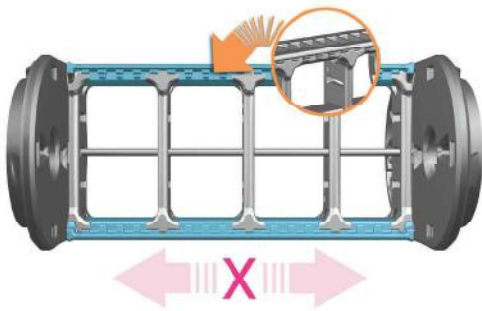


What's the cable chain?

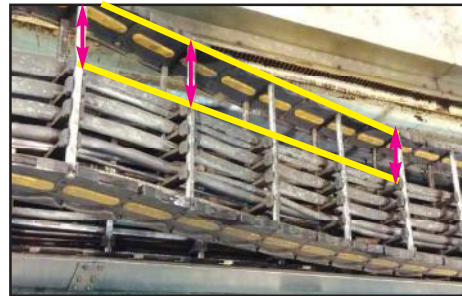
- Cable chain is to protect cables of moving machinery or automatic machinery.
Without cable chain, it causes damage to cables.
Hence cables can be protected by using suitable cable chain and it should be considered its stroke, cable types of machinery.

Good cable chain?

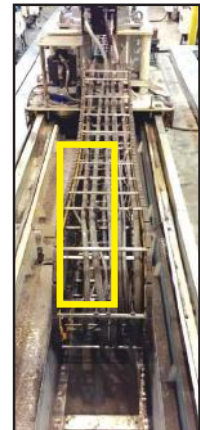
- Protect cable to be longer lifetime of cable
 - Divider never moves



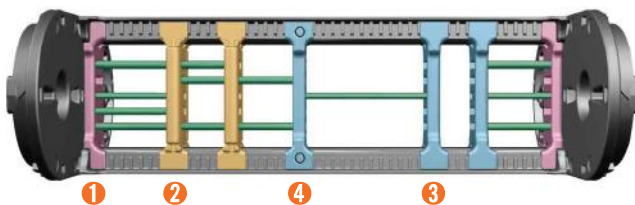
< Bad case >



If dividers move during operation, cables can be
1. focused toward one side or,
2. lost tension or,
3. twisted.



- Can make section composition



Separator (SP)



Separator Pin



① DV-S



② DV-R



③ DV-M



④ DV-T

1. **Making section** is the one important criteria whether supplier has high technology or not. Without section composition, it's possible to guarantee long lifetime of cable because of friction and losing tension of cables.
2. **We have five units for making section.**
It can protect cables more efficiently and safely by making suitable sections with diverse combination of Dividers and Separators.
3. The length of separator can be cut from 20 mm to 600 mm and be cut and used 5 mm apart.

- Characteristic of plastic frame

Frame(Bar) must be made by engineering plastic.

Friction factor of plastic(synthetic resins) against plastic(synthetic resins) is lower than plastic(synthetic resins) against aluminum(or steel) and it factor makes sure of protection for cables for long time.

In addition, as plastic is lighter than aluminum and steel, it also guarantees long self-supporting length of cable chain.



< Bad case >

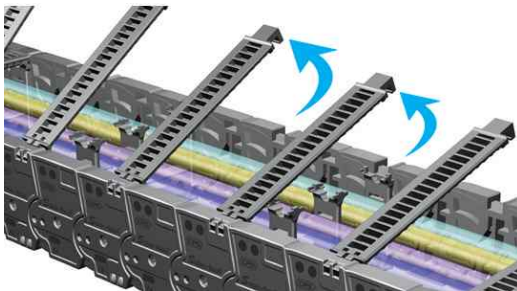


- Strong side band and frame structure

Self-supporting length is decided by side band's structure. If there's many supporting points between each side band when assembled, its self-supporting lengths sustain long.

During the operation at high speed or tough circumstance, there is a possibility of separation of frame.

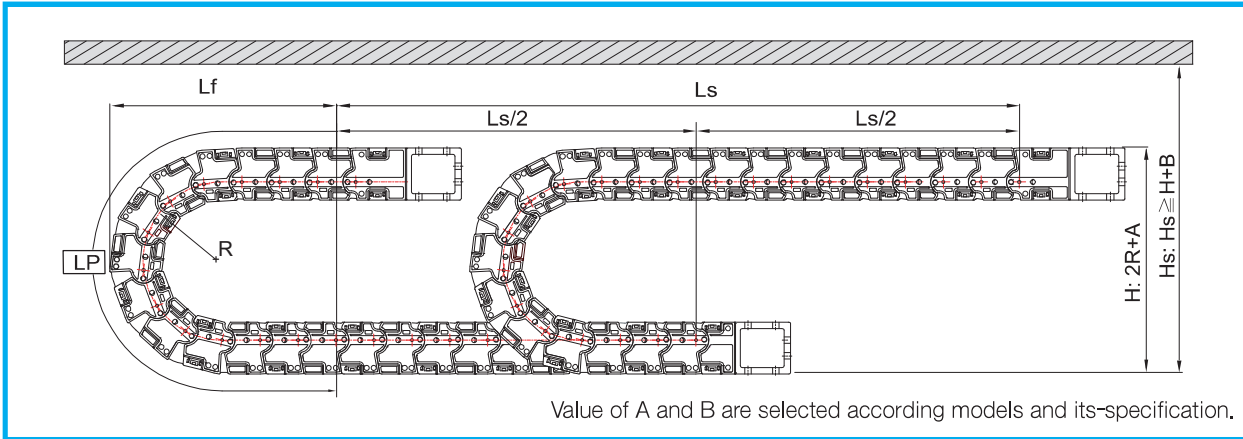
Good frame structure means frames are strongly assembled with side bands, so they are not separated during operation.



How to calculate?

L : Cable chain length R : Bending radius value
 LS : Machine Stroke HS : Safe Space
 LP : loop length H : Height(minimum)

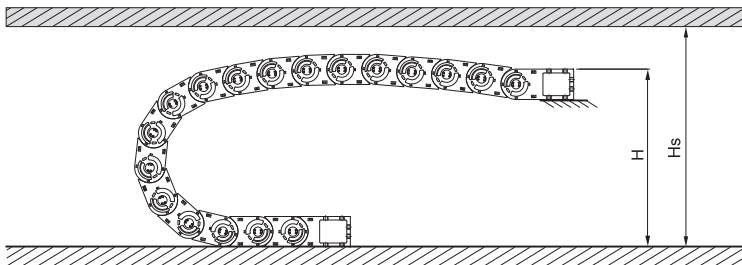
• Calculation of Cable chain's length



• Calculation of Cable chain's length

- BR Value(Min) > 8 ~ 10 x the biggest cables' outer diameter
- BR Value(Min) > 15 ~ 20 x the biggest hydraulic hose's outer diameter

• Calculation of Height(H value)



$$2R + B = H$$

- R : Bending radius value
- B : Outer height of cable chain

$$HS \geq H + \text{"S Value"}$$

• "S Value"

- CPS mini chain

CPS015	CPS020	CPS030	CPS033
10mm	15mm	30mm	30mm

- Shift chain

ST044N/E	ST055N/E	ST072N/E	ST095N/E	ST120N/E	ST150N/E
30mm	35mm	40mm	50mm	60mm	80mm

- asb chain

asb028CR/CR,L	asb035CR/CR,L	asb045CR/CR,L
30mm	30mm	40mm

- nsb chain

nsb020CR	nsb022CR	nsb028CR/N/E	nsb035CR/N/E	nsb045CR/N/E	nsb060CR/N/E	nsb075CR/N/E
30mm	30mm	30mm	30mm	40mm	40mm	60mm

• How to select alternative model for other brand

When customers should select alternative models, they must check the following value exactly.

- Model number of existing model,
- Outer width of cable chain,
- Inner width of cable chain,
- Outer height of cable chain,
- Bending radius value,
- H value or HS value,
- Total machine stroke or length of cable chain,
- Speed of machine

• How to select alternative model for CPS's discontinued models produced until 2010

- Alternative model table for CPS Normal type

CPS Chain Normal type Discontinued production in 2010	Shift Chain Normal type	nsb Chain Normal type
CPS036N	ST044N	nsb028N
CPS050N	ST055N	nsb035N
CPS068N	ST072N	nsb045N
CPS077N	ST072N	nsb045N
CPS095N	ST095N	nsb060N
CPS120N	ST120N	nsb075N

- Alternative model table for CPS Enclosed type

CPS Chain Enclosed type Discontinued production in 2010	Shift Chain Enclosed type	nsb Chain Enclosed type
CPS036E	ST044E	nsb028E
CPS050E	ST055E	nsb035E

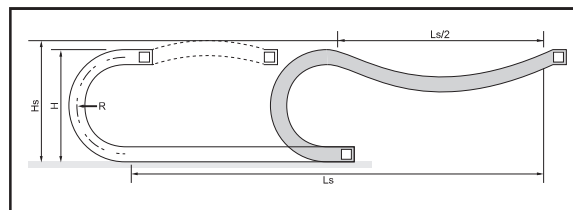
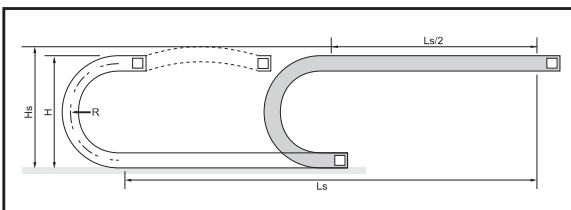
- Alternative model table for CPS Sliding type

CPS Chain Sliding type Discontinued production in 2010	Shift Chain Normal type	nsb Chain Normal type
CPS036S	ST044S	-
CPS068S	ST072S (Discontinued prodction in 2017)	nsb050S
CPS077S	ST072S (Discontinued prodction in 2017)	nsb050S
CPS095S	ST095S (Discontinued prodction in 2017)	nsb065S
CPS120S	ST120S (Discontinued prodction in 2017)	nsb080S

- Alternative model table for sb chain CR type

sb Clean Room type Discontinued production in 2010	asb chain Clean Room type	nsb Chain Clean Room type
sb018CR	-	nsb020CR
sb020CR	-	nsb022CR
sb025CR	asb028CR	nsb028CR
sb035CR	asb035CR	nsb035CR
sb045CR	asb045CR	nsb045CR
sb060CR	-	nsb060CR
sb075CR	-	nsb075CR

Self-supporting / Short Stroke



• Self-supporting application

- Self-supporting means that cable chain moves on not sagging and touch-down condition. We call it “self-supporting” or “unsupported length”. It’s general type of cable chain and CPS’ cable chain is very suitable for high speed line and guarantees long lifetime. It could be varied due to inside weight or type of cable chain. There are 3 sections regarding self-supporting.

- Self-supporting section without sagging - SPg

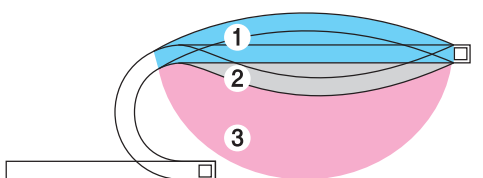
When customer need stable operation of cable chain, they need to keep like No.1 in the picture. It’s the most stable operation.

- Allowable sagging section within self-supporting section - SPa

If sagging volume is within 50mm like No.2 in the picture, it’s called “SPa”. It’s allowable to operate cable chain, even though it’s sagging, however, it could be problem when its speed is fast or its number of moving time is many.

- Exceed limit of sagging

If sagging degree is formed like No.3 in the picture, it’s dangerous to operate anymore. It usually happens cased after long period usage, thus, customers must replace cable chain with new one immediately.

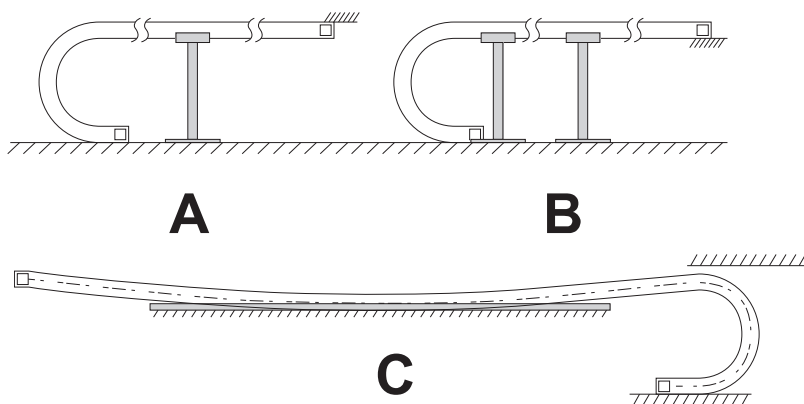


- 1 SPg. Self-supporting is good without sagging.
- 2 SPa. Allowable sagging section within 50mm. It’s fine.
- 3 You can’t use this condition for cable chain Normal type. You need to replace it with sliding(skid) type of cable chain.

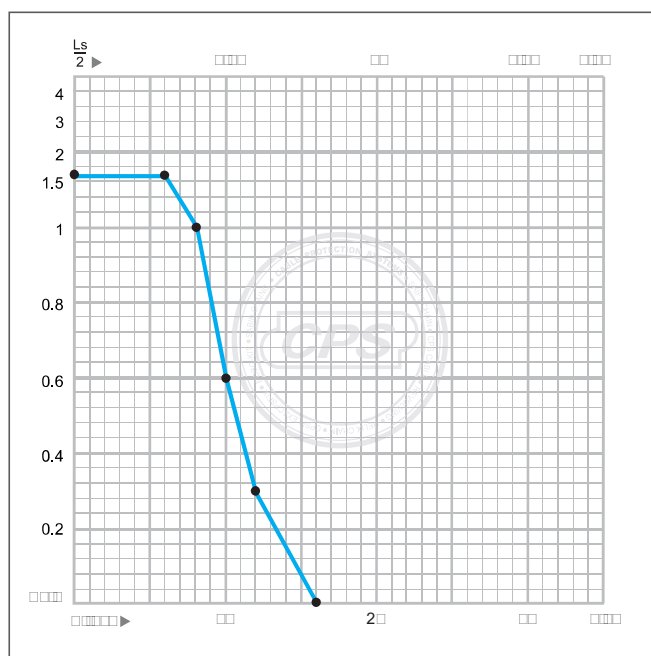


• **What to do for not enough self-supporting length maintained**

1. Select suitable model and type.
2. Otherwise, it is necessarily to install supporting guide as below;



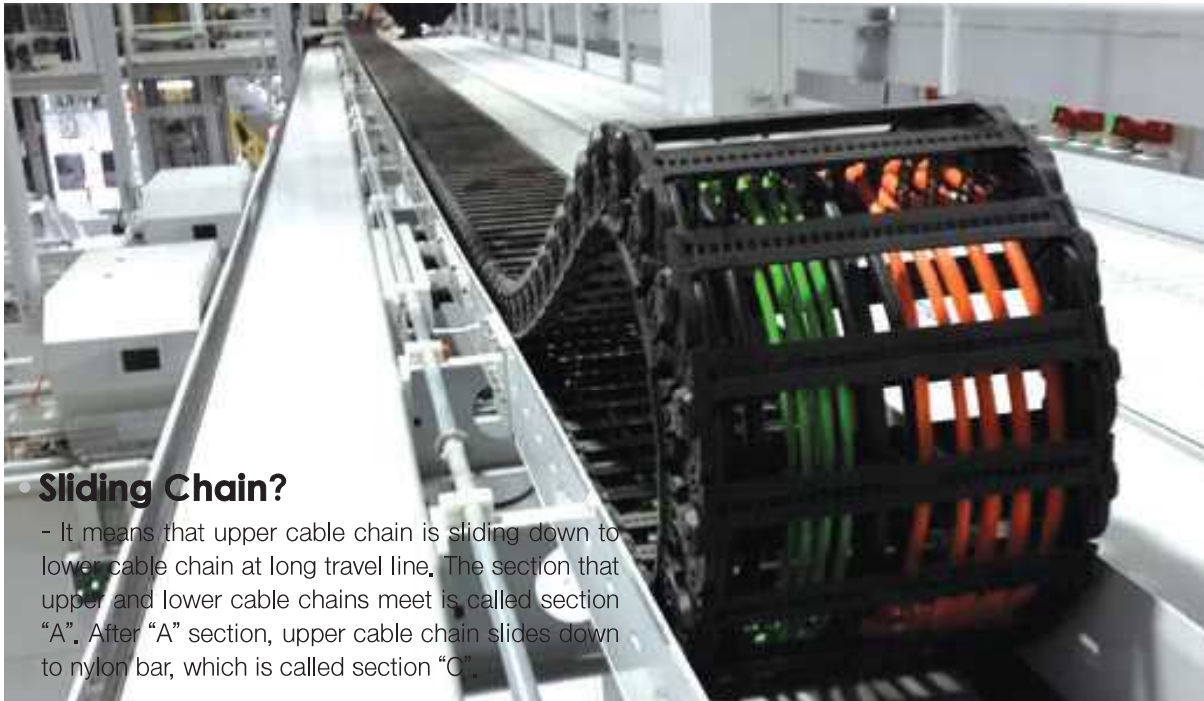
<Supporting Guide>



► **How to read a graph**

Kg/m means weight of bare cable chain.
Stroke means the travel length of machine movement.

Sliding type / long Stroke



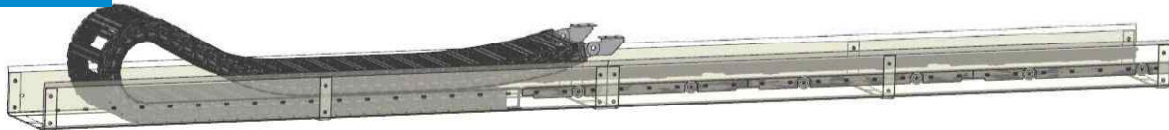
- **Sliding Chain?**

- It means that upper cable chain is sliding down to lower cable chain at long travel line. The section that upper and lower cable chains meet is called section “A”. After “A” section, upper cable chain slides down to nylon bar, which is called section “C”.

- **Guide Channel?**

- The guide channel system is applied to long stroke circumstance. Guide channel consists of 2 sections such as “A” section and “C” section. “A” section is for both cable chain(Upper + down side) and “C” section is cable chain + nylon bar.

“A” Section



“C” Section



- **Advantage of Movement in low position**

- As we recommend low height application for moving bracket part to ensure that ;

- 1. It can save space,
 2. It can make longer lifetime by reducing abrasion.
 3. It can move longer.

- **Advantage of long stroke cable chain.**

- Stable operation
- Long lifetime(at least over 2 million times)
- Ultimate design for special circumstances
- We have experts who have various and long experience

- **Must inform us of information below to make ultimate design for you.**

- Machine stroke, speed, acceleration, weight(cables and hoses), specification of cables and hoses, necessary bending radius value, operating cycle(per 1 day or per 1 month) and other relevant conditions
- Contact us at overseas_info@cpsystem.kr



ST120RS

► **Specification**

Thermoelectric power plant

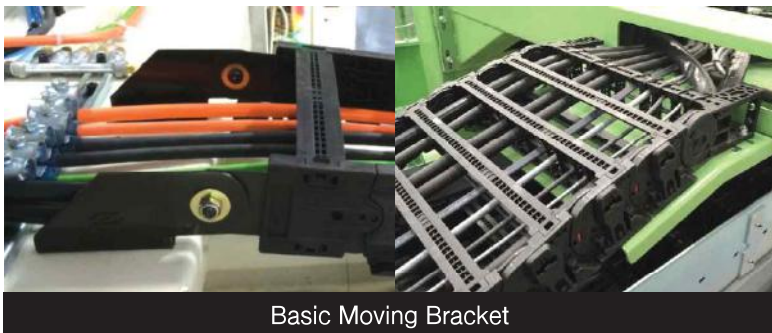
► **Location**

Korea(Hadong)

► **Stroke**

198 meters

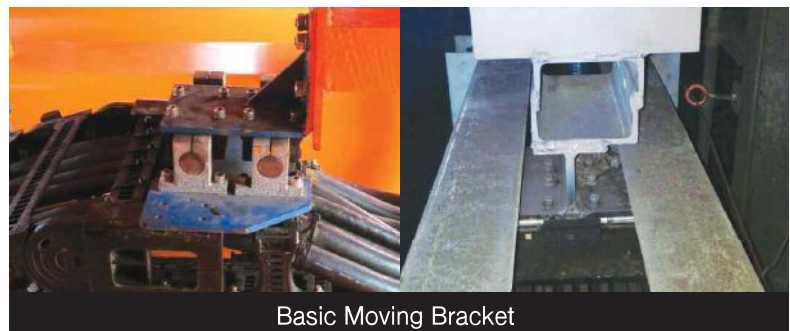
- **Moving Bracket & Moving Arm**



Basic Moving Bracket

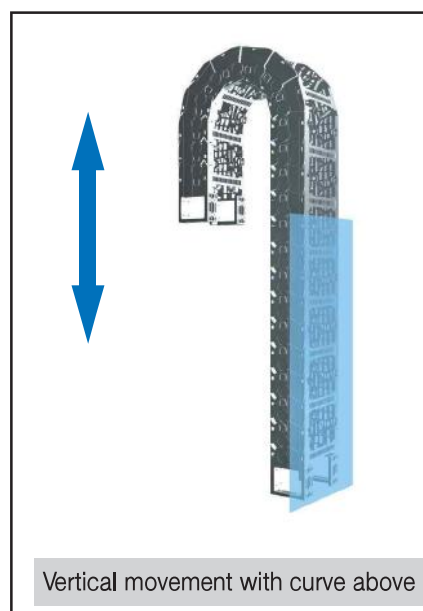
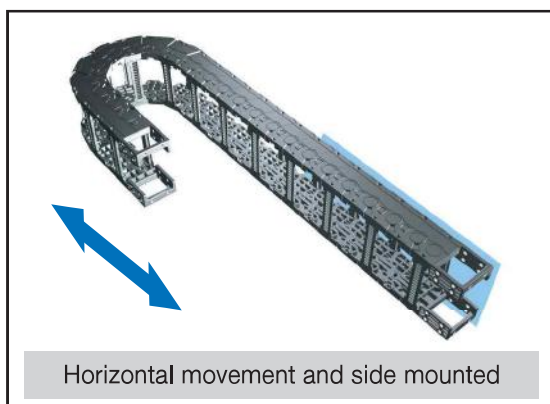
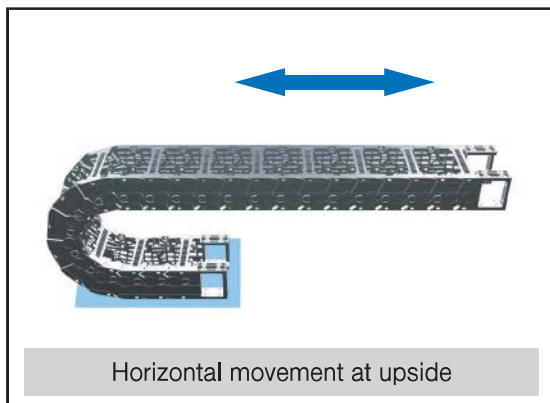
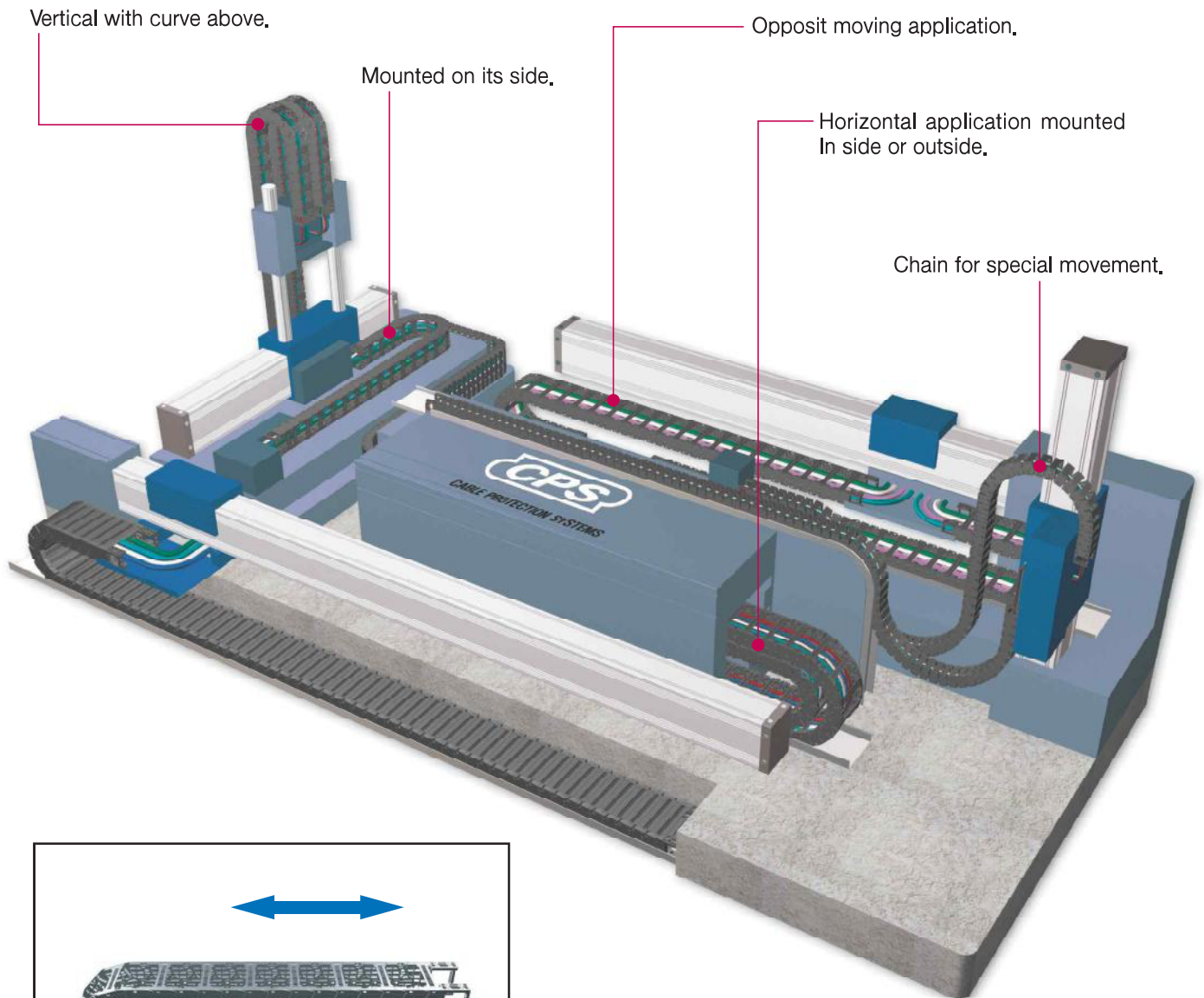


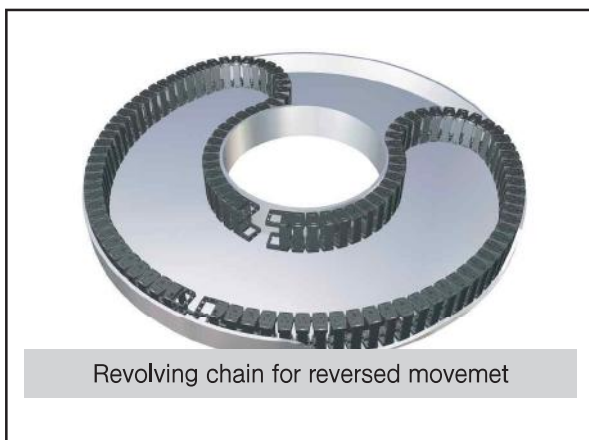
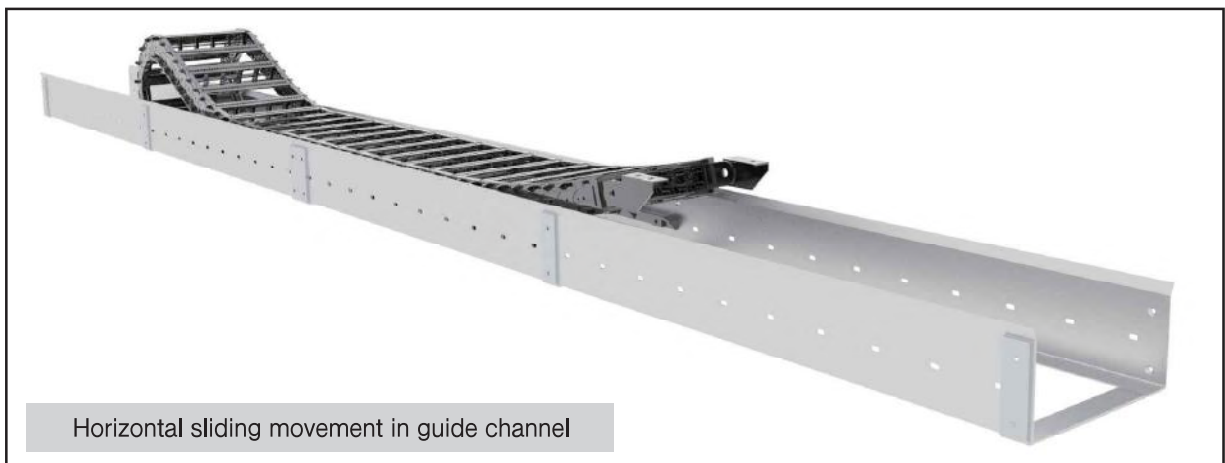
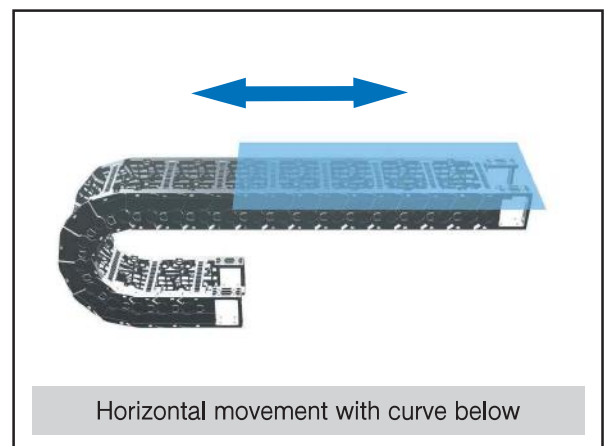
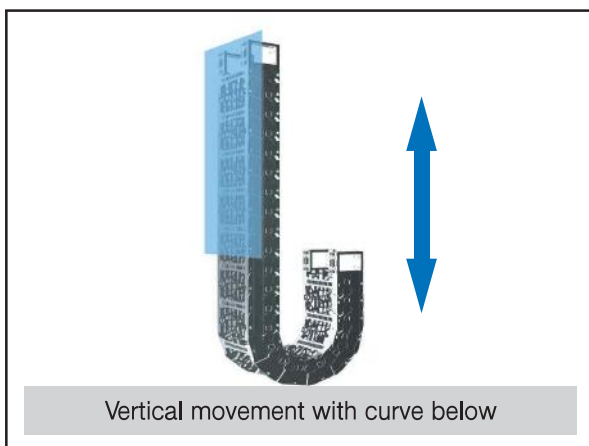
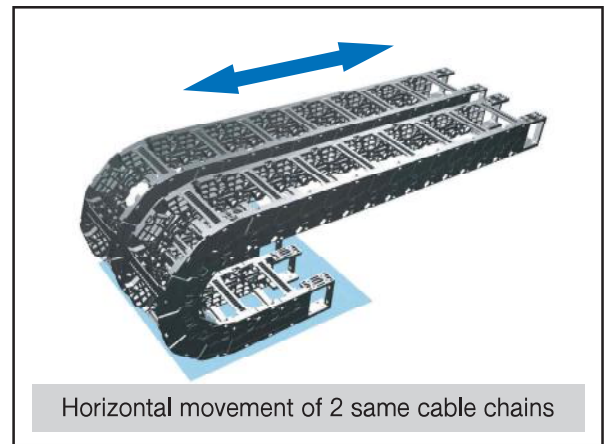
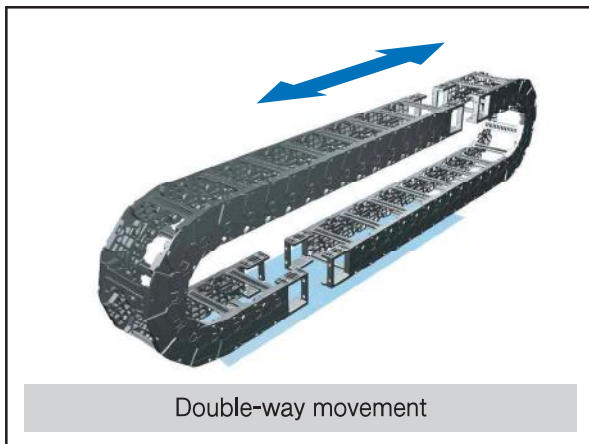
Basic Moving Arm



Basic Moving Bracket

Diverse application according to moving direction





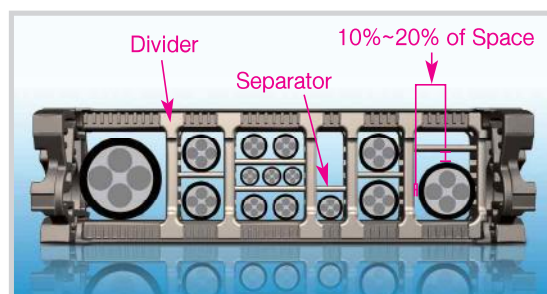
How to install cable chain with cables



Main purpose of cable chain is to protect cables and prolong cable's lifetime. To make sure, there are several standard guidance for arranging space between cables, cable layout and tension.

• Cable Space Standard

Round Cable	10% available space
Flat Cable	10% available space
Hose(Including Hydraulic Hose)	20% available space



• Cable Layout Standard

- When installing cables, the biggest cables or hoses should be laid at the side and the smallest cables should be laid in the middle to keep balance of weight during operation.



"R" min > 8 ~ 10 X Cable outer diameter

"R" min > 15 ~ 20 X Hydraulic Hose outer diameter



• Standard of Cable Tension

- Cables should be located as below at bent side of cable chain during operation.

<p>Correct arrangement of cables</p>	<div data-bbox="343 589 435 678"></div> <p>Cable chain</p> <div data-bbox="343 750 435 837"></div> <p>Cable</p>		<p>Located in the middle between upper-frame and lower-frame : OK</p>
<p>Wrong arrangement of cables</p>		<p>There's interference with frame due to short length of cables : NG</p>	

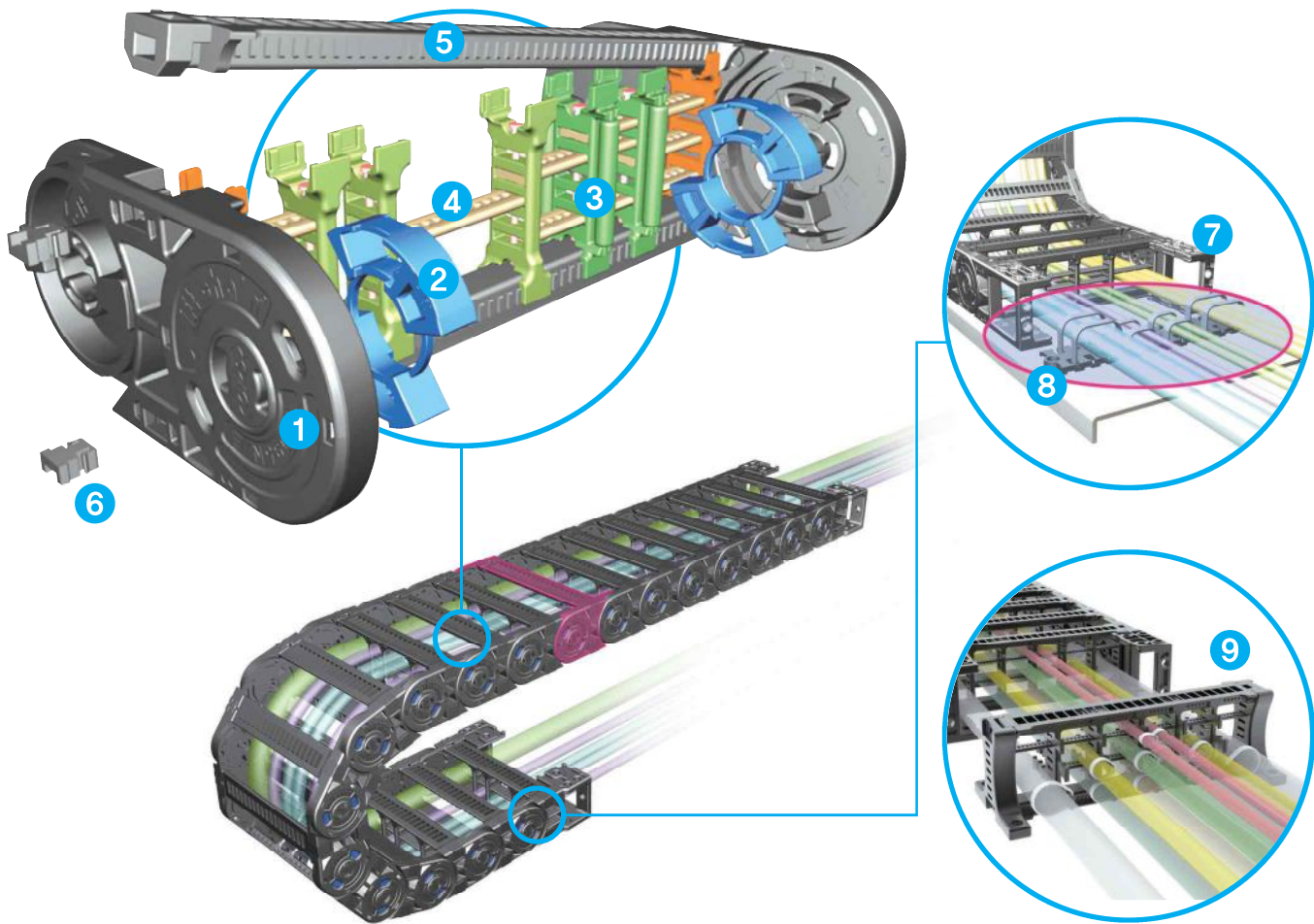
• To prevent twisted error when inserting cables

- Users or installers should use cable winding machine or equipment.
- Unfold and lay cables on the floor for 1 or half-day.



Shift Chain - Normal type

>> Part of Shift Chain Normal type



① Side Band (SB)

A unit that connects each side band and between them BR is inserted to strengthen clamping force.

② Bending Radius Unit (BR)

A unit that inserted between each side band, There are 6 supporting points to create durability.

③ Divider (DV-S, M, R, T)

A unit that divides inserted cables horizontally.

④ Separator (SP)

A unit that divides inserted cables vertically to prevent twisting and breaking problem.

⑤ Frame (Hinged Type) (FR)

Hinged-type frame, open one side, supports connection of both side of side band and have tongue and groove system plate to secure the position of the divider on the frame.

⑥ Frame Pin (FP)

The connecting pin for preventing the breakaway of Frame connected at Side Band, combining and fixing the Frame and Side Band. For Shift chain(ST)072N, 092N, 120N, 150N type, one side of the frame is fixed by inserting a fixing pin to prevent frame open, which caused by any external impact. Also, in case of ST044N, ST055N type, an open side of the frame is fixed by Hook-type frame.

⑦ Free End Bracket (FEB)

A unit that connects at last side band (left&right). It can be fixed stronger using steel washers.

⑧ Tie Wrap (TW)

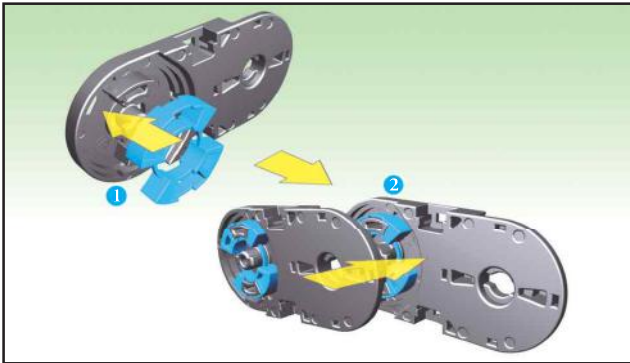
A unit that ties cables to maintain straightness of them. It can be assembled to bracket directly or installed separately from bracket.

⑨ System Tie Wrap (STW)

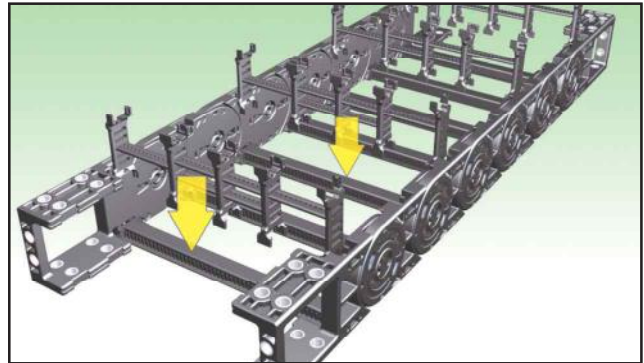
System-Tie Wrap has to be assembled on fixing and moving point of bracket and can be assembled without any tie wrap plate. This tie wrap is used to stay the cables on several floors prevent the cables from being twisted and it can also be assemble without any tools or bolt. This tie wrap has two types, one is to assemble inside bracket the other one is outside.

» Assembly procedure of Shift Chain Normal type

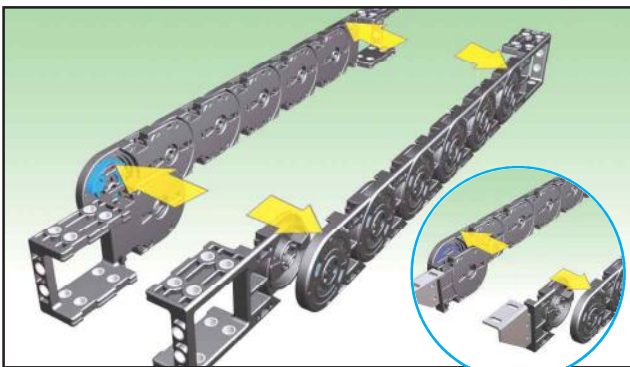
The assembling process of Shift Chain N-Type is like below and users must use rubber hammer with careful combination of Divider and Separator. Be careful of different assembling process depending on product specification such as ST044N, 055N Type, ST072N, 095N, 120N Type, ST150N Type etc.



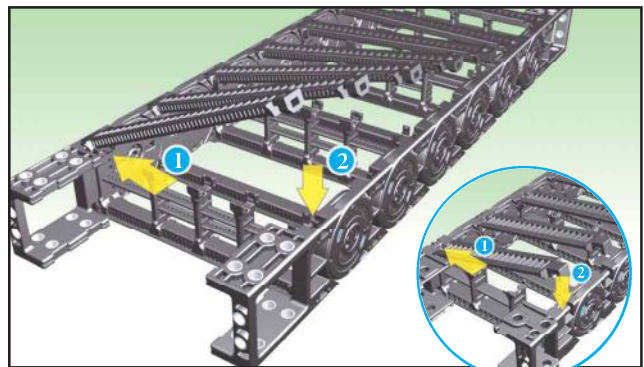
1 Insert BR unit to each side band, connect the side bands as many as you need, then do the same process to the other side of side band.



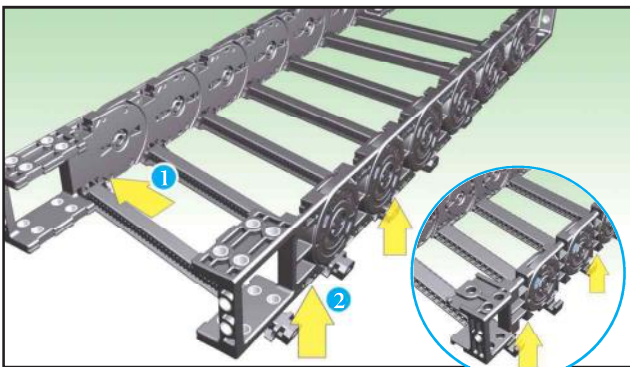
5 Fix the separator and divider patterns to the bottom-side frames as needed.



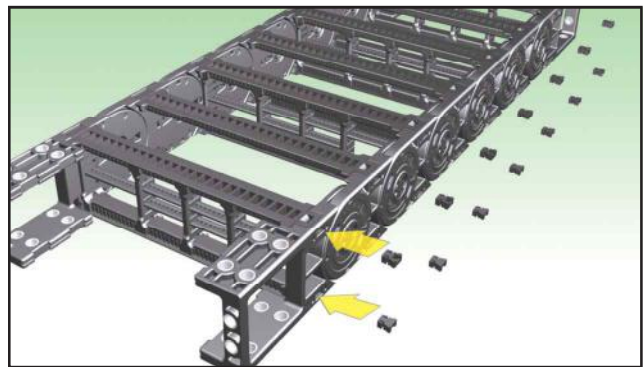
2 Assemble the end brackets on both ends using the same method. For ST150N, assemble steel brackets on both ends.



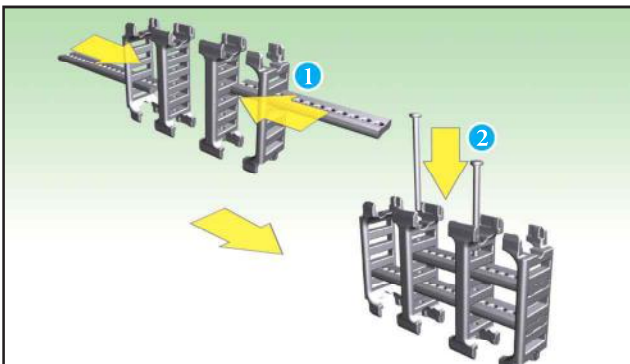
6 Attach frames to one side groove on the side band, and then the other side. ST044N, 055N frame type.



3 Attach frames to one side groove on the side band, and then the other side. ST 044N, 055N are Hinge Type or Hook Type without frame pin.



7 Insert frame pins to secure the frames and complete carrier. (ST072N, 095N, 120N, 150N are applied with frame pin, and ST044N, 055N are Hinge Type or Hook Type without frame pin.)



4 For ST072N, 095N, 120N, and 150N, connect the pin of separator in hole of divider after inserting separator in hole of divider. For ST044N and ST055N, separator fixing pins are not used.



8 Assembled Shift Chain N-Type is assembled.