

Operation Manual for Trolley Duct

The product-life is different in use conditions and the service space, however, It is possible to use it for about t 10 years by regularly maintaining and the regular service in correct construction.

- Before using, be sure to read through this Operation / Installation Manual and use the product correctly.
- After reading, keep this Operation / Installation Manual with you for your reference.
- Ask qualified electrician for troubleshooting and maintenance.
Please be sure to show this Operation / Installation Manual to that engineer.
- We have quality, strive to improve reliability, however, It finally becomes difficult the continuing use due to the deterioration of the material. Deterioration is different in use conditions like the availability and the ambient environment, etc. but degrading the year.
In the worst case degradation is the cause of the fire burning. so we recommend early inspection and replacement.
 - For a long time - you use this product on your own, "Maintenance Table" Please always check regularly once a year based on the least.
 - If you have trouble checking in, please contact the electrician.
 - This product is an important asset - customers. Please check and the following things must be observed.
 - This product is an important asset of customers. Please check and understand the following text carefully.
 In addition, safety precautions, to the extent expected by the Company are listed.

Precautions on installation

Installation of the High-Tro-Reel must be performed only by a licensed electrician. To prevent injury or accidents, always pay attention to the following points.

Warning

- **Do not modify the Tro-Reel HS in any way.** Otherwise, electric shock, fire or damage due to falling of equipment may occur.
- **Do not use where exposure occurs.** Otherwise, electric shock, fire or damage due to falling of equipment may occur
- **Use at ambient temperature -10 °C ~ 40 °C. If you use outside this temperature range, please contact Panasonic Corporation.**
- **If any abnormalities occur, turn off the power immediately and contact a qualified electrician for inspection and repair.**
Otherwise, electric shock, fire or damage due to falling of equipment may occur.
- **The replacement product is required for electrical worker qualifications.**
- **Do not use the collector shoes past replacement indication lines.**
Otherwise, a unit may produce sparks, causing fire, poor contact or separation of collector arms from wires.
- **To prevent electric shock, be sure to turn off the power before starting any inspection.** Otherwise, electric shock may occur.
- **Be sure to do a pre-use test run of equipment and do periodic inspections.**
Otherwise, electric shock, fire or damage due to falling of equipment may occur.

Caution

- **This product is for general indoor use only. Do not use this product for a damp place, a place where corrosive gas is generated or a place where cutting oil is directly splashed.** Electric shock, fire or damage due to equipment falling may occur.
- **Collector shoes use a dry lubrication system. Do not apply any other lubricants to the collector shoes or a unit's conductor surface. poor contact may occur.**
- **If products are not used for a long period of time, the unit's conductor surfaces may become oxidized, resulting in poor contact.**
Clean the conductors before resuming operation and be sure to do periodic inspections to prevent fire or electric shock.
- **During the inspection, wear protective gear such as helmets and gloves. Observe may cause injury .**
- **When mounting the duct to the hanger, stuff a duct into a hanger not to pinch a hand. Observe may cause injury to your fingers.**
- **When replacing the collector, be sure to confirm the duct unit phase (R.S.T) before connecting the leads to the load.**
Failure to do so may cause fire due to sparks.
- **Traveling speed must be 120m/min. or less (40m/min. or less in pickup duct or point duct sections).**
Sparking may occur, causing fire, poor contact, derailing of a trolley, etc.
- **Equipment design should be performed so that when electricity is supplied to a trolley in stooped status, the supplied electricity should be set to less than 1/2 of the trolley's rated current as a general target.**
Exceeding this value may result in faulty connection or fire due to the temperature increase of the contacts between the conductor and the collector.

- Before assembling, be sure to read through this Operation / Installation Manual for correct assembly.
- The work must be performed by a qualified engineer.
- After setup, Please pass this Operation Manual / Installation Manual to the customer.

Precautions on installation

Installation of the High-Tro-Reel must be performed only by a licensed electrician. To prevent injury or accidents, always pay attention to the following points.

Warning

- **Do not modify the Tro-Reel HS in any way.**
Otherwise, electric shock, fire or damage due to falling of equipment may occur.
- **Do not use where exposure occurs.**
Otherwise, electric shock, fire or damage due to falling of equipment may occur.
- **Use at ambient temperature -10 °C ~ 40 °C. If you use outside this temperature range, please contact Panasonic Corporation.**
- **Install this product according to the construction rules in Electrical Equipment Technical Standards .**
Especially for the primary side of power supply of the duct, use an adequate over-current breaker.
- **Installation must be carried out correctly according to this Installation/Operation Manual included with the products.**
Improper installation may result in electric shock, fire or damage due to equipment falling.

Caution

- **This product is for general indoor use only. Do not use this product for a damp place, a place where corrosive gas is generated or a place where cutting oil is directly splashed.**
Electric shock, fire or damage due to equipment falling may occur.
- **Position the opening of a unit facing downward or sideways. If installed with the opening facing upward, a unit may produce sparks, causing fire, poor contact or separation of collector arms from wires.**
- **When damage and crack occurred in the insulating sheath of the duct, please change the duct.**
Otherwise sparking may occur, causing fire, poor contact, or derailing of the trolley, etc.
- **When mounting the duct to the hanger, stuff a duct into a hanger not to pinch a hand.**
Observe may cause injury to your fingers.
- **When remove the duct from the joiners, pull it out while holding the tip of the duct. so that the duct may not jump out from Joyner.**
Observe, damage to the ducts, may cause injury.
- **When filing the ends of the duct, use protective gear such as glasses.**
Otherwise, your finger may be injured.
- **Be sure to remove burrs using file after cutting, drilling.**
Observe may cause injury to your fingers.
- **Use products only within the specified rating and load capacity.**
Violation of specified ranges may cause burning or fire.
- **Firmly fix this product to the material of construction and construct it.**
Otherwise, fire or damage due to falling of equipment may occur.
- **Construct the material of construction that installs the product firmly.**
Otherwise, damage due to falling of equipment may occur.

■ Maintenance schedule of Trolley Duct

The product-life is different in use conditions and the service space, however, It is possible to use it for about t 10 years by regularly maintaining and the regular service in correct construction.

Please check by the maintenance table based on this maintenance schedule.
Refer to the maintenance table for a concrete check item.

Maintenance done by the electrical work trader.

At introduction

The 5th year

The 10th year

	At introduction	The 5th year	The 10th year
Trolley Duct	<ul style="list-style-type: none"> • Check the presence of remarkable dirt of the surface of the conductor. (Once every 3 to 6 months) → Clean it with the cotton waste etc. • Check the Tro-Reel unit doesn't become it in a zigzag line. (Once every 3 to 6 months) →Correct the position of the hanger. 		
Feed-in Box Center Feed-in Box	<ul style="list-style-type: none"> • Check whether there is loosening the screws of conductor splices ? (Once every 3 to 6 months) →Retighten. 		
Hanger	<ul style="list-style-type: none"> • Check whether there is loosening of the mounting nut. (Once every 3 to 6 months) →Retighten. 		
Trolley	<ul style="list-style-type: none"> • Check whether there is loosening of the terminal screw. (Once every 3 to 6 months) →Retighten. • Check whether wear has reached the replacement line. (Once every 1 to 3 months) →Exchange the collector, when worn out to the replacement line. • Check if Running wheels rotate smoothly. (Once every 1 to 3 months) → Exchange products. 		
			Product exchange recommendation.

Trolley Duct Maintenance (Test run and periodic inspection)


Notes

<To Maintenance manager>

- Inspections item at the time of the pre-use test run(Checking at periodic inspection).
- For using safely, please inspect the system one month after starting regular operation.
- The inspection cycle is mentioned below. However, determine your own inspection cycle based on the actual operating rate and environmental condition.
- Items in bold: Inspection items requiring particular attention.

Result	○ : Normal	Measures	○ : Exchange required
	×		● : Finished with exchange
			△ : Adjustment required
			▲ : Finished with adjustment

A title	Check day	Y D M	The check person in charge
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Product	Parts	Inspection area	Inspection details	Possible causes of problems	Remedy/countermeasure	※	Result	Measures	Inspection frequency
Trolley Ducts Drop-out ducts	Conductor	Surface	Check for deposits of foreign substances.	Oil and/or dust particles present in duct interior.	Clean using conductor cleaner. Depending on the conditions, it can be smoothed with a file. Clean inside of duct with air blower, etc.				Once every 3 to 6 months
			Check for scratches.	Oil and/or dust particles present in duct interior.					
			Check for burrs on the conductor.	Contact between conductor and collector is uneven.	Clean using conductor cleaner. Adjust how trolley is pulled.				
				Surface of trolley collector is uneven.	Clean using conductor cleaner. Grind the surface of the trolley collector.				
			Check for traces of arcing.	Burr occurred on conductor and short-circuited.	Clean using conductor cleaner. Depending on the conditions, it can be smoothed with a file. Clean inside of duct with air blower, etc.				
				Contact between conductor and collector was lost.	Check the wear condition of the collectors and replace if necessary. Check whether foreign materials have gotten inside the duct, and clean out if necessary.				
				(Disconnected conductor sections)	A conductive foreign material got inside and short-circuited.	Check whether foreign materials have gotten inside the duct, and clean using air blower, etc.			
					There is a large difference in voltages between the two conductors.	Use a file to file down conductors. Modify circuit.			
			(Trolley transfer sections)	There is a large voltage difference between the conductor and the collector at the time of the trolley transfer.	Use a file to file down conductors. Modify circuit.				
			Has wear condition reached the exchange standard?	Estimated replacement The 20 million number of times of trolley passage or wear of conductor 0.5 mm depth	Replace trolley				
	Does wear of a duct reach a standard of exchange before the next check?	 Measure the duct terminal area after removing a conductor joint.							
	Joints	Check if conductor splice screws are loose.	Duct is moving a lot.	Tighten screws more. (Proper tightening torque: 1.0 to 1.5N·m) Take anti-vibration countermeasures.	○				
		Check that the two conductor joint screws on each side of the splice are tight.	Faulty installation	Fix by fastening with 2 screws on each side.	○				
	Insulator	Surface/side surface	Check that there are no cracks.	Duct fell or was subject to impact.	Replace duct body.				
Duct (casing)	Duct inside surfaces	Check for dust particle accumulation.	Friction dust; Entrance of dust from outside	Clean with cotton rags or air blower.					
		Check for burrs on the duct opening.	Trolley is running tilted due to the influence of the cable. Trolley is running tilted due to the effect of center of gravity.	Remove burrs and clean inside of duct. Adjust how trolley is pulled.					
		Do not wear on the case?	It wears out by friction with a trolley.	Replace the duct.					
	Joints	Check for misalignment of the duct openings.	Connecting plate is not securely fit into the curled section of the duct.	Fit connecting plate securely into the curled section of the duct.	○				
		Check that joint sections are straight and not angled.	Duct was not installed perfectly straight.	Change the positions of the hangers and brackets, and improve the linearity of the duct.	○				
Drop-outs	Check that doors are securely closed.	Lock pin is not fit securely into the curled section of the duct.	Fit lock pin securely into the curled section of the duct.	○					
Feed-in boxes Center feed-in boxes	Terminal	Screws; Conductor splices	Check for looseness.	Duct is moving a lot.	Tighten screws more. (Proper tightening torque: 1.0 to 1.5N·m) Take anti-vibration countermeasures.	○			
			Check for discoloration.	Temperature increase due to loose screws or disconnection of wiring.	Tighten screws more. Replace wires.				
			Check that the two conductor splice screws on each side of the splice are tight.	Faulty installation	Fix by fastening with 2 screws on each side.	○			
			Check if screws on power supply section are loose.	—	Tighten screws more.	○			

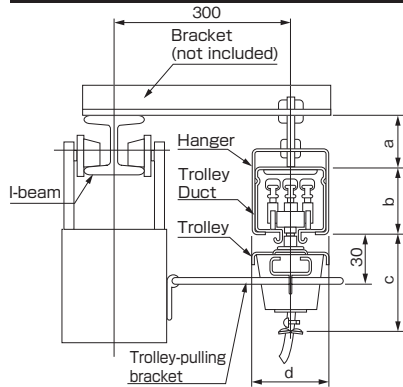
Product	Parts	Inspection area	Inspection details	Possible causes of problems	Remedy/countermeasure	※	Result	Measures	Inspection frequency	
Trolleys	Collectors	Friction surfaces; Side surfaces	Check for deposits of foreign substances.	Oil and/or dust particles present in duct interior.	Clean with cotton rags, etc.				Once every 1 to 3 months	
			Check for roughness.	There is a difference in height between the conductor connection sections. Traces of arcing generated on the conductor are grinding it down.	Fix the conductor connection section. Grind off the traces of arcing on the conductor surface.					
			Check for traces of arcing on surface.	(Inside of duct)	Contact between conductor and collector was lost.	Grind the conductor surface. Replace if necessary. Check whether foreign materials have gotten inside the duct, and clean out if necessary.				
				(Inside of duct)	A conductive foreign material got inside and short-circuited.	Check whether foreign materials have gotten inside the duct, and clean using air blower, etc.				
				(Inside of duct)	There is a large voltage difference between the two conductors at the disconnected section.	Use a file to file down conductors. Modify circuit.				
			Check whether wear has reached the wear limit line or whether it will reach the wear limit line before the next maintenance.	—	Replace collectors.					
			Check that conductor surface is even.	Contact between the conductor and collector is tilted. Duct itself is twisted due to faulty installation.	Grind the surface of the collector. If necessary, adjust the way the trolley is pulled. Adjust the linearity of the duct body.					
			Check for occurrence of burrs.	—	Remove burrs.					
	Check that collector moves up and down smoothly.	Friction dust has accumulated and movement has become poor.	Disassemble collector section and clean.							
	Running wheels; Guide wheels	—	Check if wheels rotate smoothly. Check for abnormal rattling.	Bearing damage, etc.	Replace trolley.					
	Terminal boxes	Terminal	Check screws for looseness. Check for discoloration.	Looseness of screw or disconnection.	Tighten screws more. Fix disconnection.					
		Cable clamps	Check if cable is clamped correctly.	Clamp size is not suitable for outside diameter of cable.	Correc	○				
			Check that pulling is not done with cable.	—	Adjust how trolley is pulled.	○				
			Check for cable insulation damage.	Cable is often bent. Force is applied to cable.	Adjust cable wiring conditions.					
Pulling method	—	When pulling with chain: Vertical direction : Within 30° Horizontal direction : Within 15°	—	Adjust how trolley is pulled. Adjust pulling angle.	○					
Travel characteristics	—	Check that trolleys can move within the duct smoothly.	Opening is narrowed because of hanger. Duct is not properly connected.	Adjust hanger. Adjust connection.	○					
(Common inspection items for all Trolley Duct components)	Insulation resistance	Between poles Between pole and ground	When operating voltage is 300V or less: Voltage to ground 150V or less : 0.1MΩ or more Voltage to ground higher than 150V : 0.2MΩ or more	—	<ul style="list-style-type: none"> Clean the surface of the trolley duct insulator. Clean trolley surface or inside of terminal box. 					
	Ground resistance	Duct and equipment	When operating voltage is more than 300V:0.4MΩ or more Operating voltage: 300V or less: D-type grounding : 100Ω or less More than 300V: C type grounding : 10Ω or less							
Hanger and bracket	—	Mounting parts, screws, nuts, etc.	<ul style="list-style-type: none"> Check screws and nuts for looseness. Check for deformation. Check that hanger is properly fastened to duct. 	—	Retighten screws. Correct.			Once every 3 to 6 months		

The Trolley Duct can be simply installed by combining the duct, trolley, necessary parts and accessories selected to match the installation space conditions. Please be sure to correctly install the Trolley Duct by strictly following the procedure discussed below, in order to avoid fire, operator electrical shock, damage due to equipment falling and other hazards.

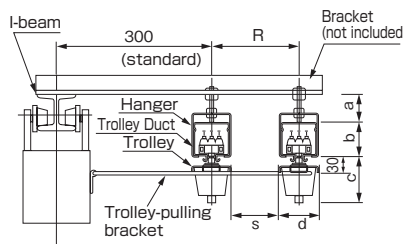
Trolley Duct installation dimensions

Dimensional relationships for I-beam or other building structures, the duct supporting bracket (not included), duct and trolley are as shown below. Use a trolley-pulling bracket for a pull-type trolley.

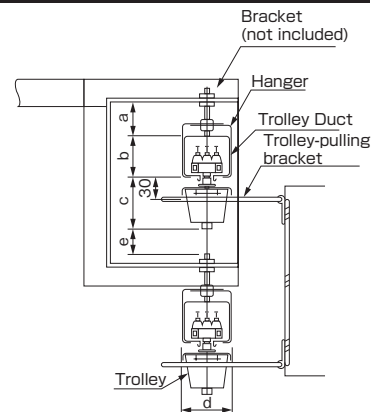
Standard installation 30A/60A/100A



Parallel installation 30A/60A/100A



2-stage installation 30A/60A/100A



Unit : mm

Duct rating	a	b	d	S	ℓ
2P 30A	65	50	60	50	110
3P AC 300V 60A					
4P 30A	60	55	90		140
5P AC 300V 60A					
2P AC 600V 100A					
3P					

Trolley rating	c	e
2P	92	Dimensions should be decided by taking lead slack allowance into consideration. Should sufficient length not be available for "e," use a side outlet cable trolley.
3P AC 300V 20A		
2P AC 300V 40A	100	
3P AC 300V 40A		
4P AC 300V 20A		
4P AC 300V 40A	120	
5P AC 300V 40A		
2P AC 600V 40A		
3P AC 600V 80A		

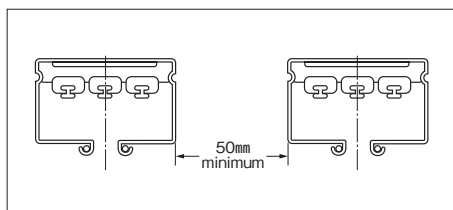
Notes

- "S" and "ℓ" on the above table indicate minimum dimensions.

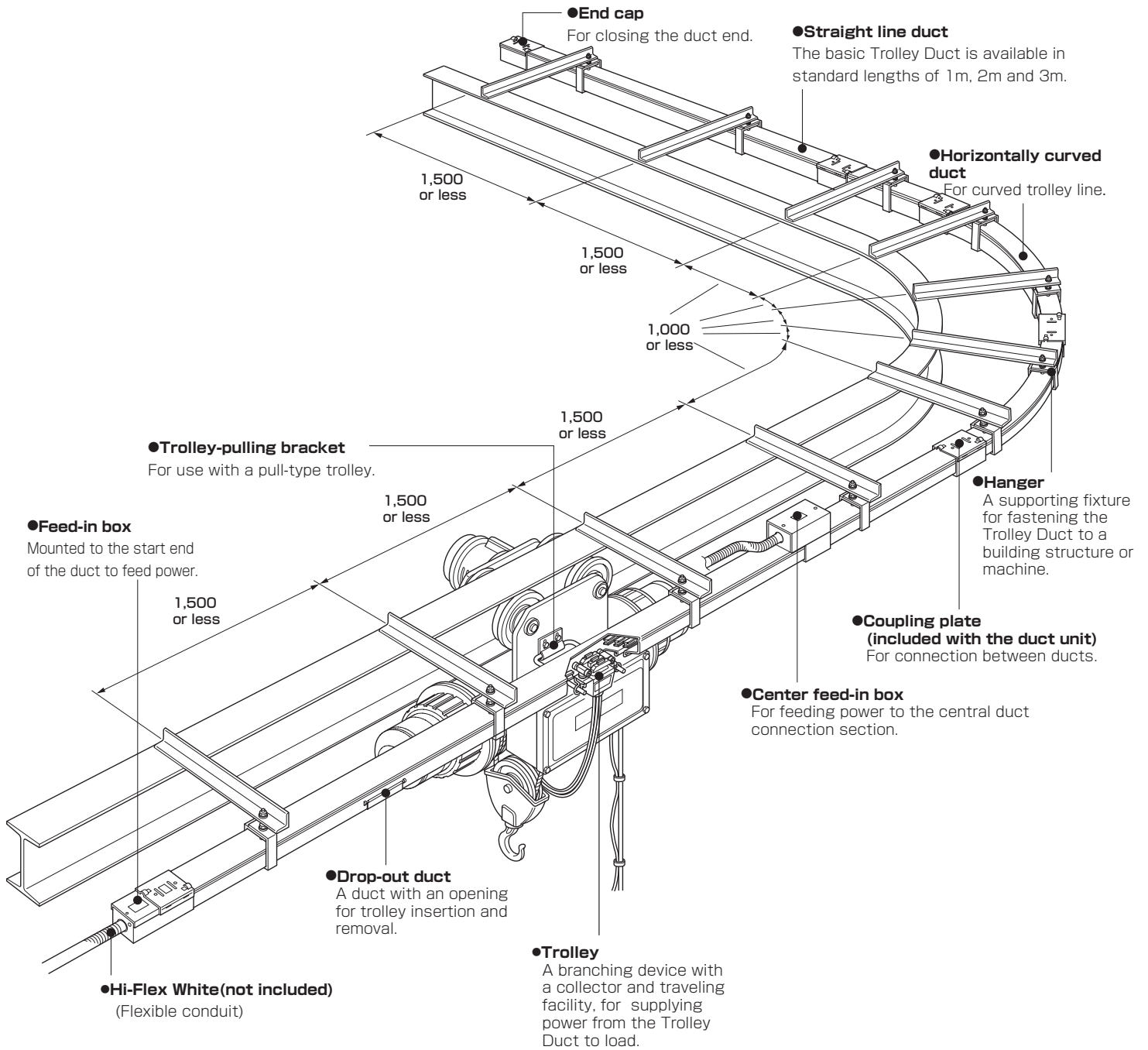
See table at up for dimensions.

Notes

- The hanger cannot be attached at the Trolley Duct connecting section or at the trolley insertion opening of the drop-out duct.
- Position the feed-in box and center feed-in box so that the cover can be opened and electrical wiring performed.
- When two or more Trolley Ducts are installed adjacent to each other, a minimum space of 50A must be between each.



- Do not install the Trolley Duct so it may warp or twist.
- Do not subject the duct unit to shock or heavy loads.



Notes

- Use hanger more than two piece about one of the duct by all means. but in the case of the duct equal to or less than 1m, use hanger more than two piece by all means.
(The dimensions of the figure are reference.)
- Make sure to use at least two hanger for curved duct.

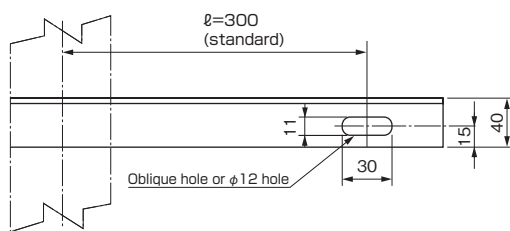
Trolley Duct installation procedures

1 Making a bracket available

Brackets for mounting the trolley supporting hanger are not provided by Panasonic Electric Works Co., Ltd. Commercially available angles should be used.

Duct rating	Bracket
2P AC 300V 30A	L-40×40×5
3P AC 300V 60A	
4P AC 300V 30A	
5P AC 300V 60A	
2P AC 600V 100A	

● Standard bracket dimensions 30A/60A/100A

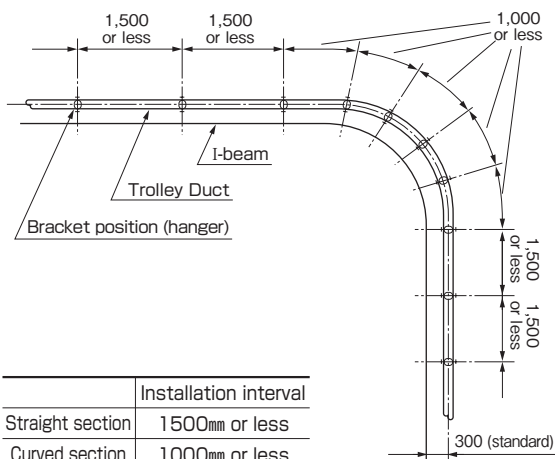


⚠ Caution

- If brackets other than those shown above are to be used, the brackets must be of a material with strength equal to or surpassing the specified brackets, otherwise the Trolley Duct may fall. Determine "l" dimensions by taking the relationship with the device in use into consideration.

2 Installing brackets

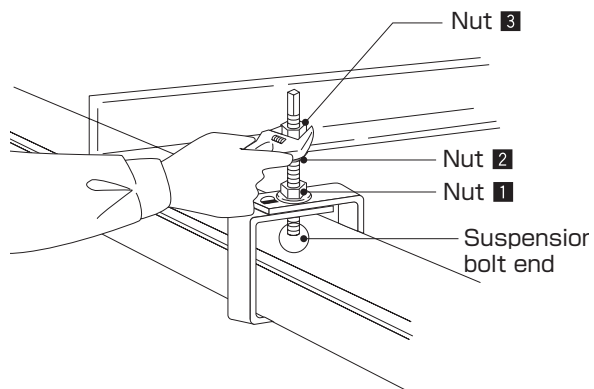
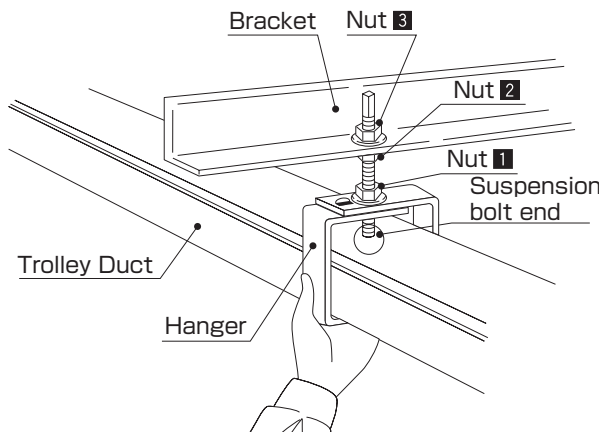
1. Determine the bracket installation positions making sure that the hanger positions will not coincide with the Trolley Duct connections or drop-out duct openings for trolley insertion.
2. Install the brackets on I-beams or other building structures.



⚠ Caution

- Standard installation intervals for brackets are shown above.
- Make sure to use at least one hanger for each duct, otherwise the duct may fall.
- Make sure to use at least two hanger for curved duct.

3 Installing the hangers



1. Mount the hanger onto the bracket and temporarily secure the Trolley Duct as shown. Turn the bolt until its end slightly contacts the duct upper surface and tighten the nut **1** to secure the duct.

Notes

- Before fastening the nut **1**, check to see there is no gap between the hanger side face and duct side face. Otherwise, the duct may be fallen down.
- When the nut **1** to secure the duct, please warn that the bolt turns together.
- When the suspension bolts closed too much, there is a threat that the opening of the trolley duct becomes small.

2. Adjust duct height with the nut **3** and connect the sections of the duct. Securely attach the hanger to the bracket by tightening the nut **2**. Make sure to tighten the nut **2** securely; otherwise the duct may fall.

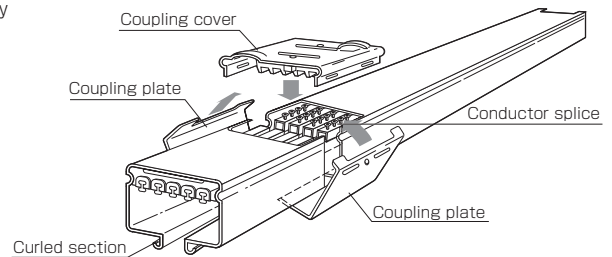
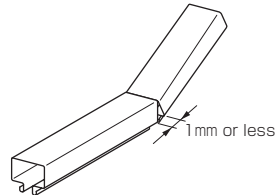
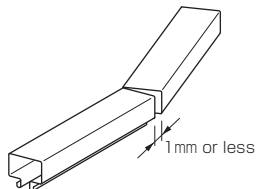
Notes

- For Trolley Duct connection, see section "4 Connecting the Trolley Duct sections."
- Check to see that the centers of the hangers and ducts are aligned correctly with each other; otherwise poor contact may occur or the trolley may separate from conductors.
- Fix the hanger precisely on the bracket.

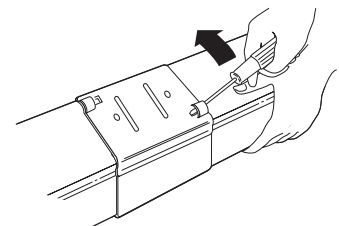
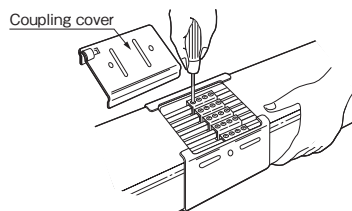
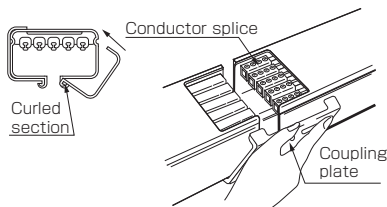
4 Connecting the Trolley Duct sections

Standard of construction accuracy

1. Horizontal construction accuracy 2. Vertical direction construction accuracy



(Drawing shows a 5P Trolley Duct.)

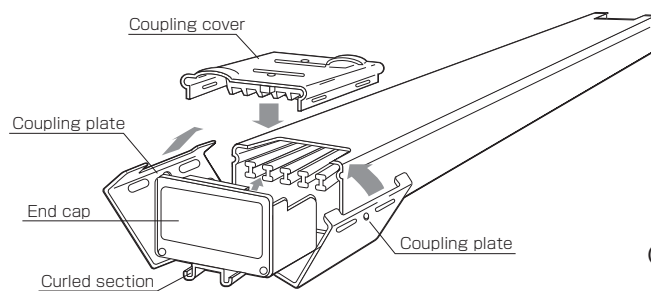


1. Insert the conductor splice to the conductor and connect the duct sections, and install the right and left coupling plates over the curled section as shown. Make sure to fit the left and right plates over the curled section correctly; otherwise the duct may fall.

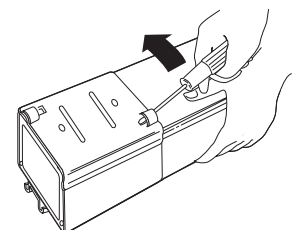
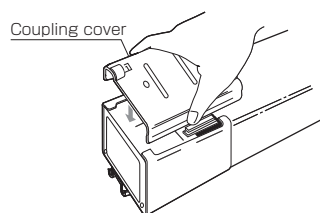
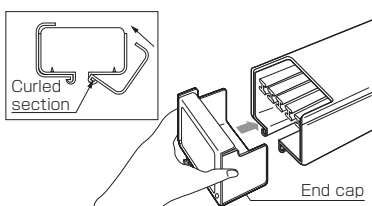
2. Move the conductor splice to the center of the connection section and tighten the screws securely. Then install the coupling cover. Screws must be tightened securely in order to avoid any danger from fire. Do not mount forcibly include a center shift, otherwise the conductor is twisted, and burr occurred on conductor or doing so may result in fire.

- <Removing the coupling cover>
The coupling cover can be removed easily by inserting a screwdriver into the hook of the coupling cover and lifting it up.

5 Installing the end cap



(Drawing shows a 5P Trolley Duct.)



1. Fit the end cap onto the end of the duct and fit the left and right coupling plates over the curled section. Make sure to fit the left and right plates over the curled section correctly; otherwise the duct may fall.

2. Mount the coupling cover.

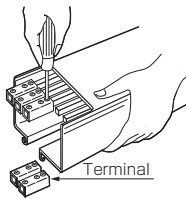
- <Removing the coupling cover>
The coupling cover can be removed easily by inserting a screwdriver into the hook of the coupling cover and lifting it up.

6 Installing the feed-in box

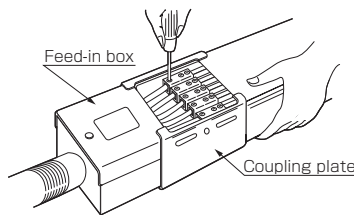
Trolley Duct type			Size of fitted flexible conduit	Cross section area of fitted wire
Rated voltage	Rated current	No. of poles		
AC 300V	30A	2 · 3	30	22mm ²
	60A	4 · 5	38	22mm ²
AC 600V	100A	2 · 3	38	38mm ²

Caution

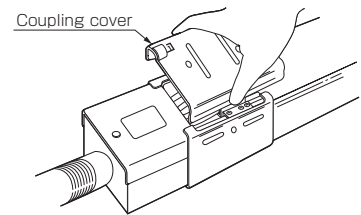
- Please decide the use electric wire in consideration of the load capacity etc. There is fear of a fire.
- Agreement flexible conduit changes by the electric wire used, and select it according to the electric wire, please.



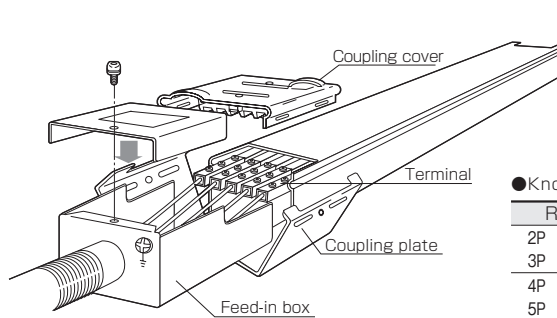
1. Insert the terminal to the conductor and tighten the screws securely. Fit the feed-in box onto the duct and install the left and right coupling plates over the curled section. Install the coupling plates securely over the curled section; otherwise the Trolley Duct may fall.



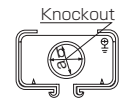
2. Connect wires to the feed-in box terminal board. Hi-Flex (class 2 metal flexible conduit) is most appropriate for piping. Make sure to connect the wires to the terminal board correctly by securely tightening the terminal screws; otherwise fire may result.



3. Install the coupling cover. To remove the coupling cover, insert a screwdriver into the hook of the coupling cover and lift it up.



(Drawing shows a 5P Trolley Duct.)

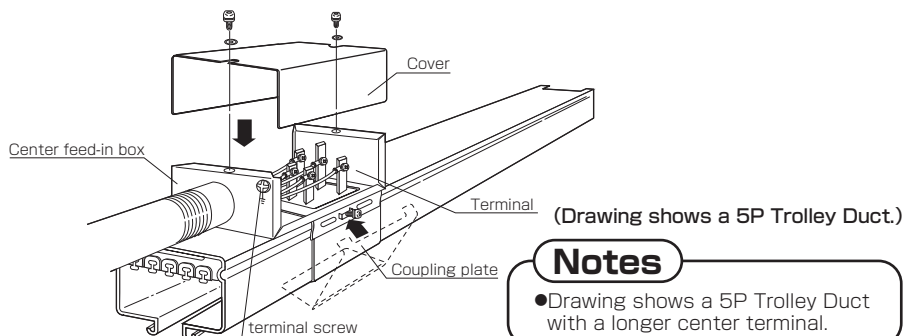


Note: Remove the knockout or make a hole in the end of the feed-in box before installing it to the Trolley Duct.

● Knockout dimensions

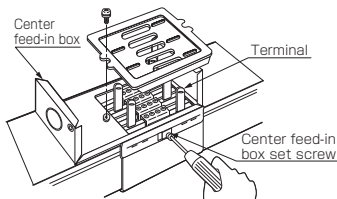
Rating	a	b
2P 300V 30A	φ26.1	φ32.5
3P 300V 60A	φ32.5	φ38.8
4P 300V 30A	φ32.5	φ38.8
5P 300V 60A	φ32.5	φ38.8
2P 600V 100A	φ32.5	φ38.8
3P 600V 100A	φ32.5	φ38.8

7 Installing the center feed-in box

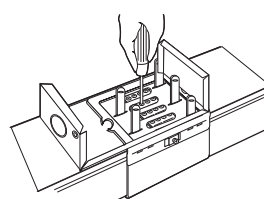


Notes

- Drawing shows a 5P Trolley Duct with a longer center terminal.



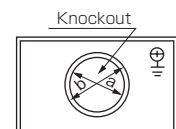
1. Insert the terminals into the conductor as shown. Install the coupling plates, fit the cover and tighten the feed-in box set screws. Correctly install the coupling plates over the curled section; otherwise the Trolley Duct may fall.



2. Secure the terminals to the conductor. Hi-Flex (class 2 metal flexible conduit) is most appropriate for piping.

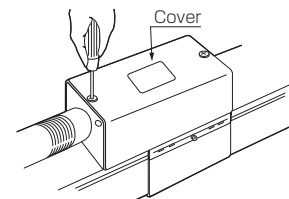
Notes

- Tighten the terminal screws securely; otherwise fire may result.



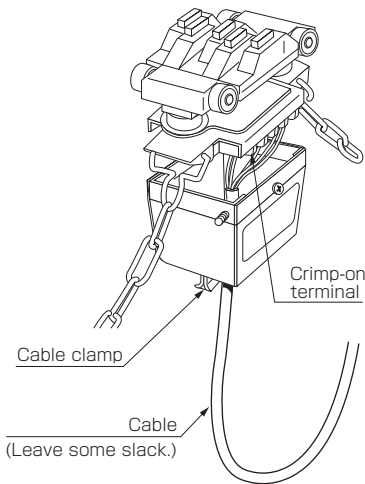
● Knockout dimensions

Rating	a	b
2P AC 300V 30A	φ26.1	φ32.5
3P AC 300V 60A	φ32.5	φ38.8
4P AC 300V 30A	φ32.5	φ38.8
5P AC 300V 60A	φ32.5	φ38.8
2P AC 600V 100A	φ32.5	φ38.8
3P AC 600V 100A	φ32.5	φ38.8



3. After wire connections, place the cover.

8 Wiring



■ Connecting wires to the trolley

Use cabtire cables for the cables, and fasten them securely using crimp-on terminals. A 20A trolley comes with 3.5mm² crimp-on terminals; a 40A trolley comes with 5.5mm² crimp-on terminals. (However, for an 80A trolley, the cables should be connected directly to the terminals.)

When installing the cables, be sure to use the cable clamp to hold them securely.

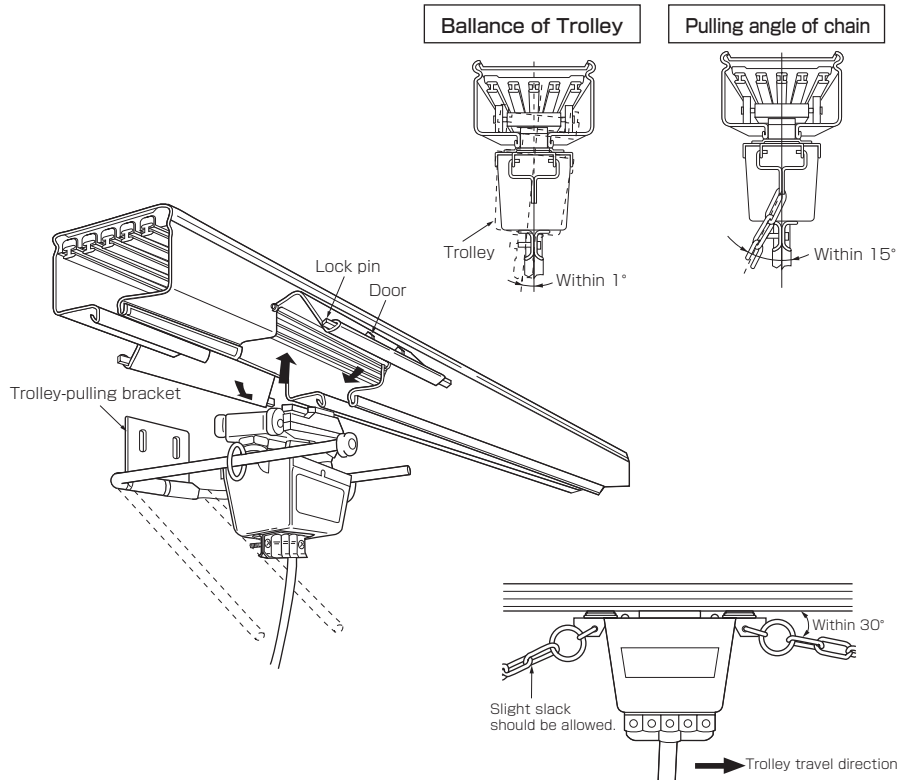
Notes

- Tighten terminal screws securely. (Tightening torque: 1.0 to 1.5N·m)
- Do not hang anything other than the power cables from the trolley.
- Leave sufficient slack in the cables so that excessive strain is not applied to the trolley during travel.

● Use cabtire cables for cables.

Trolley type			Compatible cables
Rated voltage	Rated current	No. of poles	No. of cores × nominal cross-sectional area × No. of cables
AC 300V	20A	2	2 cores × 0.75 to 5.5mm ² × 1
		3	3 cores × 0.75 to 5.5mm ² × 1
		4	4 cores × 0.75 to 5.5mm ² × 1
	40A	4	2 cores × 0.75 to 5.5mm ² × 2
		5	3 cores × 0.75 to 5.5mm ² × 2
		5	4 cores × 0.75 to 3.5mm ² × 1
AC 600V	40A	2	2 cores × 0.75 to 8.0mm ² × 1
		3	3 cores × 0.75 to 8.0mm ² × 1
		4	4 cores × 0.75 to 5.5mm ² × 1
	80A	2	2 cores × 0.75 to 8.0mm ² × 2
		3	3 cores × 0.75 to 8.0mm ² × 2
		3	4 cores × 0.75 to 5.5mm ² × 1
		2 + 3	Single core × 8 to 30mm ² × 3

9 Installing and pulling the trolley



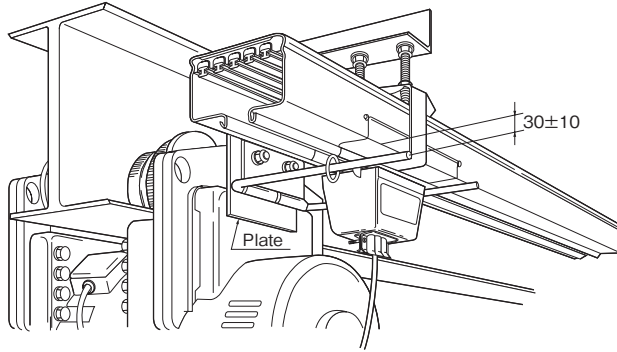
1. Insert the trolley into the opening of the drop-out duct. The opening of the drop-out duct can be opened by grasping the lock pin and unlocking it. After insert the trolley, securely close the opening. Incorrect locking may result in the trolley dropping down.
2. After insert the trolley, hand-move it about 30cm to check to see that it moves smoothly and the collector and the duct conductor correctly contact each other.

Notes

- To pull the trolley in optimum conditions, using a trolley-pulling bracket is recommended.

3. When using a chain for pulling the trolley, make sure that the trolley pulling angle is within the limit shown; otherwise poor contact may result or the trolley may separate from conductors.

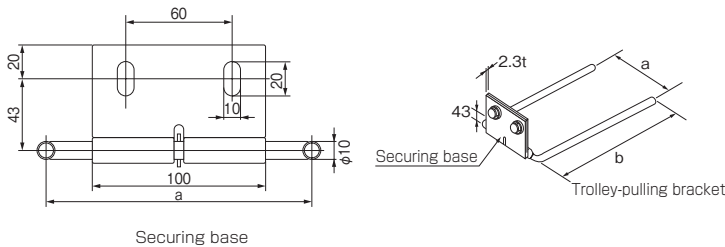
10 Using the trolley-pulling bracket



1. Tighten the trolley-pulling bracket to the plate attached to the crane or hoist using bolts. The plate should be purchased separately.

2. A 30mm space should be allowed between the duct bottom surface and the trolley-pulling bracket rod. Installation position can be adjusted by changing the securing base direction and using the oblique hole. Use M8 bolts.

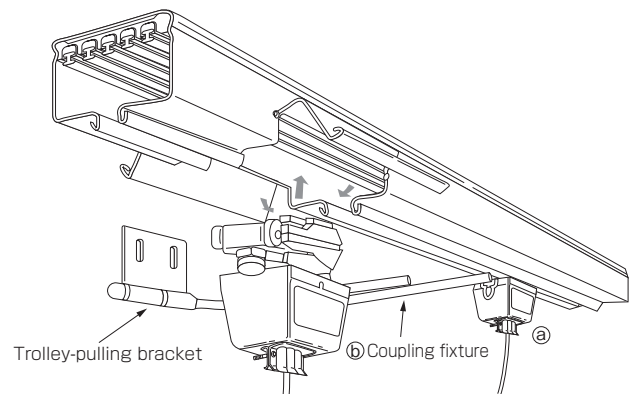
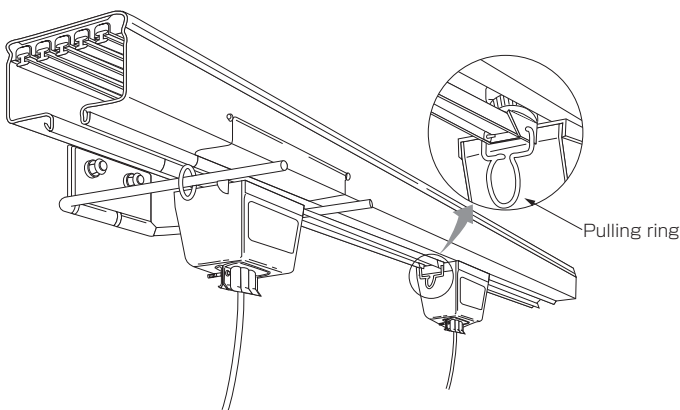
3. Install the trolley-pulling bracket so that trolley-pulling bracket rod becomes it in parallel with an axle of the crane.



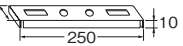
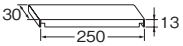
Unit:mm

Product name	Trolley-pulling bracket (A-1)	Trolley-pulling bracket (A-2)	Trolley-pulling bracket (B-1)	
Dimensions	a	145	145	200
	b	250	400	250
Compatible trolleys	2P20A 5P20A 4P40A	3P20A 2P40A 5P40A	4P20A 3P40A	2P80A 3P80A

11 Connecting trolleys



● When connecting two trolleys, install the trolley-pulling bracket onto one of the two trolleys.

Product name	Dimensions and shape	Trolley rating	
Coupling fixture A	25  10	2P20A·40A 4P20A·40A	3P20A·40A 5P20A·40A
Coupling fixture B	30  13	2P80A	3P80A

Unit:mm

1. Connecting two or more trolleys will facilitate smoother power collection in the following conditions. Use coupling fixtures when connecting trolleys.

- ① When a single trolley cannot provide enough capacity.
- ② When trolley's separation from conductors is a major problem. (When one trolley becomes separated from conductors, the other can compensate for it, and vice versa.)
- ③ For point use. (There will be no dead sections at switching points of ducts.)

2. When mounting the coupling fixtures:

- 1) Insert the trolley ③ into the duct.
- 2) Hook the coupling fixtures onto the rings of trolley ③ and trolley ④ and insert the trolley ④ into the duct.
3. When using the trolley-pulling bracket (A-2), do not use coupling fixtures.

12 Installing the pickup duct

- A pickup duct is used at the section where the trolley is inserted from space to within the trolley duct (such as on lines equipped with fire protection shutters, etc.) to enable the trolley to be smoothly inserted into the duct. In addition, for the trolley also, for this type of application use the UD-type trolley.

Notes

- For trolleys, use two UD-trolleys.
- Use two sideway traverse hanger on the duct of the pickup duct section.
- Installation and usage ranges should be kept within the range shown in Table 1. and C lever should be kept within the range shown Table 2.
- The installation positions for the sideway traverse hangers should be within 300mm from the pickup duct section.
- The distance from the pickup duct to the facing location should be a distance of at least 300mm.
- Installation interval of the UD-trolley should be a distance of at least 900mm, and should be a distance of at least 1500mm from the pickup duct section.

Table 1

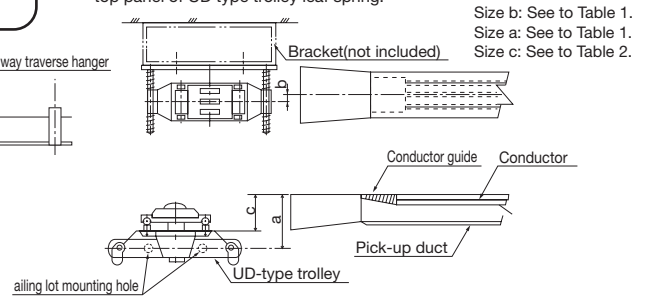
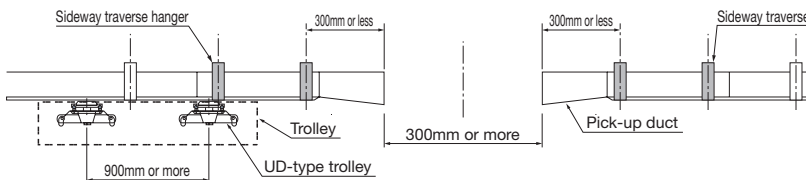
Mounting position	a (level)	30A	For 2P/3P	100±3mm
		60A	For 2P/3P	
		30A	For 4P/5P	105±3mm
		60A	For 4P/5P	
	b (de-centering)			0±2mm

* Size a indicates the distance from the top surface of pickup duct to UD type trolley mounting hole.

Table 2

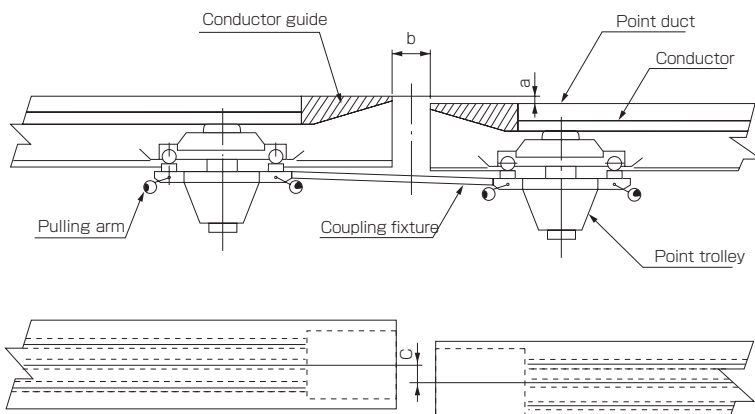
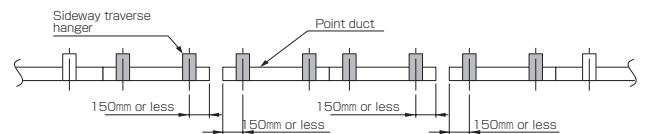
c (level)	30A	For 2P/3P	78±3mm
	60A	For 2P/3P	
	30A	For 4P/5P	83±3mm
	60A	For 4P/5P	
100A		For 2P/3P	

* Size c indicates the distance from the top surface of pickup duct to top panel of UD type trolley leaf spring.



13 Installing the point duct

1. For trolleys, use two point trolleys and pull them separately using a pulling arm.
2. Use two sideway traverse hangers on the duct of the point duct section.
3. Installation standards should be kept within the ranges shown in Table 1.
4. The installation positions for the sideway traverse hangers should be within 150mm from the point duct section. However, for curved ducts, etc. where it is not possible to install the sideway traverse hangers within 150mm from the point duct section, the sideway traverse hangers should be installed as close as possible to the point duct section.



a (Level)	3mm以下
b (Gap)	10~30mm
c (Center shift)	3mm以下 b : (10~15mm)
	5mm以下 b : (16~30mm)

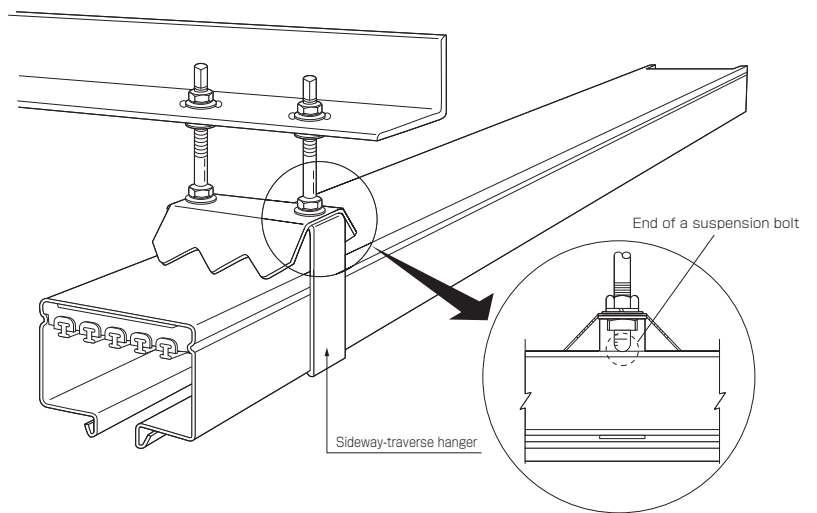
Sideway-traverse hangers

For applications where the I-beam or other structure onto which the Trolley Duct is installed is not stationary, but moves or rotates (e.g. crane girders, turntables, etc.), a sideway-traverse hanger capable of absorbing Trolley Duct vibration should be used, in order to avoid the duct dropping.

Installing the sideway-traverse hanger

Caution

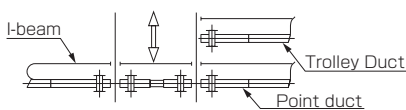
- Press the ends of the sideway-traverse hanger suspension bolts against the duct upper surface.



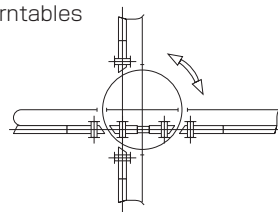
Locations where the sideway-traverse hanger should be used


① When using a point-use duct

● Traversers

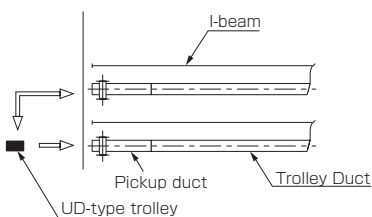



● Turntables



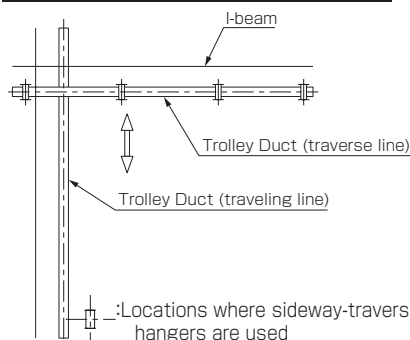
: Locations where sideway-traverse hangers are used


② When using a pickup duct



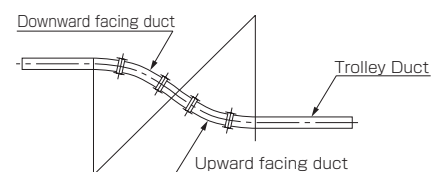
: Locations where sideway-traverse hangers are used


③ Trolley Duct for traverse movement



: Locations where sideway-traverse hangers are used

④ Vertically curved duct

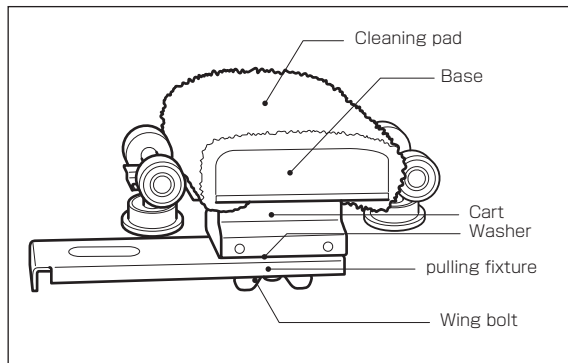


: Locations where sideway-traverse hangers are used

Using the conductor cleaner

The conductor cleaner is a cleaning cart that removes some foreign substances, such as, dust or burr adhering on the conductor sliding surface of the trolley duct so that the duct is always clean if you run it periodically.

■Name of each part



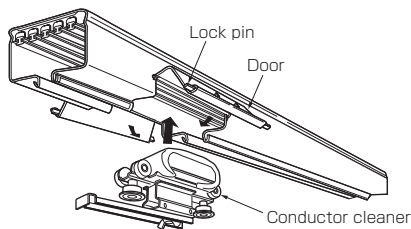
■Types of conductor cleaner

There are two types depending on the trolley duct housing types, as follows:

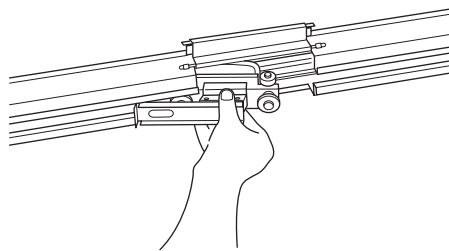
Cat. No.	Product name	Suitable duct type and its rating
DH6166	Conductor cleaner	 2P30A 3P30A 2P60A 3P60A
DH6202	Cleaning pad 10pcs/set	
DH6167	Conductor cleaner	 4P30A 5P30A 4P60A 5P60A 2P100A 3P100A
DH6203	Cleaning pad 10pcs/set	

■How to use

1. Open the opening of the drop-out duct and insert the conductor cleaner into the duct.



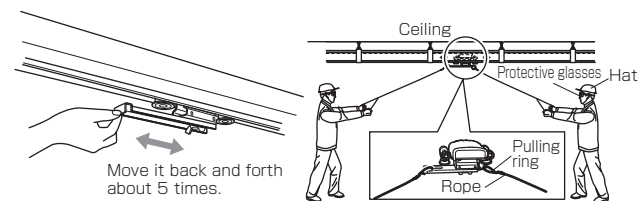
3. After cleaning, remove the conductor cleaner from the duct and use an air blower, etc. to clean inside the duct.



2. Run the conductor cleaner back and forth about 5 times to perform cleaning of the conductor.

- ① In areas where you can reach, hold the pulling fixture and perform cleaning.
- ② In areas where you cannot reach, attach a pulling ring to the pulling fixture or cart, and use a rope, etc. to perform cleaning.

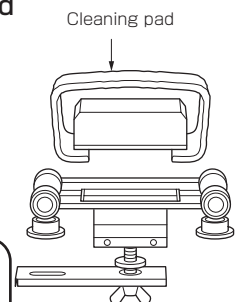
① When hands can reach: ② When hands cannot reach:



■Replacing the cleaning pad

Wrap the base with the cleaning pad and put it on top of the car and fasten the wing bolt.

This cleaning pad is available at cost.



Notes

- Replace the cleaning pad with a new one when it is deformed into concave shape.

⚠ Caution

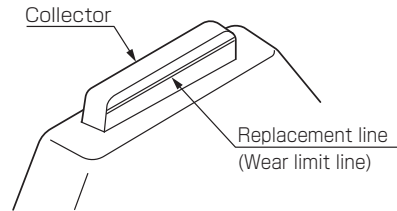
- Be sure to switch off the power to the duct when using the conductor cleaner. Failure to do so may cause electric shock or short-circuiting.
- Always remove the conductor cleaner from the duct after cleaning.
- When cleaning, be sure to wear protective equipment.
- Cleaning should be performed approximately once every 3 months. However, this should be increased or decreased depending on your usage conditions.
- The cleaning pad should be replaced every 50m as a general criteria. Failure to do so may result in dirtying of the conductor due to abrasion by the cleaning pad.
- After removing the conductor cleaner from the duct, be sure to close the door of the drop-out duct securely.

Replacement of collectors

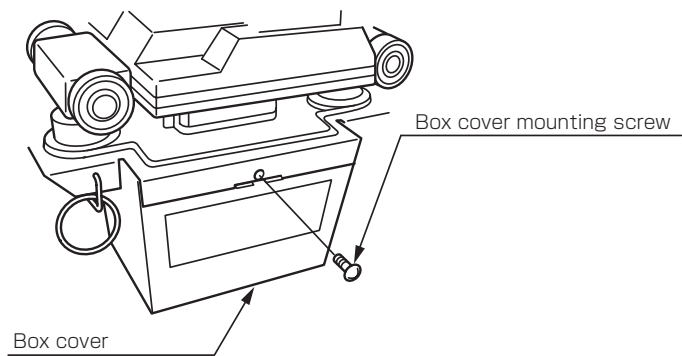
1 Removing collectors

Collector replacement timing

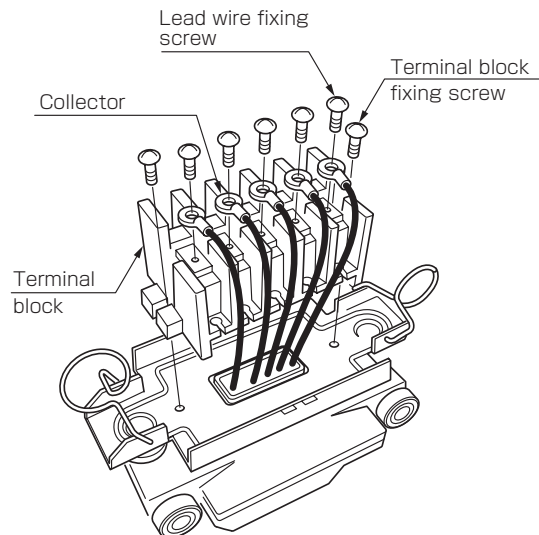
Collectors have an engraved replacement line. Replace collectors when they have been worn down to the replacement line. In addition, if there is a possibility that the collector will be worn down to the replacement line before the next maintenance cycle, the collector should be replaced early.



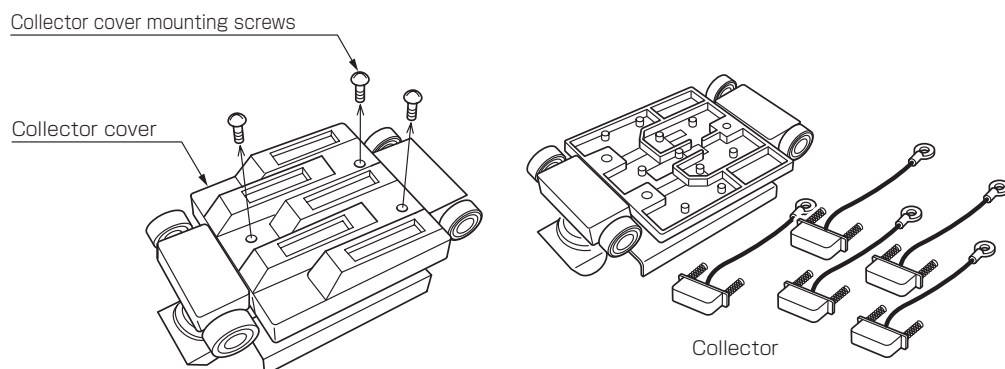
1. Unscrew the box cover mounting screw and remove the box cover.



2. Unscrew the lead wire fixing screws and terminal block fixing screws inside the box and remove the terminal block.



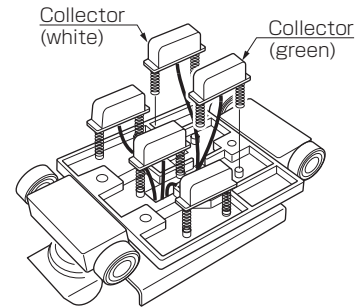
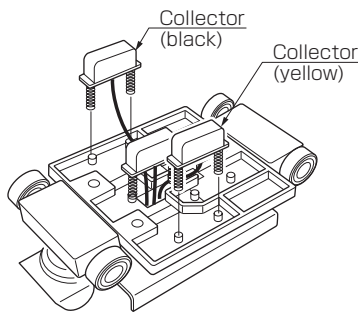
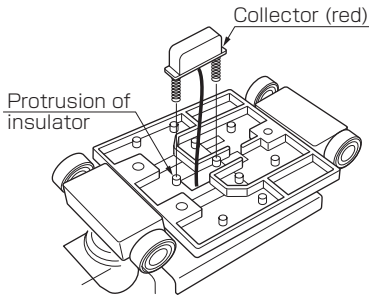
3. Unscrew the collector cover mounting screws, remove the collector cover, and remove the collectors.



2 Installing collectors

1. Install the collectors in the insulator in the positions corresponding to the painted colors. (Example: 5 collectors)

1. Install the center collector (red) of the 3-collector row first in the insulator side. 2. Install the collectors (yellow, black) on both sides of the 3-collector row. 3. Install the collectors (white, green) in the 2-collector row side.

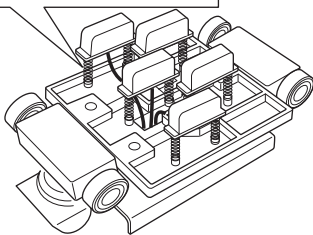


4. Check that the springs of the collectors are fully fit over the protrusions of the insulator. 5. Attach the collector cover from the 2-collector row side.

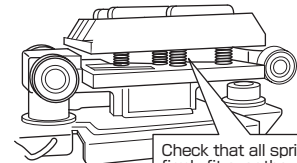
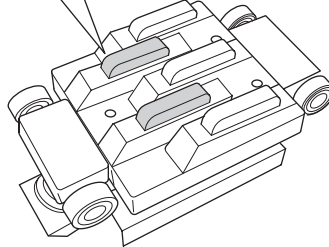
6. Look through the gap between the insulator and the collector cover and check again that all springs are fully fit over the projections.

※If a spring has come out of the projection, use tweezers to put the spring back in its proper position.

Check that each spring is fully fit over the protrusions of the insulator.



Attach collector cover from 2-collector row side.



Check that all springs are firmly fit over the corresponding projections.

⚠ Caution

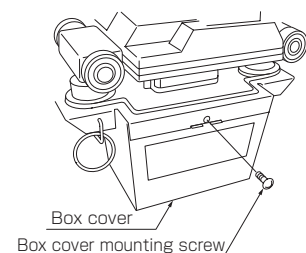
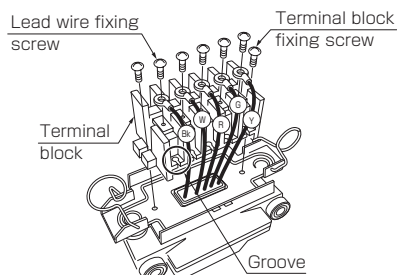
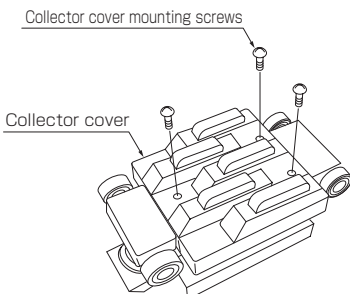
- When passing the collector lead wires through the insulator, be sure that the wires do not cross over each other. In addition, pass the lead wires through in the order of the terminal block colors.

Failure to do so may place strain on the collectors, resulting in disconnection, arcing, uneven wear, etc.

2. Attach the collector cover.
(Proper tightening torque: 1.0 to 1.5N·m)

3. Match the colors of the silicon tubes from the collectors to the corresponding colors of the terminal block and fasten the lead wires in place by tightening the lead wire fixing screws. After that, push the lead wires into the grooves, and fasten the terminal block with the terminal block fixing screws. (Proper tightening torque: 1.0 to 1.5N·m)

4. Replace the box cover and tighten the box cover mounting screw.
(Proper tightening torque: 1.0 to 1.5N·m)



Notes

- Be careful not to pinch the silicon tubes.