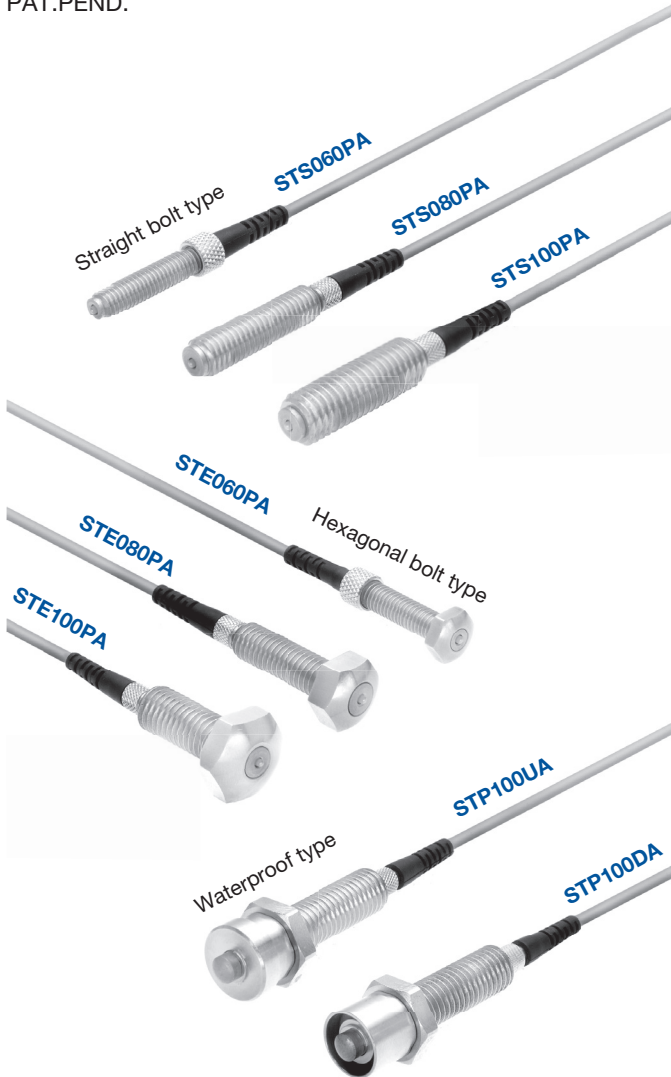


## STS / STE / STP

Seating check, plunger type  
**Straight touch type (Metal bearing)**

PAT.PEND.



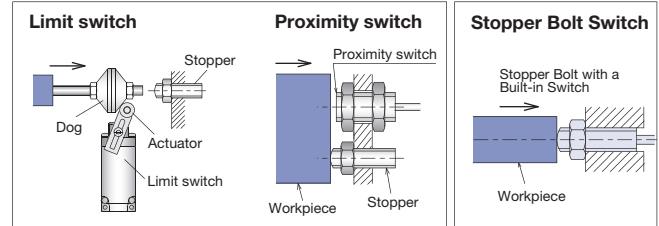
### Features

- **2 tasks with 1 device.**  
Housing a high-accuracy built-in switch in a stopper bolt.

Compact machine size by reducing the number of parts.

\*Use Air Gap Sensor(P0-4), for precision seating confirmation.

### Differences from conventional switches



No need of dogs and stopper bolts → Compact machine design

- **Maintenance cost is greatly reduced by applying cartridge type.**

When replacing the switch because of breakdown, no need for detaching the stopper bolt or adjusting the position of it, thereby simplifying the maintenance procedure.

No need to visit customer sites for repair

Install stopper bolt and adjust the position before installing the built-in type switch to avoid the twisting of the cable.



- **Improve the availability ratio of the machine and cut-down maintenance time (MTTR)**

### Standard specification

unit:mm

Shape	Product name	Output mode	Size	Protective structure	with LED	Cartridge name	
Straight bolt type	STS060P A / B	A: Normally open B: Normally close	M6×1	IP65 *1	STS060P A / B- L	KS21PA / KS21PB	
	STS080P A / B		M8×1.25		STS080P A / B- L		KS23PA / KS23PB
	STS100P A / B		M10×1.5		STS100P A / B- L		
Hexagonal bolt type	STE060P A / B	A: Normally open B: Normally close	M6×1	IP65 *1	STE060P A / B- L	KS21PA / KS21PB	
	STE080P A / B		M8×1.25		STE080P A / B- L		KS23PA / KS23PB
	STE100P A / B		M10×1.5		STE100P A / B- L		
Water-proof type	with upward protective cover	A: Normally open B: Normally close	STP080U A / B	IP67	STP080U A / B- L	KS30A / KS30B	
			STP100U A / B		M10×1.5		STP100U A / B- L
	with downward protective cover		STP080D A / B		M8×1.25		STP080D A / B- L
			STP100D A / B		M10×1.5		STP100D A / B- L

e.g.) STS060PA, STS060PB

-L: LED indicator (120mm from the switch)  
Add "-L" after cartridge name for LED type  
e.g.) KS21PA -L

\*1 Note that bolts and cartridges are not compatible with old types.  
Please refer to P5-8 for former model types.

unit:mm

### Common specification

Switch structure	Dry contact
Output mode	A: Normally open / B: Normally close
Signal point	0.3 from stopper surface
Stroke	0.7
Repeatability	Both On→Off, Off→On/ 0.01 (range) (At operating speed 50-200mm/min) *2
Movement differential	0
Contact life time	10 million (No bungle caused by vibration and use under contact rating)
Contact force	STS / STE: 2N STP: 4N
Contacting part material	SUS HRC40-50
Hardness of the stopper surface	SUS HRC40-50

\*2 Operating speed slower than 10mm/min is not recommended.

#### The following options are available.

##### Transistor output (Refer to P2-4)

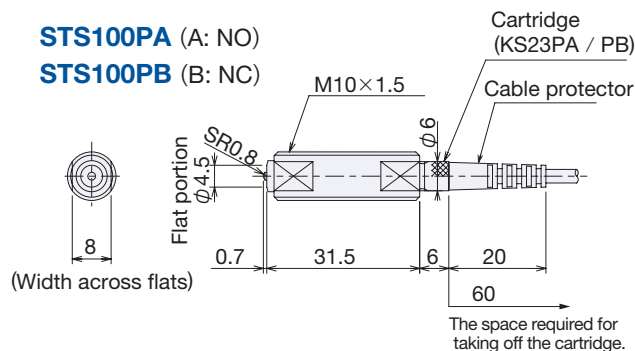
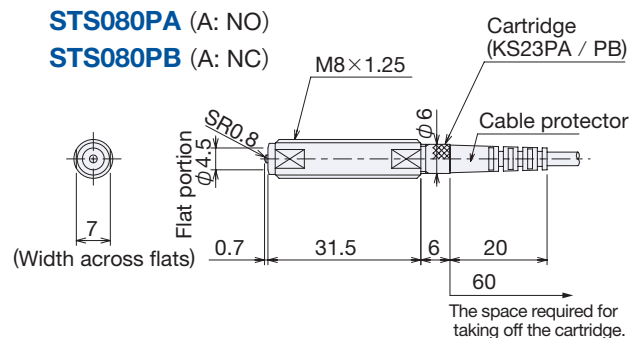
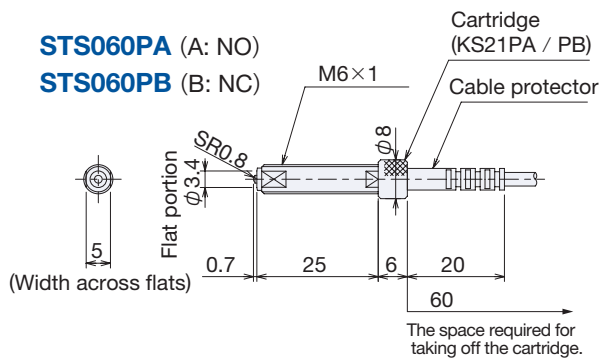
- Reverse connect protection.
- Level conversion.
- Output current is increased to 100mA.

Withstand load	5000N
Impact resistance	0.4J
Cable (Refer to P2-9)	Standard length 2m Oil resistant $\phi 2.8$ / 2 cores, Tensile strength 30N, minimum bending R7 Cable protector (Detachable)
Operating temperature range	0°C-80°C (Ice-free) *3
Temperature drift	0 (because of no amplifier)
Oscillation	10-55Hz total amplitude 1.5 for X,Y,Z each direction
Impact	300m/s <sup>2</sup> for X,Y,Z each direction
Contact rating (Refer to P7-3)	DC5V-DC24V Steady current : 10 mA or less (rush current: 20 mA or less) <b>When using the switch with LED, limit the current below 10mA.</b>
Standard accessory	Two fixing nuts and a toothed washer

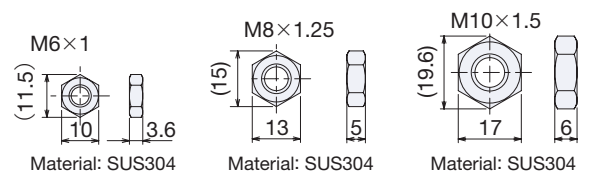
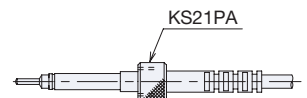
\*3 The sealed waterproof structure causes delay in return, when used under temperature (below 5°C).

### Outer dimension

#### Straight bolt type



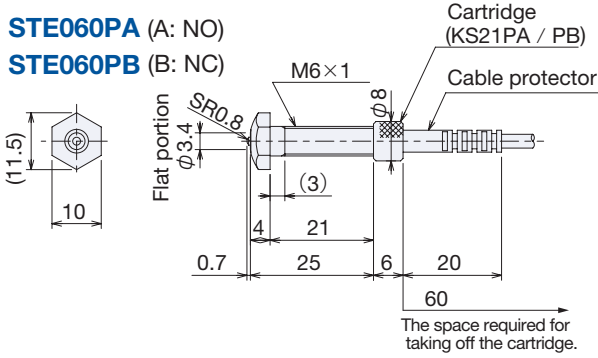
#### Drawing of cartridge



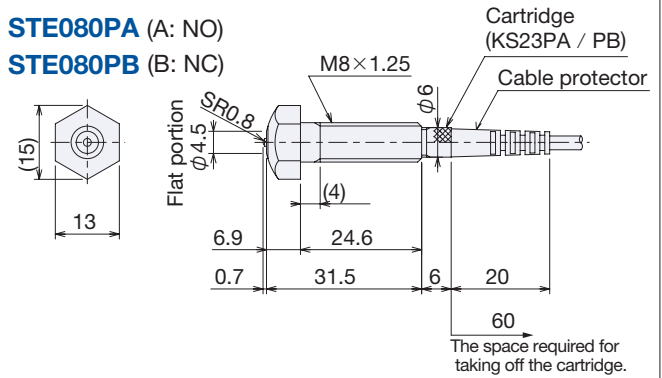
Outer dimension

Hexagonal bolt type

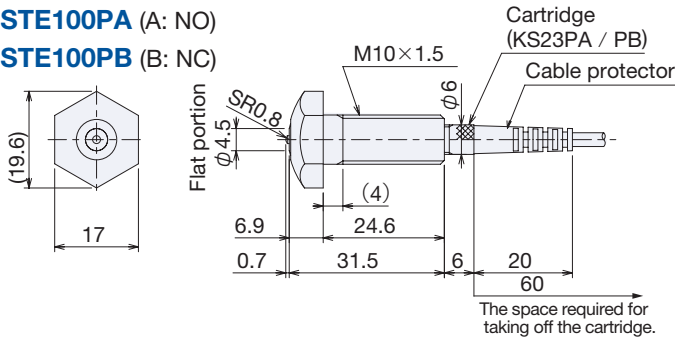
**STE060PA** (A: NO)  
**STE060PB** (B: NC)



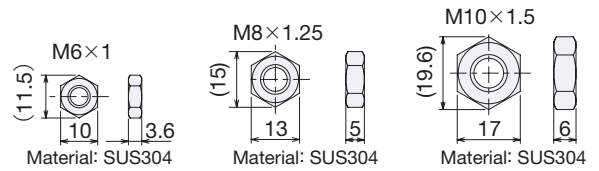
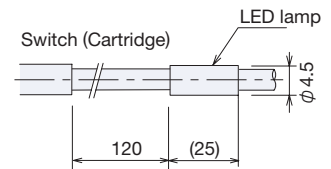
**STE080PA** (A: NO)  
**STE080PB** (B: NC)



**STE100PA** (A: NO)  
**STE100PB** (B: NC)



LED indicator(-L)



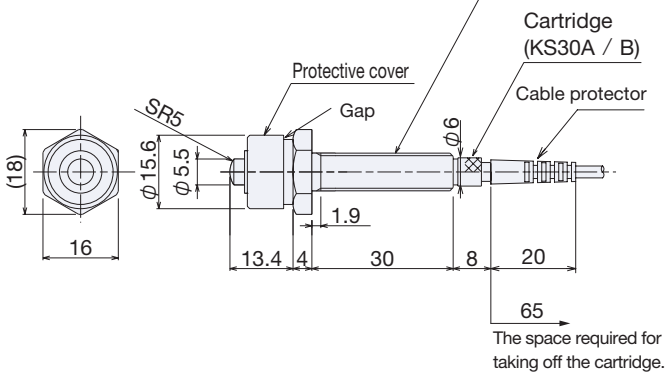
Waterproof type (IP67)

with upward protective cover

**STP080UA** (A: NO)  
**STP080UB** (B: NC)

**STP100UA** (A: NO)  
**STP100UB** (B: NC)

STP080U : M8×1.25  
STP100U : M10×1.5

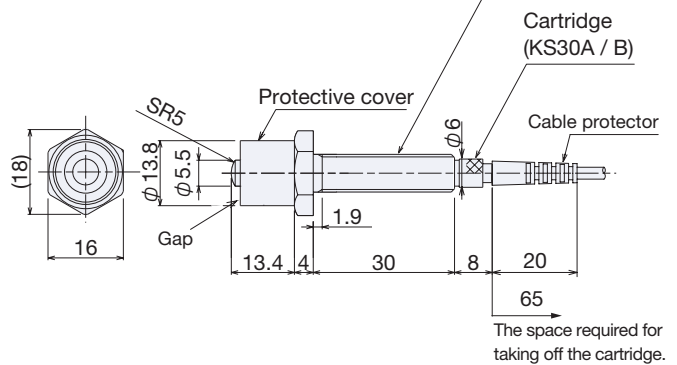


with downward protective cover

**STP080DA** (A: NO)  
**STP080DB** (B: NC)

**STP100DA** (A: NO)  
**STP100DB** (B: NC)

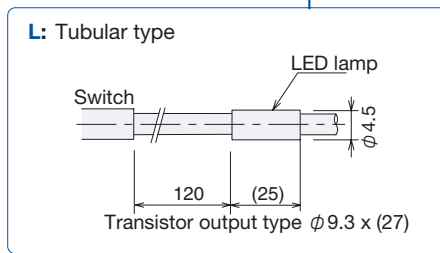
STP080U : M8×1.25  
STP100U : M10×1.5



### Options

Product name		LED indicator	Cable
<b>Straight bolt type</b> <b>STS060P A / B</b> <b>STS080P A / B</b> <b>STS100P A / B</b>	<b>Waterproof type</b> with upward protective cover <b>STP080U A / B</b> <b>STP100U A / B</b>	<b>Blank: No LED</b>  <b>L: 120mm from the switch</b>	<b>Blank: 2m</b>  <b>Option:</b> <b>Not selectable when transistor output is selected.</b> : Connector
<b>Hexagonal bolt type</b> <b>STE060P A / B</b> <b>STE080P A / B</b> <b>STE100P A / B</b>	with downward protective cover <b>STP080D A / B</b> <b>STP100D A / B</b>		

Transistor output	
<b>TNA</b>	Added to standard product name
<b>TNB</b>	Added to standard product name
<b>TPA</b>	Added to standard product name
<b>TPB</b>	Added to standard product name
(Refer to P2-4)	



- ▶ e.g.) STS060PA-L
- ▶ Transistor output e.g.) ST060PATNA

### Connector (Only applicable for cabtyre cables, not usable when transistor output is selected.)

Blank : No protective	Cable		Protective structure	Dimension	Pullout strength
Product name					
<b>CH</b>	2-cores	$\phi 2.8$	IP65	* Not usable when transistor output is selected. The switch side is able to go through M6 nuts.	1.5N

e.g.) STS060PA-L-1-CH-2

(Stopper Bolt Switch **STS060PA-L** / Switch side cable 1m / Connector **CH** / Machine side cable 2m)

**● How to Order for Maintenance**

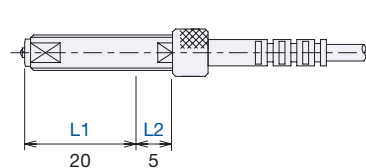
**(1) When Ordering Only the Switch Side**  
Please add **[H]** after the model name. Example: STS060PA-1-CH**H**

**(2) When Ordering Only the Machine Side**  
Please add **[Cord Length]** in 1m increments after the model name.  
Example: CH-**2** (Relay Connector: CH / Machine-Side Cord: 2m)

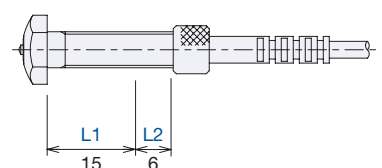
### Tightening torque for case screws and nuts

Applicable models	Tightening torque	
	L1 : 5N·m	L2 : 2.5N·m
STS060PA / B	5N·m	2.5N·m
STE060PA / B		
STS080PA / B	10N·m	
STE080PA / B		
STP080UA / B		
STP080DA / B		
STS100PA / B	25N·m	
STE100PA / B		
STP100UA / B		
STP100DA / B		

STS060PA / B



STE060PA / B



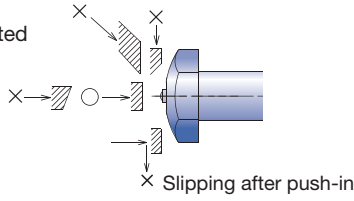
#### Caution

Use the lower torque (i.e. torque corresponding to L2) while tightening the bolt between the lengths L1 and L2 in the above picture. Please make sure to use a locknut if the bolt is likely to shift in position due to the vibrational impacts.

Stopper Bolt Switch

How to use

Make contact with the detected object at right angle (with deflection angle ±3°)



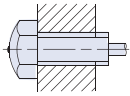
Circuit diagram

without LED	with LED
<p>Normally open (NO)</p>	<p>Normally open (NO)</p> <p>LED Normally Off</p>
<p>Normally close (NC)</p>	<p>Normally close (NC)</p> <p>LED Normally On</p>

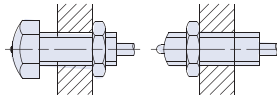
Electrical specification / circuit diagram. (Refer to P2-1)  
**When using the switches with LED option, limit the current below 10mA.** (Refer to P7-3 "Confirmation of switch operation")

How to fix the switch

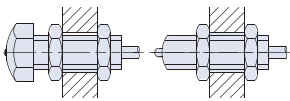
Simply screw in (No need for position setting)



Screw in to the mounting hole and apply a lock nut \*



Insert the switch in the mounting hole and apply two fixing nuts \*

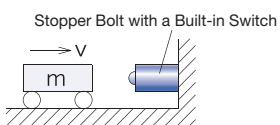


\* Use level 2 bracket screw, and note the increase of impact resistance.

Impact-resistance calculation

Inertia collision

$E = mv^2/2$   
 m: Mass kg  
 v: Speed m/s

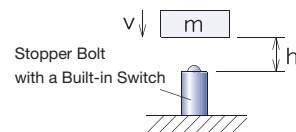


e.g.)

m	v	$mv^2/2$ [J]
80	0.1	0.4
320	0.05	0.4
80	0.05	0.1

Vertical free fall

$E = mgh$   
 g: Gravitational acceleration 9.8m/s<sup>2</sup>  
 h: Dropping height m

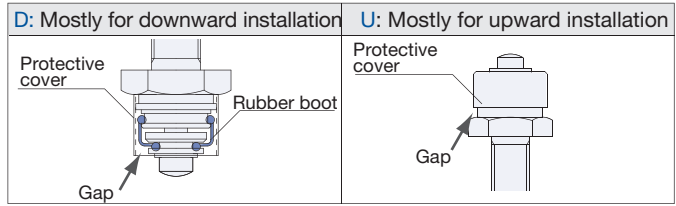


e.g.)

m	h	$v = \sqrt{2gh}$	$mgh$ [J]
0.4	0.05	1	0.2
0.4	0.1	1.4	0.4

Protective covers (Only for Water-resistant type)

Choose the suitable cover according to switch mounting direction so that the metal cuttings and coolant can't enter from the gaps. (Refer to P7-7)



For metal cuttings and coolant

- Protective cover is strongly recommended to avoid damage from cuttings and coolant when the switch is used in machining environment. In addition, an extra cover is recommended to avoid direct hit by high-pressure coolant or heavy cuttings.
- For horizontal mounting, an extra cover prevents coolant or cuttings from entering inside and getting piled up on the body.
- Fabricate and place an extra cover to avoid metal chips adhering to the rubber boots during the grinding operation.

Precautions for installing cartridge

- When the cartridge is delivered, locking coating is applied to the screw, which is tightened lightly. Tighten the nuts with fingers to optimize the locking agent.
- Tighten the cartridge firmly by fingers. Do not use pliers to fix it. That may cause malfunction.
- The cartridge is thin. Carefully handle it.
- When installing the cartridge type switch, give considerable space to replace the cartridge.

Old type product name (Protective structure : IP40)

unit:mm

Product name	Output mode	Size	Protective structure	Cartridge name
STS060 A/B	A : Normally open	M6	IP40	KS21A / KS21B
STS080 A/B		M8		KS23A / KS23B
STS100 A/B		M10		
STE060 A/B	B : Normally close	M6		KS21A / KS21B
STE080 A/B		M8		KS23A / KS23B
STE100 A/B		M10		