HS-TYPE CAM SWITCH

HS-TYPE

JHS-TYPE

EHS-TYPE

JEHS-TYPE

INDEX

Feature 1

UPGRADING SAFETY QUALITY

Finger Protection structure(IP-20) prevents contact with terminal part.

Feature 2

FALL PREVENTION DESIGN

Preventing screw falling during installation.

Feature 3

QUICK-UP SCREW

Crimp terminals can be attached without removing screw.
(Compatible with Round / Y crimp terminals)

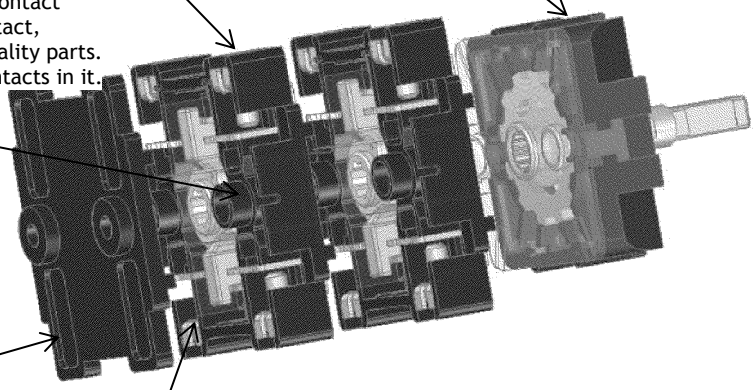
Feature 4

PADLOCK HANDLE

Handle designed with padlock support, providing better security.
(Normal handle also can be available)

SEIKO ELECTRIC

■Structure and Features



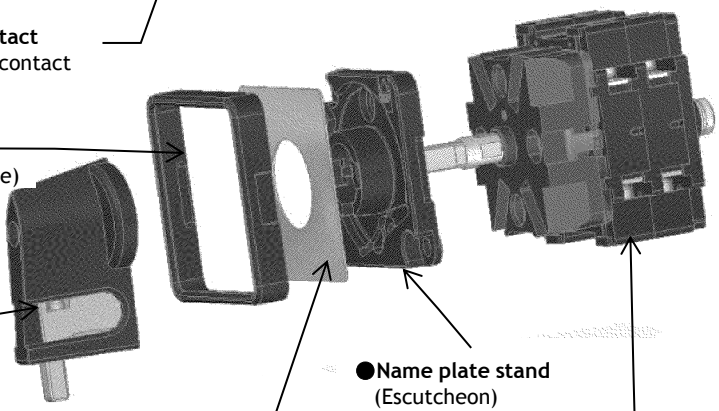
●**Mechanical Case (Operation Mechanism Unit)**
High-Durability Mechanical Structure based on PBT resin. (Flame Retardant Grade UL94V-0)

●**Contact Unit**
Featured with High-Reliability contact unit thanks to High-Quality Contact, Spring, Press and other High-Quality parts.
One(1) unit can have two(2) contacts in it.

●**Cam**
This Cam Design allows one Cam to be connected with other Cams, making the unit Design Shaft-less, which leads to a variety of contact diagram.
Up to 10 Cams can be connected.

●**End Plate**

●**Contact**
Silver contact



●**Name plate Frame**
Screw free (One-touch attachment type)

●**Handle**
Handle designed with padlock support, providing better security.

●**Name plate stand**
(Escutcheon)

●**Name plate**
Characters inscription is available at your own request.

●**Contact part**
Finger Protect structure(IP-20) prevents contact with terminal part.
Preventing screw falling during installation.

■Compliance Standards

NECA C 4520：General Clauses on Control Switch
NECA C 4522：General Clauses on Control Cam Switch
JIS C8201-5-1：Low-Voltage Switch Unit and Control Unit - Chapter No.5
Control Circuit and Switch Element
-Part1 ：Electrical Equipment Control Circuit.
IEC 60947-5-1：(Control circuit devices and switching elements-
Section 1:Electromechanical control circuit devices) Second edition 1997-10
Protection from front ： IP40

■Rated Values and General Characteristics

Specification Item	Silver Contact
Rated Flowing Voltage	690V
Rated Flowing Current	20A
Insulation Resistance	100MΩ or more (500V Megger)
Contact Resistance(Initial Value)	50mΩ or less
Impact Resistance	30G
Vibration Resistance	2G
Operating Temperature Range	-20℃~+60℃ (Shall never cause freezing)
Operating Humidity Range	30%~85%Rh (No dewdrops.)
Withstand Voltage	AC 2,500V / 1 minute
Impulse-Withstand Voltage	±7,000V (1.2/50μs) / 3 times
Minimum Operating Voltage and Current (Its ambient circumstances must be good.)	24V 50mA（1.2VA）
Overcurrent Resistance	200A / 2seconds
Switching ON/OFF Frequency	1,200 times / hour
Switching ON/OFF Speed	2πrad / second
Mechanical Durability	Over than 300,000 cycles
Electrical Durability	Over than 100,000 cycles at 110V 1.5A D.C. L/R 0.04. 2π rad/s 1,200 cycles per hour.

■Rated Working Voltage and Current (Breaking Performance)

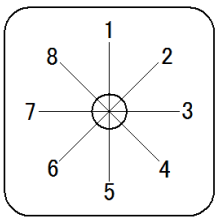
Rated Working Voltage (V)	DC (Time constant：25ms)		AC (Power Factor：0.4)	
	Rated Working Current (A)		Rated Working Current (A)	
	Resistance Load	Inductive Load	Resistance Load	Inductive Load
24	10	6	10	—
48	6	4	10	—
110	2.5	1.5	10	6.5
220	0.8	0.5	7.5	4.5
440	—	—	3	2

■Operational Instructions

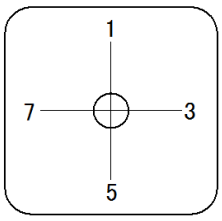
Instruction on Rotating Operation

Operation Method	Descriptions
Manual Return (Change over)	The handle stays at the specified position even after retouching the hand from the handle.
Spring Return	The handle returns automatically to the origin from specified position. (Limit is set at the point of origin.)

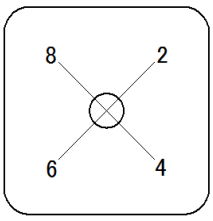
Operational Position Code



45˚ Notch



90˚ Notch



90˚ Notch
(Separation from
the center at 45˚)

Manufacturable Operational Angle

Operation Method	Notch Angle	
Manual Return(Change over) (Max. Operation Angle: 360˚)	45˚	90˚
Spring Return (Max. Operation Angle: 43˚on single side)	43˚	

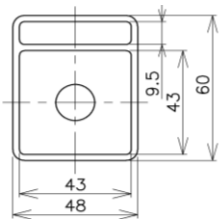
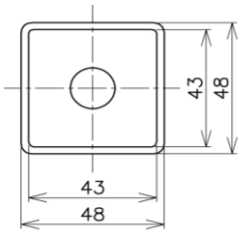
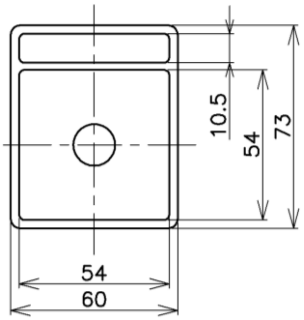
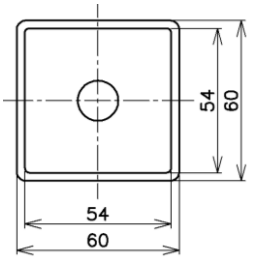
■How to Choose Type

HS N - C201 - YK K - N40

①Basic type
②Operational Method
③Contact sequence Code
④Handle type
⑤NP stand (Escutcheon)
⑥NP Letter

①Basic type

This shows NP shape & attachment type.
Choose your desired one from the list below.

Code	Spec.
HS type	One-touch attachment type 
JHS type	One-touch attachment type 
EHS type	One-touch attachment type 
JEHS type	One-touch attachment type 

②Operational Method (See P.5 for details)

Choose your desired Operation Method.

③Contact sequence (See P.18~P27 for details)

Choose your desired Contact sequence from the list of Contact sequence.

(In case of made to order Contact sequence)
Please specify your order by writing [No. of unit + X] as follows.
For example : In case of 3 units --- 3X
In case of 5 units --- 5X

④Handle type (See P.9 for details)

NN : No handle
YK : Arrow type,Black color(Close to N1.5)

⑤Name plate stand (Escutcheon)(See P.9 for details)

N : No Name plate stand
K : Black color (N1.5)

⑥Name plate Letter (See P.9 for details)

Material : Aluminum

N : No name plate
N40 : Blank
N41~ : Choose your desired name plate from list. (P.9)
NX : Inscriptions of customized letters

■Operational Method

・In case of Rotating Operation only

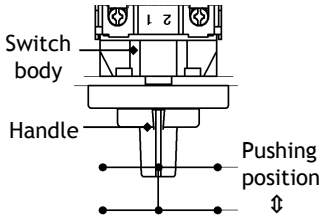
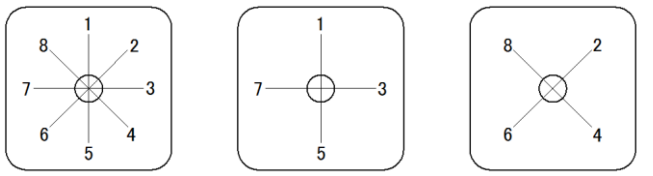
Choose the proper code in the list below in case of rotating the handle to left or right only.

Code	N	R
Rotating	Manual Return(Change over)	Spring Return
Operation pattern	□	

・In case of Rotating and Pull/Push Operations

Switch unit with Handle for Pull/Push Operation is manufacturable only in case that its operational angle 45˚or 90˚.

Pull/Push operation means that an operator should push or pull the handle for rotating it.

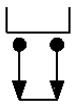
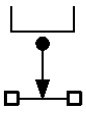
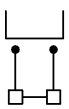
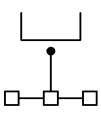
Explanation of Pull/Push Operation	Manufacturable operation position
Top view  	

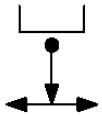
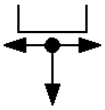
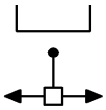
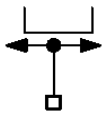
Code of Pull/Push operation is composed of [Rotating operation code] + [Pull/Push operation code] + [Pull/Push position No.].

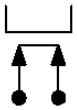
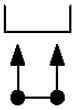
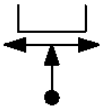
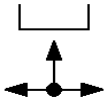
Code		Push/Pull operation	Rotating operation	
Rotating	Pull/Push		Pushing position	Pulling position
N	SF□	Spring return to Pushing position	Unrotatable	Rotatable
R	SL□		Rotatable	Unrotatable
	PF□	Manual return	Unrotatable	Rotatable
	PL□		Rotatable	Unrotatable
	TF□	Spring return to Pulling position	Rotatable	Unrotatable
	TL□		Unrotatable	Rotatable

*Fill in the □ the proper code of operational position for Pull/Push operation.
Mark [0] in the case that Push/Pull operation is needed at every operational position.
Contact us for details as for the combinations of manufacturable units.

< Example of commnly used Pull/Push operations >

Code	NSF0	NSF1	NPF0	NPF1
Rotating operation	Manual return(Change over)		Manual return(Change over)	
Pull/Push operation	Rotating operation is possible at pulling position /Spring return to Pushing position		Rotating operation is possible at pulling position /Mamual return to Pushing	
Push/Pull position	Every position	1	Every position	1
Operational pattern				

Code	RSF1	RSL1	RPF1	RPL1
Rotating operation	Spring return			
Pull/Push operation	Rotating operation is possible at pulling position /Spring return to pushing position	Rotating operation is possible at pushing position /Spring return to pushing position	Rotating operation is possible at pulling position /Manual return to pushing position	Rotating operation is possible at pushing position /Manual return to pulling position
Push/Pull position	1	1	1	1
Operational pattern				

Code	NTF0	NTL0	RTF1	RTL1
Rotating operation	Manual return(Change over)		Spring return	
Pull/Push operation	Rotating operation is possible at pushing position /Spring return to pushing position	Rotating operation is possible at pulling position /Spring return to pulling position	Rotating operation is possible at pushing position /Spring return to pushing position	Rotating operation is possible at pulling position /Spring return to pulling position
Push/Pull position	Every position		1	
Operational pattern				

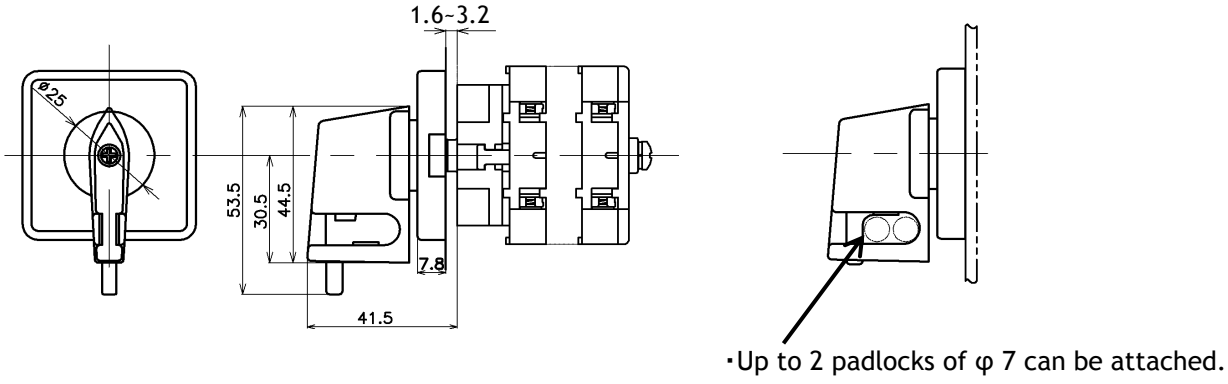
■Padlock device

･Function

･For the manual return type, the lock position is generally only one place, but it can be set maximum three positions.In case of one lock position is required,it can be set to any of lock positions. However, if two or three lock positions are required, please refer the restrictions on "lock position" below.

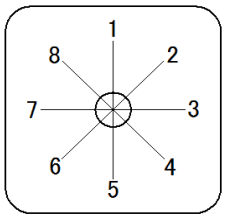
･For spring return type or pull / push type, only the lock position (1) can be set as lock position.

･Dimensions



･Up to 2 padlocks of φ 7 can be attached.

･Lock position



Rotating	No. of Lock position	Lock position
Manual return (Change over)	1	1~8
	2	90°interval
	3	90°interval
Spring return	1	1

■How to Choose Type (Padlock device)

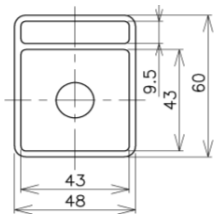
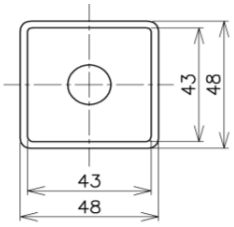
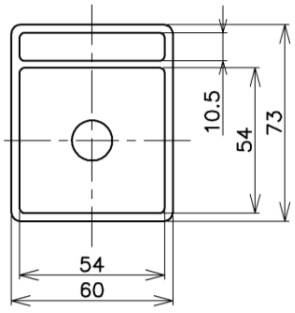
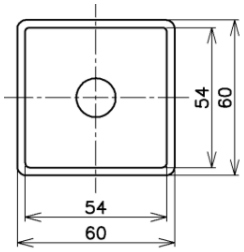
HS N L8 - C201 - K K K - N40

①Basic type ③Lock position ⑤Handle color ⑦NP stand (Escutcheon)

②Operational Method ④Contact sequence Code ⑥Lock lever color ⑧Name plate type & Name plate letters

①Basic type

This shows NP shape & attachment type.
Choose your desired one from the list below.

Code	Spec.
HS type	One-touch attachment type 
JHS type	One-touch attachment type 
EHS type	One-touch attachment type 
JEHS type	One-touch attachment type 

②Operational Method (See P.5 for details)

Choose your desired Operation Method.

③Lock position (See P.7 for details)

④Contact sequence (See P.18~P27 for details)

Choose your desired Contact sequence from the list of Contact sequence.

(In case of made to order Contact sequence)
Please specify your order by writing [No. of unit + X] as follows.
For example : In case of 3 units --- 3X
In case of 5 units --- 5X

⑤Handle color (See P.7 for details)

N : No handle
K : Black
R : Red
G : Green

⑥Lock lever color (See P.7 for details)

N : No handle
K : Black
R : Red
Y : Yellow

⑦Name plate stand (Escutcheon)(See P.9 for details)

N : No Name plate stand
K : Black color (N1.5)

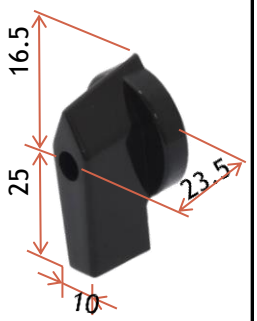
⑧Name plate stand (Escutcheon)(See P.9 for details)

N : No Name plate stand
K : Black color (N1.5)

⑨Name plate type Material : Aluminum
Name plate letters (See P.9 for details)

N : No name plate
N40 : Blank
N41~ : Choose your desired name plate from list. (P.9)
NX : Inscriptions of customized letters

■Handle

Handle shape	No handle	Arrow handle
Code	NN	YK
Color		BLACK(Close to N1.5)
Appearance		

■Name plate stand(Escutcheon)

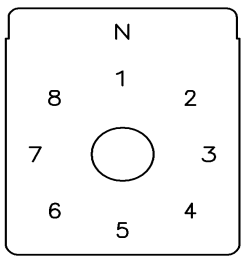
Code	Specifications
N	No name plate stand
K	Black(Color close to N1.5)

■Name plate type & Name plate letters

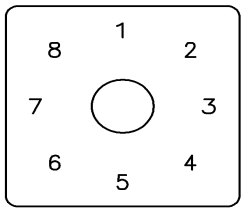
Material	Aluminum
Thickness	0.5mm

Code	Specifications	Remarks
N	No name plate	No name plate attacehd in case of no mark.
N40	Blank	
NX	Inscriptions of customized	The following for the inscription position before specifying the
N□□	Letter-Printed NP	See page.10 to check the list of Printed name plates and choose

･Inscription position



Type HS ･EHS



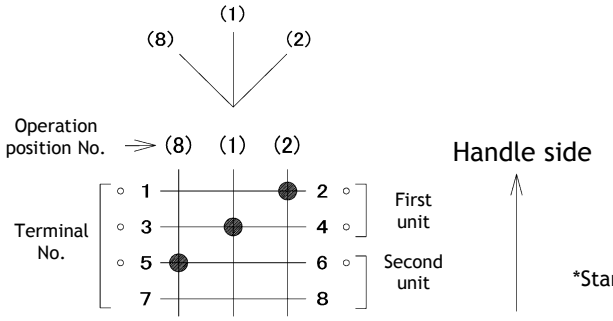
Type JHS ･JEHS

・Printed name plate

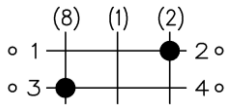
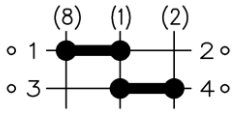
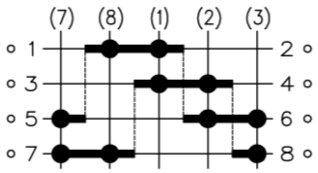
Code	N	6	7	8	1	2	3	4	5	HS type	JHS type	EHS type	JEHS type
N40										○	○	○	○
N41	AMMETER		B		0		R		Y	○	×	○	×
N42	VOLTMETER	B-R	Y-B	R-Y	0	R-N	Y-N	B-N		○	×	○	×
N43				AUTO.	0	MAN.				○	○	○	○
N44					0	1				○	×	○	×
N45				1	0	2				○	○	○	○
N46					0	1	2			○	×	○	×
N47					0	1	2	3		○	×	○	×
N48					OFF	ON				○	○	○	○
N49				OFF		ON				○	○	○	○
N50	VOLTMETER				0	R-Y	Y-B	B-R		○	×	○	×
N51	AMMETER		3		0		1		2	○	×	○	×
N52	VOLTMETER	T－R	S－T	R－S	0	R-N	Y-N	B-N		○	×	○	×
N53	BATTERY CHARGER				AUTO.	BOOST				○	×	○	×
N54	DUTY SELECTOR			AUTO.	OFF	MAN.	TEST			○	×	○	×
N55				1		2				×	○	×	○
N56			B		0		R		Y	×	○	×	○
N57		B-R	Y-B	R-Y	0	R-N	Y-N	B-N		×	○	×	○
N58				1	AUTO.	2				×	○	×	○

■Contact's operation types and How to indicate them

Operation is indicated from the handle of operation switch.



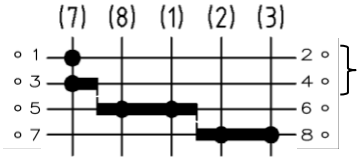
*Standard terminal numbers go like this : 1-2, 3-4, 5-6, 7-8 …

Contact operation type	How to indicate	Details on operation
Single contact		The contact between the terminals turn on at the designated position(●).
Continuous contact		Contacts on the thick horizontal line turn on continuously.
Lap contact (For 45˚/90˚ operations only)		Two or more contacts, one of the contacts turns off at the halfway of a notch while other turns on. Lapping points are connected with a dotted line.

■Instructions & Precautions on ordering customized contact sequence

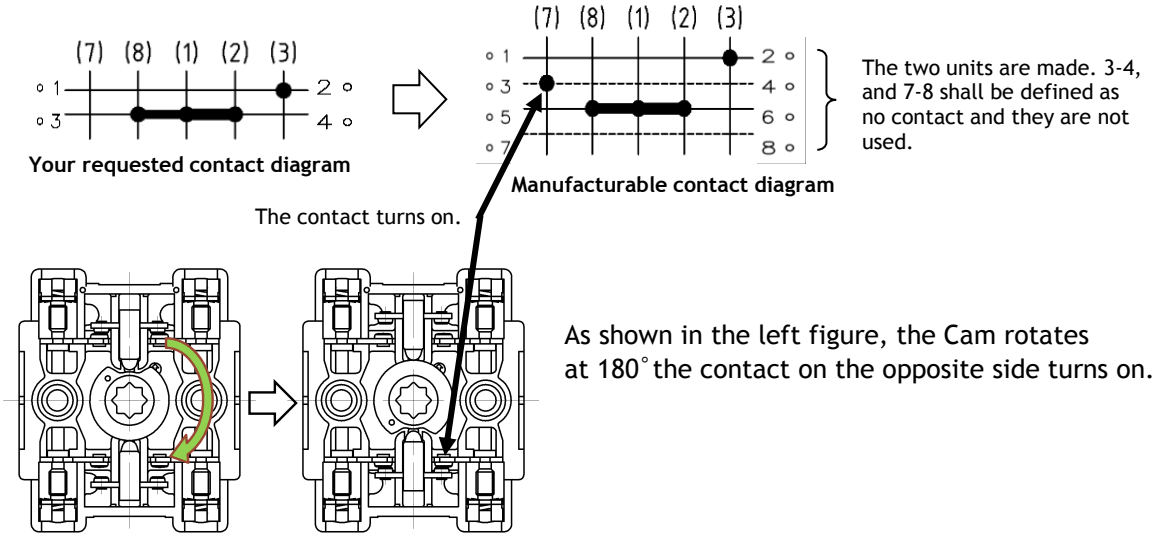
Principles on unit combinations

①Single contact and Continuous contact may be combined in same unit.
Each of other types of contacts (Pull/Push, Residual and Lap contacts) cannot be combined with any of the rest(other types of contacts) in the same unit.
(This is because one cam is used per unit. See Cam list on page.14 as for the contact combinations manufacturable.)



This unit cannot be manufactured because normal contact and lap contact are combined in the same unit.

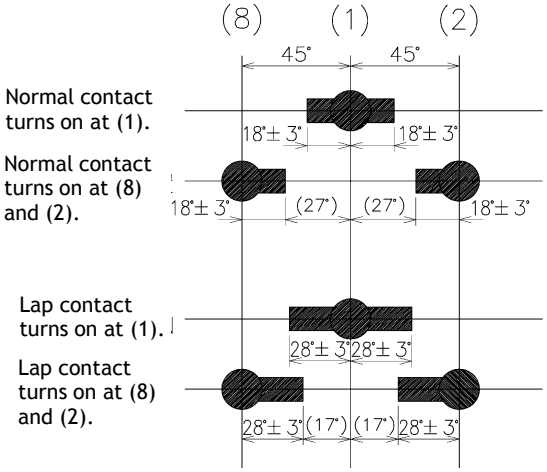
②One unit comprises of contact with two circuits. Because the cam(cam's shape) is positioned at the angle of 180˚of a couple of contacts, your requested contact sequence may not be manufactured in one unit.
(Especially in case of five notches : 180˚or more two unit shall be configured as shown below.)



As shown in the left figure, the Cam rotates at 180˚the contact on the opposite side turns on.

Operating angle and operating leeway angle

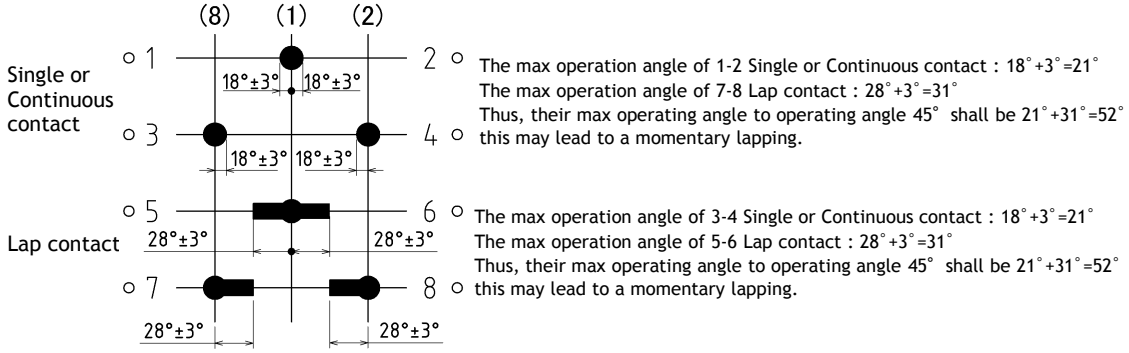
As for operating angle and operating leeway angle of normal contact (Single/Continuous contacts), and Lap contact, such angles are set as follows for controlling.



(Notch angle：45˚)

Precautions on momentary lap

As for Single contact, Continuous contact and Lap contact, leeway(allowance) angle of ±3˚is set for their respective operation angles. Therefore, in case of the following contact sequence in which Single contact (or Continuous contact) and Lap contact coincide, such contacts may cause a lapping momentarily.



The max operation angle of 1-2 Single or Continuous contact : 18˚+3˚=21˚
The max operation angle of 7-8 Lap contact : 28˚+3˚=31˚
Thus, their max operating angle to operating angle 45˚ shall be 21˚+31˚=52˚ this may lead to a momentary lapping.

The max operation angle of 3-4 Single or Continuous contact : 18˚+3˚=21˚
The max operation angle of 5-6 Lap contact : 28˚+3˚=31˚
Thus, their max operating angle to operating angle 45˚ shall be 21˚+31˚=52˚ this may lead to a momentary lapping.

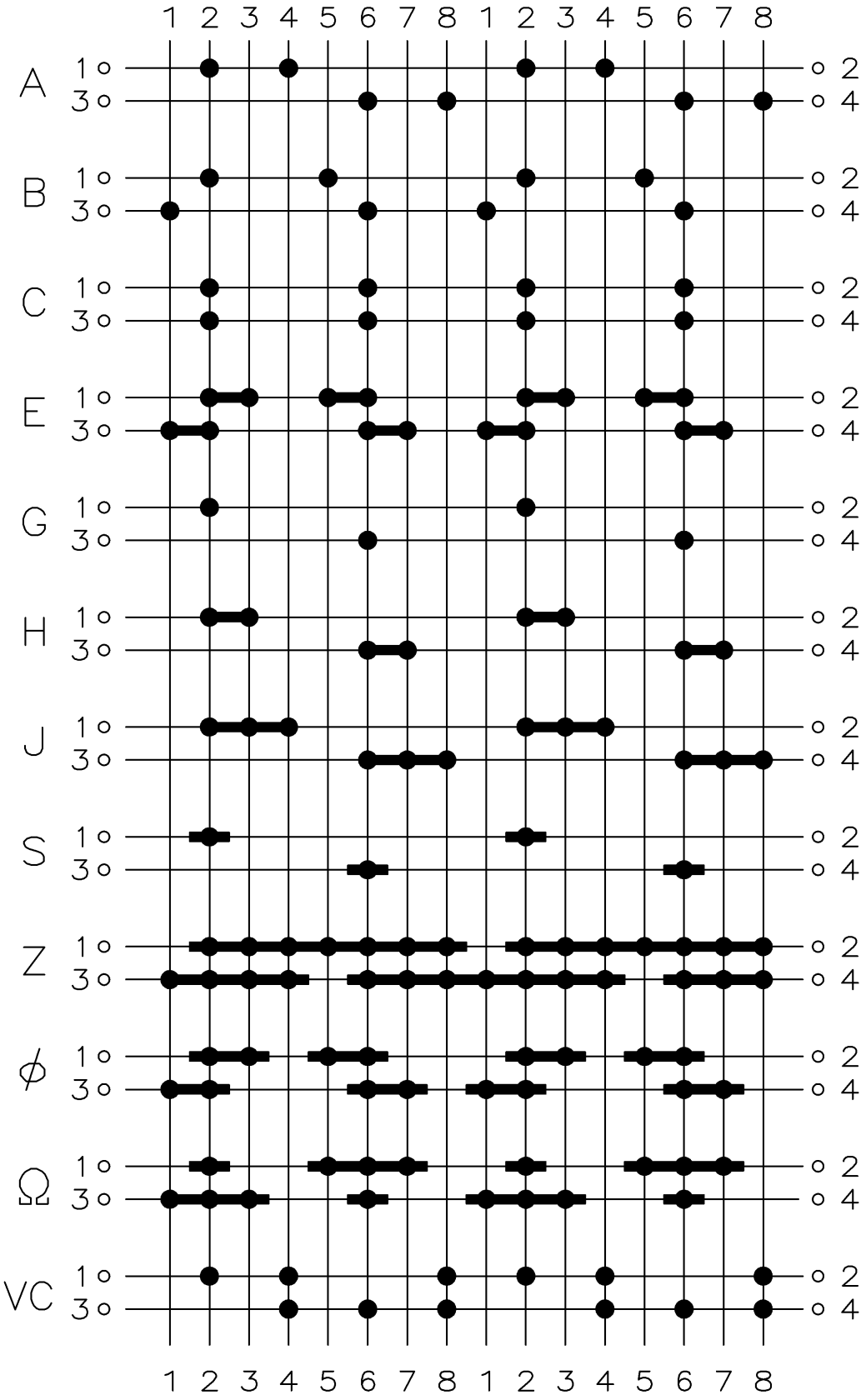
■Max number of contact units & Max number of contacts

Opera	Rotating	Manual return	Spring return	Manual return	Spring return	Manual return	Spring return
	Pull/Push	-	-	Manual return	Manual return	Spring return	Spring return
Max no. of contact units		10	6	10	3	10	3
Max no. of Simultaneous open contact		6	4	6	3	6	3
Max No. of Lap contacts		3	3	3	3	-	-

·Maximum number of simultaneously open contacts means that the number of contacts, which stay on at each position and also which are shifting from ON-status to OFF-status in case of rotating operation, is most in number.This maximum number of simultaneous open contacts means the maximum number of such type of contact.
However, the number of simultaneously open contacts manufacturable in case of Spring-return means the maximum number of such type of contact in the process of returning to the central position from the left or right position.

·Be careful as for rotating operation in case of manual return, the operation may come to stop on the halfway between the notches. Therefore, be sure to conduct the switchover operation without fail.

■CAM LIST

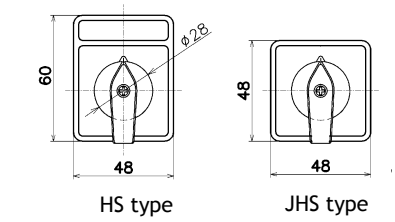


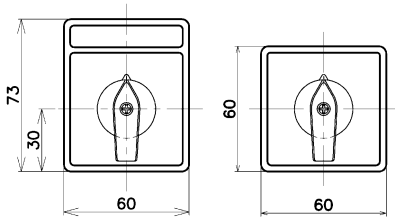
■Outline drawing

*See page 7 for dimension of padlock handle.

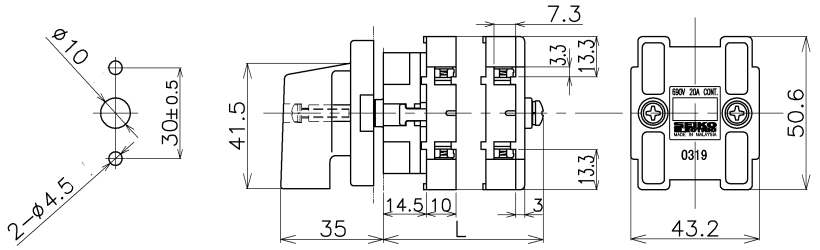
Manual return / Spring return	Type：HSN,HSR / JHSN,JHSR / EHSN,EHSR / JEHSN,JEHSR

[NP unit size]





[Mounting hole size]

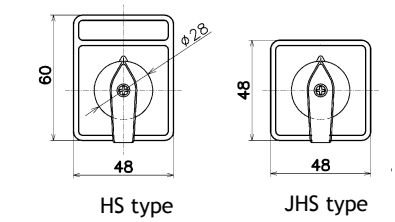


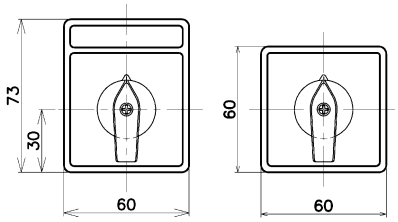
No. of units	1	2	3	4	5	6	7	8	9	10
L(mm)	34	44	54	64	74	84	94	104	114	124

*Spring return type can be manufactured up to 6 units.

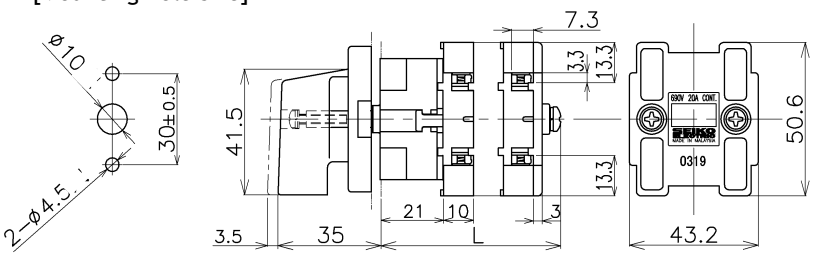
Pull / Push operation	Type：HSNP☐,HSRP☐,HSNS☐,HSRS☐ JHSNP☐,JHSRP☐,JHSNS☐,JHSRS☐ EHSNP☐,EHSRP☐,EHSNS☐,EHSRS☐ JEHSNP☐,JEHSRP☐,JEHSNS☐,JEHSRS☐

[NP unit size]





[Mounting hole size]

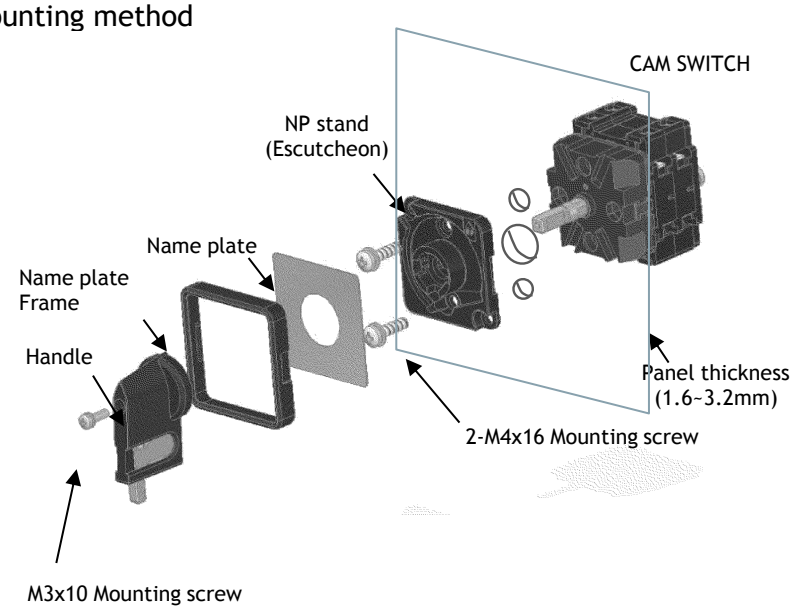


No. of units	1	2	3	4	5	6
L(mm)	40.5	50.5	60.5	70.5	80.5	90.5

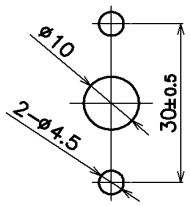
*Spring return type can be manufactured up to 3 units.

■Mounting hole processing dimensions and Assembly method

Mounting method



Mounting hole shape

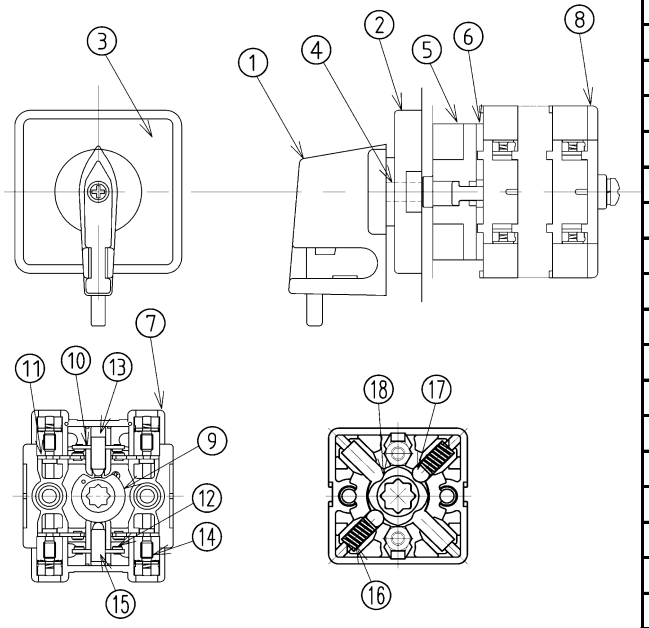


●Standard torque of screws of each type

Screw type	Screw size	Tightening torque
Handle fixing screw	M3	0.7N·m{7kgf·cm}
Terminal screw	M3.5	0.8N·m{8kgf·cm}
NP stand mounting screw	M4	1.0N·m{10kgf·cm}

■Technical reference

Name of each parts and its materials



SYM. No.	Parts name	Materials	Plating/Flame Resistance
1	Handle	ABS resin	UL94 HB
2	NP stand	ABS resin	UL94 HB
3	Name plate	Aluminum	—
4	Shaft	Zinc die-cast	Galvanized
5	Mechanical case	PBT resin	UL94 V-0
6	Secured plate	polycarbonate resin	UL94 HB
7	Contact base	PBT resin	UL94 V-0
8	End plate	PBT resin	UL94 V-0
9	CAM	Polyacetal resin	UL94 HB
10	Movable contact	Brass	Nickel plated
11	Stationary contac	Brass	Nickel plated
12	Contact	Silver/Copper	—
13	Contact spring	Stainless steel	—
14	Terminal screw	Steel	Galvanized
15	Bracket	Phenolic resin	
16	Push spring	Stainless steel	—
17	Carbon steel ball	Steel	—
18	Notch	Polyacetal resin	UL94 HB

Weight list

The weight listed below stands for roughly calculated weight of [Main body of switch + NP stand + Name plate + Handle + A set of screws used].
The number of the units manufacturable is limited depending on the types.
See page 13 for the number of the units manufacturable.

unit:(g)

Number of unit	Rotating operation	Pull/Push operation
1	95	115
2	125	145
3	155	175
4	185	205
5	215	235
6	245	265
7	275	295
8	305	325
9	335	355
10	365	385