ITOH DENKI
TECHNOLOGY FOR TOMORROW

POWER MOLLER PLUS

Carry

Slide Open Gate Module

SOG

Slide Open Gate Module

〈User Manual〉

Read this manual before use

Thank you for purchasing the Slide Open Gate Module (hereinafter referred to as “this product”).
※This product refers to all products including standard accessories.

Make sure to read this manual carefully before using, and start using only after you have understood all the product’ s functions, safety information and precautions.
After reading the manual, make sure to keep it safe in a specified place for future use, whenever necessary.

Customers are responsible for preparing the control equipment, carrying out wiring, and making programs for operation.
This document includes basic descriptions about operation methods, lamp indications, and various types of operations, assuming that customers have prepared the control equipment, and finished wiring and making the control programs by referring to this document. At the time of operation, be sure to prepare the control equipment, carry out wiring, and have made the control programs according to your operation.

ITOH DENKI

Module

No.623

1. Introduction

Features

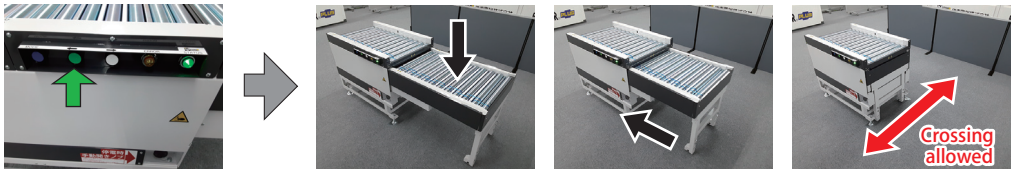
This product is material handling equipment that secures workers' moving lines in a conveyor line.
Pressing a button can open/close the gate to cut across a conveyor line.
This product is composed of the base section and gate section conveyors, or can set up an opening of almost the same size as the base section conveyor.

- Reducing workers' loads
  This product eliminates the needs for lifting up the gate of a conveyor, and going up/down the steps required in conventional systems.
- Securing a moving line easily
  A worker can easily cut across a conveyor even if both hands are occupied, such as when operating a pallet truck, pushing a dolly, or carrying a package. (when the gate is opened/closed by the motion detection sensor)
  Additionally, installing two units with their gate sides face to face provides a wider opening, which allows forklifts and pallets to pass across the line.
- Energy saving
  This product employs the Run on Demand system that operates only the sections required for transfer or opening/closing.
- No pneumatics.
  All-electric control. No pneumatics, which do not require compressor.
  It can reduce initial and maintenance cost.

Operation description

Open the gate

When the open button switch is pressed, the gate section conveyor will descend, and it will be housed into the base section conveyor. This allows the unit to come into the OPEN state, which enables traffic to move across the conveyor line.



Gate section descending | Gate section opening | Gate section is open

Close the gate

When the close button switch is pressed, the gate will be closed, and the gate section conveyor will ascend to the transfer surface level. This allows the unit to come into the original CLOSE state, which enables transfer operation.

The gate starts to close | The gate is ascending | The gate is closed

1. Introduction

Disclaimer

- This product is designed as a general industrial device. Do not use for other applications. We do not take any responsibility for any damage that may result from the disregarding of these warnings.
- In the event that an accident results from the use of this product, we do not compensate for any damage, including abnormalities of equipment, connection devices, and/or software, any damage resulting from malfunctions, and/or any other secondary damage.
- Caution : Installation, operation and usage of ITOH DENKI MDRs in combination with a control card designed by a third party could result in fatal phenomena such as fire, electric shock, injuries etc which are out of the responsibility of ITOH DENKI.

Notes on industrial property rights

There are some examples of parts that need to be prepared by customers, as explained within this manual. However, this does not provide any guarantee against the existence of any rights, such as our industrial property rights, or those of other companies.

Notes on technical support

We respond to technical inquiries based on the contents described within this manual, and on this product within the range of general items for this product unit.
There are some descriptions in this manual, about parts, equipment, and wiring arranged by customers, as well as the controls and operation under such circumstances. However, these are not included in the guaranteed operating range and/or support.
When in use, please check and perform the aforementioned based on your responsibility according to operation.

About the performance level (PL) for this system

This product is based on the performance level “C”※2 in ISO-13849-1※1.

※1：International Organization for Standardization

※2：This indicates that even though events that would result in serious injury occur infrequently under assumed risk environment, there is a high probability to avoid danger if you observe the safety contents described in this manual.

About installation environment

This product is not equipped with special dust proof/waterproof countermeasures, and is intended to be used in environments of “Pollution Degree 2”※2, as defined in IEC60664 -1※1.

※1：Insulation coordination for equipment within low-voltage supply systems - Part 1 of the International Standard

※2：Non-conductive pollution will occur, but it is assumed that condensation will happen to generate conductive property temporarily.

About description of the product

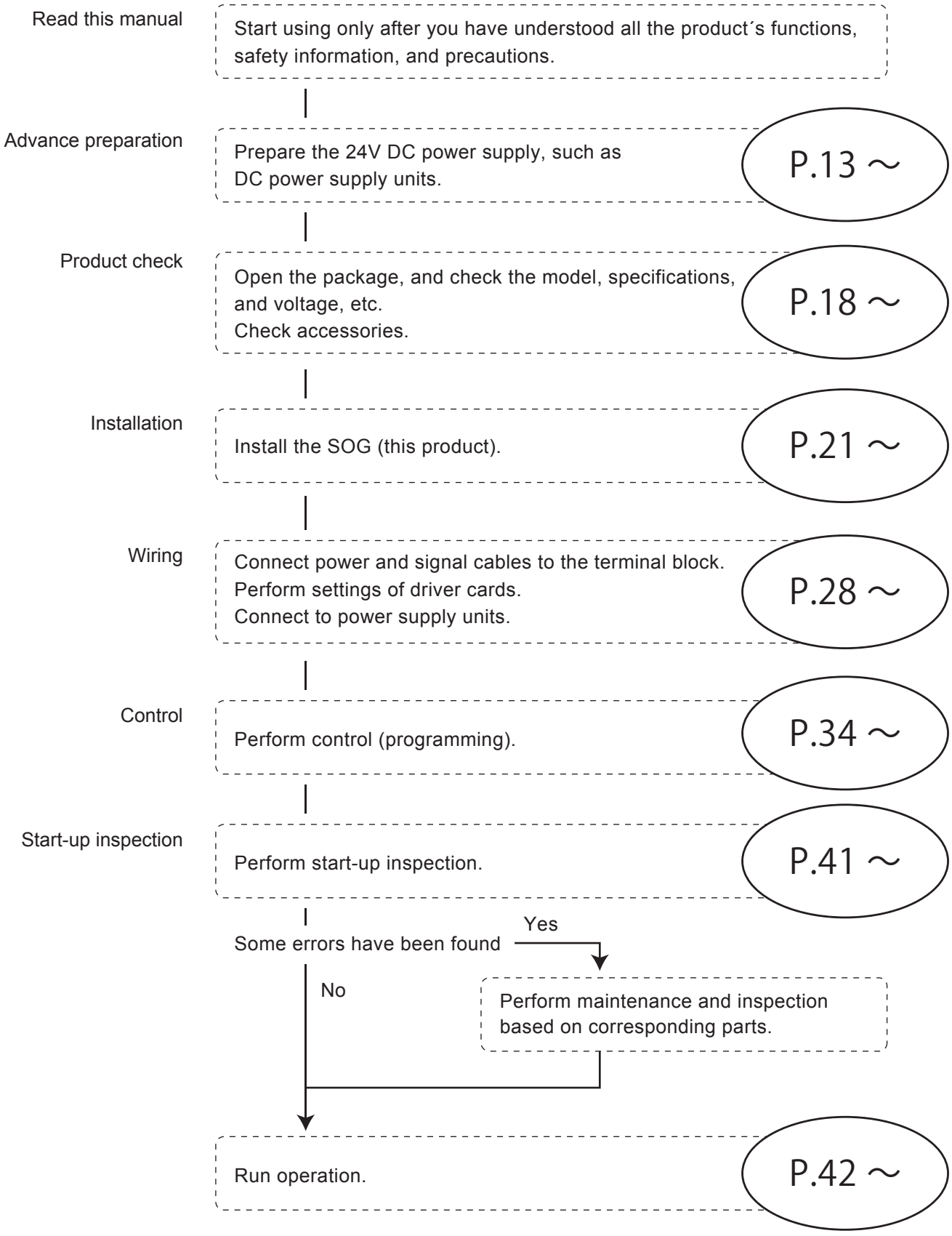
Depending on the signal type (NPN/PNP) specified by customers, different models of control driver cards are supplied as being the standard for this product.

Signal input/output type	NPN	PNP
Driver card	CB-016BN6 /HBS-202FN-MD1	CB-016BP6 /HBS-202FP-MD1

In this manual, CB-016BN6 and CB-106BP6 are described as CB-016, and HBS-202FN-MD1 and HBS-202FP-MD1 are described as HBS-202. Each driver card is described separately, when needed.

2. Procedures from installation to operation

Procedures from installation to operation



2. Procedures from installation to operation

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3. Safety precautions

For parts names in sentences, refer to 6. Structures (P.19).

3. Safety precautions

Danger level

To prevent hazards to users and/or others, and/or damage to property in advance, the important precautions to be followed securely are described below.

■ The degree of hazard and/or damage that may result if a user disregards the description and operates the product improperly is categorized as the following symbols and explained below.

⚠ WARNING	This indicates a high possibility that severe injury or even death may result.
⚠ CAUTION	This indicates a high possibility that injury or only property damage may result.。

Symbol explanation

■ The type of precautions is categorized as the following symbols and explained below.

	This symbol indicates forced operations that users should always perform.
	This symbol indicates operations that are prohibited.
	This symbol indicates a reminder you should pay attention to.

3. Safety precautions

3-1. General precautions

⚠ WARNING

Do not use the product near places subject to explosive, flammable gas, and/or corrosive atmosphere, and/or combustible materials.

Failure to follow this could result in explosion, fire, electric shock and/or injury.

When using the product in places where serious accidents and/or damage may possibly occur, install backup and/or fail-safe functions systematically.

Failure to follow this could result in the inability to control this product, which could lead to serious accidents.

Do not touch the product during operation.

Failure to follow this could result in hands getting caught and/or stuck.

⚠ CAUTION

Do not apply heavy loads to this product, such as stepping on it.

Failure to follow this could result in people falling and/or malfunction.

Never remodel the product.

Failure to follow this could result in serious accidents. We assume no responsibility for remodeled products.

Make sure to connect a ground wire to this product.

Failure to follow this could result in electric shock if any malfunction or leakage occurs.

Do not put water and/or oil on the product, and do not transfer wet and/or oily totes.

Failure to follow this could result in electric shock, and/or malfunction.

Do not apply strong impact and/or excessive force to the product, such as hitting it with objects, or dropping it.
Do not use the product of which the appearance has become deformed.

Failure to follow this could result in malfunction.

Stop operation when abnormal sound is heard during operation.

Failure to follow this could result in unexpected accidents.

Do not use in a way exceeding the range of the product specifications.

Failure to follow this could result in malfunction, fire, and/or injury.

Turn off the power supply to the product before moving, installing, and/or wiring the product, and before performing maintenance and inspection (excluding cases when the power is to remain turned on).

Working while the power is on could result in unexpected accidents.

3. Safety precautions

3-1. General precautions

⚠ CAUTION

Do not turn on/off relays and/or contactors near power cables, signal cables, and/or driver cards.
Failure to follow this could result in malfunction due to noise generation.

LED or Pull-up/Pull-down circuits implemented in the output circuit of control devices could result in unexpected operation.
Carefully check the output circuit.

Turn ON the power in order of external control devices, and then this product.
Turn OFF the power in order of this product, and then external control devices.
Turning ON/OFF the power in the wrong order could result in malfunction.

Do not forcibly rotate rollers in their stopped state with external force.
Failure to follow this could result in damage to driver cards, and/or their lifetime to be significantly shortened.

Do not touch the product when it has just stopped operation.
Failure to follow this could result in burns.

When disposing of the product, make consigning contracts with licensed industrial waste disposers, and consign the disposal to them.

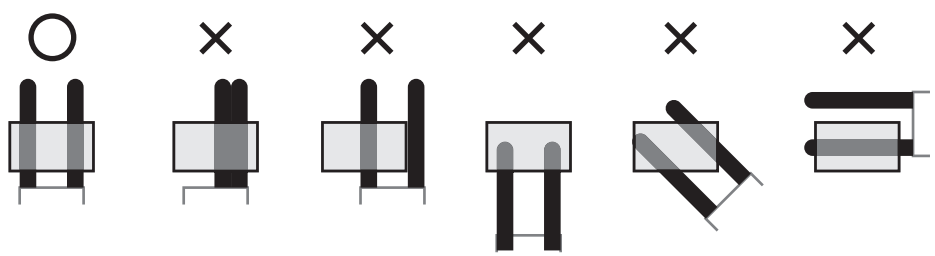
3-2. Precautions on installation

⚠ WARNING

Have the appropriate number of persons assist when carrying and/or installing the product.

When moving the product, be sure to use carrying equipment, such as a transport dolly, pallet truck, and forklift.
Using only manpower could result in unexpected accidents.

Put the forks of a forklift and pallet truck into the product from the side, by placing its center between the forks.
Transporting or moving the product with unbalanced load could result in accidents if the product falls.



3. Safety precautions

3-2. Precautions on installation

⚠ WARNING

When hoisting this product, never enter the area under the suspended load. When hoisting, use appropriate hoisting equipment, and pay special attention to prevent the balance of the suspended load from being lost and/or falling.
Also, have only qualified workers conduct the operation.

Failure to follow this could result in accidents if the product falls.

⚠ CAUTION

When handling, wear protective equipment, such as gloves.

Failure to follow this could result in hands getting injured by metal parts.

Do not remove the packing band wrapped around the product until installation is complete.
When moving the product, secure using the packing band, etc., to prevent the gate section from popping out.

Failure to follow this could result in accidents and/or malfunction if the gate section pops out.

Do not lift this product with goods loaded.

Failure to follow this could result in injury, accidents, and/or damage due to load collapse.

If necessary warning/caution labels become hidden after installation, affix again on places where they can be seen.

3. Safety precautions

3-3. Precautions on wiring

⚠ CAUTION

Turn off the power before carrying out wiring work on the terminal blocks.

Failure to follow this could result in electric shock, malfunction, and/or accidents due to unexpected operation.

Perform wiring so that cables securely come into contact with the terminal blocks.

Barb lines from the cable core could result in heat generation and/or fire due to changes of contact resistance, and/or short circuit with the adjacent contact.

Do not forcibly bend and/or pull cables.
Do not put heavy materials on cables, or do not get them stuck between cables.

Failure to follow this could result in fire and/or electric shock due to cable damage.

3-4. Precautions related to operation

⚠ CAUTION

Do not forcibly move totes when they are placed on rollers.

Failure to follow this could result in damage and/or malfunction.

Make sure to perform the start-up inspection before starting operation.

Wear protective equipment, such as gloves.
When you need to get your hands close to the parts where there is a risk of them getting caught, do not wear gloves, and take appropriate measures to prevent parts of clothes, such as sleeves, from getting caught.

Do not unplug power and/or signal cables during operation.
Do not run/stop this product using the power supply.

Failure to follow this could result in malfunction.

In the event that any abnormalities occur, for example, if abnormal noise is heard from the product, the temperature becomes high, or electric leakage occurs, turn off the power immediately.

Failure to follow this could result in unexpected injury.

3. Safety precautions

3-5. Precautions on start-up inspection/maintenance and inspection

⚠ WARNING

If any abnormalities are found, do not use this product until the causes have been eliminated completely.
Using this product with unattended abnormalities could result in not only damage to the devices, but also unexpected accidents.

Have specialists (or people who have sufficiently acquired skills) perform maintenance and inspection under instructions by management supervisors.

At the time of maintenance and inspection, post warning labels so as to prevent unauthorized persons from turning on the power.
Failure to follow this could result in unexpected accidents.

For maintenance and inspection, wear protective equipment, such as gloves.
Failure to follow this could result in hands getting injured by metal parts. When you need to get your hands close to the parts where there is a risk of them getting caught, do not wear gloves, and take appropriate measures to prevent parts of clothes, such as sleeves, from getting caught.

⚠ CAUTION

Prevent other devices around the product from operating.
Other devices incorporated in the system, such as conveyor lines, could result in unexpected accidents, since totes may start to be transferred from upstream when starting the unit.

Secure the working space for maintenance around this product.
Working in the forced position could result in unexpected accidents.

Do not disassemble sections and/or parts other than those specified.
Failure to follow this could result in malfunction and/or unexpected accidents.

Make sure to prepare maintenance parts designated by ITOH DENKI.
Using parts other than those designated by us could result in malfunction.

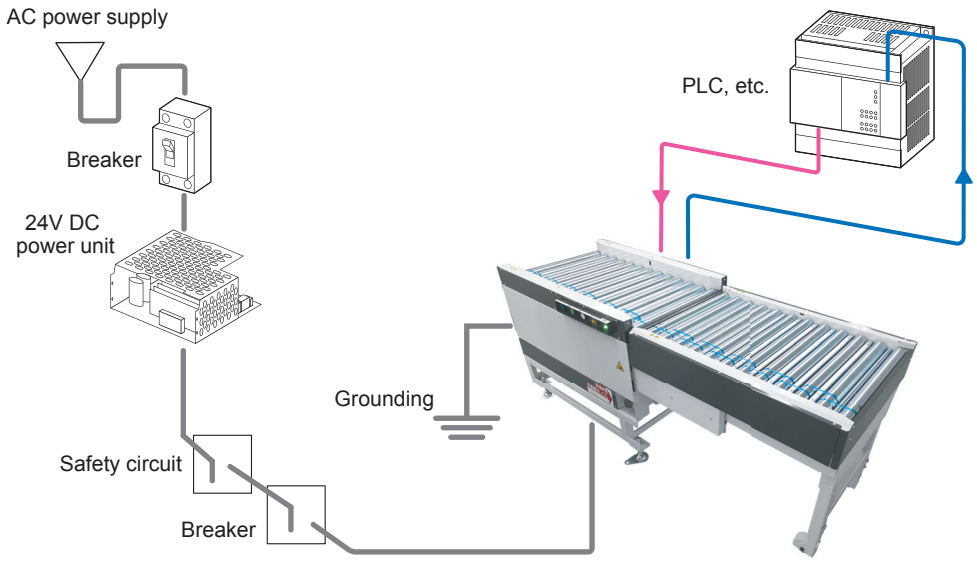
Perform maintenance and inspection in a “Pollution Degree 2” environment, as defined in IEC60664-1.

When disassembling the product, make sure to fully understand the maintenance and inspection contents before working.

4. Advance preparation

4. Advance preparation

Reference of wiring



■ As for the sensor input, and input/output signals of controllers, adopt the number of inputs/outputs based on customers' operation. (Details ⇒ P.28)

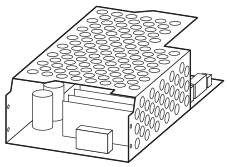
■ The safety circuit includes the emergency stop equipment and magnet contactor.

Items to be prepared by customers

Before introducing this product prepare the following devices separately.

① 24V DC power supply

Power supply equipment to supply 24 VDC to this product



- Switching power supply (24V DC/10A, 240W)
- 24V DC battery

■ A switching power supply is recommended as the DC power supply (24V DC±10%) for the driver card.

■ Use a stabilized power supply that has an adequate capacity of 24V DC and 10 A or higher and does not fluctuate due to load variation.

■ A transformer type power supply cannot be used.

■ Secure a voltage of 24V DC±10% at the power supply terminal of a driver card.

■ If the power supply capacity is less than the rated power of this product, it may result in malfunction and/or damage due to the supply voltage drop. Be sure to use a power supply with a capacity larger than the rated power of this product.

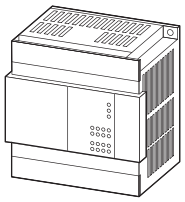
■ The power supply should not activate protection with peak current 20 A, 1 ms or below.

■ For the power supply unit, use an isolation type switching power supply compliant with the safety standard (IEC62368-1). Do not use a non-isolation type power supply for safety reasons, since it may not conform to the radiation noise regulations.

4. Advance preparation

② Control devices

Devices to control this product, such as PLCs



③ Wiring materials

Necessary for wiring of power and signal cables to the terminal blocks.

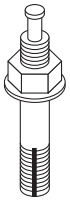
terminal block 1	Compatible crimp terminals 1.25-3／2-3
terminal block 2/ terminal block 3	Wire diameter: 0.08 to 1.5 mm2 (AWG: 28 to 16) Flexible twisted wires

■ To select the current capacity of wiring materials, secure a high safety margin based on the current value in the equipment to be used.

■ Longer wiring between the power supply unit and this product could cause the voltage drop, resulting in malfunction and/or damage.

④ Anchor bolt

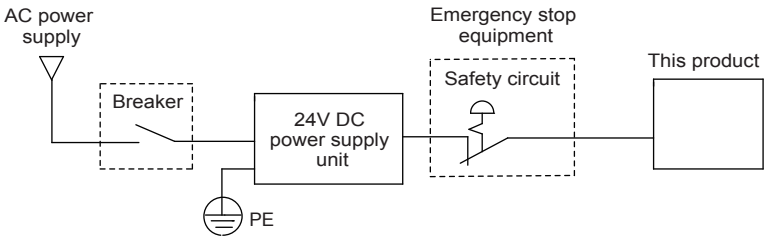
Necessary to fix this product. Prepare four M12 anchor bolts in advance.



⑤ Emergency stop equipment

This product does not include the emergency stop equipment. Customers must make sure to install it.

Install the emergency stop equipment on the side of the 24V DC power unit to which the power is supplied.



⑤-1 Checking the breaker

Regarding equipment where this product is installed, check that a breaker with appropriate capacity for AC input specifications of the 24V DC power supply unit has been installed. If abnormal operation should occur, protection through the breaker could be effective.
When using an earth leakage breaker, select one that is “inverter corresponding”. Some inverter non-corresponding earth leakage breakers could result in malfunction, since they may recognize high-frequency components of the switching power supply as leakage.

⑤-2 Operation check

When the 24V DC power supply unit has been installed, check that the breaker and safety circuit can work properly. Perform operation following the trial operation after checking them.

① Input to the 24V DC power supply unit (AC power) is securely turned ON/OFF when turning ON/OFF the breaker.

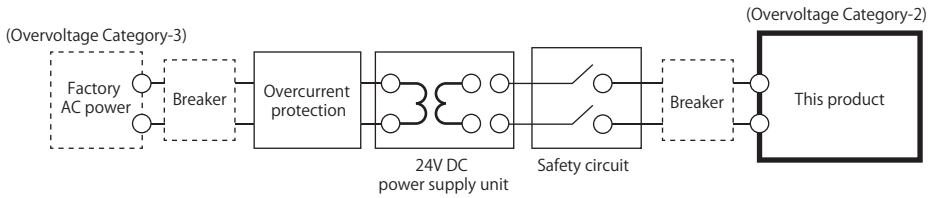
② This product input (24V DC) is securely turned OFF/ON when turning ON/OFF the safety circuit.

4. Advance preparation

⑥ About the wiring method

⑥-1 When overcurrent protection devices are required

When overcurrent protection devices need to be installed to the 24V DC power supply unit, some power supplies that need to conform to the safety standards (UL60950-1, etc.) require installation of the specified overcurrent protection device based on their specifications. In such cases, make sure to install the specified overcurrent protection device as described in the figure below. When overcurrent protection devices are not required in specifications of the 24V DC power supply unit, they do not need to be installed.

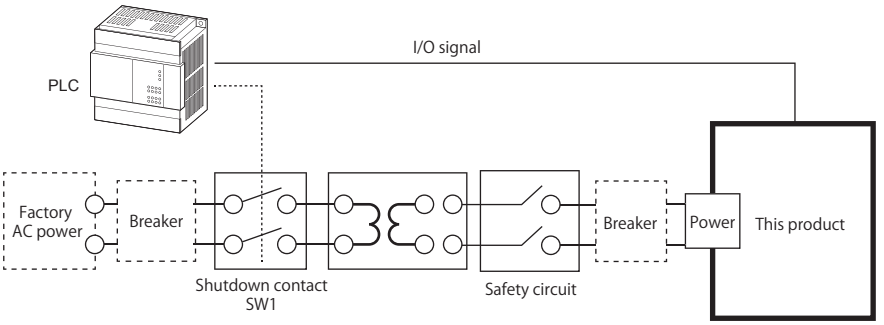


⑥-2 Installation of over-current protection device

In case of using power supply device except a limit power supply, install the over-current protection device on the 24V DC line.

⑥-3 Adding the power shutdown circuit of this product in the event of a failure

In the event that a failure occurs, such as overload or abnormal temperature, this product will transmit the I/O signal of failure generation to PLC devices, as well as stopping product operation. However, the product does not have the power shutdown function. Accordingly, if the product's power needs to be shut down in the event of a failure, as described in SW1 of the figure below, add the power shutdown circuit using a PLC.

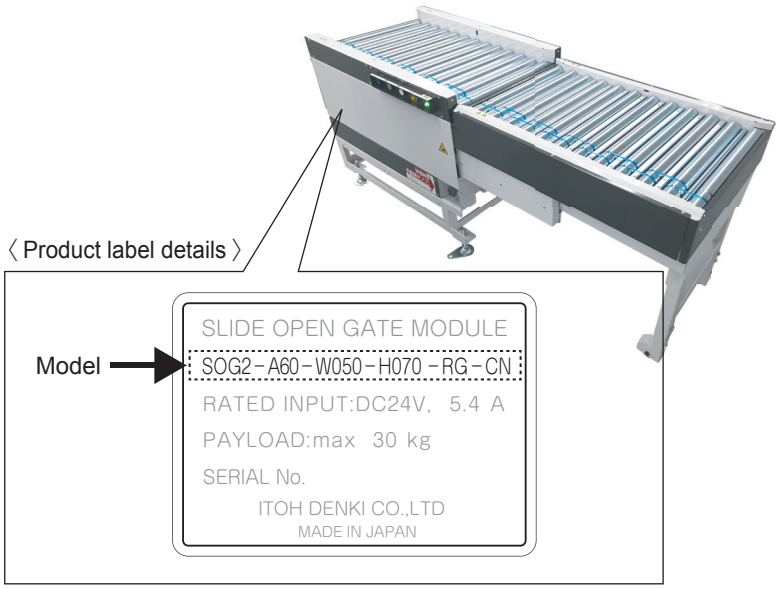


5. Product check

5. Product check

Checking the model

After unpack, check that the product model is what you ordered.



Checking appearance

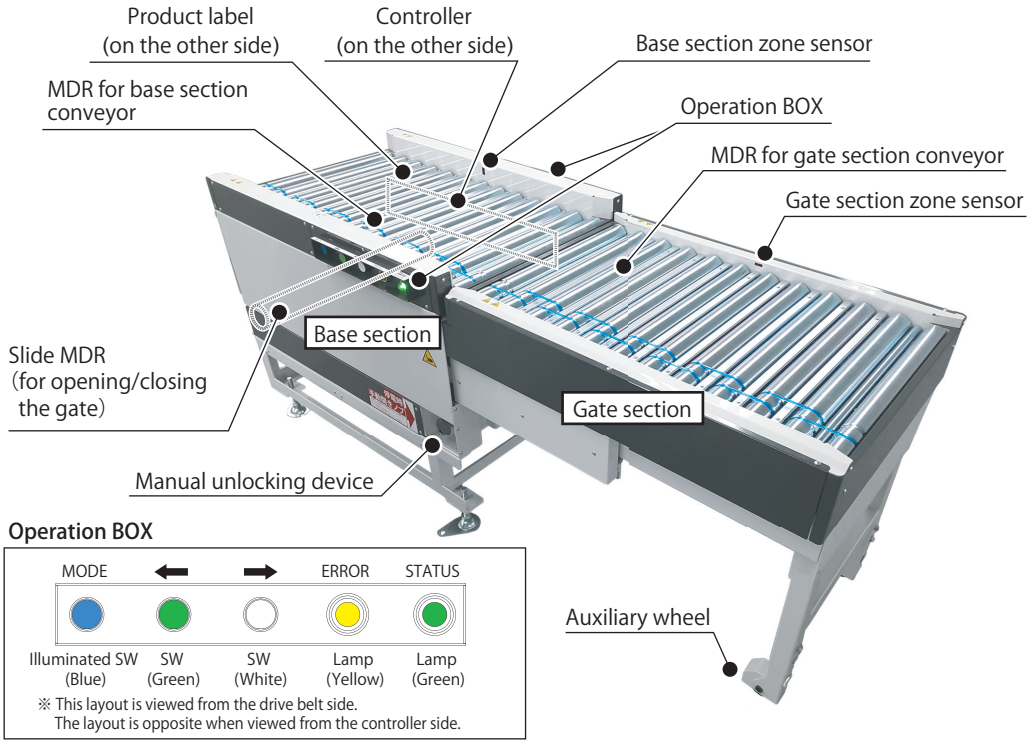
① Check that the main unit is free from any abnormalities, such as traces of scratches, dents, dirt, and/or corrosion (rust).
② Check that there is no omission and/or looseness of screws.

If any abnormalities are found, contact the supplier immediately.

6. Structures

6. Structures

Structures

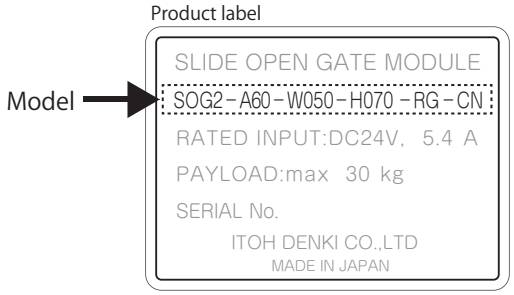


Operation BOX

※ This layout is viewed from the drive belt side.
The layout is opposite when viewed from the controller side.

For how to operate, refer to 9. Operation.

Product designation



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① Nominal speed
- 17 ··· 17m/min (Low speed type)
- 60 ··· 60m/min (Standard type)

② Transfer width (W)
- 040 ··· BF Length 415mm
- 050 ··· BF Length 515mm
- 060 ··· BF Length 615mm
- 070 ··· BF Length 715mm
- 080 ··· BF Length 815mm

③ Transfer surface height (H)
- 060 ··· Transfer surface 600 mm (adjustment range 600 to 650 mm)
- 070 ··· Transfer surface 700 mm (adjustment range 700 to 799 mm)
- 080 ··· Transfer surface 800 mm (adjustment range 800 to 899 mm)
- 090 ··· Transfer surface 900 mm (adjustment range 900 to 999 mm)
- 100 ··· Transfer surface 1000 mm (adjustment range 1000 to 1099 mm)

④ Driver card type
- C ··· CB-016×2, HBS-202-MD1
- E ··· IB-E05, HBS-202-MD1 (Network communication control type)

⑤ The input/output signal types of the driver, the base zone sensor, and the gate zone sensor
- N ··· NPN
- P ··· PNP

Term

Nominal speed

The speed on the transfer surface (m/min), and the nominal speed with a nice round value for convenience. Values differ from the actual speed.

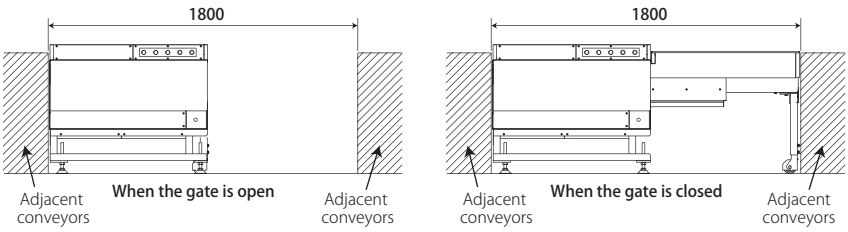
7. Installation/Wiring

7. Installation/Wiring

7-1. Before installation

Installation environment

- Install this product in places with a mounting surface tilt (inclination) of 1/1000 or less.
- Install in locations where the weight of this product and totes can be sufficiently supported. (For the main unit weight, refer to P46)
- The vibration level in the installation environment for this product should be 0.5 G or less.
- This product cannot be installed in places where the friction of the floor is too much to let the auxiliary wheels roll smoothly.
- Be sure to install the product in a place where anchor bolts can be cast.
- Observe safety regulations required for installation locations or equipment in use.
- When installing, pay attention to the opening/closing direction.
- Put adjacent conveyors apart at the distance shown in the following figure before installation.



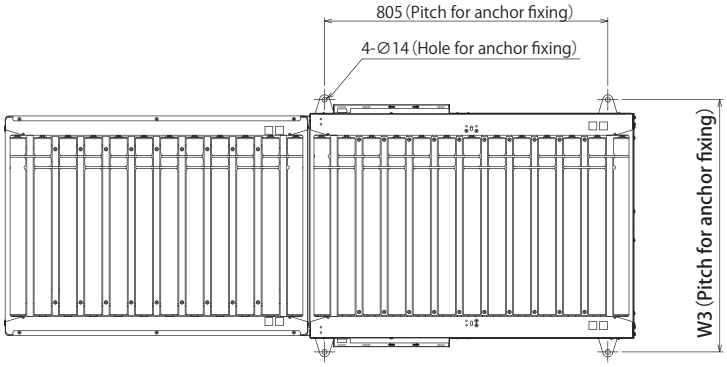
7. Installation/Wiring

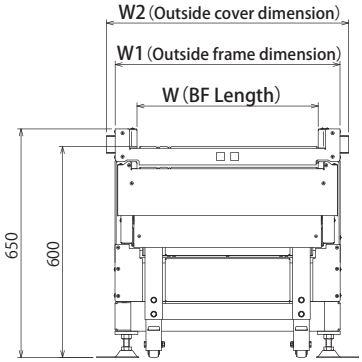
7-2. External dimensions

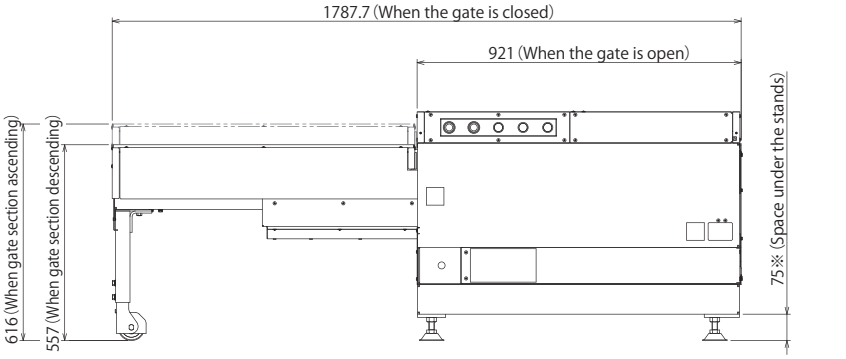
Transfer surface height：H060

Transfer width　　Unit [mm]

Model：W□	040	050	060	070	080
BF Length：W	415	515	615	715	815
Outside frame dimension：W1	539	639	739	839	939
Outside cover dimension：W2	588	688	788	888	988
Pitch for anchor fixing：W3	617	717	817	917	1017





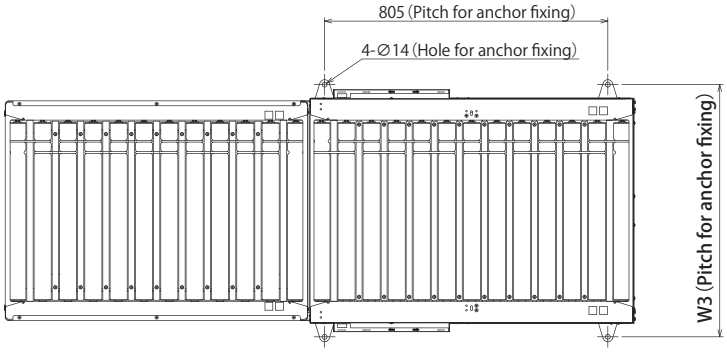


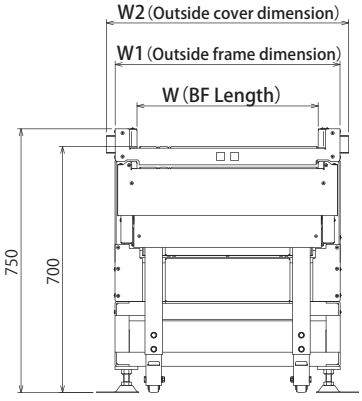
※Adjustment range：0~50mm

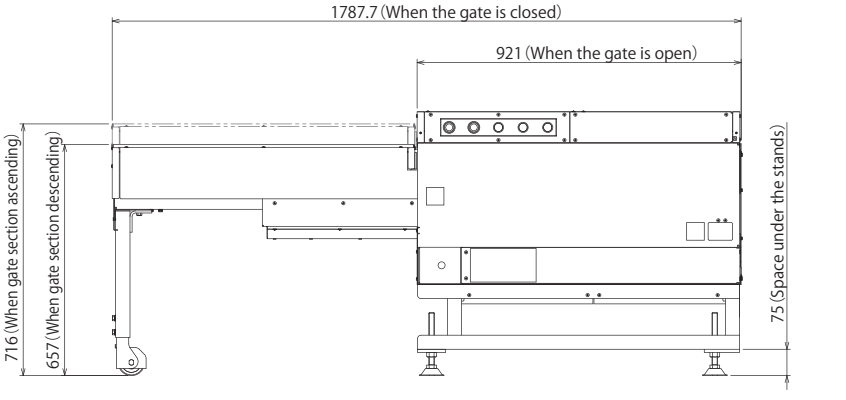
Transfer surface height：H070

Transfer width　　Unit [mm]

Model：W□	040	050	060	070	080
BF Length：W	415	515	615	715	815
Outside frame dimension：W1	539	639	739	839	939
Outside cover dimension：W2	588	688	788	888	988
Pitch for anchor fixing：W3	617	717	817	917	1017







※Adjustment range：0~99mm

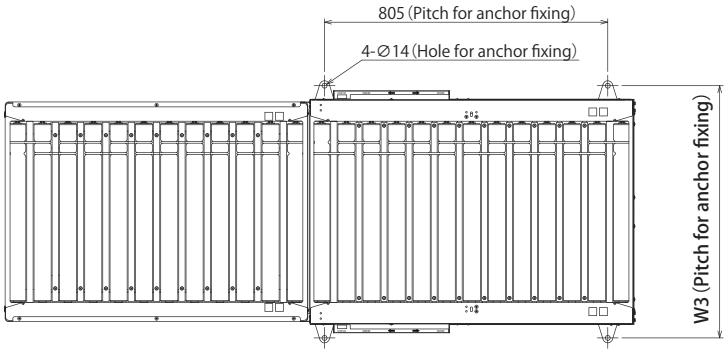
7. Installation/Wiring

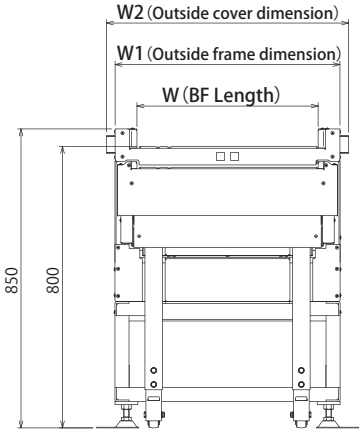
Transfer surface height：H080

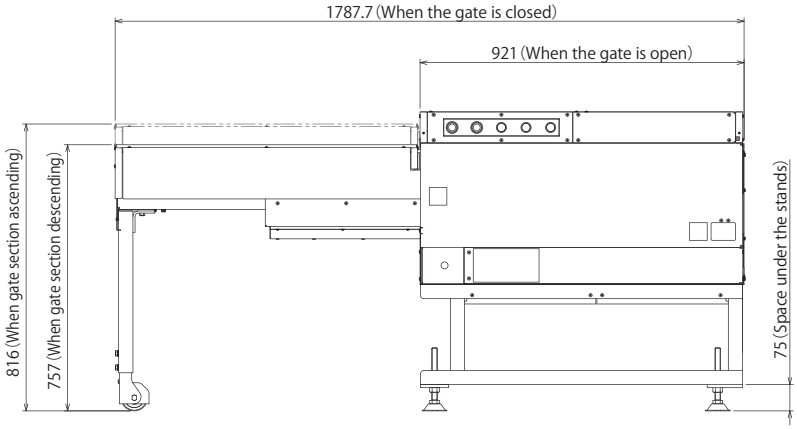
Transfer width

Unit [mm]

Model：W□	040	050	060	070	080
BF Length：W	415	515	615	715	815
Outside frame dimension：W1	539	639	739	839	939
Outside cover dimension：W2	588	688	788	888	988
Pitch for anchor fixing：W3	617	717	817	917	1017







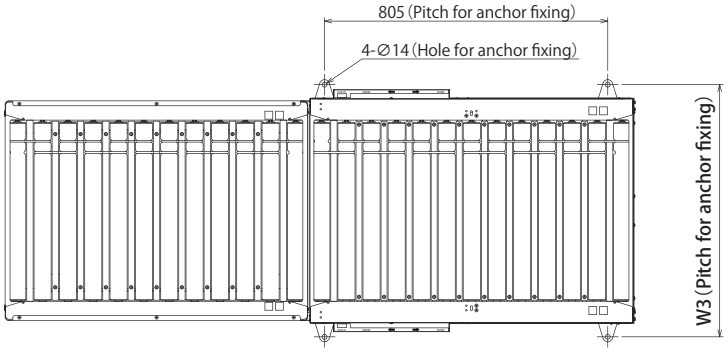
※Adjustment range：0~99mm

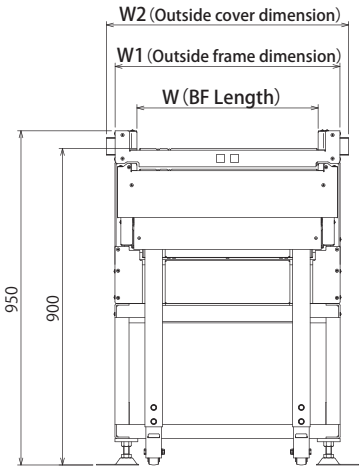
Transfer surface height：H090

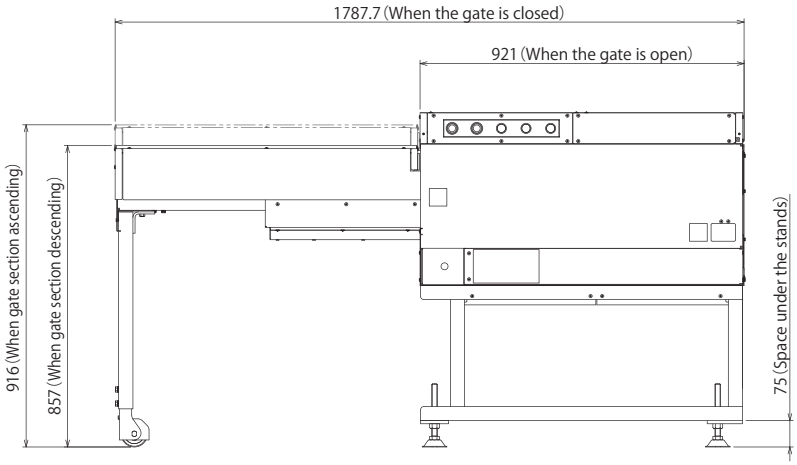
Transfer width

Unit [mm]

Model：W□	040	050	060	070	080
BF Length：W	415	515	615	715	815
Outside frame dimension：W1	539	639	739	839	939
Outside cover dimension：W2	588	688	788	888	988
Pitch for anchor fixing：W3	617	717	817	917	1017







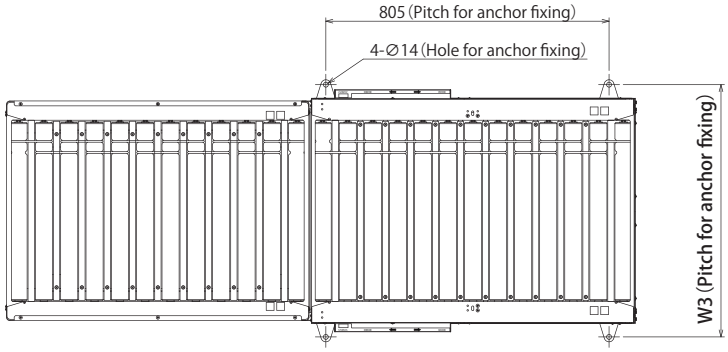
※Adjustment range：0~99mm

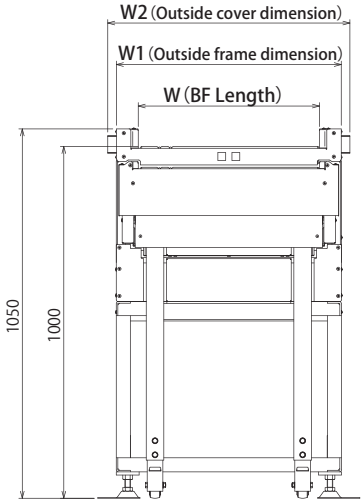
7. Installation/Wiring

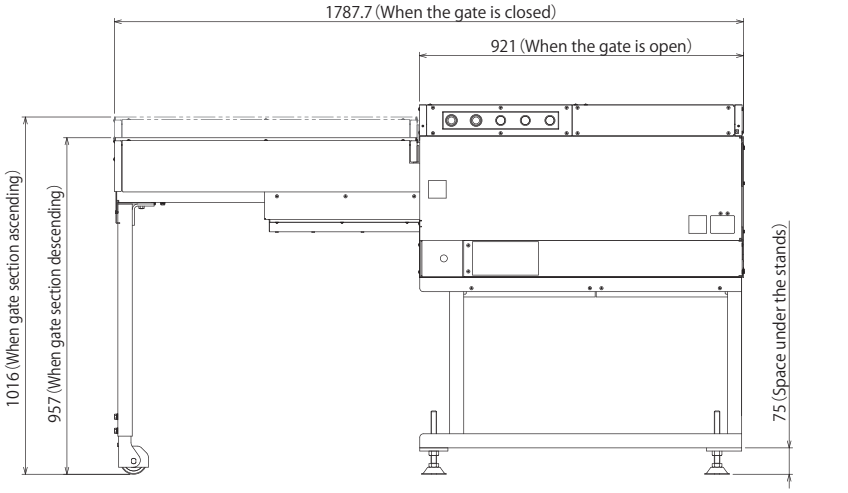
Transfer surface height：H100

Transfer width Unit [mm]

Model：W□	040	050	060	070	080
BF Length：W	415	515	615	715	815
Outside frame dimension：W1	539	639	739	839	939
Outside cover dimension：W2	588	688	788	888	988
Pitch for anchor fixing：W3	617	717	817	917	1017







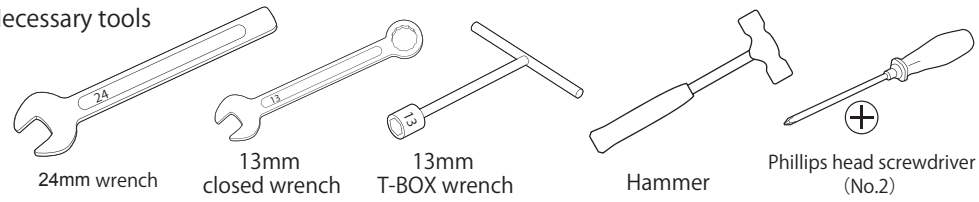
※Adjustment range：0~99mm

7. Installation/Wiring

7-3. Installation

Installation

Necessary tools

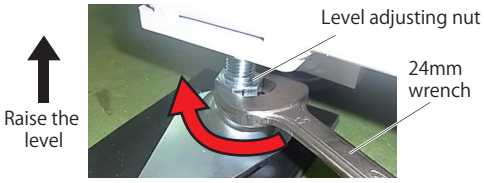


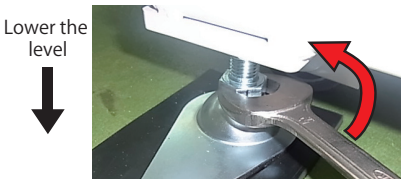
24mm wrench | 13mm closed wrench | 13mm T-BOX wrench | Hammer | Phillips head screwdriver (No.2)

1 Carry this product to the installing location.

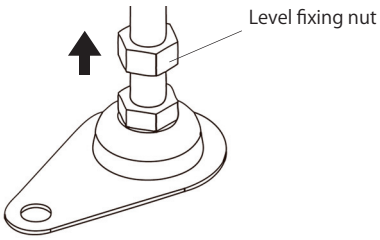
Level adjustment in the base section

2 After fixing the product, adjust the level of conveyors adjacent to the base section.





3 After adjusting the level, fix level adjusting nuts with level fixing nuts.



7. Installation/Wiring

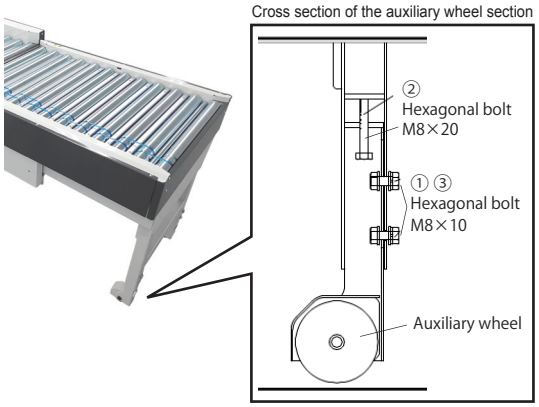
Level adjustment in the gate section

4

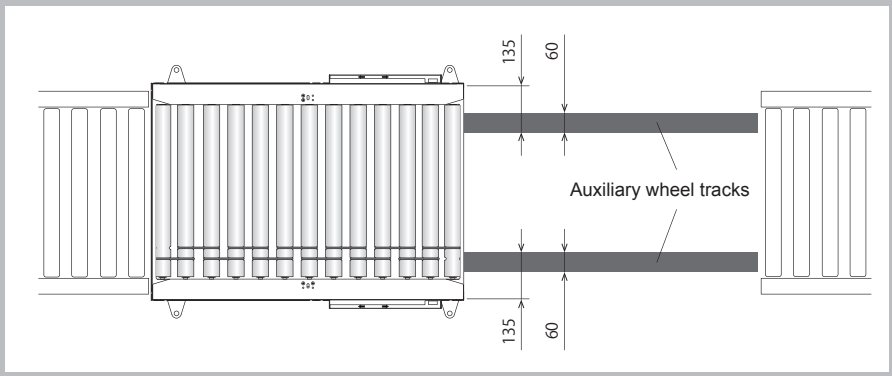
①Loosen the M8×10 hexagonal bolts with a 13 mm closed wrench and 13 mm T-BOX wrench.

②Use a 13 mm closed wrench to adjust the level by turning the M8×20 hexagonal bolt.

③After adjusting the level, tighten the M8×20 hexagonal bolt.



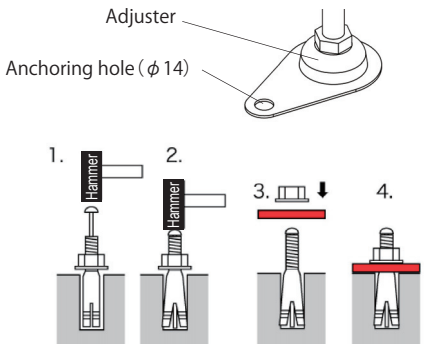
■ Do not place anything on the auxiliary wheel tracks (refer to the figure below). Failure to follow this could result in malfunction of gate opening/closing.



Fixing with anchor bolts

5

After placing the unit, use anchor bolts and adjuster anchoring holes to fix the unit in place on the floor.

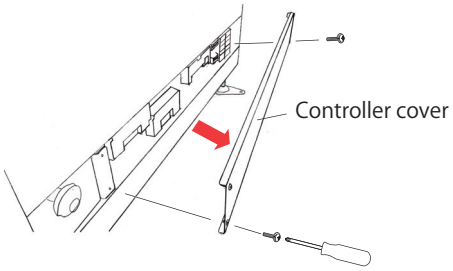


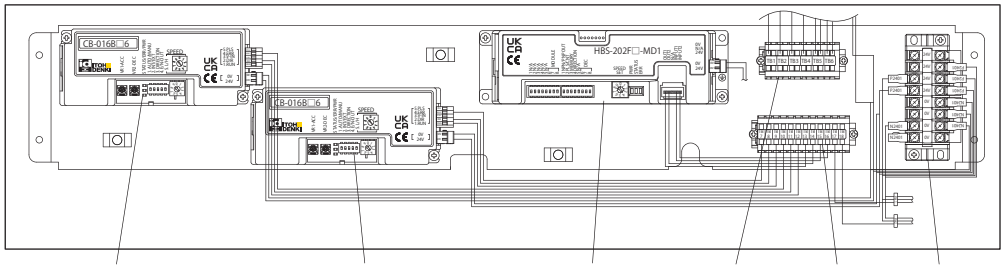
7. Installation/Wiring

7-4. Wiring

Wiring

1 Remove the controller cover.

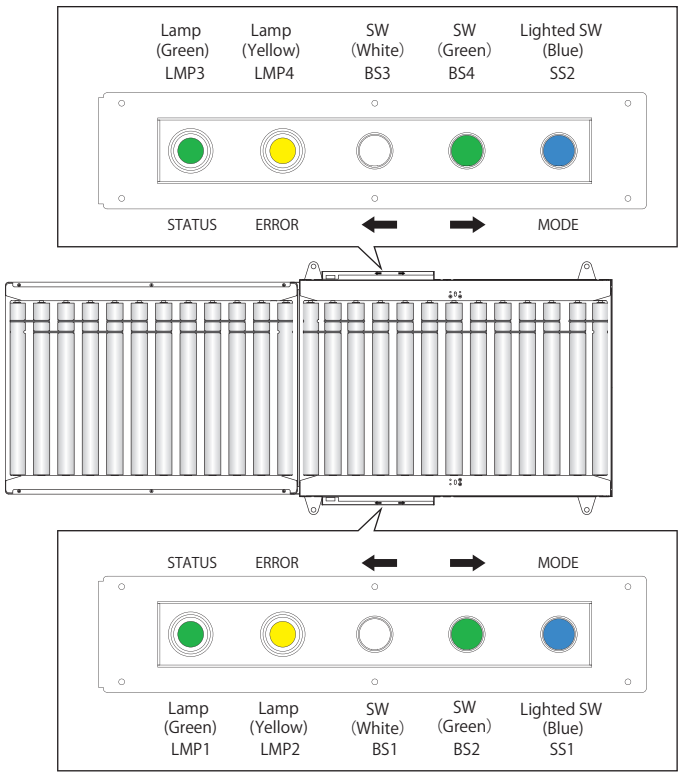




2 Carry out wiring work on the terminal blocks 1 to 3 and grounding terminal.

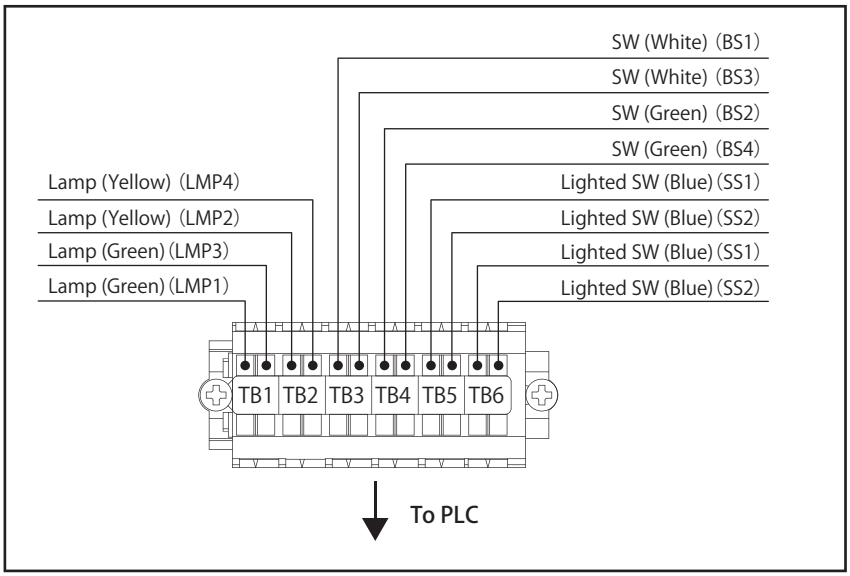
- When attaching the open/close sensor, be careful not to make an error in wiring (such as mixing up the power and GND lines in particular). Failure to follow this could result in accidents, such as power short-circuiting.
- Be sure to program the gate closing motion to start after workers or objects finish passing the gate.
- Since the gate section conveyor opens and closes in this product, wiring (control/power) with back and forth conveyors needs to be arranged so as not to affect the crossing moving line (opening/closing section).

Operation BOX



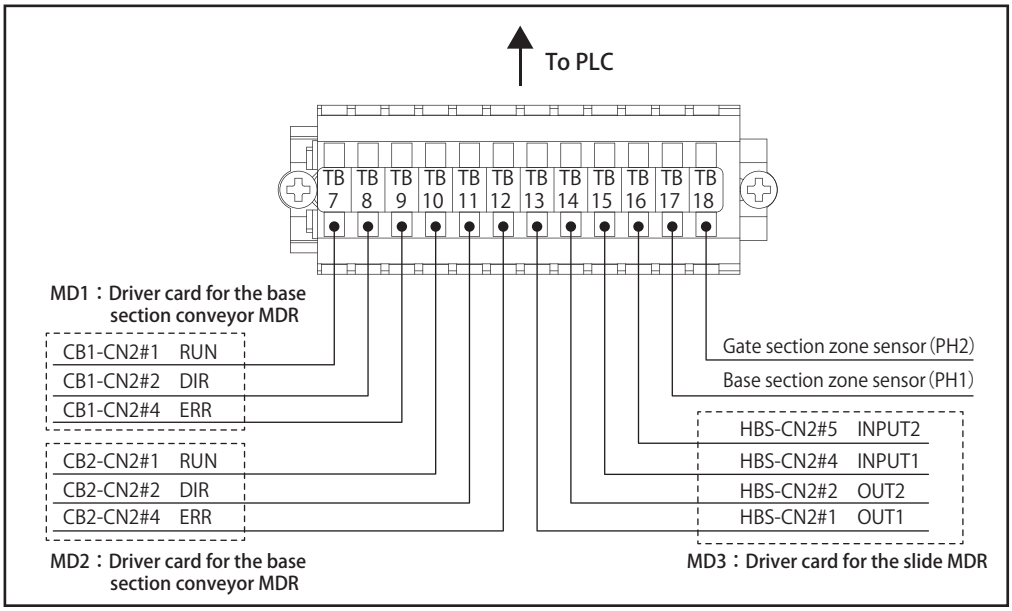
7. Installation/Wiring

Wiring on the terminal block 2 (Input and output for the operation BOX)



■ Terminal block 2 has the four-wire system.
■ Available wire diameter: 0.08 to 1.5 mm2 (AWG28 to 16) Flexible twisted wires

Wiring on the terminal block 3 (Signal input and output for the driver card and zone sensor)



■ Available wire diameter: 0.08 to 1.5 mm2 (AWG28 to 16) Flexible twisted wires

7. Installation/Wiring

Control terminals of driver cards for MD1: Base section conveyor MDR and MD2: Gate section conveyor MDR

			Functions		Detailed descriptions
CB1 CB2	CN2 (Control)	#5	Output	Motor pulse output	Unused
		#4	Output	Error signal output	・Open collector output. ・Attach protection resistance so that the output is 25mA or less.
		#3	Analog input	MDR external speed setting	Unused
		#2	Input	MDR rotation direction switching	Up to 3mA
		#1	Input	MDR RUN/STOP	Up to 3mA

For more details on CB-016, please download the driver card user manual from our web page.

ITOH DENKI Home > Download/Support > User Manual

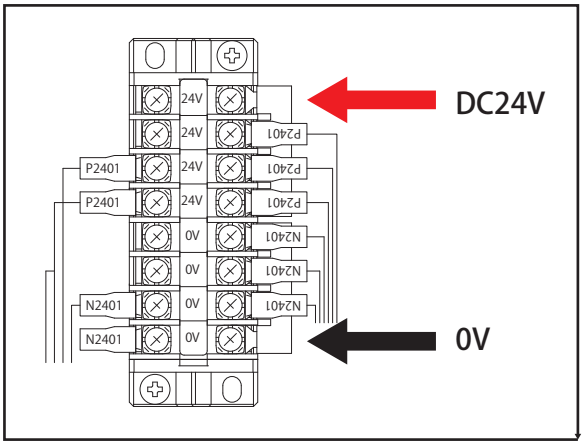
https://itohdenki.co.jp/english/support/manual.html

Control terminals of driver cards for MD3: Slide MDR

			Functions		Detailed descriptions
HBS	CN2 (Control)	#5	Input	INPUT2：OPEN input	Up to 2.5mA
		#4	Input	INPUT1：CLOSE input	
		#3	—	Unused	
		#2	Output	OUT2：OPEN state output	・Open collector output. ・Attach protection resistance so that the output is 25mA or less.
		#1	Output	OUT1：CLOSE state output	

7. Installation/Wiring

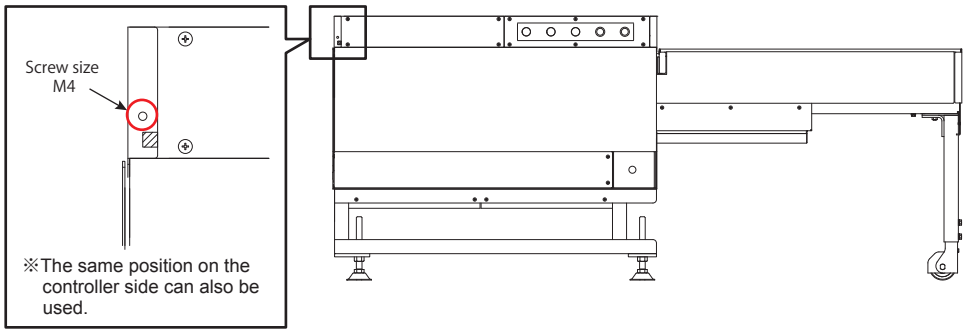
Wiring from the terminal block 1 to the DC power supply unit



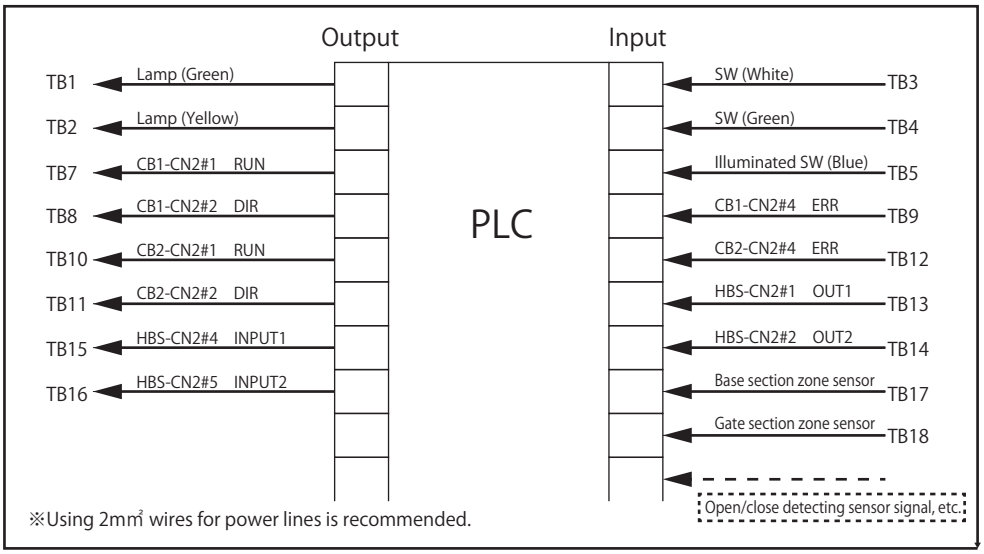
■ Compatible crimp terminals ： 1.25-3／2-3

Grounding terminal

Connect a ground wire to the following position.



Wiring example from the terminal blocks 2 and 3 to PLC



■ When using the mode switching SW, or adding indicator lamps, refer to the terminal block 2 wiring diagram, and carry out wiring.

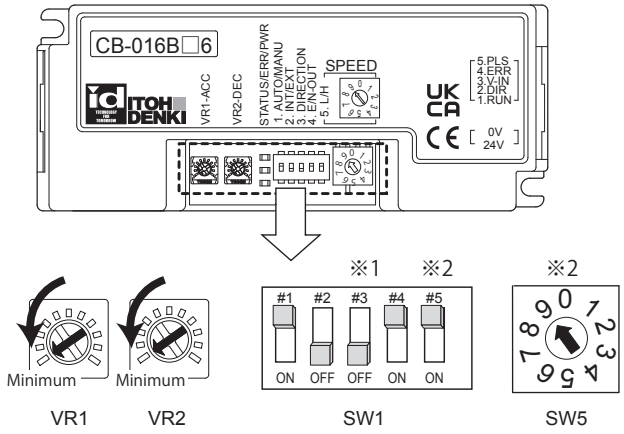
■ When attaching the open/close sensor, etc., connect it to the input terminal side of PLC.

7. Installation/Wiring

7-5. Setting driver cards

Settings for MD1 and MD2

Perform driver card settings for MD1: Base section conveyor MDR and MD2: Gate section conveyor MDR.



■ ※1 SW1#3 is used for setting the rotation direction.
Be sure to set MD1 and MD2 driver cards to the same settings. Failure to follow this could result in damage to totes and/or unexpected accidents.

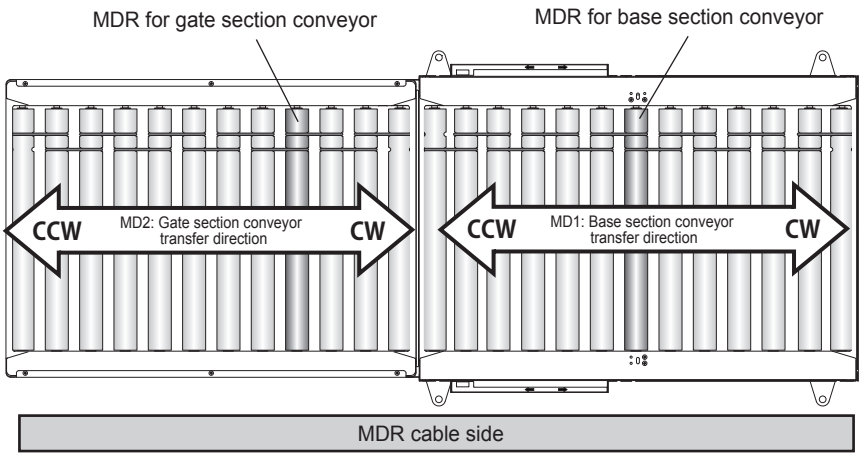
■ ※2 SW1#5 and SW5 are used for setting the speed.
Be sure to set MD1 and MD2 driver cards to the same settings. Perform settings when MD1 and MD2 stop. Failure to follow this could result in malfunction.

Setting the rotation direction

※1 is used for setting the rotation direction.
The MDR rotation direction can be changed by using the DIP switch on the driver card and signal input.

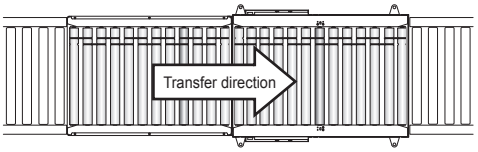
CB-016		SW1 # 3 ON (1 2 3 4 5)	SW1 # 3 OFF (1 2 3 4 5)
TB8 / TB11	DIR No DIR signal	CW	CCW
	DIR DIR signal input	CCW	CW

※ The MDR rotation direction is defined as CW or clockwise direction, and CCW or counter-clockwise direction when viewed from the cable side.



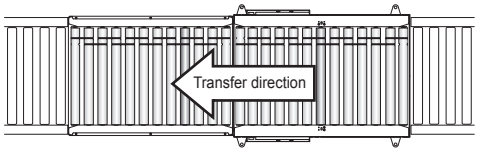
7. Installation/Wiring

Transfer setting example ①



	MD1: MDR for base section conveyor	MD2: MDR for gate section conveyor
Rotation direction	CW	CW
SW1#3	ON	ON
CN2#2	OFF	OFF
CN＃1	ON	ON

Transfer setting example ②



	MD1: MDR for base section conveyor	MD2: MDR for gate section conveyor
Rotation direction	CCW	CCW
SW1#3	OFF	OFF
CN2#2	OFF	OFF
CN＃1	ON	ON

Speed setting

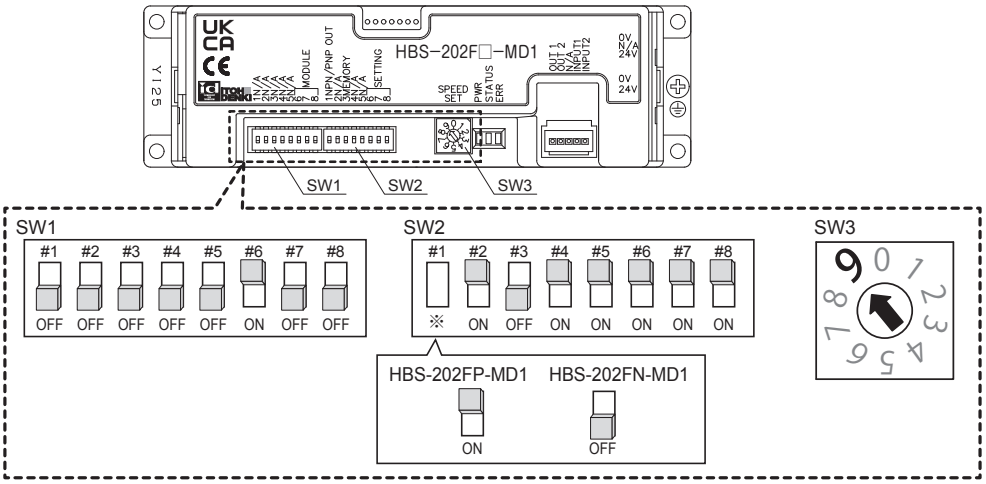
※2 is used for setting the speed.
Set the speed using the DIP switch on the driver card and rotary switch.

Speed accuracy：±3%

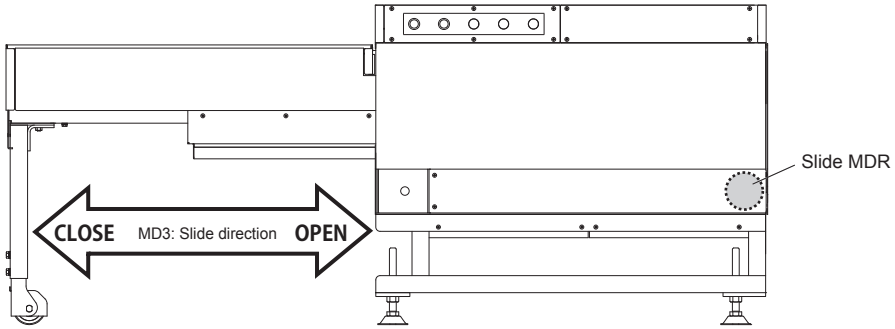
		SW1#5：ON										SW1#5：OFF									
SW5		9	8	7	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0
17m/min low speed type	Setting	16.9	15.5	14.8	14.1	13.4	12.7	11.2	10.5	9.8	9.1	8.4	7.7	7.0	6.3	5.6	4.9	4.2	3.5	2.8	2.1
60m/min standard type	Setting	60.0	55.0	52.5	50.0	47.5	45.0	40.0	37.5	35.0	32.5	30.0	27.5	25.0	22.5	20.0	17.5	15.0	12.5	10.0	7.5

Settings for MD3

Check the driver card settings for MD3: Slide MDR.
(For HBS-202, they have been already set at the factory setting.)



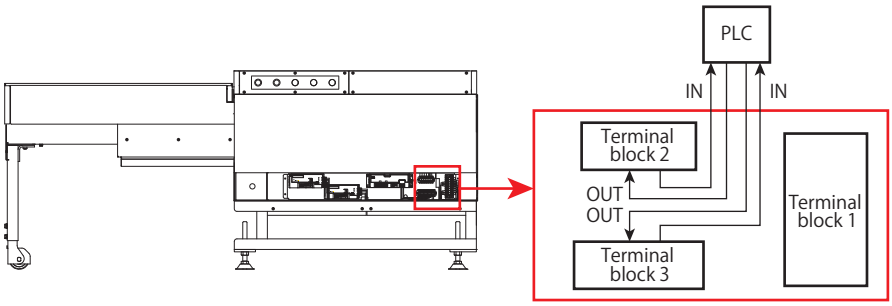
■ Do not change DIP switch settings for HBS-202.



8. Control

8. Control

8-1. I/O settings



I/O					Description		Operation BOX
PLC output	Terminal block 2	TB1	LMP1/LMP3		Lamp (Green)	Power/Operation indication	STATUS
PLC output		TB2	LMP2/LMP4		Lamp (Yellow)	Error indication	ERROR
PLC input		TB3	BS1/BS3		SW (White)	Conveyor close SW	← (→) ※
PLC input		TB4	BS2/BS4		SW (Green)	Conveyor open SW	→ (←) ※
PLC input		TB5	SS1/SS2		Illuminated SW (Blue)	Mode switching SW	MODE
PLC output		TB6	SS LMP1/SS LMP2		Illuminated SW (Blue) lamp	Illuminated SW lamp	
PLC output	Terminal block 3	TB7	CB1-CN2#1	RUN	Base section conveyor RUN input	Driver card for MD1: Base section conveyor	—
PLC output		TB8	CB1-CN2#2	DIR	Base section conveyor Rotation direction input		
PLC input		TB9	CB1-CN2#4	ERROR	Base section conveyor Error output		
PLC output		TB10	CB2-CN2#1	RUN	Gate section conveyor RUN input	Driver card for MD2: Gate section conveyor	
PLC output		TB11	CB2-CN2#2	DIR	Gate section conveyor Rotation direction input		
PLC input		TB12	CB2-CN2#4	ERROR	Gate section conveyor Error output		
PLC input		TB13	HBS-CN2#1	OUT1	Conveyor close state output	Driver card for MD3: Slide MDR	
PLC input		TB14	HBS-CN2#2	OUT2	Conveyor open state output		
PLC output		TB15	HBS-CN2#4	INPUT1	Conveyor close input		
PLC output		TB16	HBS-CN2#5	INPUT2	Conveyor open input		
PLC input		TB17	PH1		Base section zone sensor		
PLC input		TB18	PH2		Gate section zone sensor		

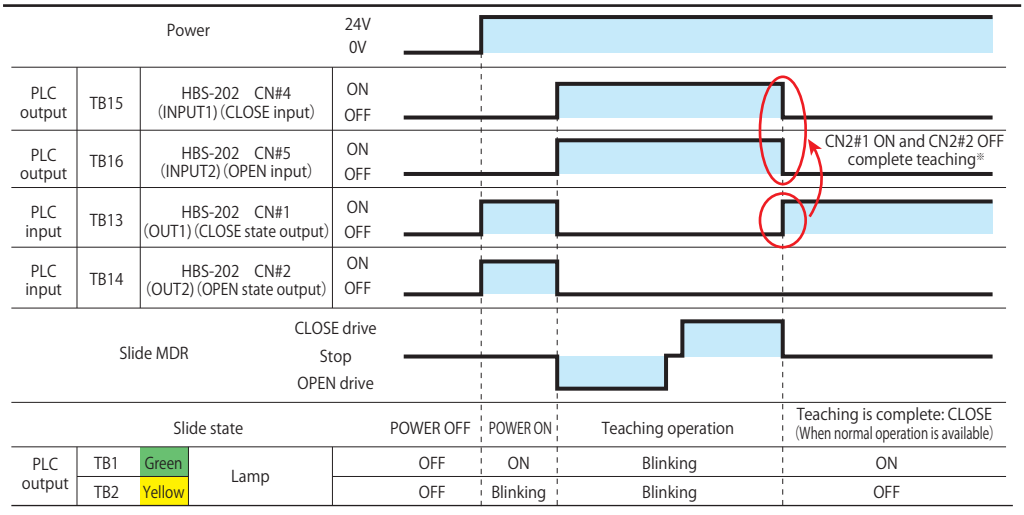
※ The arrow direction is indicated when viewed from the controller side. The arrow direction when viewed from the drive belt side is indicated in parentheses.

8-2. Teaching (initial) settings

After turning the power ON, teaching operation needs to be carried out to set the gate open/close positions.

- During teaching operation, do not load totes on the gate section. Failure to follow this could result in injury and/or damage due to totes falling.
- The gate zone sensor is turned ON during OPEN (gate open) or CLOSE (gate close) operation. (This is not a malfunction.)

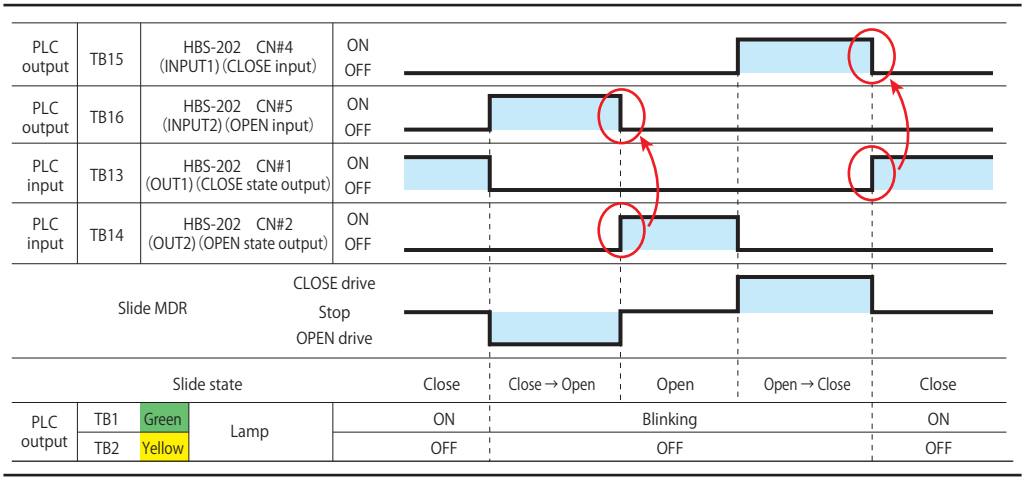
Normal operation of teaching (initial) settings



- When teaching fails, both CN2#1(OUT1)(CLOSE state output) and CN2#2(OUT2) (OPEN state output) are turned ON. The green lamp lights up, and the yellow lamp blinks. In that case, enter signals to CN2#4 (INPUT1)(CLOSE input) and CN2#5 (INPUT2)(OPEN input) again, and carry out the teaching settings.

8. Control

8-3. Operation in the gate section

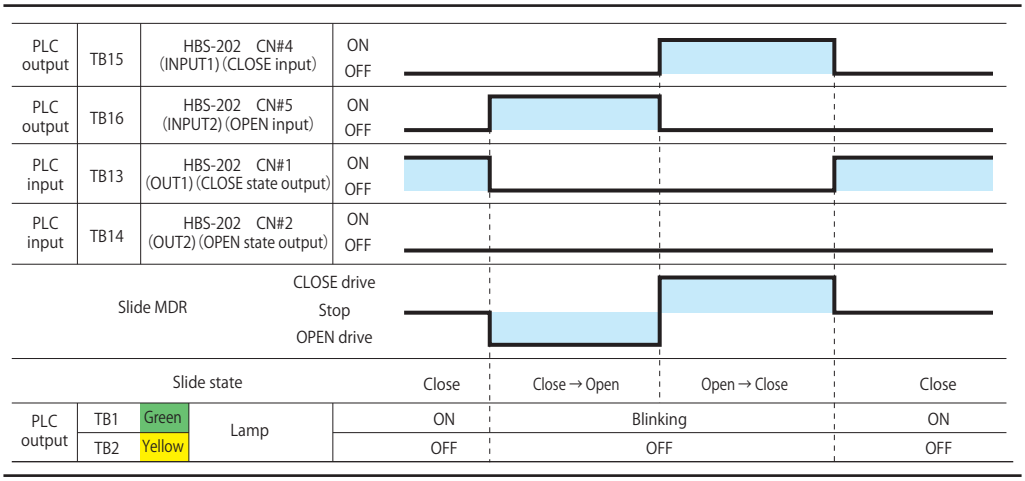


■ If the signal input stops during the open/close motion, the motion will be interrupted. Inputting signals again resumes the motion.

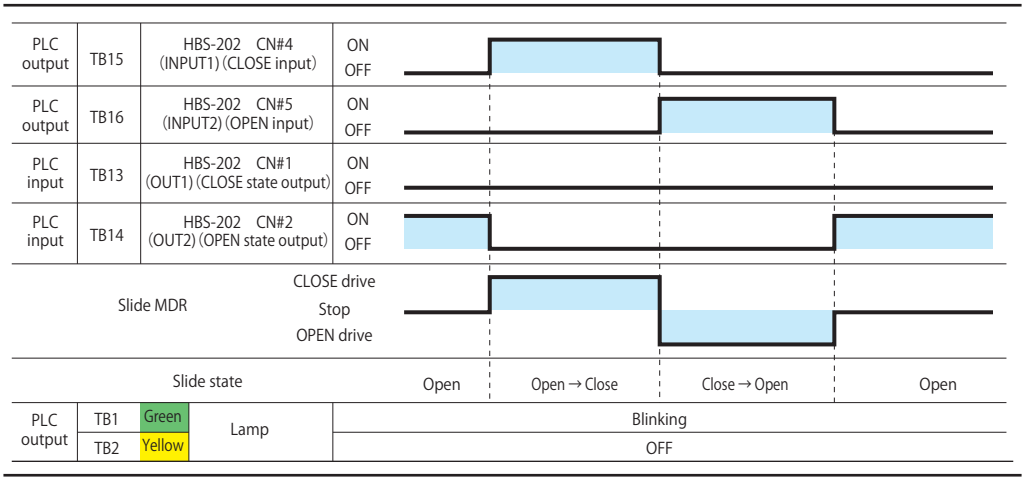
Switching between OPEN and CLOSE during the open/close motion

Switching between OPEN and CLOSE (switch to CLOSE during OPEN, or switch to OPEN during CLOSE) can be conducted during the open/close motion.

Switch to CLOSE during OPEN

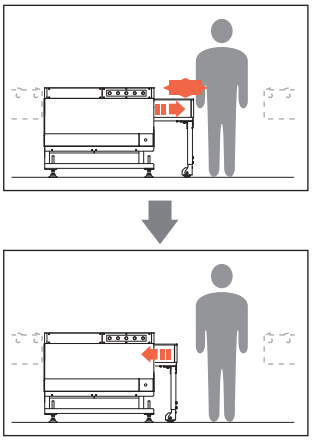


Switch to OPEN during CLOSE

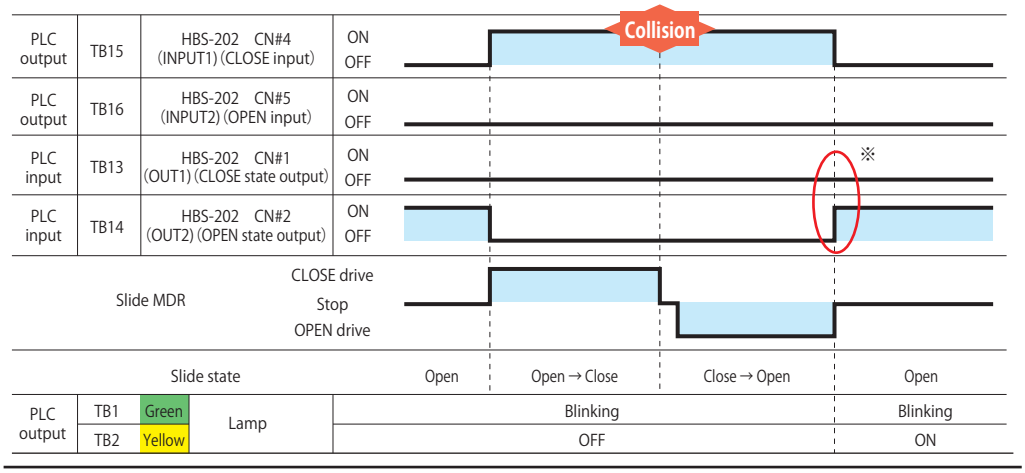


8. Control

8-4. Collision detection function



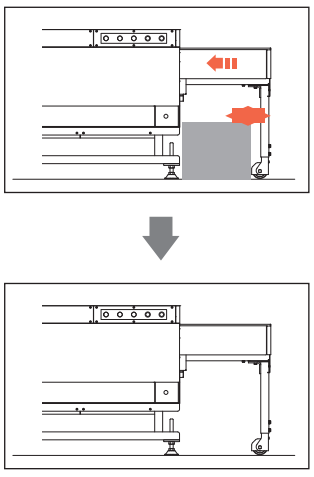
If people or objects come into contact with the gate during the CLOSE motion, the CLOSE motion will be interrupted and stop. The state will return to OPEN. Refer to the following figure for the operation.



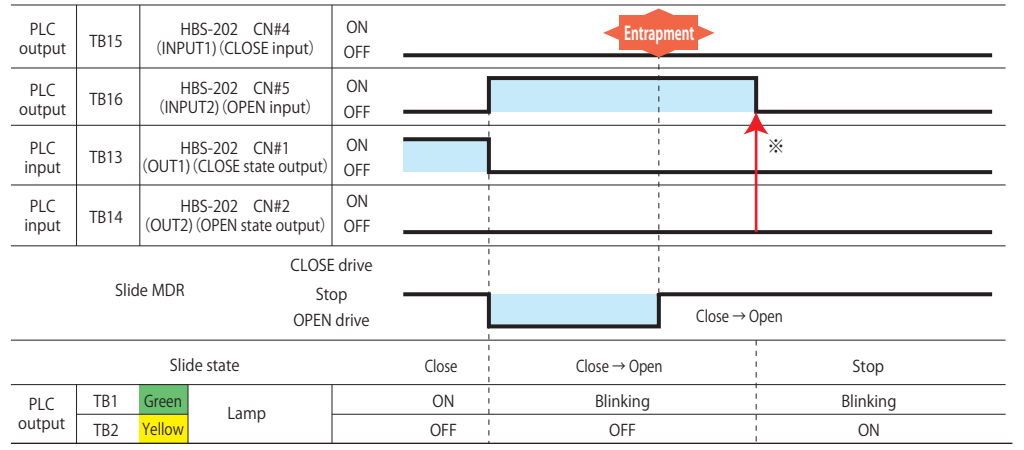
※Since no output is from CN2#1 that indicates the CLOSE state, and output is from CN2#2 that indicates the OPEN state, it is determined that the gate has collided with something.

■ The CLOSE motion will be resumed by inputting the signal to CN2#4 (INPUT1) (CLOSE input).

8-5. Entrapment detection function



If objects get stuck in the gate during the OPEN motion, the OPEN motion will be interrupted and stop. Refer to the following figure for the operation.



※ ・Since no output is from CN2#2 that indicates the OPEN state, it is determined that entrapment has occurred.
・Detect entrapment based on the opening time (5 sec) at the time of normal operation.

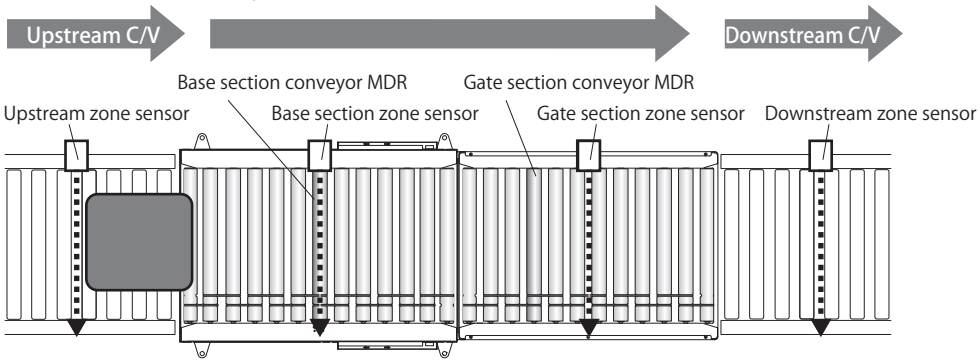
■ To resume operation, eliminate the causes, and enter signals to CN2#4 (INPUT1)(CLOSE input) or CN2#5 (INPUT2)(OPEN input).
The operation will start according to the input signal.

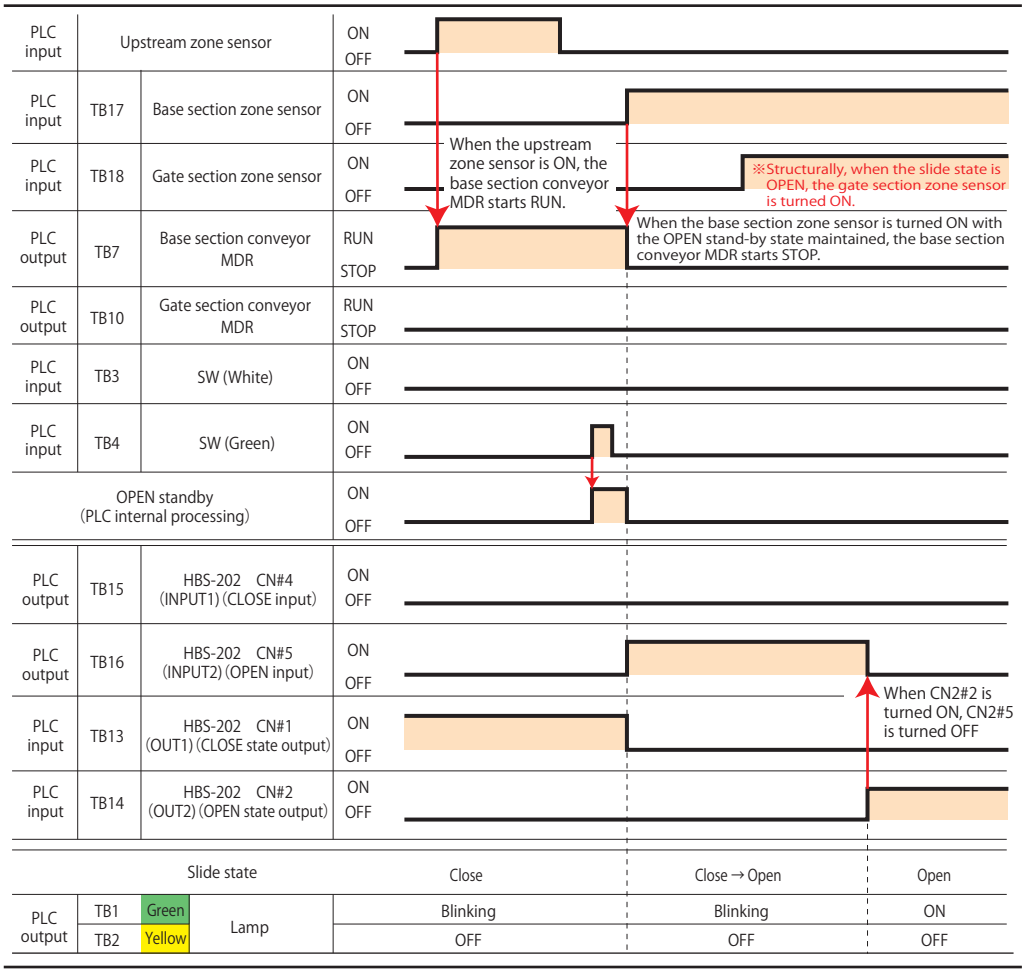
8. Control

8-6. Operation examples

■ Do not turn the signal input to TB16 (OPEN input) ON when totes are loaded on the gate section conveyor.

Example 1) When opening the gate section while totes are being transferred to the base section conveyor.

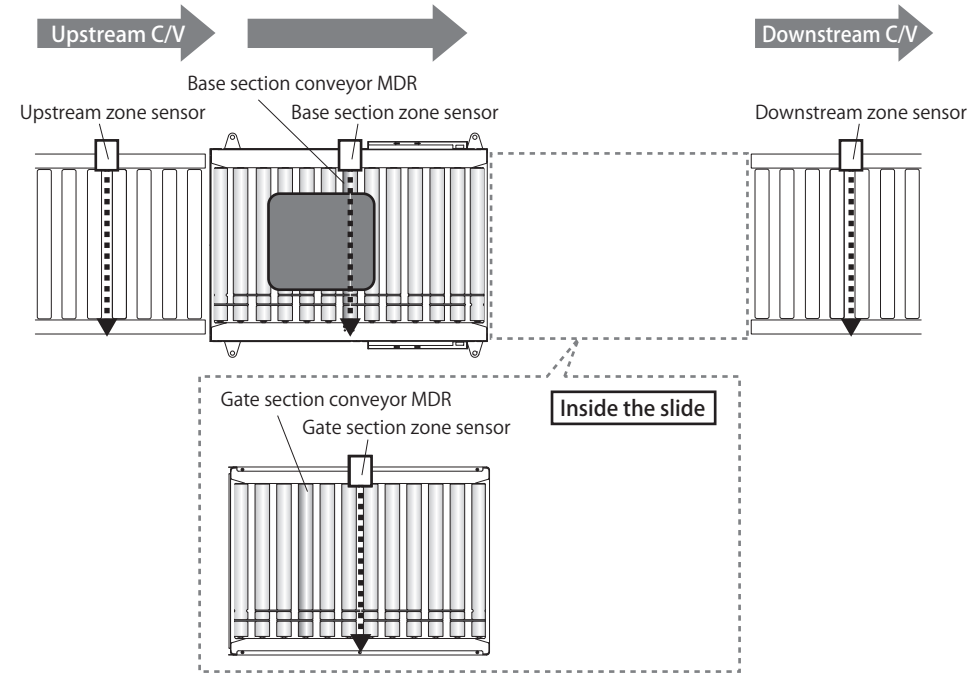


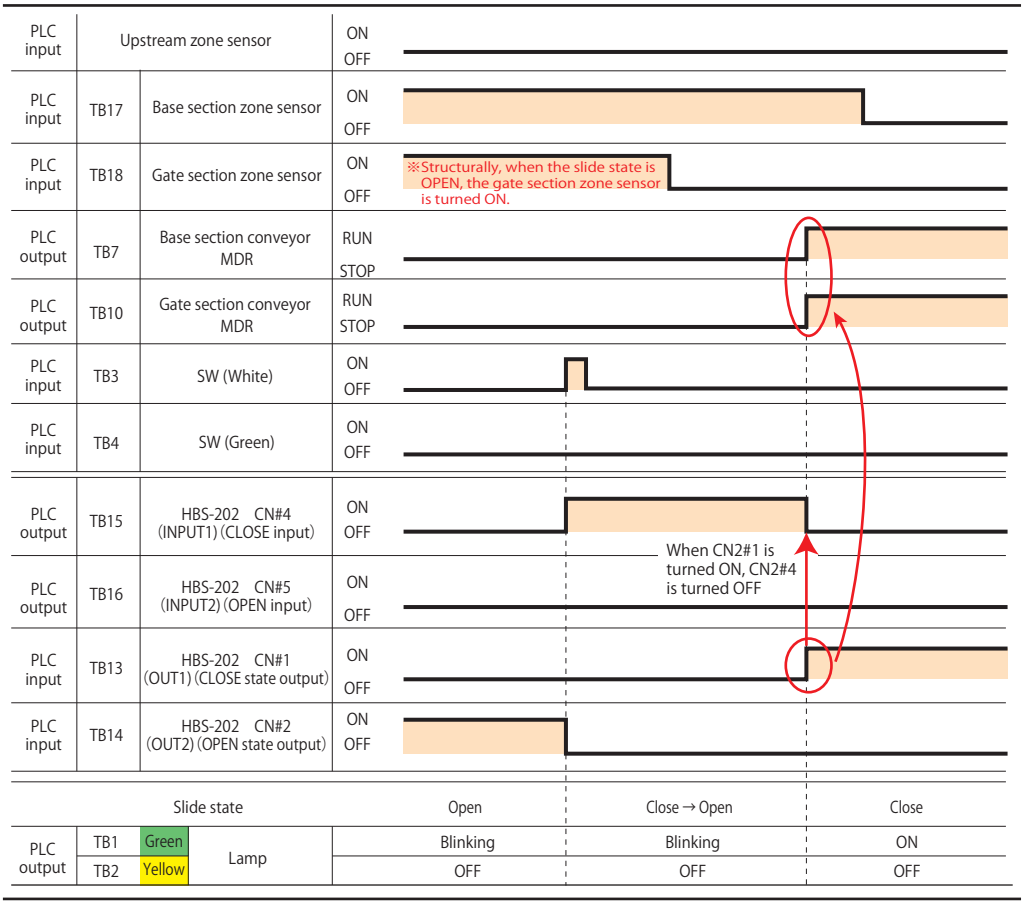


■ The DIP switches of driver cards (MD1 and MD2) have been set to initial settings.

8. Control

Example 2) When closing the gate section





■ The DIP switches of driver cards (MD1 and MD2) have been set to initial settings.

9. Operation

9. Operation

9-1. Start-up inspection

To prevent accidents and/or damage to devices during operation, refer in advance and before operation to the below, and check the safety.

Items to check before turning on the power

Turn off the power of all connected devices, and perform the following inspection, taking necessary measures.

- Turn off the power, wait a sufficient amount of time, and discharge electricity inside the DC power supply equipment.
- Post warning labels so as to prevent unauthorized persons from turning on the power.

Parts to be inspected	Items to be checked	Description of measures
Anchor bolt	Looseness on secured positions	Fix the loosened position
Roller cover	Screw looseness	Re-tighten screws
Driver card ※Remove the cover, and check.	Damage, deformation	Contact the supplier
	Screw looseness on secured positions	Re-tighten screws
	Damage to cables/Wiring failure	Perform wiring correctly
Idler	External abnormalities, such as scratches or breakage	Contact the supplier
MDR	External abnormalities, such as scratches, dents, or breakage	
Drive belt	Cracks, wear, and/or damage on the surface	
Others	Parts deformation, damage	Contact the supplier
	Cable damage	

Items to check after turning on the power

Manually input the signal to driver cards according to inspection contents.

- After completing measures to prevent fingers from getting stuck and/or caught in rollers during transfer switching, and/or transfer operation, perform inspection.
- Take safety measures, such as getting ready to shut off the power in the event that something should happen.

Parts to be inspected	Items to be checked	Description of measures
Driver card ※Remove the cover, and check.	Abnormal temperature rise	Contact the supplier
	Error check with LED display ＜Normal LED display after the power is turned on＞ If LED is displayed in a status different from those shown below, it is judged as error. CB-016: PWR (Green) ON / ERR (Red) OFF HBS-202: PWR (Green) Blinking (1Hz)※ / ERR (Red) OFF	Check error contents, and eliminate the causes. CB-016 Download from our web page. HBS-202 Check the DIP switch settings. (P.34)
Idler	Abnormal sound	Contact the supplier
	Rotation failure	
MDR	Abnormal sound	
	The specified speed cannot be achieved	
	Abnormal temperature rise	
Elevating operation	Abnormal sound	Contact the supplier
Others	Leakage from equipment	Check grounding on equipment, perform grounding

※When teaching operation is incomplete. (Immediately after turning the power ON)
When teaching operation is complete, PWR (Green) will be ON, and ERR (Red) OFF will be OFF.

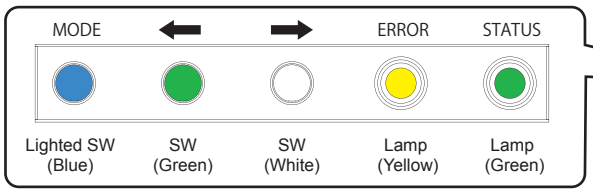
9. Operation

9-2. Before operation

■ Customers are responsible for preparing the control equipment, carrying out wiring, and making programs for operation.

This document includes basic descriptions about operation methods, lamp indications, and various types of operations, assuming that customers have prepared the control equipment, and finished wiring and making the control programs by referring to this document. At the time of operation, be sure to prepare the control equipment, carry out wiring, and have made the control programs according to your operation.

9-3. Lamps and switches in the operation BOX



※ This layout is viewed from the drive belt side.
The layout is opposite when viewed from the controller side.

Lamp (Green)	Lamp (Yellow)	Status
OFF	OFF	POWER OFF
ON	Blinking	Teaching operation is incomplete immediately after turning the power ON
Blinking	Blinking	During teaching operation
ON	OFF	Just after teaching is complete / CLOSE state
Blinking	OFF	OPEN state/ During the open/close motion/ When error is being released
Blinking	ON	When collision is detected / When entrapment is detected

SW (White)	→	Teaching (initial) settings	CLOSE operation ※
SW (Green)	←		OPEN operation※

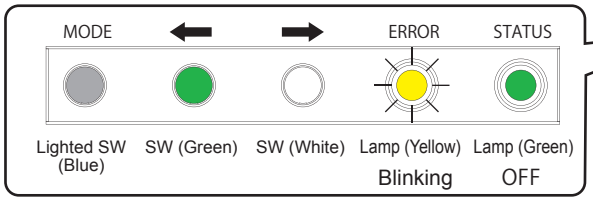
Lighted SW (Blue)	MODE	OFF	When the gate is automatically opened/closed by the sensor
		ON	When the gate is manually opened/closed using button operation

※ When teaching operation is complete (under normal operation)

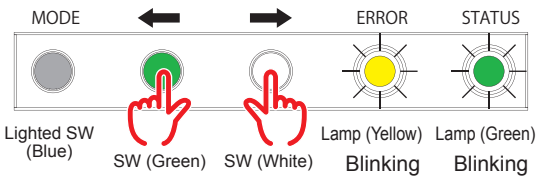
9-4. Teaching (initial) settings

After turning the power ON, carry out teaching operation to set the gate open/close positions.

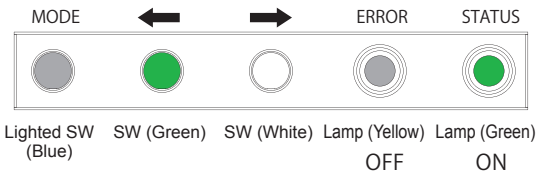
1 Turn the power ON.



2 Press and hold SW(Green) and SW(White) simultaneously. The gate will be open and closed.
(Teaching starts)



3 When the open/close motion finishes, and the gate has been closed, teaching will be complete.

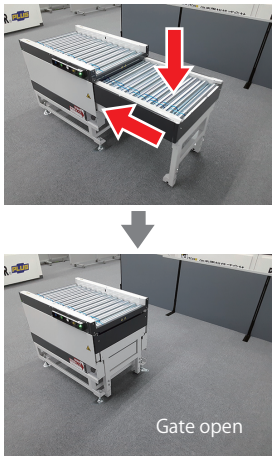


9. Operation

9-5 Operation examples

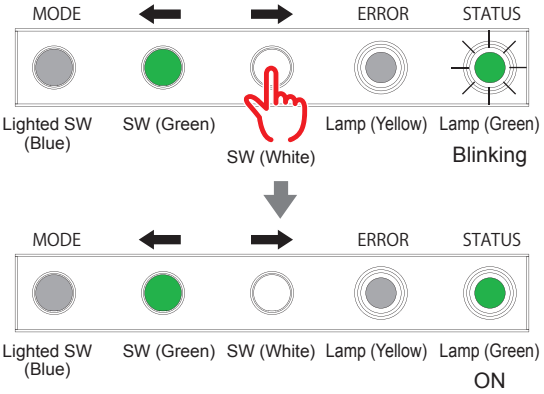
OPEN

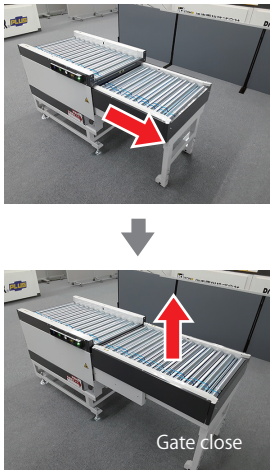
When SW(Green) is pressed, the gate section conveyor will descend, and it will be housed into the base section conveyor. This allows the unit to come into the OPEN state.



CLOSE

When SW(White) is pressed, the gate section conveyor will be extended, and the unit will come into the CLOSE state.

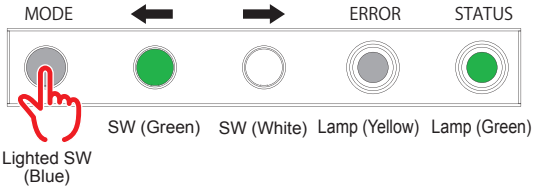




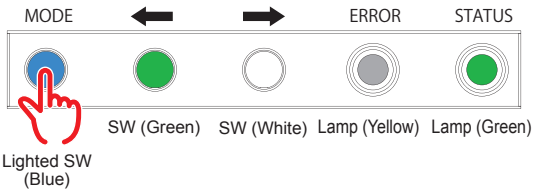
Switching between automatic and manual opening/closing

The illuminated SW (Blue) can be used to switch between automatic opening/closing operation using signal input from the area sensor, etc. and manual opening/closing operation using button operation.

When pressing the illuminated SW (Blue) to turn the lamp OFF, automatic opening/closing operation using the sensor will be enabled.



When pressing the illuminated SW (Blue) to turn the lamp ON, manual opening/closing operation will be enabled.

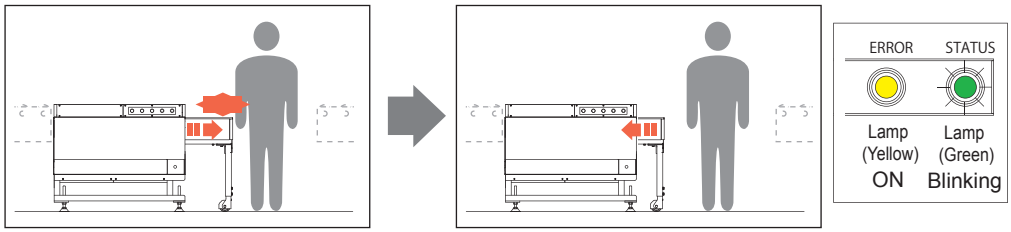


9. Operation

9-6. Safety functions

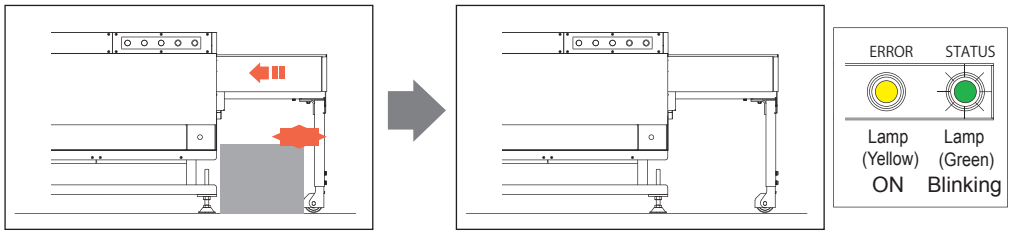
Collision detection function

If people or objects come into contact with the gate during the CLOSE motion, the CLOSE motion will be interrupted and stop. The state will return to OPEN.



Entrapment detection function

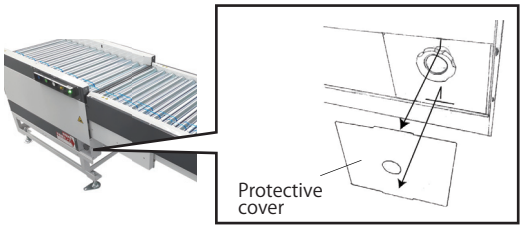
If objects get caught in the gate during the OPEN motion, the OPEN motion will be interrupted , and stop.



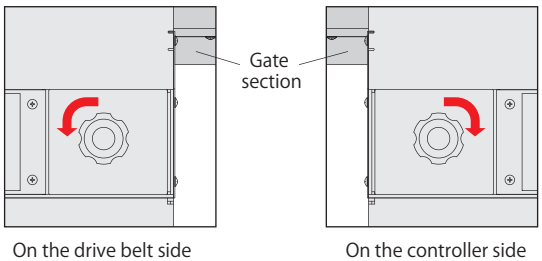
Manual unlocking device

If the gate section cannot be automatically opened due to a power outage during a time of natural disaster, the gate section can be lowered to open the gate manually using this device.

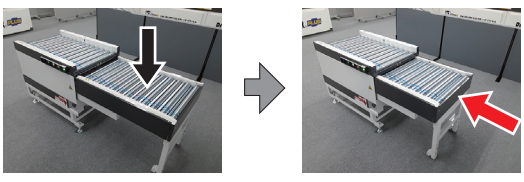
1 Remove the protective cover of the manual unlocking device.



2 Turn the manual unlocking knob in the direction of the arrow to lower the gate section conveyor.



3 After the gate descends, push the gate section to house into the base section.



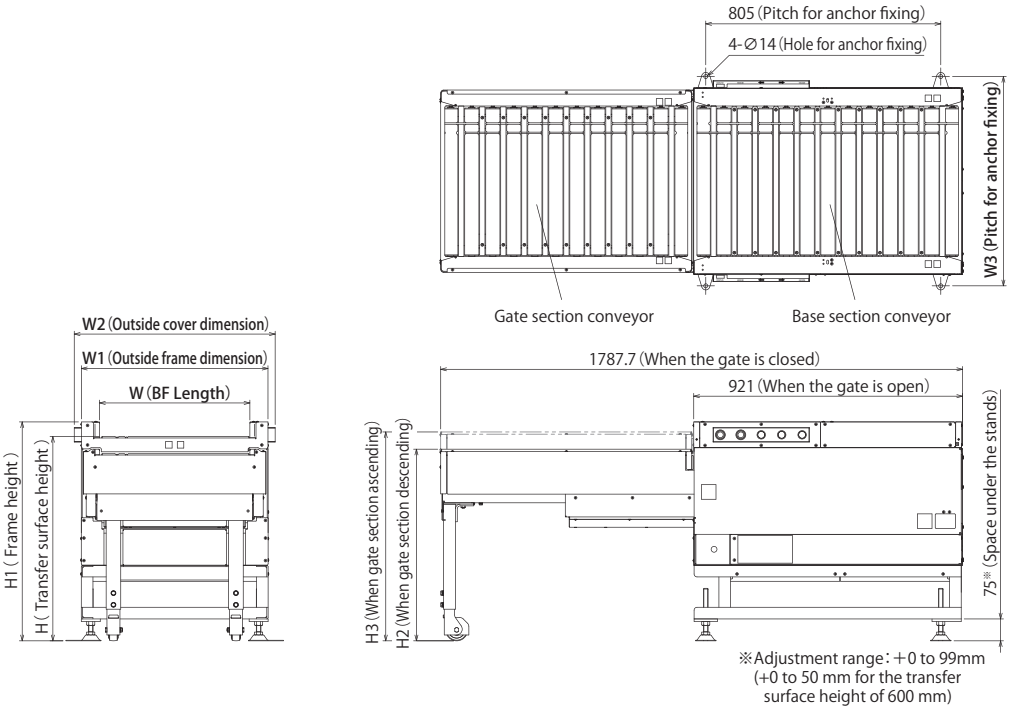
- Do not put hands on the gate section conveyor when operating the knob. Also, do not enter the area or put any part of your body under the conveyor. Failure to follow this could result in injury when the conveyor descends.
- This device is designed to be used when a power outage occurs during a time of natural disaster. Do not use it in normal times.
- Do not open the protective cover except when using.

Appendix

Appendix

Appendix 1. Product specifications

SOG2 main unit specifications



Product dimensions [mm]	BF Length：W	415	515	615	715	815
	Outside frame dimension：W1	539	639	739	839	939
	Outside cover dimension：W2	588	688	788	888	988
	Pitch for anchor fixing：W3	617	717	817	917	1017
	Transfer surface height：H	600	700	800	900	1000
	Frame height：H1	650	750	850	950	1050
	When the gate section descends：H2	557	657	757	857	957
	When the gate section ascends：H3	616	716	816	916	1016

			BF Length：W				
			415mm	515mm	615mm	715mm	815mm
Product weight [kg]	Transfer surface height：H	600mm	156	159	163	166	170
		700mm	161	164	168	171	175
		800mm	166	169	173	176	180
		900mm	171	174	178	181	185
		1000mm	176	179	183	186	190

Transfer speed	Base section conveyor	60 m/min (standard) / 17 m/min (low speed) ※The transfer speed can be changed by settings.
	Gate section conveyor	
opening/closure duration	OPEN/CLOSE	5sec
Material	Frames	Steel (Surface treatment : coating)
	Auxiliary wheel	Synthetic rubber（ϕ75mm）
	Roller	STKM12
Power supply	Voltage specifications	DC24V（22 ～ 26V）
	Rated current	5.4A
Installation environment	Ambient temperature	0 to 40℃ (No freezing)
	Ambient humidity	90%RH or less (No condensation)
	Altitude	1,000m or less
	Atmosphere	No corrosive gas
	Vibration	0.5G or less
	Installation location	Indoor
	Tilt of the mounting surface	1/1000 or less
	Pollution level	2 (according to the definition of IEC60664-1)

Appendix

MDR Base section conveyor MDR / Gate section conveyor MDR

MDR for transfer	Model	Gate section conveyor MDR： PM486FE-(①)-(②)-D-024-JW-C020-P2 Base section conveyor MDR： PM486FE-(①)-(②)-D-024-JW-Z010-P2 ①Transfer speed：17…17m/min ／ 60…60m/min ②Pipe length（mm） 400(W：415)／500(W：515)／600(W：615)／700(W：715)／800(W：815)
	Pipe diameter	φ48.6
	Rated current	2.7A
	No-load current	0.8A

Idler Idler (common to the gate and base sections)

Idler for transfer	Model	IDR-48-(①)-JH-P2 ①Pipe length（mm） 400(W：415)／500(W：515)／600(W：615)／700(W：715)／800(W：815)
	Pipe diameter	φ48.6

Sensor

		NPN output	PNP output
Model	Base section	HP7-P11（Azbil Corporation）or E3Z-R61 2M（Omron Corporation）	HP7-P12（Azbil Corporation）or E3Z-R81 2M（Omron Corporation）
	Gate section	HP7-P11-L050（Azbil Corporation）or E3Z-R61 5M（Omron Corporation）	HP7-P12-L050（Azbil Corporation）or E3Z-R81 5M（Omron Corporation）

		Azbil Corporation	Omron
Specifications	Power supply voltage	10.2 to 26.4V DC (Ripple: 10% or less)	12 to 24V DC±10% (Ripple: 10% or less)
	Current consumption	14mA or less	30mA or less
	Control output	Output withstanding voltage：30V Open/close current：100mA（resistive load） Residual voltage：2V or less （Open/close current：100mA/50mA）	26.4V DC or less 100mA or less Residual voltage：2V or less （Load current 10 to 100mA）

Lamp/button

Name		Indication on the wiring diagram	Model	Remarks
STATUS	Lamp (Green)	LMP1/LMP3	APS122DNG (IDEC)	
ERROR	Lamp (Yellow)	LMP2/LMP4	APS122DNY (IDEC)	
→ ←	SW (White)	BS1/BS3	HW1B-M110W (IDEC)	Non-illuminated push button Type : Momentary Contact configuration : 1a
	SW (Green)	BS2/BS4	HW1B-M110G (IDEC)	Non-illuminated push button Type : Momentary Contact configuration : 1a
MODE	Lighted SW (Blue)	SS1/SS2	HW1L-M110Q4S (IDEC)	Illuminated push button Type : Momentary Contact configuration : 1a

Tote

Maximum load weight	30kg		
Material	Such as trays and cardboard		
Transferrable size	BF Length W	415mm	W300×L300 ～ W300×L750mm
		515mm	W300×L300 ～ W400×L750mm
		615mm	W300×L300 ～ W500×L750mm
		715mm	W300×L300 ～ W600×L750mm
		815mm	W300×L300 ～ W700×L750mm

※When totes need to be stopped on the base section conveyor, stop them around the center of the base section conveyor. Failure to follow this could result in damage to totes and/or malfunction when the gate is closed.
※Values of the tote size and weight are reference only, since they may change depending on tote conditions.
※Depending on the bottom shape of totes, they may not be transferred normally, even if they are within the above size range.

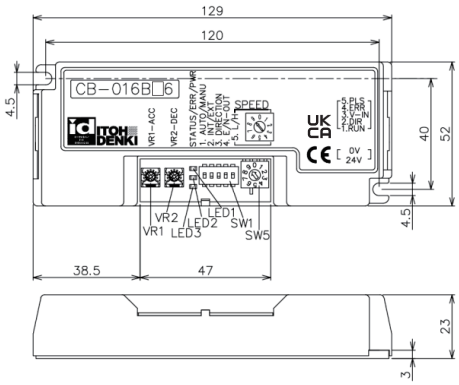
Appendix

Driver card specifications

For driving transfer

Model		CB-016B□6 (□…N：NPN ／ P：PNP) ※The base section conveyor MDR and gate section conveyor MDR are not equipped with a mechanical brake.
Power supply voltage		24 V DC±10%
Rated voltage		24 V DC
Static current		0.03 A
Starting current		4.0 A
Wire diameter	Power connector (CN 1)	0.50 ～ 1.5mm㎡ (AWG：20 ～ 14) Note 1)
	Control connector (CN 2)	0.08 ～ 0.5mm㎡ (AWG：28 ～ 20) Note 1)
Time from RUN signal input to motor starting		15msec or less
Protection function		Incorrect wiring protection Built-in 6.3 A fuse
Thermal protection		Driver card 95℃, Motor 105℃
Current limit		4.0 A
Installation environment	Ambient temperature	0 to 40ºC (No freezing)
	Ambient humidity	90%RH or less (No condensation)
	Atmosphere	No corrosive gas
	Vibration	0.5G or less
	Installation location	Indoor

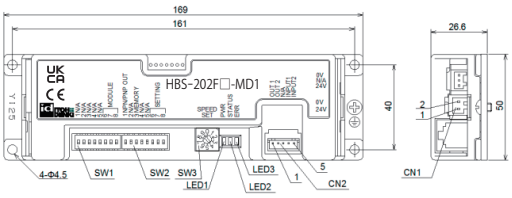
Note 1) Applicable wires to connectors included as standard



For driving the slide

Model		HBS-202F□-MD1 (□…N：NPN ／ P：PNP)
Power supply voltage		24 V DC±10%
Rated voltage		24 V DC
Static current		0.06 A
Starting current		4.0 A
Wire diameter	Power connector	0.50 ～ 1.5mm㎡ (AWG：20 ～ 14) Note 1)
Time from RUN signal input to motor starting		15msec or less
Protection function		Incorrect wiring protection Built-in 7A fuse
Thermal protection		Driver card 85℃, Motor 110℃
Current limit		4.0 A
Installation environment	Ambient temperature	0 to 40ºC (No freezing)
	Ambient humidity	90%RH or less (No condensation)
	Atmosphere	No corrosive gas
	Vibration	0.5G or less
	Installation location	Indoor

Note 1) Applicable wires to connectors included as standard



Appendix

HBM-202 LED indication and error cancellation

LED			Description	Cause	Recovery condition	Recovery operation
1 (PWR)	3 (ERR)					
ON	OFF	At normal times	Stop (No signal input)			
Blinking①	OFF		Opening			
Blinking②	OFF		Closing			
6Hz Blinking	OFF		During teaching operation			
1Hz Blinking	OFF	At abnormal times (MDR stops)	No teaching settings	Teaching settings are incomplete	Teaching settings are complete	Carry out the initial setting (Refer to P.19)
ON or all blinking patterns	ON		Thermal error	The driver card temperature is 85°C or higher, or the MDR motor temperature is 110°C or higher	The driver card temperature is 75°C or lower, or the MDR motor temperature is 95°C or lower	Carry out one of the following procedures ・Turn CN2#4 (INPUT1) OFF and ON ・Turn CN2#5 (INPUT2) OFF and ON ・Turn CN2#4(INPUT1) and CN2#5 (INPUT2) OFF and ON
			Unconnected MDR error	The MDR connector is disconnected	Connect the MDR connector	
	1Hz Blinking		MDR lock	MDR is locked when the gate section conveyor ascends/descends	Eliminate the cause of MDR locking	
OFF	1Hz Blinking		Low voltage error	The voltage is 17V or lower for one second, or the power connector is not properly connected	Supply a voltage of 17V or higher, or rewire/reconnect the power connector	
			Fuse blown	Driver card fuse blown	None	Replace the driver card

Blinking① ··· 3Hz Blinking×2 ⇔ 480ms OFF ／ Blinking② ··· 3Hz Blinking×3 ⇔ 480ms OFF

LED2(STATUS)	Description
OFF	No teaching settings / Under teaching operation / During OPEN operation / During CLOSE operation
ON	CLOSE state / OPEN state

Appendix

Appendix 2. Labels

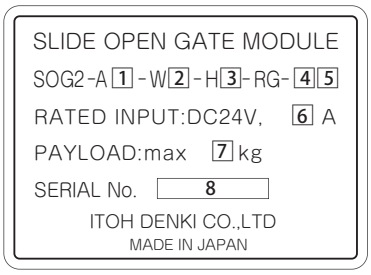
Warning / caution labels

- The table below shows labels and their usage.
- If necessary warning/caution labels on the unit become hidden after incorporating this product, affix again on places where they can be seen.

Warning / caution labels

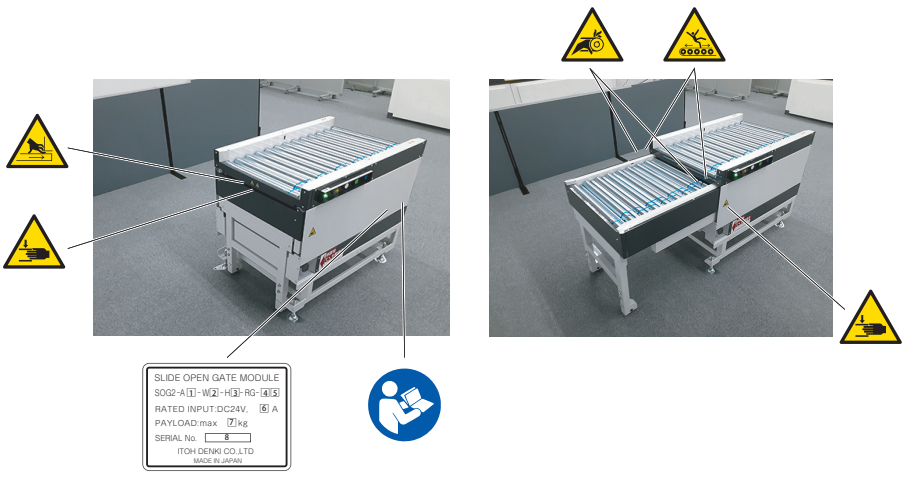
No.	Label	Usage / Description
1		Do not step on the conveyor. ・Failure to follow this could result in injury if you fall, and / or damage to the equipment.
2		CAUTION. Be careful not to get stuck ・You may be injured if you get stuck. ・Do not put hands close to the moving parts during operation, and / or at the time of inspection and repair.
3		CAUTION. Be careful not to get anything caught ・You may be injured if something gets caught. ・Do not put hands close to the belt during operation.
4		CAUTION. Be careful not to get stuck ・You may be injured if your hands get caught and stuck. ・Do not put hands close to the moving parts on the gate section during operation.
5		・Before using this product, be sure to read and understand the instruction manual.

Main label (Product label)



1. Transfer speed
2. Transfer width
3. Transfer surface height
4. Driver card type
5. Input and output signal type
6. Rated input (current)
7. Maximum load weight (kg)
8. Date of production

Arrangement of labels



9. Operation

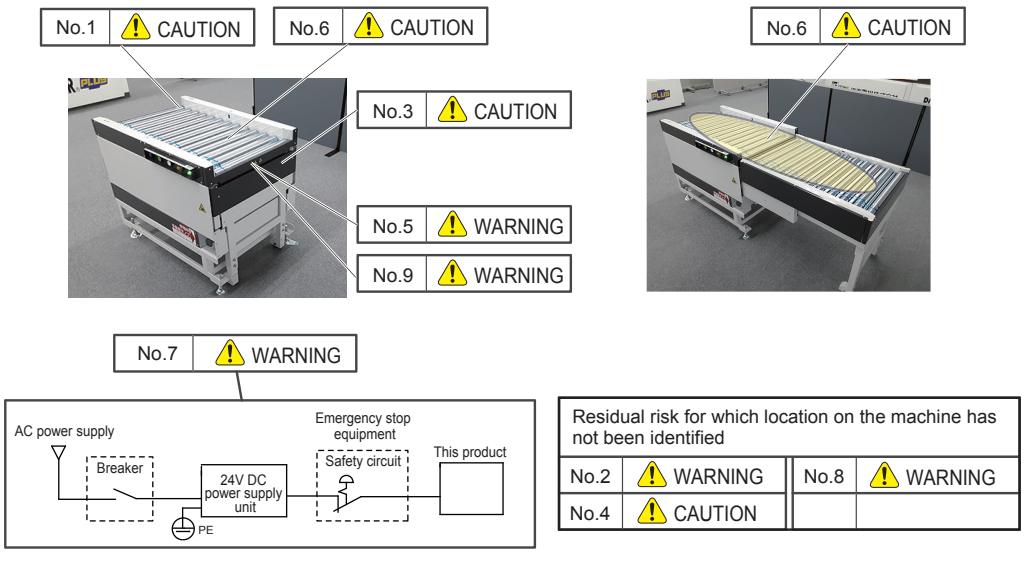
Appendix 3.
Residual risk list / MAP

Residual risk list

No.	Operation stage	Work	Qualifications / education required for work	Locations on machine	Seriousness of harm	Remaining risk factors	Examples of assumed measures	Measures that have been taken independently	Reference page
1	Installation	Unpack / Carry	Having carefully read the user manual, and having full knowledge of all the contents	Metal parts on the product	CAUTION	Hands may get injured	When working, wear protective equipment, such as gloves	Described in the instruction manual	10,11, 12
2	Installation	Carry		No particular location	WARNING	Carrying a heavy load may result in injury to the body, and / or damage to the main machine unit	Be sure to carry the product with the appropriate number of persons based on the weight of the product.	Described in the instruction manual	9,10
3	Installation	Carry / Install		Gate section on the product	CAUTION	Popping out of the gate section may result in injury to the body	Wrap packing bands or ropes around the product.	Described in the instruction manual	9
4	Installation / Operation	Trial run		No particular location	CAUTION	During test run of this unit alone, totes transferred from the upstream may result in injury to the body, and / or damage to the main machine unit	Before starting operation, shut down controls for other elements not to operate when the unit starts up.	Described in the instruction manual	12
5	Operation	All during operation		Spaces between the moving parts of the product, and gaps between the moving and fixed parts	WARNING	Workers' fingers or hands may get caught in spaces between the moving parts of the main unit, and gaps between the moving and fixed parts	• Install safety fences with an interlocking mechanism to prevent workers from carelessly moving into a restricted area. • Have workers undergo safety education.	• Affix the warning/ caution labels • Described in the instruction manual	8
6	Operation	All during operation		Top panel of the product	CAUTION	Workers may step on the product and fall if they lose their footing	• Install safety fences with an interlocking mechanism to prevent workers from carelessly moving into a restricted area. • Keep workers informed thoroughly about the prohibition of stepping on the machine	Described in the instruction manual	8
7	During maintenance / inspection	All during maintenance / inspection		Power supply part to the product	WARNING	Persons turning on the power without notice may result in unexpected operation of the product, and/or injury of workers	Post warning labels so as to prevent unauthorized persons from turning on the power	Described in the instruction manual	12
8	During maintenance / inspection	All during maintenance / inspection		No particular location	WARNING	Workers' fingers and / or hands may get stuck in the machine	Wear protective equipment, such as gloves, and work carefully.	Described in the instruction manual	12
9	During maintenance / inspection	All during maintenance / inspection		Spaces between the moving parts of the product, and gaps between the moving and fixed parts	WARNING	Workers' fingers or hands may get caught in spaces between the moving parts of the main unit, and gaps between the moving and fixed parts	At the time of inspection when the unit is powered, do not wear gloves, and take appropriate measures to prevent parts of clothes, such as sleeves, from getting caught.	• Affix the warning/ caution labels • Described in the instruction manual	12

【Seriousness of harm】
WARNING : Indicates that there is a possibility that severe injury or even death may result if protective measures have not been taken
CAUTION : Indicates that there is a possibility that minor injury may result if protective measures have not been taken

Residual risk MAP



Residual risk for which location on the machine has not been identified			
No.2	WARNING	No.8	WARNING
No.4	CAUTION		

Technology for tomorrow

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