage

- **SiO-C**: DC24V ± 10% 0.3A DC Plug: 5.5mm (outer diameter) x 2.1mm (inner diameter)
- **SiO2**: DC24V ± 10% 0.3A DC Plug: 5.5mm (outer diameter) x 2.1mm (inner diameter)
- **SiO3**: DC24V ± 10% 0.3A DC Plug: 5.5mm (outer diameter) x 2.1mm (inner diameter)

## Number of Inputs/Outputs

- **SiO-C**: 8 Inputs / 8 Outputs
- **SiO2**: 6 Inputs / 4 Outputs
- **SiO3**: 16 Inputs / 16 Outputs

## Input Specifications

- **SiO-C**: DC24V ± 10% 7mA/DC24V Non-Voltage Contact Input (NPN) Non-Insulated
- **SiO2**: DC24V ± 10% 100mA/DC24V Open Collector (NPN) Non-Insulated
- **SiO3**: DC24V ± 10% 7mA/DC24V Non-Voltage Contact Input (NPN) Non-Insulated

## Output Specifications

- **SiO-C**: DC24V ± 10% 100mA/DC24V Open Collector (NPN) Non-Insulated
- **SiO2**: DC24V ± 10% 100mA/DC24V Open Collector (NPN) Non-Insulated
- **SiO3**: DC24V ± 10% 100mA/DC24V Open Collector (NPN) Non-Insulated

## Communication Specifications

- **SiO-C**: USB 2.0 Compliant/Micro-B Type
- **SiO2**: USB 2.0 Compliant/Micro-B Type
- **SiO3**: USB 2.0 Compliant/Micro-B Type

## RoHS Compatible

- Yes

## I/O Interface

- **SiO-C**: Flat Cable Connector (20 cores)
- **SiO2**: e-CON Connector
- **SiO3**: e-CON Connector

## External Dimensions

<table>
<thead>
<tr>
<th></th>
<th>SiO-C</th>
<th>SiO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>70.4</td>
<td>59.4</td>
</tr>
<tr>
<td>Height</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>29.2</td>
<td></td>
</tr>
</tbody>
</table>

## Weight

- **SiO-C**: Approximately 62g
- **SiO2**: Approximately 107g
- **SiO3**: Approximately 178g

## Installation Method

- **SiO-C**: DIN Rail
- **SiO2**: GF/DIN Rail
- **SiO3**: GF/DIN Rail


SiO2 Starter Kit

- Item No.: SIO-K09
- Enclosed Contents:
  - ① SiO2 main unit (XAC-046)
  - ② AC adapter (C1P-401P)
  - ③ Software CD
  - ④ USB cable (SUC-121)
- All necessary items including software, USB cable, and AC adapter are included for first-time users. This product can be used as soon as it is delivered.

SiO3 Starter Kit

- Item No.: SIO-K13
- Enclosed Contents:
  - ① SiO3 main unit (XAC-050)
  - ② AC adapter (C1P-401P)
  - ③ Software CD
  - ④ USB cable (SUC-121)
- All necessary items including software, USB cable, and AC adapter are included for first-time users. This product can be used as soon as it is delivered.

SiO-C Starter Kit (e-CON)

- Item No.: SIO-K11
- Enclosed Contents:
  - ① SiO main unit (DIN rail type) (XAC-035)
  - ② Connector terminal block (e-CON system) (SUC-162)
  - ③ AC adapter (C1P-401P)
  - ④ I/O cable (2 side connector 0.2 m) (SUC-117)
  - ⑤ 24 V splitter cable (e-CON system) (SUC-207)
  - ⑥ Software CD
  - ⑦ USB cable (SUC-121)
- All necessary items including software, USB cable, AC adapter, and wiring supplies are included for first-time users. This product can be used as soon as it is delivered.

SiO2 Basic Kit 1

- Item No.: SIO-K10
- Enclosed Contents:
  - ① SiO2 main unit (XAC-046)
  - ② AC adapter (C1P-401P)
- This kit includes an AC 100 V power source (using an AC adapter).

SiO3 Basic Kit 1

- Item No.: SIO-K14
- Enclosed Contents:
  - ① SiO3 main unit (XAC-050)
  - ② AC adapter (C1P-401P)
- This kit includes an AC 100 V power source (using an AC adapter).

SiO-C Basic Kit 1 (e-CON)

- Item No.: SIO-K12
- Enclosed Contents:
  - ① SiO main unit (DIN rail type) (XAC-035)
  - ② Connector terminal block (e-CON system) (SUC-162)
  - ③ AC adapter (C1P-401P)
  - ④ I/O cable (2 side connector 0.2 m) (SUC-117)
  - ⑤ 24 V splitter cable (e-CON system) (SUC-207)
- This kit includes an AC 100 V power source (using an AC adapter) and an e-CON connector terminal block.

Main Functions of SiO Programmer

1. Program Editing
   - This function edits programs that write to SiO Controller. Edited data can be saved and printed.

2. Input/Output Monitor
   - By connecting SiO Controller to a personal computer, you can monitor the status of the input/output devices.

3. Program Reading/Writing
   - Read the program registered in SiO Controller and write a new program to SiO Controller.

4. Simulation
   - Program operation can be checked on a PC without connecting to SiO Controller.

Try using SiO Programmer for free!

To try SiO Programmer, download the software from the SUSE website and install it on your computer. You can explore program creation and simulation even before purchasing SiO Controller.

For first-time users, we also sell convenient kits with the software CD, USB cable, and AC adapter set.

SiO Programmer Operating Environment

- Operating System: Windows 7 (32Bit) / Windows 8 (32Bit) / Windows 8.1 (32Bit)
- Note: the software is not guaranteed to run on 64 Bit operating system.
- CPU & Memory: 800 MHz and up. Usable memory 512 MB
- Hard Disk: Free space: More than 100 MB
- Display: Resolution: More than 1366 x 768. Color: More than 256 colors
- Interface: USB port
- Other: You must have the Microsoft .NET Framework 2.0 installed on your PC before you can install the SiO Programmer.

What is SiO Programmer?

It is multiple-choice software developed exclusively for SiO Controller.