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sio

Simple Input Output Controller





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.

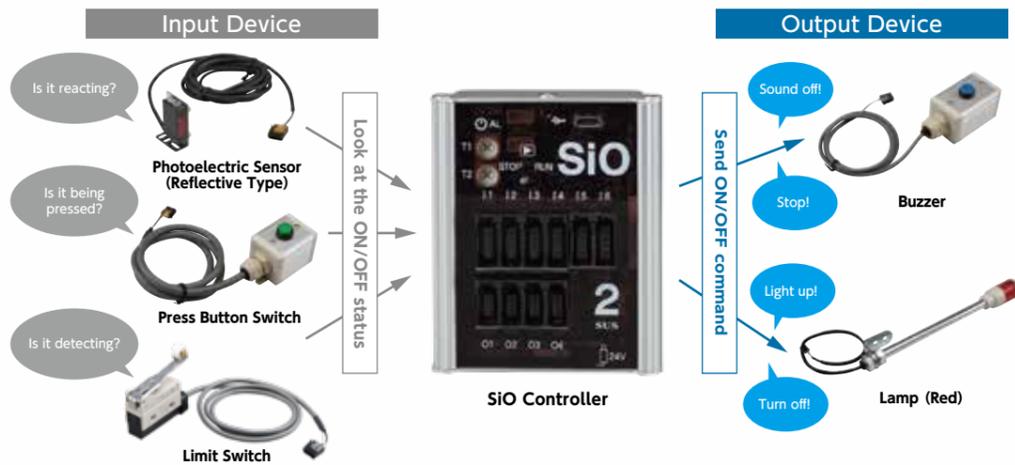
Simple and Effective

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.

These are a few of the things it can do:

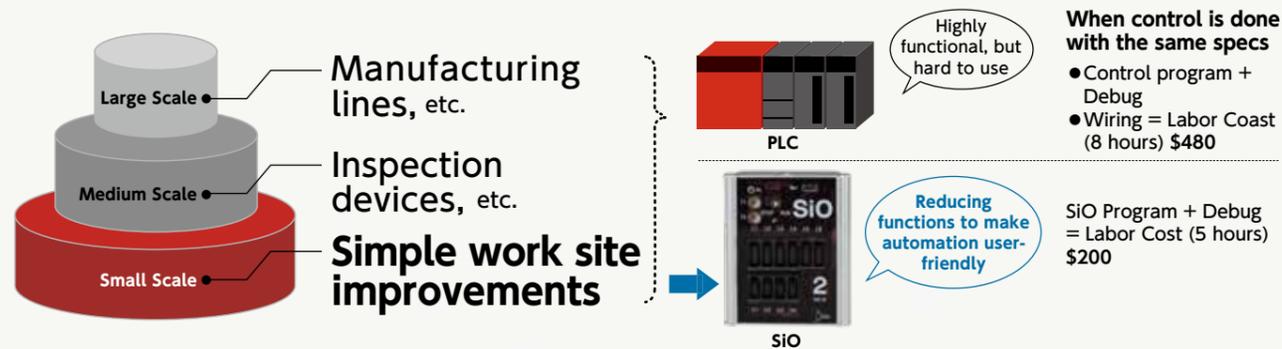
- Sound the buzzer as long as the press button switch is being pressed.
- When the photoelectric sensor reacts five times, light up the lamp.
- When the limit switch detects a work piece, stop the buzzer... etc.



What's SiO?

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 karakuri, 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.



SUC-162



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.



Examples of installation on GF

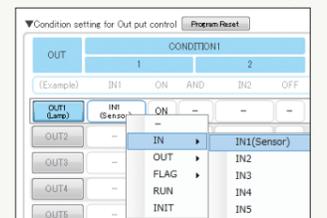
More new models are in development!
Keep your eyes open for future SiO Units.

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.



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.

A work piece is stuck!

Sensor

Light

[Necessary Parts]

- SiO2
- Sensor (Input)
- Light (Output)

[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.

OUT	CONDITION1			CONDITION2			DURATION TIME(UNTIL)			OUTPUT TYPE			
	1	2	3	1	2	3	1	2	3	1	2		
OUT1 (Lamp)	IN1 (Sensor)	OFF	-	DELAY TIME	60.0 sec	CONTINUES	DELAY TIME	10.0 sec	-	-	-	Lamp is	ON

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.

Sensor

Light

The work is here!

Inspection Process

[Necessary Parts]

- SiO2
- Sensor (Input)
- Light (Output)

[Operation Flow]

- 1 The sensor detects the work piece.
- 2 The light turns on.
- 3 After ten seconds, the light turns off.

OUT	CONDITION1			CONDITION2			DURATION TIME(UNTIL)			OUTPUT TYPE			
	1	2	3	1	2	3	1	2	3	1	2		
OUT1 (Lamp)	IN1 (Sensor)	ON	-	DELAY TIME	60.0 sec	CONTINUES	DELAY TIME	10.0 sec	-	-	-	Lamp is	ON

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

We met today's goal!

Sensor

Goal Met

50% Complete

[Necessary Parts]

- SiO2
- Sensor (Input)
- Light (Output)

[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.

OUT	CONDITION1			CONDITION2			DURATION TIME(UNTIL)			OUTPUT TYPE			
	1	2	3	1	2	3	1	2	3	1	2		
OUT1 (50%)	IN1 (Sensor)	ON	-	50	TIMES THEN	DELAY TIME	0.0 slater	RUN	OFF	-	-	50% is	ON
OUT2 (100%)	IN1 (Sensor)	ON	-	100	TIMES THEN	DELAY TIME	0.0 slater	RUN	OFF	-	-	100% is	ON

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

Sensor

Light

The material is running out!

[Necessary Parts]

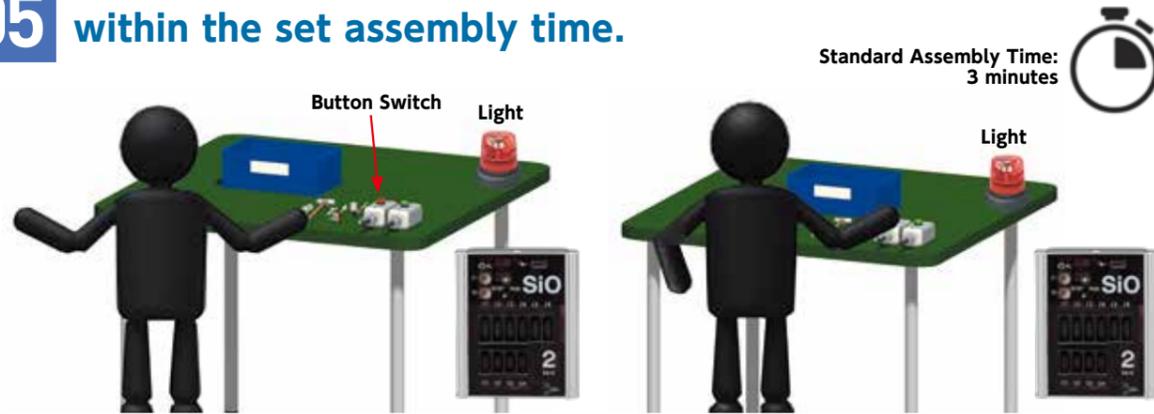
- SiO2
- Sensor (Input)
- Light (Output)

[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.

OUT	CONDITION1			CONDITION2			DURATION TIME(UNTIL)			OUTPUT TYPE			
	1	2	3	1	2	3	1	2	3	1	2		
OUT1 (Lamp)	IN1 (Sensor)	OFF	-	DELAY TIME	10.0 sec	CONTINUES	DELAY TIME	10.0 sec	-	-	-	Lamp is	ON

Example 05 You want to know if assembly is being completed within the set assembly time.



[Operation Flow]

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

[Necessary Parts]

- SiO2
- Start Button(Input), End Button (Input)
- Light(Output)

OUT	CONDITION1				CONDITION2				DURATION TIME(UNTIL)				OUTPUT TYPE		
	1	2	3	4	1	2	3	4	1	2	3	4			
OUT1 (Lamp)	FLAG1 (Measur..)	ON	-	-	-	DELAY TIME	180.0 sec	CONTINUES	CONDITION1	OFF	-	-	-	Lamp is	ON
FLAG1 (Measur..)	IN1 (Start)	ON	-	-	-	THEN	DELAY TIME	0.0 s later	IN2 (End)	ON	-	-	-	Measur.. is	ON

Example 07 You want to notify people of the work progress using lights.



[Operation Flow]

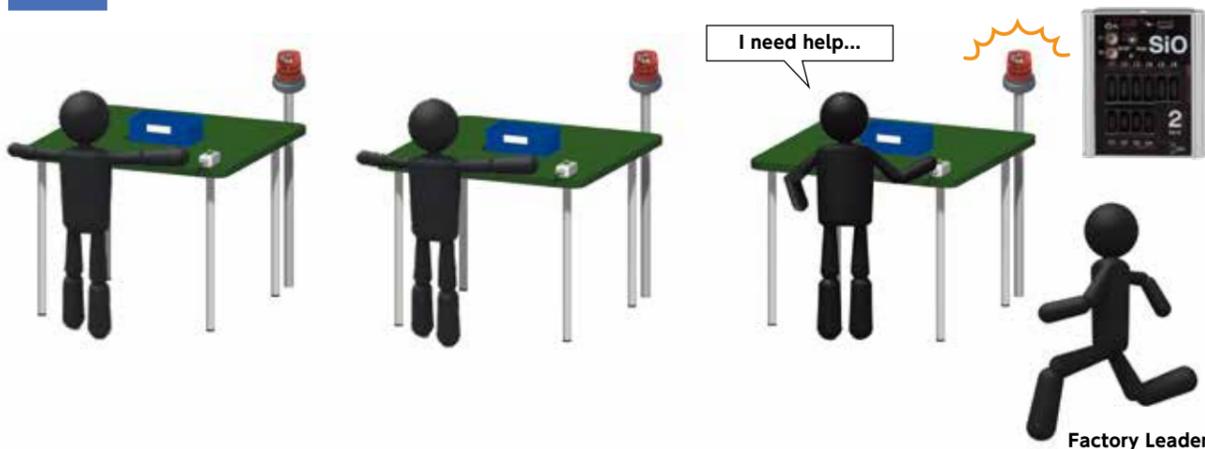
- 1 Press the work switch.
- 2 The green light turns on (red light is off).
- 3 Press the stop switch.
- 4 The red light turns on (green light is off).

[Necessary Parts]

- SiO2
- Switch(Input)
- Stacked Lamp(Output)

OUT	CONDITION1				CONDITION2				DURATION TIME(UNTIL)				OUTPUT TYPE		
	1	2	3	4	1	2	3	4	1	2	3	4			
OUT1 (Work)	IN1 (WorkSw)	ON	-	-	-	THEN	DELAY TIME	0.0 s later	IN2 (StopSw)	ON	-	-	-	Work is	ON
OUT2 (Stop)	IN1 (StopSw)	ON	-	-	-	THEN	DELAY TIME	0.0 s later	IN1 (WorkSw)	ON	-	-	-	Stop is	ON

Example 06 You want to call the factory leader.



[Operation Flow]

- 1 A worker presses the button.
- 2 The light turns on.
- 3 After ten seconds, the light turns off.

[Necessary Parts]

- SiO2
- Button(Input)
- Light(Output)

OUT	CONDITION1				CONDITION2				DURATION TIME(UNTIL)				OUTPUT TYPE		
	1	2	3	4	1	2	3	4	1	2	3	4			
OUT1 (Lamp)	IN1 (Button)	ON	-	-	-	THEN	DELAY TIME	0.0 s later	DELAY TIME	10.0 sec	-	-	-	Lamp is	ON

Example 08 You want to know how much time has elapsed using lights.



[Operation Flow]

- 1 Press the start switch.
- 2 A new lamp turns on every ten seconds.
- 3 The lamp turns off after 50 seconds or when the stop switch is pressed.

[Necessary Parts]

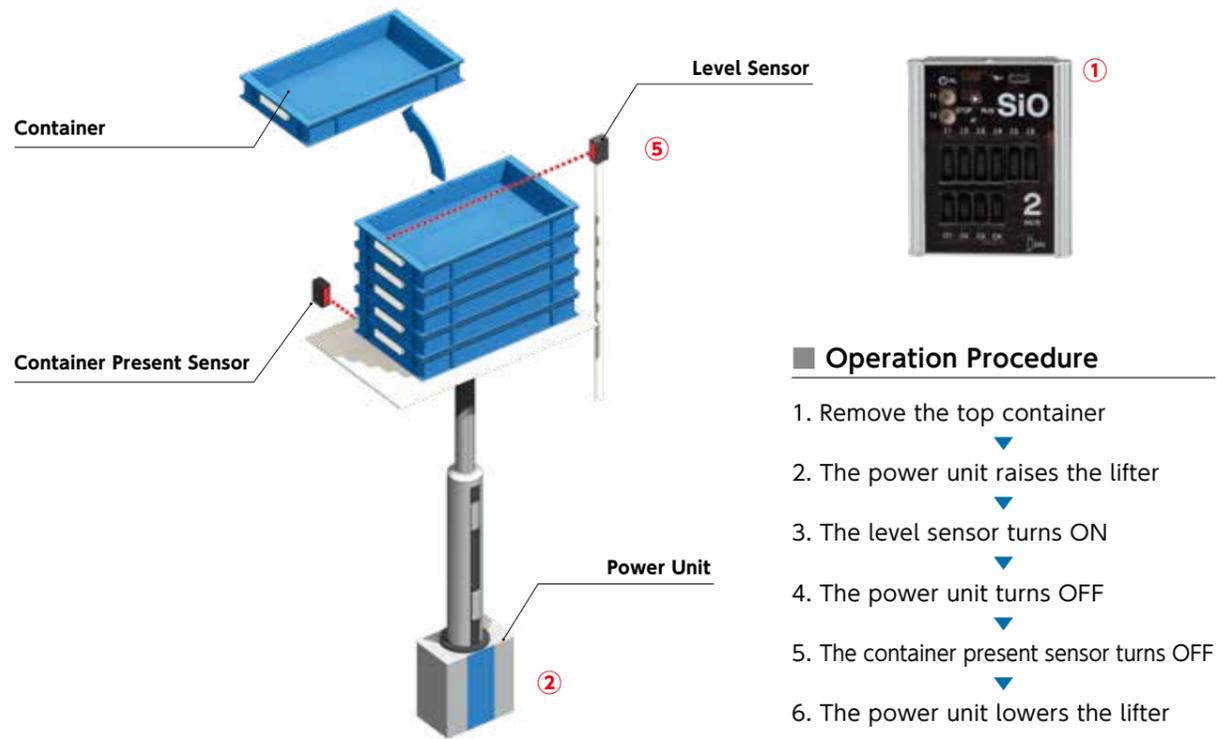
- SiO2
- Switch(Input)
- Stacked Lamp(Output)

OUT	CONDITION1				CONDITION2				DURATION TIME(UNTIL)				OUTPUT TYPE		
	1	2	3	4	1	2	3	4	1	2	3	4			
OUT1 (Lamp1)	FLAG1	ON	-	-	-	DELAY TIME	10.0 sec	CONTINUES	CONDITION1	OFF	-	-	-	Lamp1 is	ON
OUT2 (Lamp2)	FLAG1	ON	-	-	-	DELAY TIME	20.0 sec	CONTINUES	CONDITION1	OFF	-	-	-	Lamp2 is	ON
OUT3 (Lamp3)	FLAG1	ON	-	-	-	DELAY TIME	30.0 sec	CONTINUES	CONDITION1	OFF	-	-	-	Lamp3 is	ON
OUT4 (Lamp4)	FLAG1	ON	-	-	-	DELAY TIME	40.0 sec	CONTINUES	CONDITION1	OFF	-	-	-	Lamp4 is	ON
FLAG1	IN1 (StartSwitch)	ON	-	-	-	THEN	DELAY TIME	0.0 s later	DELAY TIME	50.0 sec	OR	IN2 (StartSwitch)	ON	FLAG1 is	ON

Lifter

Keeping the containers at a constant height.

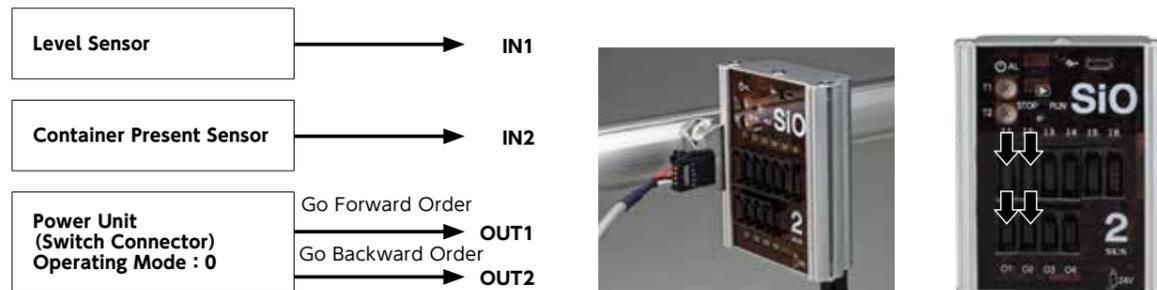
Raises the containers to the height of the level sensor.
 Take out one container and the next will be raised until it reaches the height of the level sensor.
 When the lifter is empty, the entire unit will lower.



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

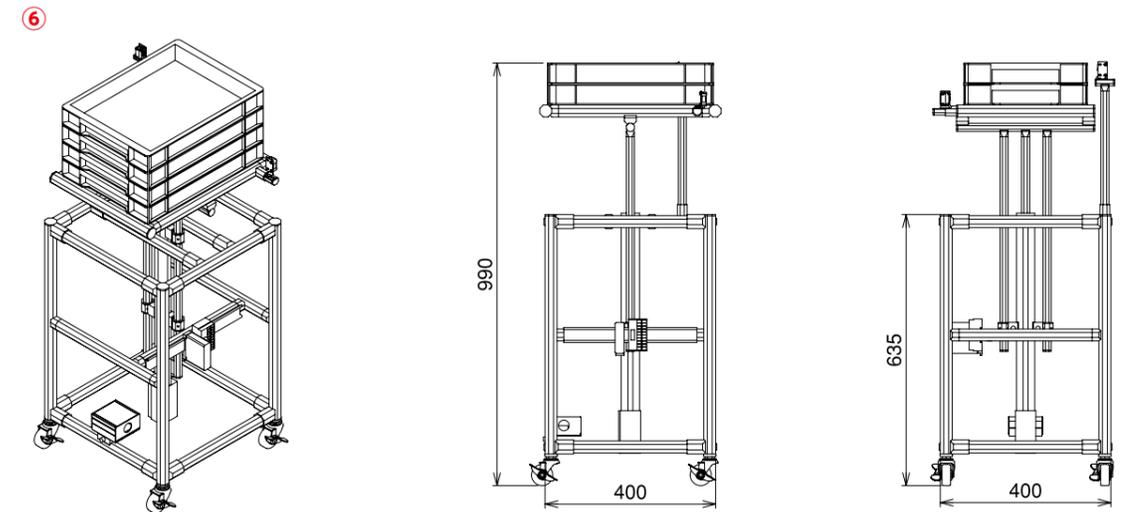
Connections (Wiring Places)



Program Input



Device Image



I/O Table

No.	Input Part	No.	Output Part
11	Level Sensor	O1	Power Unit Go Forward Order
12	Work Piece Present Sensor	O2	Power Unit Go Backward Order
13		O3	
14		O4	
15		O5	
16		O6	
17		O7	
18		O8	

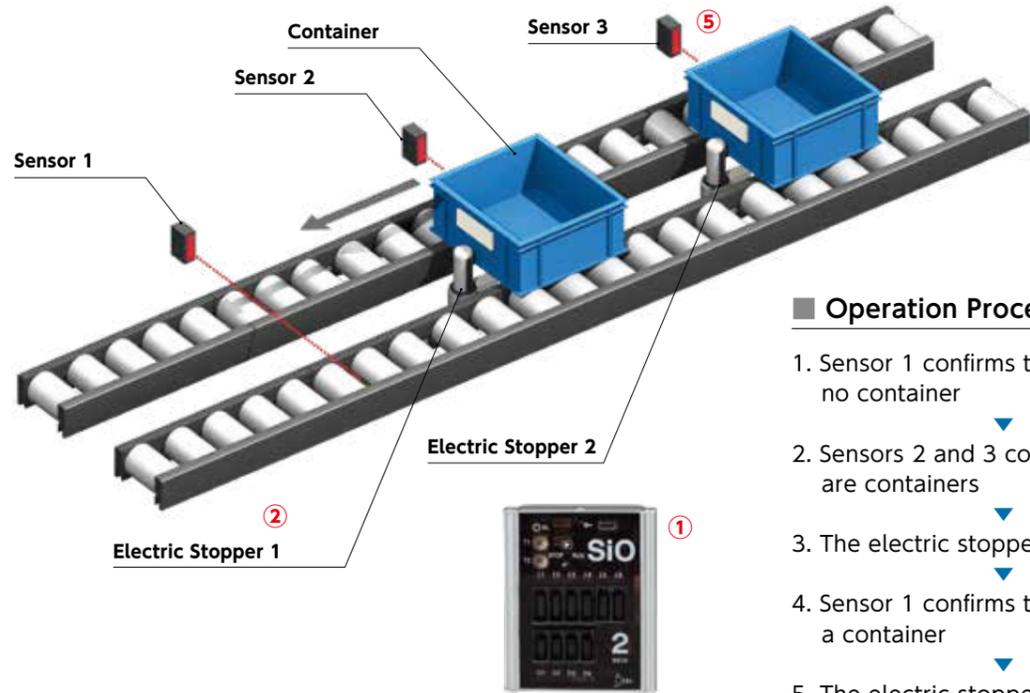
Part Table

No.	Product Name	Model	Quantity
1	SiO2 Basic Kit 1	SIO-K10	1
2	Power Unit	XAK-P06	1
3	AC Adapter	C1P-401P	1
4	Output Cable for the Power Unit	SUC-191	1
5	Photoelectric Sensor (Reflective)	SUC-195	2
6	Equipment Rack Set	GFU28034220	1

Transport

Spacing the containers with electric stoppers.

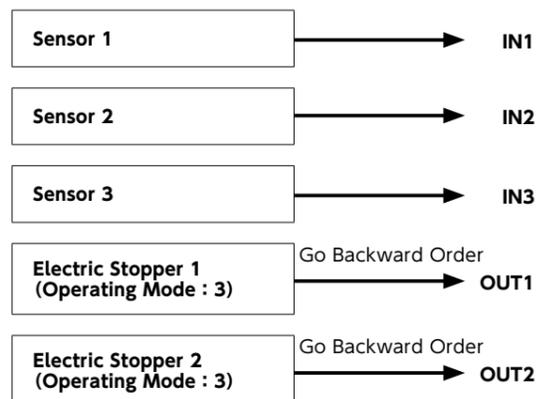
Sensors determine whether a work piece is present, then the containers move forward one by one using electric stoppers.



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)

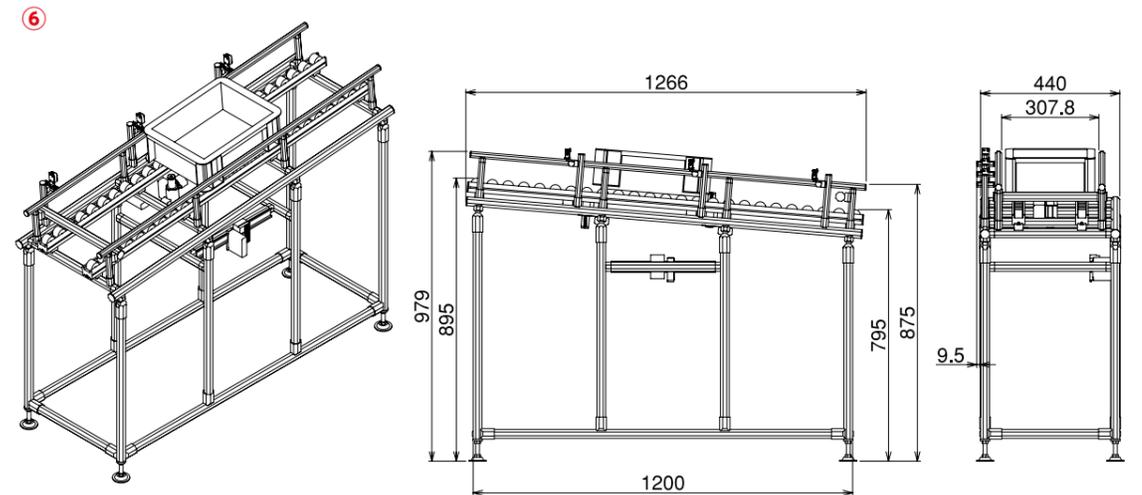


Program Input

OUT	CONDITION1				CONDITION2		DURATION TIME(UNTIL)				OUTPUT TYPE			
	1	2	3	4	1	2	1	2	3	4				
OUT1 (Stopper1)	IN1 (Sensor1)	OFF	AND	IN2 (Sensor2)	ON	THEN	DELAY TIME	0.0 s later	IN1 (Sensor1)	ON	-	-	-	Stopper1 is ON
OUT1 (Stopper2)	IN2 (Sensor2)	OFF	AND	IN3 (Sensor3)	ON	THEN	DELAY TIME	0.0 s later	IN2 (Sensor2)	ON	-	-	-	Stopper2 is ON

IN1 : Sensor1
IN2 : Sensor2
IN3 : Sensor3
OUT1 : Electric Stopper 1 Go Backward Command
OUT2 : Electric Stopper 2 Go Backward Command

Device Image



I/O Table

No.	Input Part	No.	Output Part
11	Sensor 1	O1	Electric Stopper 1 Go Backward Command
12	Sensor 2	O2	Electric Stopper 2 Go Backward Command
13	Sensor 3	O3	
14		O4	
15		O5	
16		O6	
17		O7	
18		O8	

Part Table

No.	Product Name	Model	Quantity
1	SiO2 Basic Kit 1	SiO-K10	1
2	Electric Stopper	XAK-S050	2
3	AC Adapter	C1P-401P	2
4	Output Cable for the Electric Stopper	SUC-197	2
5	Photoelectric Sensor (Reflective)	SUC-195	3
6	Equipment Rack Set	GFU28034210	1

8 Inputs / 8 Outputs



6 Inputs / 4 Outputs



Product Name	SiO-C	SiO2
Item No.	XAC-035	XAC-046
Power-Supply Voltage	DC24V ± 10% 0.3A DC Plug : 5.5mm (outer diameter) x 2.1mm (inner diameter)	
Number of Inputs/Outputs	8 Inputs / 8 Outputs	6 Inputs / 4 Outputs
Input Specifications	DC24V ± 10% 7mA/DC24V Non-Voltage Contact Input (NPN) Non-Insulated	
Output Specifications	DC24V ± 10% 100mA/DC24V Open Collector (NPN) Non-Insulated	
Communication Specifications	USB 2.0 Compliant/Micro-B Type	
RoHS Compatible	RoHS Compatible	
I/O Interface	Flat Cable Connector (20 cores)	e-CON Connector
External Dimensions	<p>70.4, 59.4, 72.4, 29.2, 43.2, SiO, SUS Corp.</p>	<p>65, 31, 25, 4, 33.3, 81.1, 77, SiO, 2, 01, 02, 03, 04, 24V, DIN rail center</p>
Weight	Approximately 62g	Approximately 107g
Installation Method	DIN Rail	GF/DIN Rail

16 Inputs / 16 Outputs



Product Name	SiO3
Item No.	XAC-050
Power-Supply Voltage	DC24V ± 10% 0.3A DC Plug : 5.5mm (outer diameter) x 2.1mm (inner diameter)
Number of Inputs/Outputs	16 Inputs / 16 Outputs
Input Specifications	DC24V ± 10% 7mA/DC24V Non-Voltage Contact Input (NPN) Non-Insulated
Output Specifications	DC24V ± 10% 100mA/DC24V Open Collector (NPN) Non-Insulated
Communication Specifications	USB 2.0 Compliant/Micro-B Type
RoHS Compatible	RoHS Compatible
I/O Interface	e-CON Connector
External Dimensions	<p>130, 31, 25, 4, 33.2, 81, 77, SiO 3, SUS, 24V, DIN rail center</p>
Weight	Approximately 178g
Installation Method	GF/DIN Rail

SiO2 Starter Kit



Item No.	SIO-K09
Enclosed Contents	① SiO2 main unit(XAC-046) ② AC adapter(C1P-401P) ③ SoftwareCD 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 SoftwareCD 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 SoftwareCD 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.



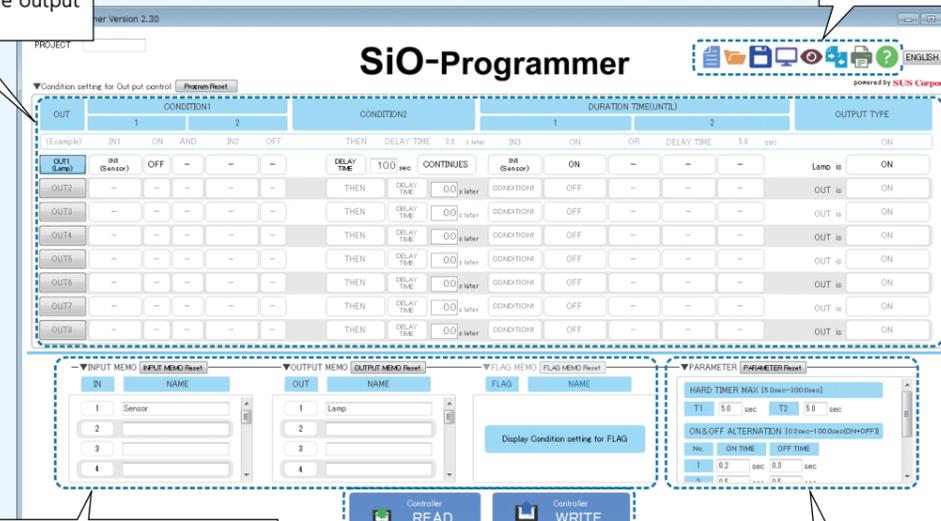
What is SiO Programmer?

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

Tool Icon

You can compare data, monitor input/output, save files, etc.

Program Editing
Set the conditions to turn the output ON/OFF.



Memo Input
This is the input/output memo column. The contents are reflected in the program, input/output monitor, and simulator.

Read & Write Button
This communicates with SiO Controller to read and write the settings.

Other Settings
You can set various other parameters.

Main Functions of SiO Programmer

- Program Editing**..... This function edits programs that write to SiO Controller. Edited data can be saved and printed.
- Input/Output Monitor**..... By connecting SiO Controller to a personal computer, you can monitor the status of the input/output devices.
- Program Reading/Writing** Read the program registered in SiO Controller and write a new program to SiO Controller.
- Simulation**..... Program operation can be checked on a PC without connecting to SiO Controller.

POINT

Try using SiO programmer for free!

To try SiO Programmer, download the software from the SUS 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.



SiO2 Starter Kit (SIO-K09)

“SiO Programmer” Operating Environment

Operating System	Windows 7 (32Bit) / Windows8 (32Bit) / Windows8.1 (32Bit) Note: the software is not guaranteed to run on 64 Bit operating system.
CPU & Memory	800MHz and up. Usable memory 512MB.
Hard Disc Free Space	Free space: More than 10MB
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.

Input Device (Device → SiO)

Switch Box (x1)



Item No.	SUC-203
Description	This box has a single button switch. Cable Length: 1m

Photoelectric Sensor (Transmission type)



Item No.	SUC-196
Description	Detects when an object obscures the light between the opposing light projector and light receiver. The light projector and light receiver must be installed diagonally. [Detected Object] Non-transparent objects. Cable Length: 2m

Photoelectric Sensor (Reflective)



Item No.	SUC-195
Description	This sensor detects objects by reflecting light off them. It can detect almost any object, not just metals. [Detected Object] Objects with a certain color or shape. Cable Length: 2m

Proximity Sensor



Item No.	SUC-194
Description	This sensor detects objects when they approach. It can detect without being affected by contamination or shape of the object. [Detected Object] Metals including iron and aluminum. Cable Length: 2m

Rod Type Mechanical Switch (with cover)



Item No.	SUC-200
Description	This switch mechanically detects objects. Cable Length: 2m

Rod Type Mechanical Switch



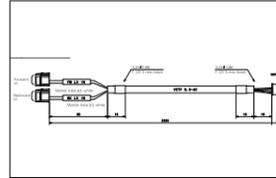
Item No.	SUC-201
Description	This switch mechanically detects objects. Cable Length: 2m

Limit Switch



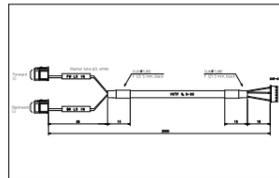
Item No.	SUC-193
Description	This switch mechanically detects objects. Cable Length: 2m

Input Cable for the Power Unit



Item No.	SUC-192
Description	Detects the advancing end and the receding end. Cable Length: 2m

With Power Unit (B) Electric Stopper Input Cable for the Electric Winch



Item No.	SUC-198
Description	Detects the advancing end and the receding end. Cable Length: 2m

Emergency Stop Switch Box



Item No.	SUC-220
Description	This box is for an emergency stop switch. Press the switch at the B contact to turn the input OFF. Cable Length: 2m

Output Device (SiO → Device)

Light (red)



Item No.	SUC-199
Description	A red light activates with the correct input. Cable Length: 1m

Buzzer



Item No.	SUC-206
Description	A buzzer sound activates with the correct input. Cable Length: 1m

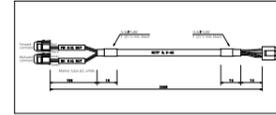
Output Device (SiO → Device)

Solenoid Valve Cable for the SMC Products



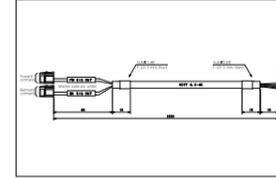
Item No.	SUC-202
Description	A solenoid valve control cable for the SMC SY series ※Solenoid valve not included.

Power Unit With Power Unit (B) Electric Winch Output Cable for the GF Conveyor



Item No.	SUC-191
Description	This can control go forward and go backward commands. Cable Length: 2m

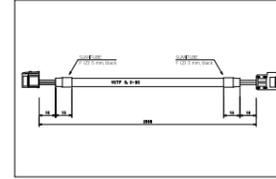
Output Cable for the Electric Stopper



Item No.	SUC-197
Description	This can control go forward and go backward commands. Cable Length: 2m

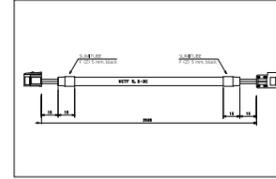
Extension cable

Extension Cable for Input (4 pins)



Item No.	SUC-210
Description	Used to extend cables for input. Cable Length: 2m

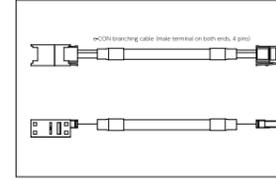
Extension Cable for Output (3 pins)



Item No.	SUC-209
Description	Used to extend cables for output. Cable Length: 2m

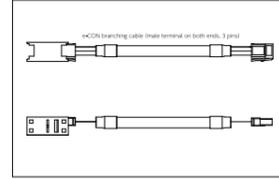
Input Aggregate/Output Splitter

Input Aggregate Cable



Item No.	SUC-208
Description	Used to combine the signals of two to three input devices. Cable Length: 0.1m

Output Splitter Cable



Item No.	SUC-230
Description	Used to split signals to output devices. Cable Length: 0.1m

Single Connector

Connector inputs (4 pins)



Item No.	SUC-212
Description	Used to crimp the wiring of input devices. 10 pieces For heavy lines (37104-2206-000FL) : ×7 For light lines (37104-4080-G00FL) : ×3

Connector outputs (3 pins)



Item No.	SUC-211
Description	Used to crimp the wiring of output devices. 10 pieces For heavy lines (37103-2206-000FL) : ×7 For light lines (37103-4080-G00FL) : ×3