

## FOOT SWITCH SERIES



## SOLENOID Series



# Safety and Trust

Foot switches produced by KOKUSAI are switch devices (closers) that control power supply and electronic signals via foot actions.

Foot switches are not only suitable for industrial machinery such as operating machinery and forge press, but also measuring instruments, medical equipments and entertainment facilities. With broad varieties and extensive scope of application, the product has been well praised by customers.

As a professional manufacturer of foot switches, we have more than 50 years of experience and outstanding performance and is committed to the development of new products.

## Major Applications of Foot Switches

Operating machinery, forge press, oil press, welding machine, industrial machinery, packing machine, calking machine, logistic equipment, medical equipment, photographic equipment, electronic equipment, office equipment, education equipment, measuring instrument, communication instrument, probing machine, leisure equipment, domestic equipment, shipping machinery, etc.





# Correct Selection and Usage of the Foot Switch

Foot switches are no doubt should be selected according to their purpose of use for their function, structure and model. Besides, their electronic performance should also be studied to confirm their conformity with conditions of use.

### 1. Type of load

Type of load (resistance load, inductive load, etc.), voltage (AC/DC) and current (starting current and holding current in the case of inductive load) should be confirmed.

For different types of inductive load, the starting current and holding current may differ substantially. For example, when the power of motor, light or solenoid is switched on, there is intense starting current, which is 5–10 times of rated current for motors, 10–15 times for lights and several to 20 times for solenoids. Therefore, type of load and circuit structure must be confirmed before selection of foot switches.

When excessive current larger than the rated current is likely to pass, electromagnetic switch must be used.

### 2. About the use of low voltage and feeble current

When a foot switch is used for circuit control purpose, functions of common foot switch of built-in micro switch are limited. Therefore, please use the “low voltage feeble current type” foot switch we develop in order to meet such increasing demand.

### 3. About surrounding environment

Placed on the ground, foot switches are likely to be affected by foreign objects such as pollutant, dust, water and oil, and are mostly used in rugged environment. Such are the causes for their poor voltage withstanding and insulation performance. Therefore, please take environment factors into full consideration before making your choice of models.

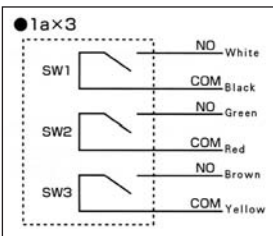
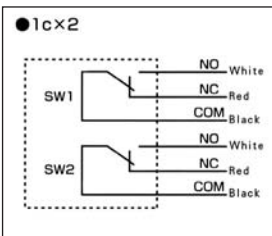
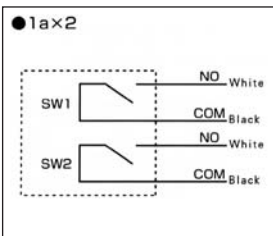
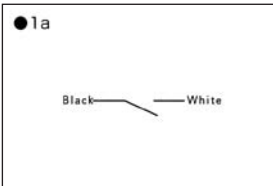
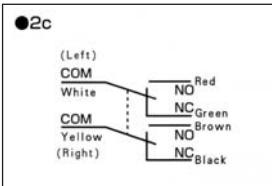
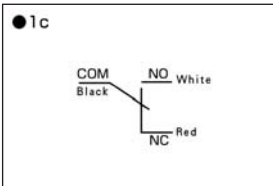
### 4. About shock

Foot switches are mostly placed in rugged environment, and little protection is provided. Since they are placed on the ground, mis-operation caused by dropped items is likely to occur, so please pay sufficient attention to excessive shocks so as to prevent influence on service life of the foot switch. Foot switches with jacket or optional jackets can be used according to your needs.

### 5. About outdoor parameters

The conditions of using the foot switch in places with direct exposure to rain and sunshine are not taken into consideration. If the foot switch is to be used in such conditions, please consult with us.

### Lead wire connection colors



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# Foot switch Product Checklist

Type	Shape	Model	Contact Structure	Pattern	Action		Rated Value	Features	Major Applications	Product Intro-duction Page
					Instan- taneous	Interac- tive				
Uni- versal type		SF-1	1c	Basic type	●		AC250V 10A	● A flagship product emphasizing on both comfort and firmness. ● Long service life and high precision; improved safety performance with protection of insulation rubber soft wire protection. ● Z type micro switch and locking button switch are adopted as built-in switch.	Various types of operating machinery and equipment, woodworking machine, testing machine, etc.	4
		SF-2	2c	Two-loop type	●		AC250V 6A			
		SF-1H	1a	Basic type		●	AC250V 6A			
		SF-1HN	1a	Basic type		●	AC250V 5A			
Uni- versal popular type		SFZ-1	1c	Basic type	●		AC250V 10A	● Reasonable switch installation design. ● A high quality product with low price. ● Z type micro switch and locking button switch are adopted as built-in switch.	Various types of operating machinery, oil press., woodworking machine, measuring instrument, testing machine, etc.	
		SFZ-1H	1a	Basic type		●	AC250V 6A			
		SHZ-1-2	1c x 2	Two-link type	●		AC250V 10A			
Uni- versal small type		SFL-1	1c	Basic type	●		AC250V 6A	● A small size product with firm structure. ● Inclined design for stamping, no fatigue even after long hours of operation. ● Z type and S type micro switches are adopted as switch.	Various types of wood-working machine, measuring instrument, testing machine, domestic machine and equipment, education instrument, sound equipment, communication equipment, etc.	5
		SFL-1H	1a	Basic type		●	AC250V 3A			
		SFL-1-2	1c x 2	Two-link type	●		AC250V 6A			
		SFVA-1	1c	Back stamp type	●		AC250V 6A	● Reasonable size and design provide excellent shock and vibration resistance performance. ● Thin back stamp structure design to facilitate stamping and reduce fatigue. ● Two linkage products (SFVA-1-2) are also available.		
		SFVA-1-2	1c x 2	Two-link type	●		AC250V 6A			
		SFE-1-2	1c x 2	Two-link type	●		AC250V 6A	● A two linkage product with thin back stamp structure design, no fatigue even after long hours of operation. ● Steel plate with anti-slip rubber mat used at the bottom achieves the small-size and lightweight design and guarantees safe operation.	OA equipment, medical electronic device, measuring instrument, electronic application equipment, sound equipment, sewing machine, etc.	
Univer- sal mini type		SFK-1	1c	Basic type	●		AC250V 6A	● Small size, light weight. ● Economical design with resin as raw material. ● Z type and S type micro switches are adopted as switch. ● Back stamp structure design (SFKB-1). ● Anti-slip rubbers fixed at the bottom, light weight and stable. ● Water-proof 2-level design is also available (SFKB-2DW).	Various types of OA equipment, measuring instrument, medical equipment, domestic machine and equipment, etc.	6
		SFK-1H	1a	Basic type		●	AC250V 3A			
		SFKF-1	1a	Basic type	●		AC250V 6A			
		SFKB-1	1a	Back stamp type	●		AC250V 6A			
		SFO-1	1a	Basic type	●		AC250V 6A	● Base plate design makes the product light weight and safe to operate. ● Two-linkage V shape installation, operate with heel as pivot to reduce fatigue. ● Four jacket colors (red, black, green and white) are available.	Medical equipment, OA equipment, precision instrument, measuring instrument, entertainment and electronic machine, etc.	
		SFO-1-2	1a x 2	Two-link type	●		AC250V 6A			
Round switch series		SFU-1	1c	360° type	●		AC250V 6A	● Simple and unique design. ● Allow 360 ° all direction operation; A multifunctional series that can be operated by hand, foot, knee and other part of body. ● Two jacket colors (red and black,) are available.	Electronic application equipment, sewing machine, medical electronic device, measuring instrument, OA equipment, domestic machinery and equipment, sound equipment, education instrument, entertainment equipment, etc.	7
		SFU-1-2	1c x 2	Two-link type	●		AC250V 6A			
Thin pocket size series		SFT-1	1a	360° type	●		AC125V 5A	● A super slim and light weight mini switch. ● Allow 360 ° all direction operation. ● Simple and fashionable design, also suitable for home and office use. ● Three jacket colors (red, black and white) are available.	Household automation, entertainment equipment, medical equipment, precision equipment, etc.	
		SFT-1-2	1a x 2	Two-link type	●		AC125V 5A			
Round pocket size series		SFQ-1	1a	360° type	●		AC250V 6A	● Diversified types, 360 ° all direction operation, 2 linkage, 3 linkage, etc. ● ON, OFF operation, which can also be used as a switch. ● A multifunctional series that can be operated by foot, knee and other part of body. ● Six jacket colors (red, black, white, yellow, blue and green) are available.	Electronic application equipment, medical electronic device, OA equipment, sound equipment, measuring instrument, domestic machinery and equipment, education instrument, operating machinery, etc.	8
		SFQ-1-2	1a x 2	Two-link type	●		AC250V 6A			
		SFQ-1-3	1a x 3	Three-link type	●		AC250V 6A			
Low voltage feeble current type		SFKS-1	1c	Basic type	●		Standard rating AC 250V 3A. For SFVS-1 and SFVS-1-2, the rated value is AC 100V, <2A	● Low voltage feeble current foot switch independently developed by our company. ● Ideal for sequencer, metering and measuring instrument, computer, etc. ● Especially suitable for switch of medical equipment; a trustable product.	Medical equipment, sequencer, metering and measuring instrument, sound equipment, OA equipment, education instrument, etc.	9
		SFOS-1	1a	Basic type	●					
		SFOS-1-2	1a x 2	Two-link type	●					
		SFVS-1	1c	Back stamp type	●					
		SFVS-1-2	1c x 2	Two-link type	●		Feeble rating DC6V 5mA DC12V 2mA DC24V 1mA			
		SFQS-1	1a	360° type	●					
		SFUS-1	1c	360° type	●					
		SFTS-1	1a	360° type	●					
		SFP-1	1a	Basic type	●					

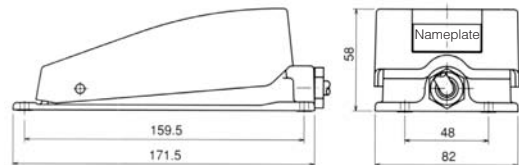
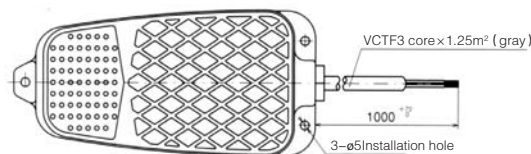
Type	Shape	Model	Contact Structure	Pattern	Action		Rated Value	Features	Major Applications	Product Introduction Page
					Instantaneous	Inter-active				
Industry use full protection jacket type		SFMS-1	1c	Pedal type	●		AC250V 10A	<ul style="list-style-type: none"> <li>Full protection design to prevent mis-operation caused by external shock and dropped items.</li> <li>Firm structure capable of bearing the weight of safety boot.</li> <li>Shock-proof design with rubber sticking.</li> <li>Front lifting cover design capable of preventing mis-operation.</li> <li>Equipped with our independently developed locking device. No pedal operation is possible if no foot is inserted.</li> </ul>	Forge press, cutting machine, operating machinery, industry machine and equipment, etc.	10
		SFMS-2	2c	Two-loop type	●		AC250V 6A			
		SFMS-1G	1c	Pedal type	●		AC250V 10A			
		SFMS-1SG	1c	Pedal type	●		AC250V 10A			
		SFD-1	1c	Pedal type	●		AC250V 10A			
		SFD-2	2c	Two-loop type	●		AC250V 6A			
Industry use no protection jacket type		SFMP-1	1c	Pedal type	●		AC250V 10A	<ul style="list-style-type: none"> <li>Most suitable for industries to improve productivity.</li> <li>Simple pedal stamp-in design.</li> <li>Built-in switch protection design.</li> </ul>	Automation production line of various types of operating machinery and equipment, etc.	
		SFMP-2	2c	Two-loop type	●		AC250V 6A			
Industry use half protection jacket type		SFM-1	1c	Pedal type	●		AC250V 10A	<ul style="list-style-type: none"> <li>Half protection design to prevent mis-operation caused by external shock and dropped items.</li> <li>Built-in switch protection design.</li> <li>Equipped with our independently developed locking device. No pedal operation is possible if no foot is inserted.</li> </ul>	Various types of operating machinery, cargo carrier, automation production line, etc.	11
		SFM-2	2c	Two-loop type	●		AC250V 6A			
		SFM-1HN	1a	Pedal type		●	AC250V 5A			
		SFM-1SG	1c	Pedal type	●		AC250V 10A			
Industry use three-level foot switch		SFMS-2TPG	2a action banned	Three-level pedal type (OFF   ON   OFF)	●		AC125V 1A	<ul style="list-style-type: none"> <li>OFF-ON-OFF three level foot switch of ergonomic design. Even if the pedal is stamped on intensely, the output is OFF, so as to stop operation.</li> <li>Equipped with our independently developed special level device consists of loop and spring (patent pending).</li> </ul>	Descending instructions of forge press braking, ascending and descending instructions of aerial lift vehicle (construction equipment), boost voltage instruction of spot welding, descending instruction of cutting machine, etc.	12
		SFMS-2TP			●		AC125V 1A			
		SFM-2TP			●		AC125V 1A			
		SFMP-2TP			●		AC125V 1A			
Water-proof type (P × 7)		SFA-1W	1a	Basic type	●		DC5 ~ 30V 100mA	<ul style="list-style-type: none"> <li>Water-proof design, capable of operating in normal status even water or sterilizing fluid is poured on.</li> <li>Shaft-less simple design ideal for medical environment.</li> <li>No fatigue after operation of long hours.</li> <li>※ SFA-2W is not a CE certified product.</li> </ul>	Medical equipment (observation room, hospital bed, etc.), OA equipment, precision instrument, measuring instrument, etc.	14
		SFA-2W	2a	Two-loop type	●		DC5 ~ 30V 100mA			
		SFA-1W-2	1a × 2	Two-link type	●					
		SFKB-2DW	2a	Two-level pedal type	●		Above DC5V 1mA	<ul style="list-style-type: none"> <li>Two-level stamping is ideal for 2-level action switch.</li> <li>Water-proof design resistant to external environment.</li> </ul>		
Water-proof type (built-in switch protection feature --- P67)		SF-1W	1c	Basic type	●		AC250V 3A	<ul style="list-style-type: none"> <li>Water-proof design resistant to external environment.</li> <li>V type micro switch complying with IEC IP 67 is adopted as built-in switch.</li> <li>Built-in switch is encapsulated with resin, insulation rubber soft wires are molded together with external resin cover to achieve excellent anti-soaking performance.</li> <li>Seven models of different applications suitable for different sectors from industry to precision instrument respectively.</li> </ul>	Car washing equipment, shipping machinery, water sprayer, oil press, forge press, welding machine, woodworking machine, medical equipment, sanitary equipment, photographic equipment, office equipment, education equipment, testing machine, optical equipment, domestic machine and equipment, etc.	15
		SFU-1W	1c	360° type	●		AC250V 3A			
		SFKF-1W	1c	Basic type	●		AC250V 3A			
		SFMS-1W	1c	Pedal type	●		AC250V 3A			
		SFM-1W	1c	Pedal type	●		AC250V 3A			
		SFMP-1W	1c	Pedal type	●		AC250V 3A			
		SFQ-1W	1a	360° type	●		AC250V 3A			
Switch input support		SFQ-1UL	1a	360° type	●		AC250V 5A	<ul style="list-style-type: none"> <li>Parts and materials are products with UL certification.</li> <li>Can be assembled to machines exported to US.</li> <li>Water-proof models with high trustability and anti-soaking micro switch.</li> </ul>	Medical equipment, measuring instrument, equipment exported to US	
		SFQ-1WUL	1a	Water-proof type	●		AC250V 3A			
Universal type		SPS-1	1a	360° type	●		DC30V 1A Feeble rating DC6V 5mA DC12V 2mA DC24V 1mA	<ul style="list-style-type: none"> <li>Connect to welfare equipment, switch used to support input signal.</li> <li>Can be combined with latch port, call device and PC port component; people with disabilities can use with ease.</li> </ul>	Welfare equipment	



## Universal Type SF series



SF-1



● SF series has the same external dimension, except SF-1H and SF-1HN have a full height of 63.

### ●SF-1

Z type micro switch with mechanical service life over 10 million times and electronic service life over 500,000 times (in the case of resistance load) is used as built-in switch. A universal foot switch of long service life and high precision.

### ●SF-2

Two-loop connection product of SF-1. Independent 2c contact structure. 1c loop can be connected in two different loops.

### ●SF-1H

An interactive universal foot switch ideal for continuous live operation. Built-in button type switch.

### ●SF-1HN

An interactive universal foot switch ideal for continuous live operation. Built-in button Z type micro switch. SF-1HN has better durability compared with SF-1H.

## Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SF-1	AC250V 10A	1c	●		VCTF 3core × 1.25mm <sup>2</sup> × 1m	34.3	Z type micro switch	510
SF-2	AC250V 6A	2c	●		VCTF 6core × 0.75mm <sup>2</sup> × 1m			600
SF-1H		1a		●	VCTF 2core × 0.75mm <sup>2</sup> × 1m	24.5	Lock shape button switch	470
SF-1HN	AC250V 5A			●			Z type micro switch	480

## Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Sealing Screw Cap	Color/ Paint Color
SF-1	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Aldehyde resin	Metal color, equivalent to R25-635*
SF-2					
SF-1H					
SF-1HN					

### [Universal Parameters]

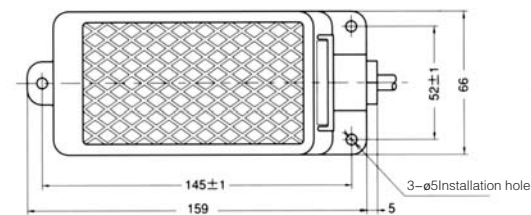
- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Ambient temperature: -5~40°C
- Ambient relative humidity/ below 85%RH.

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

## Universal Popular Type SFZ series



SFZ-1



●SFZ series has the same external dimension, except SFZ-1H has a full height of 64.

### ●SFZ-1

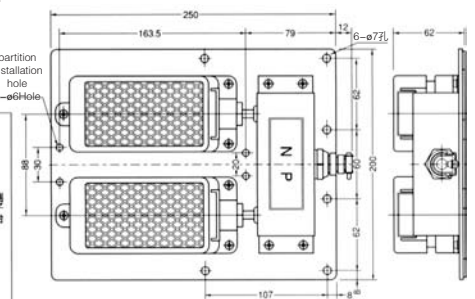
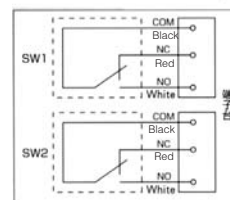
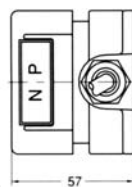
Z type micro switch with mechanical service life over 10 million times and electronic service life over 500,000 times (in the case of resistance load) is used as built-in switch. A universal foot switch of long service life and high precision.

### ●SFZ-1H

An interactive universal foot switch ideal for continuous live operation. Built-in button type switch.

### ●SFZ-1-2

An interlink foot switch that combines two SFZ-1 units. It connects to the load via a terminal block, so customer must provide or buy an insulation rubber soft wire.



## Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFZ-1	AC250V 10A	1c	●		VCTF 3core × 1.25mm <sup>2</sup> × 1m	19.6	Z type micro switch	450
SFZ-1H	AC250V 6A	1a		●	VCTF 2core × 0.75mm <sup>2</sup> × 1m	39.2	Lock shape button switch	430
SFZ-1-2	AC250V 10A	1c × 2	●		—	19.6	Z type micro switch	2300

## Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Sealing Screw Cap	Color/ Paint Color
SFZ-1	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Aldehyde resin	Metal color, equivalent to R25-635*
SFZ-1H					
SFZ-1-2					

### [Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Ambient temperature: -5~40°C
- Ambient relative humidity/ below 85%RH.

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.



SFZ-1-2

## Universal Small Type SFL series



SFL-1

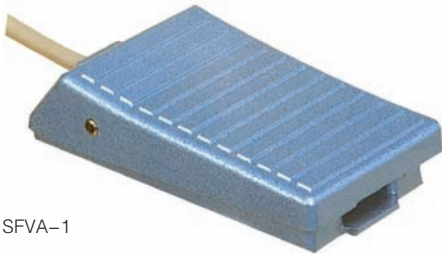


SFL-1-2

## ■ Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Inter-active				
SFL-1	AC250V 6A	1c	●		VCTF 3core × 0.75mm2 × 1m	19.6	V type micro switch	310
SFL-1H	AC250V 3A	1a		●	VCTF 2core × 0.75mm2 × 1m		S type micro switch	270
SFL-1-2	AC250V 6A	1c × 2台	●		—————		V type micro switch	2100

## Universal Small Type SFVA series



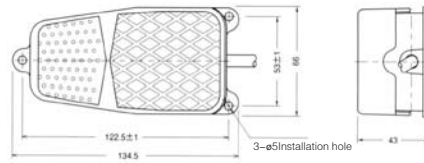
SFVA-1



SFVA-1-2

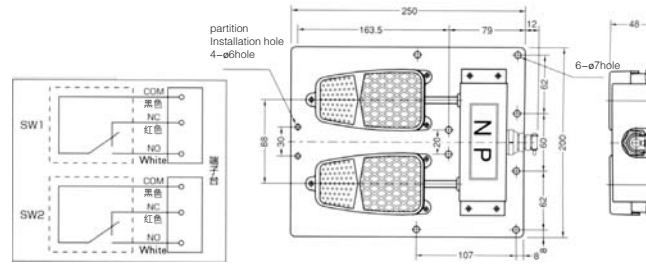
●SFL-1

A small size product that inherits the firm structure of universal SF-1.



●SFL-1-2

An interlink foot switch that combines two SFL-1 units. The back that fixing the steel plate is equipped with an anti-slip rubber mat.



●SFL-1H

An interactive universal foot switch combining an interactive device and S type micro switch.

- Only SFL-1H has a full height of 45.

## ■ Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Sealing Screw Cap	Color/ Paint Color
SFL-1	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Aldehyde resin	Metal color, equivalent to R25-635*
SFL-1H					
SFL-1-2					

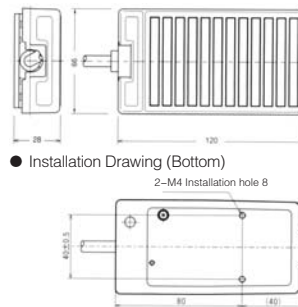
\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

[Universal Parameters]

- Insulation resistance/ over DC500V 100M $\Omega$ .
- Voltage withstanding/AC1500V/min
- Enbient temperature: -5~40℃
- Embient relative humidity/ below 85%RH.

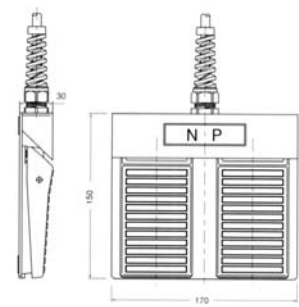
●SFVA-1

Thin size and back stamping design expand the pedal area and achieve more stable operation. Select metal fastening parts to fix the foot switch.



●SFVA-1-2

An interlock foot switch that combines two SFVA-1 units. Gather the lead wires needed for two loops (2c) into a 6-core rubber covered insulation wires to facilitate the treatment of lead wires.



## ■ Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFVA-1	AC250V 6A	1c	●		VCTF 3 core $\times 0.75\text{mm}^2 \times 1\text{m}$	29.4	V type micro switch	260
SFVA-1-2		1cx2	●		VCTF 6 core $\times 0.75\text{mm}^2 \times 1\text{m}$		V type micro switch	1180

## ■ Major Raw Materials

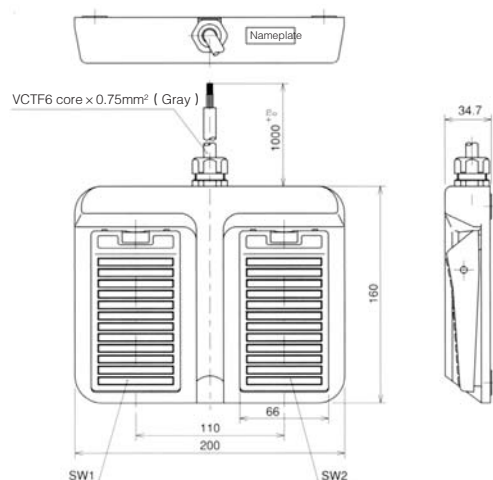
Model	Main Body/Protection Cover	Return Spring	Transmission Shaft	Color/ Paint Color
SFVA-1	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Blue Newton, equivalent to R22-706*
SFVA-1-2				

\* Refer to B version standard color card published by Japan Paint Manufacturers Association

[Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Ambient temperature: -5~40℃
- Ambient relative humidity/ below 85%RH.

## Universal Small Type SFE series



### ●SFE-1-2

Considerate simple color design.  
The bottom side is a steel plate with anti-slip mat.  
The partition board to prevent simultaneous stamping on the two pedals is integrated on the switch.  
Gather the lead wires needed for two loops (1c X 2) into a 6-core rubber covered insulation wires to facilitate the treatment of lead wires.



SFE-1-2

### ■Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Inter-active				
SFE-1-2	AC250V 6A	1c x 2	●		VCTF 6 core x 0.75mm² x 1m	29.4	V type micro switch	1150

### ■Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Cable Clamp	Color/ Paint Color
SFE-1-2	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Nylon 66	Milky white,, equivalent to R3-348*

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

### [Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Enbient temperature: -5-40℃
- Embient relative humidity/ below 85%RH.

## Universal Mini Type SFK series



SFK-1



SFKF-1



SFKB-1(Back Stamping)

### ●SFK-1

Polycarbonate resin is used for the main body and the protection cover. Milky white (the main body) and gray (the protection cover) color assortment.

### ●SFK-1H

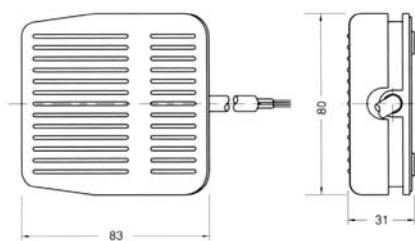
An interactive universal foot switch that combines our innovative interaction device and S type micro switch.  
ABS resin and polycarbonate resin are used for the main body and the protection cover. Black (the main body) and gray (the protection cover) color assortment.

### ●SFKF-1

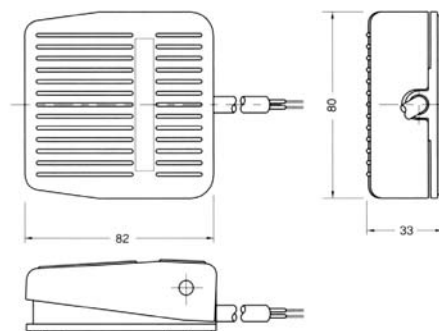
As a sister product of SFK-1, SFKF-1 pursues economical design.  
Economical ABS resin is used for the main body and the protection cover.

### ●SFKB-1

SFKB-1 inherits outstanding operation performance of SFK-1 and adopts the back stamping operation design.  
Economical ABS resin is used for the main body and the protection cover.



●External dimension of SFK-1, SFK-1H and SFKF-1.



●External dimension of SFKB-1.

### ■Major Parameters

Model	Rating	Contact Struc- ture	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	weight (g)
			Instan- taneous	Inter- active				
SFK-1	AC250V 6A	1c	●		VCTF 3 core × 0.75mm <sup>2</sup> × 1.5m	9.8	V type micro switch	290
SFK-1H	AC250V 3A	1a		●	VCTF 2 core × 0.75mm <sup>2</sup> × 1m		S type micro switch	250
SFKF-1	AC250V 6A	1a	●			V type micro switch	240	
SFKB-1			●				250	

### ■Major Raw Materials

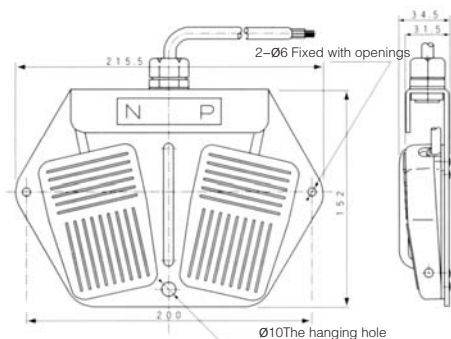
Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Bottom Plate	Color/ Paint Color
SFK-1	Polycarbonate resin	SWP (Piano wire)	SS400 (Steel)	SPCC (Steel)	Protection cover: gray, Main body: milky white
SFK-1H	ABS resin / Polycarbonate resin				Protection cover: gray, Main body: black
SFKF-1	ABS resin				Protection cover: black, Main body: black
SFKB-1					

### [Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Enbient temperature: -5-40℃
- Embient relative humidity/ below 85%RH.



## Universal Mini Type SFO series



### ●About the model

- SFO-1-2 □ □
- Protection cover color
- Standard color: R=Red, G=Green
  - Custom colors: B=Black, M=Milky

### ●SFO-1

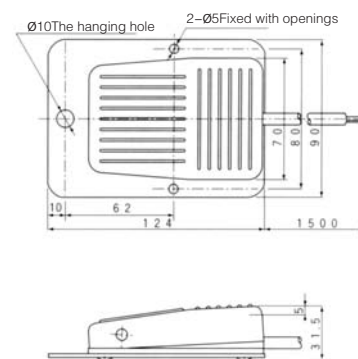
The base plate design ensures more stable operation. The hanging hole on the base plate enables the foot switch to be fixed on the wall. The main body is molded with ABS resin, and four colors are available.

### ●SFO-1-2

V type installation; operate with heel as pivot to reduce fatigue.



A design with emphasis on operating environment; can be placed freely.



## ■Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFO-1	AC250V 6A	1a	●		VCTF 2 core × 0.75mm <sup>2</sup> × 1.5m	3.92	V type micro switch	350
SFO-1-2	AC250V 6A	1a × 2	●		VCTF 4 core × 0.75mm <sup>2</sup> × 1.5m			900

## ■Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Bottom Plate	Color/ Paint Color
SFO-1	ABS resin	SWP (Piano wire)	SS400 (Steel)	SPCC (Steel)	Main body: black, red, green, milky Bottom plate: anti-rust coating
SFO-1-2					

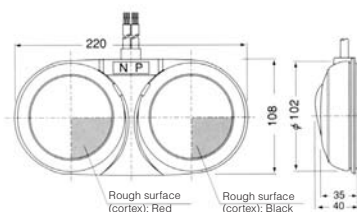
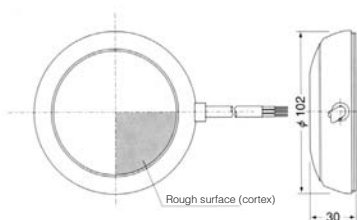
### [Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Ambient temperature: -5~40°C
- Ambient relative humidity/ below 85%RH.

## Round Switch SFU series



SFU-1



### ●SFU-1

With anti-slip pad at the back, this model has slim size while ensuring stable operation. With optional rubber magnets installed, the foot switch can be easily installed on a steel plate.

### ●SFU-1-2

Two-linkage design of SFU-1. The especially designed foot switch installation base plate enables easier use.

### ●About the model:

- SFU-1 □ □
- Optional/none = standard
- M=with rubber magnet
- Protection cover color
- Standard color: R=Red, B=Black
  - Custom colors: G=Gray, Y=Yellow, B=Blue, G=Green

## ■Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFU-1	AC250V	1c	●		VCTF3 core × 0.75mm <sup>2</sup> × 1.5m	11.7	V type micro switch	340
SFU-1-2	6A	1c × 2	●					970

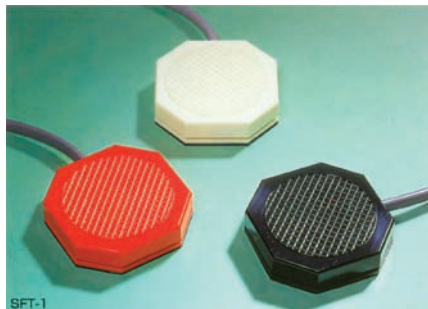
## ■Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Bottom Plate	Color/ Paint Color
SFU-1	ABS resin/ Ethylene vinylacetate copolymer	SUS (Stainless steel)	SPCC(Steel)	Black, red (standard); Gray, yellow, blue, green (custom)
SFU-1-2			Base plate: aluminum die casting	Right: black, Left: red

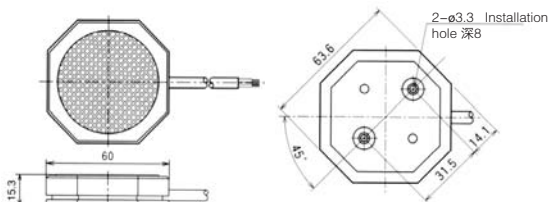
### [Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Ambient temperature: 0~40°C
- Ambient relative humidity/ below 85%RH.

## Thin Pocket Size SFT series



●Installation Drawing (Bottom)



Note: Pay attention when installing the foot switch: since the depth of installation hole is 8mm, bolts less than 8mm long are used. Before installation, the rubber pad should be removed. F type bolts with M4 cross are recommended.

●About the model:

SFT-1

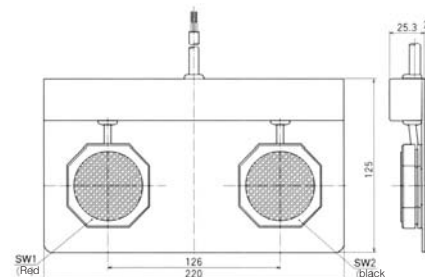
Protection cover color  
 B=Black R=Red M=Milky

### ●SFT-1

Super slim foot switch of octagon design, fashionable and simple. Easy 360° all-round operation. Can be operated by foot as well as hand, knee and other part of body. Three colors of protection cover are available.

### ●SFT-1-2

A two-linkage foot switch made up of SFT-1 units, which expands the installation gap and facilitates operation.



## Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Inter-active				
SFT-1	AC125V 5A	1a	●		VCTFK2 core × 0.75mm <sup>2</sup> × 1.5m	14.7	S type micro switch	95
SFT-1-2	AC125V 5A	1a × 2	●		VCTF4 core × 0.75mm <sup>2</sup> × 2m			920

## Major Raw Materials

Model	Main Body/Protection Cover	Return Spring	Bottom Plate	Color/ Paint Color
SFT-1	Aldehyde resin	SUS (Stainless steel)	No	Milky, black, red
SFT-1-2			Special base plate	SW1: red, SW2: black

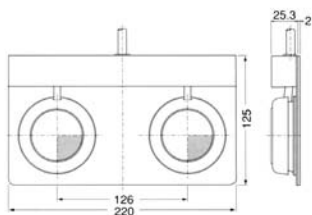
[Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Enbient temperature: -5-40°C
- Embient relative humidity/ below 85%RH.

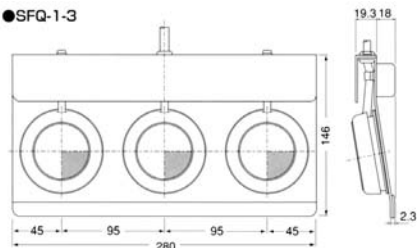
## Round Pocket Size SFQ series



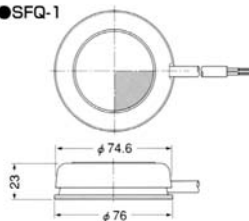
### ●SFQ-1-2



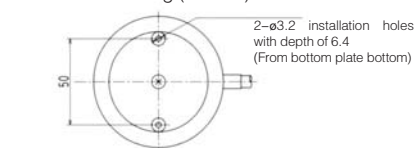
### ●SFQ-1-3



### ●SFQ-1



●Installation Drawing (Bottom)



Note: Pay attention when installing the foot switch: since the depth of installation hole is 8mm, bolts less than 8mm long are used. Before installation, the rubber pad should be removed. F type bolts with M4 cross are recommended.

### ●SFQ-1

A small and slim size improved round series. Easy 360° all-round operation. Can be operated by foot as well as hand, foot, knee and other part of body. Made of ABS resin, having excellent oil, heat, wearing and aging resistance performance. Six colors of protection cover are available to differentiate operation contents.

●About the model

SFQ-1

Protection cover color

- Standard color:  
B=Black R=Red
- Custom colors:  
M=Milk Y=Yellow B=Blue G=green

### ●SFQ-1-2, SFQ-1-3

Two-linkage and three-linkage foot switch of SFQ-1. Gather the lead wires into a 4-core (2-link type) and 6-core (3-link type) rubber covered insulation wires to facilitate the treatment of lead wires.

## Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Inter-active				
SFQ-1	AC250V 6A	1a	●		VCTF 2 core × 0.75mm <sup>2</sup> × 1.5m	8.8	V type micro switch	200
SFQ-1-2		1a × 2	●		VCTF 4 core × 0.75mm <sup>2</sup> × 2m			1300
SFQ-1-3		1a × 3	●		VCTF 6 core × 0.75mm <sup>2</sup> × 2m			1800

## Major Raw Materials

Model	Main Body/Protection Cover	Return Spring	Bottom Plate	Color/ Paint Color
SFQ-1	ABS resin	SUS (Stainless steel)	SPCC (Steel)	Black, red (standard) Milky, yellow, blue, green (custom)
SFQ-1-2				Right: black, Left: red (standard)
SFQ-1-3				Right: yellow, Middle: red, Left: blue (standard)

[Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/AC1500V/min
- Enbient temperature: -5-40°C
- Embient relative humidity/ below 85%RH.

## Low Voltage Feeble Current Type



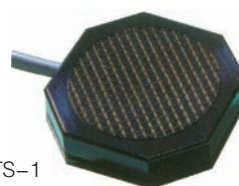
SFKS-1



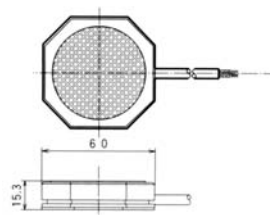
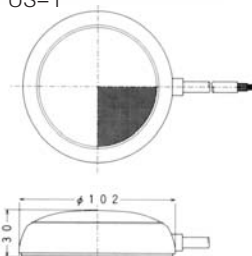
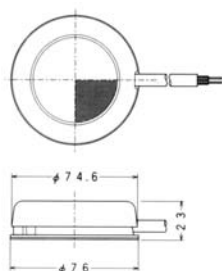
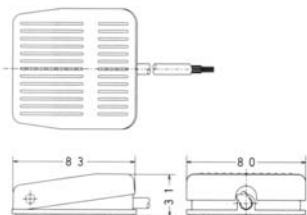
SFQS-1



SFUS-1



SFTS-1



SFOS-1



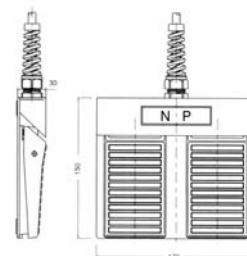
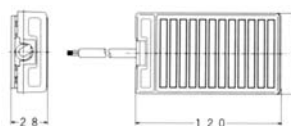
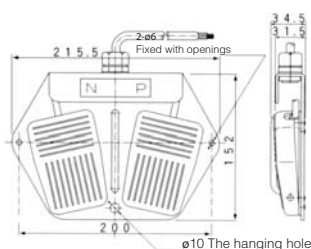
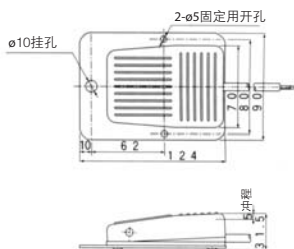
SFOS-1-2



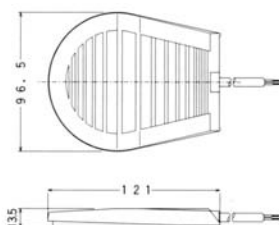
SFVS-1



SFVS-1-2



SFP-1



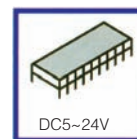
●SFP-1

SFP-1 is a super slim foot switch. The built-in switch is two parallel connected low voltage feeble current mechanical switches, which boost trustability of switching and provide stable switching performance.

- About the model

SFP-1 ☐

—Protection cover color  
 B□=Blue    BR□=Brown



DC5~24V



( SFPseries )

## ■ Major Parameters

Model	Rating	Contact Structure	Action Instantaneous	Insulation Rubber Soft Wire	Action Force (N)	Built-in switch	Weight (g)	Voltage withstand-ing
SFKS-1	标准额定 AC250V 3A 其中, SFOS-1、 SFOS-1-2、 SFVS-1、 SFVS-1-2为额 定AC100V以下  微量额定(最小) DC 6V 5mA DC 12V 2mA DC 24V 1mA	1c	●	VCTF36SB 3core × 0.75mm <sup>2</sup> × 1.5m	9.8	V type micro switch with gold plating joint contact	320	AC500 V/min
SFOS-1		1a	●	MVVS 2core × 0.5mm <sup>2</sup> × 1.5m	3.92		350	
SFOS-1-2		1a × 2	●	MVVS 4core × 0.5mm <sup>2</sup> × 1.5m			900	
SFVS-1		1c	●	MVVS 3core × 0.5mm <sup>2</sup> × 1m	255			
SFVS-1-2		1c × 2	●	MVVS 6core × 0.5mm <sup>2</sup> × 1m	29.4		1100	
SFQS-1			1a	●	VCTF36SB 2core × 0.75mm <sup>2</sup> × 1.5m		8.8	
SFUS-1		1c	●	VCTF36SB 3core × 0.75mm <sup>2</sup> × 1.5m	11.7		370	
SFTS-1	DC 5V 1mA ~ DC 30V 0.1A	1a	●	MVVS 2core × 0.3mm <sup>2</sup> × 1.5m	14.7	S type mi- cro switch	95	AC500 V/min
SFP-1	DC 24V 50mA		●	VCTF 2core × 0.3mm <sup>2</sup> × 1.5m	9.8	Mechani- cal main switch	180	

## ■ Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Bottom Plate	Color/ Paint Color	
SFKS-1	Polycarbonate Resin	SWP (Piano wire)	SS400 ( Stainless steel )	SPCC (Steel plate)	Protection cover: gray Main body: milky white	
SFOS-1	ABS resin			—	—	Black, red, green, milky
SFOS-1-2						
SFVS-1	Aluminum alloy die casting			—	—	Silver Newton, equivalent to R1-1004*
SFVS-1-2						
SFQS-1	ABS resin	SUS (Stainless steel)	—	—	Black or red	
SFUS-1	ABS resin/ Ethylene vinylacetate copolymer		—	—	Black, red (standard) Gray, yellow, blue, green (custom)	
SFTS-1	Polycarbonate Resin		—	—	Black, red, milky	
SFP-1	Polycarbonate Resin	SWP (Piano wire)	—	SPCC (Steel plate)	Protection cover:brown, blue Main body: milky white	

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

[Universal Parameters]

● Insulation resistance/ over DC500V 100MΩ.

- Ambient temperature:  $-5-40^{\circ}\text{C}$

- Ambient relative humidity/ below 85%RH.



# Full Protection Cover Type for Industry Use

Full protection cover type foot switch with a latch structure for industry use. The latch structure can effectively prevent mis-operation of the foot switch caused by external shock and falling objects from above.



## SFG Series



### ■ SFG-1SG3

#### Safer and simpler operation

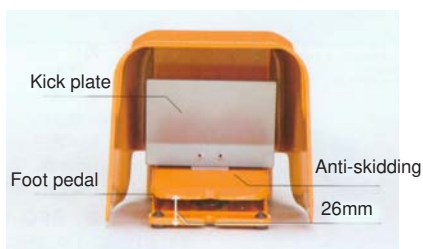
**A global foot switch that achieves the best performance in the industry.**

- Top service life in the industry. 10 times power service life than traditional models, 5 million times.
- Low pedal position of top level in the industry, easy to step on and no fatigue. Pedal height 26mm.
- Protection structure of top level in the industry, achieving IP66.
- Firmer full protection cover of top level in the industry, achieving 100J in shock test.
- Others

When the pressing the latch structure, the anti-skidding pad (rubber pad) makes the footswitch firmer.

The wide kick plate ensures the lock structure can be released even when you wear a safety boot.

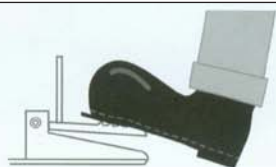
### ■ Lock structure is adopted



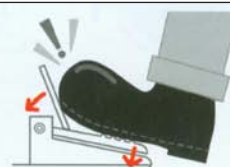
### ■ Connection possibility



**Better emphasis on safe operation.**



No operation is performed even if the pedal is stepped on.



When the kick plate is kicked in, the lock latch function is released and the foot pedal can be used.

### ■ Major parameters

Model	Ratings	Contact structure	Action		Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive			
SFG - 1SG3	AC250V 3A (resistance load) DC24V 1mA (resistance load)	1a-2b	●		27	Limit switch for built-in use basic switch	1770

### ■ Major parameters

Model	Main body /Protection cover	Return spring	Transmission shaft	Kick plate	Color/Paint color
SFG-1SG3	Aluminum	SUS (stainless steel)	SUS (stainless steel)	ZAM	2.5YR-6/13

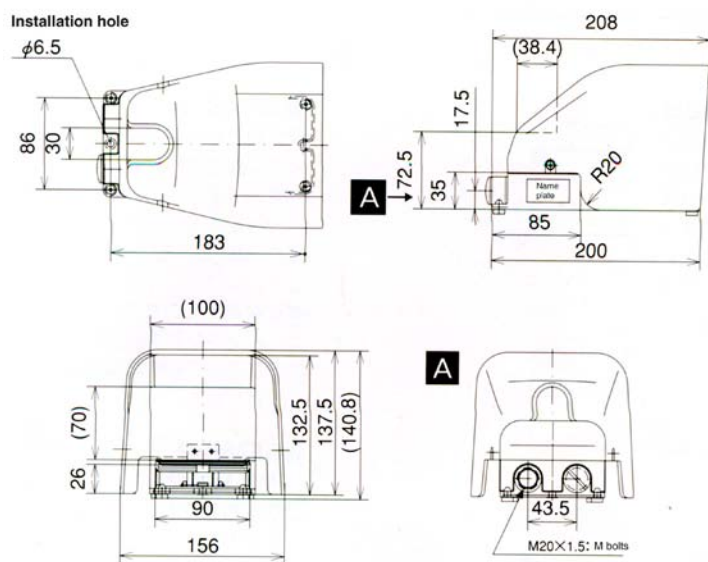
[General parameters]

- Insulation resistance/DC500V 100MΩ above
- Voltage withstanding
- Ambient temperature
- Ambient temperature/85%RH below

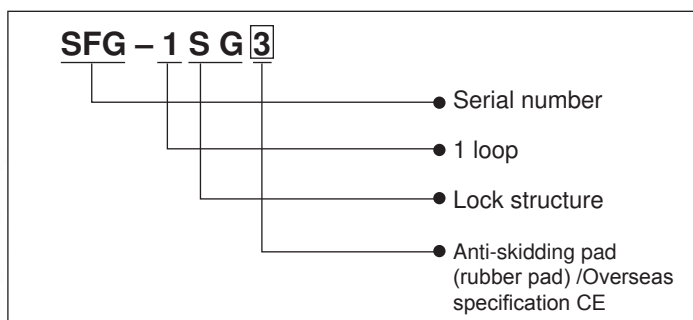
# Full protection cover type for industry use



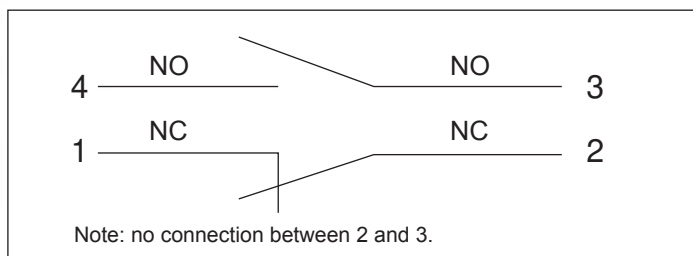
## External drawing [ SFG-1SG3 ]



## Model instruction



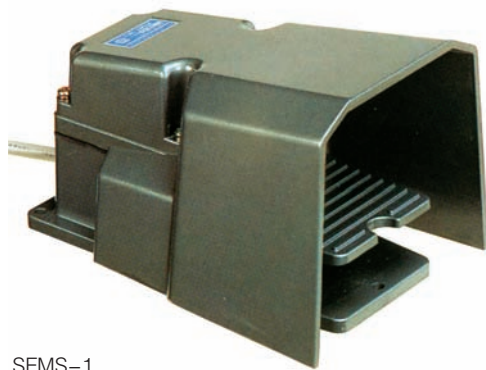
## Connection drawing (contact mode: 2 loop double disconnection)



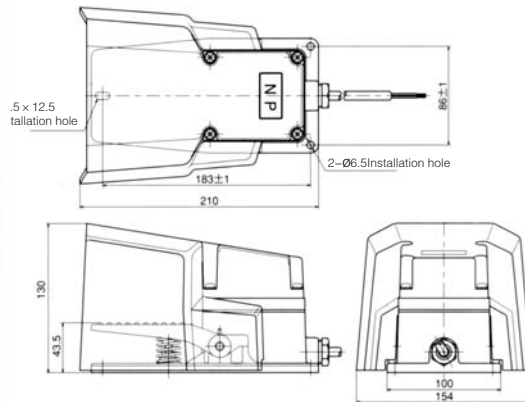
- This is a wireless product.
- When hose is not used, please use cable fastener to fix the cable.  
Recommend to use: Plastic cable seat skintopST-M20×1.5 etc. produced by RAPCABLE.
- Applicable bonded terminal: R1.25-4 R2-4
- Recommended fastening torque of the terminal bolt of the built-in switch (M4-5.5 with toothed washer): 1.0~1.4N·m.

# Industry Use Full Protection Jacket Type

## SFMS series



SFMS-1



### ● SFMS-1

A product that allows pedal operation when you are wearing safety boots.

A brake is equipped below the pedal to prevent excessive force on the built-in switch; Interoperable with SFMP-1 and SFM-1.

Besides, a rubber sticking carrying the function of dust prevention is provided between the main body and the protection cover.

### ● SFMS-2

Two-loop connection product of SFMS-1. Independent 2c contact structure. 1c loop can be connected in two different loops.

### ● SFMS-1G

Front lifting cover design capable of preventing mis-operation is installed on the front panel of the foot switch.

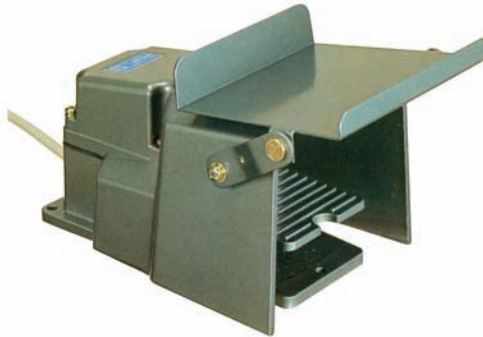
When the machine is not in use, mis-operation can be prevented by shutting the lifting cover.

### ● SFMS-1SG

Our independently developed locking device makes pedal operation safer. No pedal operation is possible if no foot is inserted.



SFMS-1G



## Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFMS-1	AC250V 10A	1c	●		VCTF 3 core × 1.25mm <sup>2</sup> × 1m	32.3	Z type micro switch	1500
SFMS-2	AC250V 6A	2c	●		VCTF 6 core × 0.75mm <sup>2</sup> × 1m			1600
SFMS-1G	AC250V 10A	1c	●		VCTF 3 core × 1.25mm <sup>2</sup> × 1m			1800
SFMS-1SG			●					1800

## Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Sealing Screw Cap	Color/ Paint Color
SFMS-1	Aluminum alloy die casting	SWP (Piano wire)	SS400 (Steel)	Aldehyde resin	Metal color, equivalent to R25-635*
SFMS-2					
SFMS-1G					Equivalent to R39-236*
SFMS-1SG					

### [Universal Parameters]

● Insulation resistance/ over DC500V 100MΩ.

● Voltage withstanding/ AC1500V /min.

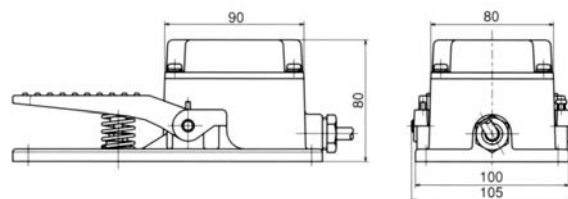
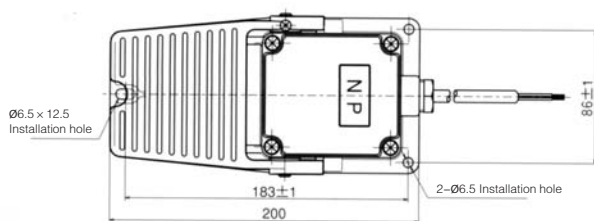
● Ambient temperature: -5-40°C

● Ambient relative humidity/ below 85%RH.

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.



## Industry Use No Protection Jacket Type SFMP series



●SFMP series have the same external dimensions.



SFMP-1

●SFMP-1  
A design with the half protection cover of SFM-1 removed.

●SFMP-2  
Two loop linkage design of SFMP-1.

### Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Inter-active				
SFMP-1	AC250V 10A	1c	●		VCTF3 1.25mm <sup>2</sup> × 1m	32.3	Z type micro switch	880
SFMP-2	AC250V 6A	2c	●		VCTF6 0.75mm <sup>2</sup> × 1m			970

### Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Trans-mission Shaft	Sealing Screw Cap	Color/ Paint Color
SFMP-1	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Aldehyde resin	Metal color, equivalent to R25-635*
SFMP-2					

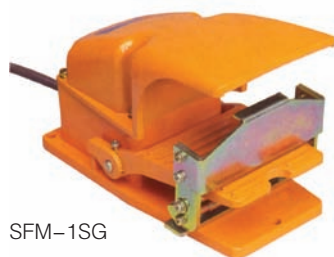
\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

[Universal Parameters]  
 ●Insulation resistance/ over DC500V 100MΩ.  
 ●Voltage withstanding/ AC1500V /min.  
 ●Enbient temperature: -5-40°C  
 ●Embient relative humidity/ below 85%RH.

## Industry Use Half Protection Jacket Type SFM series



SFM-1



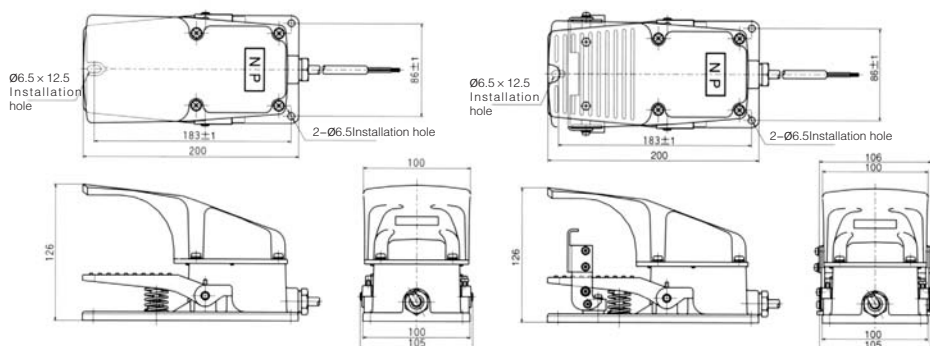
SFM-1SG

●SFM-1  
Z type micro switch is used as built-in switch, suitable for medium load high frequency. The model features long service life and high precision.

●SFM-2  
Two loop linkage design of SFM-1.

●SFM-1HN  
An interactive universal foot switch ideal for continuous live operation. Equipped with Z type micro switch, the model features long service life and high precision.

●SFM-1SG  
Our independently developed locking device makes pedal operation safer. No pedal operation is possible if no foot is inserted.



●SFM-1 series has the same external dimensions.

### Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Inter-active				
SFM-1	AC250V 10A	1c	●		VCTF 3 core × 1.25mm <sup>2</sup> × 1m	32.3	Z type micro switch	1100
SFM-2	AC250V 6A	2c	●		VCTF 6 core × 0.75mm <sup>2</sup> × 1m			1200
SFM-1HN	AC250V 5A	1a		●	VCTF 2 core × 0.75mm <sup>2</sup> × 1m			1100
SFM-1SG	AC250V 10A	1c	●		VCTF 3 core × 1.25mm <sup>2</sup> × 1m			1400

### Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Trans-mission Shaft	Sealing Screw Cap	Color/ Paint Color
SFM-1	Aluminum die casting	SWP (Piano wire)	SS400 (Steel)	Aldehyde resin	Metal color, equivalent to R25-635*
SFM-2					
SFM-1HN					
SFM-1SG					Equivalent to R39-236*

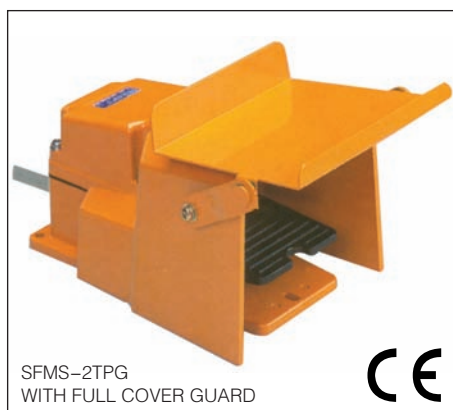
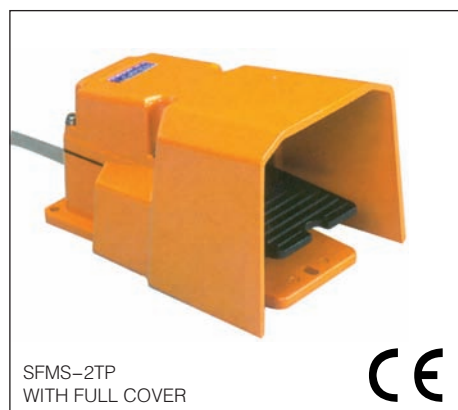
\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

[Universal Parameters]  
 ●Insulation resistance/ over DC500V 100MΩ.  
 ●Voltage withstanding/ AC1500V /min.  
 ●Enbient temperature: -5-40°C  
 ●Embient relative humidity/ below 85%RH.

# Industry Use Three-Level Foot Switch

OFF-ON-OFF three level foot switch of ergonomic design. Even if the pedal is stamped on intensely, the output is OFF, so as to stop operation. The foot switch includes:

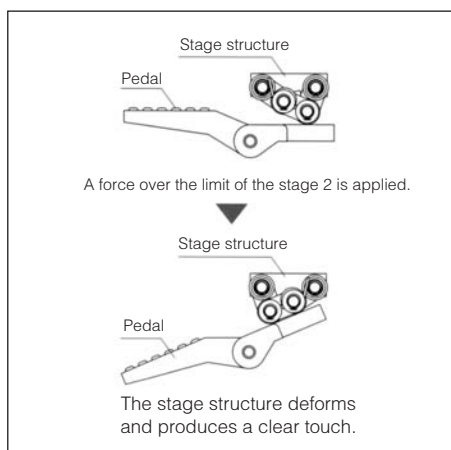
- Disable switch: When the pedal is stamped to stage 2 (level 3), the contact is OFF. The OFF state is kept maintained before the pedal returns to level 1.
- Single fault mapping: Thanks to independent two-loop contact (2a) design, dual safety mapping can be ensured by using “inconsistency detection loop”.
- Direct open circuit action device: when the built-in switch has the contact burnt, the device detach the contact by force.
- Protection design IP54.



**No fatigue in operation**  
**Our independently developed level device**  
**(Patent pending)**

This model is equipped with our independently developed special level device consists of loop and spring.

- At stage 1 (level 2), the correctly operated pedal has clear stop feeling, which can prevent stop error caused by mis-operation.
- When excessive load is applied from stage 1, you can confirm the pedal reaches the disable switch detection position at the stage 2 (level 3) via clear a touch, and accurately achieve the stop operation.



## Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFMS-2TPG	AC125V 1A (resistance load), minimum applicable load DC24V 4mA (resistance load)	2a operation banned: OFF-ON-OFF in operation	●		CE, UL AWG19 X 5 core X 3m	Around 10N level device action force 196N ± 15N (when delivered from factory) (30mm from the front end)	Disable switch, with UL, cUL, TUV and CE certification	2500
SFMS-2TP			●					2100
SFM-2TP			●					1700
SFMP-2TP			●					1500

## Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Color/ Paint Color
SFMS-2TPG	Aluminum alloy die casting	SUS (Stainless steel)	SUS (Stainless steel)	Main body abd protection cover: orange (equivalent to R39-236*) Pedal: black (equivalent to N-1.0*)
SFMS-2TP				
SFM-2TP				
SFMP-2TP				

[Universal Parameters]

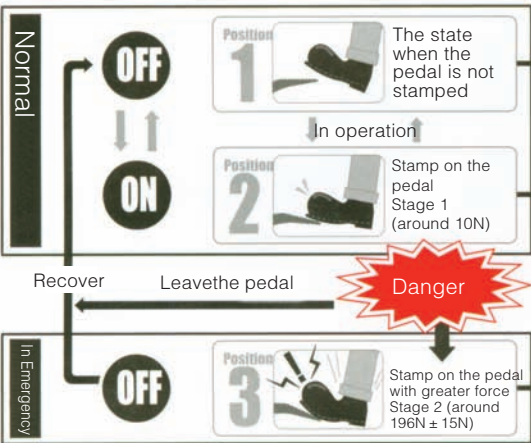
- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/ AC2200V /min.
- Ambient temperature: -5-40°C
- Ambient relative humidity/ below 85%RH.

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

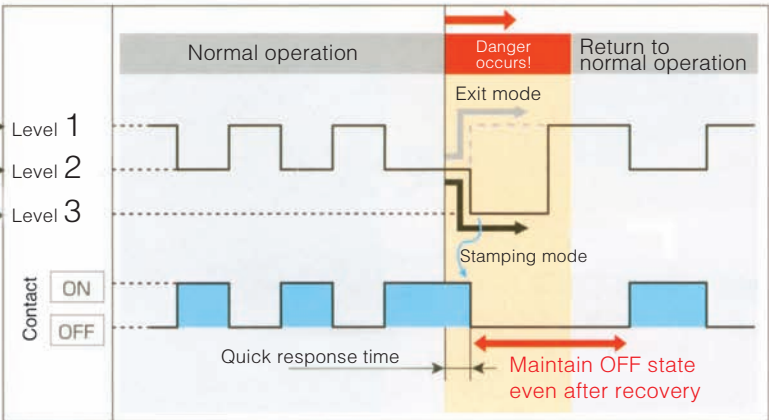
# Industry Use Three-Level Foot Switch



Three-level foot switch actions

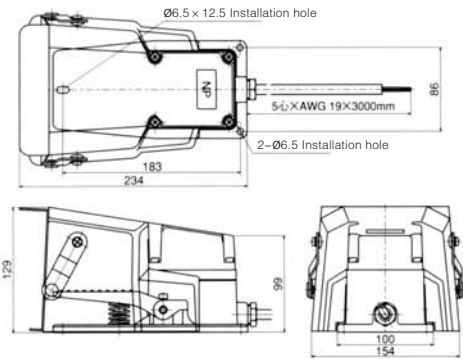


Three-level action drawing

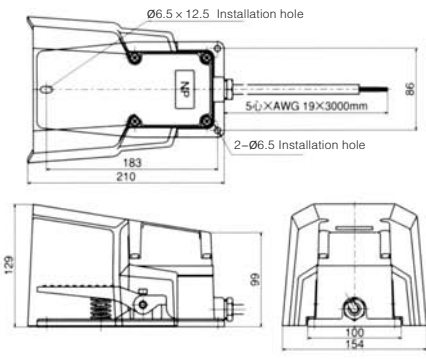


※ Compared with emergency switch, the Stage 3 pedal switch can achieve the stop operation more quickly.

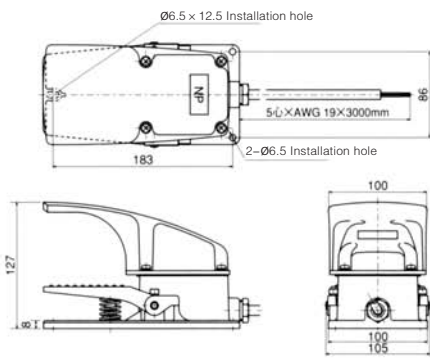
●SFMS-2TPG



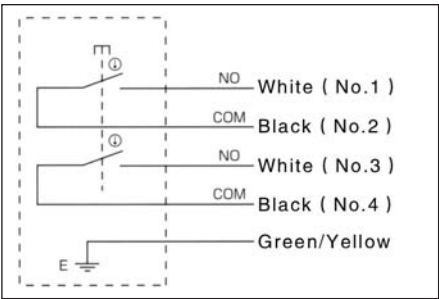
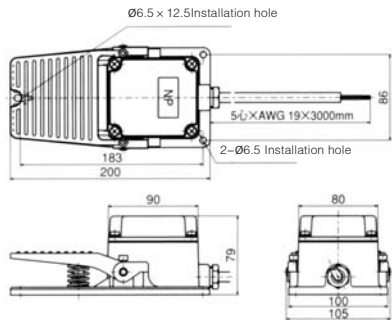
●SFMS-2TP



●SFM-2TP



●SFMP-2TP



2TP with connection diagram



# Waterproof Type

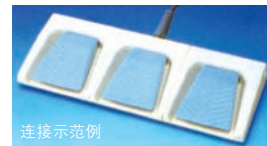
## ■SFA series

- Water-proof design, capable of operating in normal status even water or sterilizing fluid is poured on.
- Shaft-less simple design ideal for medical environment.
- No fatigue after operation of long hours.
- Can be equipped with a button switch. (※)
- Cables can be extended from the back. (※)
- Protection structure IP×7
- (※) Please consult the nearest business office.

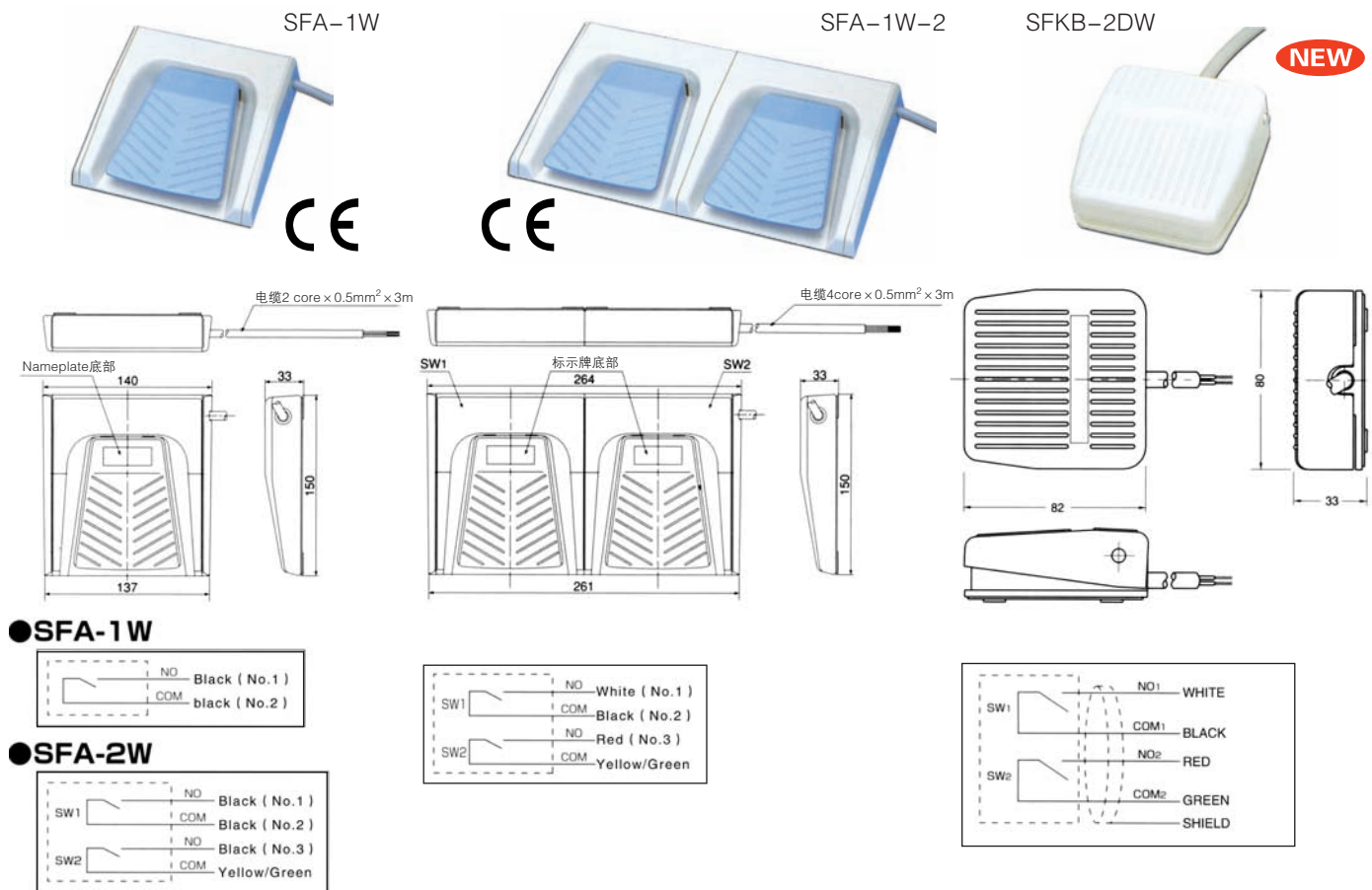
## ■For SFKB-2DW, pay attention as follows:

- Two-level stamping design, ideal for two-level action switch.
  - Water-proof design, focus on adaptability to surrounding environment.
  - Back stamping design pursuing excellent operation performance.
- SFA-2W is not a CE certified product.

The following is the locked type two linkage, three linkage and four linkage foot switch with clear connection.



Patent Pending  
No reconnection is possible after purchase. The three linkage and above products are customized. Please consult relevant business office.



## ■Major Parameters

Model	Rating	Contact Structure	Action		Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	Weight (g)
			Instantaneous	Interactive				
SFA-1W	Standard rating: DC5~30V100mA (resistance load) Feeble rating: DC6V 5mA (resistance load) DC12V 2mA (resistance load) DC24V 1mA (resistance load)	1a	●		CE、UL 2 core × 0.5mm <sup>2</sup> × 3m	9.8	Water proof S type micro switch IP 67	510
SFA-2W		2a	●		CE、UL 4 core × 0.5mm <sup>2</sup> × 3m			600
SFA-1W-2		1a × 2	●					960
SFKB-2DW	Standard rating: below AC100V 3A Feeble rating: above DC5V 1mA (resistance load)	1a × 2	●		MVVS 4 core × 0.5mm <sup>2</sup> × 1.5m	Stage 1: above 15N, Stage 2: above 30N	Water proof V coated micro switch IP 67	320

## ■Major Raw Materials

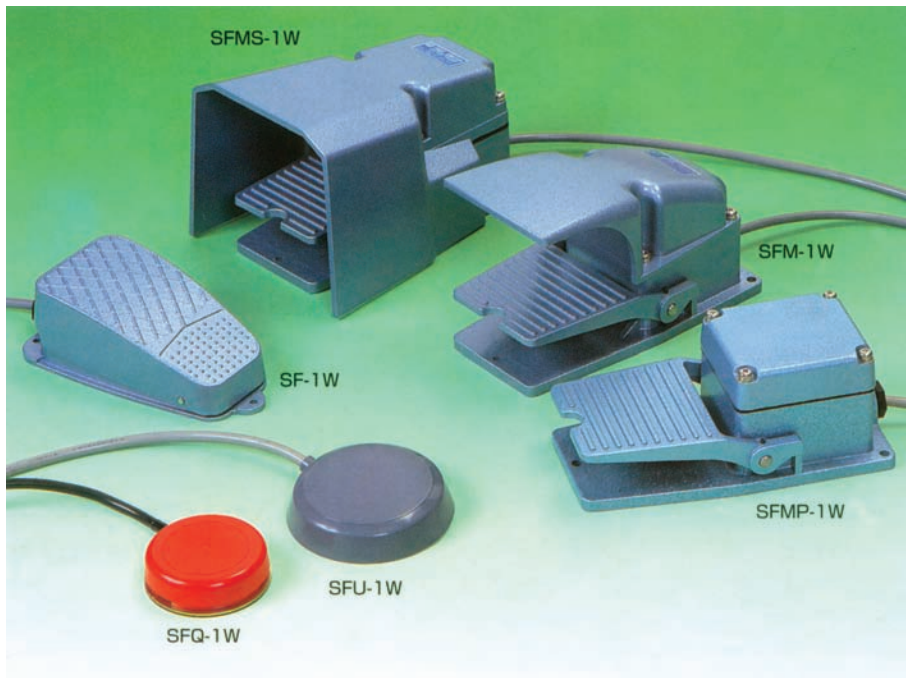
Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Bottom Plate	Color/ Paint Color
SFA-1W	PTB resin	SUS (Stainless steel)	—	SUS304	Pedal: blue (equivalent to 10B7/6*) Base: milky (equivalent to 5Y9.3/1.1*)
SFA-2W			—		
SFA-1W-2			—		
SFKB-2DW	ABS resin	SWP(Piano wire)	SS400(Steel)	SPCC	Protection cover: gray, Main body: gray (equivalent to N-8.5)

[Universal Parameters]

- Insulation resistance/ over DC500V 100MΩ.
- Voltage withstanding/ AC1500V /min (AC500V /min for SFKB-2DW).
- Enbient temperature: 10~40°C (-5~40°C for SFKB-2DW).
- Enbient relative humidity/ 30~75%RH.

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

# Water Proof Type



- SF-1W、SFU-1W  
SFKF-1W、SFMS-1W、  
SFM-1W、SFMP-1W、  
SFQ-1W

Water proof V type micro switch with protection level of IP-67 according to IEC specifications is used as built-in switch.

SFQ-1W is not suitable for environment with considerable foreign matters such as dust and soil (equivalent to IP20).

Please contact us for environment of use.

## Major Parameters

Model	Rating	Contact Structure	Action	Insulation Rubber Soft Wire	Action Force (N)	Built-in Switch	External Di-mensions	Weight (g)
			Instantaneous					
SF-1W	AC250V 3A	1c	●	VCFT 3 core × 0.75mm <sup>2</sup> × 3m	24.1	Water proof V type micro switch with gold plating contact	The same as SF-1	640
SFU-1W			●	VCFT 3 core × 0.75mm <sup>2</sup> × 2m	11.7		The same as SFU-1	390
SFKF-1W			●		9.8		The same as SFKF-1	330
SFMS-1W			●	VCFT 3 core × 0.75mm <sup>2</sup> × 3m	28.4		The same as SFMS-1	1600
SFM-1W			●				The same as SFM-1	1200
SFMP-1W			●				The same as SFMP-1	980
SFQ-1W		1a	●	VCFT 2 core × 0.75mm <sup>2</sup> × 2m	8.8		The same as SFQ-1	240

## Major Raw Materials

Model	Main Body/ Protection Cover	Return Spring	Transmission Shaft	Sealing Screw Cap	Bottom Plate	Color/ Paint Color
SF-1W	Aluminum alloy die casting	SUS (Stainless steel)	SUS (Stainless steel)	Aldehyde resin	—	Blue Newton, equivalent to R22-706*
SFU-1W	ABS resin/ Ethylene vinylacetate copolymer		—	—	Brass with Ni plating	Gray
SFKF-1W	ABS resin	SWP (Piano wire)	SS400 (steel)	—	SPCC (Steel plate)	Black
SFMS-1W	Aluminum alloy die casting	SUS (Stainless steel)	SUS (Stainless steel)	Aldehyde resin	—	Blue Newton, equivalent to R22-706*
SFM-1W						
SFMP-1W						
SFQ-1W	ABS resin	—	—	—	SPCC (Steel plate)	Black or red

[Universal Parameters]

- Insulation resistance/ over DC500V 100M $\Omega$ .
- Voltage withstanding/ AC1500V /min.
- Ambient temperature: -5-40°C (0-40°C for SFU-1W).
- Ambient relative humidity/ below 85%RH.

\*Refer to R version standard color card published by Japan Paint Manufacturers Association.

## ■About SI Unit System

According to the new law of metrology, the units are changed starting from October 1st 1999. The action forces specified in this instruction manual are converted into SI units according to following formula.

$$1\text{N}(\text{Newton}) = 0.102\text{kgf}$$

(SI unit)                      (Units used in the past)

## ■Name of Foot Switch Parts and Terms Explanation

### ●Simultaneous type

When stamping on the protection cover or the pedal, the built-in switch is turned ON/OFF; when released, the switch returns to the original state.

### ●Interactive type

When stamping on the protection cover or the pedal, the built-in switch is turned ON/OFF; the switch does not return to the original state until the protection cover or the pedal is stamped on again. Latch type.

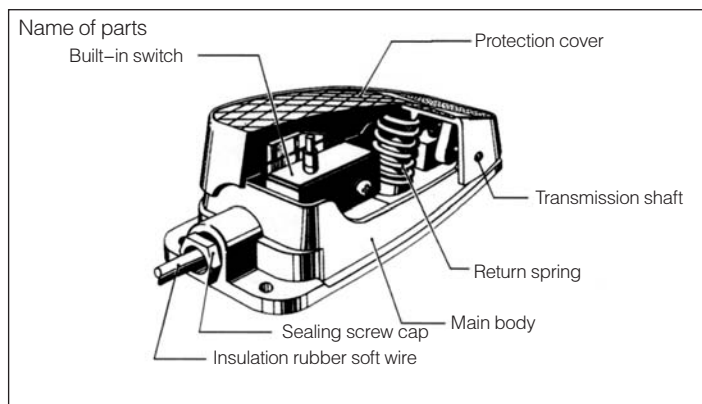
### ●Rated voltage

The voltage when foot switch is used under the rated current. The voltage used shall not exceed the rated voltage.

### ●Rated current

The current that can maintain power without turning on/off the switch. The current used shall not exceed the rated current.

(Please refer to Correct Selection and Usage of the Foot Switch on Page 1.)



## Reference

### ■External diameter of insulation rubber soft wire

Following information is used for selection of connection wires for reference.

Model	Section Area (mm <sup>2</sup> )	Number of Cores	External Dimension (mm)
VCTF	0.30	2	Ø5.0
	0.75	2	Ø6.6
	0.75	3	Ø7.0
	0.75	6	Ø8.9
	1.25	3	Ø7.8
VCTF 36SB	0.75	2	Ø7.3
	0.75	3	Ø7.7
VCT	1.25	3	Ø10.5
CE-362	0.5	2	Ø6.2
	0.5	4	Ø7.1

## ■About SI Unit System

### [Disclaimer]

- We do not undertake any responsibility for any subsequent interest or loss caused by using our products.

### [Warranty Period]

- The warranty period of the product is one year after a customer buys the product at the designated store.

### [Scope of Warranty]

- If fault occurs during the warranty period due to the customer's responsibility, the customer shall bear the cost of replacement or repair of the faulty parts.

However, following conditions are not in the scope of warranty:

- ① Improper use or operation by the user;
- ② Fault or loss caused by transportation or dropping or shock occurs in transit after purchase;
- ③ Fault is caused by reasons other than the product;
- ④ Fault or loss caused by earthquake, fire, flood or other natural disasters;
- ⑤ Fault or loss caused by violation of this instruction manual or items specified in precautions of the product;
- ⑥ Disassemble or modification of the product by a third party;
- ⑦ Use of the product outside Japan.

In addition, the warrant herein is the warranty of the product itself, and does not include other damages caused by the fault of the product.

## ■Precautions for Purchase

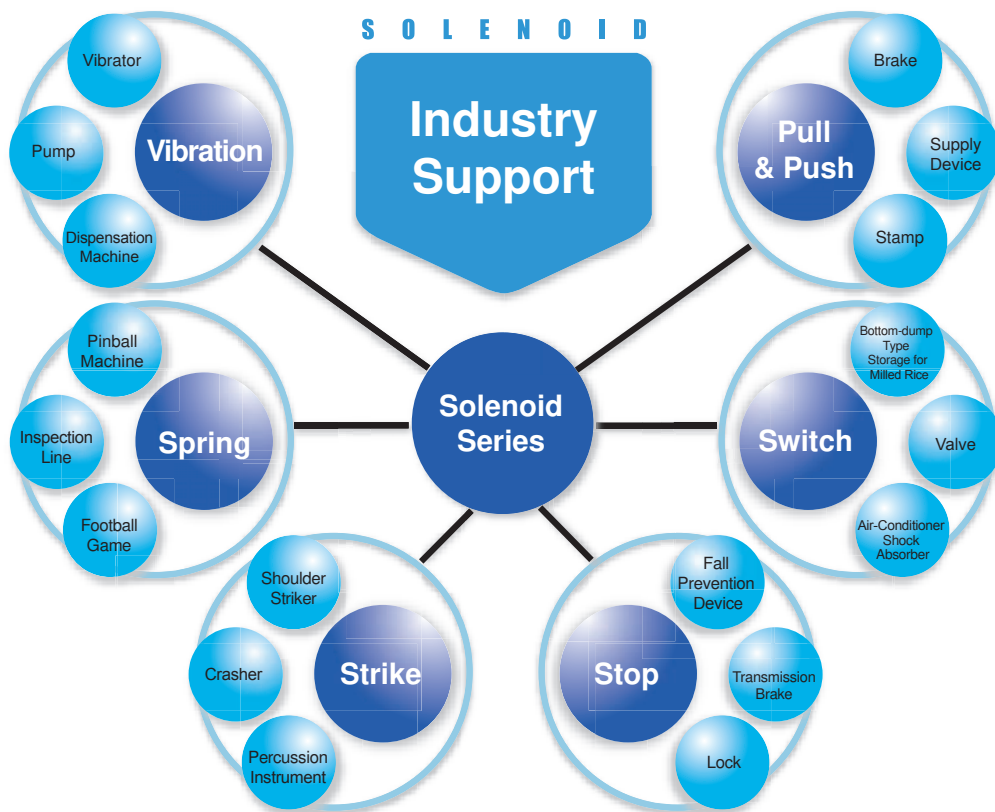
Unless otherwise specified, catalog, specification, evaluation sheet and contract represent order based on confirmation of general clauses.

We are committed to ensuring product trustability and quality for production and sales with excellent technology. Any problem occurs shall be dealt with based on communication with the customer according to items in the "When using our products".

In addition, we will make best effort to ensure customer accept the product as soon as possible. Please pay proper attention to product management and maintenance before the acceptance.

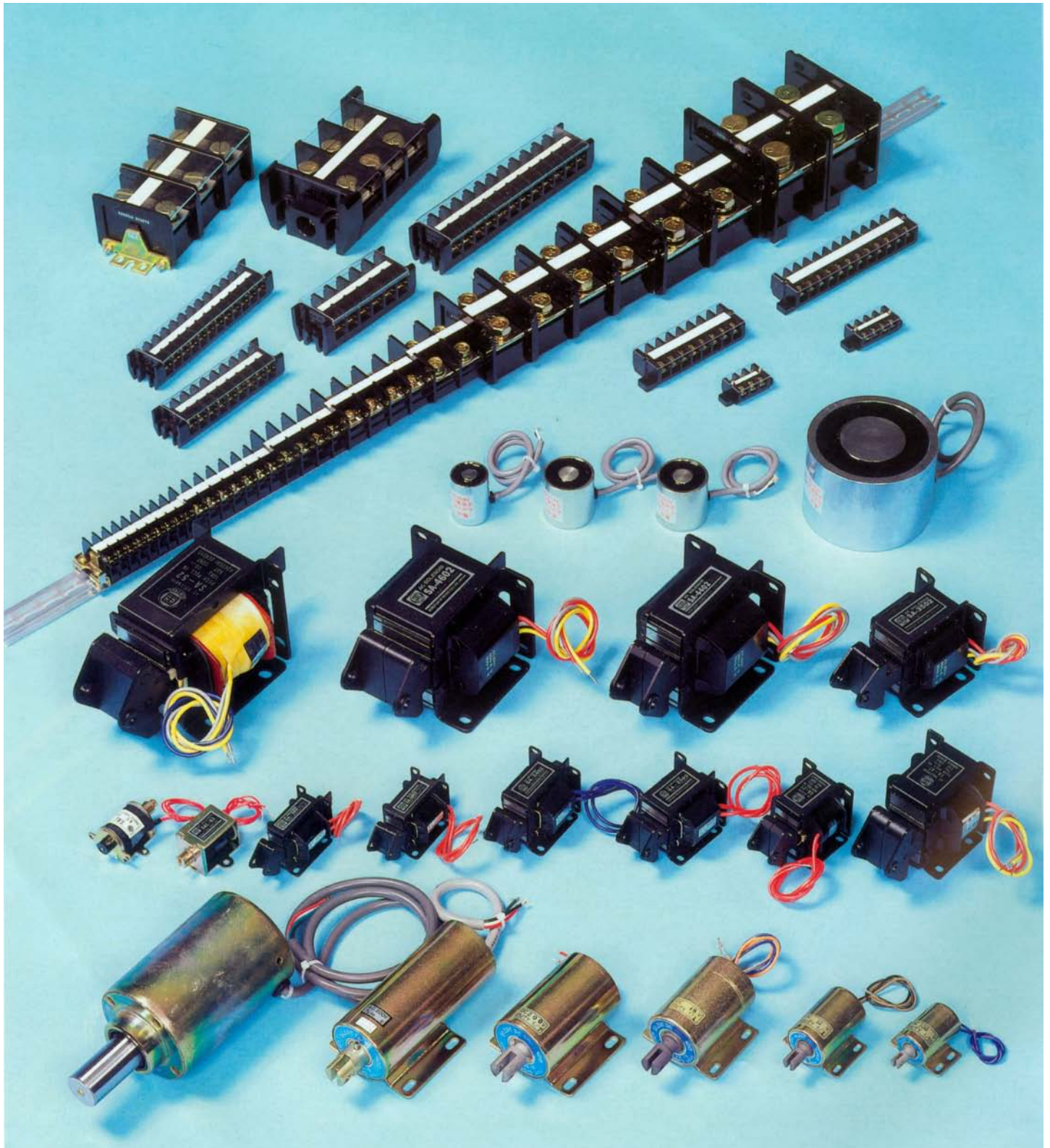


# CREATION OF SOLENOID APPLICATION SOFTWARE



# Safety and Trust

We have been specialized in research and development of automation control parts for more than 50 years. We develop parts such as AD and DC solenoids, terminal blocks and unique electromagnetic machines, substantially improve the quality and reliability of the original management, stabilize supply and make great contributions to automation of the industry and preservation of labor.



# Solenoid

The solenoid is a converter to convert electric energy to mechanical energy of rectilinear motion. The fixed iron core is excited by the winding, and the plunger or cylinder movable iron core can move inside. The solenoid includes AC and DC type.

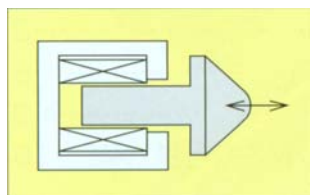
Since solenoids can complete basic functions in automation in a simple and economical manner such as pull, push, stop, strike and bend, they are widely used in industry, life, office, household, vending machine, etc. due to their low cost.

## Difference between AC and DC Solenoids

AC solenoid is driven by an AC power, and its movable iron core is mainly plunger iron core, which is made of punched silicon steel sheets fastened by rivets. Therefore, the AC solenoid has good shock, heat and wearing resistance performance.

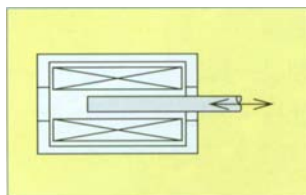
DC solenoid is driven by a DC power, and its movable iron core is mainly cylinder iron core. As magnetic material, the outer framework and the movable iron core are usually made of cold rolled steel plate, quick cutting bar or round steel.

### ●AC solenoid



Plunger type

### ●DC solenoid



Framework type

## Solenoid Term Explanation

### ●Solenoid

The plunger type electromagnetic stone that converts electromagnetic energy into mechanical motion via the movable iron core after the AC or DC exciting winding is electrified.

### ●Rated Stroke

The movement distance of the movable iron core driven by the solenoid.

### ●Rated Attracting Force

The minimum attracting force in the whole stroke to the rated stroke position when the rated voltage is applied.

### ●Rated Power Consumption

The power consumed by the winding resistance under the condition that the iron core is attached to the fixed iron core when the rated voltage is applied.

### ●Retentiveness

The maximum load that the keeps the movable iron core attached to the fixed iron core position without detaching when the rated voltage is applied.

### ●Holding Current

The exciting current that keeps the movable iron core attached to the fixed iron core position when the rated voltage is applied.

### ●Starting Current

The exciting current that keeps the iron core at the rated stroke position when the rated voltage is applied.

### ●Fixed Iron Core

The fixed part of the iron core that forms the electromagnetic loop of the solenoid.

### ●Movable Iron Core

The iron core attached to by the fixed iron core, also called plunger.

### ●Continuous Rating

The rating in continuous use under designated condition, which neither exceeds the designated temperature rise limit or deviate from other limits.

### ●Short-term Rating

The rating in short-term use under designated condition starting from cold state, which neither exceeds the designated temperature rise limit or deviate from other limits.

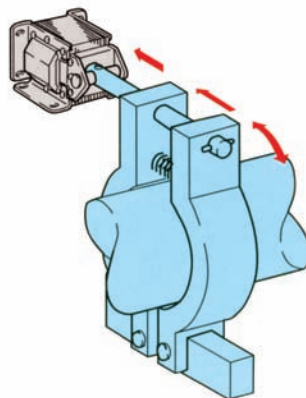
### ●Duty

The proportion of action time in the aggregate (a cycle) of the action time and stop time of a solenoid, which is calculated according to following formula:

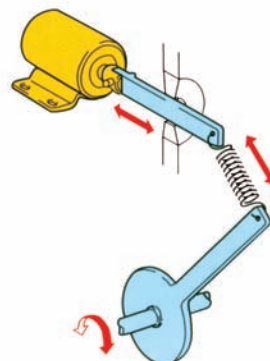
$$\text{DUTY (Load)} = \frac{(\text{Action Time})}{(\text{Action Time} + \text{Stop Time} = 1 \text{ Cycle})} \times (100\%)$$

## Application Example of Solenoids

### ● Application of brake

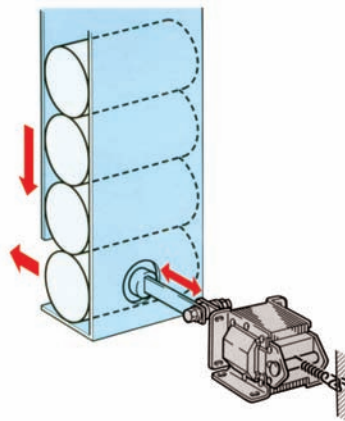


### ● The method to cover from rectilinear motion to rotary motion.



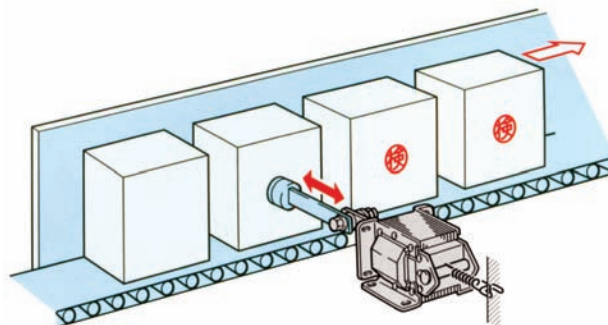
### ● Part transmission device (supply device)

( ※Application above SA-4402 and SA-51 level. )



### ● Application of lettering and perforation

( ※ Application above SA-4402 and SA-51 level. )





# AC Solenoid

AC solenoids can be divided into silicon-steel sheet stacked plunger type and framework type made of cold rolled steel plate, and have more than 30 standard types with a combination of attracting force from 2.9N (0.3kgf) to 117.6N (12kgf) and stroke from 10mm to 40mm.

## ■Features

Outstanding anti-wearing performance, without guide rail structure  
Plunger guide rail is a structure molded by nylon resin to integrate with the winding shaft, thus substantially improves the electronic and mechanical performance and make the solenoid a trustable high quality product.

### Long service life

As an important functional part, solenoid plays a decisive role in a machine's performance.

In order to extend service life of solenoid, we have been devoted to improvement of protection technologies and now we have developed long service products that can be used over 1 million times. (Consult us for service life of our products.)

### Excellent winding insulation performance

Mold according to our independently developed protection process, achieve outstanding heat, water, oil and shock resistance performance via resin molding (equivalent to type B insulation) and glass cloth tape (equivalent to type A insulation).

### Rich variety and extensive use

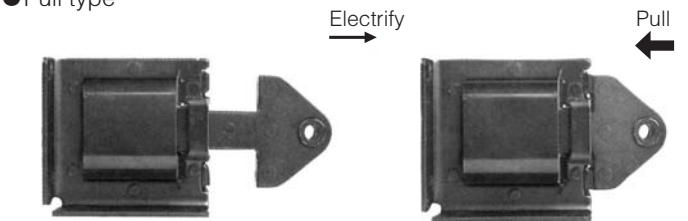
Include 30 standard types with attracting force from 2.9N (0.3kgf) to 117.6N (12kgf), provide diversified choices for various industries for labor saving and automation.

### Simple installation

Horizontal installation, vertical installation, double-side installation, etc. The installation holes on the lateral plate designed for fastening facilitate installation.

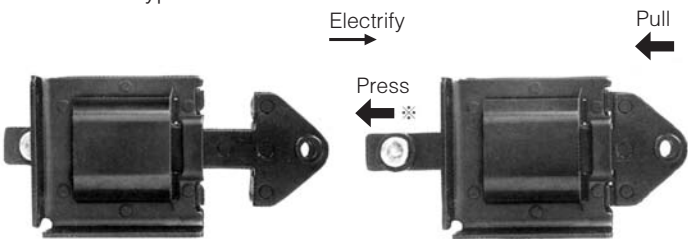
## Two types of different usage

### ●Pull type



When electrified, the plunger is pulled, so the product is called pull type.

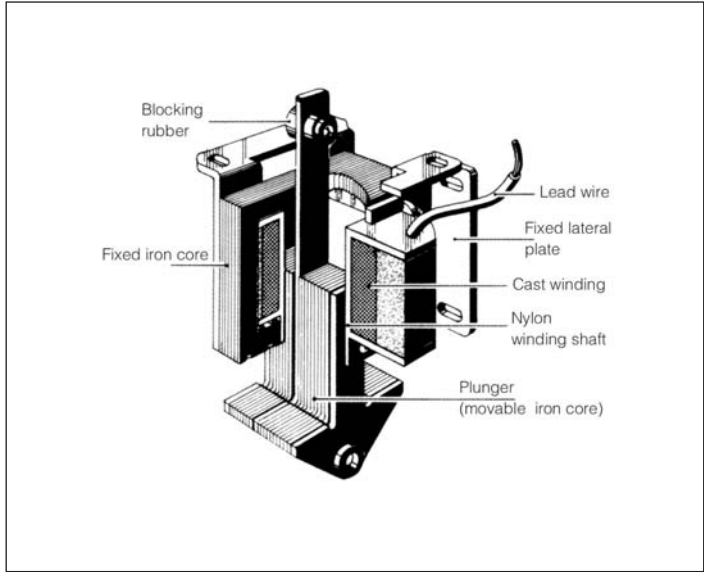
### ●Push-Pull type



When electrified, the plunger is pulled. At the same time, press on the other side. Since it applies force in the pull direction and press direction, it is called Push-Pull type.

※The basic action of the solenoid is described below: when electrified, the plunger is attracted into the winding to attach to the fixed iron core.  
For most models, the plunger will not reset automatically, so screw caps should be used to make the plunger return to its original position.  
※Push-Pull blocking rubber below SA-3702, SA-33 is mainly used to prevent the plunger (movable iron core) from falling.

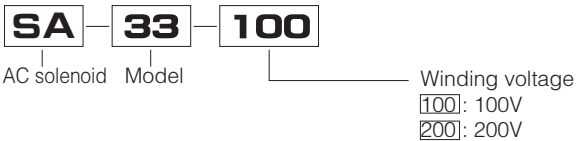
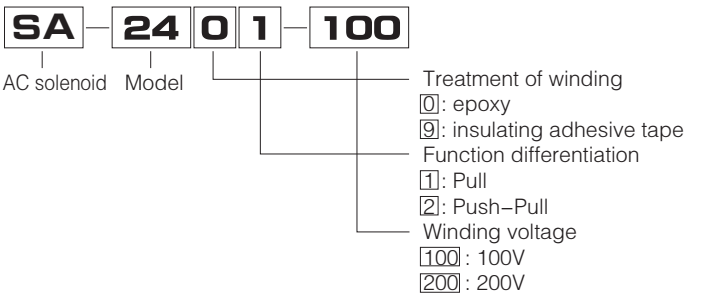
## AC Solenoid



The above drawing shows the general structure of our plunger type solenoid. Insert the winding into the fixed iron core, and the movable iron core can move inside.

Once the winding is electrified, magnetic force is generated at the center of the winding and the movable iron core is attracted to attach to the fixed iron core and thus push external mechanical movement. At this time, the force is attracting force, and the application of the attracting force becomes the principle of automation and labor saving.

### Model No. Formation



# AC Solenoid

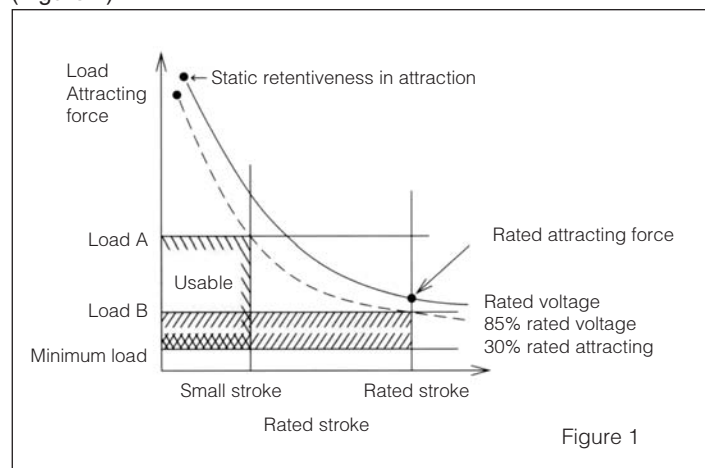
## Other Precautions and Instructions

Please use appropriate load.

When deciding the attracting force of the solenoid:

1. The full stroke attracting force must exceed the load.
2. Change of the power voltage needs to be considered.

(Figure 1)



If the stroke is too large or the attracting force is insufficient, the movable iron core can not be attracted completely, which may lead to burn-down of the solenoid.

Do not exceed the rated stroke in use. In addition, considering the change of the voltage, select the solenoid with characteristics of attracting force under 85% rated voltage (90% rated voltage for some products).

Use under 30% rated attracting force may accelerate the breakdown of the solenoid.

In Figure 1, the attracting force under 85% rated voltage will exceed the load B to the rated stroke position. Therefore the load B can be used in the full stroke. However, the load A, which is heavier than the load B can only be used under the stroke smaller than the rated stroke.

### About Installation of the Solenoid

The solenoid can be installed at the vertical or horizontal direction relating to movement direction of the iron core. Action of the solenoid will generate considerable shock and advance and return movement. If not installed appropriately, the solenoid may become loose or slide, and thus leads to accidental fault or noise.

#### ■ Installation of the fixed iron core

1. Please use bolts and nuts of size suitable for installation hole of the solenoid.
2. Please use screw caps capable of preventing loose and gaskets with teeth for fastening.
3. During installation, the movable iron core must attach firmly to the fixed iron core.  
If two iron cores can not be attached, large current will pass the winding and burn down the winding.

#### ■ Connection with load

Please pay attention to following issues:

1. The load must move on the central axis of the movable iron core and apply no force to the movable iron core in horizontal and diagonal direction. If an external force affects the movable iron core in horizontal and diagonal direction, it will shorten the service life of the solenoid and generate loud noise.
2. During the attraction process, the movable iron core must attach firmly to the fixed iron core.
3. Pins used for connection to load must meet the size of connection hole of the load of the movable iron core. If the connection pin and the connection hole produce any sound, the service life of the solenoid will be affected.

#### ■ Installation of the Push-Pull type

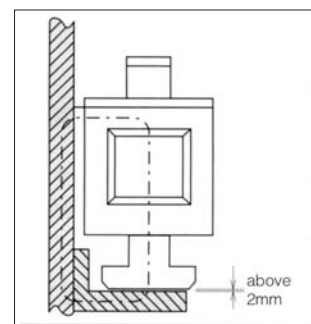
Please pay attention to following issues:

1. When the Push side (the blocking rubber side) is used, the action point of the attaching surface of the movable iron core and the load will separate considerably. Therefore, compared with the Pull side, action in horizontal and diagonal direction will generate huge noise.
2. The blocking rubber of the Push-Pull type solenoid can prevent falling caused by improper use. Therefore, when the load is directly applied to the blocking rubber in reset or the solenoid is used too frequently, an additional stopper must be used.

### About external magnetic loop

#### ■ Please consider the circuit breaking method

The solenoid generates magnetic force because of the current passing the winding, and drives the movement of the plunger via the magnetic loop. Therefore, when install the installation plate, the load connection part, the stopper and the cover made of magnetic materials, an external magnetic loop will be formed, which may reduce the effective magnetic beams and substantially decrease the attracting force.



As a result, some parts should be made of non-magnetic material or clearance (over 2mm) shall be setup to prevent formation of the magnetic loop.

### Maintenance of the solenoid

Please check if the attaching surface has any filth or dust.

The filth or dust on the attaching surface may generate noise. Even a tiny foreign object can generate a huge noise or burn down the winding. In addition, if the attaching surface is stained with oil, grease or water, the movable iron core may reset improperly. If abnormal noise or improper reset of the movable iron core is found in use, please check the attaching surface.

### Protection against over-current



























When the load increases or there is foreign object on the attaching surface, the movable iron core can not closely attach to the fixed iron core, large current may pass the winding or even burn the winding. In order to prevent such situation, over-current protection relay is recommended. Please select the relay according to the starting current of the solenoid used.

### About Insulation Type

Insulation Type	Temperature °C
Y type	90
A type	105
E type	120
B type	130
F type	155

# AC Solenoid Products Checklist

## ■ SA Series










Model	Operation Method		Rated stroke (mm)	Rated attraction force N(kgf)	Rated voltage (V)	Rated cycle (Hz)	Insulation type	Insulation disturbance rejection	Voltage with-standing	Winding temperature rise	Weight of the movable iron core (g)	Total weight (g)
	Push-Pull	Pull										
SA-992			10	4.9 (0.5)	A C 1 0 0 V	50/60 for common use (two lead wires)	Equivalent to type B insulation	over D C 5 0 0 V  5 0 M Ω	A C 1 5 0 0 V per minute	Below 8 5 °C	65	205
SA-991	SA-992	SA-991									60	195
SA-1092				5.8 (0.6)							73	235
SA-1091	SA-1092	SA-1091									68	225
SA-1192				7.8 (0.8)							96	295
SA-1191	SA-1192	SA-1191									91	285
SA-2402			15	9.8 (1.0)	A C 1 0 0 V	50/60 for common use (two lead wires)	Equivalent to type B insulation	over D C 5 0 0 V  1 0 0 M Ω	A C 2 0 0 V for 1 minute	Below 8 5 °C	100	360
SA-2401	SA-2402	SA-2401									95	350
SA-2502				14.7 (1.5)							125	430
SA-2501	SA-2502	SA-2501									120	420
SA-2602				19.6 (2.0)							150	490
SA-2601	SA-2602	SA-2601									145	480
SA-3002			20	29.4 (3.0)	or  A C 2 0 0 V	50/60 (three lead wires)	Equivalent to type B insulation	over D C 5 0 0 V  1 0 0 M Ω	A C 2 0 0 V for 1 minute	Below 8 5 °C	225	760
SA-3001	SA-3002	SA-3001									215	750
SA-3502				29.4 (3.0)							295	1015
SA-3501	SA-3502	SA-3501									285	1000
SA-3602				39.2 (4.0)							350	1175
SA-3601	SA-3602	SA-3601									340	1150
SA-3702			30	49.0 (5.0)		50/60 (three lead wires)					405	1315
SA-3701	SA-3702	SA-3701									395	1280
SA-4402				49.0 (5.0)							580	2130
SA-4401	SA-4402	SA-4401									555	2080
SA-4502				58.8 (6.0)							745	2650
SA-4501	SA-4502	SA-4501									710	2580
SA-4602			30	78.4 (8.0)		50/60 (three lead wires)					910	3250
SA-4601	SA-4602	SA-4601									880	3180

※Winding temperature rise values are under rated current.※Refer to JISC4552 for testing conditions and judgment criteria.

※RoHS compliance product



## SA Series







Model	Operation Method		Rated stroke (mm)	Rated attraction force N(kgf)	Rated voltage (V)	Rated cycle (Hz)	Insulation type	Insulation disturbance rejection	Voltage withstanding	Winding temperature rise	Weight of the movable iron core(g)	Total weight (g)	
	Push-Pull	Pull											
SA-21			10	9.8 (1.0)	A C 1 0 0 0 或 A C 2 0 0 0	50/60 for common use (two lead wires)	Equivalent to type B insulation	over D C 5 0 0 0 V 5 0 M Ω	A C 1 5 0 0 V for 1 minute	below 85°C	122	430	
SA-32			15	29.4 (3.0)		50/60 (three lead wires)					Equivalent to type A insulation	350	1150
SA-33				49.0 (5.0)								450	1450
SA-51			40	98.0 (10.0)			Equivalent to type B insulation			920		3150	
SA-52						1280				4400			
SA-55						below 85°C				1280	4400		
SA-56										1480	5160		
SAL-02			10	2.9 (0.3)		50/60 for common use (two lead wires)	Equivalent to type A insulation			(in 1 minute) below 65°C	18	81	
SAL-03				4.9 (0.5)							22	115	

※Winding temperature rise values are under rated current. ※ Refer to JISC4552 for testing conditions and judgment criteria.

※RoHS compliance product

## High Attracting force Silent AC Solenoid

### SSAB Series

Model	Operation Method		Rated stroke (mm)	Rated attraction force N(kgf)	Rated voltage (V)	Exciting current (AC)	Rated cycle (Hz)	Continuous power-on hours	Duty	Insulation type	Insulation disturbance rejection	Voltage with-standing	Installation direction	Lead-ing wire color	Total weight (g)
	Push-Pull	Pull													
SSAB-1602			20	16.6 (1.7)	A C 1 0 0 0 or A C 2 0 0 0	0.9A (100V) or 0.45A (200V)	50/60 for common use	Within 3 minutes	1/8	Equivalent to type E insulation	over D C 5 0 0 0 V  1 0 0 M Ω	A C 1 5 0 0 V  for 1 minute	Vertical or horizontal	A C 1 0 0 0 V Blue-blue / A C 2 0 0 0 V Red-red	610
SSAB-1601	SSAB-1602	SSAB-1601		19.6 (2)											600
SSAB-1802			25	19.6 (2)		1.1A (100V) or 0.55A (200V)		Within 7 minutes	1/6						935
SSAB-1801	SSAB-1802	SSAB-1801		24.5 (2.5)											920
SSAB-2002			30	29.4 (3)		1.3A (100V) or 0.65A (200V)									1720
SSAB-2001	SSAB-2002	SSAB-2001		36.7 (3.74)					1700						

※Winding temperature rise values are under rated current. ※ Refer to JISC4552 for testing conditions and judgment criteria.

※RoHS compliance product

# Major Component Material Checklist

## ■ AC Solenoid SA Series

Model	SA-992	SA-1092	SA-1192	SA-2402	SA-2502	SA-2602	SA-3002	SA-3502	SA-3602	SA-3702	SA-4402
	SA-991	SA-1091	SA-1191	SA-2401	SA-2501	SA-2601	SA-3001	SA-3501	SA-3601	SA-3701	SA-4401
Power-on time	Continuous rating										
Movable iron core	Cold rolled silicon steel plate										
Fixed • movable lateral plate	Cold rolled steel plate										
Plunger guide rail	Nylon resin integrated with the winding shaft										
Winding insulation	Epoxy polyester insulation adhesive tape treatment (white)			Resin casting treatment							
Winding	Polyester copper wire										
Lead wire	Heat resisting ethylene wire (UL-1015)										
Surface treatment	Black electro-coating										
Lead wire color	100V-blue / 200V-red							100V-blue / 200V-red / 50Hz-yellow / 60Hz-gray			

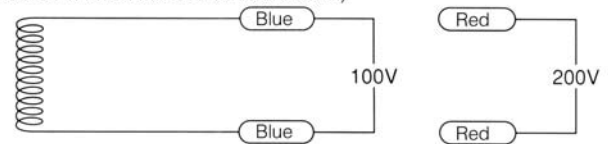
Model	SA-4502	SA-4602	SA-21	SA-32	SA-33	SA-51	SA-52	SA-55	SA-56	SAL-02	SAL-03
	SA-4501	SA-4601									
Power-on time	Continuous rating									1 min rating	
Movable iron core	Cold rolled silicon steel plate									Rolled steel plate for ordinary structure	
Fixed・movable lateral plate	Cold rolled steel plate									Rolled steel plate for ordinary structure	
Plunger guide rail	Nylon resin integrated with the winding shaft		Brass・nylon resin molded product							Nylon resin integrated with the winding shaft	
Winding insulation	Resin molding treatment		Epoxy polyester insulation adhesive tape treatment (white)			Glass cloth tape immersion paint treatment		Resin molding treatment		Acetic acid adhesive tape treatment	
Winding	Polyester copper wire										
Lead wire	Heat resisting ethylene wire (UL-1015)									Heat resisting ethylene wire (UL-1007)	
Surface treatment	Black electro-coating									Complex acid salt coating treatment (Ep-Fe/Zn 5/CM2 C)	
Lead wire color	100V-blue/200V-red/ 50Hz-yellow/60Hz-gray									100V-blue / 200V-red	

## ■ Silent AC Solenoid SSAB Series

Model	SSAB-1602 SSAB-1601	SSAB-1802 SSAB-1801	SSAB-2002 SSAB-2001
Movable iron core	SUM (free machining steel)		
Fixed iron core	SUM (free machining steel)		
Winding insulation	Resin filled		
Winding	Polyester copper wire		
Winding shaft	P.B.T containing glass		
Surface treatment	Complex acid coating treatment (Ep-Fe/Zn 5/CM2 C) Fixed iron core / Polyfurol resin coating treatment		
Pipe	STKM (Structure steel pipe for mechanical use)		
Installation platform	Cold rolled steel plate		
Lead wire	Heat resisting ethylene wire (UL-1007)		
Lead wire color	100V-blue / 200V-red		
O ring	NBR		

### ● Connection Method of Lead Wires

(Situation in which two lead wires are used.)



(Situation in which three lead wires are used.)



**Note**

(For situation in which three lead wires are used.)

Do not use when the 50Hz (yellow)-60Hz (gray) circuit is open, otherwise the winding will burnt down.

# AC Solenoid

●NP: Name Plate ●VP: Voltage Plate



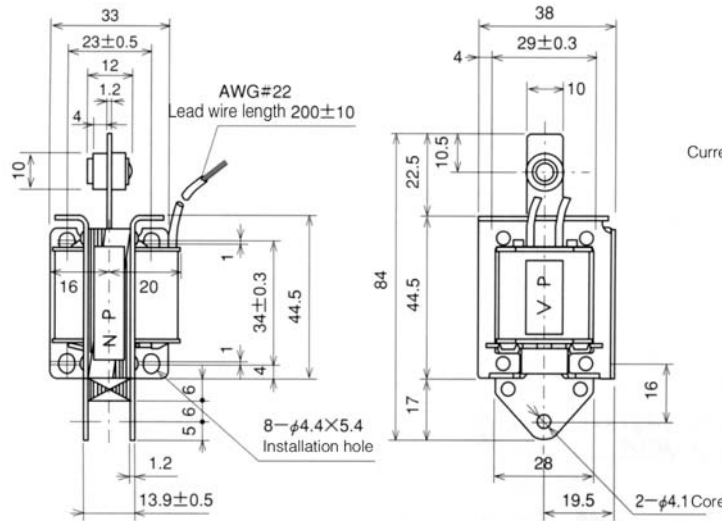
●PUSH-PULL

●PULL

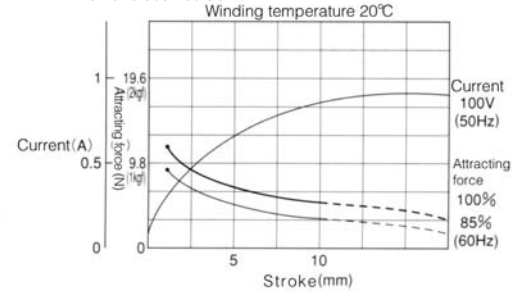
## SA-992 (PUSH-PULL)

## SA-991 (PULL)

(The figure is SA-992)



■Attracting force characteristics: current characteristics



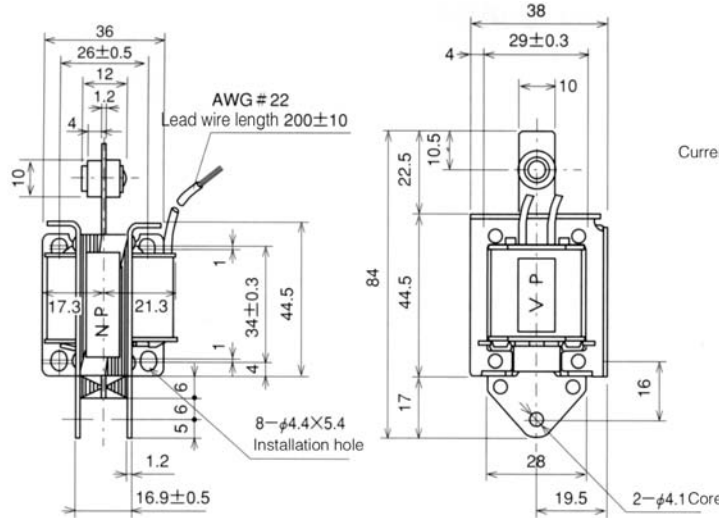
■Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-992	100	0.8	0.12	4.9N(0.5kgf) /10mm	
	200	0.45	0.07		
SA-991	100	0.8	0.12	4.9N(0.5kgf) /10mm	
	200	0.45	0.07		

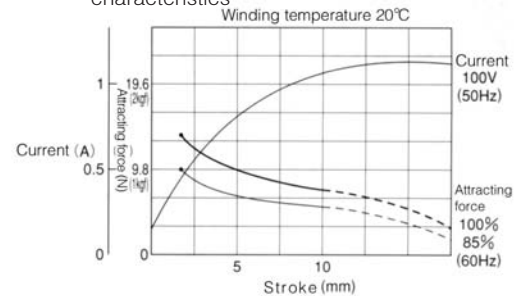
## SA-1902 (PUSH-PULL)

## SA-1901 (PULL)

(The figure is SA-1902)



■Attracting force characteristics: current characteristics



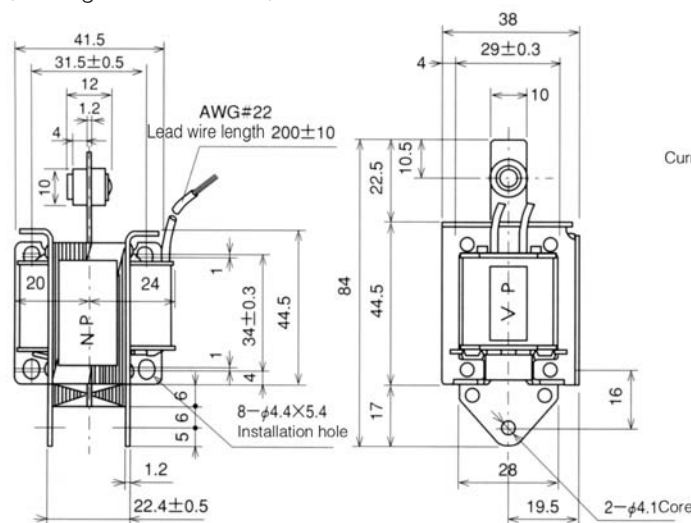
■Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-1902	100	1.1	0.16	5.8N(0.6kgf) /10mm	
	200	0.6	0.1		
SA-1901	100	1.1	0.16	5.8N(0.6kgf) /10mm	
	200	0.6	0.1		

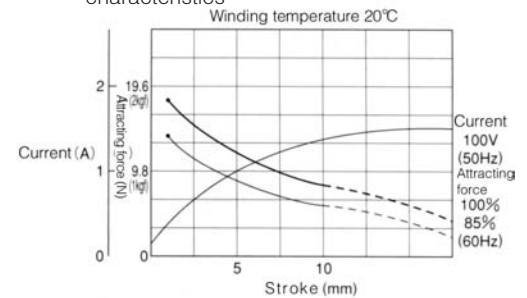
## SA-1192 (PUSH-PULL)

## SA-1191 (PULL)

(The figure is SA-1192)



■Attracting force characteristics: current characteristics



■Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-1192	100	1.3	0.18	7.8N(0.8kgf) /10mm	
	200	0.7	0.1		
SA-1191	100	1.3	0.18	7.8N(0.8kgf) /10mm	
	200	0.7	0.1		



# AC Solenoid

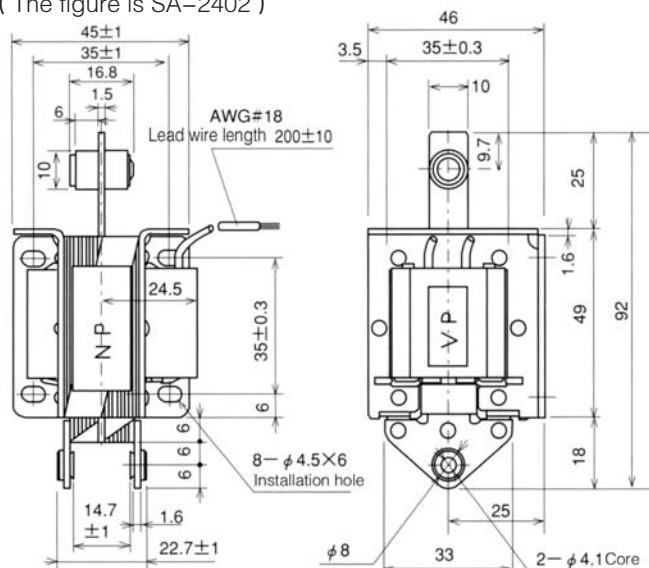
## SA-2402

(PUSH-PULL)

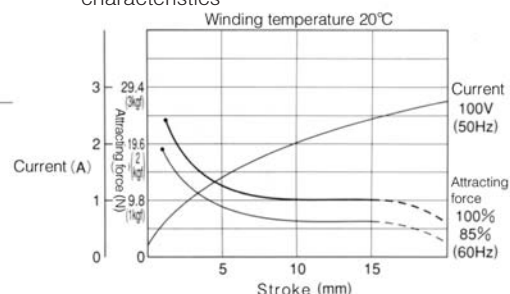
## SA-2401

(PULL)

( The figure is SA-2402 )



■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-2402	100	2.1	0.30	9.8N(1.0kgf) /15mm	
	200	1.1	0.12		
SA-2401	100	2.1	0.30	9.8N(1.0kgf) /15mm	
	200	1.1	0.12		

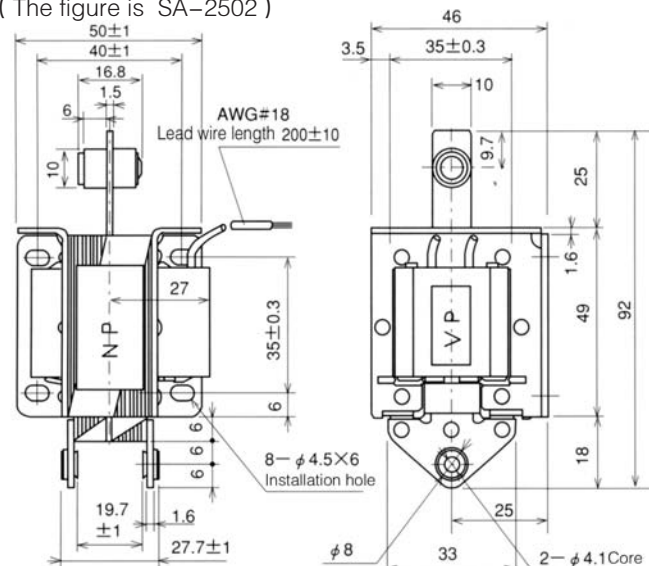
## SA-2502

(PUSH-PULL)

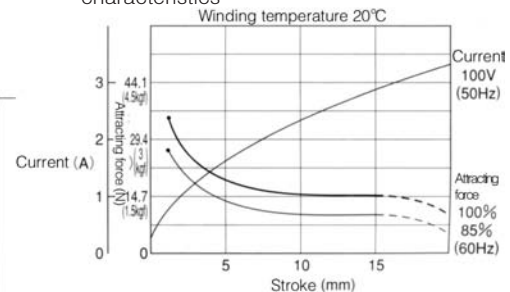
## SA-2501

(PULL)

( The figure is SA-2502 )



■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-2502	100	3.1	0.35	14.7N(1.5kgf) /15mm	
	200	1.4	0.17		
SA-2501	100	3.1	0.35	14.7N(1.5kgf) /15mm	
	200	1.4	0.17		

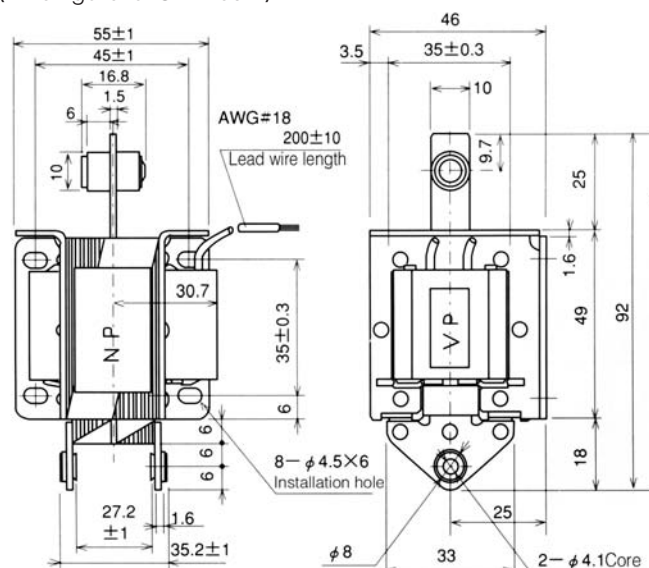
## SA-2602

(PUSH-PULL)

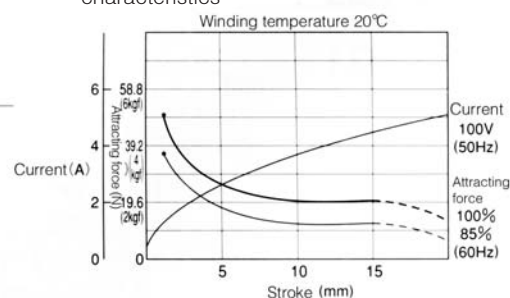
## SA-2601

(PULL)

( The figure is SA-2602 )



■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-2602	100	4.0	0.4	19.6N(2.0kgf) /15mm	
	200	2.0	0.2		
SA-2601	100	4.0	0.4	19.6N(2.0kgf) /15mm	
	200	2.0	0.2		



●PUSH-PULL

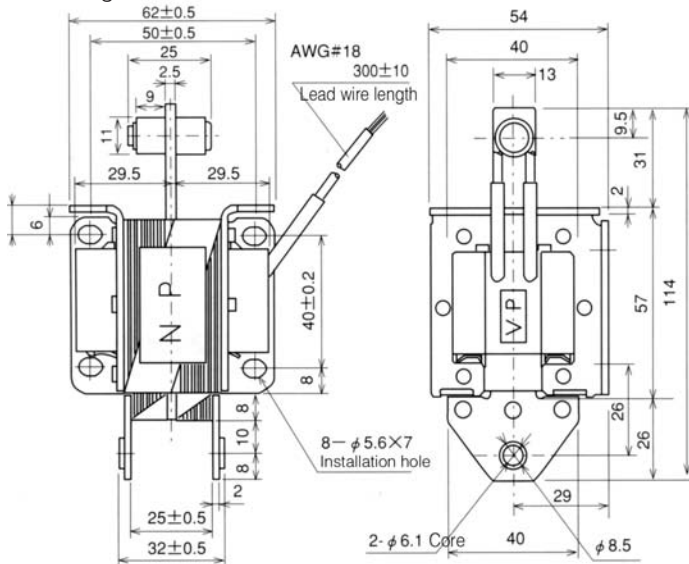


●PULL

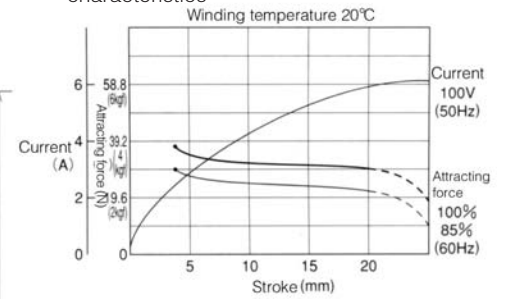
## SA-3002 (PUSH-PULL)

## SA-3001 (PULL)

( The figure is SA-3002 )



■Attracting force characteristics: current characteristics



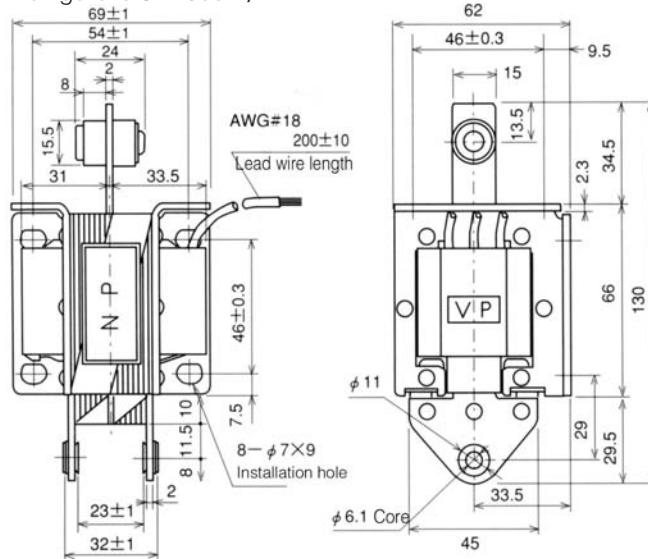
■Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-3002	100	5.8	0.52	29.4N(3.0kgf) /20mm
	200	2.9	0.25	
SA-3001	100	5.8	0.52	29.4N(3.0kgf) /20mm
	200	2.9	0.25	

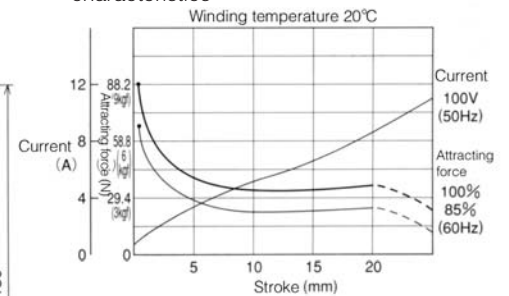
## SA-3502 (PUSH-PULL)

## SA-3501 (PULL)

( The figure is SA-3502 )



■Attracting force characteristics: current characteristics



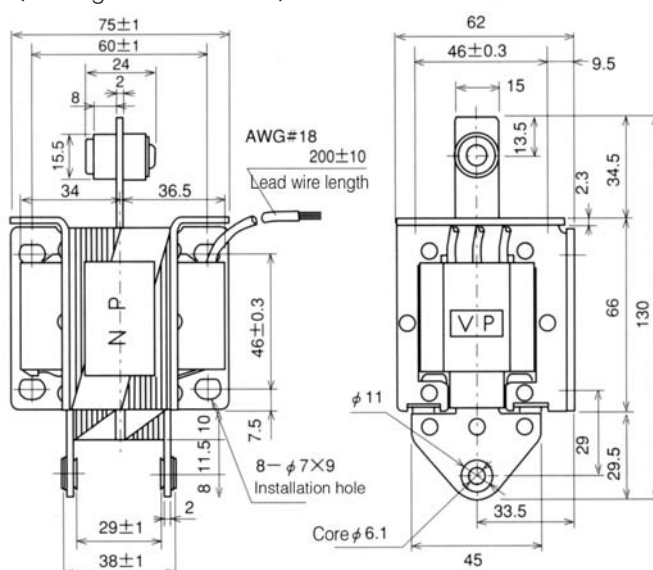
■Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-3502	100	8.0	0.6	29.4N(3.0kgf) /20mm
	200	4.0	0.33	
SA-3501	100	8.0	0.6	29.4N(3.0kgf) /20mm
	200	4.0	0.33	

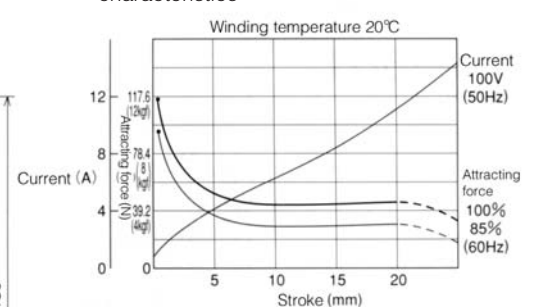
## SA-3602 (PUSH-PULL)

## SA-3601 (PULL)

( The figure is SA-3602 )



■Attracting force characteristics: current characteristics



■Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-3602	100	9.6	0.8	39.2N(4.0kgf) /20mm
	200	4.5	0.4	
SA-3601	100	9.6	0.8	39.2N(4.0kgf) /20mm
	200	4.5	0.4	

# AC Solenoid

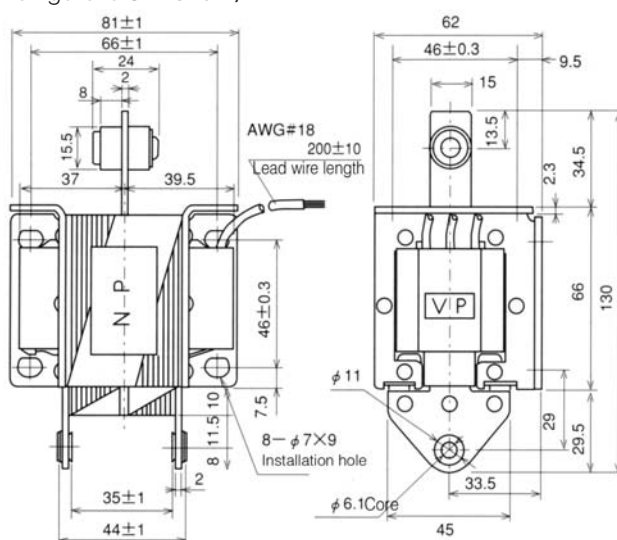
## SA-3702

(PUSH-PULL)

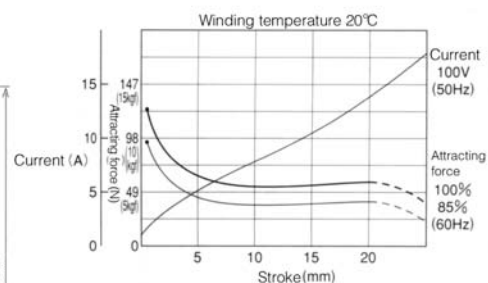
## SA-3701

(PULL)

( The figure is SA-3702 )



■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-3702	100	12.0	0.9	49.0N(5.0kgf) /20mm	
	200	5.5	0.45		
SA-3701	100	12.0	0.9	49.0N(5.0kgf) /20mm	
	200	5.5	0.45		

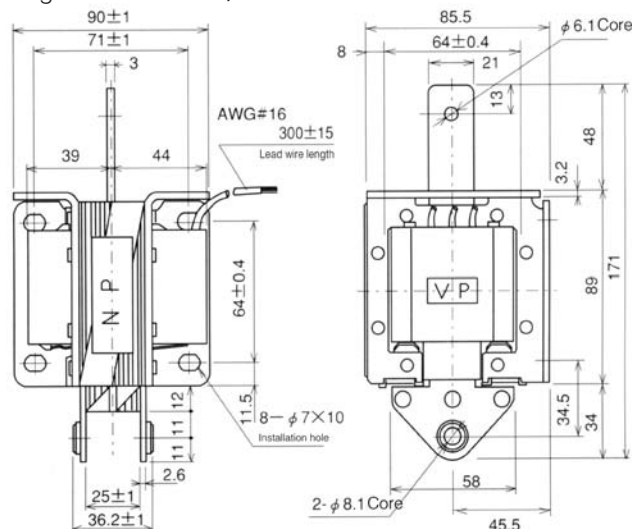
## SA-4402

(PUSH-PULL)

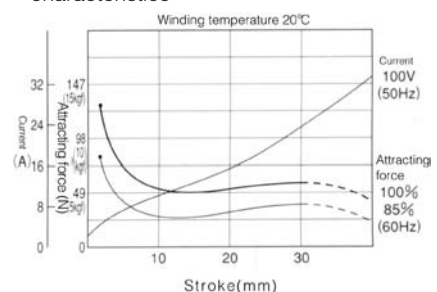
## SA-4401

(PULL)

( The figure is SA-4402 )

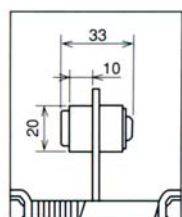


■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-4402	100	20.0	1.4	49.0N(5.0kgf) /30mm	
	200	10.0	0.65		
SA-4401	100	20.0	1.4	49.0N(5.0kgf) /30mm	
	200	10.0	0.65		



When blocking rubber is connected.

● With SA-4402 blocking rubber

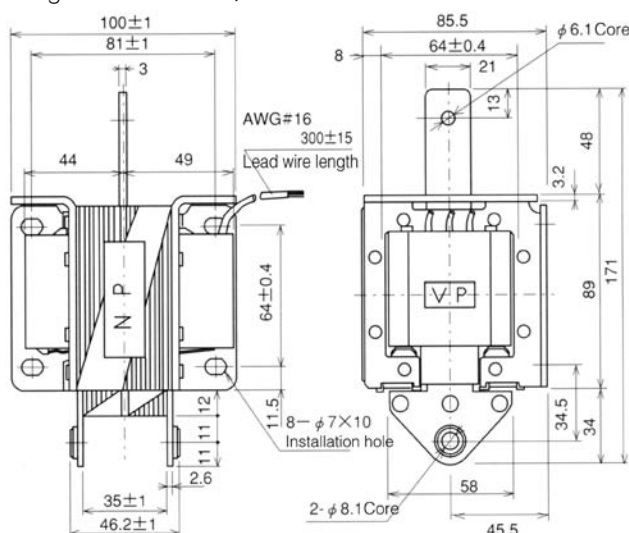
## SA-4502

(PUSH-PULL)

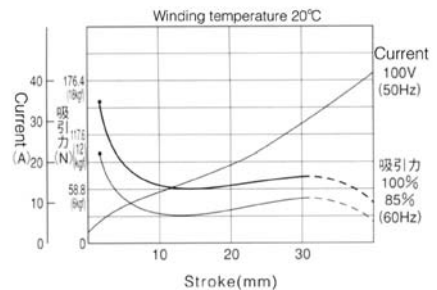
## SA-4501

(PULL)

( The figure is SA-4502 )

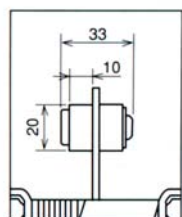


■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-2602	100	27.0	1.75	58.8N(6.0kgf) /30mm	
	200	12.6	0.76		
SA-2601	100	27.0	1.75	58.8N(6.0kgf) /30mm	
	200	12.6	0.76		



When blocking rubber is connected.

● With SA-4502 blocking rubber





●PUSH-PULL



●PULL

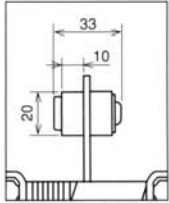
## SA-4602

(PUSH-PULL)

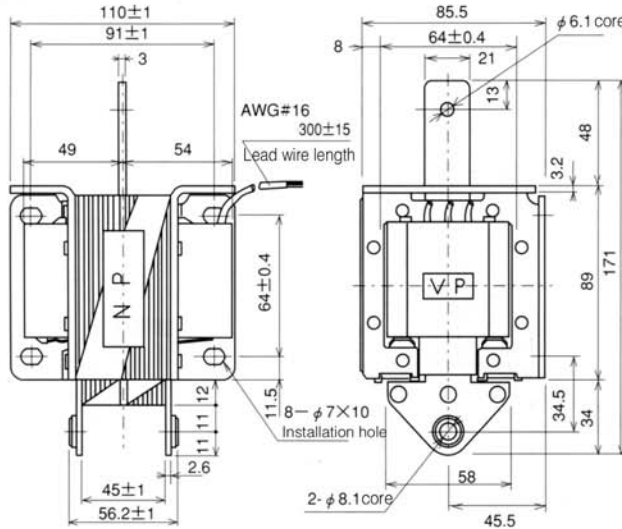
## SA-4601

(PULL)

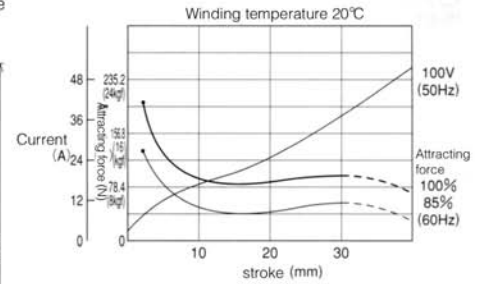
( The figure is SA-3002 )



● With SA-4402 blocking rubber



■ Attracting force characteristics: current characteristics

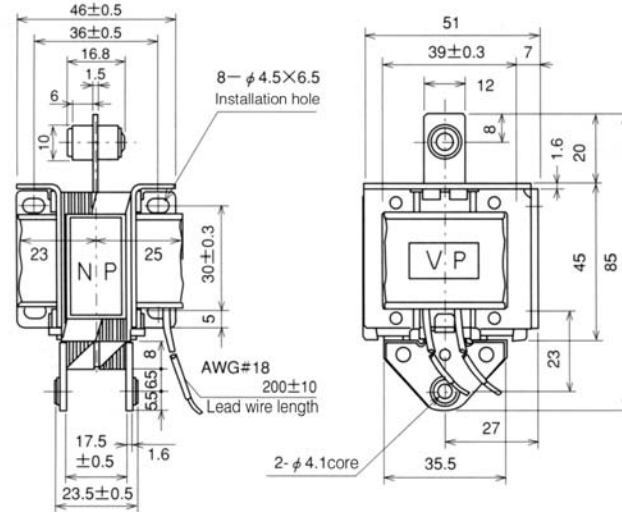


■ Current Value

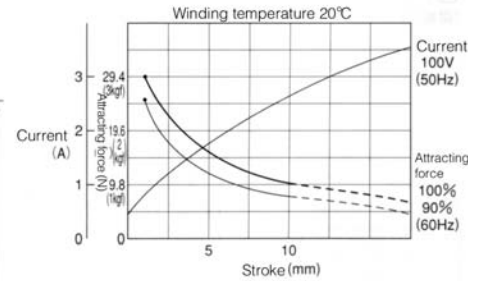
Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-4602	100	32.0	2.0	78.4N(8.0kgf) /30mm	
	200	14.5	1.0		
SA-4601	100	32.0	2.0	78.4N(8.0kgf) /30mm	
	200	14.5	1.0		

## SA-21

(PUSH-PULL)



■ Attracting force characteristics: current characteristics

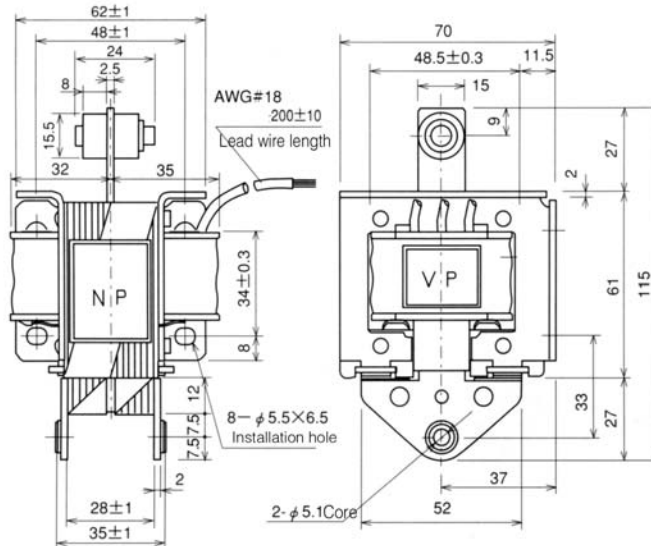


■ Current Value

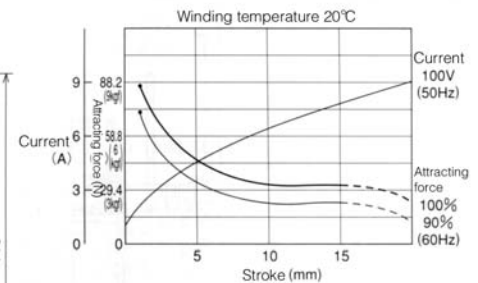
Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-21	100	2.6	0.42	9.8N(1.0kgf) /10mm	
	200	1.3	0.2		

## SA-32

(PUSH-PULL)



■ Attracting force characteristics: current characteristics

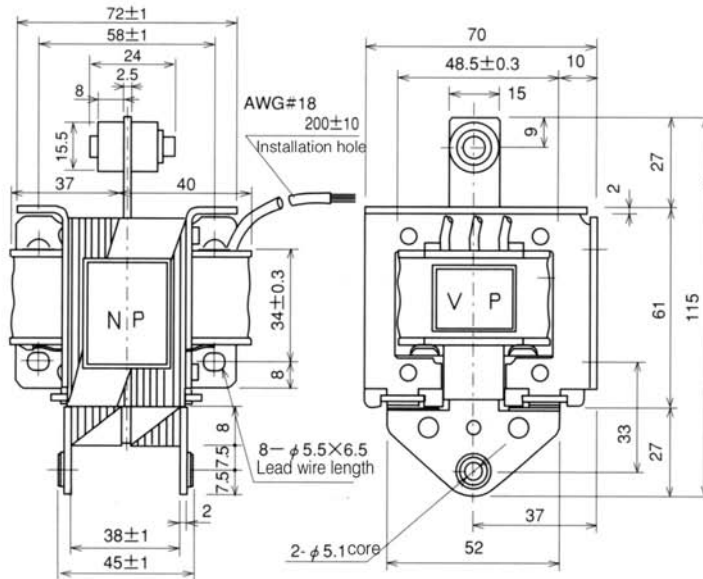


■ Current Value

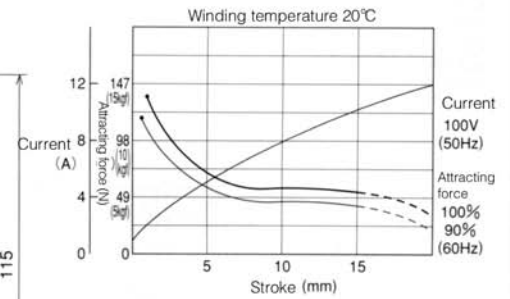
Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force	Rated stroke
SA-32	100	7.2	0.8	29.4N(3.0kgf) /15mm	
	200	3.6	0.42		

# AC Solenoid

## SA-33 (PUSH-PULL)



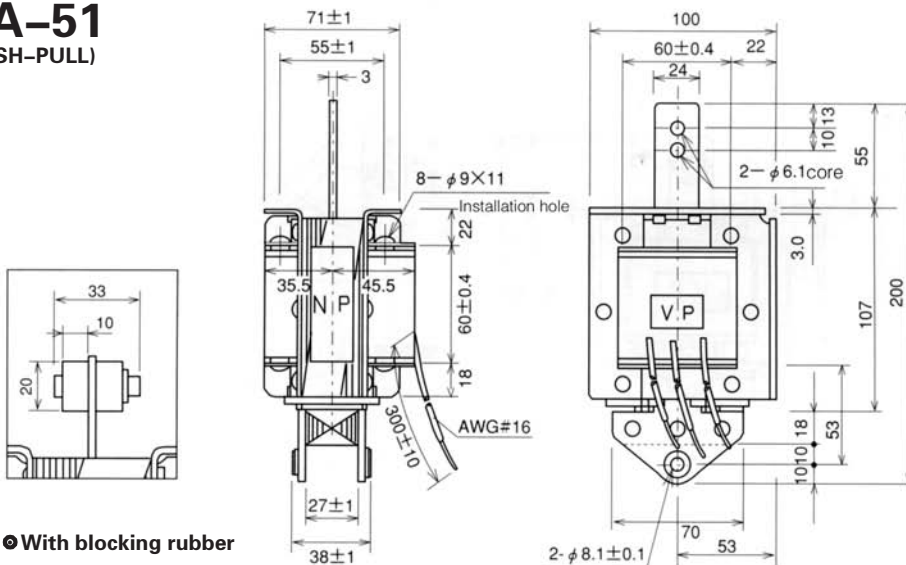
■ Attracting force characteristics: current characteristics



■ Current Value

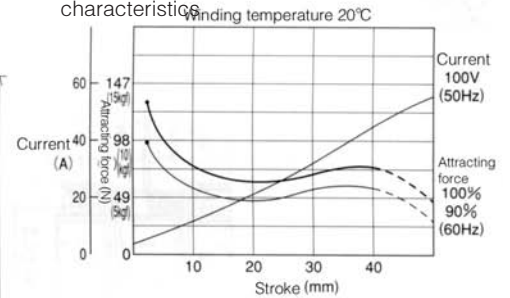
Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-33	100	11.0	1.1	49.0N(5.0kgf) /15mm
	200	5.5	0.55	

## SA-51 (PUSH-PULL)



● With blocking rubber

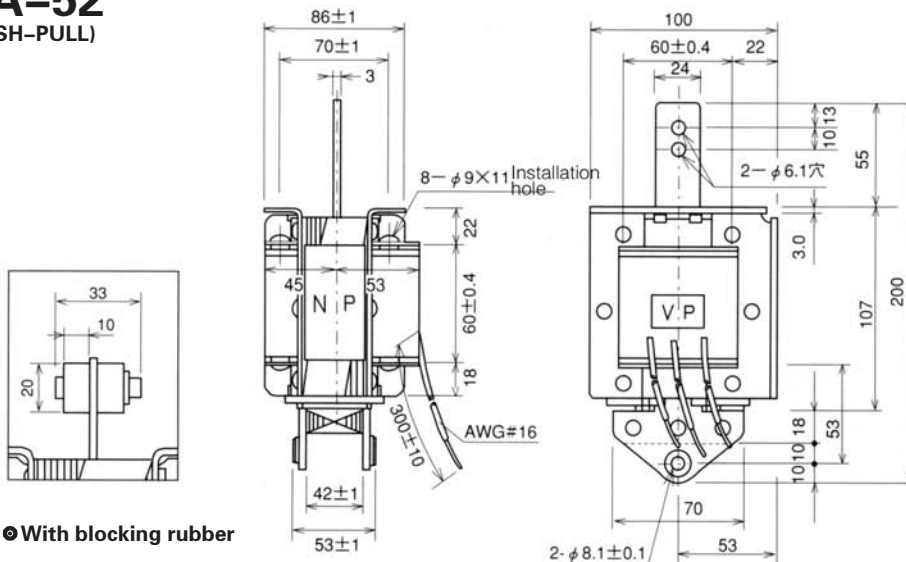
■ Attracting force characteristics: current characteristics



■ Current Value

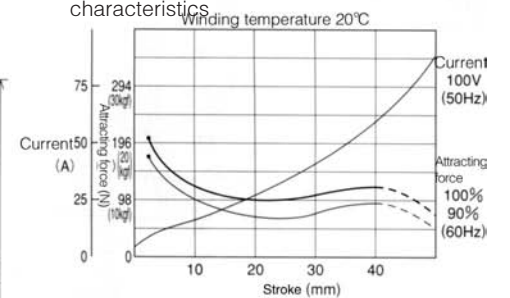
Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-51	100	45.0	2.6	49.0N(5.0kgf) /40mm
	200	14.0	1.6	

## SA-52 (PUSH-PULL)



● With blocking rubber

■ Attracting force characteristics: current characteristics



■ Current Value

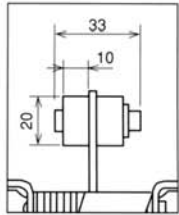
Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-52	100	70.0	3.7	98.0N(10.0kgf) /40mm
	200	35.0	2.0	



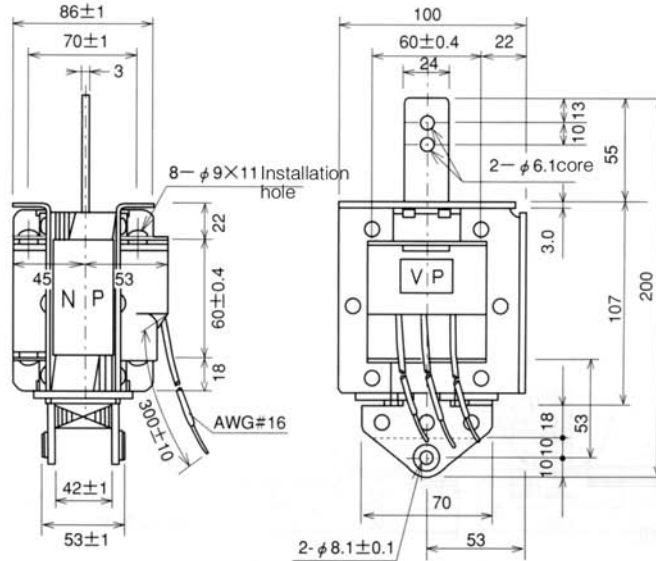
● PUSH-PULL

● PULL

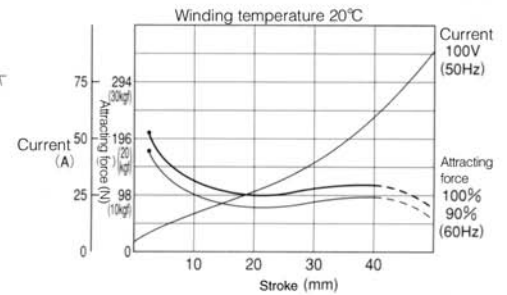
## SA-55 (PUSH-PULL)



● With blocking rubber



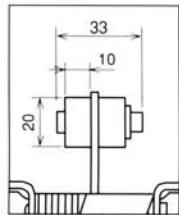
■ Attracting force characteristics: current characteristics



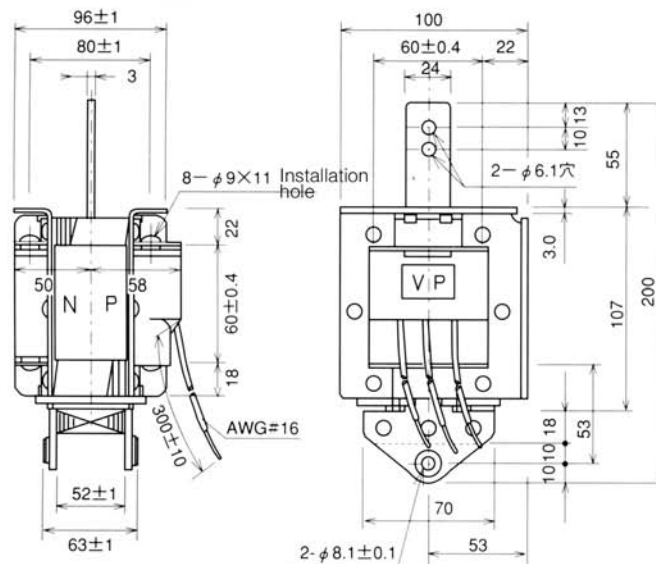
■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-55	100	70.0	3.7	98.0N(10.0kgf) /40mm
	200	35.0	2.0	

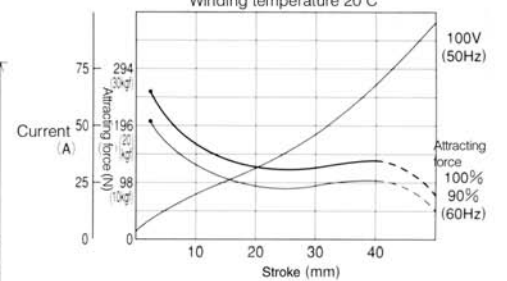
## SA-56 (PUSH-PULL)



● With blocking rubber



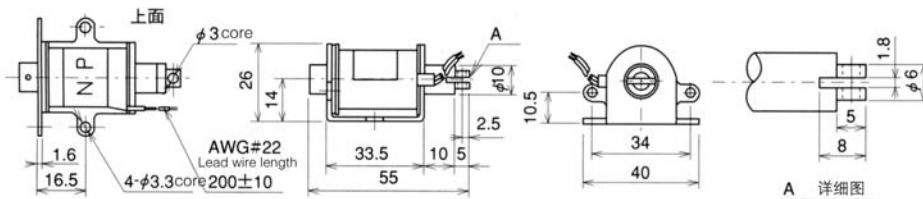
■ Attracting force characteristics: current characteristics



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SA-56	100	75.0	3.7	117.6N(12.0kgf) /40mm
	200	40.0	1.8	

## SAL-02(PUSH-PULL)



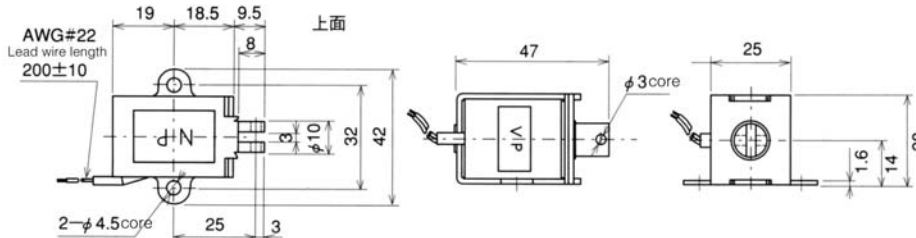
■ Characteristics

SAL-02 is a automatic reset model using built-in screw caps.



For SAL-02 and SAL-03, at duty of 1/10 and frequency of use at 6 times per minute, please use at maximum power-on time of 1 minute. Use at a condition exceeding the rating may lead to burnout of the winding.

## SAL-03(PUSH-PULL)



■ Current Value

Model	Voltage AC (V)	Starting current (A)	Holding current (A)	Rated attracting force / Rated stroke
SAL-02	100	1.0	0.6	2.9N(0.3kgf) /10mm
	200	0.5	0.29	
SAL-03	100	1.0	0.42	4.9N(0.5kgf) /10mm
	200	0.5	0.22	



# High Attracting Force Silent AC Solenoid

For the SSAB series, movable iron core has received polyfurol resin coating treatment to achieve excellent wearing and rust resistance performance and substantially increase the service life

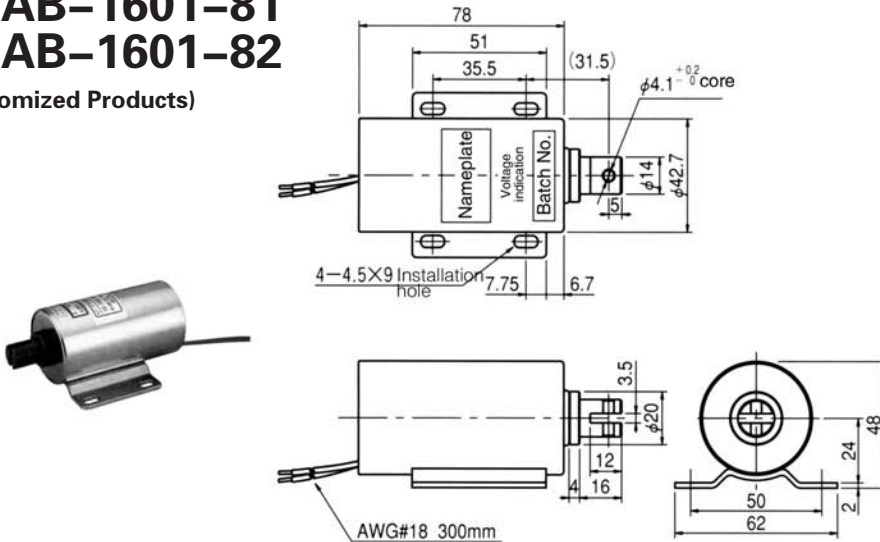
Compared with original silent AC solenoids, the SSAB series have stronger attracting force.

**New Product**

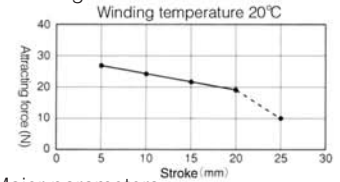
## ■ Pull Type

### SSAB-1601-81 SSAB-1601-82

(Customized Products)



#### ■ Attracting force characteristics

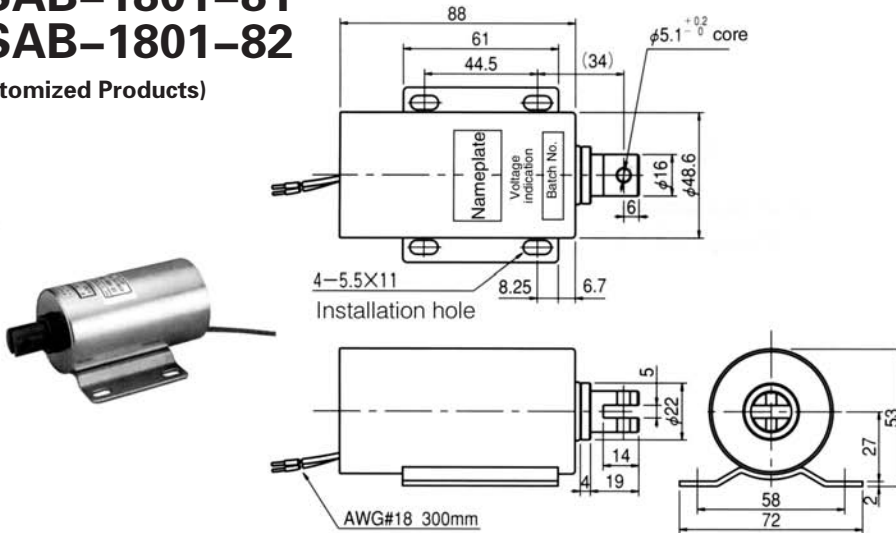


#### ■ Major parameters

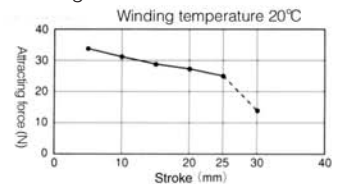
Rated voltage	AC100V 50/60Hz	AC200V 50/60Hz
Exciting current (AC)	0.9A	0.45A
Continuous power on	Within 3 min	
Duty	1/8 DUTY	
Rated attracting force	19.6N(2kgf)	
Rated stroke	20mm	
Installation direction	Horizontal or vertical	
Operation mode	Pull type	
Insulation resistance	Above DC500V 100MΩ	
Voltage withstanding	AC1500V for 1 minute	
Insulation type	Equivalent to type E insulation	
Lead wire color	AC100 blue, blue	AC200V red, red
Model No. composition	SSAB-1601-8□ 1: AC100V 2: AC200V	

### SSAB-1801-81 SSAB-1801-82

(Customized Products)



#### ■ Attracting force characteristics

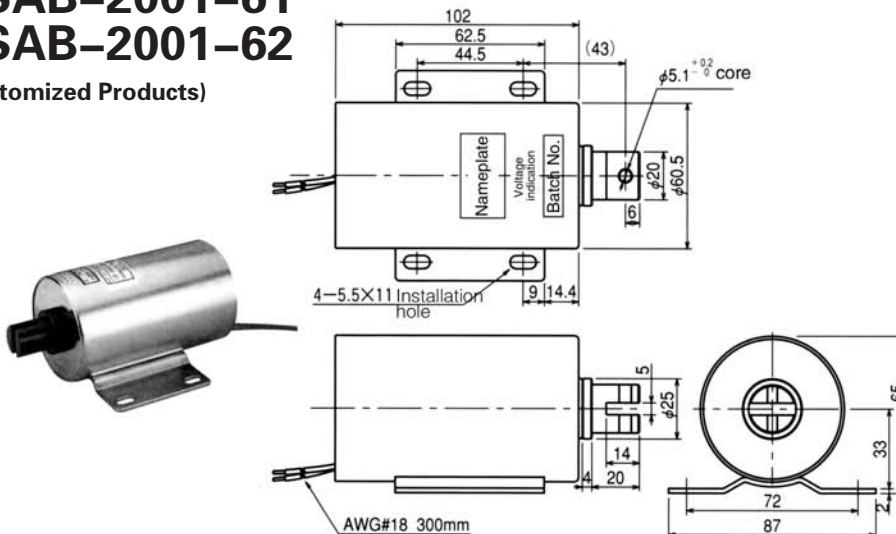


#### ■ Major parameters

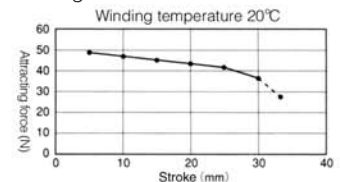
Rated voltage	AC100V 50/60Hz	AC200V 50/60Hz
Exciting current (AC)	1.1 A	0.55 A
Continuous power on	Within 3 min	
Duty	1/8 DUTY	
Rated attracting force	24.5 N (2.5 kgf)	
Rated stroke	25mm	
Installation direction	Horizontal or vertical	
Operation mode	Pull type	
Insulation resistance	Above DC500V 100MΩ	
Voltage withstanding	AC1500V for 1 minute	
Insulation type	Equivalent to type E insulation	
Lead wire color	AC100 blue, blue	AC200V red, red
Model No. composition	SSAB-1801-8□ 1: AC100V 2: AC200V	

### SSAB-2001-61 SSAB-2001-62

(Customized Products)



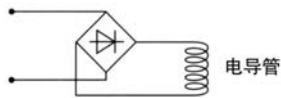
#### ■ Attracting force characteristics



#### ■ Major parameters

Rated voltage	AC100V 50/60Hz	AC200V 50/60Hz
Exciting current (AC)	1.3 A	0.65 A
Continuous power on	Within 7 min	
Duty	1/6 DUTY	
Rated attracting force	36.7 N (3.74 kgf)	
Rated stroke	30 mm	
Installation direction	Horizontal or vertical	
Operation mode	Pull type	
Insulation resistance	Above DC500V 100MΩ	
Voltage withstanding	AC1500V for 1 minute	
Insulation type	Equivalent to type E insulation	
Lead wire color	AC100 blue, blue	AC200V red, red
Model No. composition	SSAB-2001-6□ 1: AC100V 2: AC200V	

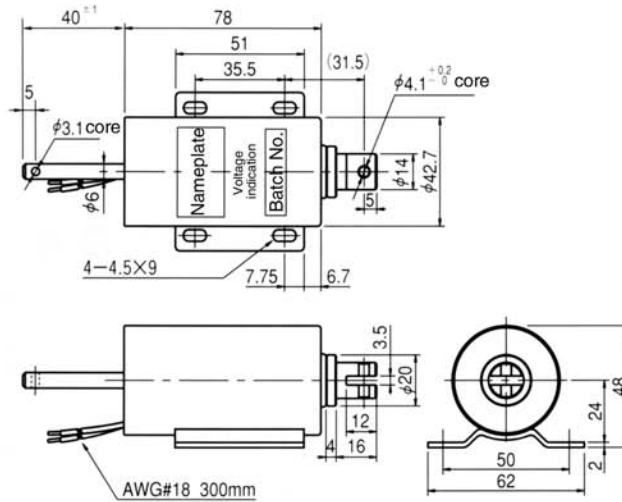
## connection diagram



## Pull Type

# SSAB-1602-81 SSAB-1602-82

(Customized Products)

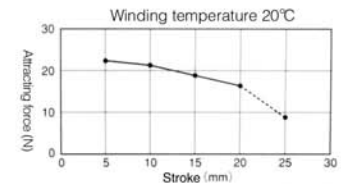


●PUSH-PULL



●PULL

## Attracting force characteristics

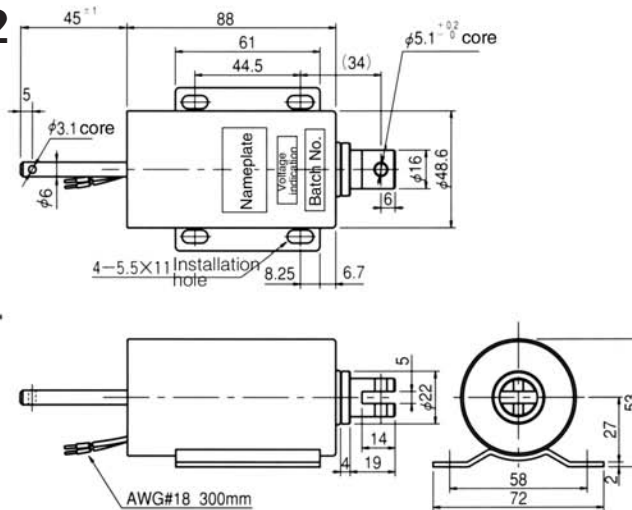


## Major parameters

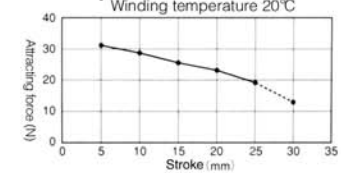
Rated voltage	AC100V 50/60Hz	AC200V 50/60Hz
Exciting current (AC)	0.9A	0.45A
Continuous power on	Within 3 min	
Duty	1/8 DUTY	
Rated attracting force	16.6 N (1.7 kgf)	
Rated stroke	20 mm	
Installation direction	Horizontal or vertical	
Operation mode	Pull type	
Insulation resistance	Above DC500V 100MΩ	
Voltage withstanding	AC1500V for 1 minute	
Insulation type	Equivalent to type E insulation	
Lead wire color	AC100 blue, blue	AC200V red, red
Model No. composition	SSAB-1602-8□ 1 : AC100V 2 : AC200V	

# SSAB-1802-81 SSAB-1802-82

(Customized Products)



## Attracting force characteristics

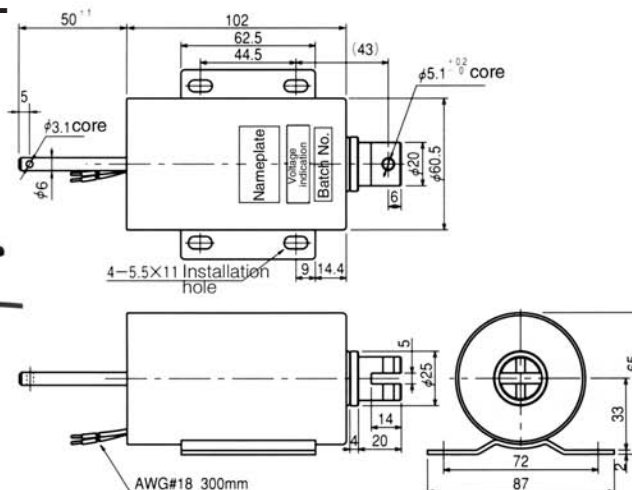


## Major parameters

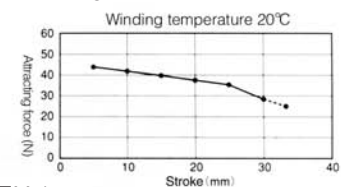
Rated voltage	AC100V 50/60Hz	AC200V 50/60Hz
Exciting current (AC)	1.1 A	0.55 A
Continuous power on	Within 3 min	
Duty	1/8 DUTY	
Rated attracting force	19.6 N (2 kgf)	
Rated stroke	25 mm	
Installation direction	Horizontal or vertical	
Operation mode	Pull type	
Insulation resistance	Above DC500V 100MΩ	
Voltage withstanding	AC1500V for 1 minute	
Insulation type	Equivalent to type E insulation	
Lead wire color	AC100 blue, blue	AC200V red, red
Model No. composition	SSAB-1802-8□ 1 : AC100V 2 : AC200V	

# SSAB-2002-61 SSAB-2002-62

(Customized Products)



## Attracting force characteristics



## Major parameters

Rated voltage	AC100V 50/60Hz	AC200V 50/60Hz
Exciting current (AC)	1.3 A	0.65 A
Continuous power on	Within 7 min	
Duty	1/6 DUTY	
Rated attracting force	29.4 N (3 kgf)	
Rated stroke	30 mm	
Installation direction	Horizontal or vertical	
Operation mode	Pull type	
Insulation resistance	Above DC500V 100MΩ	
Voltage withstanding	AC1500V for 1 minute	
Insulation type	Equivalent to type E insulation	
Lead wire color	AC100 blue, blue	AC200V red, red
Model No. composition	SSAB-2002-6□ 1 : AC100V 2 : AC200V	

# Silent DC Solenoid

“International” silent DC solenoid is an epoch making DC solenoid product that meets the social demand, featuring no noise and long service life. AC and DC solenoids are widely used in various sectors of automation control, but the shocking sound generated by attaching of plungers may make operators at operation site feel uncomfortable and sometimes become a public nuisance. The silent DC solenoid solves such deficiency and substantially extends the service life by removing the shock of plunger, so it is a trustable high quality product. The silent DC solenoid is suitable for sound equipment, office equipment, medical equipment, measuring instrument, etc.

## ■Features

### Noise free

Silent DC solenoid is different from other solenoids in that its plunger has no shock and can move freely in the space inside the winding and thus generates power, so it is noise free.

### Long service life

Considering the wearing resistance, the moving part of the plunger is surface treated to improve its service life.

### Small size and large output

In the intermittent solenoid of pulse driving type, in order to achieve large attracting force in long stroke, the ratio of plunger diameter to winding cord has been setup. In addition, clearance of the winding has been filled with resin to improve the cooling effect to achieve the features of small size and large output.

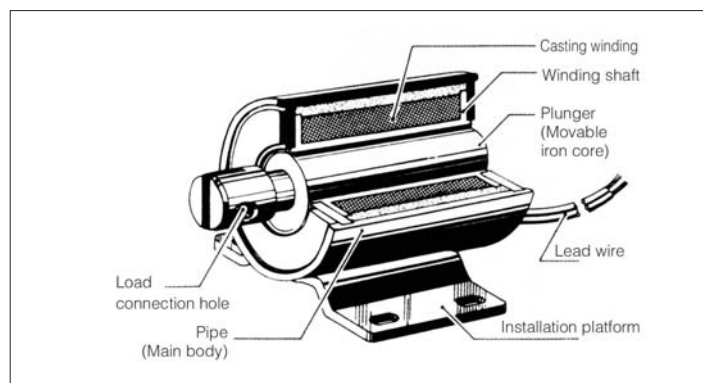
### Flat attracting force characteristics

Silent DC solenoid has very flat attracting force characteristics and is convenient to use.

### Simple installation

With a long hole designed, silent DC solenoid is simple to install and can be adjusted after installation.

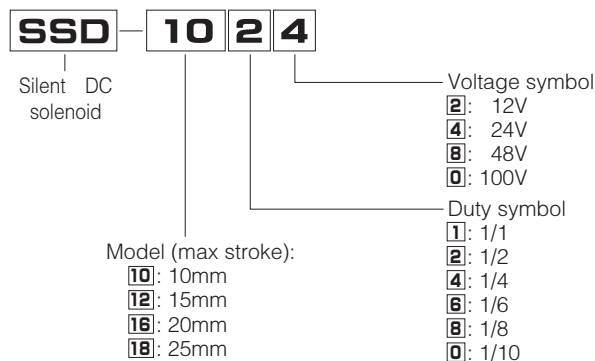
## Structure of Silent DC Solenoid



Silent DC solenoid takes full advantage of functions and electromagnetic characteristics of leak type (framework type) solenoid to achieve best effect.

As shown in the figure above, the plunger can move freely in the space inside the winding and thus generate power, while the plunger itself remains delicate in the balancing of load.

## Model No. Structure



## Other Precautions and Instructions

### Please use proper loads.

Please use model with load of 1.3 –1.5 times attracting force.

According to actual action of the solenoid, in order to protect the full stroke passing in any condition, please use solenoid under the load attracting force.

### Time rating (duty)

●The time rating can be divided into continuous rating and intermittent rating in terms of the purpose of use.

By allowing large consumption power according to the duty, intermittent rating can result in attracting force that is several times larger than the continuous rating.

●Considering the actual frequency of use and power supply capacity, the duty can be determined according to following formula:

$$\text{DUTY load} = \frac{(\text{Action Time})}{(\text{Action Time} + \text{Stop Time}=1 \text{ Cycle})} \times (100\%)$$

If the power-on time in a cycle exceeds following value, please select continuous rating for all.

Duty: 50% duty time for 7 minutes, 25% duty time for 2 minutes, 10% duty time for 1 minute.

### About installation of the solenoid(main body)

The solenoid can be installed at the vertical or horizontal direction relating to movement direction of the iron core. Action of the solenoid is repeated advance and return movement. If not installed appropriately, the solenoid may become loose or slide, and thus leads to accidental fault or noise.

#### ■Installation of the fixed iron core

1. Please use bolts and nuts of size suitable for installation hole of the solenoid.
2. Please use screw caps capable of preventing loose and gaskets with teeth for fastening.
3. Please adjust the plunger so that it can be parallel to the hole of the solenoid when it is attracted.

#### ■Connection with load

Please pay attention to following issues:

1. The load must move on the central axis of the movable iron core and apply no force to the movable iron core in horizontal and diagonal direction. If an external force affects the movable iron core in horizontal and diagonal direction, it will shorten the service life of the solenoid.
2. Pins used for connection to load must meet the size of connection hole of the load of the movable iron core..

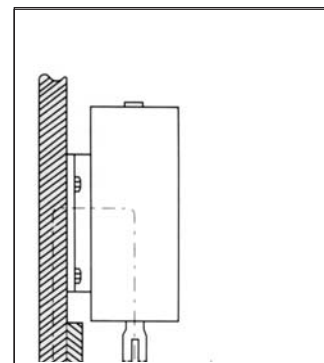
### Maintenance of the solenoid

Please check if the plunger and solenoid have any filth or dust inside. The filth or dust may lead to improper action.

### About external magnetic loop

#### ■Please consider the circuit breaking method

The solenoid generates magnetic force because of the current passing the winding, and drives the movement of the plunger via the magnetic loop. Therefore, when install the installation plate, the load connection part, the stopper and the cover made of magnetic materials, an external magnetic loop will be formed, which may reduce the effective magnetic beams and substantially decrease the attracting force. As a result, some parts should be made of non-magnetic material or clearance (over 2mm) shall be setup to prevent formation of the magnetic loop.





# Silent DC Solenoid Product Checklist

## ■SSD Series (Customized)

Model	Range of Attracting Force N(gf)	Max stroke (mm)	Power Consumption (W)	Weight of the Movable Iron core (g)	Total Weight (g)
SSD-10	0.16~2.74(16~280)	10	4~40	25	110
SSD-12	0.63~7.45(64~760)	15	7.5~75	45	210
SSD-16	0.86~15.68(88~1600)	20	10~100	115	550
SSD-18	1.57~23.52(160~2400)	25	14~140	165	850

※RoHS compliance product



SSD-10



SSD-12



SSD-16



SSD-18

### ■Universal parameters

Rated voltage	DC12V、24V、48V、100V
Duty	1/1、1/2、1/4、1/6、1/8、1/10
Winding temperature rise	※Below 65℃ at rated power consumption
Insulation type	Equivalent to type E insulation
Voltage withstanding (between winding and non-charging metal part)	60V以下 AC1000V for 1 minute Above 60V 125V以下 AC1500V for 1 minute
Insulation resistance (between winding and non-charging metal part)	Above DC500V 20MΩ

※ **Note** When the temperature exceeds 65℃, the winding may burn down because of overheat.

### ■SSD major components

Movable iron core	SUM (quick cutting steel)
Winding insulation	Resin filling
Winding shaft	Include glass PBT
Surface treatment	Pipe: complex acid salt coating treatment (Ep-Fe/Zn 5/CM2 C) Movable iron core: tuffride processing
Pipe	STKM structural steel pipe for mechanical use
Installation platform	SPCC (cold rolled steel plate)
Lead wire	Heat resisting ethylene wire (UL-1007)
Winding	PEW (polyester copper wire)

### ■Lead wire colors (applicable to all models)

DUTY \ Voltage	DC12V	DC24V	DC48V	DC100V
1/1	Black – Brown (Black)	Brown – Orange (Black)	Orange – Blue (Black)	Blue – Red (Black)
1/2	Black – Brown (Gray)	Brown – Orange (Gray)	Orange – Blue (Gray)	Blue – Red (Gray)
1/4	Black – Gray (Black)	Brown – Black (Black)	Orange – Brown (Black)	Blue – Orange (Black)
1/6	Black – Black (Black)	Brown – Brown (Black)	Orange – Orange (Black)	Blue – Blue (Black)
1/8	Black – Gray (Gray)	Brown – Black (Gray)	Orange – Brown (Gray)	Blue – Orange (Gray)
1/10	Black – Black (Gray)	Brown – Brown (Gray)	Orange – Orange (Gray)	Blue – Blue (Gray)

### ■Lead wire colors (applicable to all models)

Model	Attracting force N(gf)	Maximum stroke (mm)	Power consumption	Continuous power-on time	Total weight (g)
SSD-18MD	19.6(2.0)	20	84VA	Within 180s	1000
SSD-20MD	29.4(3.0)	20	120VA	Within 240s	1500



SSD-18MD

### ■Universal parameters

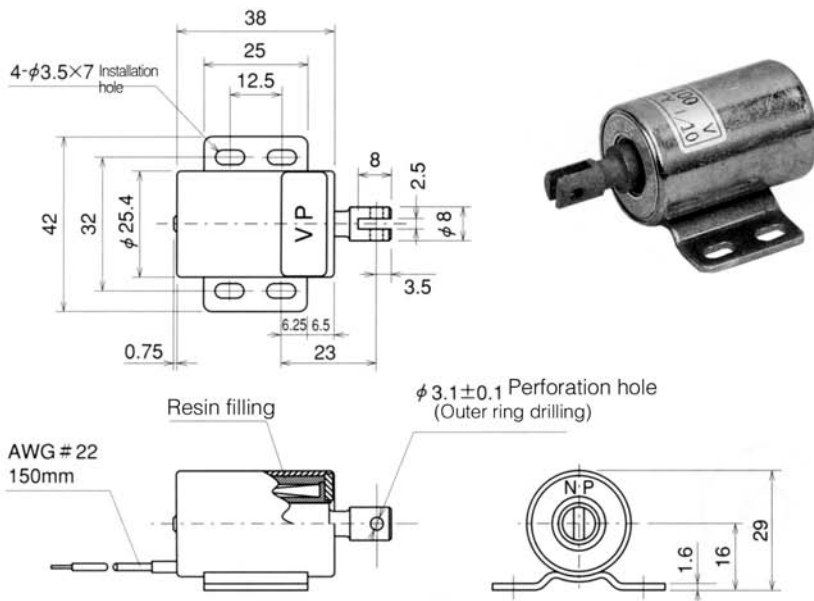
Rated voltage	AC100V 50/60Hz
Winding temperature rise	※Below 65℃ at rated power consumption
Insulation type	Equivalent to type E insulation
Voltage withstanding (between winding and non-charging metal part)	AC1500V for 1 minute
Insulation resistance (between winding and non-charging metal part)	Above DC500V 100MΩ
Installation direction	Horizontal or vertical
Action mode	Pull
Micro switch rating	AC250V 2A以下 (resistance load) DC30V 2A以下 (resistance load)
Insulation rubber soft wire	VCTF 4 core x0.75mm <sup>2</sup> x300mm

※ **警告** When the temperature exceeds 65℃, the winding may burn down because of overheat.

# Silent AC Solenoid

●NP: Name Plate ●VP: VP: Voltage Plate

## SSD-10 (Customized Product)



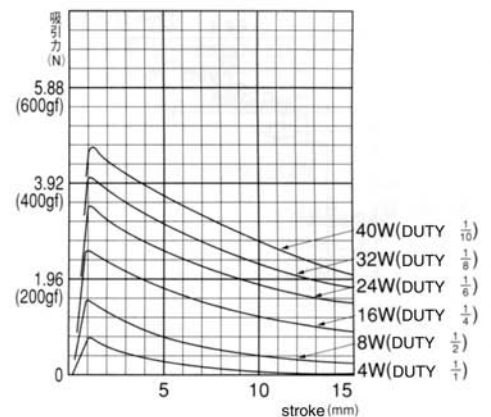
### Major parameters

Range of attracting force	Max stroke	External pipe diameter	Movable iron core diameter
0.16~2.74N(16~1280gf)	10mm	φ25.4	φ10

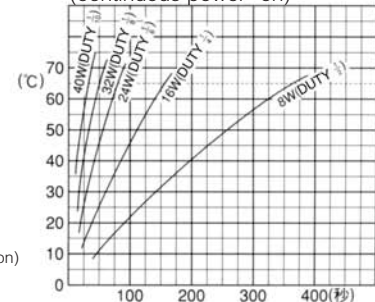
### Universal parameters

Temperature rise: below 4W65°C (continuous power-on)  
 Insulation resistance:  
 above : DC500V 20MΩ.  
 Voltage withstanding:  
 (between winding and non-charging metal part)  
 Below 60V, AC 1000V for 1 minute.  
 Above 60V and below 125V, AC 1500V for 1 minute.

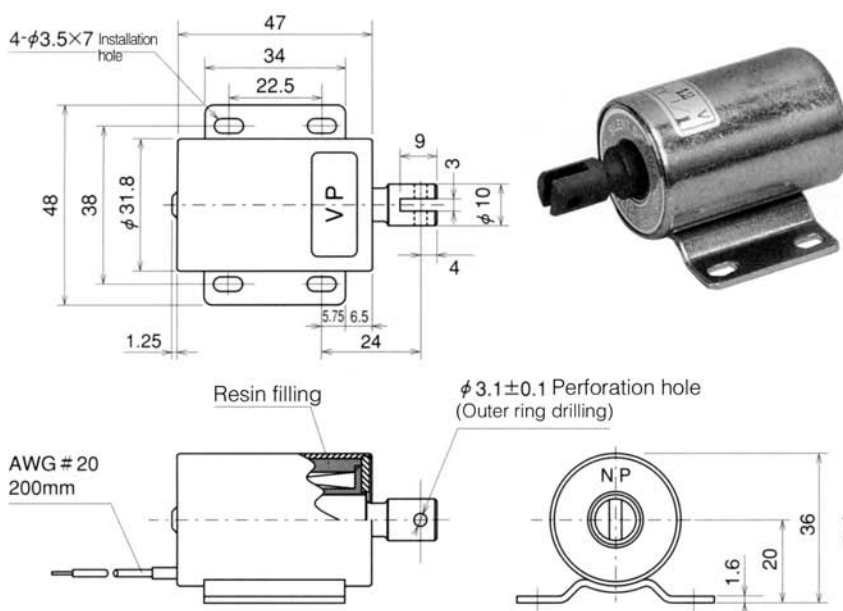
Stroke/Attracting Force Characteristic Table  
(Winding Temperature 20°C)



Temperature rise characteristics  
(continuous power-on)



## SSD-12 (Customized Product)



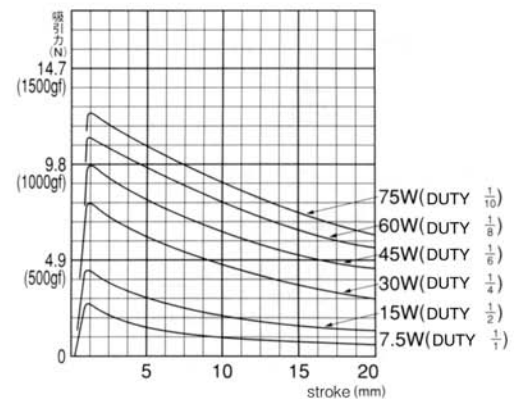
### Major parameters

Range of attracting force	Max stroke	External pipe diameter	Movable iron core diameter
0.63~7.45N(64~760gf)	15mm	φ31.8	φ12

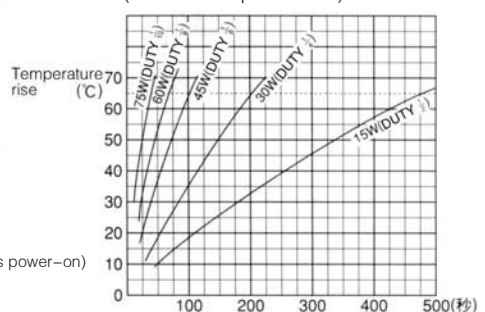
### Universal parameters

Temperature rise: below 7.5W65°C (continuous power-on)  
 Insulation resistance:  
 above : DC500V 20MΩ.  
 Voltage withstanding:  
 (between winding and non-charging metal part)  
 Below 60V, AC 1000V for 1 minute.  
 Above 60V and below 125V, AC 1500V for 1 minute.

Stroke/Attracting Force Characteristic Table  
(Winding Temperature 20°C)

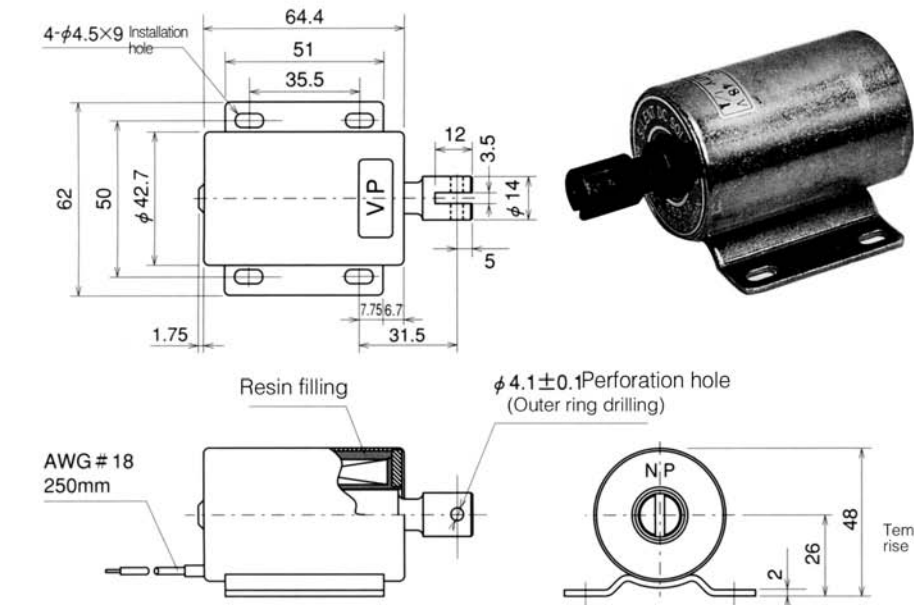


Temperature rise characteristics  
(continuous power-on)



# Silent AC Solenoid

## SSD-16 (Customized Product)



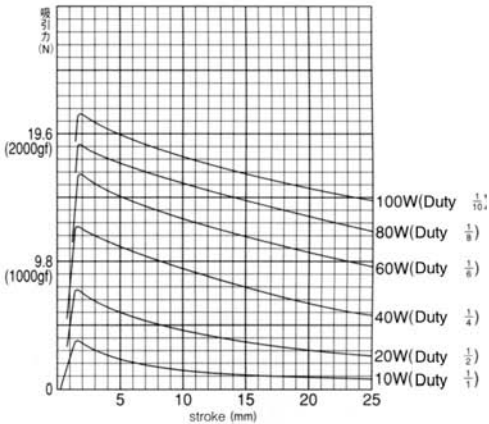
### Major parameters

Range of attracting force	Max stroke	External pipe diameter	Movable iron core diameter
0.86~15.19N(88~1550gf)	20mm	$\phi 42.7$	$\phi 16$

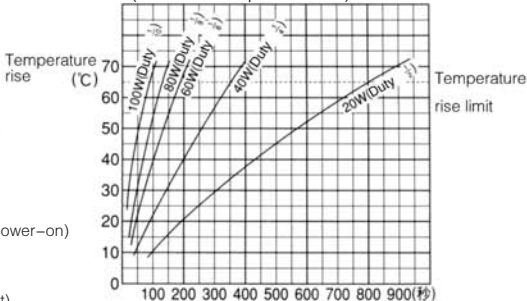
### Universal parameters

Temperature rise: below 4W65°C (continuous power-on)  
Insulation resistance: above : DC500V 20M $\Omega$ .  
Voltage withstanding: (between winding and non-charging metal part)  
Below 60V, AC 1000V for 1 minute.  
Above 60V and below 125V, AC 1500V for 1 minute.

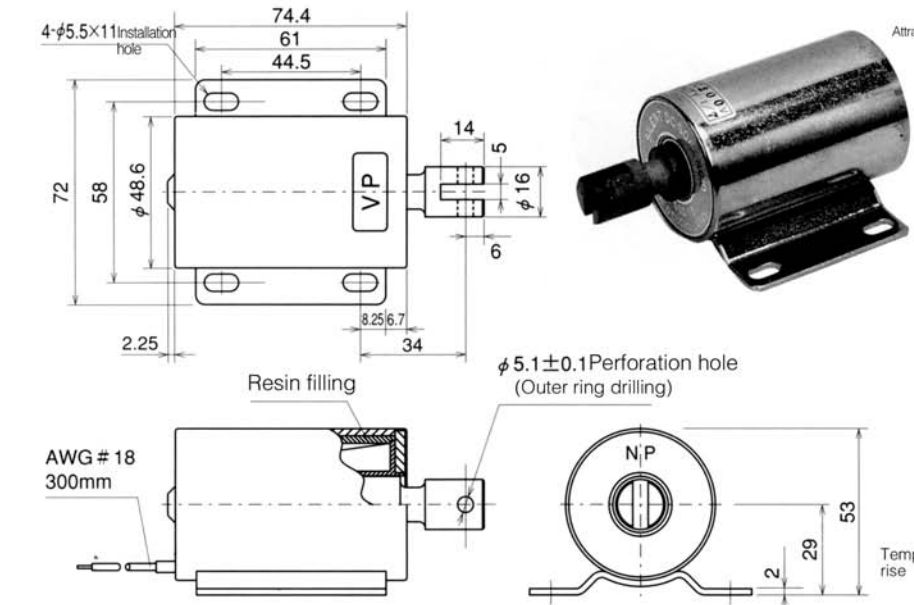
Stroke/Attracting Force Characteristic Table (Winding Temperature 20°C)



Temperature rise characteristics (continuous power-on)



## SSD-18 (Customized Product)



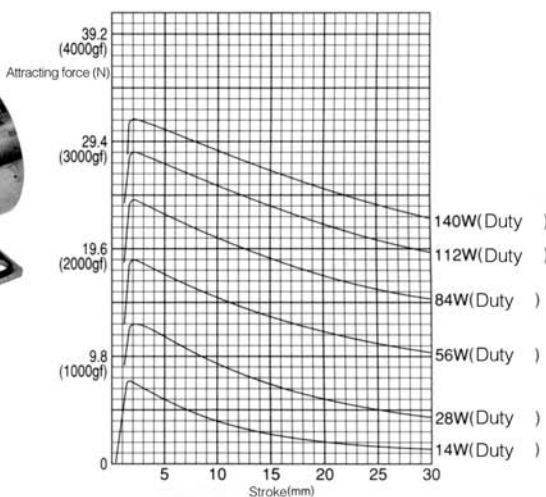
### Major parameters

Range of attracting force	Max stroke	External pipe diameter	Movable iron core diameter
1.57~23.52N(64~760gf)	25mm	$\phi 48.6$	$\phi 18$

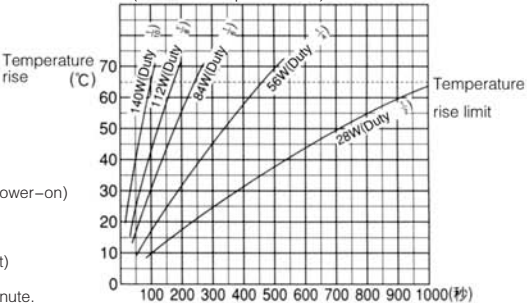
### Universal parameters

Temperature rise: below 4W65°C (continuous power-on)  
Insulation resistance: above : DC500V 20M $\Omega$ .  
Voltage withstanding: (between winding and non-charging metal part)  
Below 60V, AC 1000V for 1 minute.  
Above 60V and below 125V, AC 1500V for 1 minute.

Stroke/Attracting Force Characteristic Table (Winding Temperature 20°C)



Temperature rise characteristics (continuous power-on)





# Silent DC solenoid with limit switch

Silent DC solenoid SSD series is equipped with a limit switch to indicate the action status of the solenoid.

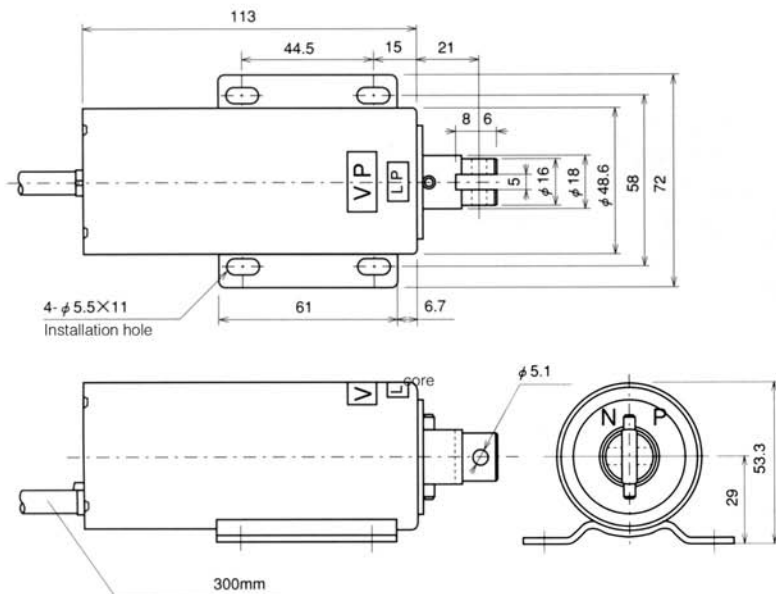
In addition, with a rectifier equipped, it can be used with AC power.

Plunger attraction: limit switch ON.

●NP: Name Plate ●VP: Voltage Plate ●LP: Lot Number



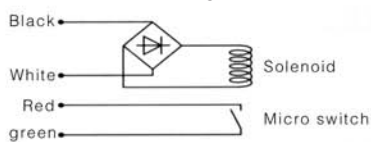
## SSD-18MD (Customized Product)



### Major parameters

Range of attracting force	Max stroke	External pipe diameter	Movable iron core diameter
19.6N(2.0gf)	20mm	φ48.6	φ18

### Connection diagram (lead wire colors)

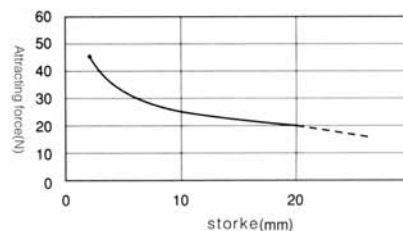


### Major characteristics

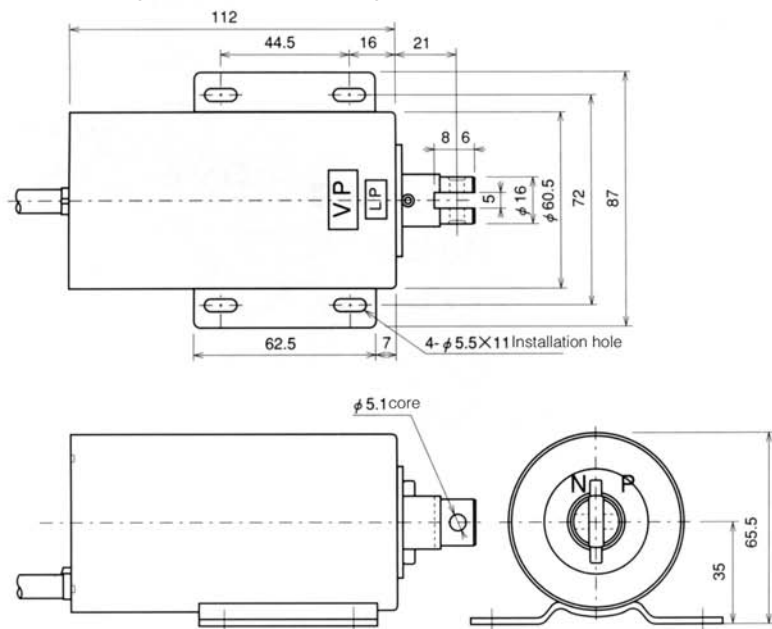
Rated voltage	AC200V 50/60Hz
Power consumption	84VA
Attracting force	19.6N(2.0kgf)
Stroke	20mm
Duty	1/6
Duty rating	Continuous power-on within 3 minutes
Temperature rise	below 65°C
Insulation type	JISC4552, Equivalent to type E insulation
Insulation resistance	Above DC500V 100MΩ
Voltage withstanding	AC1500V for 1 minute
Installation direction	Horizontal or vertical
Action mode	Pull
Micro switch rating	AC250V Below 2A DC30V Below 2A ( resistance load )
Wires	VCTF4 core x0.75mm²x300mm

Note: the minimum load of the micro switch is DC15V, 0.1A.  
Notify in addition when connecting small loads.

### Attracting Force Characteristic



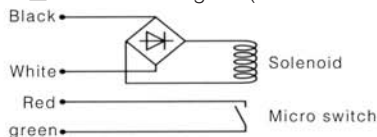
## SSD-20MD (Customized Product)



### Major parameters

Range of attracting force	Max stroke	External pipe diameter	Movable iron core diameter
29.4N(3.0gf)	20mm	φ60.5	φ18

### Connection diagram (lead wire colors)

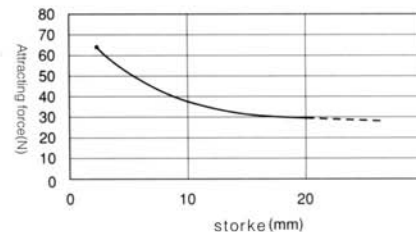


### Major characteristics

Rated voltage	AC200V 50/60Hz
Power consumption	120VA
Attracting force	29.4N(3.0kgf)
Stroke	20mm
Duty	1/6
Duty rating	Continuous power-on within 4 minutes
Temperature rise	below 65°C
Insulation type	JISC4552, Equivalent to type E insulation
Insulation resistance	Above DC500V 100MΩ
Voltage withstanding	AC1500V for 1 minute
Installation direction	Horizontal or vertical
Action mode	Pull
Micro switch rating	AC250V Below 2A DC30V Below 2A ( resistance load )
Wires	VCTF4 core x0.75mm²x300mm

Note: the minimum load of the micro switch is DC15V, 0.1A.  
Notify in addition when connecting small loads.

### Attracting Force Characteristic



# KOKUSAI PROFILE

## ■ Company Profile

- Company Name  
KOKUSAI Dengyo Co., Ltd.
- Founded in:  
February 1953
- Headquarters Address:  
27-14, Enjo-Cho, Showa-Ku, Nagoya,  
Aichken 466-0054, Japan
- Registered Capital  
100,000,000 JPY
- Legal Representative  
Nagatake Furukawa
- Scope of Business
  - Manufacturer and sales of foot switch, solenoid and terminal block.
  - Manufacturer and sales of electronic application machines and ion cutters.
  - Manufacturer and sales of entertainment equipment.
- Business Office  
Tokyo, Nagoya, Osaka
- Factory  
Togo, Hamamatsu
- Trading Banks  
The Bank of Tokyo-Mitsubishi UFJ, Ltd.,  
Tsurumai Branch  
Industry and Commercial Union Central  
Vault, Atsuda Branch  
Gifu Shinkin Bank, Nagoya Bank

## ■ Product History

- |                   |   |
|-------------------|---|
| In June 1956,     | high frequency electric welding equipment and foot switch were released.  |
| In June 1958,     | micro switch/limit switch was released.   |
| In April 1961,    | automation control parts were expanded.   |
| In February 1971, | electromagnetic coil was released.  |
| In May 1975,      | electromagnetic track was released.   |
| In January 1977,  | mute solenoid was released.   |
| In October 1980,  | NC device as M&E equipment was released.  |
| In March 1985,    | drilling machine of PCB and X/Y table were released.  |
| In March 1987,    | plasma cutter was released.   |
| In October 1988,  | orthogonal robot was released.  |
| In March 1990,    | accumulated sales volume of the foot switch reached 10 million units.   |
| In October 1991,  | universal and popular type nailing machine was released.  |
| In October 1994,  | 3D parking equipment fall prevention equipment was development.   |
| In April 1999,    | desktop hand drill was released.  |
| In July 1999,     | parking lot actuary management system was released.   |
| In February 2003, | portable dialogue aided device (Heart Chat) won the "Official Award of SMB Department" and "Excellent Product Award". |
| In March 2003,    | Grip Tone was released and won the "Excellent Award" issued by Japan Rehabilitation Medicine Association.             |
| In April 2003,    | foot switch SFA series was released.  |
| In October 2003,  | notes recognition device control base plate was released.   |
| In October 2004,  | new type plasma cutter was released.  |
| In June 2004,     | three-level foot switch for industrial use was released.  |
| In April 2006,    | water drainage two-level foot switch was released.  |



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**Hamamatsu Factory:** 1-2-15, Shizuoka, Hamamatsu City, 431-2103, Japan

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