Pop-up Diverter Operating Instructions

Pop-up Diverter

Thank you for purchasing Pop-up Diverter

- Before using, please read the operating instructions carefully to obtain the product knowledge, safety information and to understand all of the caution items.
- After reading the instructions, store the booklet in a designated location for readily accessing at any time. When you open the crate, check the model, specifications, voltage, etc. are correct.

⚠ ・When the tray or object is less than 350×350mm, move the tray along the branching side edge.

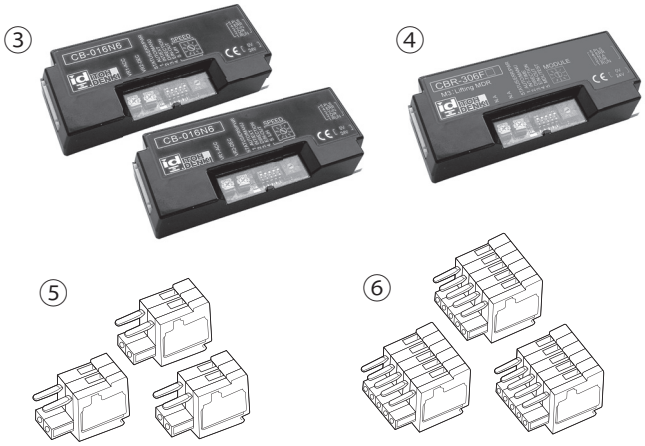
When opening the crate …

The crate contains the following items. Check that every item is included.
Also, check if the model, specification, etc. are as you ordered.

	Item	Quantity	Remarks
①	Pop-up Diverter main body	1 unit	with roller bottom sensor (SN・S) / roller top sensor (SN・R)
②	Hex bolt M8×20 ／ Spring washer	4 sets	For installation of the Pop-up Diverter main body
③	Driver card　CB-016□[Note)]6	2	
④	Driver card（Lifting）CBR-306F□[Note)]	1	
⑤	Power connector　734-102 (WAGO)	3	
⑥	Control connector 733-105 (WAGO)	3	
⑦	Cross-slotted screw/washer M4×15 / Hex nut M4	6 sets	For mounting driver card

Note）Depending on the input/output type of Pop-up Diverter, the included driver card operates with either NPN (N) or PNP (P) signal input.

The photo shows Size B (Left)



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1. General Cautions ····· For your safety, please comply with them.

- Be sure to comply with all of the caution items and instructions contained in this safety manual.
- To avoid functional deterioration, unexpected accident or product failure, check the operation according to this manual.

Warning & Caution

Shown below are the caution items for using the product safely and avoiding danger and damage to the user. Caution items can be classified into danger, warning and caution as described below.

⚠ Danger	The most serious danger with possibility of death or serious injury.
⚠ Warning	Incorrect handling may lead to death or serious injury, indicating potential danger.
⚠ Caution	Possible danger of light or medium injury, or only a material damage.

1 - 1. Basic Warning

⚠ Warning Incorrect handling may lead to death or serious injury, indicating potential danger.
Comply with the following warning and perform the work correctly.

- Do not use the product in an explosive, flammable or corrosive atmosphere, or near flammable material. It may cause explosion, fire, electrical shock or injury.

1 - 2. Basic Cautions

⚠ Caution Incorrect work or use may lead to light or medium-level injuries and/or property damages.
Comply with the following warning and perform the work correctly.

- Do not step on the product or apply a load. It may lead to a failure or unexpected accident.
- Do not touch the mechanism by hand during operation. The hand may be caught by the mechanism and injured.
- Do not absolutely modify the Pop-up Diverter or the driver card. Serious injury may be caused.
- Do not forcibly bend or pull the wire. Do not put a heavy item on the wire or pinch the wire. The cord may break and cause fire or electrical shock.
- To avoid a failure or electrical shock, ground the DC power supply or driver card to the conveyor frame.
- Do not touch the equipment immediately after stopping. It may cause kin burn.
- Do not splash water on the equipment. Electrical shock or failure may be caused.
- Do not apply a strong impact or excessive force such as hitting the equipment or dropping an object. Do not use the equipment after it is impacted or deformed. It may cause a failure.
- When abnormal sound is heard during motion, stop the operation. Continued operation may cause an accident or failure.
- Do not use the equipment by exceeding the specification. It may cause a failure, fire or injury.
- Do not carry out operation of transfer, connection, maintenance inspection (except maintenance inspection to be performed during operation). Switch off the power before operation.
- Comply with the safety rules required for the location and equipment to be used.
- Some type of driver card failure may make the input/output ON condition or OFF condition. Apply an external monitoring circuit fo the input/output signal that may lead to an injury or property damage.
- Connect or disconnect a connector when the power is shut off. Do not perform wiring with the connector inserted in the driver card.
- Securely attach the connector of each connecting cable to the connection point.
- Incorrect wiring may cause a failure. Carefully check the wiring.
- Do apply excessive force for operating the DIP switch.
- Do not perform on/off operation of a relay or connector near the power line, signal line, or driver card. That may cause malfunction by noise.
- When LED circuit or Pull-up/Pull-down circuit is connected to the output circuit, unexpected operation may occur.
- Apply power ON in the order of external controller→Driver card. Perform power OFF in the order of Driver card→External controller. Incorrect order may cause malfunction.
- Cutting the power disables electrical braking control, and the roller becomes easy to be rotated.
- Do not pull out a cable during operation. It may cause a failure.
- Do not forcibly rotate MDR except during maintenance inspection. That may cause driver card breakage or make the operation life extremely short.
- Do not shut off the power during MDR rotation. It may cause a failure.
- Do not apply power while riding on the conveyor or while a tray is unstable condition. MDR rotation immediately after power ON may cause injury, accident or breakage.
- When error occurs frequently, remove the cause.
- When disposing the equipment, make a consignment contract with an authorized industrial waste processing company for disposal.

1 - 3. About the performance level (PL) for this system

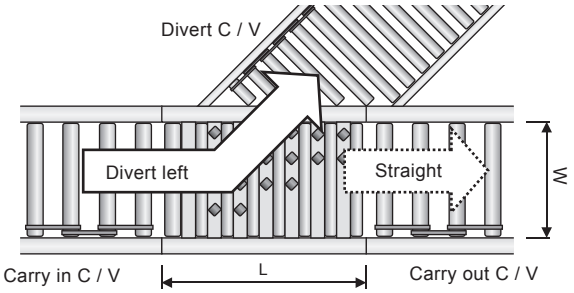
- This product is based on the performance level “C”*2 in ISO13849-1*1.

  *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.

2. Product designation

POP-D-①②-③④-⑤⑥



① Divert direction
- L ⋯ Divert left
- R ⋯ Divert right

② Divert angle
- 30D ⋯ 30 degrees
- 45D ⋯ 45 degrees

③ Speed
- 60 ⋯ 60m/min

④Signal type selection
- N ⋯ NPN input/output（NPN input/output driver card / up/down sensor included）
- P ⋯ PNP input/output（PNP input/output driver card / up/down sensor included）

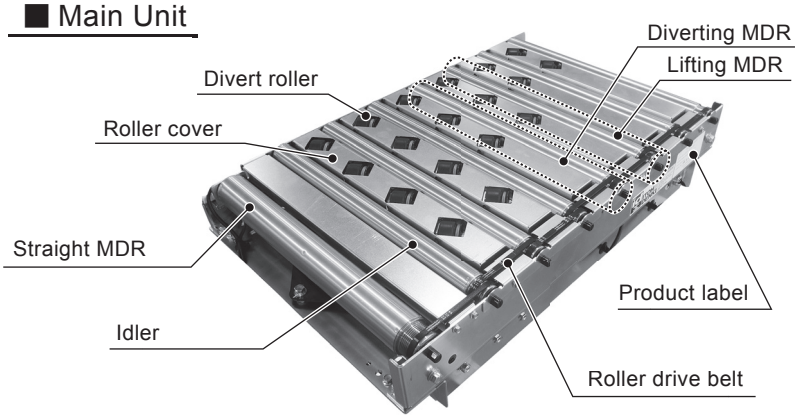
⑤Size
- A⋯W394mm×L760mm
- B⋯W494mm×L760mm
- C⋯W594mm×L760mm
- D⋯W694mm×L760mm

⑥Type
- 1

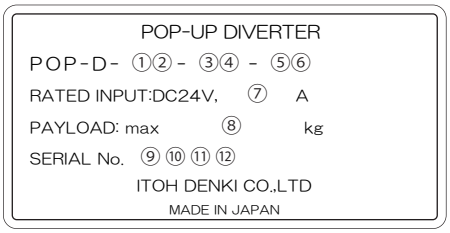
Model Example：POP-D-L45D-60N-B1
Divert left 45 deg, Transport speed 60m/min, NPN input/output type, Size B（W500mm×L774mm）, Type 1

3. Structure

■ Main Unit



Label detail



Product model
① Divert direction, ②Divert angle, ③Transport speed,
④ Input/output type, ⑤Size, ⑥Type

Transport capacity
⑦ Rated current of transport MDR, ⑧Available load weight

Serial No.（ YY.MM.DD Lot No）
⑨ Year (last 2 digits) ⑩ Month ⑪ Day ⑫ Lot No (3 digits)

4. Power Supply

■ Switching power supply（24VDC・10A 240W）
■ Rectified power（With a rectifying capacitor, ripple rate 10% or below）
■ 24VDC Battery

- A switching power supply is recommended as the DC power supply (24VDC ±10%) for drivers.
  Use a stabilized power supply that has an adequate capacity of 24VDC and 10A or higher and does not fluctuate due to load variation.
- The power supply shall have a capacity larger than the total of 2 MDRs rated values.
- A transformer type power supply cannot be used.
- Secure a voltage of 24VDC ±10% at the power source terminal of a driver.
- If the power supply capacity is the rated power of 2 MDRs or smaller, the supply voltage may drop to cause failure or damage of MDRs and drivers. Be sure to use a power supply with a capacity larger than the rated power of 2 MDRs.
- Use a power supply that does not trigger protection even when a peak current of 20A flows for 1 ms or less.

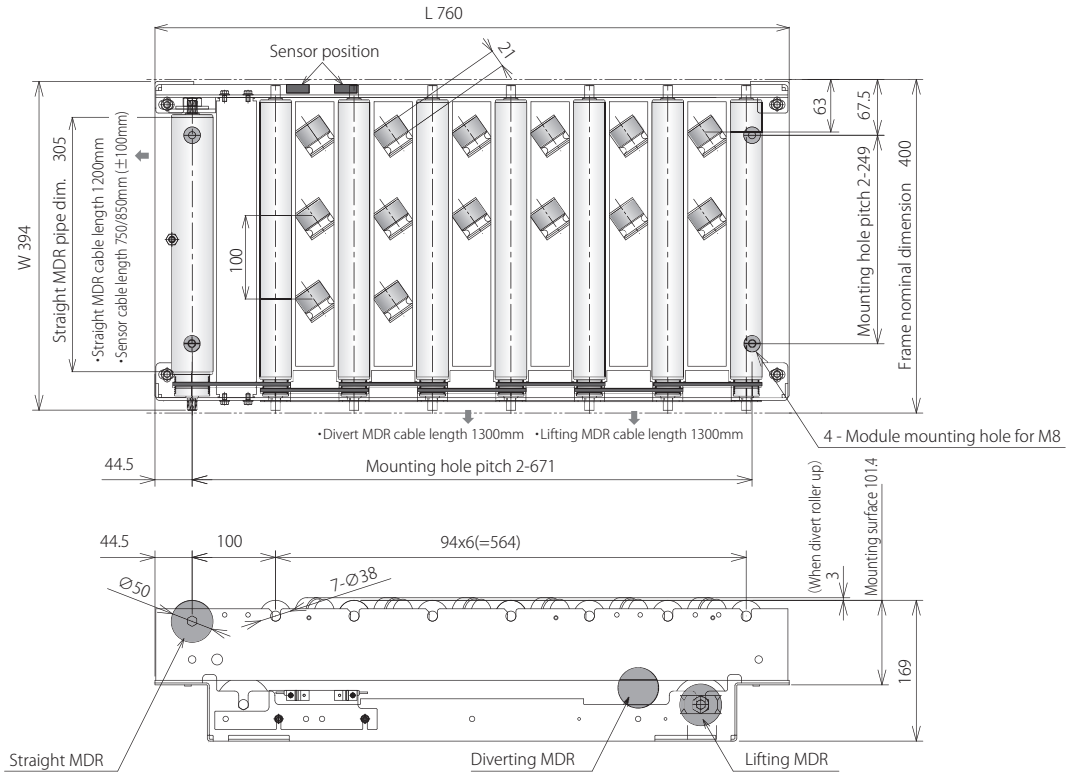
■ Wiring between power supply and driver card/controller

- The voltage could be dropped when a wiring between power supply and driver card/controller gets longer, which might cause malfunctions or damages.
  Use recommended wire gauge, AWG: 20 – 14 and secure 24VDC±10%.

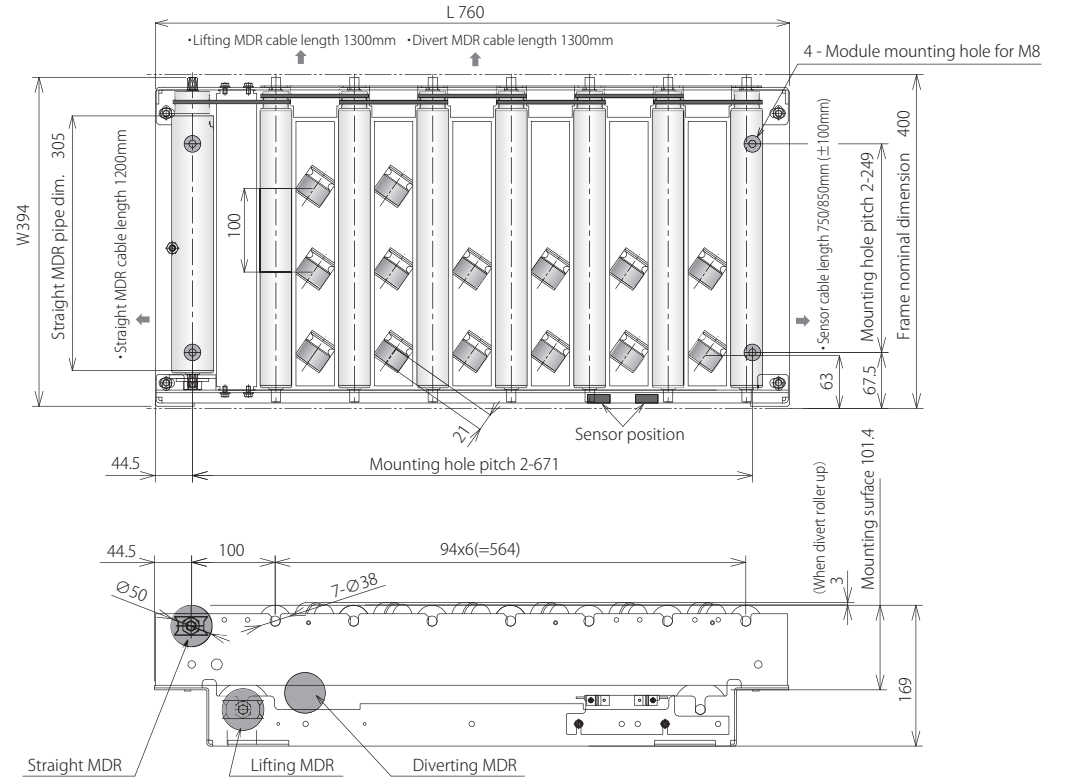
5. Dimensions

■ Main Unit

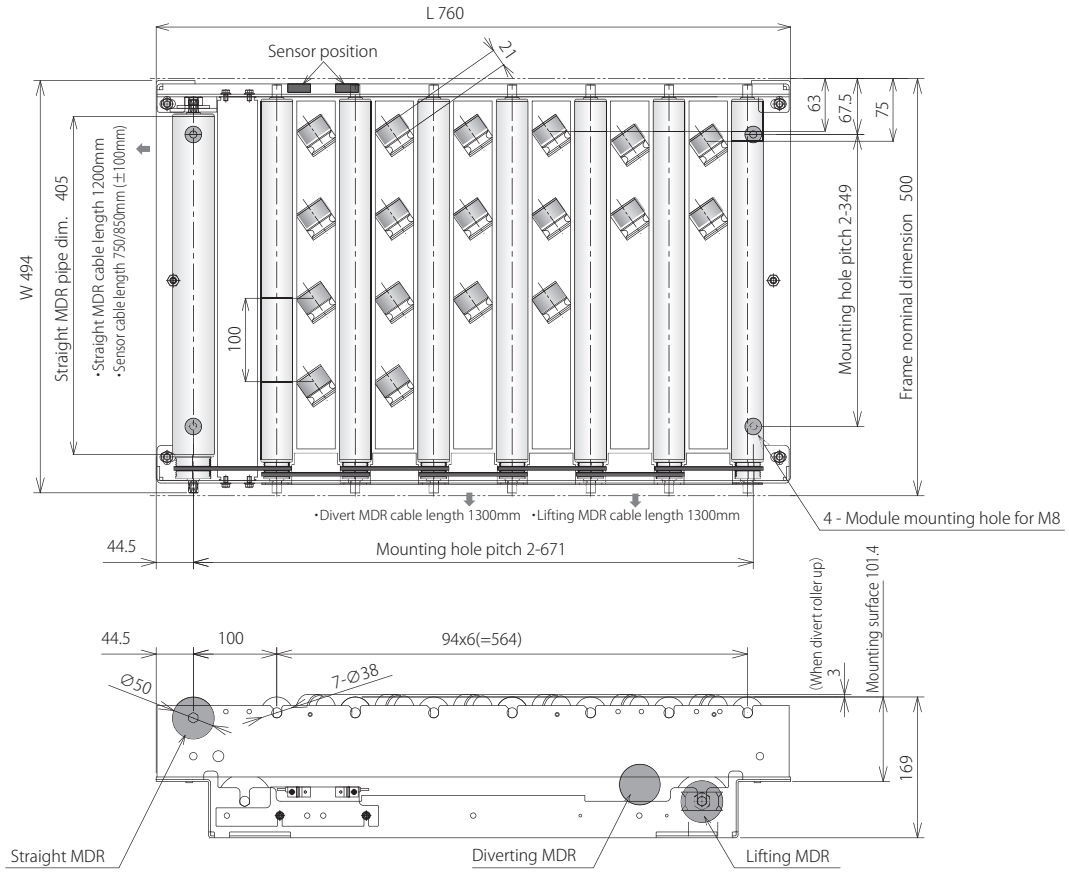
● Size A ··· W394mm×L760mm Divert Left



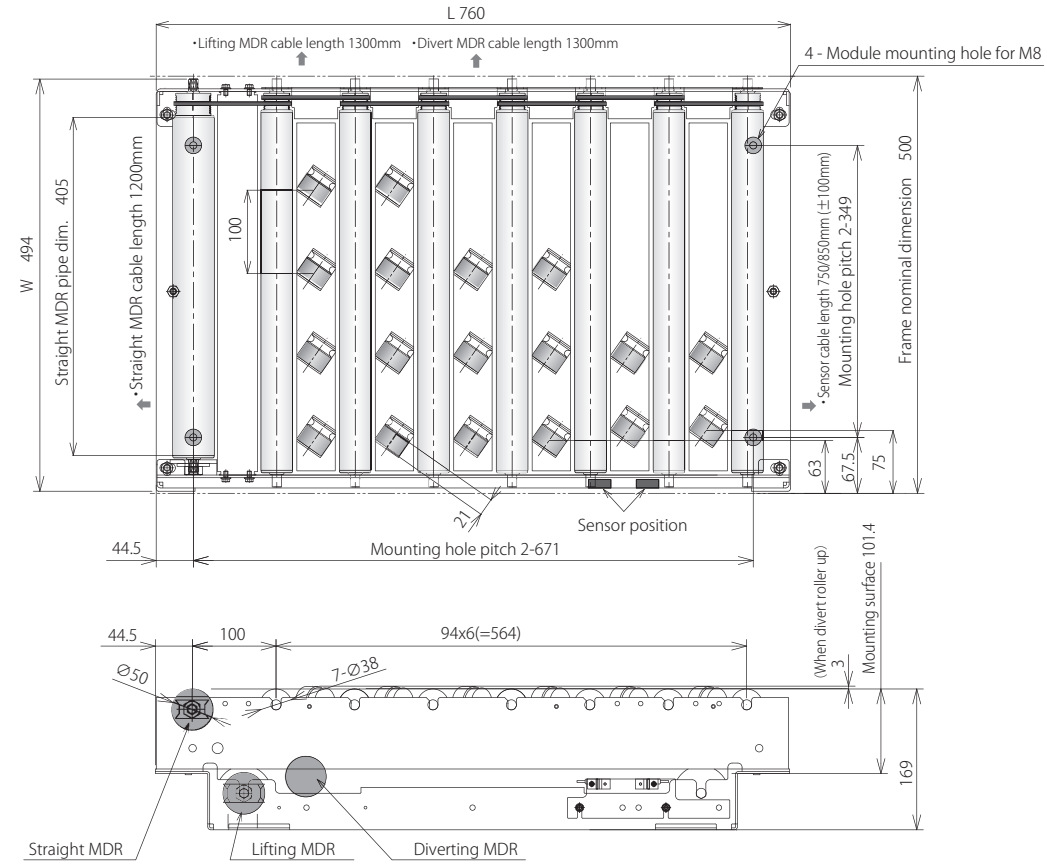
● Size A … W394mm×L760mm Divert Rright



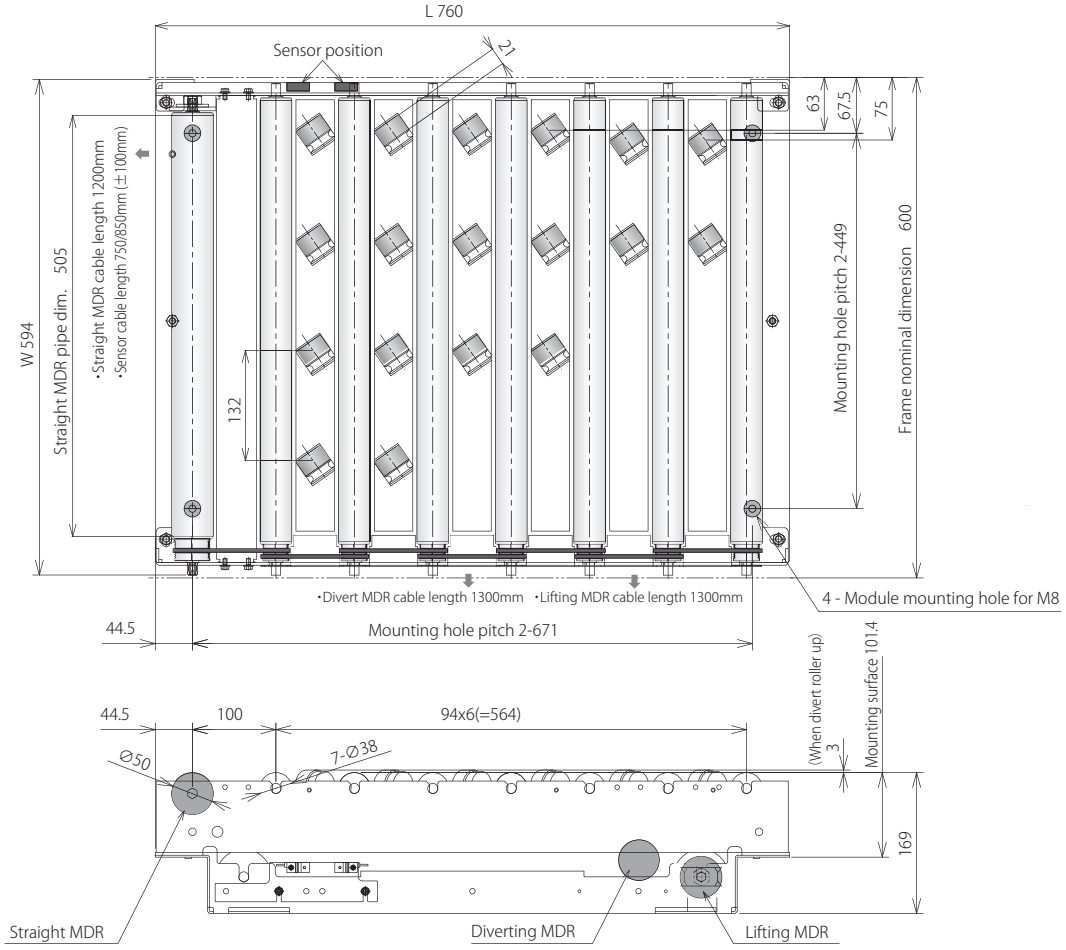
● Size B ··· W494mm×L760mm Divert Left



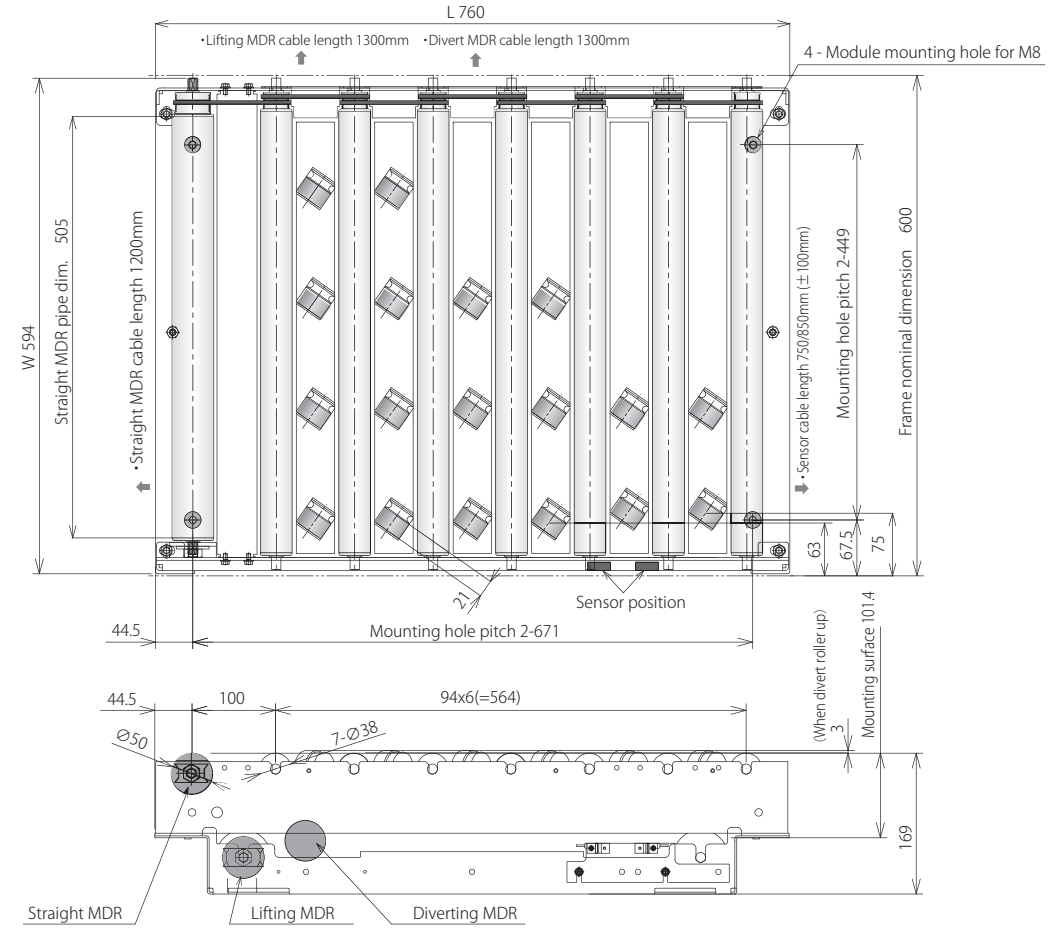
● Size B ··· W494mm×L760mm Divert Right



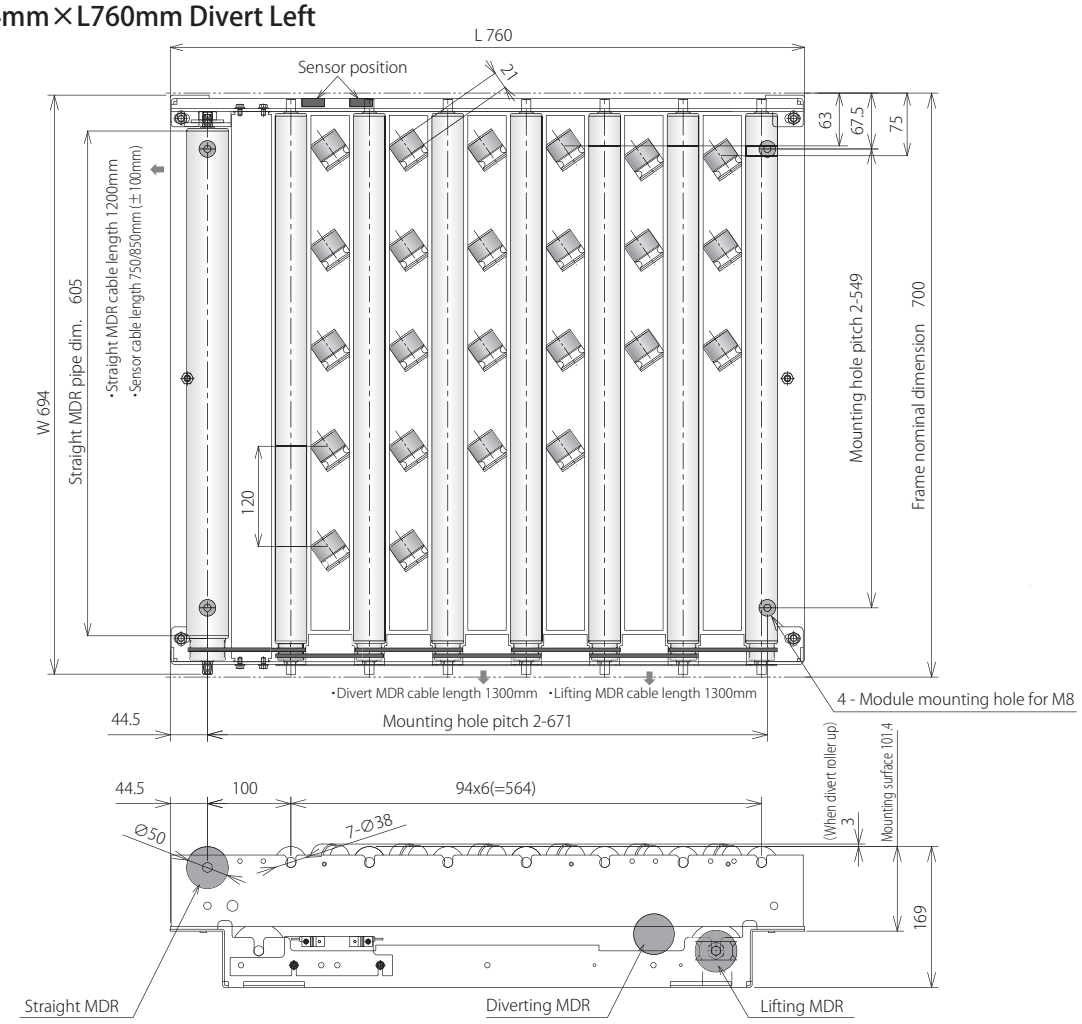
● Size C… W594mm×L760mm Diver Left



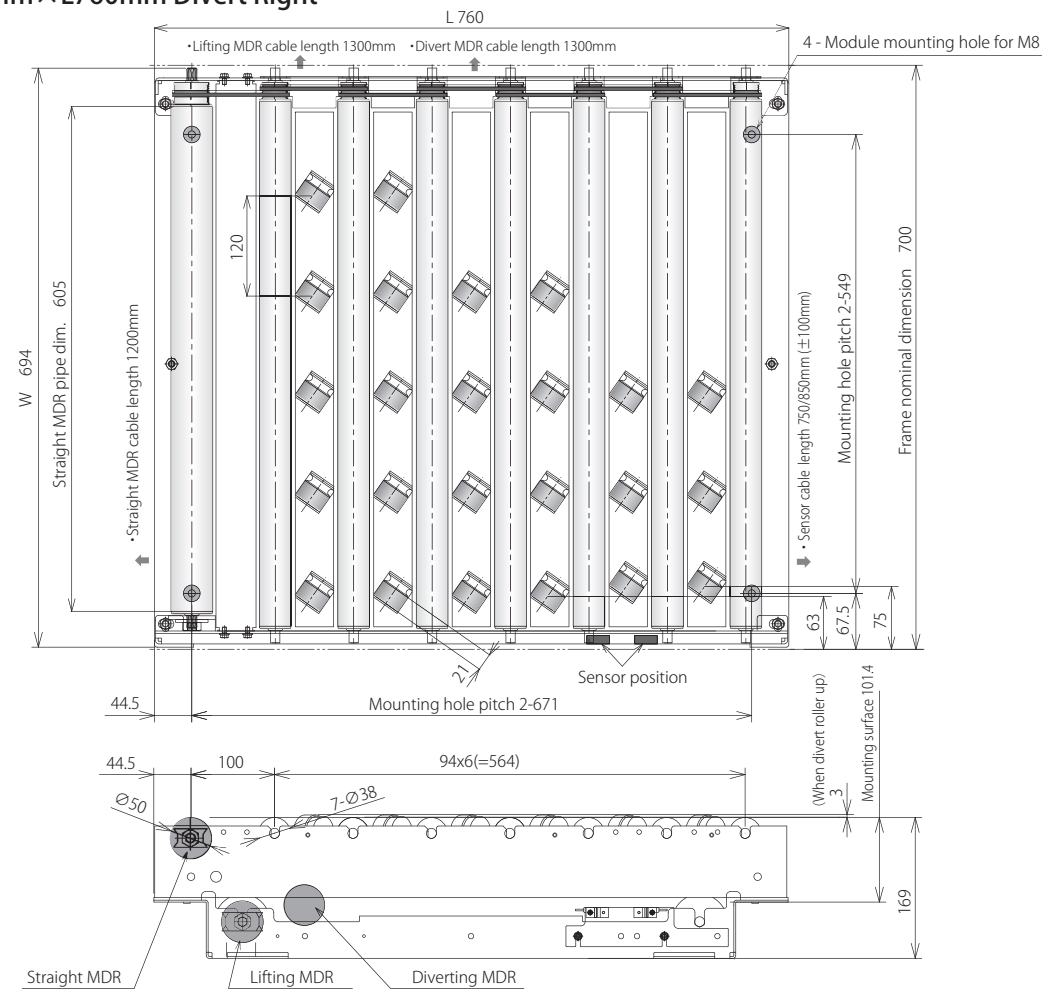
● Size C … W594mm×L760mm Divert Right



● Size D ··· W694mm×L760mm Divert Left



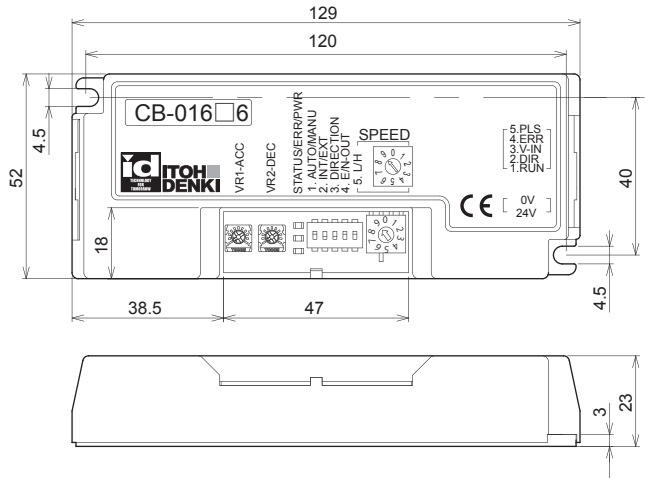
● Size D ··· W694mm×L760mm Divert Right



■ Accessory

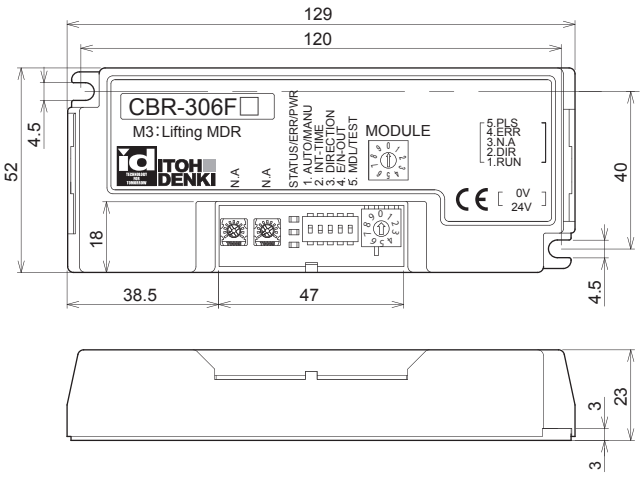
● CB-016□6

※□=N（NPN input/output）or P（PNP input/output）



● CBR-306F□

※□=N（NPN input/output）or P（PNP input/output）



6. Installation and Operation

6 - 1. Cautions during Transportation

Caution

● Avoiding injuries

Majority of this product is made from metal and careless handling may cause injury of hands. Be sure to wear protective means such as gloves to avoid injury.

● Handle the heavy item by two persons as a rule

Some product type weighs over 50kg. To protect the operators, transport the unit by two or more persons as a rule of handling a heavy item.

● Prohibiting Impacts

・This product contains precision components such as bearing and microchip. Use caution for avoiding impacts by dropping or collision during transportation as impacts may cause damage of such components.

6 - 2. Cautions during Uncrating

Caution

● Avoiding injuries

Majority of this product is made from metal and careless handling may cause injury of hands. Be sure to wear protective means such as gloves to avoid injury.

● Appearance Check

・Check the following when opening the crate.

① Abnormality on the unit such as dent, concave mark, smear, corrosion (rust), etc.

② Loose or missing screw.

Please report to the supplier when you find abnormality.

6 - 3. Caution during Installation…Electrical

● Checking the Circuit breaker

・For the facility equipment using this product, check that a power breaker with appropriate capacity has been installed. In case the product generates abnormal motions, protection by the breaker is sometimes effective.
If the earth leakage breaker is planned for use as a breaker, select a type compatible with inverter. Certain type of incompatible ground fault interrupter causes malfunction by sensing high frequency component of switching power supply as leak current.

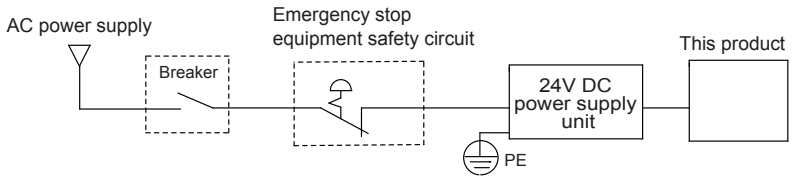
● Checking the DC Power Supply

・DC power supply must be an insulation type switching power supply certified by the safety standard (IEC62368-1) for ensuring safety. Do not use non-insulation type series power supply for safety as well as conforming to radiation noise restriction.

・Current capacity of the DC power supply should have sufficient capacity to accommodate this product.
Current capacity of the wiring material should also provide sufficient margin to the specified current value.

● Checking the Wiring

- When the DC power supply is integrated, check if the equipment breaker and emergency stop switch correctly operate. Test operation and any further procedure should be performed after finishing this checking.
  ① ON/OFF operation of the breaker reliably turns ON/OFF of the input (AC power supply) to the DC power supply unit.
  ② ON/OFF operation of the emergency switch reliably turns OFF/ON of the input (DC24V) to this product.



- Carefully check if these wiring would not contact any moving parts of this product.

6 - 4. Caution during Installation…Main Unit

● Installation environment

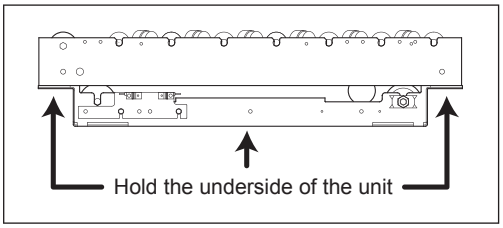
- This product is not equipped with a special dust or water proof measures, and is intended for use in "pollution level 2" defined by IEC60664-1. For this reason, when the product is installed in the environment requiring dust or water proof measures, the user needs to provide additional protection and check the performance.
- Vibration level of the environment in which this product is used must be 0.5G or below.
- Install this product with the tilt of 5/1000 or below.
- Secure a work space around this product for maintenance purpose.
- Comply with the safety rules required for the place of installation or equipment to be used.

● Main unit installation

Caution

● During installation, use caution for installing direction (orientation). Be sure to use the specified mounting holes. (Refer to 5. Dimension P.5, P.6, P.7, P.8).
Incorrect direction (orientation) or using non-specified securing holes may cause unexpected accident.

- Perform installation operation always by two persons.
- Use caution for motor cable or sensor cable not to be pinched by other object.
- Do not attach the driver card on the pop-up diverter unit. It may cause loose screws or other failure by vibration.
- Securely attach the unit on the frame by considering the product weight, tray weight, and vibration.



● Safety assurance

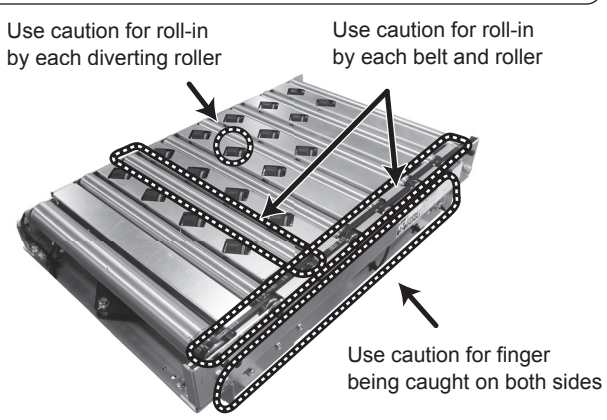
Warning

● Operator should not come close to any moving part that may hook or roll-in objects.
Provide a means for not permitting the operator to touch the moving part with a safety fence.

Caution

● To prevent any object from popping out of the area by collision, and to avoid injury by such object, install a safety fence around the equipment.

- If the warning label becomes hidden by installing the product, reattach the warning label in a visible place.
- When performing maintenance operation, make sure the main power is completely shut off.



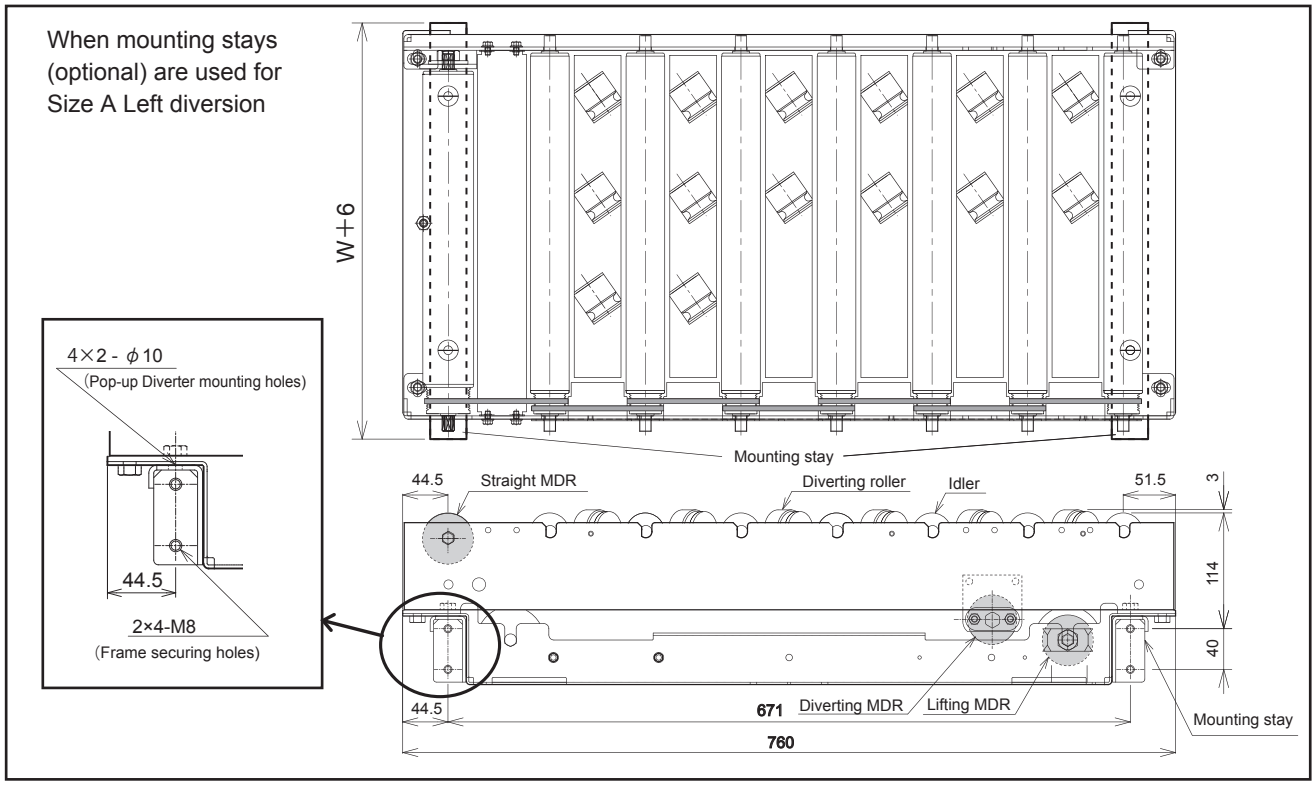
6 - 5. Installation

- Attach the Pop-up Diverter by using the module mounting holes (Refer to 5. Dimension)
- When using mounting stays, refer to the attachment example shown below.

■ C/V Transport Level (Height)

- Align the inbound C/V level with the roller surface of the Pop-up Diverter, and diverting C/V level with the diverting roller surface (3mm above the roller surface).

● Attachment reference example

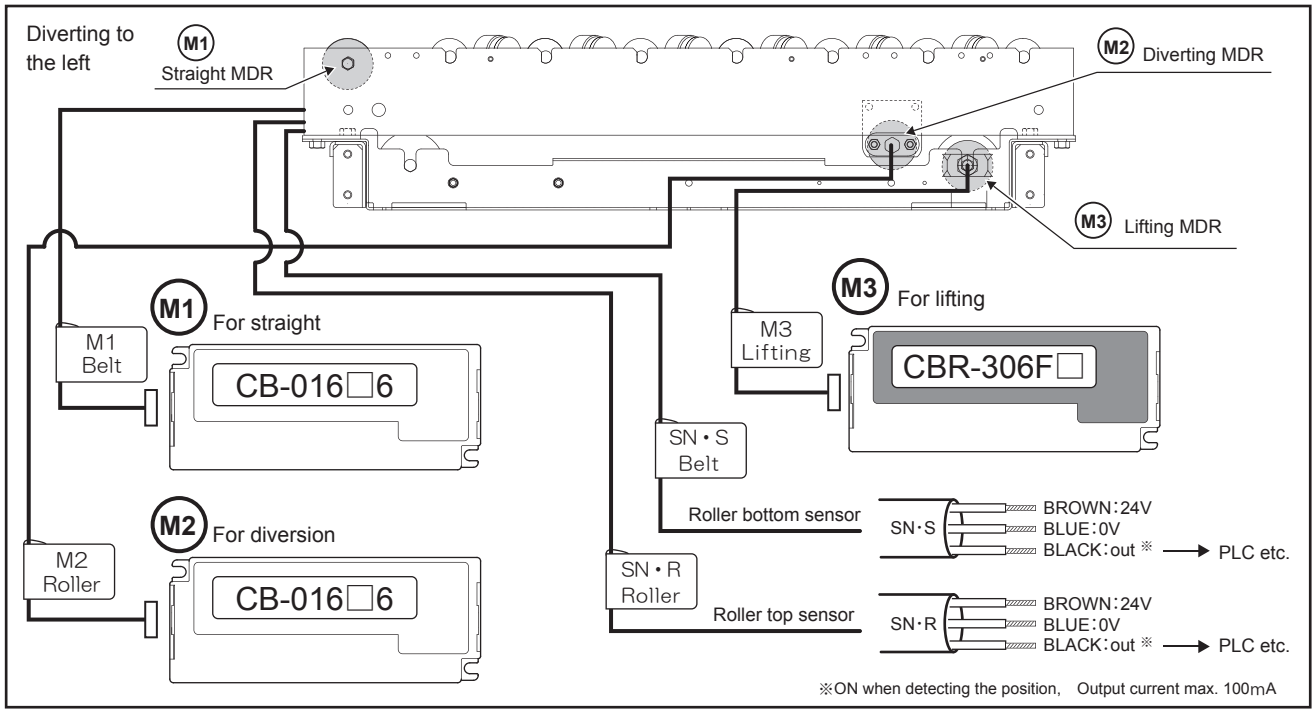


■ Connection

- Attach the power connector <CN1>, Control connector <CN2>, MDR connector <M1：For straight, M2：For diversion, M3：For Lifting > to the driver card as shown below.

※Connector attachment and detachment must be made after shutting off the power and by holding the connector.

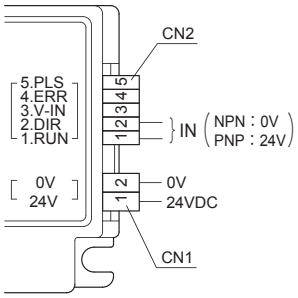
※Securely attach each connector to the contact part.



※Pop-up diverter zone sensor is not included. User needs to provide it.

■ Wiring

CB-016□6 M1：For straight／M2：For diversion



CN2（Control）

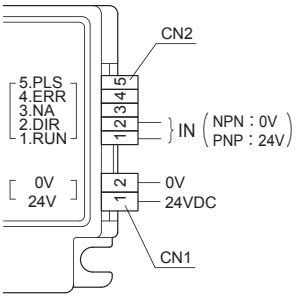
	Motion	in/out current
5	Motor pulse outpu	Use 25mA※ or below
4	Error signal output	
3	MDR ext speed setting	Max 2mA
2	MDR rotation dir change	3mA
1	MDR run/stop	

※Attach a protection resistor

CN1（Power）

2	0V
1	24VDC

CBR-306F□ M3：For lifting



CN2（Control）

	Motion	in/out current
5	Motor pulse outpu	Use 25mA※ or below
4	Error signal output	
3	—	—
2	MDR rotation dir change	3mA
1	MDR run/stop	

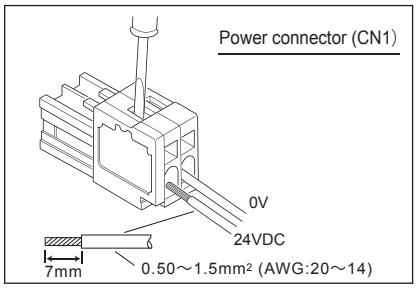
※Attach a protection resistor

CN1（Power）

2	0V
1	24VDC

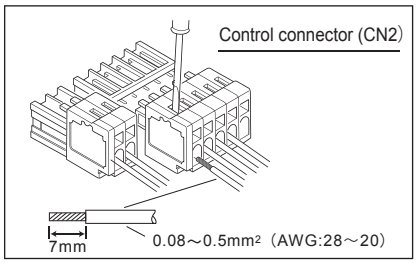
■ Connector Wiring（Common to CB-016/CBR-306）

①Connect 24V DC / 0V wires to the power connector < CN1(2 contacts)>.
※Do not connect any branching wire. It may cause electrical shock, short-circuit or failure due to over capacity of the connector.
(Connector capacity：10A)
※Do not wire in reverse polarity.
※Wiring should be made before inserting the connector into the driver card.



②Connect wires to control connector < CN2(5 contacts)>.
※Input voltage supplied to CN2#1(MDR run/stop), CN2#2(MDR rotation direction change) must be common to the power supply voltage.
(Connector capacity :4A)

③Plug the power connector < CN1(2 contacts)>, control connector < CN2 (5 contacts)>, MDR connector <CN3> to the driver card.
※Connector attachment/detachment must be made after shutting off the power and by holding the connector.
※Securely insert the connector to the contact part.



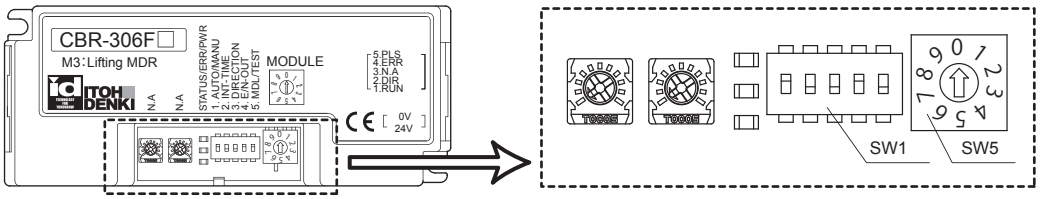
For the detailed specification of CB-016□6, please download the driver card operating instruction manual from our company HP.

Home > Download / Support > User Manual > CB-016□6

＊ For detail of CBR-306, refer to Appendix 1. CBR-306F Detail (P.25)

■ Driver Card Setting

① M3：Set the driver card for lifting.

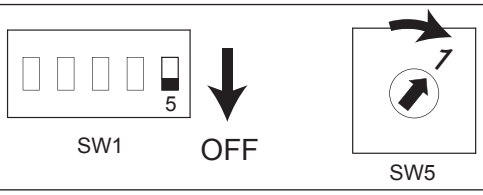


⚠ Caution

- Make sure to turn OFF SW1#5.
  ON state does not allow external signal input and may lead to a failure.
- SW5 must be set to "1" when using Pop-up Diverter.
  Using with other than "1" may lead to a failure.

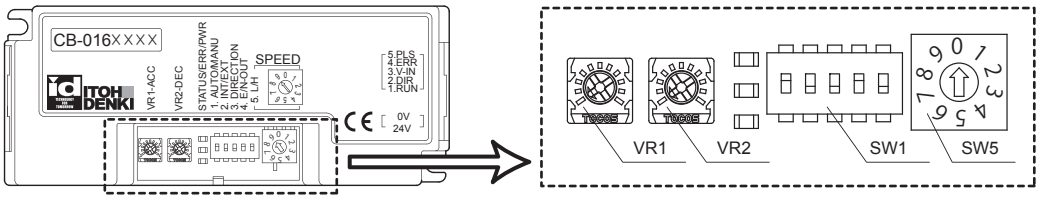
M3：For lifting

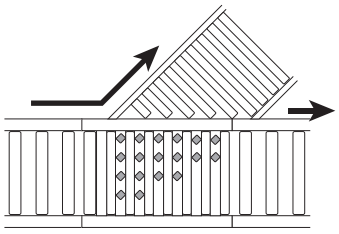
CBR-306F□



※For detail, refer to Appendix 1. CBR-306F□ Detail (P.25) .

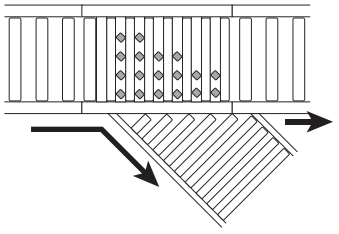
② Set M1：Driver card for straight, and M2：Driver card for diversion.





L
Divert Left

	MDR acc/dec	MDR rot. direction	MDR speed
M1 Straight	VR1 VR2	SW1#3 OFF	SW1#5 ON, SW5
M2 Diversion	VR1 VR2	SW1#3 ON	※Refer to Speed Setting when changing the speed.



R
Divert Right

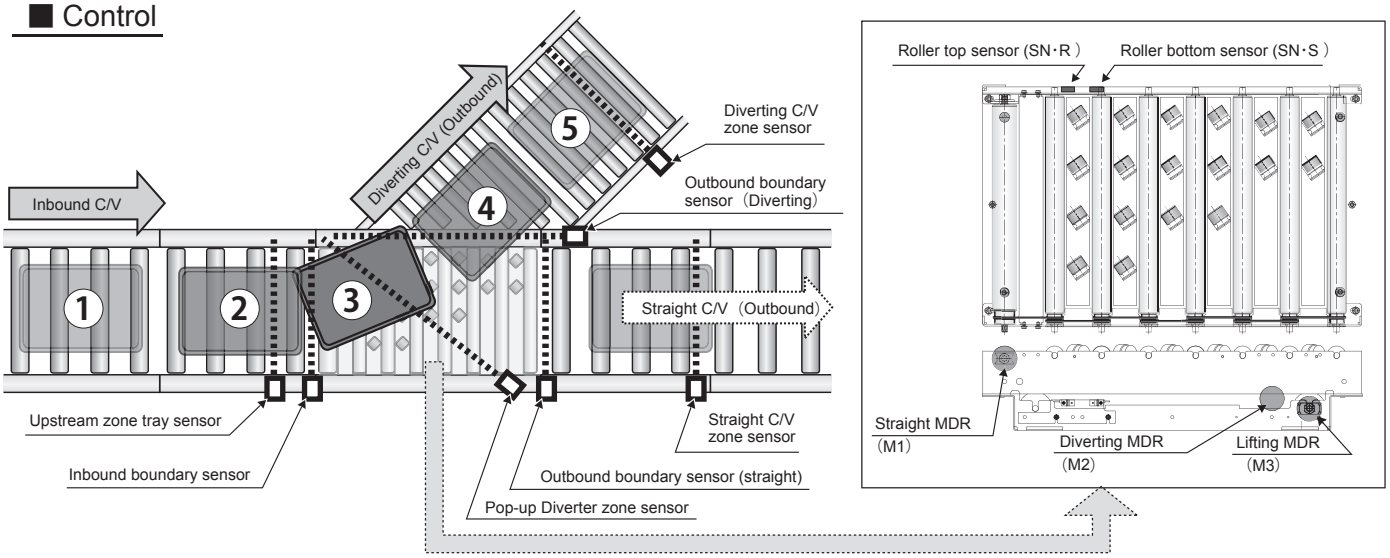
	MDR acc/dec	MDR rot. direction	MDR speed
M1 Straight	VR1 VR2	SW1#3 ON	SW1#5 ON, SW5
M2 Diversion	VR1 VR2	SW1#3 OFF	※Refer to Speed Setting when changing the speed.

Speed Setting

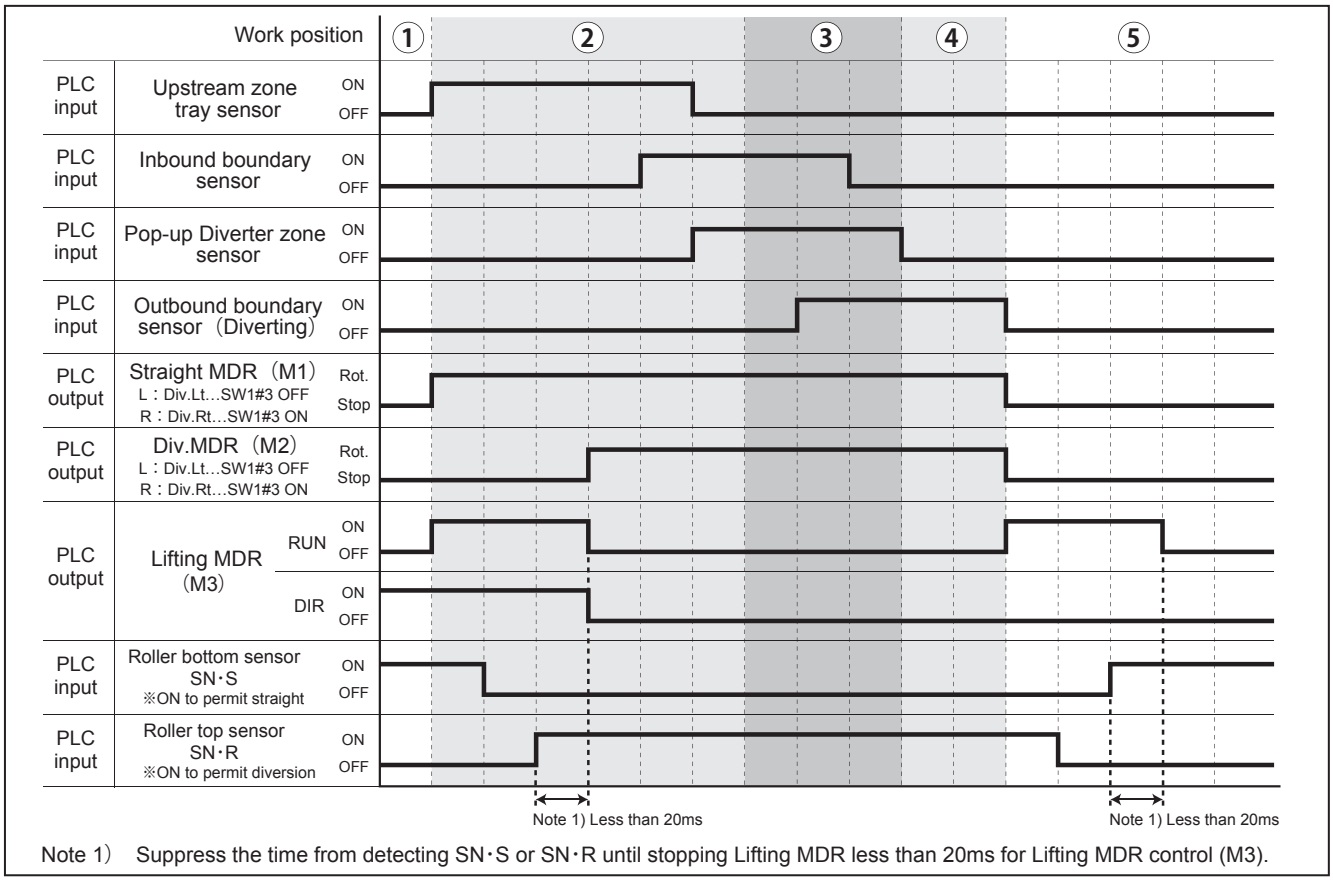
(m/min) Speed accuracy:±3%

	SW1#5：ON										SW1#5：OFF									
SW2	9	8	7	6	5	4	3	2	1	0	9	8	7	6	5	4	3	2	1	0
M1：Straight	53.5	53.5	53.5	51.4	48.9	46.3	41.2	38.6	36.0	33.4	30.9	28.3	25.7	23.1	20.6	18.0	15.4	12.9	10.3	7.7
M2：Diverting	90.2	90.2	90.2	85.8	81.5	77.4	68.6	64.4	60.0	55.9	51.6	47.2	42.9	38.5	34.4	30.2	25.8	21.5	17.1	12.8

■ Control



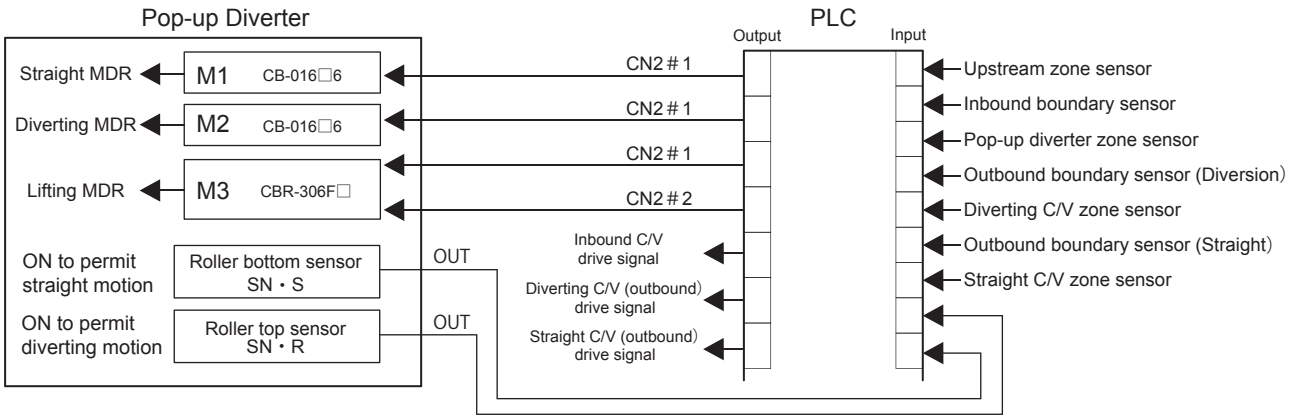
Example time chart when diverting



Note 1） Suppress the time from detecting SN・S or SN・R until stopping Lifting MDR less than 20ms for Lifting MDR control (M3).

・Use control components with response time 20ms or shorter to avoid abnormal motion.

Example of connector wiring using a PLC



6 - 6. Precautions for Trial Run

● Checking the environment for permitting trial run

⚠ Caution

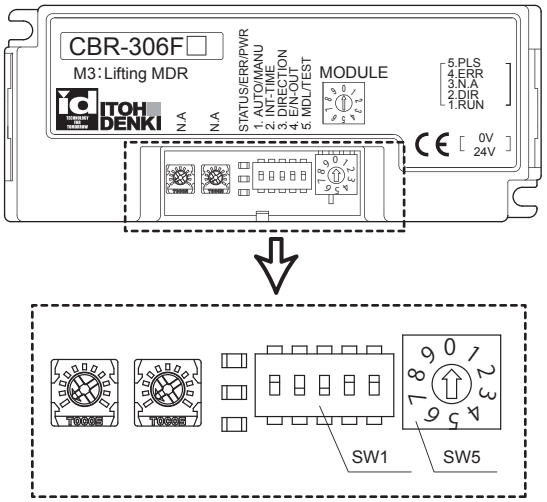
- Make sure other devices in the system do not run.
  In the case of a conveyor line integrated in a system, starting signal would cause a tray to flow down the conveyor and cause danger. Before trial run, make sure that other elements of the system does not operate.
- Before a trial run, make sure the wiring and driver card setting have been correctly made.
  Insufficient check may lead to a damage and failure.

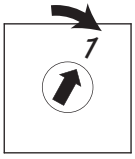
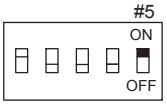
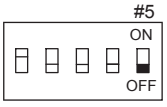
1. Before starting a trial run, check the following.

① Is the wiring correct? Did you check that no loose connector or wire breakage exist? (⇒ P11 ～ 13)

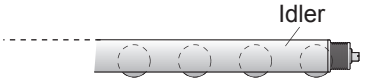
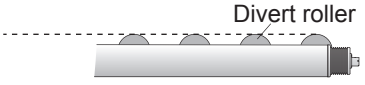
■ Checking the roller bottom sensor (SN・S) and roller top sensor (SN・R)

- Confirm that roller bottom sensor (SN・S) ON makes the divert roller lifted down, or roller bottom sensor (SN・S) ON makes the divert roller lifted up.
- When both the roller bottom sensor (SN・S) and roller top sensor (SN・R) are OFF, then perform the following operation and, confirm that roller bottom sensor (SN・S) ON makes the divert roller lifted down.



1	SW5		M3：Set SW5 of lifting driver card CBR-306 to "1"
2	SW1		Change SW1#5 to OFF→ON.
3	SW1		When SN・S is turned ON, turn OFF SW1#5.

【Condition of the transfer surface】

Roller bottom sensor (SN・S)	Roller top sensor (SN・R)	Transfer surface
ON	OFF	Divert roller is lifted down 
OFF	ON	Divert roller is lifted up 

② Is the driver card setting correct? (⇒ P13)

- M3：In the lifting driver card (CBR-306), is SW1#5 OFF and SW5 "1"?

2. Trial run should be performed without trays and make sure no abnormal operation occurs.
   At such time, check the following points.
   ①No error LED blinks on the driver card.
   ②No abnormal sound or high temperature is detected.

7. Repair / Replacement

In order to avoid accident or damage during operations, confirm safety.
The illustration used for repair and inspection is size C, left diversion. Use caution for different shape when other size or right diversion is used.（Refer to 5. Dimensions）

● Safety check before repairing or replacing a part.

Warning

● In order to avoid interference by power circuit and signals, turn off the power of all connected devices.
（a）After turning off the power switch, leave for more than 3 minutes for discharging the DC power supply.
（b）Indicate warning to prevent other people from turning the power.

● Part repair and replacement

Warning

● Perform repair or replacement operations by wearing protective means such as gloves.
Working without protective means results in hand injury such as cut by metal part.

- When a damaged component is discovered, promptly replace with a new component.
- Do not perform disassembly other than in a designated place. Unexpected accident may occur.
- Repair/replacement operation sometimes requires turning or lifting a component. Use caution for being caught or pinched by other parts and injured.

● Component repair and confirmation after replacement

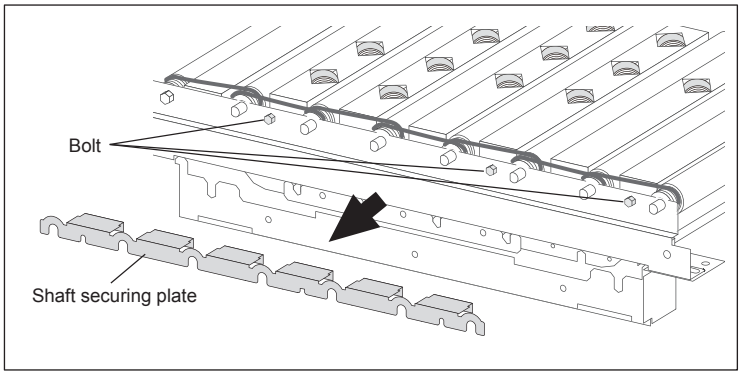
- When component repair and replacement is completed, check the following before starting trial run.
  （a）Roller link belt and diversion roller link belt are attached in the right groove.
  （b）The removed cover is securely closed.
  （c）All removed components and parts are attached.

7 - 1. Replacement of Idlers, Roller Link Belt, Straight MDR

Tools to be used ··· 8mm・19mm spanners, flat-tip screw-driver, nipper

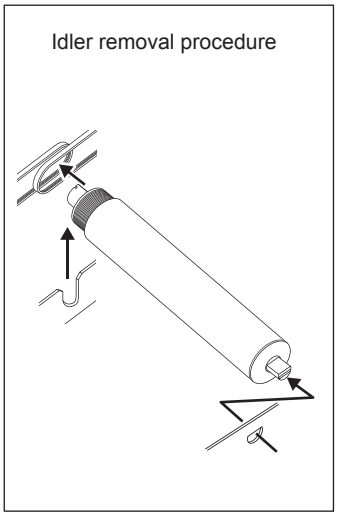
① Remove the shaft securing plate.

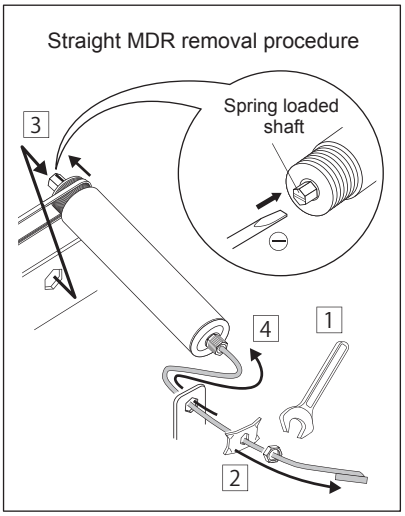
・Loosen the bolts on the shaft securing plate, and pull out the plate to remove.



② Remove idlers or straight MDR from the end of the module.

・A roller without a power cable is a idler.
・For removing straight MDR, loosen the attachment bracket on the power cable side and remove the cable tie which secures the MDR connector and cable.



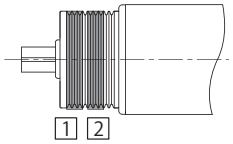


③ Replace and assemble idlers, roller link belt, straight MDR.

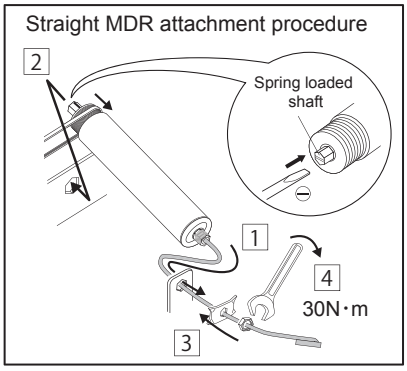
Attach the straight MDR, and assemble idlers from the straight MDR side toward the end of the module.
After assembling straight MDR, attach the MDR connector to the driver card and secure the cable with general-purpose cable-ties.

③ - 1.Engage the link belt on all rollers.
Refer to the following chart for groove position on which the link belt is attached.

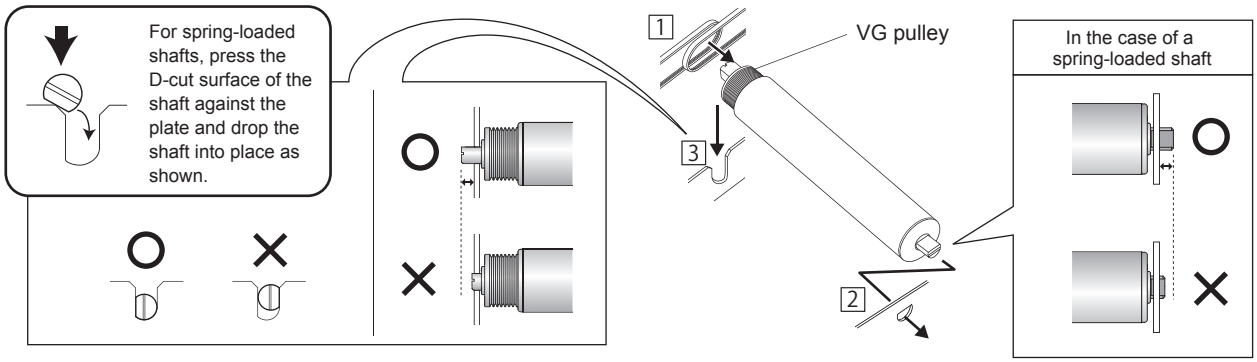
- Linking the straight MDR and idlers ・・・PJ316（3PJ316）
- Linking idlers ・・・・・・・・・・・・・・PJ286（3PJ286）



Straight MDR and idlers
1 Use 3 grooves from the left edge
2 Leave 1 groove and then use 3 grooves



③ - 2. Assemble the idlers one by one in the following order: 1 the V-ribbed belt, 2 the shaft opposite the VG pulley, and 3 the shaft on the VG pulley side.
The idler roller is available with a spring-loaded shaft or a fixed shaft.



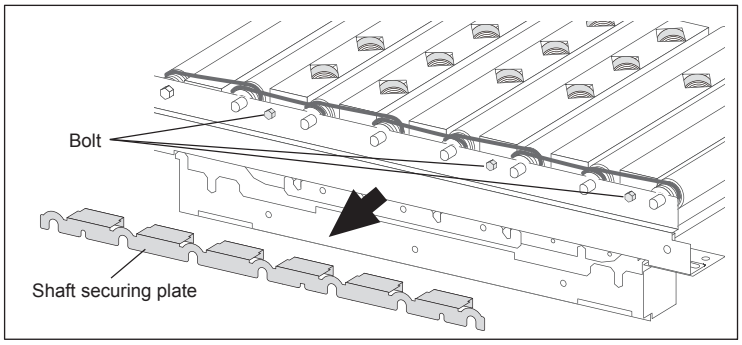
④ Attach the shaft securing plate.

7 - 2. Replacement of a Diverting Roller

Tools to be used ⋯ 8mm・19mm spanners, cross-tip screw-driver, flat-tip screw-driver, nipper, 10mm socket wrench

① Remove the shaft securing plate.

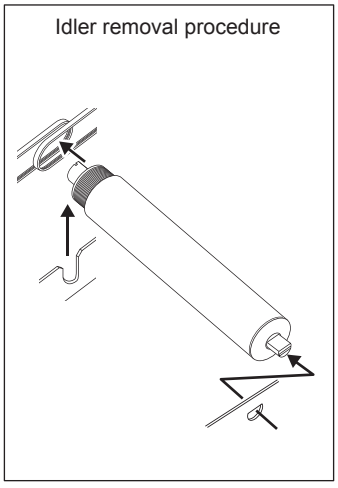
・Loosen the bolts on the shaft securing plate, and pull out the plate to remove.

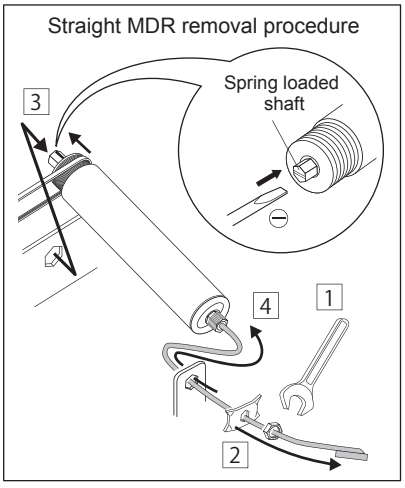


② Remove idler or straight MDR from the end of the module.

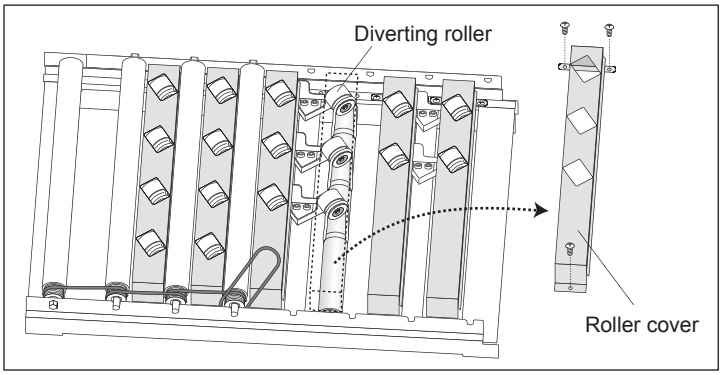
※Remove idlers until those on both sides of the diverting roller to be replaced can be removed.

・A roller without a power cable is a idler.
・For removing straight MDR, loosen the attachment bracket on the power cable side and remove the cable tie which secures the MDR connector and cable.

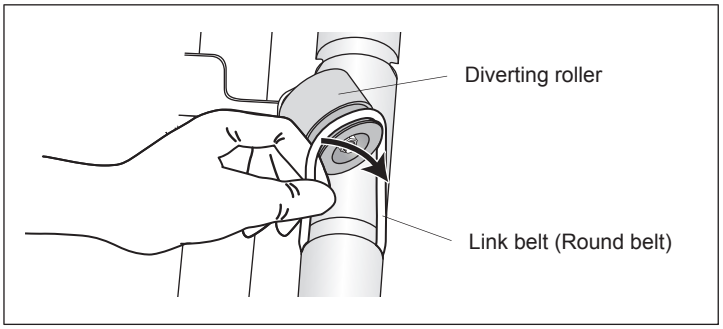




③ Remove the roller cover of the diverting roller to be replaced.

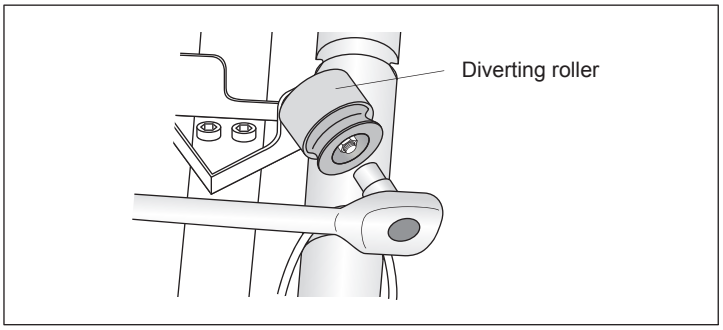


④ Remove the link belt of the diverting roller to be replaced (Round belt).



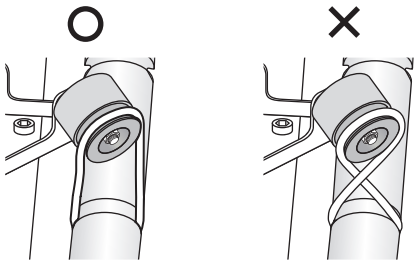
⑤ Replace the diverting roller.

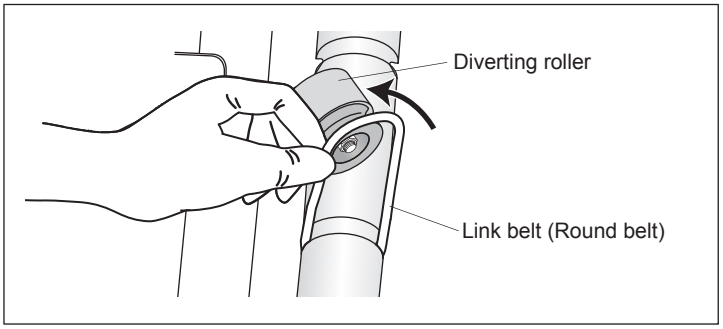
- Check the direction of the diverting roller when assembling. (Fastening torque 5.4N・m)
- Always use a new nut.
  ※Old nut may not be fully fastened.



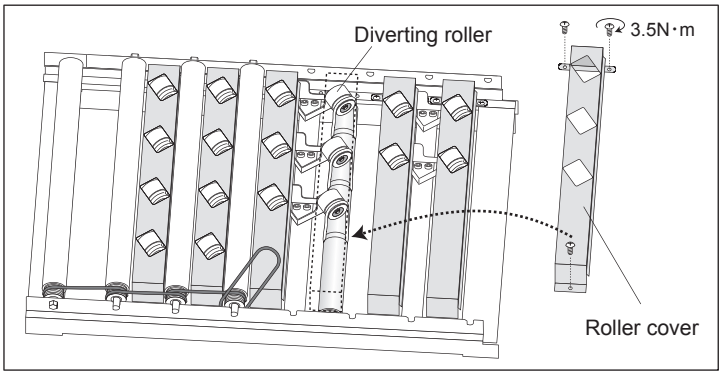
⑥ Attach the link belt (Round belt) around the diverting roller.

- Use caution for the link belt not to be twisted.





⑦ Attach the roller cover on the diverting roller.
(Fastening torque 3.5N・m)

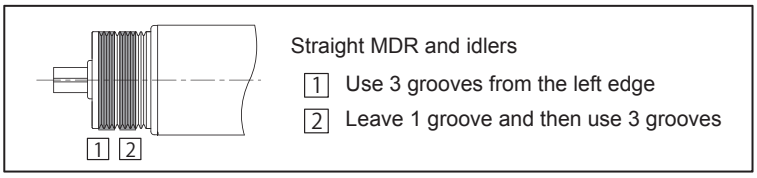


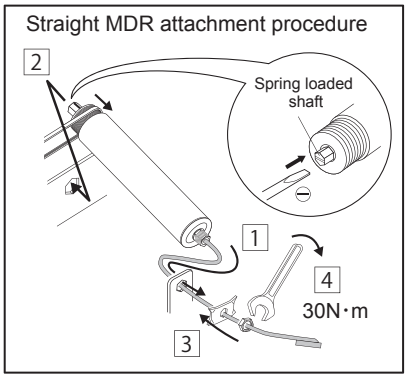
⑧ Replace and assemble idlers, roller link belt, straight MDR.

Attach the straight MDR, and assemble idlers from the straight MDR side toward the end of the module.
After assembling straight MDR, attach the MDR connector to the driver card and secure the cable with general-purpose cable-ties.

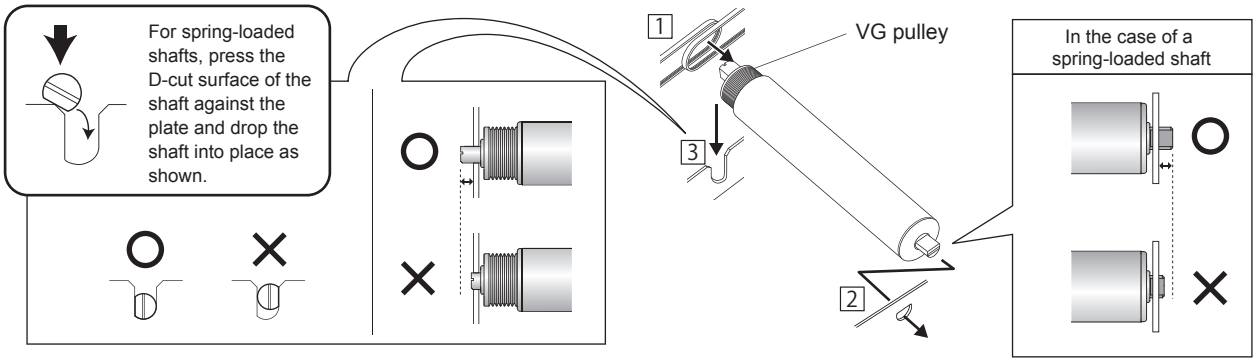
⑧ - 1.Engage the link belt on all rollers.
Refer to the following chart for groove position on which the link belt is attached.

- Linking the straight MDR and idlers ・・・PJ316（3PJ316）
- Linking idlers ・・・・・・・・・・・・・PJ286（3PJ286）





⑧ - 2. Assemble the idlers one by one in the following order: 1 the V-ribbed belt, 2 the shaft opposite the VG pulley, and 3 the shaft on the VG pulley side.
The idler roller is available with a spring-loaded shaft or a fixed shaft.

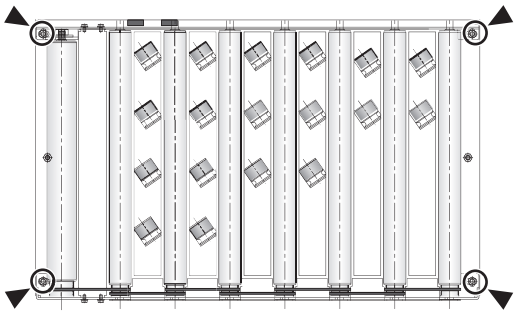


⑨ Attach the shaft securing plate.

7 - 3. Replacing/assembling Linking Belts (round belt) of Diverting Rollers

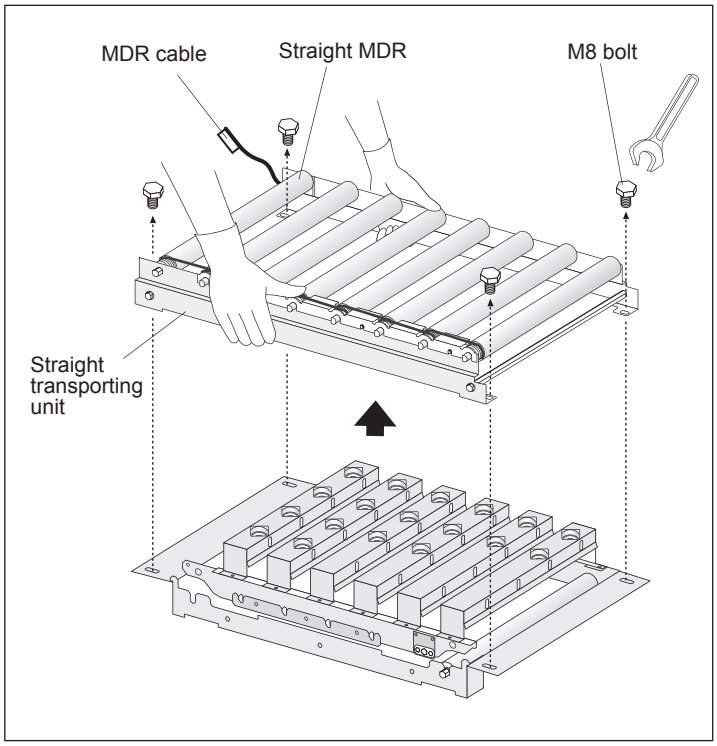
Tools to be used … 13mm spanner (2), 19mm spanner, Phillips head screw-driver, flat-tip screw-driver, nipper, 8mm box wrench

① Loosen the M8 bolts at the 4 corners of Pop-up Diverter and remove the straight transporting unit.

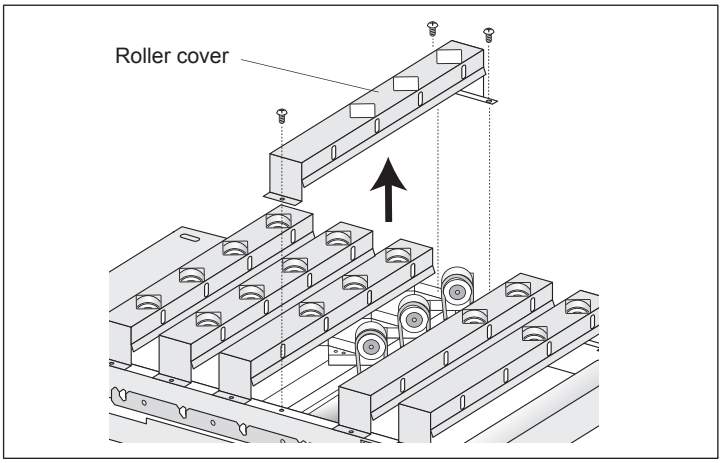


- Disconnect the straight MDR connector from the driver card.
- Remove the cable tie which secures the cable.
- When lifting the straight transport unit for removal, hold the unit as shown.

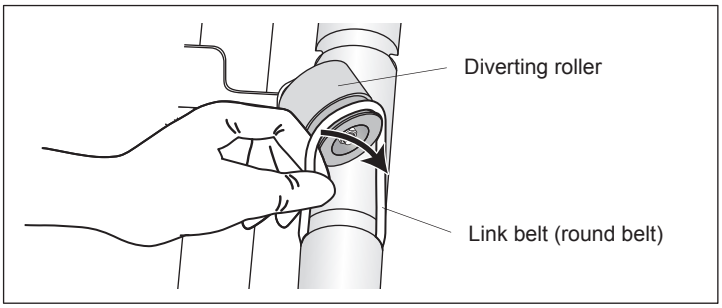
※Because the straight MDR is heavy, use caution for not dropping or giving strong impacts.
※Use caution not to damage the straight MDR cable by pinching, hooking, or forcibly pulling.



② Remove the diverting roller cover.



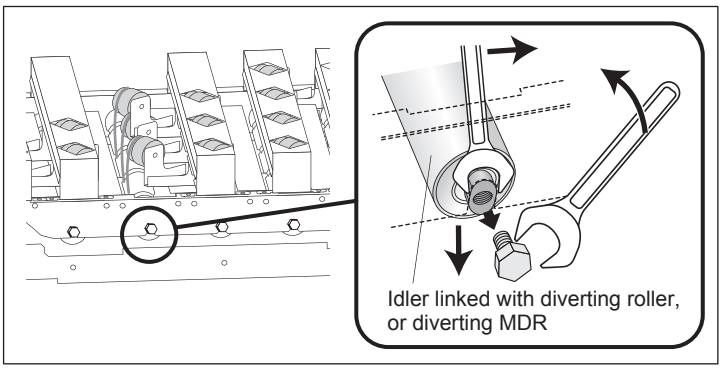
③ Remove all link belts (round belts) attached on the diverting rollers.



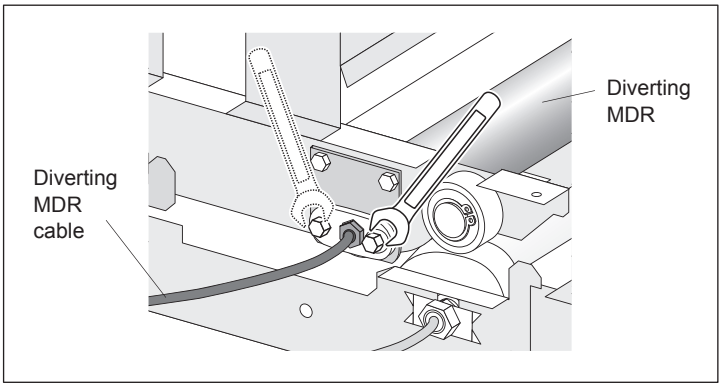
④ Remove the idler linked with diverting roller, or diverting MDR.

・Remove only the attachment shaft opposite from VG pulley.
（It is not necessary to completely remove the idler linked with diverting roller or diverting MDR.）

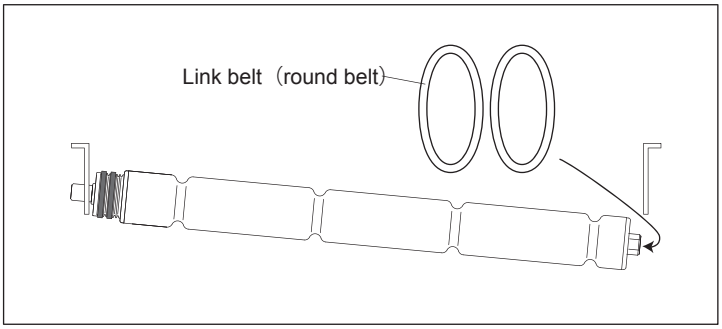
※If the spanner cannot be inserted in the gap, move the roller to VG pulley to secure a gap for inserting the spanner.



・When replacing a diverting MDR link belt (round belt), first, loosen the 2 hex bolts on the attachment bracket on VG pulley side.

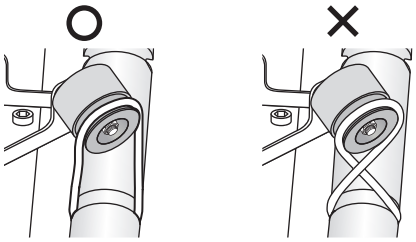


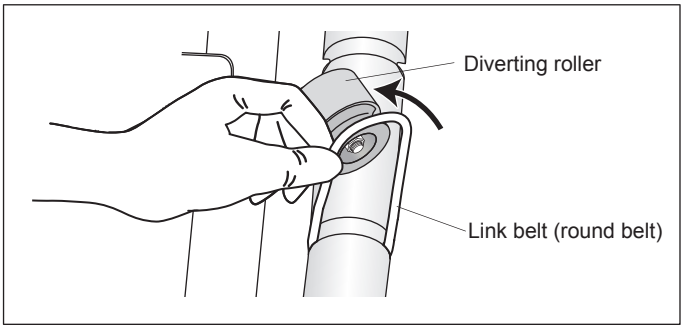
⑤ Attach and replace a link belt from the attachment shaft side.



⑥ Attach a link belt (round belt) on the diverting roller.

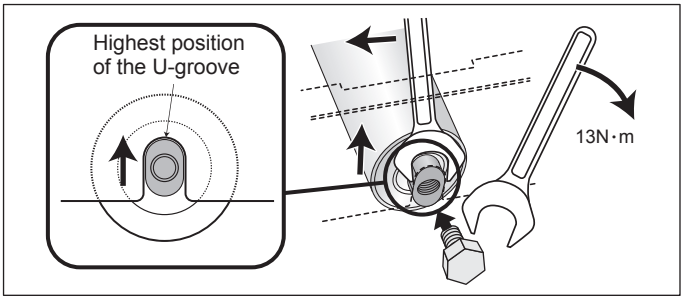
・ Use caution for not twisting the link belt.



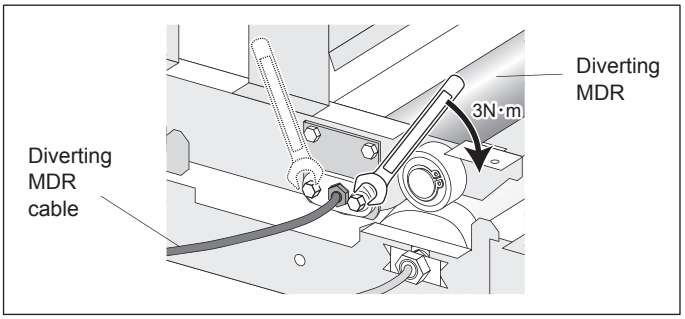


⑦ Secure the idler linked with diverting roller, or diverting MDR.

・Fasten the hex bolt of attachment shaft at the highest position of the U-groove for securing.

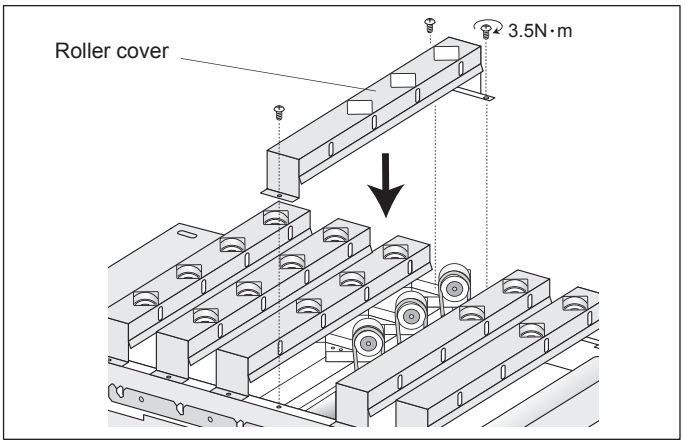


※ When the link belt (round belt) of a diverting MDR, tighten the 2 hex bolts the VG pulley side attachment bracket. (Fastening torque 3N・m)



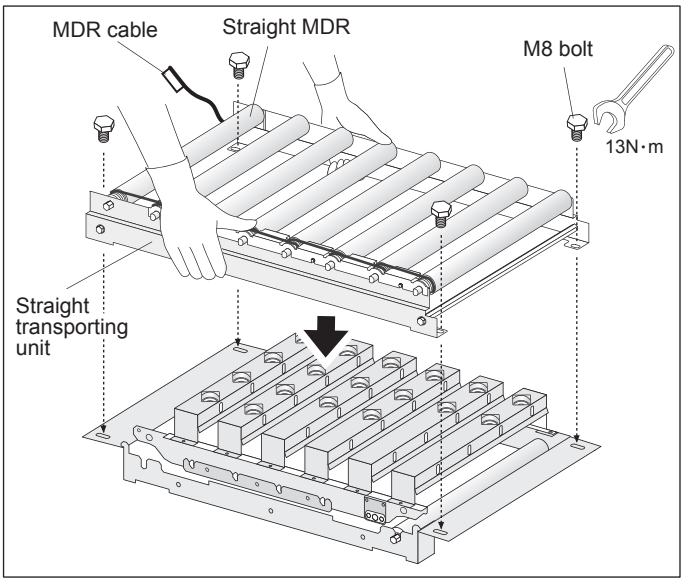
⑧ Attach the roller cover of the divering roller.

・ Use caution for avoiding interference between roller cover of the diverting roller and diverting roller. (Fastening torque 3.5N・m)



⑨ Attach the straight transport unit and secure the 4 corners.

・Use caution for the orientation of the unit to be attached
・Avoid MDR cable being pinched by other objects.
・During attachment operation, avoid interference between the straight transport unit rollers and roller cover of the diverting roller.
・Attach the connector of straight MDR to the driver card.
・Secure the cable with general-purpose cable ties.



8. Specifications

Product Specifications

■ Pop-up diverter unit specifications

Roller diameter		ϕ50mm
Diverting roller	Size	ϕ39.5mm
	Material	Urethane 90°
Size	Width(W)	394, 494, 594, 694mm
	Length (L) straight direction	760mm
Mechanism height		169mm（with diverting roller up：172mm）
Transfer speed	Straight	Approx 60m/min
	Diversion	Approx 90m/min
Lifting stroke		3mm
Drive power		24VDC±10%
Operating temperature		0～40℃(No freezing)
Operating humidity		90%RH or below（No condensation）
Atmosphere		No corrosive gas
Vibration		0.5G or below
Installed location		Indoor
Tilt of the mounting surface		5/1000 or below
Lifting sensor (Roller bottom sensor SN･S / Roller top sensor SN･R)	Current consumption	15mA or below
	Output	Maximum inrush current: 100mA Applied voltage: 30V DC or less (between output and 0V DC) Residual voltage: 2V DC or less (100mA inrush current)
	Output motion	ON when detecting the position
	Cable	Outer dia. ϕ3mm 0.15㎟ 3 wires

■ CB-016□6 / CBR-306F□ ※□=N（NPN in/out or P (PNP in/out）

Power voltage		24VDC±10%
Rated voltage		24VDC
Static current		0.03A
Starting current		4.0A
Peak current		20A（1ms or less）
Wire dia.	Pwr connector（CN1）	0.50～1.5㎟(AWG:20～14) Note)
	Cntrl connector (CN2)	0.08～0.5㎟(AWG:28～20) Note)
Motor rotation from drive input		15msec or below
Temperature protection		95℃ for circuit board, 105℃ for motor
Ambient temperature		0～40℃(No freezing)
Ambient humidity		90%RH or below（No condensation）
Atmosphere		No corrosive gas
Vibration		0.5G or below
Location		Indoor

Note) Conforming wire to the included connector

PCB side	Power connector	734-162 (WAGO)	〔MAX：10A〕
	Control connector	733-365 (WAGO)	〔MAX： 4A〕
Wiring side	Power conn. (CN1)	734-102 (WAGO)	〔MAX：10A〕
	Control conn. (CN2)	733-105 (WAGO)	〔MAX： 4A〕

■ Product Weight

Size	Weight
SizeA	46kg
Size B	49kg
Size C	51kg
Size D	54kg

Transfer Load

■ Load Size and Weight

Size	Transport Speed	Min. size ～ Max. size	Max. Load Weight
SizeA	60m/min type	W300 × L300mm ～ W300 × L650mm	30kg
Size B		W300 × L300mm ～ W400 × L650mm	
Size C		W300 × L300mm ～ W500 × L650mm	
Size D		W300 × L300mm ～ W600 × L650mm	

※ Size and mass are approximate, as they vary by the load condition.
※ Certain type of load may not be transfered correctly depending on the bottom shape.

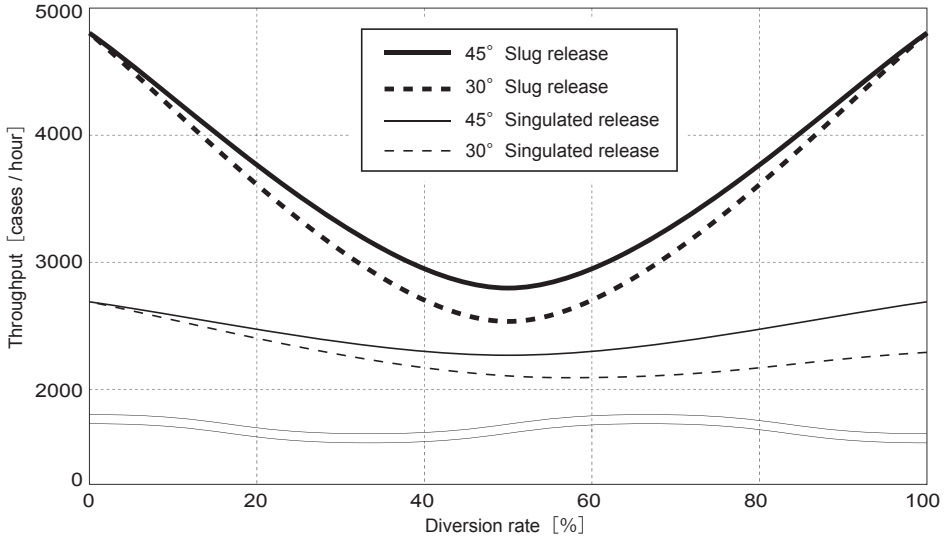
Transfer Throughput

Transfer speed 60m/min Size D type
Load condition：Carton box W360×L360mm 30kg
Diversion is made from the condition with every load staying in each zone of the inbound C/V

※The curves shown are based on the company's measurement for reference only, not warranted values.

※The curves of slug release are based on the total control by using idLinX for controlling the conveyors before and after Pop-up diverter.

※Throughput vary by load size, material, bottom condition and transfer speed.



■ Replacement Parts for Pop-up Diverter

	Part Name	Part Number	
1	Diverting roller link belt（round belt）	MXP5-04/87F　L=260mm	
2	Roller link belt	Idler ⇔ Idler	3PJ286
		MDR ⇔ Idler	3PJ316
3	Diverting roller	POP-D-ROL	
4	Straight MDR	PM500FE-60-（305 ／ 405 ／ 505 ／ 605）-D-024-JW-C150-VG (sizeA ／ sizeB ／ sizeC ／ sizeD)	
5	Idler （For straight motion）	ARI-38-（326 ／ 426 ／ 526 ／ 626）-JX-VG-OS POP-D-（ L ／ R ） (sizeA ／ sizeB ／ sizeC ／ sizeD)　(Divert left ／ Divert right)	
6	Driver card	CB-016□6　(M1：Straight ／ M2：Diversion)	□: Specify N = NPN or P = PNP according to the input/output type
		CBR-306F□　(M3：Lifting)	
7	Cup square neck bolt M6×45mm ※		
8	U nut M6 ※		

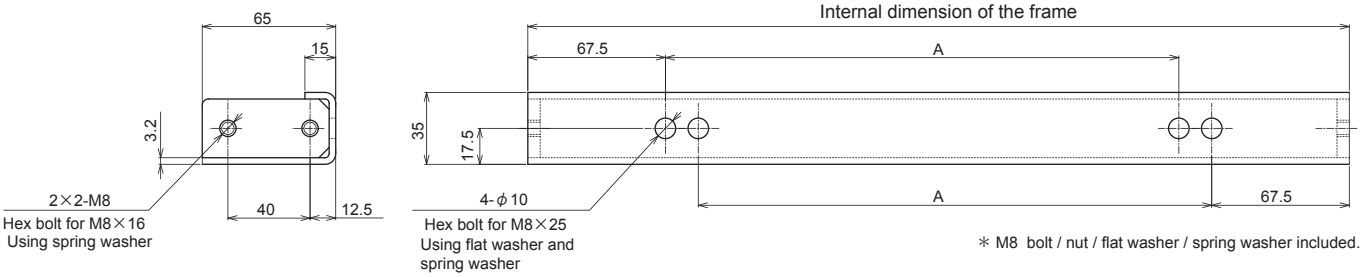
※ For diverting roller installation. Need to be purchased with diverting roller.

■ Optional Item List（Extention cable, etc.）

● Mounting stay

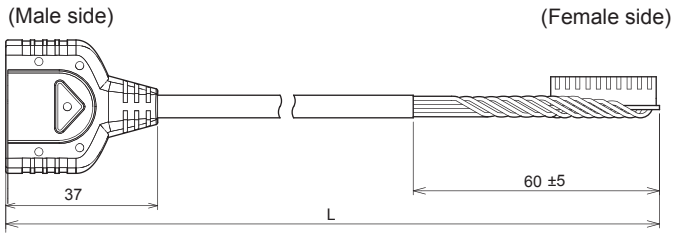
(mm)

Size	Internal dim. of frame	A dim.
A	400 - 499	249
B	500 - 599	349
C	600 - 699	449
D	700	549

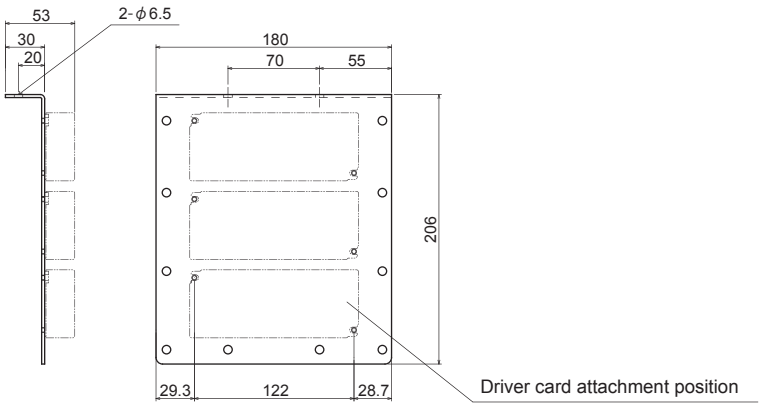


● Extension cable

Model	Cable specification
ACE-CBM-B0600	9P ext. cable length　600mm
ACE-CBM-B0850	9P ext. cable length　850mm
ACE-CBM-B1200	9P ext. cable length　1200mm



● Driver card attaching plate（F-RAT-S1-DB）



9. When Questioning a Failure

When questioning a failure, check the items shown below before contacting us or requesting a repair.

Symptom	Check the Following	Perform the Following	Refer to
Pop-up diverter does not operate	Is PWR LED of each driver turned on?	Supply 24VDC.	Connector wiring P.12
	Is LED2 (red) of each driver card blinking or lit, indicating error output?	Eliminate error cause and cancel the error setting.	• Error detail/ cancel method P.26 • CB-016□6 User manual
	Is each connector correctly connected? Is the wiring correct?	Check the wiring and rewire correctly.	Connection P.11 Wiring P.12
	Does each driver card type※ (NPN/ PNP input/output) and input/output signal (NPN input/output /PNP input/ output) of PLC, etc. match?	Match each driver card type (NPN input/ output / PNP input/output) and input/ output signal (NPN input/output / PNP input/output) of PLC, etc.	Wiring P.12
	Is the input voltage common to the supplied power voltage?	Make the input voltage common to the supplied power voltage.	Connector wiring P.12
Lifting unit does not operate, or the motion is abnormal.	M3：Is the lifting driver card set with SW1#5 to OFF and SW5 to "1"?	M3：Set the lifting driver card with SW1#5 to OFF and SW5 to "1".	Driver card setting P.15
	Is the control made for detecting lifted-up/down position when the roller bottom sensor (SN・S) or roller top sensor (SN・R) is ON?	Make the control to detect the lifted up/down position when the roller bottom sensor (SN・S) or roller top sensor (SN・R) is ON.	Control P.14
	M3：Isn't the RUN signal to the lifting driver card kept continuously entered?	Set the RUN signal to the M3：Lifting driver card to OFF when the lift up/down position is detected.	Control P.14
	M3：Is the lifting driver card LED2 (red) blinking or lit, indicating error output?	Eliminate the error cause and cancel the error.	Error detail/ cancel method P.26
Cannot change the speed	Is speed change of straight MDR by operating M1：straight driver card switch, and diversion MDR speed by operating M2：diversion driver card switch individually ？	Speed change of straight MDR should be operated by M1：straight driver card switch, and speed change of diverting MDR should be operated by M2：diversion driver card switch.	Driver card setting P.13
	Isn't M3：lifting driver card switch operated?	If M3：lifting driver card switch is operated, return it to the original position.	
During diversion, each load moves as if disturbed	During diversion, both straight MDR (M1) and diverting MDR (M2) are driven at the same time?	During diversion, straight MDR (M1) needs to be driven.	Control P.14
Rotation direction does not match (diverting roller / straight MDR)	Does the diversion type (L/R) of Pop-up diverter and switch setting of M1：straight driver card and M2：diversion driver card switch (SW1#3) match?	Switch setting of M1: straight driver card and M2: diversion driver card should match the Pop-up diverter type.	Driver card setting P.13
Some diverting rollers do not rotate during diversion	Is the tension on the diverting roller comparable to the tension on other link belt? Isn't any link belt broken?	Replace the link belt.	Replacement/assembly of diverting roller link belt (round belt) P.19

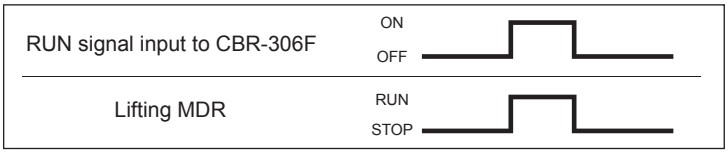
Appendix 1 . CBR-306F□ Detail

CBR-306F is a driver card for up/down motion.
MDR is driven by RUN signal input, but is automatically stopped after counting predetermined motor pulses.

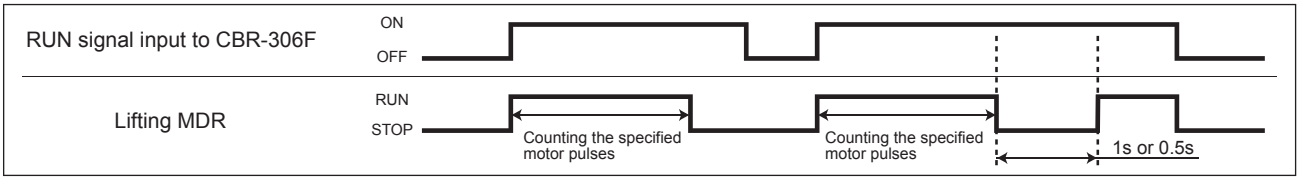
⚠ Caution	Keep SW1-5 to be OFF. It cannot operate by external input signal, or may cause a failure if SW1-5 is set to ON.

Time Chart

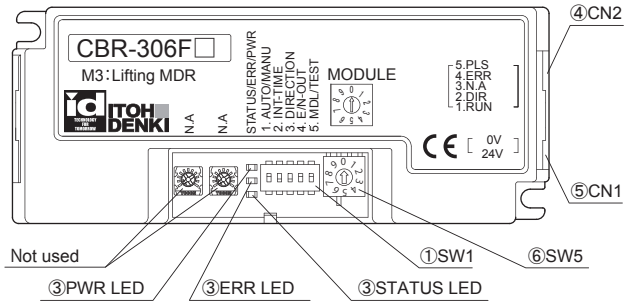
● Normal up/down motion



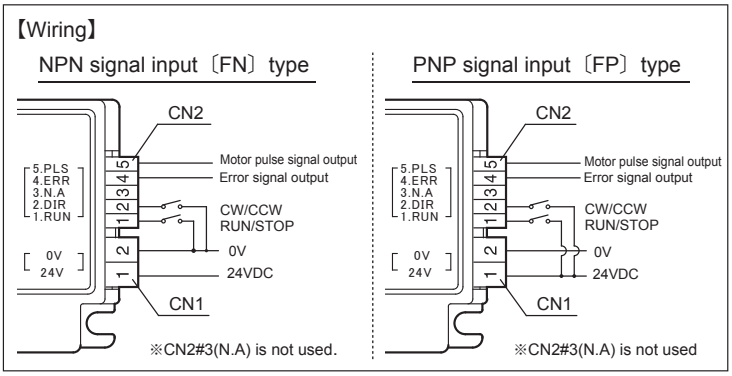
● Abnormal up/down motion



■ List of Functions



【Wiring】



		Description	ON	OFF	Default	Remarks
① SW1 (DIP switch)	1	Auto/manual recovery selection with thermal, low voltage, induced voltage error	Manual rec.	Auto rec.	ON	Ref. Error detail, cancellation
	2	Stop holding time	0.5sec	1sec	OFF	Ref. Time chart ● Refer to abnormal lifting operation
	3	Rotation direction selection	(Ref. rotation dir. change)		OFF	(Normally set to OFF)
	4	Alarm (error) signal output selection	Normal time output	Error time output	OFF	Ref. Error signal output
	5	Forcible RUN	RUN	Module selection	OFF	⚠Caution Keep SW1-5 to be OFF. It cannot operate by external input signal, or may cause a failure if SW1-5 is set to ON.

		Color	Indication	Remarks
③	PWR LED	Green	Indicates powered condition	Ref. Error detail, canceling method
	ERR LED	Red	Indicates error type	
	STATUS LED	orange	Indicates number of error occurrence form thermister reaction, motor stall or under voltage	Refer to CB-016 User Manual

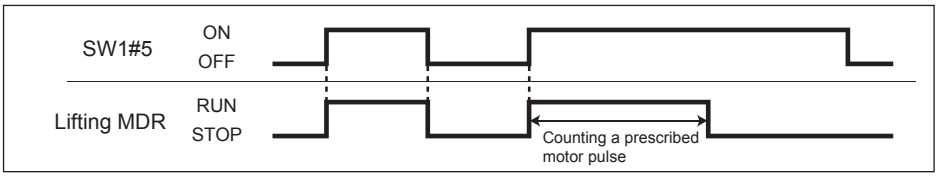
	No.	Description	Remarks
④ CN2 (Control)	5	Motor pulse output	Motor pulse signal output (2pulses/1 rev. of internal motor)
	4	Error signal output	Ref. Error signal output
	3	—	(Not used)
	2	MDR rotation direction change	Ref. Rotation direction change
	1	MDR start/stop	ON : RUN／ OFF : STOP (Approx 3mA current flows)

⑤ CN1 (Power)	2	0V
	1	24VDC

⑥ SW5 (Module selection)	0	Not operating	⚠Caution	Make sure to select a correct number for installed product.
	1	F-RAT-S series／Pop-up Diverter		
	2	F-RAT-T225		
	3	F-RAT-U225		
	＊ Product may be in unexpected behavior in case of incorrect setting.			

■ Forcible RUN

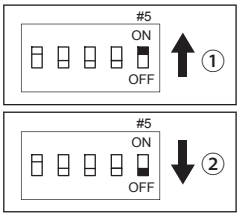
・Lifting MDR starts by turning DIP-SW SW1-5 to ON, without external signal to CN2-1 / CN2-2.



⚠ Caution

SW1-5 must be set to OFF when the roller bottom sensor (SN・S) is ON, in case of Pop-up Diverter.
That may cause Pop-up Diverter breakage or make the operation life extremely short.

SW1#5 (DIP-SW)

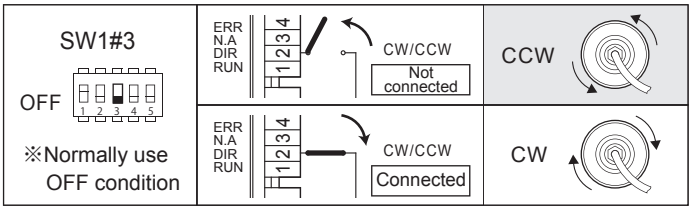


① Lifting MDR starts by turning DIP-SW SW1-5 to ON after injecting main power.
② Lifting MDR stops by turning OFF.

■ Rotation Direction Change

・MDR rotation can be changed by external switch.

※MDR rotation in the right turn direction is defined as CW when viewed from the cable side, and left turn as CCW.
※0V must be common to the power supply.
※CN2#2 carries approx. 3mA current.



■ Error Signal Output

・SW1#4 can change setting of normal-time signal output or error-time signal output.
・CN2#4 delivers error signal output.

※Power ON/OFF operation generates error signal. Make the control to ignore error signal from the driver card for 0.5sec at power ON, and 2sec at power OFF.
※Use a protection resistor to suppress current to 25mA or below. Use of higher current damages the transistor in the driver card.
※Protection resistor 100Ω is furnished in the driver card.

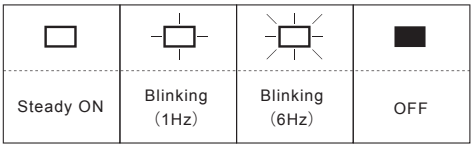
SW1#4	
OFF	ON
Error-time signal output	Normal-time signal output
Normal time open (Transistor in the driver card is ON during error)	Error time open (Transistor in the driver card is OFF during error.)

■ Error Detail, Cancellation Method

・Error can be checked by PWR LED(green), ERR LED(red), and CN2#4 signal.

※Error signal cancellation by CN2#1 ON → OFF → ON immediately starts MDR.
※At low power voltage (8.5V or below), the motion same as power shut down or unexpected motion may occur.

LED Indication



PWR LED (green) / ERR LED (red)	CN2#4 (Error signal) SW1#4OFF	CN2#4 (Error signal) SW1#4ON	MDR	Error Cause	Error Signal Cancellation		MDR Restart
□ / ■	Open	Output	—	(Normal operation)	—		
■ / ■	Open	Open	Stop	No power	Supply 24V DC		—
■ / □	Output	Open	Stop	Driver card failed	Shut off the power and replace the driver card		—
□ / □	Output	Open	Stop	Thermal protection has been activated by temperature rise of driver card or MDR (Thermal error)	Auto rec setting	1 min after reaching recovery temp, error signal cancellation and immediate start	
						After reaching recovery temp, CN2＃1 ON→OFF→ON to cancel error and start	
						After reaching recovery temp, CN2＃2 ON→ OFF→ON or OFF→ON→OFF	Start by CN2＃1 ON→OFF→ON
							Start within 1 min.
					Manual recovery setting	After reaching recovery temp, CN2＃1 ON→OFF→ON to cancel error and start	
						After reaching recovery temp, CN2＃2 ON→ OFF→ON or OFF→ON→OFF	Start by CN2＃1 ON→OFF→ON
				MDR connector has been separated	Shut off the power and connect the connector		—
□ / □	Output	Open	Stop	4sec elapsed with locked MDR (Lock error)	CN2＃1 ON→OFF→ON to cancel error and start		
					CN2＃2 ON→OFF→ON or OFF→ON→OFF		Start by CN2＃1 ON→OFF→ON
□ / □	Output	Open	Stop	Power voltage is 15V or below (Low voltage error)	Auto rec setting	Secure power voltage 18V or higher	Immediate start
					Manual recovery setting	Secure power voltage 18V or higher, CN2＃1 ON→OFF→ON to cancel error and start	
						Secure power voltage 18V or higher, CN2＃2 ON→OFF→ON or OFF→ON→OFF	Start by CN2＃1 ON→OFF→ON

Error can be canceled by power OFF (2sec or longer)

Appendix2. Maintenance

- When starting and ending daily operation, perform maintenance inspection by referring to the following.
- To avoid accident or damage during operation, perform safety check and procedure.

● Safety check procedure before starting maintenance inspection operation

Warning

- To avoid interference by power circuit or signal, shut off power to all connected devices.
  - （a）After turning off the power switch, leave for 3min or longer to discharge the DC power supply.
  - （b）To prevent unrelated personnel from supplying power, post a warning indication.
  - （c）When inspecting during operation for noise or abnormal rotation, use caution for finger being caught by rollers and other moving part. In preparation for immediate stopping of the equipment apply sufficient safety measures.
- Always use protective means such as gloves.
  Operations without using protective means may lead to cutting by a metal part and other injury.

● Confirmation after maintenance inspection

- After completing maintenance inspection operation, check the following before a trial operation.
  （a）Whether the roller link belts and diversion roller link belts are attached in the correct groove position.
  （b）Once-removed covers are securely installed.
  （c）No components have been forgotten for assembly.

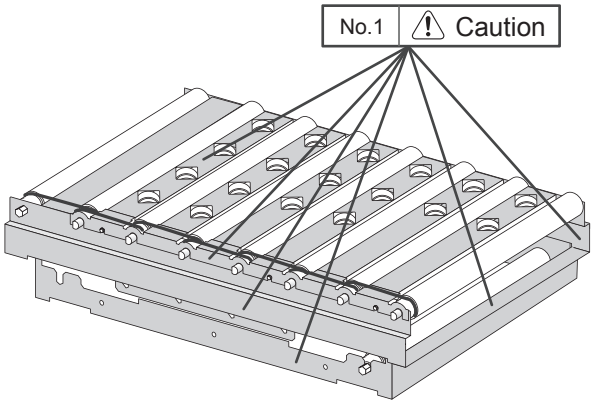
Inspection Locations	Inspection Items	Action Contents
・Mounting points of Pop-up Diverter ・Mounting stay（Optional）	・Loose screws	・Tighten the screw
・Driver card	・Loose screws at mounting points	・Tighten the screw
	・Incorrect attachment of driver card	・Attach connector correctly
	・Wire damage, defective wiring	・Correct the wiring
	・Abnormal temp rise, damage	・Stop and report to the distributor
・Idler	・Abnormal sound ・Rotation failure ・Appearance defect by damage	・Repair, replacement P.16 P.23
・Roller MDR	・Abnormal sound ・Speed degradation from setting ・Appearance abnormality, dent ・Abnormal temperature rise	
・Roller link belt	・Crack on belt surface ・Wear on belt surface ・Damage on belt side(degradation)	
・Diverting roller	・Surface crack, lost material ・Surface wear ・Appearance abnormality, dent ・Abnormal sound, poor rotation	
・Diverting roller link belt	・Belt surface crack ・Belt surface wear	
・Other	・Current leak from the equipment	・Equipment grounding
	・Component deformation, damage	・Stop and report to distributor

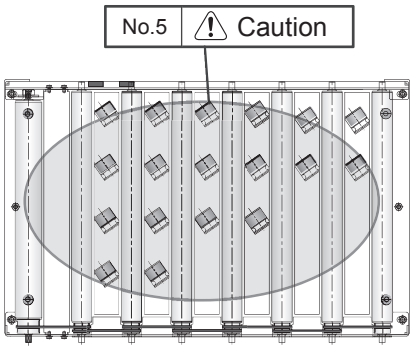
Appendix 3. Remaining Risks List, MAP

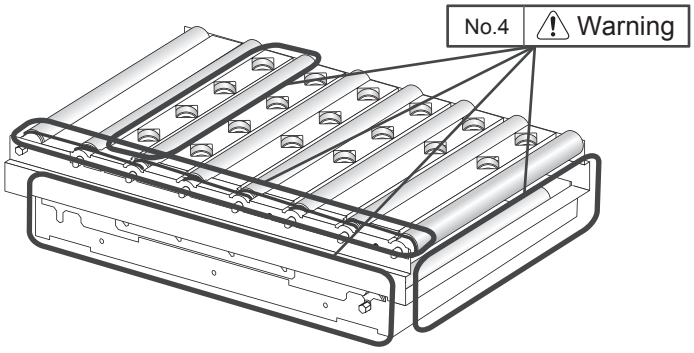
■ List of Remaining Risks

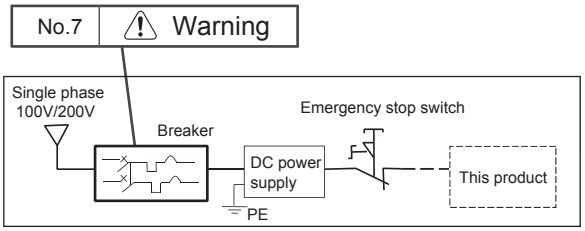
No.	Stage	Operation	Qualification for operation	Position on unit	Danger level	Remaining risk factor	Presumed measures	Implemented measures	Manual pages
1	Preparation	Uncrate/ transfer	Fully reading the manual and understanding the content	Product metal part	Caution	Injury by product metal part	Wear protection: gloves, etc.	Explained in the manual	P9
2	Preparation	Transfer		No specific position	Caution	Heavy item transfer by a single operator may cause injury or damage on product	2 or more operators hold product by both hands while supporting the bottom.	Explained in the manual	P9
3	Operation	Trial opr.		No specific position	Caution	During stand-alone trial operation, unexpected load transfer causes injury	Cut off the control to avoid motion of other parts before starting the unit.	Explained in the manual	P15
4	Operation	All operations		Between moving parts and between moving part and stationary part	Warning	Operator's fingers/hand are caught between the unit and moving part, or between moving parts	・Enclose the area with interlocked fence to prevent operator coming close. ・Add a cover to the gap in the unit to eliminate gap.	・Attach a warning/caution label ・Explained in the manual	P10
5	Operation	All operations		The upper surfase of product	Caution	Operator rides on the unit and slips and falls down	・Enclose the area with safety fence to prevent operator coming close. ・Train the operator not to ride on the equipment	Explained in the manual	P3
6	Operation	All operations		No specific position	Caution	Operator is injured by a load popped out of the C/V	Enclose the area with safety fence to keep people off and stop object to pop out.	Explained in the manual	P10
7	Maintenance	All inspections		Power supply to driver card	Warning	Power-on action by someone makes the product move unexpectedly and causes injury	Post a warning sign to prevent unrelated personnel from supplying power.	Explained in the manual	P16、P27
8	Maintenance	All inspections		No specific position	Warning	Operator's finger or hand is caught by the product	Work carefully by wearing protective items such as gloves.	Explained in the manual	P16、P27

■ Remaining Risk MAP









Remaining risk without specified position on the unit			
No.2	⚠ Caution	No.6	⚠ Caution
No.3	⚠ Caution	No.8	⚠ Warning

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