

Trimmer Auto Switch

One auto switch allows work pieces to be distinguished easily.

New

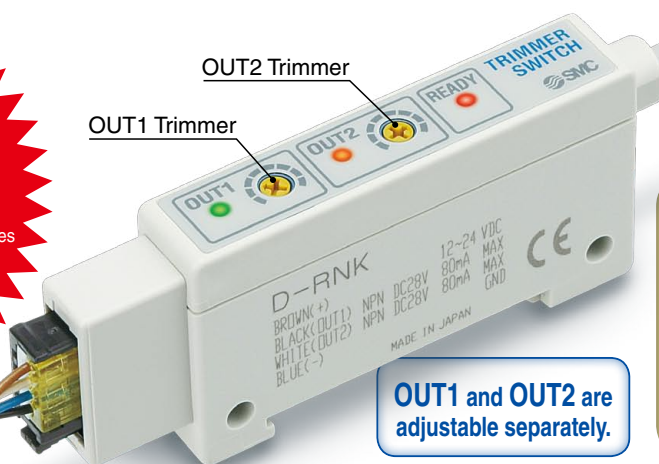
RoHS

Minimum adjustment width to detect

0.5 mm

With one switch, various sized work pieces can be detected by the difference of 0.5 mm or more.

* From 0.5 mm to detectable width dependant on applied actuator.



OUT1 and OUT2 are adjustable separately.

Direct mounting (Round groove) type newly added



Large workpiece



Green light is ON. Red light is ON.



Medium workpiece



Green light is ON. Orange light is ON. Red light is ON.



Small workpiece



Orange light is ON. Red light is ON.



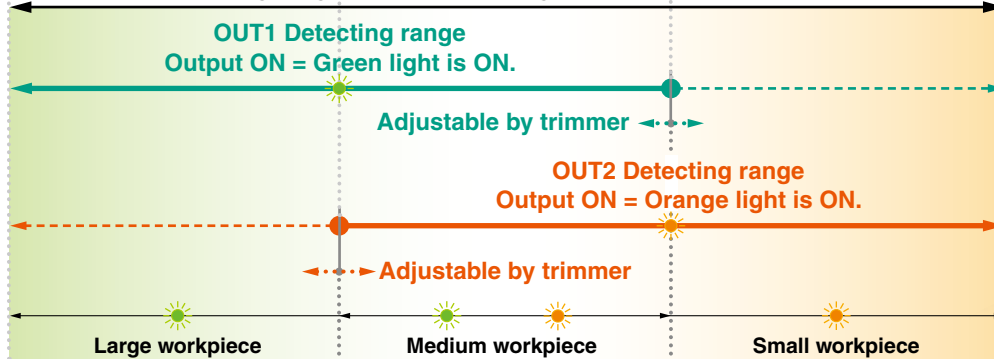
No workpiece



All lights are OFF.



Operating range of sensor (Red light of the sensor unit is ON.)



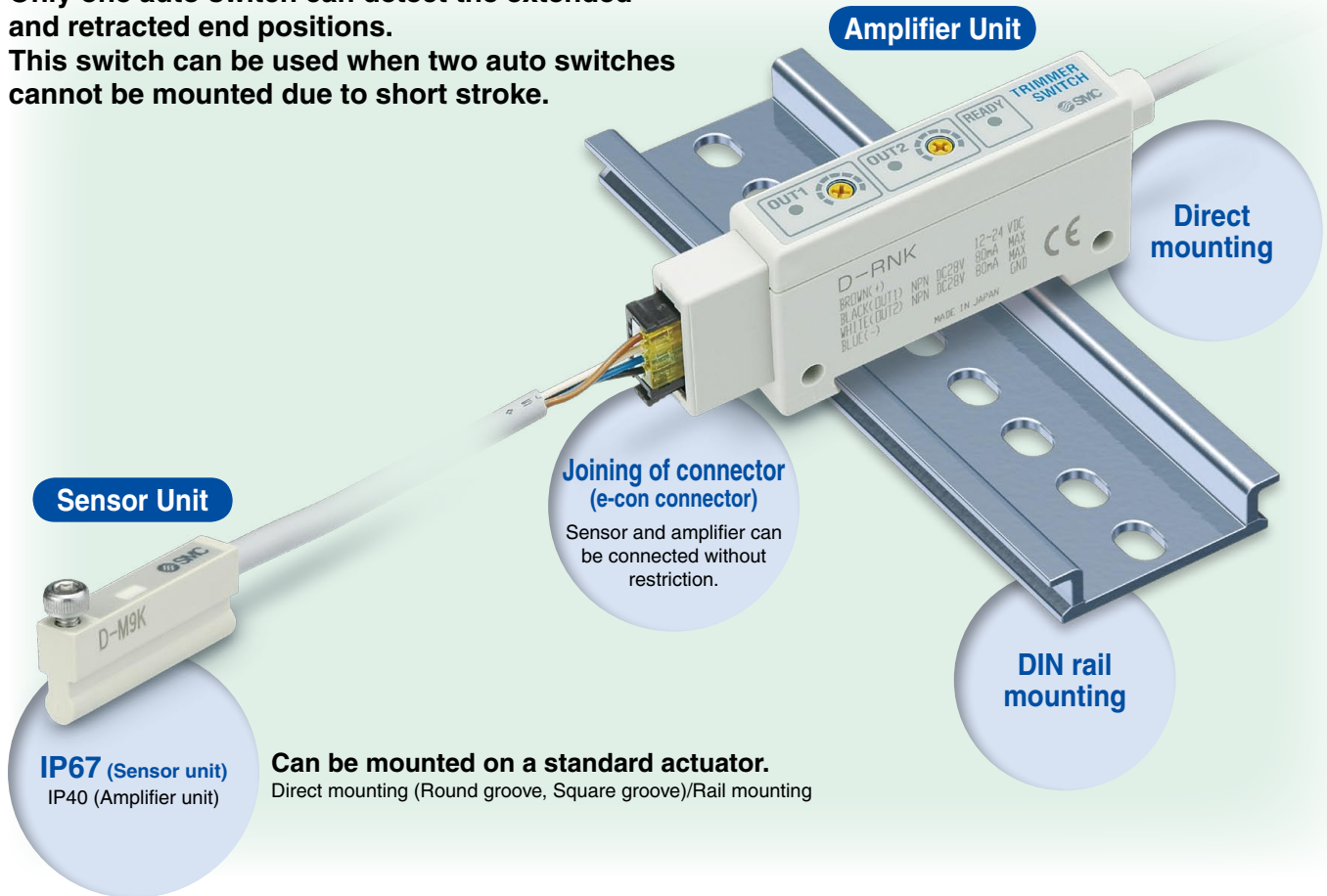
Series **D-M9K/D-□7K/D-R□K**



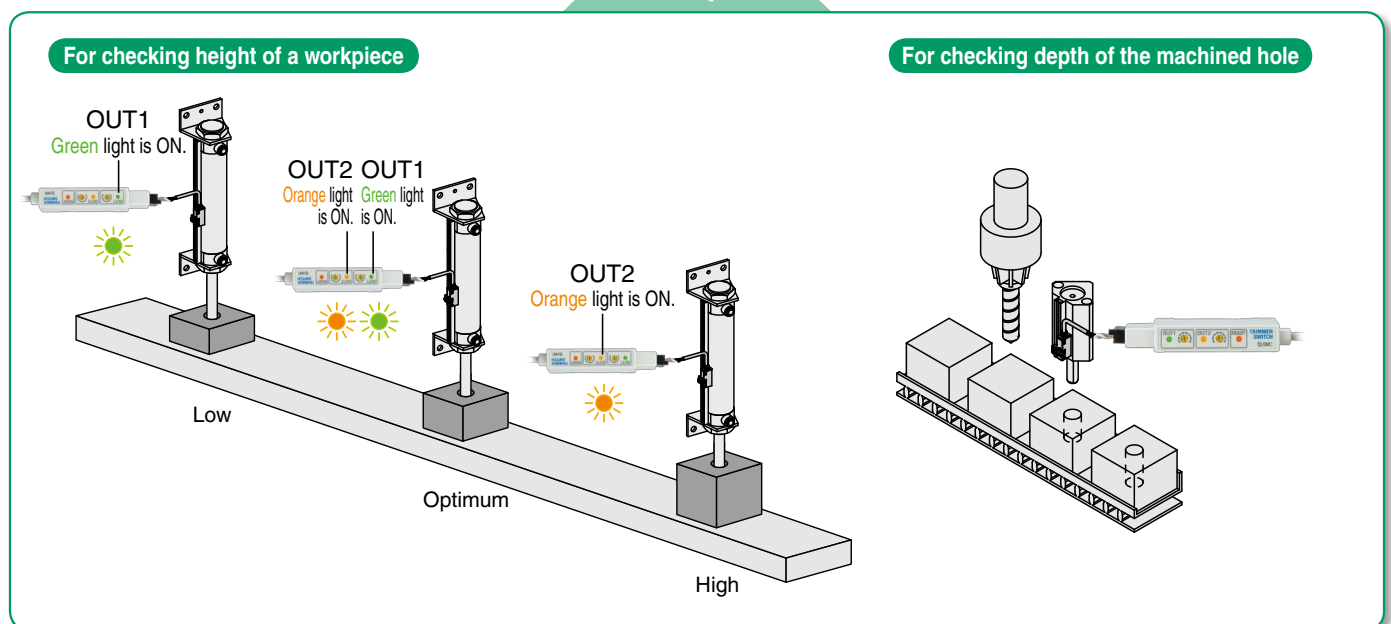
CAT.ES20-180C

Applicable to the short stroke cylinder.

Only one auto switch can detect the extended and retracted end positions.
This switch can be used when two auto switches cannot be mounted due to short stroke.



Examples

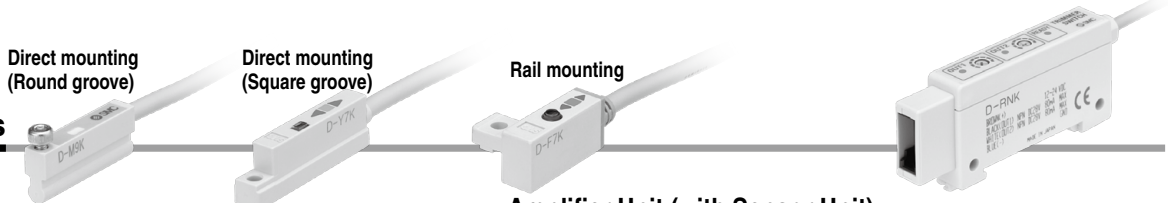


Trimmer Auto Switch

D-M9K/D-□7K/D-R□K



Specifications

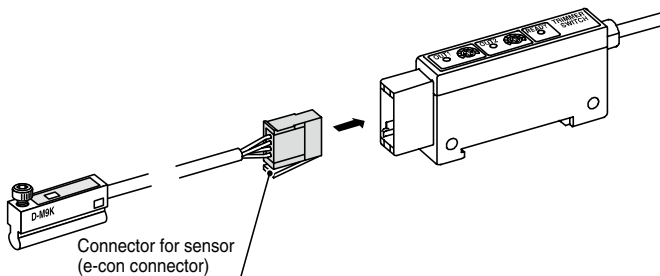


Sensor Unit

Auto switch model	D-M9K	D-Y7K	D-F7K
Mounting	Direct mounting (Round groove)	Direct mounting (Square groove)	Rail mounting
Applicable amplifier unit	D-RNK, D-RPK		
Indicator lamp	Red lights ON at sensitive position. Green lights ON at optimum detecting position.		
Electrical entry	Grommet		
Impact resistance	980 m/s ²		
Insulation resistance	50 MΩ or more (500 VDC measured via megohmmeter) between lead wire and case		
Withstand voltage	1000 VAC for 1 minute (between lead wire and case)		
Ambient temperature	-10 to 60°C		
Enclosure	IP67		
Weight (with connector)	55 g	58 g	
Standard	CE Marking		

Oilproof Heavy-duty Cable

Auto switch model		D-M9K	D-Y7K	D-F7K
Sheath	Outside diameter [mm]	ø3.5		
Insulator	Number of cores	4 cores (Brown/Blue/Black/White)		
	Outside diameter [mm]	ø1.0		
Conductor	Effective area [mm ²]	0.15 (AWG26)		
	Strand diameter [mm]	ø0.08		
Minimum bending radius [mm] (Reference value)		21		

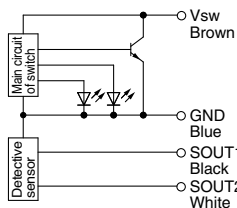


Note) The connector for sensor (e-con connector) is not attached to the lead wire. It will be supplied loose in the same shipment (1 pc.).

Internal Circuit

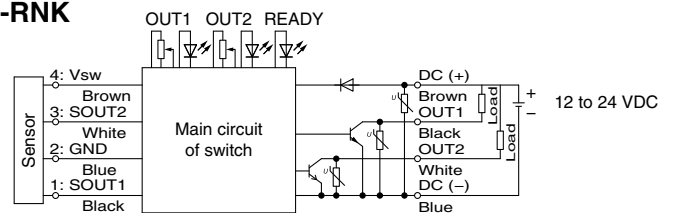
Sensor Unit

D-M9K/D-□7K

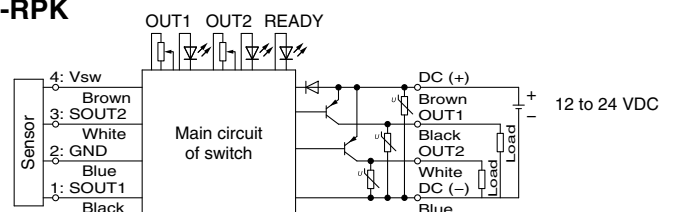


Amplifier Unit

D-RNK



D-RPK



Series D-M9K/D-□7K/D-R□K

Values which include hysteresis are for guideline purposes only, they are not a guarantee (assuming approximately ±30% dispersion) and may change substantially depending on the ambient environment. Please consult with SMC for alternative actuators other than those shown below.

Applicable Actuators and Operating Range (Angle)

Sensor Unit D-M9K



Air Grippers (The operating range for grippers is measured when both ends are open.)

(mm)

Description/Series		Bore size												
		10	16	20	25	32	40	50	63	80	100	125		
Parallel style	MHZ2	—	3.5	5.5	6.0	7.5	8.0	—	—	—	—	—	—	—
Parallel style	MHZJ2	—	5.0	6.0	6.0	—	—	—	—	—	—	—	—	—
Parallel style	MHS2 (2 fingers)	—	—	4.0	4.5	*				—	—	—	—	
Parallel style	MHS3 (3 fingers)	—	—	4.0	4.5	*				—	—	—	—	
Parallel style	MHS4 (4 fingers)	—	—	4.0	4.5	*				—	—	—	—	

Air Cylinders

(mm)

Description/Series		Bore size														
		12	16	20	25	32	40	50	63	80	100	125	140	160	180	200
Compact cylinder	CQ2-Z	3.0	4.0	4.0	4.0	4.5	4.0	4.5	5.0	5.0	6.0	6.5	6.5	6.0	6.0	6.0
Compact cylinder guide rod type	CQM	2.5	3.0	4.0	3.5	4.5	4.0	4.5	5.0	5.0	6.0	—	—	—	—	—
3 position cylinder	RZQ	—	—	—	—	4.5	4.0	4.5	5.0	—	—	—	—	—	—	—
Rotary clamp cylinder	MK-Z	2.5	3.5	3.5	4.0	4.5	4.0	4.5	4.5	—	—	—	—	—	—	—
Compact guide cylinder	MGP-Z	3.0	4.0	4.0	4.0	4.5	4.0	4.0	4.5	4.5	5.0	—	—	—	—	—

*1 When using the MHS series (bore size ø32 or more), use the D-Y7K.

Sensor Unit D-Y7K



Air Grippers (The operating range for grippers is measured when both ends are open.)

(mm) or (°)

Description/Series		Bore size											
		10	12	16	20	25	32	40	50	63	80	100	
Parallel style	MHZ2	3.0	—	5.0	7.0	7.0	8.0	8.5	—	—	—	—	—
Parallel style	MHZL2	6.0	—	7.0	10.0	11.0	—	—	—	—	—	—	—
Wide type	MHL2	7.0	—	8.0	8.5	10.5	11.0	12.5	—	—	—	—	—
Parallel style	MHS2 (2 fingers)	—	—	—	—	—	6.5	7.0	7.5	8.5	—	—	—
Parallel style	MHS3 (3 fingers)/MHS(L)3	—	—	—	—	—	6.5	7.0	7.5	8.0	—	—	—
Parallel style	MHS4 (4 fingers)	—	—	—	—	—	6.5	7.0	7.5	8.5	—	—	—
Angular style	MHC2	30° to -10°	—	30° to -10°	30° to -10°	22.5° to -10°	—	—	—	—	—	—	—
180° Angular style	MHW2	—	—	—	88° to -5°	54° to -6°	58° to -5°	41° to -5°	30° to -4°	—	—	—	—

Air Cylinders

(mm)

Description/Series		Bore size											
		10	12	16	20	25	32	40	50	63	80	100	
Compact guide cylinder	MGP	—	3.5	5.0	4.5	4.5	5.5	5.5	5.5	5.5	5.5	5.5	6.0
Non-rotating double power cylinder	MGZ	—	—	—	—	—	—	5.5	6.5	6.5	—	—	—
Air cylinder	CA2	—	—	—	—	—	—	4.0	4.0	6.0	6.0	6.0	6.0

Sensor Unit D-F7K



Air Cylinders

(mm)

Description/Series		Bore size													
		10	12	16	20	25	32	40	50	63	80	100	125	140	160
Air cylinder	CJ2	4.0	—	4.5	—	—	—	—	—	—	—	—	—	—	—
Air cylinder	CM2*2	—	—	—	3.5	3.5	3.5	3.5	—	—	—	—	—	—	—
Compact cylinder	CQ2*3	4.5	4.5	5.5	5.5	5.0	5.5	5.5	5.5	6.0	5.5	6.0	7.5	7.5	7.5
Plate cylinder	MU	—	—	—	—	5.5	6.5	6.5	6.5	6.5	—	—	—	—	—
Rotary clamp cylinder	MK/MK2	—	—	—	5.0	5.0	6.5	6.0	6.0	6.5	—	—	—	—	—

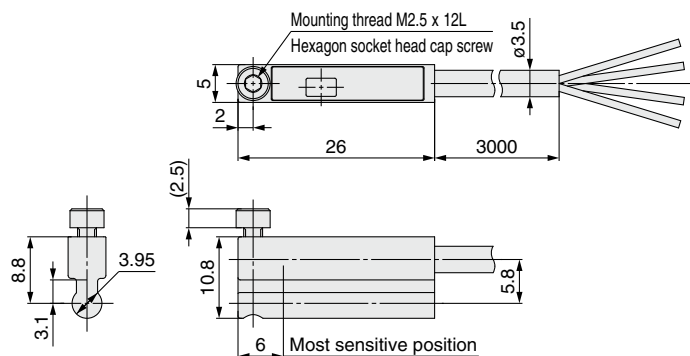
*2 Use the Made-to-Order product (-XC13: Auto switch rail mounting type) for the CM2 series.

*3 Not applicable to the CQ2-Z series.

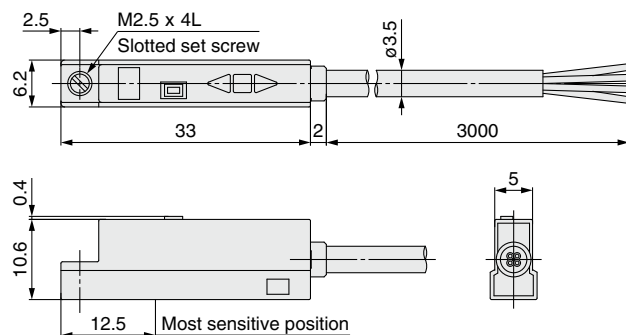
Dimensions

Sensor Unit

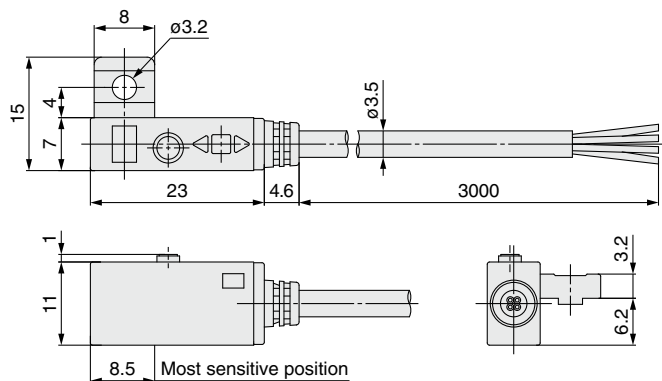
D-M9K



D-Y7K

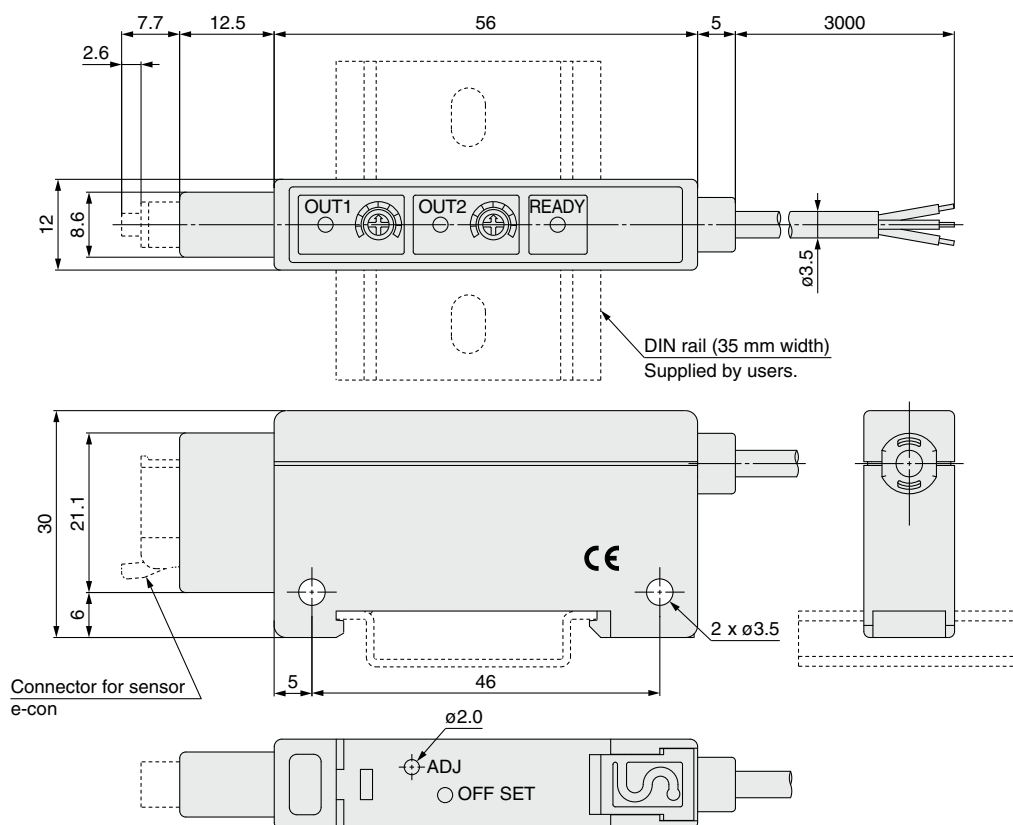


D-F7K



Amplifier Unit

D-R□K



Series D-M9K/D-□7K/D-R□K

How to Mount and Move the Auto Switch

D-M9K **Mounting Bracket** Direct Mounting Type

<Applicable auto switch>

Solid state..... D-M9K

Applicable Actuators

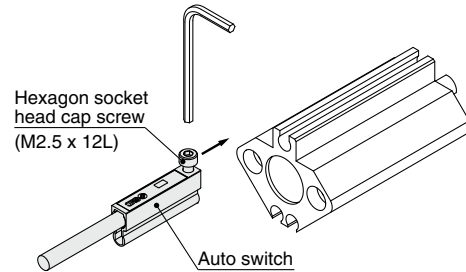
Air Grippers

Description	Series	Bore size
Parallel style	MHZ2	16 to 40
Parallel style	MHZJ2	16 to 25
Parallel style	MHS2 (2 fingers)	20, 25
Parallel style	MHS3 (3 fingers)	20, 25
Parallel style	MHS4 (4 fingers)	20, 25

Air Cylinders

Description	Series	Bore size
Compact cylinder	CQ2-Z	12 to 200
Compact cylinder guide rod type	CQM	12 to 100
3 position cylinder	RZQ	32 to 63
Rotary clamp cylinder	MK-Z	12 to 63
Compact guide cylinder	MGP-Z	12 to 100

How to Mount and Move the Auto Switch



Note) The tightening torque for a hexagon socket head cap screw (M2.5 x 12L) is 0.1 to 0.2 N·m.

D-Y7K **Mounting Bracket** Direct Mounting Type

<Applicable auto switch>

Solid state..... D-Y7K

Applicable Actuators

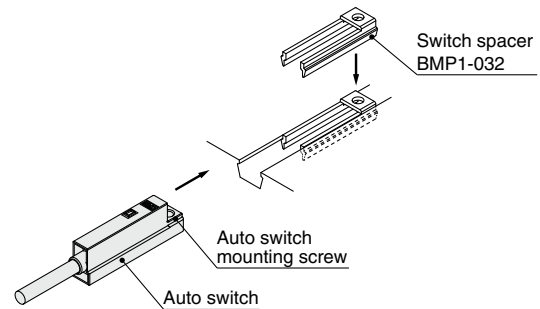
Air Grippers

Description	Series	Bore size
Parallel style	MHZ2	10 to 40
Parallel style	MHZL2	10 to 25
Wide type	MHL2	10 to 40
Parallel style	MHS2 (2 fingers)	32 to 63
Parallel style	MHS3 (3 fingers)/MHS(L)3	32 to 63
Parallel style	MHS4 (4 fingers)	32 to 63
Angular style	MHC2	10 to 25
180° Angular style	MHW2	20 to 50

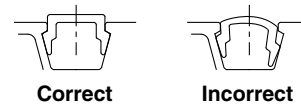
Air Cylinders

Description	Series	Bore size
Non-rotating double power cylinder	MGZ	40 to 63
Compact guide cylinder	MGP	12 to 100

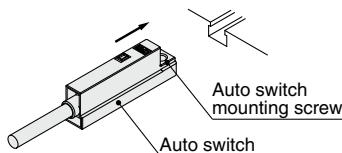
How to Mount and Move the Auto Switch (2)



1. After picking up a switch spacer between your fingers, push it in the cylinder tube groove.
2. Confirm that it is set in the correct mounting orientation.



How to Mount and Move the Auto Switch (1)



1. Insert the auto switch into the mounting groove and set it at the auto switch mounting position.
2. After reconfirming the detecting position, tighten the mounting screw to secure the auto switch.
3. Modification of the detecting position should be made in the condition of 1.

Note) When tightening an auto switch mounting screw, use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm. Also, tighten with a torque of about 0.05 to 0.1 N·m. As a guide, it should be turned about 90° past the point at which tightening can be felt.

3. Insert the auto switch into the mounting groove and set it at the auto switch mounting position.
4. After reconfirming the detecting position, tighten the mounting screw to secure the auto switch.

Note) When tightening an auto switch mounting screw, use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm. Also, tighten with a torque of about 0.05 to 0.1 N·m. As a guide, it should be turned about 90° past the point at which tightening can be felt.

Auto Switch Mounting Bracket/Part No. (Switch spacer and auto switch mounting bracket)

Cylinder series	Bore size		
	40	50	63
MGZ	BMP1-032	BMP1-032	BMP1-032

How to Mount and Move the Auto Switch

D-F7K **Mounting Bracket** Rail Mounting Type

<Applicable auto switch>

Solid state.....D-F7K

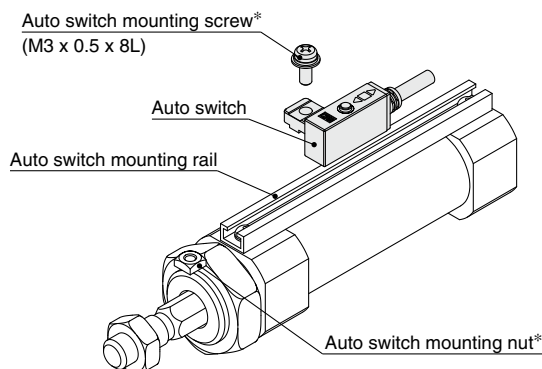
Applicable Actuators

Air Cylinders

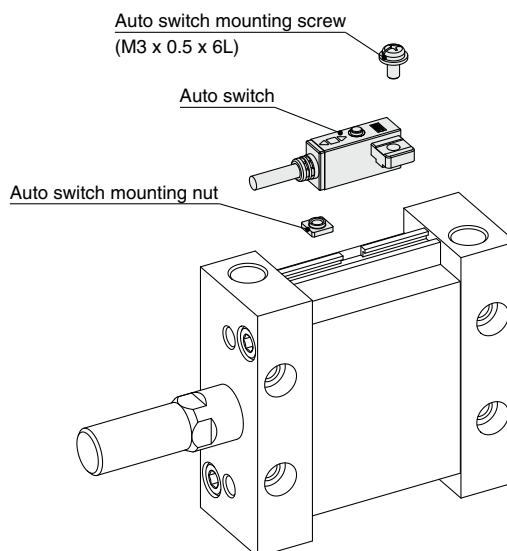
Description	Series	Bore size
Air cylinder	CJ2	10, 16
Air cylinder	CM2	20 to 40
Compact cylinder	CQ2	12 to 160
Plate cylinder	MU	25 to 63
Rotary clamp cylinder	MK/MK2	20 to 63

How to Mount and Move the Auto Switch

- Slide the auto switch mounting nut inserted into the mounting rail and set it at the auto switch mounting position.
- Fit the convex part of auto switch mounting arm into the concave part of auto switch mounting rail. Then, slide the switch over the nut.
(Series CDQ2: Fit the convex part of auto switch mounting arm through the auto switch spacer into the concave part of auto switch mounting rail.)
- Push the auto switch mounting screw lightly into the mounting nut through the hole of auto switch mounting arm.
- After reconfirming the detecting position, tighten the mounting screw to secure the auto switch. (Tightening torque of M3 screw should be 0.5 to 0.7 N·m.)
- Modification of the detecting position should be made in the condition of 3.



* When the CJ2 (rail mounting type) and the CM2-XC13 cylinders are ordered, nuts and screws are included.



Auto Switch Mounting Bracket Part No. (Including Nut, Screw, (Spacer))

Cylinder series	Bore size													
	12	16	20	25	32	40	50	63	80	100	125	140	160	
CQ2	BQ-1	BQ-1	BQ-1	BQ-1	BQ-2	BQ-2	BQ-2	BQ-2	BQ-2	BQ-2	BQ-2	BQ-2	BQ-2	
MU	—	—	—	BMU1-025	BMU1-025	BMU1-025	BMU1-025	BMU1-025	—	—	—	—	—	
MK/MK2	—	—	BQ-1	BQ-1	BQ-2	BQ-2	BQ-2	BQ-2	—	—	—	—	—	

Series D-M9K/D-□7K/D-R□K

How to Mount and Move the Auto Switch

D-Y7K **Mounting Bracket** Tie-rod Mounting Type

<Applicable auto switch>

Solid state..... D-Y7K

Applicable Actuators

Air Cylinder

Description	Series	Bore size
Air cylinder	CA2	40 to 100

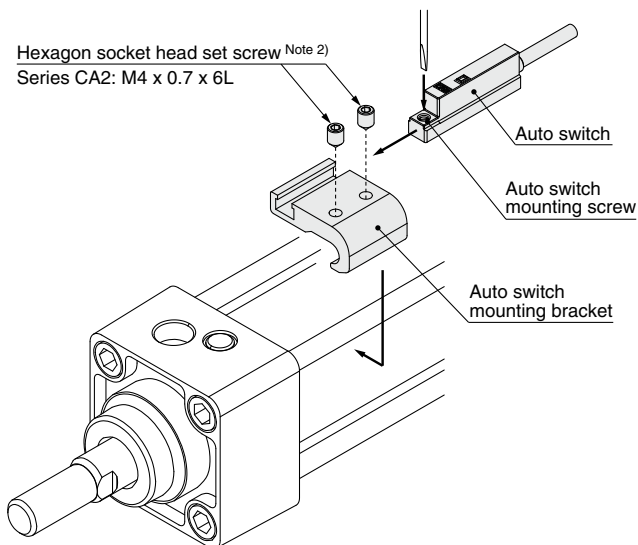
How to Mount and Move the Auto Switch

1. Fix it to the detecting position with a set screw by installing an auto switch mounting bracket in cylinder tie-rod and letting the bottom surface of an auto switch mounting bracket contact the cylinder tube firmly. Fix it to the detecting position with a set screw. (Use a hexagon wrench.)
2. Fit an auto switch into the auto switch mounting groove to set it roughly to the mounting position for an auto switch.
3. After confirming the detecting position, tighten up the mounting screw attached to an auto switch, and secure the auto switch.
4. When changing the detecting position, carry out in the state of 2.

* To protect auto switches, ensure that main body of an auto switch should be embedded into auto switch mounting groove with a depth of 15 mm or more.

Auto Switch Mounting Bracket Part No. (Including Bracket, Set Screw)

Cylinder series	Bore size				
	40	50	63	80	100
CA2	BA4-040	BA4-040	BA4-063	BA4-080	BA4-080



Note 1) When tightening an auto switch mounting screw, use a watchmaker's screwdriver with a grip diameter of 5 to 6 mm. Also, set the tightening torque to be 0.05 to 0.1 N·m. As a guide, turn 90° from the position where it comes to feel tight.

Note 2) Set the tightening torque of a hexagon socket head set screw (M4 x 0.7) to be 1 to 1.2 N·m.



Trimmer Auto Switch Specific Product Precautions

Be sure to read before handling. Refer to back cover for Safety Instructions. For Auto Switch Precautions, refer to “Handling Precaution for SMC Products” and the Operation Manual on SMC website, <http://www.smcworld.com>

Design and Selection

⚠ Warning

1. Check the specifications.

Read the specifications carefully and use this product appropriately. The product may be damaged or malfunction if it is used outside the range of specifications of current load, voltage, temperature or impact.

2. Cautions for use in an interlock circuit

When an auto switch is used for an interlock signal requiring high reliability, devise a double interlock system to avoid trouble by providing a mechanical protection function, or by also using another switch (sensor) together with the trimmer auto switch. Also, perform periodic maintenance and confirm proper operation.

⚠ Caution

1. Take precautions when multiple cylinders are used close together.

When 2 or more cylinders with trimmer auto switches are used in close proximity, maintain a minimum actuator interval of 40 mm or more. (When the allowable interval is indicated for each cylinder series, use the specified values.) Magnetic field interference may cause the trimmer auto switches to malfunction.

2. Keep the wiring as short as possible.

Use a wire 3 m or shorter between the sensor and amplifier. If the sensor cable length exceeds 3 m, the CE marking does not apply to the auto switch. Although wire length of power supply/output cable should not affect switch function, use a wire 100 m or shorter.

3. Take precautions for the internal voltage drop of the switch.

Auto switches may not operate properly depending on the connected equipment.

4. Take measures for rotational stoppage of the piston rod.

Take measures for rotational stoppage of the piston rod when designing by guide etc. Or use non-rotating type SMC products. The operation may be unstable.

Mounting and Adjustment

⚠ Caution

1. Do not drop or bump.

Do not drop, bump or apply excessive impacts (980 m/s² or more for sensor unit and 98 m/s² or more for amplifier unit) while handling. Although the trimmer auto switch body may not be damaged, the inside of the trimmer auto switch could be damaged and cause a malfunction.

2. Refer to the Operation Manual for how to adjust/set.

Wiring

⚠ Caution

1. Avoid repeatedly bending or stretching lead wires.

Broken lead wires will result from applying bending stress or stretching forces to the lead wires.

2. Be sure to connect the connector for sensor to the amplifier before power is applied.

3. Do not allow short circuit of loads.

Output is automatically stopped when the protection circuit is working, as the output unit registers any excess current flow, if loads are short circuited. Should this occur, shut off the power supply, remove the cause of this excess current flow and switch on the power again. Take special care to avoid reverse wiring between the power supply line (brown) and the output line (black, white).

Wiring

⚠ Caution

4. Avoid incorrect wiring.

If the connections are reversed (power supply line + and power supply line -), the trimmer auto switches will be protected by a protection circuit. However, if the power supply line (-) is connected to the black, white wire, the trimmer auto switches will be damaged.

Operating Environment

⚠ Warning

1. Never use in an atmosphere with explosive gases.

The structure of trimmer auto switches is not designed to prevent explosion. Never use in an atmosphere with an explosive gas since this may cause a serious explosion.

⚠ Caution

1. Do not use in an area where a magnetic field is generated.

Trimmer auto switches will malfunction or magnets inside actuators will become demagnetized.

2. Do not use in an environment where the trimmer auto switch will be continually exposed to water.

Although the sensor units of trimmer auto switches satisfy the IEC standard IP67 structure, do not use trimmer auto switches in applications where continually exposed to water splash or spray. Poor insulation or swelling of the potting resin inside trimmer auto switches may cause a malfunction. (Amplifier unit D-RNK and RPK: IP40)

3. Do not use in an environment with oil or chemicals.

Please consult with SMC if trimmer auto switches will be used in an environment with coolant, cleaning solvent, various oils or chemicals. If trimmer auto switches are used under these conditions for even a short time, they may be adversely affected by improper insulation, malfunction due to swelling of the potting resin, or hardening of the lead wires.

4. Take measures against freezing when operating at 5°C or less.

Maintenance

⚠ Warning

1. Perform the following maintenance periodically in order to prevent possible danger due to unexpected trimmer auto switch malfunction.

1) Secure and tighten trimmer auto switch mounting screws.

If screws become loose or the mounting position is dislocated, retighten them after readjusting the mounting position.

2) Confirm that there is no damage to lead wires.

To prevent faulty insulation, replace trimmer auto switches or repair lead wires, etc., if damage is discovered.


Other


⚠ Caution


1. Please consult with SMC concerning water resistance, elasticity of lead wires, and usage at welding sites, etc.

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1, and other safety regulations.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Danger:** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.

If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.

If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

*2) Vacuum pads are excluded from this 1 year warranty.


A vacuum pad is a consumable part, so it is warranted for a year after it is delivered. Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Revision history

Edition B	* Added applicable actuators. * The descriptions in the pictures on the cover page were corrected. * Large workpiece: OUT1 Green light is ON. → OUT2 Orange light is ON. * Small workpiece: OUT2 Orange light is ON. → OUT1 Green light is ON. JY
Edition C	* The sensor unit (D-M9K) applicable to the direct mounting (round groove) type newly added. SO

 **Safety Instructions** Be sure to read “Handling Precautions for SMC Products” (M-E03-3) before using.