



SUNCO SPRING

PRODUCTS CATALOG

Introduction

We developed a constant force spring in 1952 and announced it under the name of "CONSTON®", derived from its characteristics (constant force spring). Its unique properties quickly attracted attention from various industries and it became adopted in various products.

At present, "CONSTON" has gained an undisputed reputation as a constant force spring, and it is widely and commonly used and highly evaluated all over the world.

Today, CONSTONs are used in a wide range of fields, from stationery to home appliances, housing equipment, automobiles, medical equipment, semiconductor devices, construction machinery, ships, and satellites.

We offer many standard products so that customers can easily enjoy the effects of CONSTON. We do not only manufacture springs, but also establishes the design, development, and research departments for those mechanisms and devices that use springs to meet a wide variety of customer needs.

Springs are effective also in reducing the environmental burden, which has been a global issue, and have the potential to play a role as a power source for energy saving that will replace electricity, gas, oil, etc.

Our basic stance is to go one step further beyond the previous concept that "springs are parts", promote unitization of springs that can work immediately by screwing, and design and manufacture them from the standpoint of customers. We will continue to work in collaboration with our customers to develop new components and products.

"CONSTON®" and "コンストン®" are registered trademarks of Sunco Spring Co., Ltd.

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CONSTON Constant Force Spring

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All the above are RoHS-compliant products.

List of Standard Products in Ascending Order of Output

Standard products Catalog Page No.	C Type CONSTON		N Type CONSTON					Mainspring Units	
	CS Type P.30	SB Type P.36	NWS Type P.40	NWT Type P.41	NWG Type P.42	NWH Type P.43	NWS-OD Type P.44	MSW-A Type P.58	MSW-B Type P.59
0.49(0.05)	0.05-1								
0.98(0.1)	0.1-1								
1.96(0.2)	0.2-1		0.2-1-R(L)						
2.94(0.3)			0.3-2-R(L)						
3.92(0.4)	0.4-1		0.4-1-R(L)						
4.90(0.5)			0.5-1-R(L)				0.5-10-R(L)	A0.5	B0.5
5.88(0.6)	0.6-1		0.6-2-R(L)						
6.86(0.7)									B0.7
7.84(0.8)	0.8-1		0.8-1-R(L)						
8.82(0.9)									B0.9
9.80(1.0)	1.0-1		1.0-1-R(L)				1.0-10-R(L)	A1.0	
	1.0-2								
11.76(1.2)	1.2-1		1.2-2-R(L)						
13.72(1.4)	1.4-1								
	1.4-2								
14.70(1.5)			1.5-1-R(L)				1.5-10-R(L)	A1.5	
15.68(1.6)	1.6-1								
17.64(1.8)	1.8-1								
19.60(2.0)	2.0-1			2.0-1-R(L)				A2.0	
	2.0-2								
21.56(2.2)	2.2-1								
	2.2-2								
23.52(2.4)	2.4-1								
24.50(2.5)								A2.5	
25.48(2.6)	2.6-1								
28.42(2.9)	2.9-1								
	2.9-2								
29.40(3.0)				3.0-1-R(L)				A3.0	
31.36(3.2)	3.2-1								
	3.2-2								
33.32(3.4)		SB-1							
34.30(3.5)	3.5-2								
	3.5-3								
37.24(3.8)		SB-2							
38.22(3.9)	3.9-1								
	3.9-3								
39.20(4.0)					4.0-1-R(L)				
40.18(4.1)		SB-3							
42.14(4.3)	4.3-1								
43.12(4.4)		SB-4							
46.06(4.7)	4.7-2								
47.04(4.8)		SB-5							
49.00(5.0)		SB-6			5.0-1-R(L)				
50.96(5.2)	5.2-1								
	5.2-2								
52.92(5.4)		SB-7							
	5.7-1	SB-8							
55.86(5.7)	5.7-2								
	5.7-3								
58.80(6.0)		SB-9			6.0-1-R(L)				
61.74(6.3)		SB-10							
63.70(6.5)	6.5-2								
64.68(6.6)		SB-11							
67.62(6.9)		SB-12							
68.60(7.0)					7.0-1-R(L)				
69.58(7.1)		SB-13							
72.52(7.4)		SB-14							
73.50(7.5)	7.5-2								
75.46(7.7)		SB-15							
78.40(8.0)		SB-16			8.0-1R-(L)				
83.30(8.5)	8.5-2								
84.28(8.6)		SB-17							
89.18(9.1)		SB-18							
96.04(9.8)		SB-19							
98.00(10.0)	10.0-2				10.0-1-R(L)				
100.94(10.3)		SB-20							
112.70(11.5)	11.5-2								
117.60(12.0)					12.0-1-R(L)				
127.40(13.0)	13.0-2								
147.00(15.0)	15.0-2				15.0-1-R(L)				
196.00(20.0)						20.0-2-R(L)			
245.00(25.0)						25.0-2-R(L)			
294.00(30.0)						30.0-2-R(L)			

Standard Product Lineup

C Type CONSTON

CONSTON spring that has a sub-plate and is wound around a drum. A bracket is separately available for C Type CONSTON (CS Type). (Page 32)



N Type CONSTON

A CONSTON spring with its output converted to the wire. Since it is unitized, it can be used immediately.



Mainspring unit

A unitized mainspring which can be used immediately upon delivery. The wire output is adjustable with the adjustment mechanism. (The output is not a constant force because of the mainspring.)



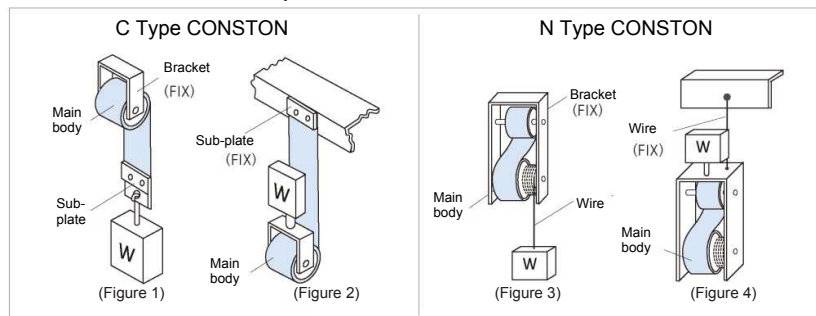
Notes on selecting a spring

1. Even if the stroke of each standard product is larger than that to be used actually, no problem will occur with the specifications or the characteristics of the spring.
2. If the lineup does not include the specifications for your desired output, select an output that is stronger by one level. Adjust it by adding a balance weight to the mating load.
3. The products are basically intended for use at room temperature. Contact us for using a product at a lower or higher temperature.

Weight addition to main body

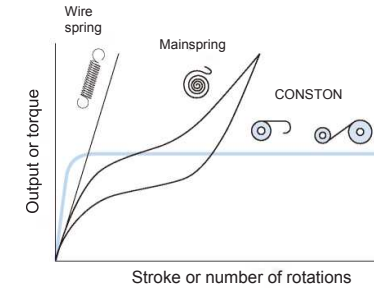
If the spring is to be attached with the end of the sub-plate or wire fixed (instead of fixing the bracket side (FIX in Figures 1 and 3 below)) so that the body can move along with W (Figures 2 and 4 below), select the spring output after adding the mass of the main body to that of W in the figure.

Contact us for the mass of the main body.



What is Constant Force Spring “CONSTON”?

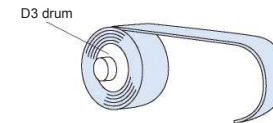
CONSTON is a product name of the constant force spring that we have developed. CONSTON is a spring that can always offer a constant output regardless of whether it is pulled out or pushed, and even if the stroke is long.



Features

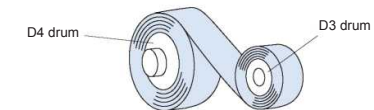
- The output is unchanged even for a long stroke.
The maximum output is obtained at the point where the CONSTON spring is pulled out by approx. a half or more turns from the drum.
- A long stroke is achieved in a small space.
A wire spring requires its own space, but the CONSTON requires only a small installation space because the long spring fits in a small-diameter drum.

C Type CONSTON



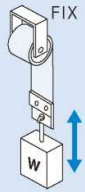
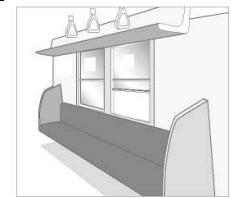

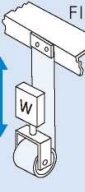
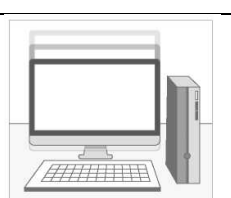
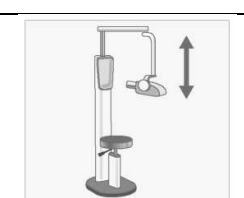
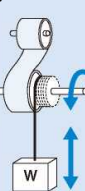
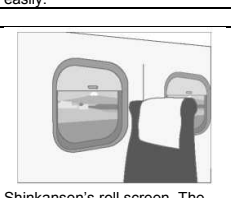
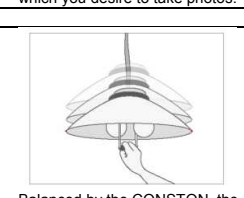



The C Type CONSTON is used by pulling out the CONSTON spring. Suitable for applications with guide rails.

N Type CONSTON



The N type CONSTON generates a rotational force and uses the tension that winds a wire and the like. Suitable for applications without guide rails because routing is possible with the wire.

Usage Examples of CONSTON Constant Force Spring

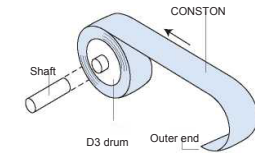
<p>Hanging a heavy object (balanceable)</p> <ul style="list-style-type: none"> - Raising/lowering a window - Raising/lowering a cycle rack - Various types of balancers 	 <p>CONSTON allows you to raise/lower even a heavy window of the train with ease and stop it at any position.</p>	 <p>CONSTON is used to lift/lower a bicycle lightly. This helps to make effective use of the bicycle parking space.</p>
<p>Pushing up a heavy object (balanceable)</p> <ul style="list-style-type: none"> - Raising/lowering liquid crystal display - Raising/lowering dental X-ray camera - Raising/lowering height of fan 	 <p>The use of CONSTONs allows adjusting the height of the bicycle to a position at which you can work easily.</p>	 <p>If you use a CONSTON for the heavy camera section, you can easily raise/lower it to the height at which you desire to take photos.</p>
<p>Winding it with a constant force (balanceable)</p> <ul style="list-style-type: none"> - Winding roll screen - Tool balancer - Raising/lowering pendant lighting 	 <p>Shinkansen's roll screen. The constant force enables to stop it at any position without a stopper.</p>	 <p>Balanced by the CONSTON, the height is adjustable to any position according to the ceiling height and the brightness.</p>
<p>Pushing and pulling it with a constant force</p> <ul style="list-style-type: none"> - Automatically feeding products forward - Automatically opening a cup holder - Parts feeder 	 <p>Cigarette packs are always placed at the front because the CONSTON can automatically push them forward. CONSTON springs are also available for various products other than cigarette packs.</p>	 <p>Used as the power source for the one-push opening mechanism of cup holders in cars. Since the spring can push it out to the end with a constant force, the smooth operation can give a sense of quality.</p>

Types and General Usage of CONSTONS

C Type CONSTON

This is the most commonly used type. When the CONSTON is pulled out, a force acts in the direction (←) to return to the original shape. This returning force is utilized.

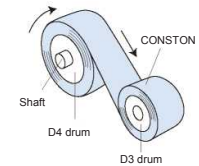
C Type CONSTON



N Type CONSTON

The CONSTON is used as the rotational force source. Pull out the CONSTON spring wound up around the smaller drum, D3, and fix it to the larger drum, D4, with its front and back reversed. If the CONSTON spring is released after being wound around the D4 drum, the spring will generate a force in the direction of the arrow (→) to return to the D3 drum. The rotational force can be obtained by rotating the D4 drum with this force.

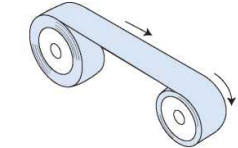
N Type CONSTON



O Type CONSTON

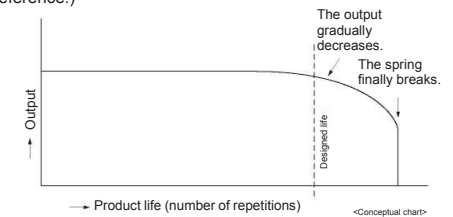
The original form of the CONSTON is the same as the C Type CONSTON, but by using the two drums, it can be used as a cover for being wound to the left and right.

O Type CONSTON



● Product life of CONSTON

When the designed life has been reached, the CONSTON' force decreases due to some effects such as cracks produced in the spring. If it is continued to be used after this, the cracks will gradually grow and the spring will eventually break. (The life cycle value of each product is only for reference.)



Custom-Made Products

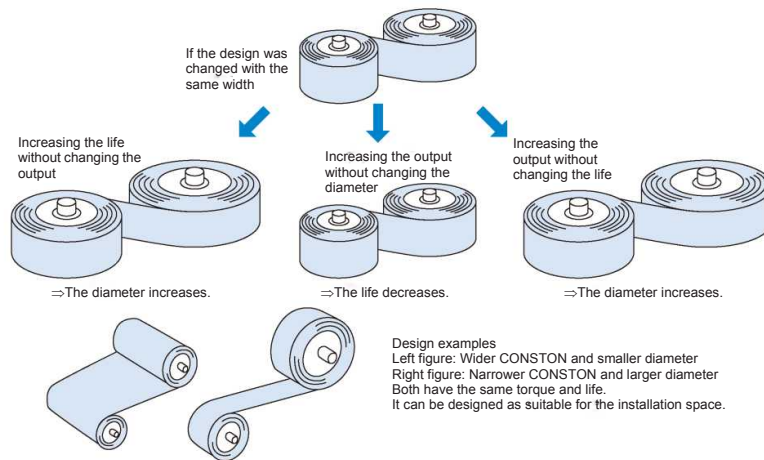
● CONSTONs can be designed according to space.

The power and torque of each CONSTON is determined by a combination of material thickness, width, and diameter; we design it according to space.

When ordering a custom-made product, please let us know about the following:

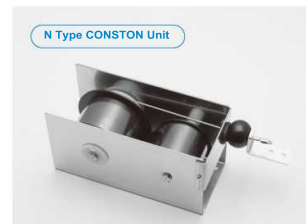
- Applications
- Required output (N) or torque (mN·m)
- Working stroke (or number of rotations) and set length
- Life (number of repetitions)
- Installable space
- Operating environment (e.g. temperature, humidity, vibration, and shock)
- Production quantity

Relationship among the output, dimensions (width and diameter), and life of a CONSTON



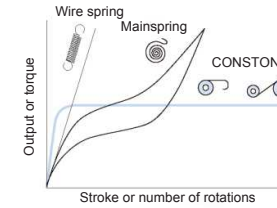
● CONSTON units

CONSTON springs are often used as a unit combined with other parts, rather than being used alone. We will also consider the unitization. Please feel free to contact us.



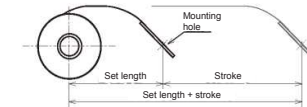
C Type CONSTON Features

- The maximum output of the CONSTON spring is obtained at the point where it is pulled out by approx. a half or more turns from the drum.
- After reaching the maximum output, the output is unchanged, no matter how long the stroke is stretched.
- In contrast, the wire spring has a proportional relationship between the stroke and output; the longer the stroke, the stronger the force becomes.
- An ordinary wire spring requires its own space, but a CONSTON requires only a small installation space because the long spring fits in a small-diameter drum.



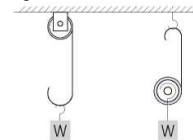
● Set length + stroke

Basically, the "set length" is the length from which the CONSTON spring is pulled out by approx. a half or more turns from the drum. The "stroke range" (repeated-operation range) begins with the "set length"; it must be used so that the total of "set length" plus "stroke" is within the specified range.

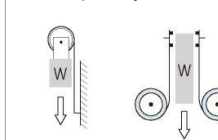


Typical usage

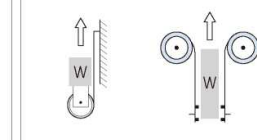
- Hanging a heavy object to make it move up/down with light force.



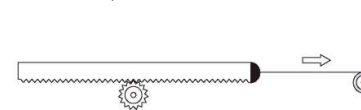
- Holding down an object or pushing it down with a constant force up to any desired length.



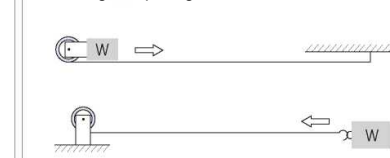
- Pushing up a heavy object from below to balance it.



- Remove the pinion-rack backlash.



- Pushing and pulling it with a constant force.



* These figures are conceptual diagrams for the installation of C Type CONSTONs. In actual operations, they are used in conjunction with objects having a guiding role.

ASSEMBLY

● How to hold C Type CONSTON

Wind it around the drum and pass it through the shaft. ❶

It can rotate smoothly in the most common way. Take care to minimize the friction between the drum and shaft.

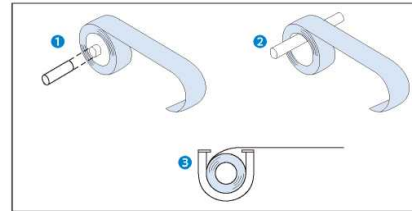
Support the C Type CONSTON directly on its inner circumference by using the shaft. ❷

The friction slightly increases.

Put it in the case. ❸

Support the outer circumference with a case. The friction slightly increases when pulling out.

How to hold C Type CONSTON

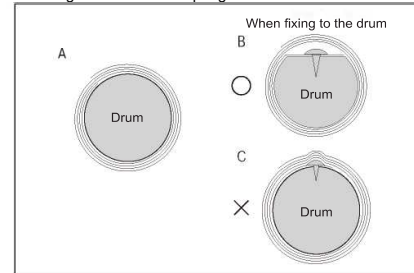


● Installing the CONSTON spring to the drum

Normally, the CONSTON spring is merely wound around the drum as shown in Figure A without being fixed to it. Be careful that the CONSTON spring will, therefore, come off the drum if it is pulled out more than the specified stroke.

When fixing the CONSTON spring to the drum to prevent it from coming off, attach it as shown in Figure B so that the screw head fits within the circumference of the drum. In Figure C, the CONSTON spring will deform.

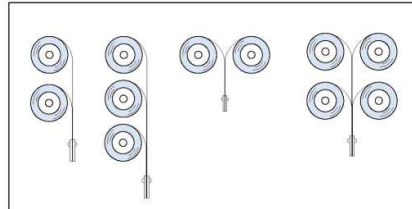
Installing the CONSTON spring to the drum



● Combination of two or more C Type CONSTONS

If the spring power is insufficient with one C Type CONSTON or it cannot be balanced well, two or more ones should be combined.

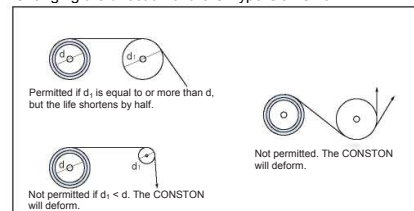
Combination of two or more C Type CONSTONS



● Changing the direction of the C Type CONSTON

When changing the direction of the C Type CONSTON directly using a pulley, pay attention to the notes in the right figure.

Changing the direction of the C Type CONSTON



● Setting

Use it after performing the setting, or conditioning operation. The stable output is reached after performing the setting (or conditioning operation) which reciprocates it across the entire stroke 5 to 10 times. Perform the setting in the state where it is used (after the installation). Using the spring alone is dangerous.

C Type CONSTON Practical Examples

● Move up/down a heavy object with light force

Television camera pedestal ❶

A television camera pedestal contains more than 20 C Type CONSTONS installed. The camera mass (about 100 kg) is completely balanced by the C Type CONSTONS, and thus, the camera operator can move it up/down with a slight force. It is designed to be balanced by removing some C Type CONSTONS depending on the camera mass.

Residential double-hung window ❷

A double-hung window sash has C Type CONSTONS installed on its both sides. The window is balanced using the C Type CONSTONS, and thus, can be opened/closed with light force. This is available even for heavy windows in a well-balanced manner according to the window weight.

Opening/closing the power shovel front window ❸

The fully openable front windshield (or windscreen) can be opened/closed lightly, with a C Type CONSTON installed to it.

● Pushing up a heavy object (balanceable)

Adjusting the height of the fan wings ❹

The fan wings can be balanced at any height by installing a C Type CONSTON in the direction in which it pushes up the wings and motor section (mass about 4.5 kg).

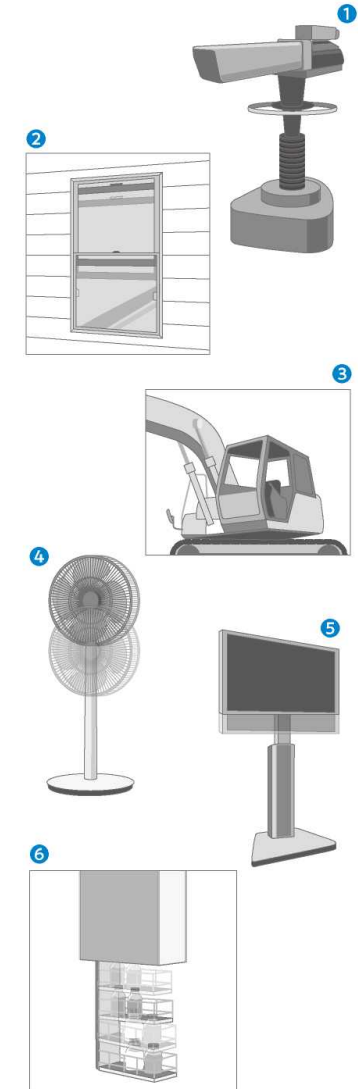
Adjusting the height of a large-screen display ❺

To change the height of a large-screen display (mass about 80 kg) according to your viewing style, you can use a C Type CONSTON to adjust it lightly.

● Hanging a heavy object (balanceable)

Elevating kitchen cabinets ❻

For the beauty of the kitchen and effective use of its space, you can use a C Type CONSTON when storing the hanging cabinets, thereby allowing you to quickly take them out conveniently.



● **Holding down an object or pushing it down with a constant force**

Always pressing an object with constant load

Even if the part (shown by hatching) wears and its dimensions change, the use of a C Type CONSTON allows it to be always held down with a constant load.

Product forward-feed store fixture

Taking out a product causes the C Type CONSTON to automatically feed the rear ones forward.

● **Gravity-0 free stop mechanism**

CONSTAND

For example, a dental X-ray camera can be moved up/down lightly by installing a C Type CONSTON inside the support. It can also be balanced in any position without any stopper.

● **Stacked CONSTONS**

If the output is insufficient with one CONSTON spring, you can use a stacked set of two or more CONSTON springs.

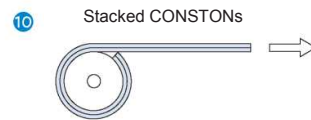
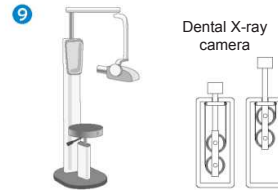
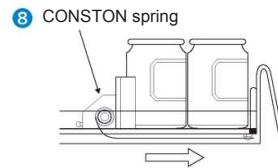
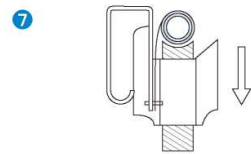
(This is limited only to certain CONSTON springs conforming to the specifications. Contact us for details.)

● **Slit cover (covering CONSTON)**

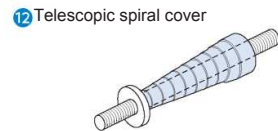
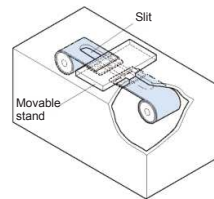
A C Type CONSTON can be a freely movable cover by utilizing its sturdiness and wideness and the nature to wind itself to the inside. The applications include control of dust and cutting chips on machine tools and light blocking.

● **Dust-proof protective cover for shafts and screws (spiral cover)**

The spiral cover is made of strong metal (stainless steel for springs); thus, it can be a cover to protect important parts of machinery and instruments.



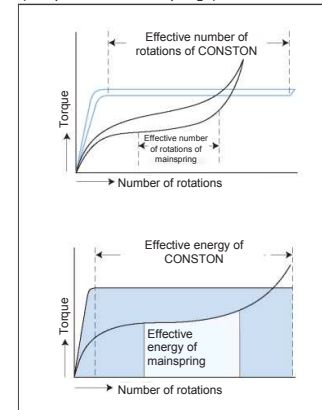
Telescopic slit cover



N Type CONSTON Features

- An N Type CONSTON can generate a rotational force and wind wires, and its tension can be used.
- It is suitable for applications without guide rails because routing is possible with the wire.
- It can also be used as the rotational force source, and the torque is constant regardless of the number of rotations.
- It is also possible to design to achieve more than 50 rotations.
- Motor-like behavior can be obtained with a simple structure.
- Compared to mainsprings, the full power is reached with a little pre-winding.

Features of N Type CONSTON (compared with mainsprings)



Typical usage

Pulling it with a constant force. Balancing a heavy object. Winding it with constant torque.

Running it with constant torque. Rotating it with constant torque. Using it instead of a motor.

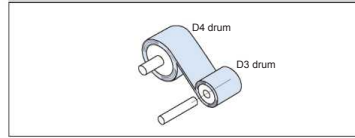
A mainspring is inconvenient because the torque changes. With a mainspring, the number of rotations is insufficient.

ASSEMBLY

● How to hold the N Type CONSTON

Two drums are used to hold the spring: large, D4, and small, D3. The drums and shafts must be freely rotatable as in the case of C Type CONSTONS. By integrating the D4 drum and shaft, the shaft can also be used as the rotational force source.

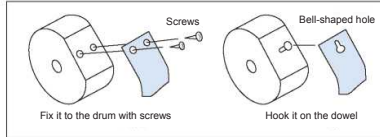
How to hold the N Type CONSTON



● Installing the N Type CONSTON to the drum

Like a C Type CONSTON, the installation to the D3 drum is accomplished by only winding it around the D3 drum instead of fixing it thereto. Be careful that an N Type CONSTON spring will, therefore, come off the drum if it is pulled out more than the specified number of rotations or stroke. See the right figure for how to fix the CONSTON to the D4 drum.

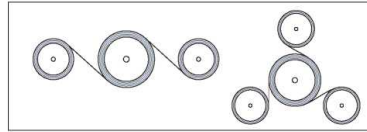
Installing the N Type CONSTON to the drum



● Combination of two or more N Type CONSTONS

If the output or torque is insufficient with one N Type CONSTON, you can combine two or more ones. The number of D3 drums and that of D4 drums do not have to be identical. As shown in the figure on the right, more than one D3 drum can be used for one D4 drum.

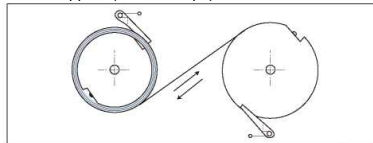
Combination of two or more N Type CONSTONS



● Drum stoppers (rotation stops)

Excessive rotation of the D4 drum due to the wrong operation may cause the CONSTON spring to come off the D3 or D4 drum and fail. To avoid this, consider installing a stopper mechanism as shown on the right if necessary.

Drum stoppers (rotation stops)



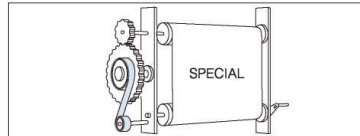
● How to increase the number of rotations of an N Type CONSTON

Increasing the CONSTON spring length
The number of rotations can be increased relatively easily.

With a gear or pulley set on the D4 shaft,
Increasing the number of rotations with the gear ratio

In this case, the torque is inversely proportional to the gear ratio.

How to increase the number of rotations of an N Type CONSTON



● Setting

Use it after performing the setting, or conditioning operation. The stable output is reached after performing the setting (or conditioning operation) which reciprocates it across the entire stroke 5 to 10 times. Perform the setting in the state where it is used (after the installation). Using the spring alone is dangerous.

N Type CONSTON Practical Examples

● Power source used instead of a motor

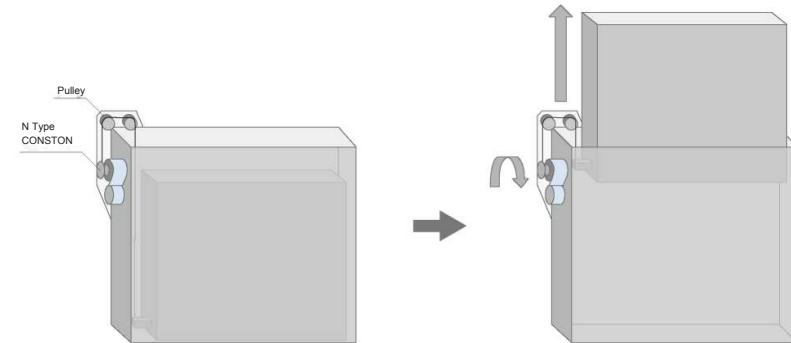
Motor-like behavior can be obtained because of constant torque.

- No electrical troubles because no wiring is necessary.
- It can be designed as suitable for space.

● Raising/lowering a unit

It can raise the unit stored in a box.

A wire type N Type CONSTON can be freely laid out via a pulley or the like. Motor-like behavior can be obtained with a simple configuration.

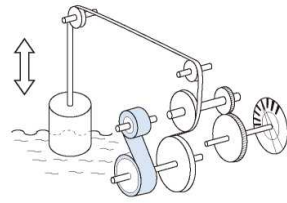


- **Keeping a constant tension applied to a long tape, wire, or the like**

- **Float type liquid level gauge for gas stations, oil tankers, etc.**

The float rises and falls according to the level of the liquid surface; by rewinding the tape, wire, or the like hanging the float with an N Type CONSTON having constant torque, they indicate the accurate liquid level without slacking.

Some oil tankers have a CONSTON spring that can be as long as 35 meters (measured length 40 meters).

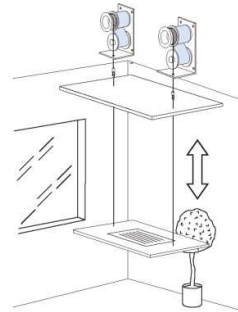


- **Balancing a heavy object**

Heavy objects can also be balanced using a C Type CONSTON. However, for example, if no guide rail can be installed due to the structure, if the stroke is too long, or if you do not want to pull out the CONSTON spring directly, use an N Type CONSTON and lift it with the wire, tape, or the like to balance the object.

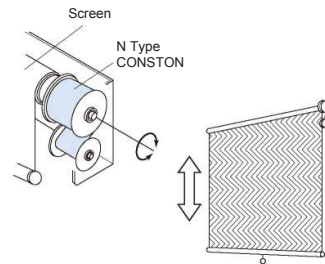
- **Raising/lowering the blowing outlet of an air conditioner**

By lifting the blowing outlet of a ceiling-mounted air conditioner using an N Type CONSTON, the filter section can be easily raised and lowered during cleaning.



- **Winding a roll screen**

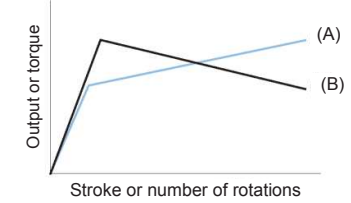
If the weight of the screen is kept to match the tension of the N Type CONSTON, it is balanced without any stopper. You can operate it without stress because the operation feeling is constant.



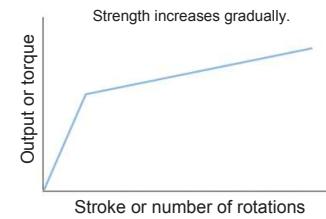
Variable and Reverse Load Type CONSTONS

The output of coil springs gradually increases by pulling or pushing them, whereas that of CONSTON constant force springs is constant no matter how far they are pulled or pushed.

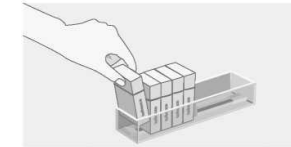
A CONSTON with the output or torque characteristics meeting your needs can be manufactured by adopting the variable load type (A) or reverse variable load type (B) while maintaining the feature that obtains long stroke in a small space.



Variable load type (1)

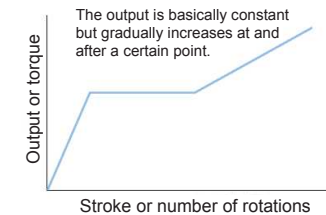


Example: Product forward-feed case, C Type

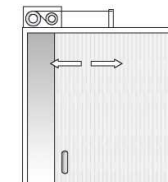


The spring force is designed to increase gradually so that, when the case contains many products, they are pushed out strongly, and when it contains a few products, they are pushed weakly.

Variable load type (2)



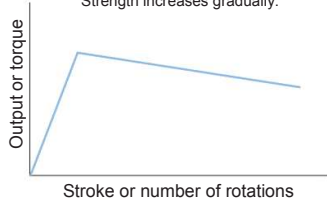
Example: Opening/closing a sliding door, N Type



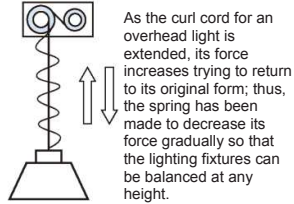
During the course of closing, the sliding door operates firmly at the beginning of the movement, and the output weakens gradually near the closing.

Reverse variable load type (1)

Strength increases gradually.

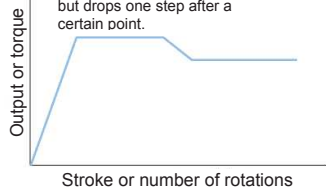


Example: Raising/lowering a pendant lighting, N Type

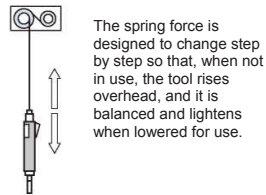


Reverse variable load type (2)

The output is basically constant but drops one step after a certain point.



Example: Raising/lowering a tool, N Type



CONSTONS of variable load or reverse load type have a limit in the achievable output variation. Contact us for details.

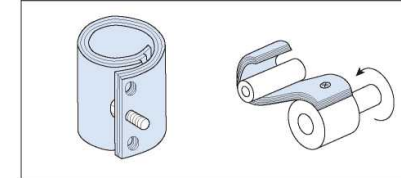
NH Type CONSTON (Stacked Type)

The NH Type CONSTON (stacked type) is one of a series of those CONSTON springs for small rotation angles that can provide strong torque in a small space.

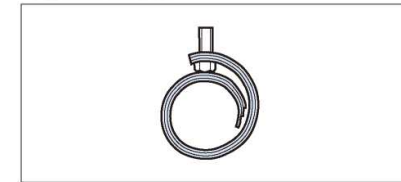
● **NH Type CONSTON**

Each NH Type CONSTON consists of two or more CONSTON springs stacked. One NH Type CONSTON can output n times the torque of one CONSTON spring although its operating range is usually limited within 110°. In the released state (i.e. delivered product state), an NH Type CONSTON has the original shape as shown on the right.

NH Type CONSTON



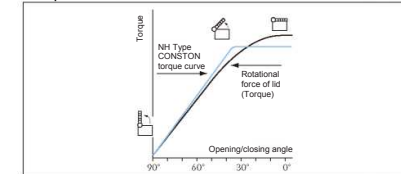
Original shape of NH Type CONSTON



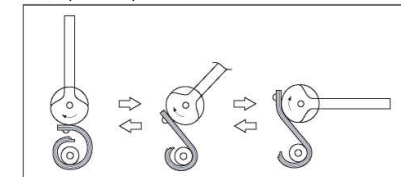
● **Torque curve**

In the right figure, the black curve shows the rotational force (i.e. torque) of the lid. For a flat lid, its torque is 0 in a vertical position (i.e. opens 90°) and reaches the maximum just before closing (i.e. coming to 0°). On the other hand, the torque curve of an NH Type CONSTON rises from 90° to 0° as shown by the blue line. That is, by using an NH Type CONSTON, which has a repulsive force to open against the torque of closing the lid, the operating force to open/close can be reduced so that even a heavy lid can be opened/closed lightly.

Torque curve



Description of operation



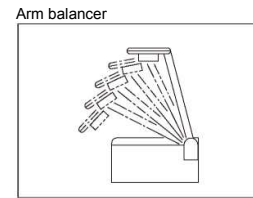
● **Setting**

Use it after performing the setting, or conditioning operation. The stable output is reached after performing the setting (or conditioning operation) which reciprocates it across the entire stroke 5 to 10 times. Perform the setting in the state where it is used (after the installation). Using the spring alone is dangerous.

NH Type CONSTON Practical Examples

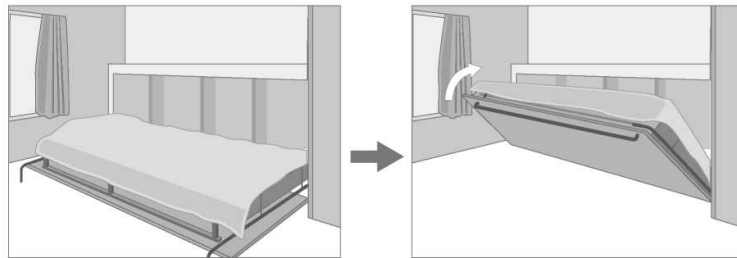
- **Arm balancer**

To prevent the arm from lowering swiftly, it can be lowered quietly by installing an NH Type CONSTON to the fulcrum.



- **Opening/closing a heavy bed**

The use of NH Type CONSTON allows you to open/close lightly even a large and heavy object such as a bed.



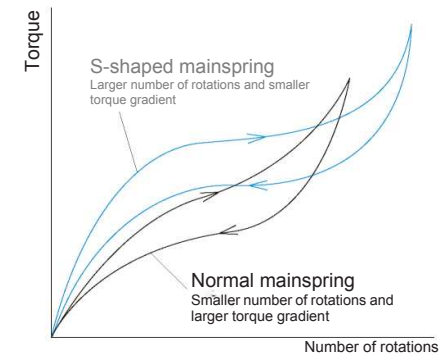
Mainspring Features

- **About the mainspring**

There are normal, S-shaped, equal-pitched mainsprings, etc. S-shaped mainsprings are used for our standard products (MSW).

- **S-shaped mainspring**

An S-shaped spring is formed by applying a constant reverse curvature to it and winding it around a winding shaft; thus, it exhibits excellent properties not found in normal mainsprings. The appearance and usage are the same as normal mainsprings, but a larger number of rotations are assured and the torque gradient is smaller.



Performance of the two types of mainsprings made of the same material

Mainspring Practical Examples

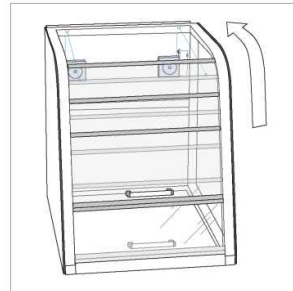
- **Self-closing door**

The wire retractable spring unit MSW (standard product), can be used as the power source for a self-closing slide door or elevator door, is available.



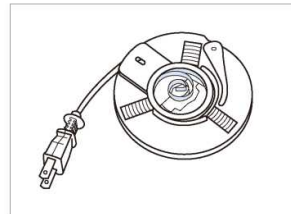
- **Raising/lowering slide shutter**

For example, a raising/lowering slide shutter that changes in weight can be operated lightly by taking advantage of the output characteristics of the mainspring.



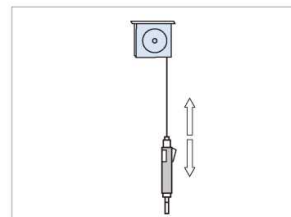
- **Cable winding**

Mainspring units are used for a wide range of products from household goods to precision equipment (e.g. cable winding units).



- **Tool hanging**

When not in use, the tool is kept raised; when it is to be used, it can be lowered easily for use.



Convex and Convex CONSTON

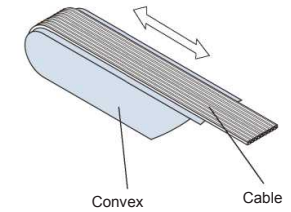
- **Convex**

A stainless steel strip machined into a raingutter shape. This has a characteristic that the bent part tends to stretch straight.

It is used for a cable guide by using this characteristic.



Applications: Cable guide, etc.



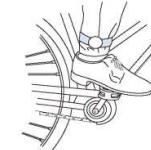
- **Convex CONSTON**

We manufacture a special spring called "Convex CONSTON", which curls up when tapped, from the convex shape.

It is used for armbands by utilizing this characteristic.



The hems of pants are prevented from being caught in the chain.



Shirt cuffs can be kept tucked up.



Leaf Spring, Forming, and Deformed Wire Machining




- Leaf spring

Products made from various spring materials, such as stainless steel for springs, are used for almost all products, including electronic equipment, communication equipment, household goods, automobiles, and medical devices.








CONSTON Constant Force Spring Lineup


C Type CONSTON Standard Products

	Description of C Type CONSTON Standard Products 26
	CS Type Standard Products 30 Output: 0.49 N (0.05 kgf) to 147 N (15.0 kgf)
	Bracket SBR Type Standard Products (for CS Type)..... 32
	SB Type (C Type plus with Bracket) Standard Products 36 Output: 33.32 N (3.4 kgf) to 100.94 N (10.3 kgf)

N Type CONSTON Standard Products

	Description of N Type CONSTON NW Type Standard Product 38
	NWS Type Standard Products 40 Wire output: 1.96 N (0.2 kgf) to 14.7 N (1.5 kgf)
	NWT Type Standard Products 41 Wire output: 19.6 N (2.0 kgf) to 29.4 N (3.0 kgf)
	NWG Type Standard Products 42 Wire output: 39.2 N (4.0 kgf) to 147 N (15.0 kgf)
	NWH Type Standard Products 43 Wire output: 196 N (20.0 kgf) to 294 N (30.0 kgf)
	NWS-OD Type (with Oil Damper) Standard Products 44 Wire output (reference value) 4.9 N (0.5 kgf) to 14.7 N (1.5 kgf)

NH Type CONSTON (Stacked Type)

	NH Type CONSTON (Stacked Type)..... 47
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Description of C Type CONSTON Standard Products

● C Type CONSTON Standard Products

Brackets (SBR Type) for the CS, SB, and CS Types are available. It is possible to offer custom-made products, not standard ones. For details, please feel free to contact us.

CS Type (page 30 and after)
Output 0.49 N (0.05 kgf) to 147 N (15.0 kgf)
(CONSTON spring, sub-plate, drum)



SB Type (page 36)
Output 33.32 N (3.4 kgf) to 100.94 N (10.3 kgf)
(CONSTON spring, sub-plate, drum, shaft, bracket)



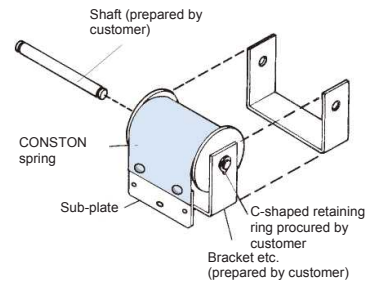
Bracket SBR Type (page 32 and after)
As auxiliary parts for CS Type, Bracket SBR Type series products are available. You can use these by combination with CS Type products.



● **When manufacturing a bracket or shaft**

With the shaft diameter determined according to the drum hole, manufacture it so that the shaft and drum can rotate freely.

The shaft and bracket may be either fixed or rotatable, provided that the shaft cannot come off the drum due to a C-shaped retaining ring.



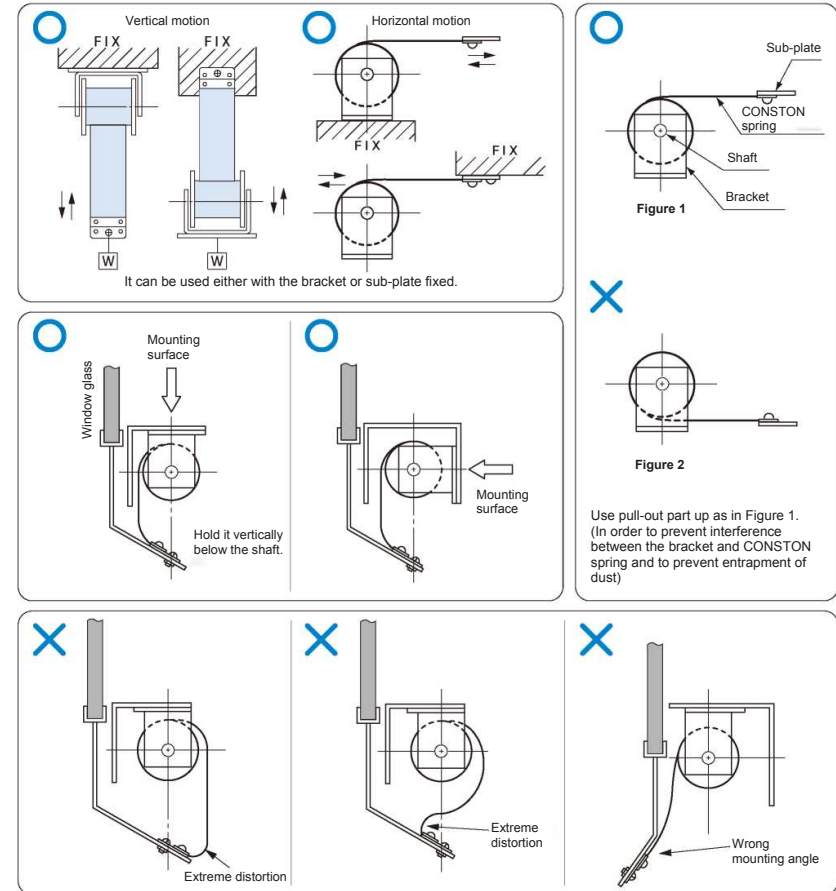
● **Notes on selection**

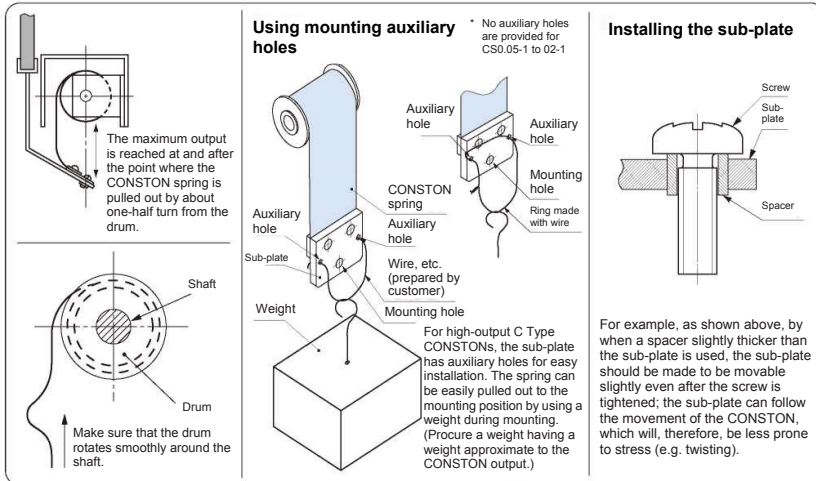
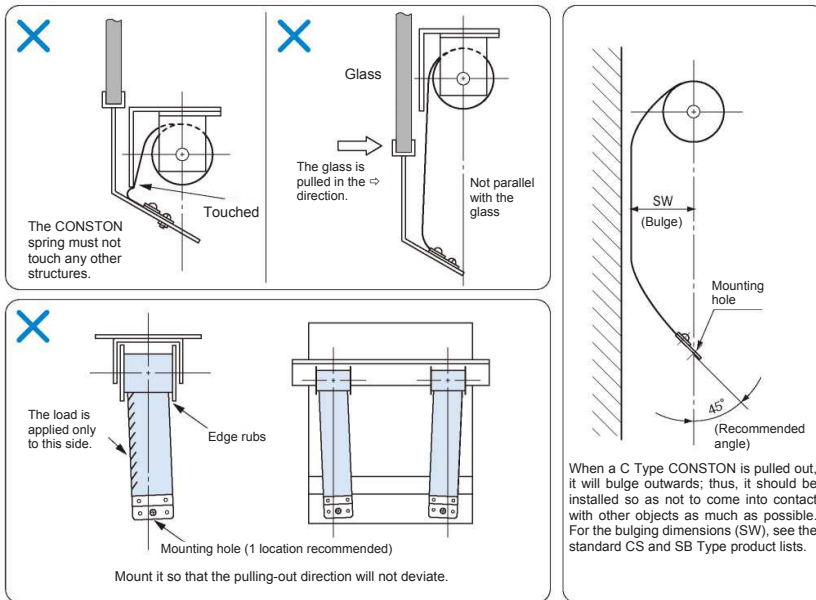
Even if the range of the "set length + stroke" in the standard product list exceeds that to be used actually, no problem will occur with the use or the spring characteristics.

* CONSTON springs are assumed to be used under a static load. Thus, do not apply any shocking load to them.

Notes on Installing a C Type CONSTON

C Type CONSTON springs are used for various purposes. For convenience, this section describes SB Type series CONSTON springs (with bracket) that are used for the raising/lowering windows. Use it for reference when you procure the bracket yourself or when you combine the optional bracket (SBR Type) for CS Type.





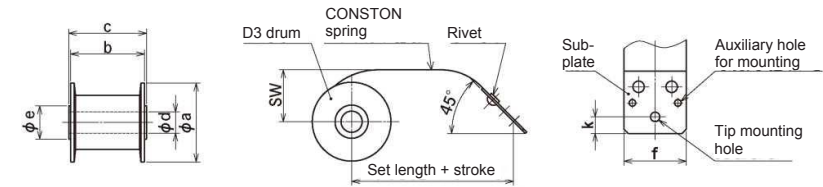
⚠ DANGER If you pull out the CONSTON spring more than the specified stroke, it may come off the drum, resulting in danger. (The specified stroke is indicated on the tip of the CONSTON spring.)

C Type CONSTON CS Type Standard Products



Material	
Part name	Material
CONSTON spring	Stainless steel for spring
Sub-plate	SUS
* D3 drum	Plastic or AL
* Rivet	Cu or AL

* Contact us for the material for the applicable product.



CS Type standard product list

Output tolerance +15%
0%

Model number	Output N (kgf)	Set length + stroke (mm)	Life (reference value) (times)	Tip mounting hole (mm)		Drum (mm)					Sub-plate width CONSTON width f (mm)	Bulge (reference value) SW (mm)
				Dia. φ	Pos. k	φ a	b	c	φ d	φ e		
CS0.05-1	0.49 (0.05)	500	160,000	3.2	5	26	17	18	5.2	8.2	10	(16)
CS 0.1-1	0.98 (0.1)	500	50,000	3.2	5	26	17	18	5.2	8.2	10	(16)
CS 0.2-1	1.96 (0.2)	500	35,000	3.2	5	26	17	18	5.2	8.2	10	(16)
CS 0.4-1	3.92 (0.4)	1,000	37,000	4.5	8	34	25.6	27.6	10.2	13	20	(18)
CS 0.6-1	5.88 (0.6)	1,000	25,000	4.5	8	34	25.6	27.6	10.2	13	20	(18)
CS 0.8-1	7.84 (0.8)	1,500	25,000	4.5	8	34	30.6	32.6	10.2	14	25	(18)
CS 1.0-1	9.8 (1.0)	500	6,000	4.5	5	26	17	18	5.2	8.2	13	(16)
CS 1.0-2		1,000	19,000	4.5	8	38	26.2	27.6	10.2	14	20	(21)
CS 1.2-1	11.76 (1.2)	1,500	34,000	4.5	8	44	40.6	42.6	10.2	14	35	(26)
CS 1.4-1	13.72 (1.4)	1,000	9,000	4.5	8	34	25.6	27.6	10.2	13	20	(18)
CS 1.4-2		1,000	33,000	6.5	8	44	45.6	47.6	10.2	16	40	(26)
CS 1.6-1	15.68 (1.6)	1,500	17,000	4.5	8	38	35.6	37.6	10.2	16	30	(21)
CS 1.8-1	17.64 (1.8)	1,500	9,000	4.5	8	34	30.6	32.6	10.2	14	25	(18)
CS 2.0-1	19.6 (2.0)	1,000	6,000	4.5	8	38	26.2	27.6	10.2	14	20	(21)
CS 2.0-2		1,000	16,000	4.5	8	44	35.6	37.6	10.2	14	30	(26)
CS 2.2-1	21.56 (2.2)	1,000	8,000	4.5	8	44	25.6	27.6	10.2	14	20	(26)
CS 2.2-2		1,000	19,000	4.5	8	44	40.6	42.6	10.2	14	35	(26)

Output tolerance ^{+15%}_{0%}

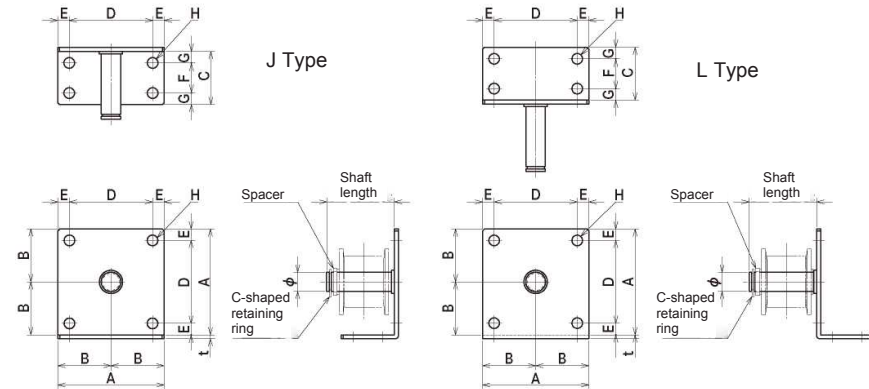
Model number	Output N (kgf)	Set length + stroke (mm)	Life (reference value) (times)	Tip mounting hole (mm)		Drum (mm)					Sub-plate width CONSTON width f (mm)	Bulge (reference value) SW (mm)
				Dia. φ	Pos. k	φ a	b	c	φ d	φ e		
CS 2.4-1	23.52 (2.4)	1,000	6,000	4.5	8	38	30.6	32.6	10.2	14	25	(21)
CS 2.6-1	25.48 (2.6)	1,000	9,000	4.5	8	44	30.6	32.6	10.2	14	25	(26)
CS 2.9-1	28.42 (2.9)	1,000	6,000	4.5	8	38	35.6	37.6	10.2	16	30	(21)
CS 2.9-2		1,000	20,000	6.5	8	54	46	49	10.2	16	40	(32)
CS 3.2-1	31.36 (3.2)	1,000	8,000	4.5	8	44	35.6	37.6	10.2	14	30	(26)
CS 3.2-2		1,000	7,000	4.5	8	38	40.6	42.6	10.2	14	35	(21)
CS 3.5-2	34.3 (3.5)	1,000	7,000	4.5	8	38	43.6	45.6	10.2	16	38	(21)
CS 3.5-3		1,000	21,000	6.5	8	54	56	58	10.2	16	50	(33)
CS 3.9-1	38.22 (3.9)	1,000	8,000	4.5	8	44	40.6	42.6	10.2	14	35	(26)
CS 3.9-3		1,000	17,000	6.5	8	67	47	49	10.2	16	40	(41)
CS 4.3-1	42.14 (4.3)	1,000	8,000	4.5	8	44	43.6	45.6	10.2	16	38	(26)
CS 4.7-2	46.06 (4.7)	1,000	9,000	6.5	8	44	50.6	52.6	10.2	14	45	(26)
CS 5.2-1	50.96 (5.2)	1,500	6,000	4.5	8	60	37	40	10.2	16	30	(36)
CS 5.2-2		1,000	18,000	6.5	8	70	56	59	10.2	16	50	(48)
CS 5.7-1	55.86 (5.7)	1,000	8,000	6.5	8	44	55.6	57.6	10.2	14	50	(26)
CS 5.7-2		1,500	12,000	6.5	8	54	56	58	10.2	16	50	(33)
CS 5.7-3		1,000	17,000	6.5	8	67	67	69	10.2	16	60	(41)
CS 6.5-2	63.7 (6.5)	1,000	14,000	6.5	8	95	47	49	10.2	16	40	(60)
CS 7.5-2	73.5 (7.5)	1,000	14,000	6.5	8	95	57	59	10.2	16	50	(60)
CS 8.5-2	83.3 (8.5)	1,000	13,000	6.5	8	95	57	59	10.2	16	50	(60)
CS10.0-2	98 (10.0)	1,000	13,000	6.5	8	95	67	69	10.2	16	60	(60)
CS11.5-2	112.7 (11.5)	1,000	13,000	6.5	8	95	77	79	10.2	16	70	(60)
CS13.0-2	127.4 (13.0)	1,000	14,000	6.5	8	95	87	89	10.2	16	80	(60)
CS15.0-2	147 (15.0)	1,000	13,000	6.5	8	95	97	99	10.2	16	90	(60)

- * No auxiliary holes for mounting are provided for CS 0.05 to 0.2 or CS 1.0-1.
- * The output is the value at the middle point of the return stroke.
- * The output is the value after setting, or conditioning operation. (See page 9.)
- * For installation notes, see the "Notes on Installing a C Type CONSTON" section (page 28 and after).
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

Bracket SBR Type Standard Products (for CS Type)

A bracket for mounting a C Type CONSTON. This can easily be used as a unit product by combining it with a C Type CONSTON.

(For the combinations, see "List of brackets for CS Type" (page 35).)

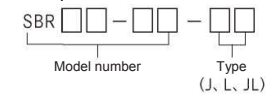


Material

Part name	Material
Bracket	SUS
C-shaped retaining ring	
Shaft	SWCH-equivalent nickel plating
* Spacer	POM

* Whether to use the spacer depends on the SBR model number and type.

Order specification



SBR dimensional table (common to J, L, and JL Types)

Model number	Shaft diameter φ	Bracket board thickness t	Dimensions							
			A	B	C	D	E	F	G	H
SBR45-5	5	1.5	45	22.5	22.5	35	5	12.5	5	8-φ4.5
SBR55-10	10	2.0	55	27.5	27.5	43	6	15.5	6	8-φ5.5
SBR75-10	10	2.0	75	37.5	37.5	63	6	25.5	6	8-φ5.5

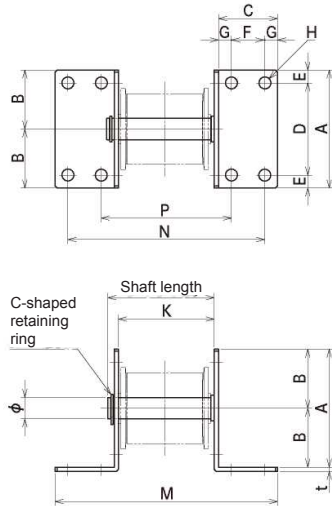
"Shaft length" depends on the combination with CS Type.

* The JL Type is not available for SBR45-5.

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

If the CONSTON output is too strong, the JL Type is recommended.

JL Type



Determining the dimensions (calculation formulas)

Type	K	M	N	P
SBR common to all model numbers-JL	Total drum width + 2	$K + 2t + 2C$	$P + 2F$	$K + 2t + 2G$

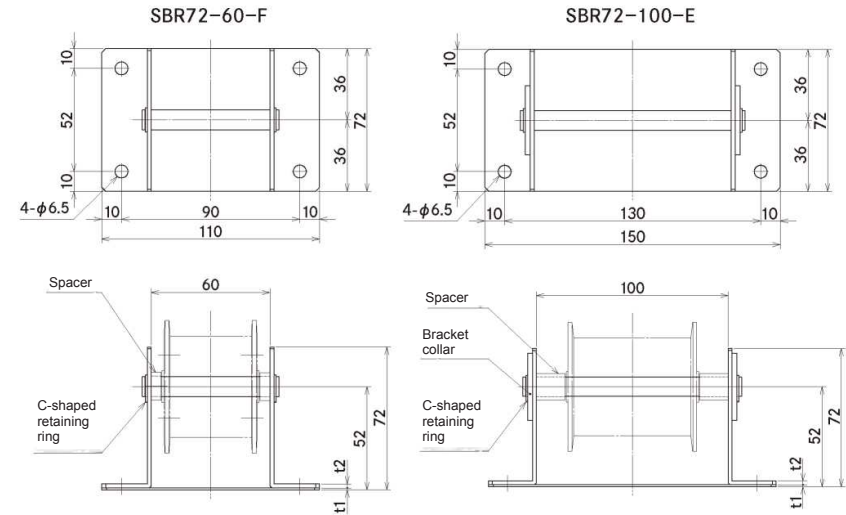
- * For the total drum width, see the CS Type standard product list (page 30 and after).
- * The JL Type is not available for SBR45-5.
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

Use SBR72 for large CS Type products.

Material

Part name	Material
Bracket	SUS
Shaft	
C-shaped retaining ring	
*1 Spacer	
*2 Bracket collar	POM

- *1 Whether to use the spacer or not depends on the combination with the CS Type.
- *2 For the bracket collar, only SBR72-100E is used.



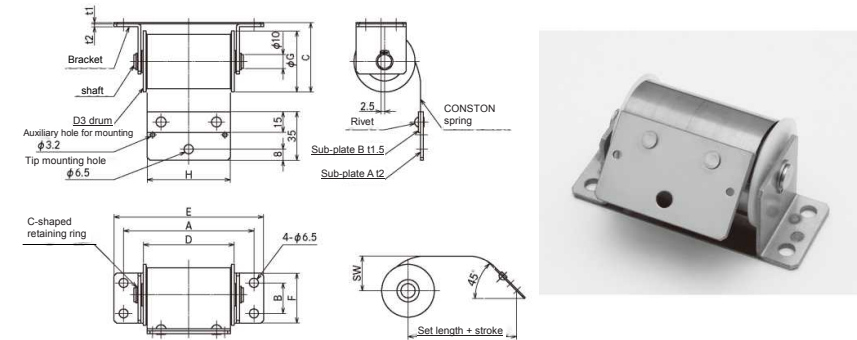
List of brackets for CS Type

CS Type standard product	SBR model No.	Type (selectable)
CS 0.05-1	45-5	J/L
CS 0.1-1	45-5	J/L
CS 0.2-1	45-5	J/L
CS 0.4-1	55-10	J/L/JL
CS 0.6-1	55-10	J/L/JL
CS 0.8-1	55-10	J/L/JL
CS 1.0-1	45-5	J/L
CS 1.0-2	55-10	J/L/JL
CS 1.2-1	55-10	J/L/JL
CS 1.4-1	55-10	J/L/JL
CS 1.4-2	55-10	J/L/JL
CS 1.6-1	55-10	J/L/JL
CS 1.8-1	55-10	J/L/JL
CS 2.0-1	55-10	J/L/JL
CS 2.0-2	55-10	J/L/JL
CS 2.2-1	55-10	J/L/JL
CS 2.2-2	55-10	J/L/JL
CS 2.4-1	55-10	J/L/JL
CS 2.6-1	55-10	J/L/JL
CS 2.9-1	55-10	J/L/JL
CS 2.9-2	75-10	J/L/JL

CS Type standard product	SBR model No.	Type (selectable)
CS 3.2-1	55-10	J/L/JL
CS 3.2-2	55-10	J/L/JL
CS 3.5-2	55-10	J/L/JL
CS 3.5-3	75-10	J/L/JL
CS 3.9-1	55-10	J/L/JL
CS 3.9-3	72-60-F	-
CS 4.3-1	55-10	J/L/JL
CS 4.7-2	55-10	J/L/JL
CS 5.2-1	75-10	J/L/JL
CS 5.2-2	72-60-F	-
CS 5.7-1	55-10	J/L/JL
CS 5.7-2	75-10	J/L/JL
CS 5.7-3	72-100-E	-
CS6.5-2	72-60-F	-
CS7.5-2	72-60-F	-
CS8.5-2	72-60-F	-
CS10.0-2	72-100-E	-
CS11.5-2	72-100-E	-
CS13.0-2	72-100-E	-
CS15.0-2	72-100-E	-

- * See the dimensional drawing of each bracket type for the dimensions of the bracket.
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

C Type CONSTON SB Type (C Type plus with Bracket) Standard Products



Material

Part name	Material
CONSTON spring	Stainless steel for spring
Sub-plate	SUS
Bracket	
Shaft	
C-shaped retaining ring	Plastic
D3 drum	
Rivet	

For the SB Type, the center of the shaft and those of the two bracket mounting holes are shifted by 2.5 mm in consideration of the mounting location. Mount it in the direction more convenient for your design.

SB Type standard product list

Model No.	Out N (kgf)	Output tolerance N (kgf)	Set length + stroke (mm)	Life (reference value)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	Bulge (reference value) SW (mm)
SB-1	33.32(3.4)	+2.97 0 (+0.3 0)	1,000	6,000	74	17	41	50.6	88	31	34	45	(18)
SB-2	37.24(3.8)		1,000	6,000	84	17	41	55.6	98	31	34	50	(18)
SB-3	40.18(4.1)		1,000	6,000	74	17	43	50.6	88	31	38	45	(21)
SB-4	43.12(4.4)		1,000	6,000	74	17	43	50.6	88	31	38	45	(21)
SB-5	47.04(4.8)		1,000	6,000	84	17	43	55.6	98	31	38	50	(21)
SB-6	49(5.0)		1,000	6,000	74	22	50	50.6	88	36	44	45	(26)
SB-7	52.92(5.4)		1,000	6,000	84	22	50	55.6	98	36	44	50	(26)
SB-8	55.86(5.7)		1,000	6,000	84	22	50	55.6	98	36	44	50	(26)
SB-9	58.8(6.0)		1,000	6,000	84	22	50	60.6	98	36	44	55	(26)
SB-10	61.74(6.3)		1,000	6,000	84	22	50	60.6	98	36	44	55	(26)
SB-11	64.68(6.6)		1,000	6,000	94	22	50	65.6	108	36	44	60	(26)
SB-12	67.62(6.9)		1,000	6,000	94	22	50	65.6	108	36	44	60	(26)
SB-13	69.58(7.1)	1,000	6,000	94	22	50	70.6	108	36	44	65	(26)	
SB-14	72.52(7.4)	1,000	6,000	94	22	50	70.6	108	36	44	65	(26)	
SB-15	75.46(7.7)	+3.92 0 (+0.4 0)	1,000	6,000	99	22	50	75.6	113	36	44	70	(26)
SB-16	78.4(8.0)		1,000	6,000	99	22	50	75.6	113	36	44	70	(26)
SB-17	84.28(8.6)		1,000	6,000	109	22	50	80.6	123	36	44	75	(26)
SB-18	89.18(9.1)		1,000	6,000	109	22	50	85.6	123	36	44	80	(26)
SB-19	96.04(9.8)		1,000	6,000	119	22	50	95.6	133	36	44	90	(26)
SB-20	100.94(10.3)		1,000	6,000	119	22	50	95.6	133	36	44	90	(26)

- * The output is the value at the middle point of the return stroke.
- * The output is the value after setting, or conditioning operation. (See page 9.)
- * For installation notes, see the "Notes on Installing a C Type CONSTON" section (page 28 and after).
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

Description of N Type CONSTON NW Type Standard Products

What is NW Type?

- A unit that can obtain a constant drawing force (i.e. returning force) regardless of how far the terminal attached to the wire (i.e. tip mounting plate) is stretched.

• Optimal cases for NW Type

- The object to be handled as the load (i.e. workpiece) has no guide for movement, and a degree of freedom is desired.
- Running with a wire (e.g. when it cannot be installed linearly)
- No space for C Type CONSTON
- Preventing the CONSTON spring from coming into contact with any other objects
- The stroke is insufficient with C Type CONSTON.
- A C Type CONSTON is improper in terms of appearance because the spring is pulled out as it is.

• NW Type standard products

From the following five types of standard products, you can select the one meeting your purpose. It is possible to offer custom-made products, not standard ones. For details, please feel free to contact us.



NWS Type (page 40)
Wire output 1.96 N (0.2 kgf) to 14.7 N (1.5kgf)



NWT Type (page 41)
Wire output 19.6 N (2.0 kgf) to 29.4 N (3.0 kgf)



NWG Type (page 42)
Wire output 39.2 N (4.0 kgf) to 147 N (15.0 kgf)



NWH Type (page 43)
Wire output 196 N (20.0 kgf) to 294 N (30.0 kgf)



NWS-OD Type (with oil damper) (page 44)
Wire output (reference value) 4.9 N (0.5 kgf) to 14.7 N (1.5 kgf)

— **NW series products with tip mounting plate** —
 Because of high-power products, for the NWT, NWG, and NWH Types, the tip mounting plate has two screw holes for easy mounting.

Use the screw holes as shown in Figure 1, and use the weight only during mounting. This way, it can be easily pulled out to the mounting position. (Procure a weight having a weight approximate to the CONSTON output.)

(Temporary fastening depending on balance state)

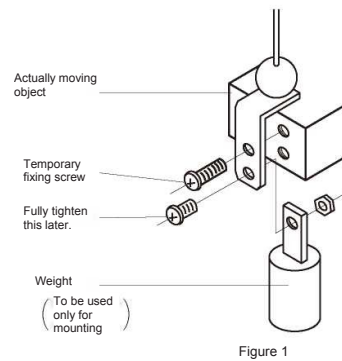


Figure 1

● **Notes on use**

⚠ DANGER

— **Wire** —

- (1) To prevent wire cutting, the wire should be attached so that it will not rub against the pulling outlet of the bracket or any other parts.
- (2) If a pulley is used for changing the wire direction, the pulley must meet the following: (Figure 2)
 NWS, NWT, and NWS-OD Types $\geq \phi 30$
 NWG and NWH Types $\geq \phi 40$ mm
- (3) Use it within the specified wire stroke.

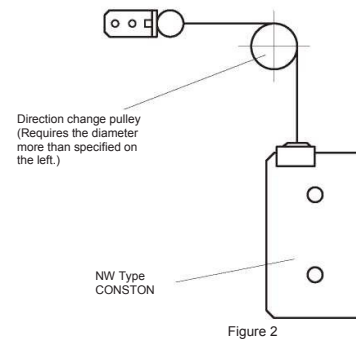


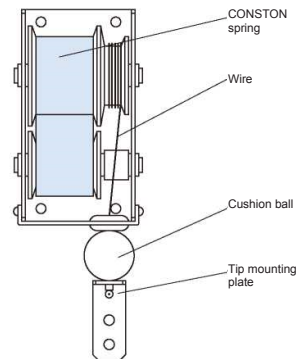
Figure 2

* CONSTON springs are assumed to be used under a static load. Thus, do not apply any shocking load to them.

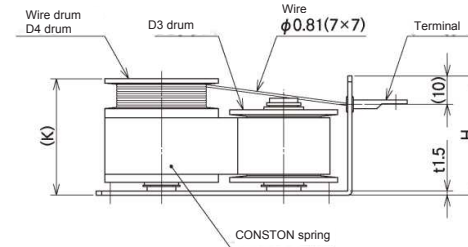
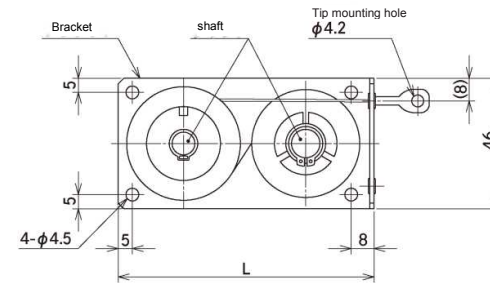
— **Cushion ball** —

The NWG and NWH Type products have a rubber cushion ball attached, in order to reduce the damage from the shock caused by the wire pulled inward at a stretch, for example, when it is released from the operator's hand.

* Avoid any design that requires the operator to make the cushion ball work every time.



N Type CONSTON NWS Type Standard Products



Material

Part name	Material
CONSTON spring	Stainless steel for spring
Bracket	SUS
C-shaped retaining ring	
Wire	
Shaft	SWCH-equivalent nickel plating
D3 drum	PP
Wire drum D4 drum	
Terminal	Fe trivalent chromate

● **Wire pull-out direction**

The standard is pulling out to the right (R) (as shown on the left). The leftward pull-out (L) products are made-to-order products.

NWS Type standard product list

Output tolerance +15%
0%

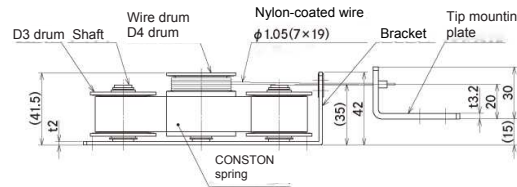
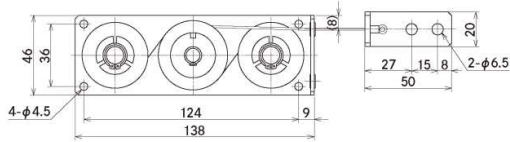
Model number	Wire output N (kgf)	Wire stroke (mm)	Life (reference value) (times)	Dimensions (mm)		
				L	H	K
NWS0.2-1-R (or -L)	1.96 (0.2)	1,000	20,000	70	33	(32)
NWS0.3-2-R (or -L)	2.94 (0.3)	1,000	30,000	90	42	(41)
NWS0.4-1-R (or -L)	3.92 (0.4)	1,000	11,000	70	33	(32)
NWS0.5-1-R (or -L)	4.9 (0.5)	1,000	22,000	90	42	(41)
NWS0.6-2-R (or -L)	5.88 (0.6)	1,000	16,000	90	42	(41)
NWS0.8-1-R (or L)	7.84 (0.8)	1,000	4,000	70	33	(32)
NWS1.0-1-R (or L)	9.8 (1.0)	1,000	11,000	90	42	(41)
NWS1.2-2-R (or -L)	11.76 (1.2)	1,000	8,000	90	42	(41)
NWS1.5-1-R (or -L)	14.7 (1.5)	1,000	6,000	90	42	(41)

* The output is the value at the middle point of the return stroke.

* The output is the value resulting after setting, or conditioning operation. (See page 13.)

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

N Type CONSTON NWT Type Standard Products



Material

Part name	Material
CONSTON spring	Stainless steel for spring
Bracket	SUS
C-shaped retaining ring	
Wire support	
Wire	SUS nylon-coated product
Shaft	SWCH-equivalent nickel plating
D3 drum	PP
D4 drum	
Tip mounting plate	
Tip mounting plate	SPC trivalent chromate

● Wire pull-out direction

The standard is pulling out to the right (R) (as shown on the left). The leftward pull-out (L) products are made-to-order products.

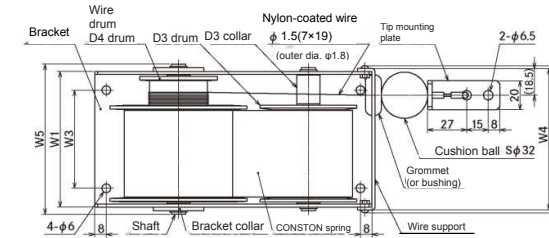
NWT Type standard product

Output tolerance $+15\%$
 0%

Model number	Wire output N (kgf)	Wire stroke (mm)	Life (reference value) (times)
NWT2.0-1-R (or -L)	19.6(2.0)	1,000	11,000
NWT3.0-1-R (or -L)	29.4(3.0)	1,000	6,000

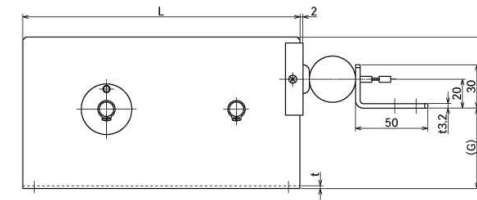
- * The output is the value at the middle point of the return stroke.
- * The output is the value resulting after setting, or conditioning operation. (See page 13.)
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

N Type CONSTON NWG Type Standard Products



Material

Part name	Material
CONSTON spring	Stainless steel for spring
Bracket	SUS
Wire support	
Shaft	
C-shaped retaining ring	SUS nylon-coated product
Wire	
*1 D3 drum	Plastic or AL
*1 D4 drum	
Wire drum	POM
D3 collar	
*2 Bracket collar	
*3 Bushing	ABS
Tip mounting plate	SPC trivalent chromate
*3 Grommet	Rubber
Cushion ball	



- *1 Contact us for the material for the applicable product.
- *2 The bracket collar is used for NWG 8.0-1 to 15.0-1.
- *3 NWG15.0-1 uses the bushing. The others use the grommet.

● Wire pull-out direction

The standard is pulling out to the right (R) (as shown on the left).

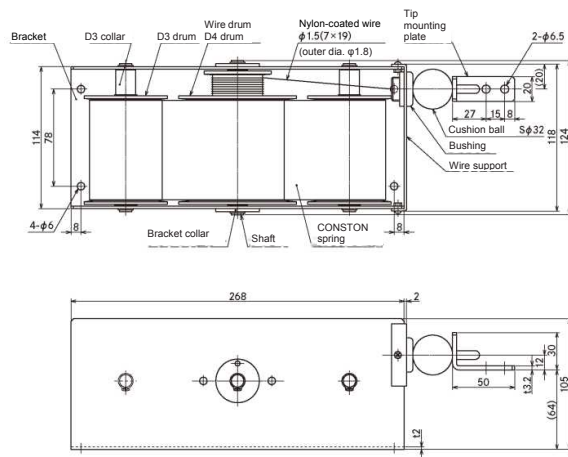
NWG Type standard product

Output tolerance $+15\%$
 0%

Model number	Wire output N(kgf)	Wire stroke (mm)	Life (reference value) (times)	Dimensions (mm)								
				L	W1	W2	W3	W4	W5	H	G	t
NWG 4.0-1-R (or -L)	39.2 (4.0)	1,000	6,000	135	73	(81)	48	77	79	80	(41)	1.5
NWG 5.0-1-R (or -L)	49 (5.0)	1,000	6,000	135	83	(91)	58	87	89	80	(41)	1.5
NWG 6.0-1-R (or -L)	58.8 (6.0)	1,000	6,000	135	93	(101)	68	97	99	80	(41)	1.5
NWG 7.0-1-R (or -L)	68.6 (7.0)	1,000	6,000	135	103	(111)	78	107	109	80	(41)	1.5
NWG 8.0-1-R (or -L)	78.4 (8.0)	1,000	7,000	192	74	(82)	48	78	84	105	(56)	2.0
NWG 10.0-1-R (or -L)	98 (10.0)	1,000	7,000	192	84	(92)	58	88	94	105	(56)	2.0
NWG 12.0-1-R (or -L)	117.6 (12.0)	1,000	7,000	192	94	(102)	68	98	104	105	(56)	2.0
NWG 15.0-1-R (or -L)	147 (15.0)	1,000	7,000	192	104	(112)	78	108	114	105	(56)	2.0

- * The output is the value at the middle point of the return stroke.
- * The output is the value resulting after setting, or conditioning operation. (See page 13.)
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

N Type CONSTON NWH Type Standard Products



Material

Part name	Material
CONSTON spring	Stainless steel for spring
Bracket	SUS
Wire support	
Shaft	
C-shaped retaining ring	SUS nylon-coated product
Wire	PP
D3 drum	
Wire drum D4 drum	POM
D3 collar	
Bracket collar	ABS
Bushing	
Tip mounting plate	SPC trivalent chromate
Cushion ball	Rubber

● Wire pull-out direction

The standard is pulling out to the right (R) (as shown on the left). The leftward pull-out (L) products are made-to-order products.

NWH Type standard product list

Output tolerance $\begin{matrix} +15\% \\ 0\% \end{matrix}$

Model number	Wire output N (kgf)	Wire stroke (mm)	Life (reference value) (times)
NWH 20.0-2-R (or -L)	196 (20.0)	1,000	17,000
NWH 25.0-2-R (or -L)	245 (25.0)	1,000	11,000
NWH 30.0-2-R (or -L)	294 (30.0)	1,000	9,500

* The output is the value at the middle point of the return stroke.

* The output is the value resulting after setting, or conditioning operation. (See page 13.)

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

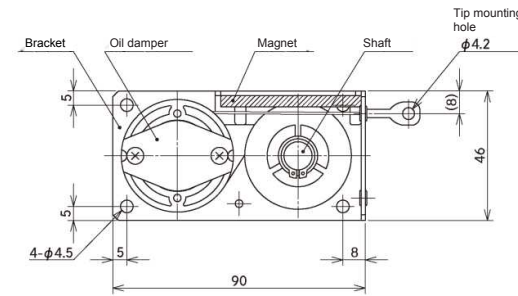
N Type CONSTON NWS-OD Type (with Oil Damper) Standard Products

The oil damper allows the wire to rewind slowly, which is safe. This function is ideal for slowly raising the lighting or ceiling-mounted air conditioner filters after maintenance.

It operates firmly to the end because the returning force (i.e. pulling force) is constant. Thus, motor-like behavior can be obtained.

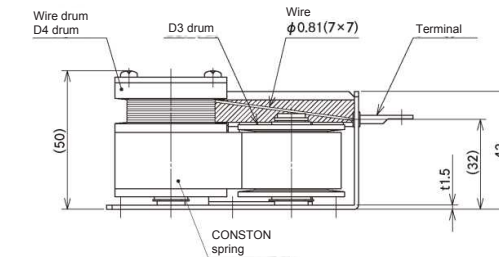
● Notes on use

Do not push the wire back faster than the rewind speed of the CONSTON spring. This may loosen the wire, causing a failure.



Material

Part name	Material
CONSTON spring	Stainless steel for spring
Bracket	SUS
C-shaped retaining ring	
Wire	
Shaft	SWCH-equivalent nickel plating
D3 drum	PP
Wire drum D4 drum	
Oil damper	Plastic, SUS, oil
Terminal	Fe trivalent chromate
Magnet	Ferrite magnet



● Wire pull-out direction

The standard is pulling out to the right (R) (as shown on the left). The leftward pull-out (L) products are made-to-order products.

NWS-OD Type standard product list

Model number	Wire output (reference value) N(kgf)	Wire stroke (mm)	Wire return speed (reference value)Note 1) (mm/sec)	Life (reference value)Note 2) (times)
NWS-OD-0.5-10-R (or -L)	4.9 (0.5)	1,500	20	22,000
NWS-OD-1.0-10-R (or -L)	9.8 (1.0)	1,500	90	11,000
NWS-OD-1.5-10-R (or -L)	14.7 (1.5)	1,500	200	6,000

Note 1: The return speed varies depending on the torque tolerance of the oil damper and the difference in oil viscosity due to temperature. Thus, use these values only for reference.

Note 2: Use the product at 2 cycles/min or less to prevent the oil damper temperature from rising. The life values are the number of times that will result when the product is used at 2 cycles/min or less.

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

NH Type CONSTON (Stacked Type)

What is NH Type CONSTON (stacked type)?

- Provides strong torque in a small space.
- A series of CONSTON springs for a small rotation angle.

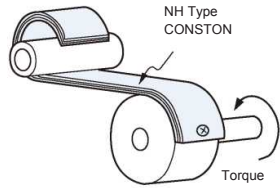


Figure 1

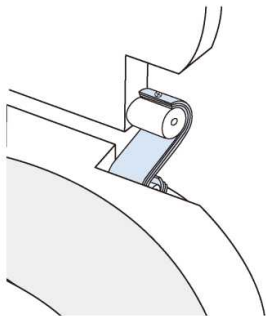


Figure 2

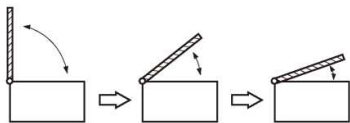


Figure 3

● NH Type CONSTON (Figure 1)

Each NH Type CONSTON consists of a number of CONSTON springs stacked shown in Figure 1.

One NH Type CONSTON can output n times the torque of one CONSTON spring although its operating range is usually limited within 110° .

It is possible to meet the desired torque by expanding the width, increasing the number of CONSTON springs, or changing the thickness.

NH Type CONSTONS are used for various purposes. This section explains using it to open/close the lid of a box as a typical example.

(Contact us if you are considering any other application)

● Installation example (Figure 2)

If an NH Type CONSTON is to be used to open/close the lid, it allows you to open/close the lid easily by attaching it at the lid hinge.

● Lid opening/closing angle (Figure 3)

If an NH Type CONSTON is used to open/close the lid, it is used to open/close in the range from the vertical to horizontal position as shown in Figure 3.

(Contact us if you assume the use in another angular range)

NH Type CONSTON Design plan

● Main installation method (Figures 4 and 5)

Figures 4 and 5 show the two methods of installing an NH Type CONSTON to the lid. As shown in Figures 4 and 5, with the original shape unchanged, fix the outer end of the NH Type CONSTON to the **D4 drum** with screws. Then, attach the inner end to the **D3 roller**, which is freely rotatable. (The installation method in Figure 4 is common.)

Attaching the D4 drum to the lid

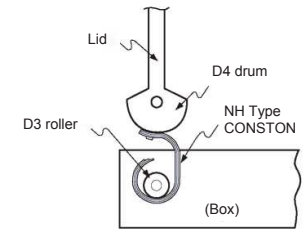


Figure 4

Attaching the D3 roller to the lid

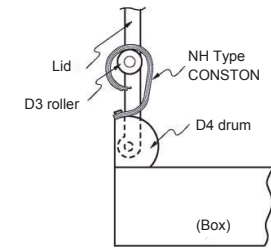


Figure 5

● Other installation methods (Figures 6, 7 and 8)

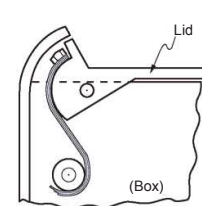


Figure 6

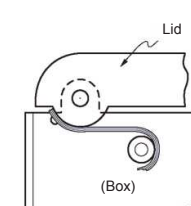


Figure 7

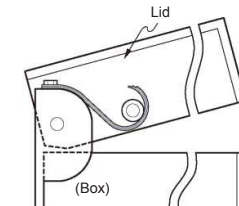


Figure 8

Operation of NH Type CONSTON



Figure 9

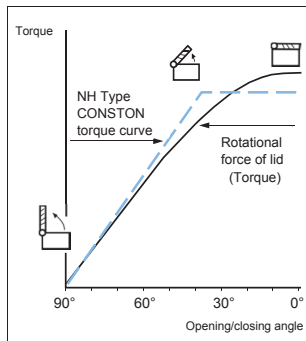


Figure 10



Figure 11



Figure 12



Figure 13

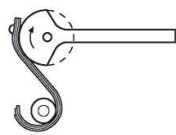


Figure 14

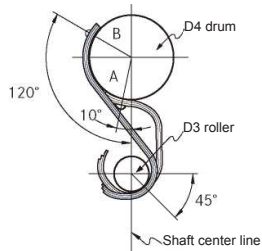


Figure 15

● NH Type CONSTON original shape (Figure 9)

The material of an NH Type CONSTON is stainless steel for spring. In the released state (i.e. delivered product state), it has the shape as shown in Figure 9.

● Torque curve (Figure 10)

The solid curved line in Figure 10 shows the rotational force (i.e. torque) of the lid. For a flat lid, the torque is 0 in a vertical position (90° open) and reaches its maximum torque just before the lid goes horizontal (0°).

On the other hand, the NH Type CONSTON torque curve rises from 90° to 0° as shown by the dashed line in Figure 10.

That is, by using an NH Type CONSTON, which has a repulsive force to open against the torque of closing the lid, the opening/closing load can be reduced.

● Description of operation (Figures 11 to 14)

If the outer end is fixed to the D4 drum with screws and the inner end is attached to the D3 roller, the NH CONSTON winds in the reverse direction from the D3 roller to the D4 drum while the lid is closing.

Since the NH Type CONSTON reversed to the D4 drum tries to return to its original shape, a rotational force (i.e. torque) is generated on the D4 drum, thus allowing you to open/close the lid lightly.

● Operating angle (Figure 15)

The D4 drum operating angle is 110° in the standard design. Use it while the mounting bolt is between position A (about 10° from the shaft center line) and B (120° from there).

The operating angle may be changed, provided that the CONSTON spring length is determined so that the spring section of 45° remains on the D3 roller.

NH Type CONSTON Design Procedure

Depending on the required life (i.e. number of repetitions) and torque, select the NH Type CONSTON thickness, width, number of installations, and number of stacked springs based on Tables 1 and 2 on pages 54 and 55 by using the following procedure.

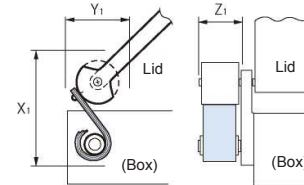


Figure 16

● Installation space (Figure 16)

First, determine the allowable installation space (X_1 , Y_1 , Z_1) and the outlined relationship among the installation positions.

See the "X" and "Y" columns of "Space dimensions" and the "Width" columns of "NH Type CONSTON dimensions" in Tables 1 and 2 on pages 54 and 55.

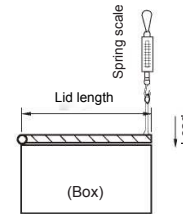


Figure 17

● Life (number of repetitions)

Determine how many times a day you will operate the NH Type CONSTON and how many years you will use it before replacement.

In Tables 1 and 2 on pages 54 and 55, the life values are **4,000** and **10,000 times** (reference values), respectively.

Torque per piece
Calculate the required torque (T_a) per piece.

Total torque ÷ Number of pieces installed = Required torque per piece (T_a)
(Total torque = Maximum torque in opening/closing the lid)

● How to measure the total torque (Figure 17)

If the actual lid is available, the total torque can be calculated by measuring the lid load with the lid almost horizontal as shown in Figure 17.

Spring scale measured value x Lid length = Total torque

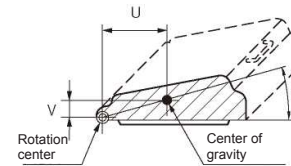


Figure 18

● Center of gravity (Figure 18)

For some shapes of the lid, it is necessary to consider the center of gravity of the lid. As shown in Figure 18, it is convenient to obtain the center-of-gravity position angle, θ (theta).

To make measurement using the actual lid, do the following: As shown in Figures 19 and 20, balance it in two directions and measure the distances from the center of rotation, U and V, to find the center of gravity.

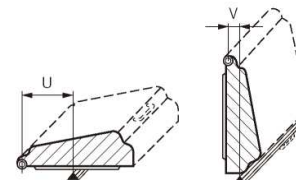


Figure 19

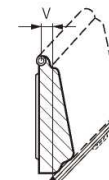


Figure 20

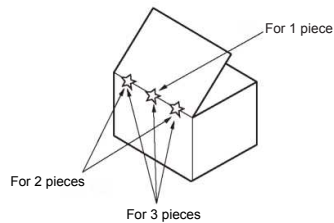
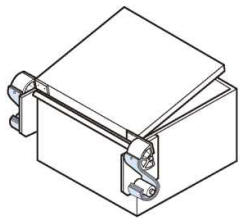


Figure 21

$T_a + T_i = n$
T_a: Required torque per piece
T_i: Torque per spring
n: Number of stacked springs
 (Equation 1)

$T_i \times n = T_a$
T_i: Torque per spring
n: Number of stacked springs
T_a: Required torque per piece
 (Equation 2)



Please feel free to contact us if you have any questions.

● **Number of pieces installed (Figure 21)**

Usually, use two pieces in total, one on each side of the left and right. The required torque per piece decreases as the number of pieces installed increases.

● **Determining the number of stacked springs**

It is convenient to tentatively determine the number of stacked springs, keeping the allowed mounting space in mind.

The number of stacked springs is usually 2 to 20. For example, if it is 10, multiply the required torque per one piece (T_a) by 1/10. Then, from Tables 1 and 2 on pages 54 and 55, select a torque per spring (T_i) slightly higher than that value.

The increase/decrease in the number of stacked springs is directly proportional to the torque. Contact us if you wish to stack 11 springs or more

NH Type CONSTON specifications

1. Life (number of repetitions)
2. Required torque per piece (T_a)
3. NH Type CONSTON dimensions (thickness x width x length)
4. Number of pieces installed
5. Number of stacked springs
6. Mounting dimensions (D4 drum diameter, D3 roller diameter, inter-shaft distance)
7. Applications and environment

NH Type CONSTON Example

Below is an example where the D4 drum is attached to the lid when a space of X₁=100, Y₁=60, and Z₁=40 is placed on both sides of the lid as shown in Figure 22.

1. Life: 4,000 times

2. Total torque (Figure 23)

Assume that the lid is flat and for opening/closing and its length and weight are 400 mm and 32.34 N (3.3 kgf), respectively.

Total torque = 400 mm ÷ 2 × 32.34 N (3.3 kgf) = 6,468 mN·m (660 kgf·mm)

3. Number of pieces installed: 2

4. Torque per piece (T_a)

Total torque ÷ Number of pieces installed = Torque per piece (T_a); therefore, 6,468 mN·m (660 kgf·mm) ÷ 2 = 3,234 mN·m (330 kgf·mm).

5. Number of stacked springs

If it is 10 stacked springs, the torque per spring (T_i) is 3,234 mN·m (330 kgf·mm) ÷ 10 sheets = 323.4 mN·m (33 kgf·mm).

In Table 1 on pages 54 and 55, the pair of X=95 and Y=52 matches the desired space in "Space dimensions". Therefore, find the intersection of the 0.15 mm row of NH Type CONSTON "Thickness" in the right column of the table and the 30 mm "Width" column. Select 332.22 mN·m (33.9 kgf·mm) in that cell.

3,234mN·m (330 kgf·mm) ÷ 332.22 mN·m (33.9 kg·f·mm) = 9.7 springs

From this result, nine springs are used so that it will be stable when the lid is closed.

6. Torque per piece

332.22 mN·m (33.9 kgf·mm) x 9 springs = 2,989.98 mN·m (305.1 kgf·mm)

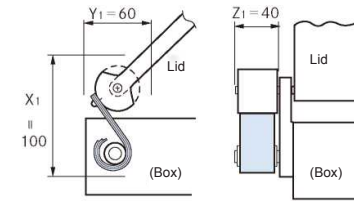


Figure 22

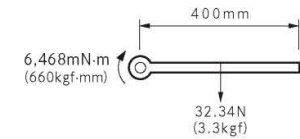


Figure 23

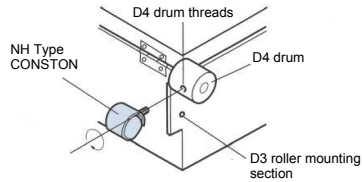
Determining the specifications for the example

1. Life (reference value)
4,000 times
2. Required torque per piece (T_a)
2,989.98 mN·m (305.1 kgf·mm)
3. NH Type CONSTON dimensions
0.15 × 30 × 105 mm
4. Number of pieces installed: 2
5. Number of stacked springs: 9
6. Mounting dimensions (from Table 1 on pages 54 and 55)
D4 drum φ36 mm
D3 roller φ15 mm
Inter-shaft distance (E) 48mm
7. Mounting bolt (from Table3 on pages 54 and 55)
1-M6

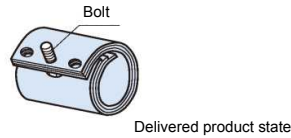
Installing the NH Type CONSTON to the drum

Install the NH Type CONSTON by reference to the following procedure.

(1) Temporarily fixing the NH Type

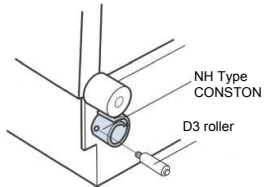


Temporarily fasten to the threads of the D4 drum, the bolt incorporated in the NH Type CONSTON in the delivered product state.



Delivered product state

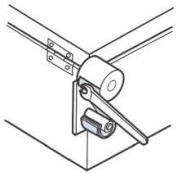
(2) Attaching the D3 roller



With the lid open (90°), attach the D3 roller. At this time, slightly lower the NH Type CONSTON using the D3 roller.

* Make sure that the D3 roller can be retrofitted as described above

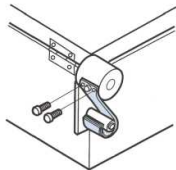
(3) Fully tightening the NH Type CONSTON (if one hole is at the tip)



With the lid closed (i.e. with the NH Type CONSTON stretched), securely tighten the bolt that temporarily fastened in step (1). At this time, be careful not to twist the NH Type CONSTON.

* If the NH Type CONSTON has a width of 40mm or more, three holes must be at the tip. If there are three tip holes, perform the installation in the order of (1) → (2) → (4).

(4) Fully tightening the NH Type CONSTON (if three holes are at the tip)



With the lid closed (i.e. with the NH Type CONSTON extended), insert the bolts into the left and right holes of the bolts that were temporarily fastened in step (1), and tighten and fix the three bolts evenly and firmly. At this time, be careful not to twist the NH Type CONSTON.

* After the installation is completed, use it after performing the setting, or conditioning operation.
The stable output is reached after performing the setting (or conditioning operation) which repeats opening/closing the lid 5 to 10 times.

NH Type CONSTON Torque Table

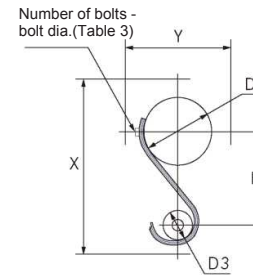


Table 1 Torque per NH Type CONSTON spring

	Mounting dimensions (mm)				
	Space dimensions		Drum/roller dia.		Inter-shaft distance
	X	Y	D4	D3	E
Life (reference value) 4,000 times	69	38	24	10	33
	82	46	30	12	41
	95	52	36	15	48
	121	68	50	20	60
	144	80	60	25	71
	170	92	70	30	84

Table 2 Torque per NH Type CONSTON spring

	Mounting dimensions (mm)				
	Space dimensions		Drum/roller dia.		Inter-shaft distance
	X	Y	D4	D3	E
Life (reference value) 10,000 times	79	44	30	12	41
	95	52	36	15	48
	109	61	45	18	55
	141	78	60	25	71
	168	90	70	30	84

- * For reading the table, see the NH Type CONSTON design procedure (page 50).
- * Tables 1 and 2 list the torque values per NH Type CONSTON (Ti).
- * The torque values are those resulting after setting, or conditioning operation. (See page 13.)
- * The torque tolerance per piece is $\pm 8\%$.
If an excessive number of stacked springs are used, the actual number of stacked springs may differ from the specified number, taking the tolerance into consideration.
- * Table 3 is a mounting bolt table. The mounting bolt is determined by the CONSTON width.
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

It is possible to offer custom-made products not listed in the table. For details, please feel free to contact us.

NH Type CONSTON dimensions (mm)												
Length	Thickness	Width										
		10	13	15	20	25	30	35	40	45	50	
70	0.1	49.00 (5.0)	63.70 (6.5)	73.50 (7.5)	98.98 (10.1)	123.48 (12.6)						
90	0.13	83.30 (8.5)	108.78 (11.1)	125.44 (12.8)	166.60 (17.0)	208.74 (21.3)	249.90 (25.5)					
105	0.15	110.74 (11.3)	144.06 (14.7)	166.60 (17.0)	221.48 (22.6)	277.34 (28.3)	332.22 (33.9)	388.08 (39.6)	442.96 (45.2)			
130	0.2	196.98 (20.1)	255.78 (26.1)	295.96 (30.2)	393.96 (40.2)	492.94 (50.3)	590.94 (60.3)	689.92 (70.4)	787.92 (80.4)	886.90 (90.5)	984.90 (100.5)	
160	0.25		399.84 (40.8)	461.58 (47.1)	615.44 (62.8)	769.30 (78.5)	923.16 (94.2)	1,077.02 (109.9)	1,230.88 (125.6)	1,384.74 (141.3)	1,539.58 (157.1)	
190	0.3			655.62 (66.9)	874.16 (89.2)	1,092.70 (111.5)	1,311.24 (133.8)	1,529.78 (156.1)	1,748.32 (178.4)	1,966.86 (200.7)	2,185.40 (223.0)	

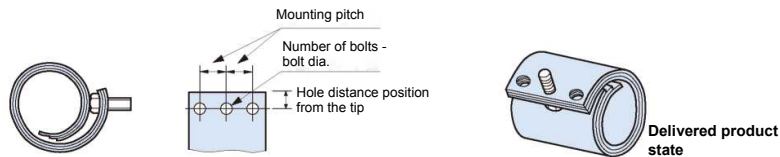
mN·m
(kgf·mm)

NH Type CONSTON dimensions (mm)												
Length	Thickness	Width										
		10	13	15	20	25	30	35	40	45	50	
90	0.1	39.20 (4.0)	50.96 (5.2)	58.80 (6.0)	78.40 (8.0)	98.00 (10.0)						
110	0.13	64.68 (6.6)	84.28 (8.6)	97.02 (9.9)	129.36 (13.2)	161.70 (16.5)	194.04 (19.8)					
120	0.15	89.18 (9.1)	115.64 (11.8)	133.28 (13.6)	177.38 (18.1)	221.48 (22.6)	266.56 (27.2)	310.66 (31.7)	354.76 (36.2)			
160	0.2	157.78 (16.1)	204.82 (20.9)	236.18 (24.1)	315.56 (32.2)	393.96 (40.2)	473.34 (48.3)	551.74 (56.3)	631.12 (64.4)	709.52 (72.4)	788.90 (80.5)	
190	0.25		304.78 (31.1)	351.82 (35.9)	469.42 (47.9)	587.02 (59.9)	704.62 (71.9)	821.24 (83.8)	938.84 (95.8)	1,056.44 (107.8)	1,174.04 (119.8)	

mN·m
(kgf·mm)

Table 3 Mounting bolts

Width	10	13	15	20	25	30	35	40	45	50
Number of bolts - bolt dia.	1-M4	1-M4	1-M5	1-M5	1-M6	1-M6	1-M6	3-M5	3-M5	3-M5
Mounting pitch	-	-	-	-	-	-	-	12	12	12
Hole distance position from the tip	7	7	7	7	8	8	8	7	7	7



Note: The delivered product contains only one bolt assembled at the center of the NH Type CONSTON. (Products using three bolts (width ≥ 40 mm) come with two bolts attached.)

Mainspring Unit Lineup

MSW Type Mainspring Units



MSW-A Type Standard Products 58
Wire output: 4.9 N (0.5 kgf) to 29.4 N (3.0 kgf)



MSW-B Type Standard Products 59
Wire output: 4.9 N (0.5 kgf) to 8.82 N (0.9 kgf)

Mainspring Unit MSW-A Type Standard Products



● Features

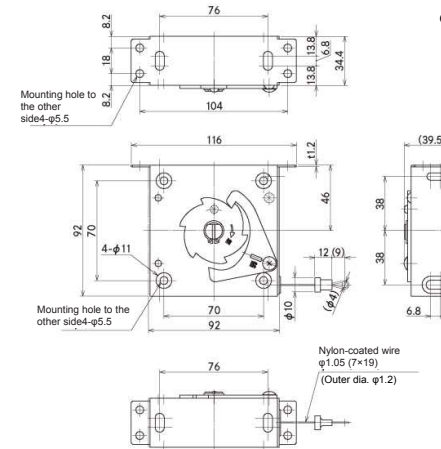
- (1) There are six wire output types from 4.9 N (0.5 kgf) to 29.4 N (3.0 kgf).
- (2) The wire can be pulled out in one of eight directions. Specify the desired one when ordering it.
- (3) The wire output is adjustable. For how to adjust it, there is a separate instruction manual available.
- (4) This product has two mounting surfaces, which can be tailored to your application.

● Order specification

MSW-A□ □ -1,500-□□

Model number Stroke Pull-out direction (figure below)

● Wire pull-out direction



Material

Part name	Material
Mainspring	Stainless steel for spring
Bracket	SPC trivalent chromate
Wire	SUS nylon-coated product
Mainspring case	PP
Wire terminal	Brass

MSW-A Type standard

Model number	Wire output N (kgf)	Wire stroke (mm)	Output tolerance ±10%	
			Maximum adjustment output N (kgf) / number of rotations (reference value)	Minimum adjustment output N (kgf) / number of rotations (reference value)
MSW-A0.5	4.9(0.5)	1,500	6.86 (0.7) / 6 rotations	3.92 (0.4) / -1 rotation
MSW-A1.0	9.8(1.0)	1,500	11.76 (1.2) / 4 rotations	8.82 (0.9) / -1 rotation
MSW-A1.5	14.7(1.5)	1,500	16.66 (1.7) / 2 rotations	13.72 (1.4) / -1 rotation
MSW-A2.0	19.6(2.0)	1,500	19.6 (2.0) (not adjustable)	18.62 (1.9) / -1 rotation
MSW-A2.5	24.5(2.5)	1,500	24.5 (2.5) (not adjustable)	23.52 (2.4) / -1 rotation
MSW-A3.0	29.4(3.0)	1,500	29.4 (3.0) (not adjustable)	28.42 (2.9) / -1 rotation

* The output is the value at the 10 mm point of the return stroke.

* The maximum adjustment output / number of rotations is the value obtained when a stroke of 1,500 mm is used.

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

CAUTION

* Use it within the specified wire stroke.

* Mainspring units are assumed to be used under a static load. Thus, do not apply any shocking load to them.

Mainspring Unit MSW-B Type Standard Products



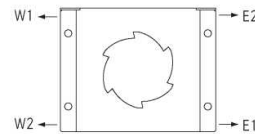
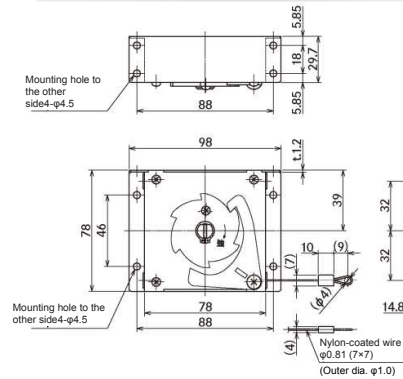
● Features

- (1) There are three wire output types: 4.9 N (0.5 kgf) to 8.82 N (0.9 kgf).
- (2) The wire can be pulled out in one of four directions. Specify the desired one when ordering it.
- (3) The wire output is adjustable. For how to adjust it, there is a separate instruction manual available.
- (4) This product has two mounting surfaces, which can be tailored to your application.

● Order specification

MSW-B□. □-1,500-□□
 Model number Stroke Pull-out direction (figure below)

● Wire pull-out direction



Material

Part name	Material
Mainspring	Stainless steel for spring
Bracket	SPC trivalent chromate
Wire	SUS nylon-coated product
Mainspring case	PP
Wire terminal	Brass

MSW-B Type standard

Output tolerance ±10%

Model number	Wire output N (kgf)	Wire stroke (mm)	Maximum adjustment output N (kgf) / number of rotations (reference value)	Minimum adjustment output N (kgf) / number of rotations (reference value)
MSW-B0.5	4.9(0.5)	1,500	6.08 (0.62) / 5 rotations	4.61 (0.47) / -1 rotation
MSW-B0.7	6.86(0.7)	1,500	8.13 (0.83) / 3 rotations	6.47 (0.66) / -1 rotation
MSW-B0.9	8.82(0.9)	1,500	8.82 (0.9) (not adjustable)	8.23 (0.84) / -1 rotation

- * The output is the value at the 50 mm point of the return stroke.
- * The maximum adjustment output / number of rotations is the value obtained when a stroke of 1,500 mm is used.
- * The product specifications are subject to change without prior notice. Thus contact us before ordering.

Covering Products / Others Lineup

Covering Products and Others



Spiral Cover SC 62



Covering CONSTON CC..... 64



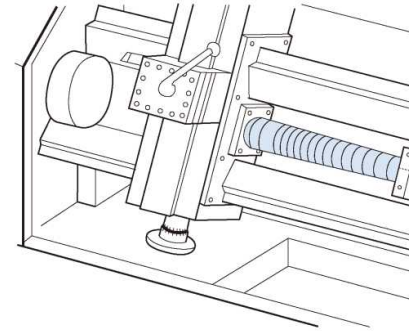
Winder Cover MC..... 66

Convex



Raingutter-Shaped Steel Strip Convex 67

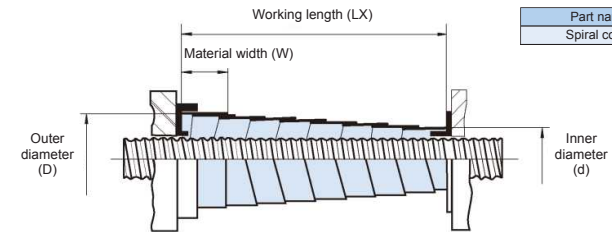
Spiral Cover SC



The spiral cover is a telescopic dustproof cover, which is optimal for protecting ball screws, shafts, cylinders and the like of various machines.

Material

Part name	Material
Spiral cover	Stainless steel for spring



Spiral cover SC dimension table

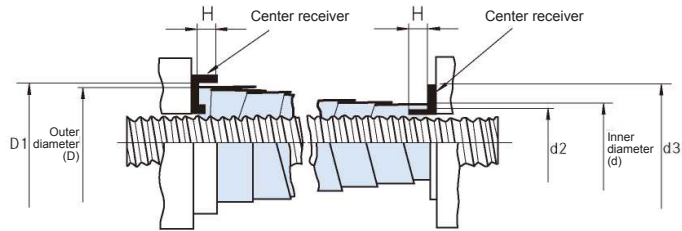
Model number	Material width W	Inner diameter d	Working length LX	Outer diameter D
SC -2020	20	20	200	37
-2025	25	20	250	37
-2030	30	20	300	37
-2520	25	25	200	42
-2525	25	25	250	44
-2530	30	25	300	44
-2540	40	25	400	44
-3020	30	30	200	47
-3025	30	30	250	50
-3030	35	30	300	50
-3040	40	30	400	52
-3050	50	30	500	52
-3525	30	35	250	57
-3530	35	35	300	57

Model number	Material width W	Inner diameter d	Working length LX	Outer diameter D
SC -3540	40	35	400	60
-3550	50	35	500	60
-4025	35	40	250	63
-4030	40	40	300	64
-4040	50	40	400	65
-4050	50	40	500	70
-4070	65	40	700	72
-4530	40	45	300	69
-4540	50	45	400	70
-4550	50	45	500	75
-4570	65	45	700	77
-5030	50	50	300	75
-5040	50	50	400	80
-5050	50	50	500	86
-5070	65	50	700	88

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

● **Notes on use**

Note 1: While using the spiral cover, keep a center receiver attached to each of the terminals.
(The center receiver must be procured by the customer.)



Main dimensions of center receiver

$D1 = D + (1 \text{ to } 2 \text{ mm})$, $d2 = d - (1 \text{ to } 2 \text{ mm})$, $d3 = D$ or more

The spiral cover involves rotation and changes in diameter when it expands and contracts. Thus, be sure to use the center receivers.

Note 2: If the working length is insufficient with one spiral cover, connect the small diameter side to the inside as shown in Figure 1.

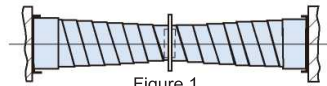


Figure 1

Note 3: When using the vertically placed version, be sure to mount it so that the large diameter side will be at the top. (Figure 2)

Avoid connecting in the vertical direction because the spiral cover sinks due to its own weight, causing the operation to be unstable.

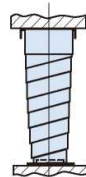


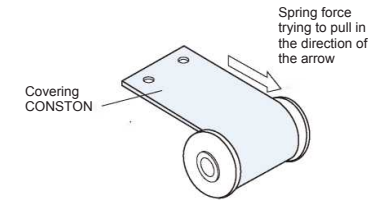
Figure 2

CAUTION

* The spiral cover of the delivered product is packed using a stop band in a compressed state. Because of strong spring pressure, it jumps out when the stop band is cut. Pay sufficient attention to its handling, for example, when incorporating it into the body.

Covering CONSTON CC

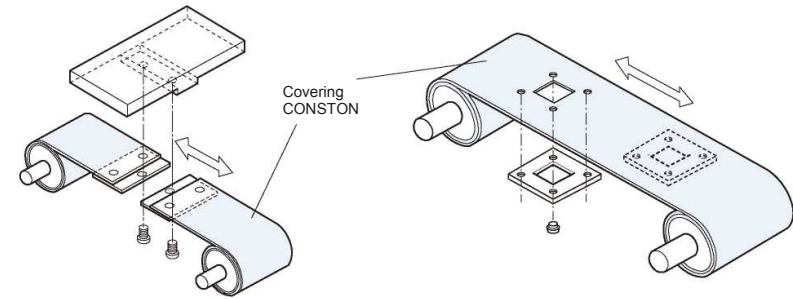
The covering CONSTON is a cover with spring force. It is a dustproof cover that expands and contracts smoothly in sync with the movement because the stainless-steel strip is given a spring force to pull in by itself.



● **Examples**

C Type (use of two pieces)

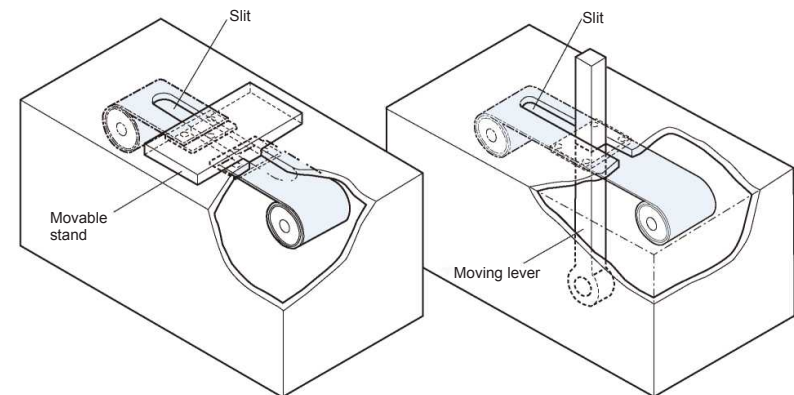
O Type

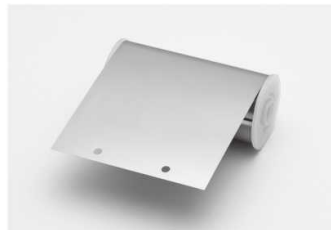
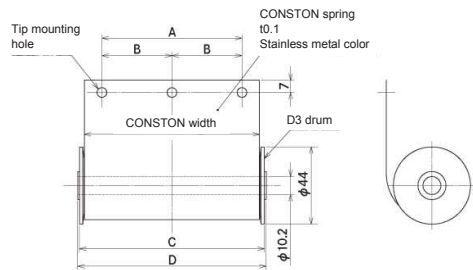


Even if it is moved to the left or right with a moving table or moving lever attached, the slit after moving is kept covered by the covering CONSTON.

C Type (use of two pieces)

O Type





* The actual product is not straight machined (at the end)

Material

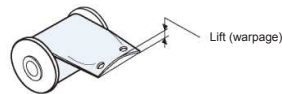
Part name	Material
CONSTON spring	Stainless steel for spring
Drum	Plastic

Model number	CONSTON width (mm)	Set length + stroke (mm)	Life (reference value) (times)	Output N (kgf) (reference value)	Dimensions (mm)				
					Tip mounting hole	A	B	C	D
CC-50x2000-SUS	50	2,000	500 k	2.16(0.22)	2-φ4.5	26	-	55.6	57.6
CC-60x2000-SUS	60	2,000	500 k	2.55(0.26)	2-φ4.5	40	-	65.6	67.6
CC-70x2000-SUS	70	2,000	500 k	2.94(0.3)	2-φ4.5	40	-	75.6	77.6
CC-80x2000-SUS	80	2,000	500 k	3.43(0.35)	2-φ4.5	40	-	85.6	87.6
CC-90x2000-SUS	90	2,000	500 k	3.82(0.39)	2-φ4.5	40	-	95.6	97.6
CC-100x2000-SUS	100	2,000	500 k	4.21(0.43)	3-φ5.5	80	40	105.6	107.6
CC-120x2000-SUS	120	2,000	400 k	5.1(0.52)	3-φ5.5	80	40	125.6	127.6
CC-140x2000-SUS	140	2,000	300 k	5.88(0.6)	3-φ5.5	80	40	145.6	147.6
CC-160x2000-SUS	160	2,000	250 k	6.79(0.69)	3-φ5.5	120	60	165.6	167.6
CC-180x2000-SUS	180	2,000	200 k	7.64(0.78)	3-φ5.5	120	60	185.6	187.6

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

~ Lifted convex (warpage) ~

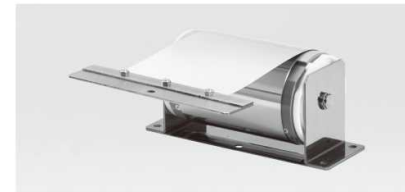
On the covering CONSTON, a convex warp is generated as the spring is stretched (right figure). The height of the warpage depends on the spring width, working length, etc.



* For installation notes, see the "Notes on Installing a C Type CONSTON" section (page 28)

Winder Cover MC (spring type)

A unit that winds a flat stainless steel belt using a mainspring. A dustproof cover that expands and contracts smoothly in sync with the movement.

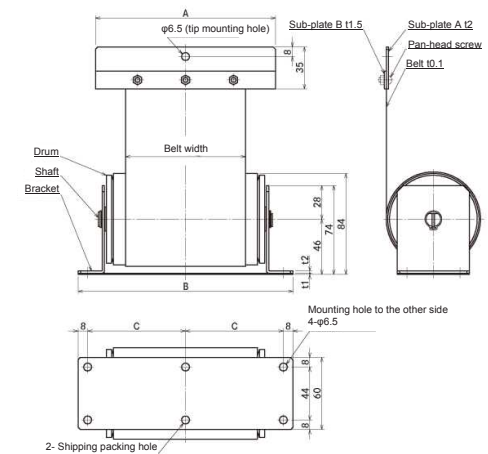


• Features

- No convex warpage occurs because a flat stainless steel belt is used.
- Can cover the entire stroke without gaps.

Material

Part name	Material
Mainspring	Stainless steel for spring
Belt	SUS
Sub-plate	
Bracket	
Shaft	
Drum	Plastic



Model number	Stroke (mm)	Dimensions (mm)			
		Belt width	A	B	C
MC-100	1,500	100	150	179	81.5
MC-150	1,500	150	200	229	106.5
MC-300	1,500	300	350	379	181.5

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

• Notes on use

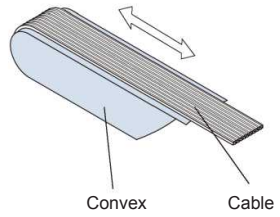
For horizontal pulling out, the center of the stroke hangs down as shown in the figure below due to the own weight of the belt. Thus, install and use a support guide.



Raingutter-Shaped Steel Strip Convex

A stainless steel strip machined into a convex shape.
Used for cable guides and telescopic mechanisms.

Applications: Cable guide, etc.



Material

Part name	Material
Convex	Stainless steel for spring



Contact us for your desired dimensions.

Store Supplies and Sales Promotion Products Lineup

Store Supplies and Sales Promotion Products

	Small Dispenser Unit DU 70 Product Forward-Feed Unit
	Security Silver Bell (Clip Type for Push Plate W) 75 Security parts for deterring theft
	Acrylic Cigarette Pack Forward-Feed Case 76 CONSTON spring type
	Jointed Case for Cigarette 77 Stackable according to the space
	Line Pusher 78 Plastic single hook product forward-feed spring
	Convex CONSTON 80 A mysterious spring that curls when tapped

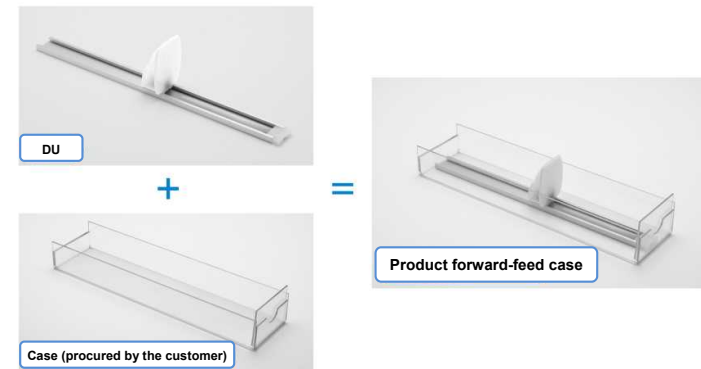
Small Dispenser Unit DU

Design registered

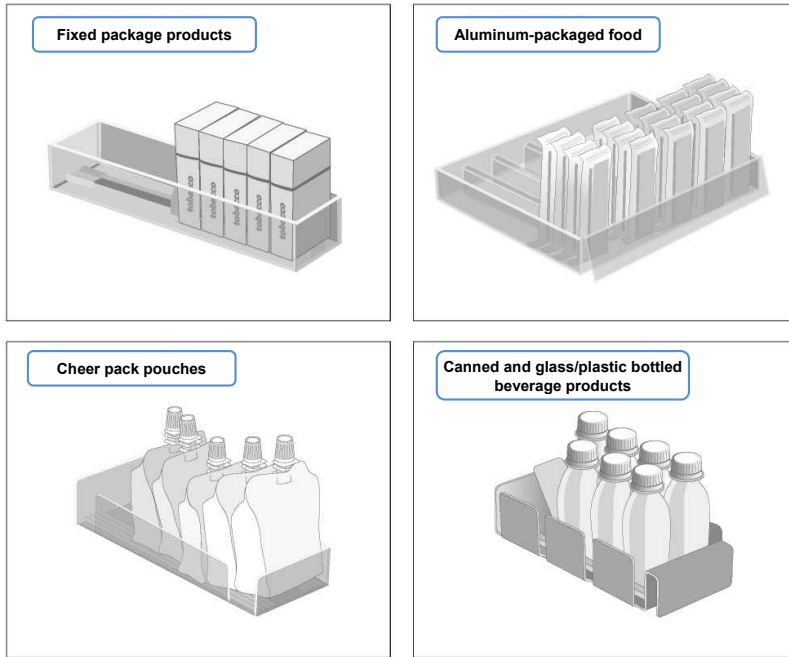


What is Small Dispenser Unit DU?

- You can prepare a display case which forward-feeds products, only by pasting a DU to the display case with a double-sided seal.
- The products are always fed forward by the CONSTON spring.
- Three types of push plates are available that allow forward feed of products ranging from narrow width (e.g. cigarette lighters, spice bottles, lipsticks) to wide width (e.g. cigarette packs, pharmaceuticals).

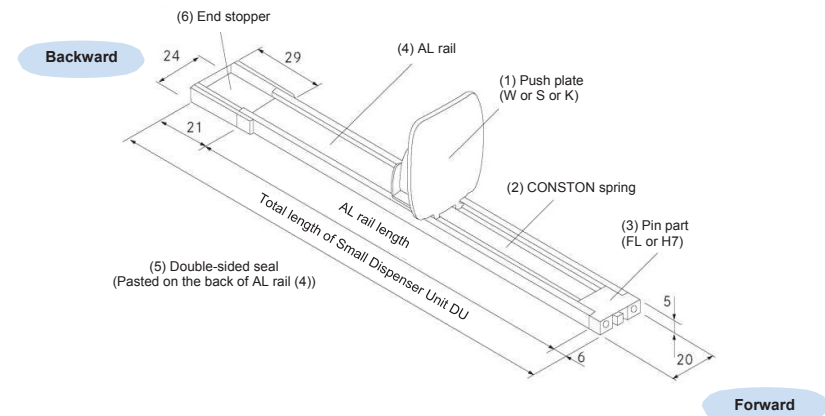


Examples of Use



Used for a lot of cases of, for example, cigarette packs, cosmetics, food, pharmaceuticals, stationery, and miscellaneous goods. The products are always displayed on the front without manual forward-feed work.

Small Dispenser Unit DU Configuration



(1) Push plate (POM)

(W or S or K)



- **Push plate W**

Standard type
For a wide variety of products

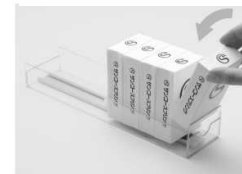
- **Push plate S**

For narrow products

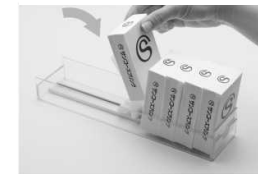
- **Push plate K**

(Patent Application
2010-213444)
Easy first-in-first-out

Supply from the front



Supply from behind



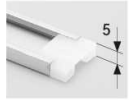
(2) CONSTON spring (SUS)



Multiple types of springs are available. If you can lend us one face (row) of products to be subjected to forward feed, we can select a suitable spring.

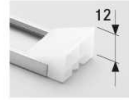
(3) Pin parts (POM)

(FL or H7)



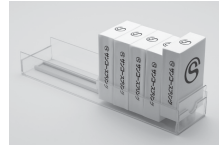
● Flat (FL)

The products on the front can always be aligned at the same height.



● Hop-up (H7)

The front product hops up and is easy to take out.



(4) AL rail (aluminum)



If you need an AL rail, let us know the inside dimensions of the case.

* When putting the products into the case, make sure that the front of the unit (pin part side) touches the inner surface of the case and a space of 2 to 6 mm is kept at the rear.

Total length of Small Dispenser Unit = Case inner size - 2 to -6 mm AL rail length
= Case inner size - 8 to -12mm (or -29 to -33 mm if the end stopper is used)

(5) Double-sided seal



The delivered DU-3 and DU-5 products have a total of two double-sided seals attached to the front and rear of the AL rail. (DU-5 has one additional seal.)

(6) End stopper (POM)



The push plate can be stopped at the rear during resupply of products (available for push plates W and S).

* When using the end stopper, paste the attached double-sided seal across the AL rail and end stopper.

Five Combinations

Model number	Combination										
DU-1		+		+							
	(1) Push plate (W or S or K)		(2) CONSTON spring		(3) Pin part (FL or H7)						
DU-2		+		+		+					
	(1) Push plate (W or S or K)		(2) CONSTON spring		(3) Pin part (FL or H7)		(4) AL rail				
DU-3		+		+		+		+			
	(1) Push plate (W or S or K)		(2) CONSTON spring		(3) Pin part (FL or H7)		(4) AL rail		(5) Double-sided seal		
DU-4		+		+		+		+			
	(1) Push plate (W or S)		(2) CONSTON spring		(3) Pin part (FL or H7)		(4) AL rail		(6) End stopper		
	<small>* Push plate K cannot be used.</small>										
DU-5		+		+		+		+		+	
	(1) Push plate (W or S)		(2) CONSTON spring		(3) Pin part (FL or H7)		(4) AL rail		(5) Double-sided seal		(6) End stopper
	<small>* Push plate K cannot be used.</small>										

* If you procure a molded case, we can provide the product with parts (1) and (2) combined. If so, consult with us.

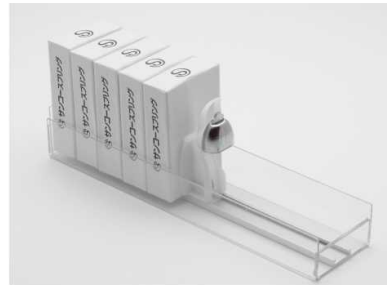
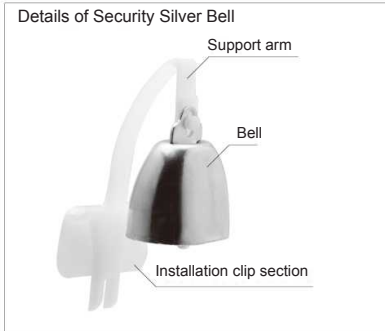
* The product specifications are subject to change without prior notice. Thus contact us before ordering.

Security Silver Bell (Clip Type for Push Plate W)

Public-Service Foundation Tokyo Prefecture crime prevention society Recommendation No. 576

● Features

- By attaching it to a small dispenser unit (push plate W), the bell rings each time a product is taken out, which deters theft.
- It is a specially-designed open-ended bell that can generate a loud sound.
- The bell sounds for a long time because it is supported by a plastic thin arm.
- It can be installed simply by inserting it into push plate W from above.



This product is sold as a set of bell and support arm. It can be attached to the Small Dispenser Unit (push plate W) or a jointed case (for cigarette packs).



● Attaching the bell to push plate K

A bell can be attached with the support arm for push plate K.

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

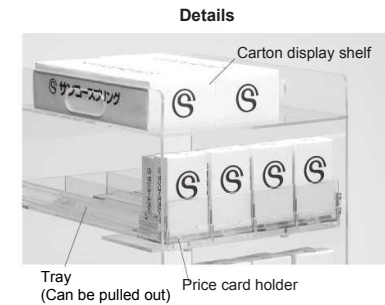
Acrylic Cigarette Pack Forward-Feed Case

Cigarette pack forward-feed case of 4 faces / tray × 4 steps (16 items)



● Features

- With a CONSTON spring, the forward feed of cigarette packs can be automated.
- The spring force is set up exclusively for cigarette packs, which can thus be softly fed forward.
- The price card can be inserted into the front of the case.
- Packs with even the 100S size can be stored.
- On its top, the case has a carton display shelf.

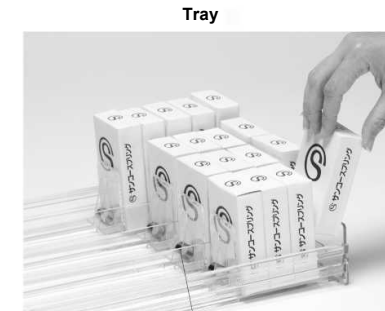


Specifications

Case dimensions	(W273mm×D310mm×H590mm)
Case material	Acrylic resin
Faces	16 faces / unit
Stored products per face	10 cigarette packs

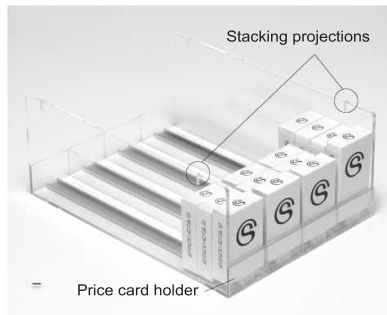
* The product specifications are subject to change without prior notice. Thus contact us before ordering.

* You can order one or more units.



Tray for cigarette packs can be pulled out of the case. This is useful for resupply and inventory checks.

Jointed Case for Cigarettes



Vertical stacking of two units (Packs of even the 100S size can be stored.)

● Features

- Cases can be stacked vertically or like a staircase. Thus, you can add them to suit the number of cigarette packs and the layout.
- Packs with even the 100S size can be stored.
- With a CONSTON spring, the forward feed of cigarette packs can be automated.
- The spring force is set up exclusively for cigarette packs, which can thus be softly fed forward.
- The price card can be inserted into the front of the case.



Staircase-type stacking of two units (Shiftable by 25mm)

Specifications

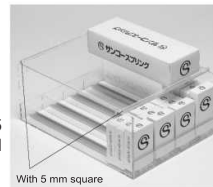
Case dimensions	(W255mm×D344mm×H140mm) (Stacking protrusion H143mm)
Case material	Acrylic resin
Faces	4 faces / unit
Stored products per face	13 cigarette packs
Stackable steps	Vertical: About 10 steps Staircase-type: About 5 steps

* The product specifications are subject to change without prior notice. Thus contact us before ordering.

* You can order one or more units.

Carton display shelf (Acrylic resin) (Option: sold separately)

Dimensions: W 255 × D 311 mm; board thickness 3 mm



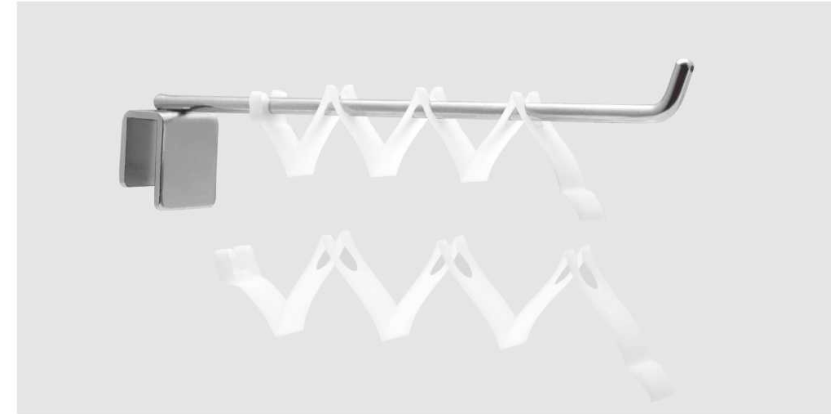
Security Silver Bell (Option: sold separately)



Line Pusher® (Plastic single hook product forward-feed spring)

Patent No. 2786844
U.S.PAT. 6,102,192

This is a plastic product forward-feed spring that helps "front alignment" of the products suspended on a single hook.



This product has a stopper for adjusting the pushing force and stroke.

The stopper position is adjustable.

One-touch mounting

While holding the entire stopper, snap it onto the stick.

Also to a double hook (jitte-shaped hook)

1. When products are fully stored ...

- Spring pressure ≤ total weight of products

The products dose not move.

2. When products start being sold ...

- Spring pressure ≥ total weight of products

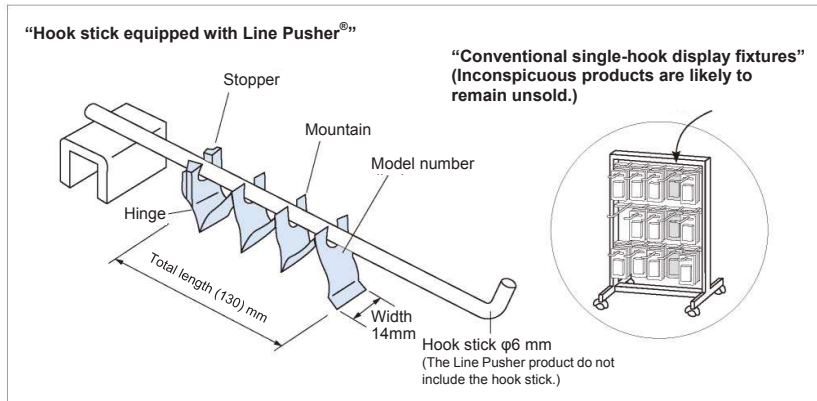
When you take out the frontmost product, the spring pushes the succeeding ones from behind.

3. When there is one product left ...

- Spring pressure = total weight of products

Even when only one product left, it will be placed in a position where it is easy to see and take out.

To prevent unsold products



Typical examples of applied products	Line Pusher®		Available hook stick
	Model number	Specifications	
Light products such as toothbrush	φ6-30	<Number of mountains> 6, with stopper	<Stick diameter> For φ6mm only <Stick length> ≥ 130 mm * Check the hook stick diameter.
Candy bag pack	φ6-40	<Total width> 14 mm	
Camera battery	φ6-50	<Total length> (130) mm (initial length) <Pushing stroke> 120 mm (initial value)	
Heavy products such as AA alkaline batteries	φ6-60	<Material> Polyacetal (POM)	

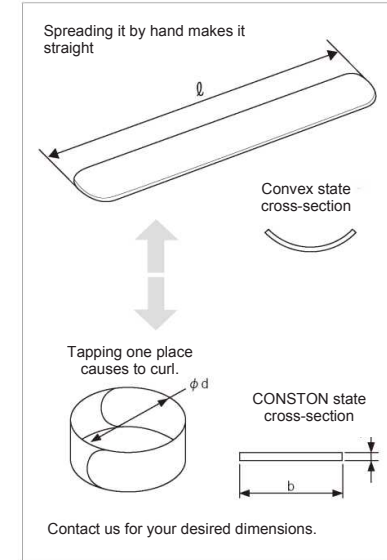
* You can order 100 or more pieces per product type.
 * The product specifications are subject to change without prior notice. Thus contact us before ordering.

Notes

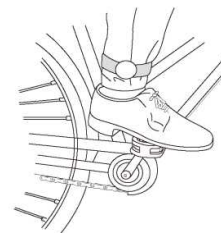
- The larger the branch number of the model number, the stronger the pushing force.
- The products applicable to the above model numbers are only for reference. Perform a test using the actual Line Pushers before selecting the optimal model number.
- If the stopper is 120 mm or more away from the tip of the hook stick, no product will be pushed down when the Line Pusher is fully extended. (By moving the stopper back and forth, adjust so that the product does not hop out.)
- If the Line Pusher is left contracted for a long period of time, the restoration length will shorten. Thus, adjust it by moving the stopper forward.
- Because the hinge is thin, bending or twisting may cause damage.

**A mysterious spring that curls when tapped
Convex CONSTON**

"Convex" represents a raingutter-like shape. A "CONSTON" refers to a curling spring. A "Convex CONSTON" is a spring that has interesting characteristics: when it is flat, tapping its surface causes it to curl, and by spreading it by hand, it returns to the original convex. By taking advantage of such wrapping characteristics, you can use it for the applications as shown below, including armbands.



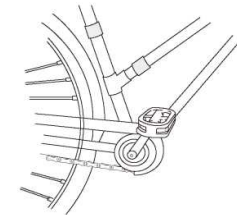
- When riding a bicycle
- When doing housework
- For bicycle frames



The hems of pants are prevented from being caught in the chain.



Shirt cuffs can be kept tucked up.



For example, a reflector for night safety can be made detachable.

■ **Terms and Conditions of Warranty** ■

All warranty for the product ("Product") that the customer purchased from Sanko Spring Co., Ltd. ("Company") shall be based on these terms and conditions of warranty ("Terms and Conditions").

Note that if the customer purchases or uses the Product, the customer is deemed to have agreed to the Terms and Condition.

■ **Scope and period of warranty** ■

1. If any failure such as damage, deformation, or defect that should be attributed to the Company's responsibility ("Failure") is found within the warranty period of the purchased Product, the Company will replace part or the whole of the Product, or repair the Failure free of charge, provided that a written notice containing details that the Company has satisfied with the Failure has arrived at the Company within the warranty period (defined in the following clause) and the Company has acknowledged that the Failure should be attributed to the Company's responsibility.
Notwithstanding to the above, if the Company stipulates that replacement or repair is not acknowledged for a failure applicable to any of the following items or for the Product, it shall be excluded from the warranty scope.
 - (1) Breakdown, or accident, etc. outside the warranty period.
 - (2) Matters other than the standard for the Product (e.g. the suitability for purpose and the usefulness of the Product, its adequateness or compatibility with other products, sales period, and other guarantees).
 - (3) A Failure that occurs when the Product is used for the following: transportation equipment such as an automobile, vehicle equipment, or ship for the purpose of transporting people; medical equipment for the purpose of human treatment and medical examination; consumer goods such as an electronic or home appliance used in ordinary households; aerospace equipment; nuclear equipment; or a weapon, arm, or other military uses.
 - (4) A Failure due to intentional disassembly, remodeling, machining, or repair.
 - (5) A Failure due to poor handling, overturning or dropping, or unexpected external force.
 - (6) A Failure caused by force majeure such as an extraordinary natural phenomenon or natural disaster.
 - (7) A failure due to use not complying with the following: the standards, applications, precautions on use, usage conditions, or drawings in the catalogs; other matters related to the Product; or the descriptions or other indications of the package inserts of the Product (including accessories).
 - (8) A Failure caused by any other device.
 - (9) A Failure due to use outside Japan.
 - (10) A Failure due to an unknown or unexpected purpose or usage.
 - (11) A Failure caused by the customer's use of the Product in violation of the provisions of the Terms and Conditions.
2. The warranty period applied to the Product by the Terms and Conditions shall be one year after shipment from the Company or the time when it reaches the end of the number of times defined as the life in the catalogs (including the drawings and delivery specifications), whichever comes first.
However, if the life is not defined in the catalogs (including the drawings and delivery specifications), it shall be six months after shipment from the Company.
3. Slight scratches, dirt, dents, discoloration, or others that does not make the Product unusable shall not be considered failures.
However, if the Company considers that the abrasion, dirt, dent, or discoloration, etc. is particularly remarkable, it shall be considered as a failure.
4. Within one week after receipt of the Product, the customer shall confirm the name, model, and quantity, and check for conformity with the standards listed in the catalog or drawings and for any failure. If the customer finds a Failure, they shall notify the Company of that matter within the period. If the Company receives no notification from the customer within the period, it may be deemed that the Product has no Failure due to which it should be replaced or repaired.

■ **Disclaimer** ■

1. The Company shall not be liable for any damage (which shall not matter whether it is indirect or direct damage, and whether it is ordinary or special damage) or any loss or cost ("Damage") arising in connection with any Failure of the Product, except for the obligations stipulated in the Terms and Conditions or the obligations based on the Product Liability Law. The damage caused in relation to a Failure of the Product shall include (1) damage due to failure of product(s) manufactured using the Product or collection of the Products or products manufactured by using the Product, and (2) damage due to production line shutdown at the factory or production facility of the customer.
2. Regarding any Damage that has been caused to the customer due to a Failure of the Product and that is due to reasons attributable to the Company, the upper limit shall be the price of the Product that the customer purchased and caused the Damage.
3. The customer shall not have any right to claim compensation against the Company for Damage. caused by or in relation to the following reasons:
 - (1) The customer used the Product in violation of the notes on use or the prohibitions described in the Terms and Conditions etc.
 - (2) Due to a Failure of the Product caused by intent or negligence of the customer
 - (3) Due to a Failure of the Product caused by force majeure
 - (4) Due to an infringement of intellectual property rights, such as a patent, utility model, design, or trademark right, possessed by a third party that was caused in relation to the Product
 - (5) Export of the Product or export delay or ban due to laws or regulations
 - (6) Delay in delivery of the Product or inability to deliver it has occurred due to a natural disaster, an amendment(s) to a law or regulations, a traffic accident, disposition based on the exercise of public power, a transportation accident, a labor dispute, or other unavoidable circumstances

■ **Notes** ■

1. The Terms and Conditions presuppose that they shall be applied to the purchase and use of the Product in Japan, otherwise, no warranty shall apply for the Product.
2. The Product is subject to change without prior notice.



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