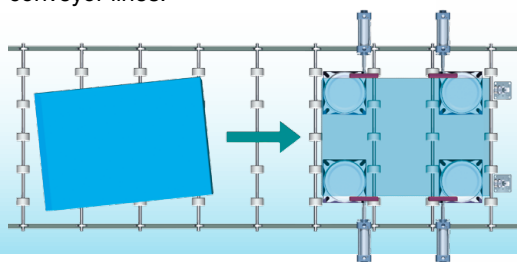


Centering Unit

Alignment and positioning of transferred workpieces

Contributes to space saving on conveyor lines

Heavy workpieces can now be aligned and positioned with small cylinders, resulting in compact conveyor lines.



Table

Max. allowable load weight: **1000 kg** (MACM10)

Workpieces can be moved in any direction: forward/backward, right/left, at an angle, and even rotated (360°). Ball bearings allow for smooth operation.

Table centering accuracy

±1 mm or less

(Workpiece not loaded)

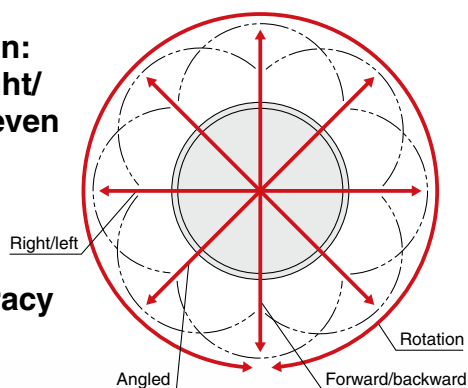
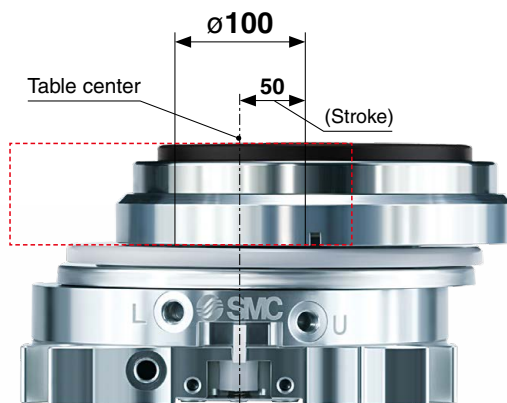


Table center movable range

Max. \varnothing **100 mm** (MACM10-50)



4 types of table material can be selected.

New

Stainless steel (Cut finish)

Stainless steel (Polished finish)

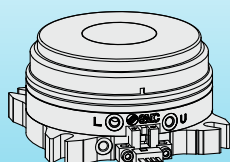
Ultra high molecular weight polyethylene

Cast nylon



For lock/unlock confirmation
External photo sensor mountable

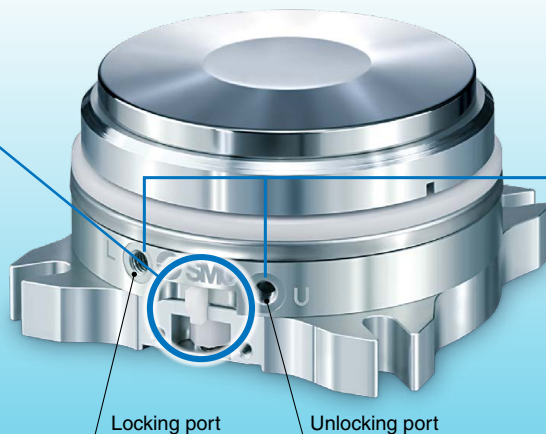
Select from lock port side or opposite side of port installation.



External photo sensor

Built-in air locking mechanism

Table can be held in any position.



Locking port

Unlocking port

MACM Series



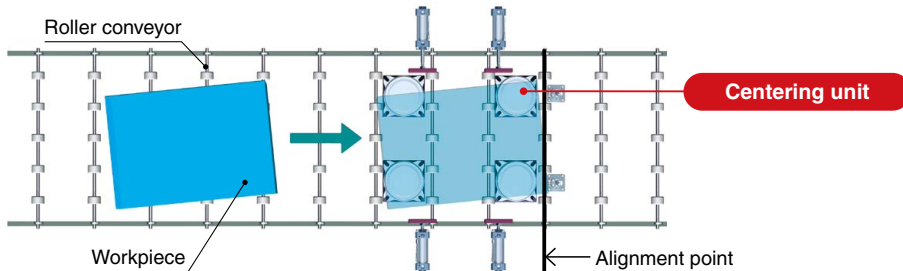
P-E17-19

<Application Examples>

Conveyor Line

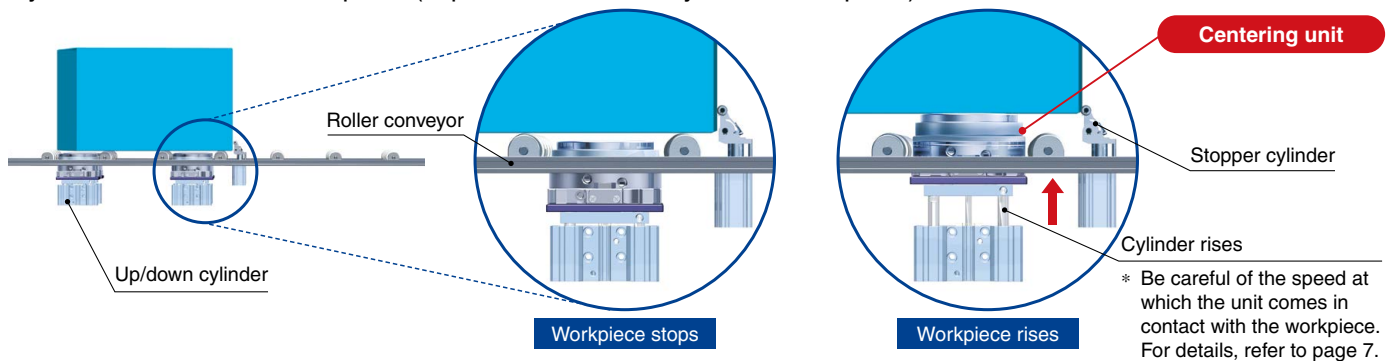
1 Transferred workpieces are stopped

Workpieces transferred at an angle are stopped at an alignment point (stops where the centering unit is installed).



2 Centering unit rises

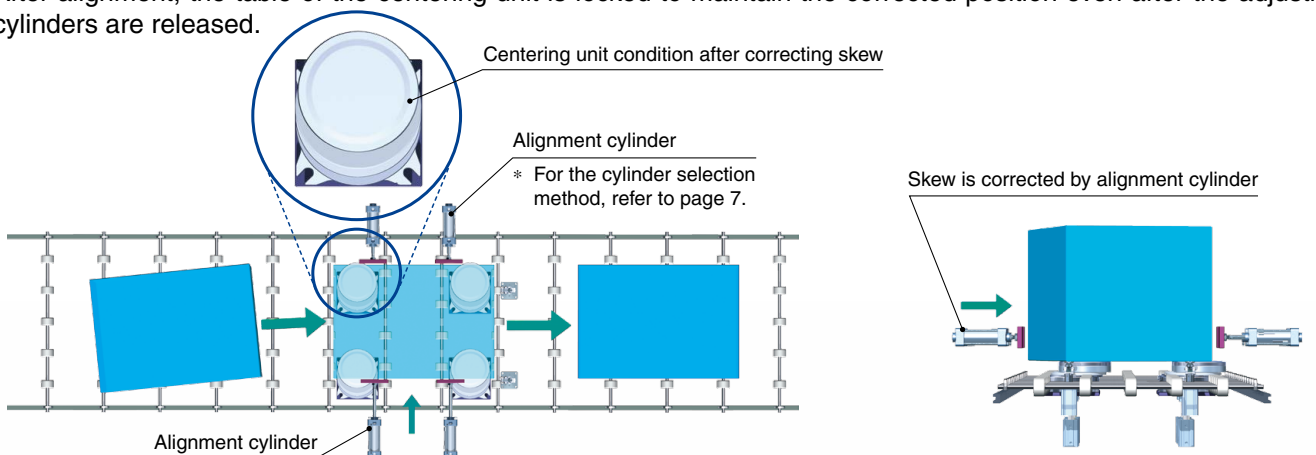
Cylinder rises to lift the workpiece (separates roller conveyor from workpiece).



3 Workpiece alignment/table lock

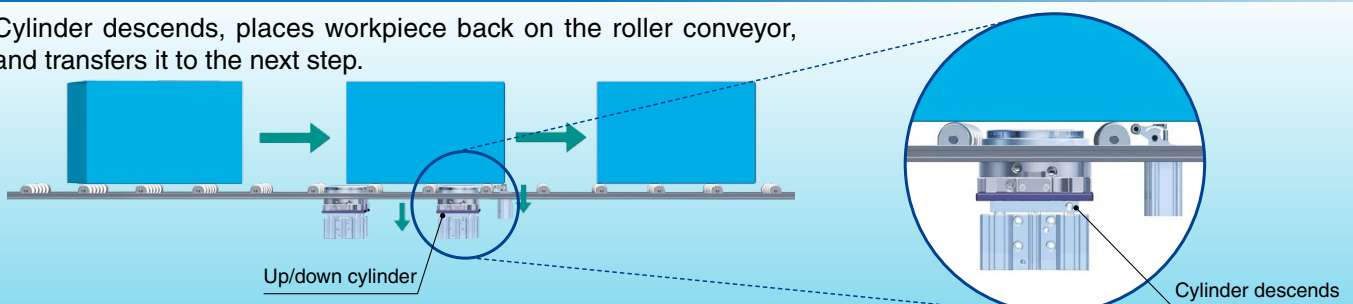
Alignment cylinder corrects skewed workpieces and realigns them.

After alignment, the table of the centering unit is locked to maintain the corrected position even after the adjustment cylinders are released.



4 Centering unit descends/workpiece is transferred to next step

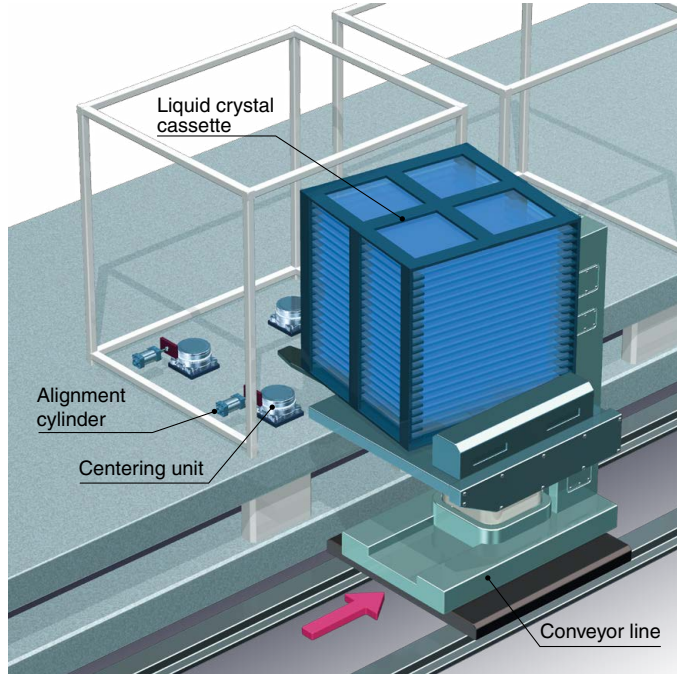
Cylinder descends, places workpiece back on the roller conveyor, and transfers it to the next step.



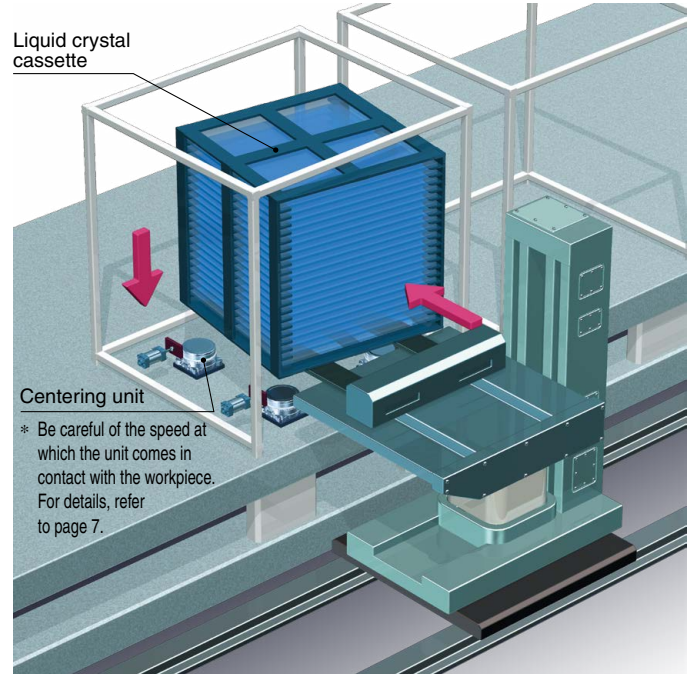
Liquid Crystal Cassette Transfer

1 Stops in front of rack

Is transferred to and stopped in front of the rack where skewed liquid crystal cassettes are to be stored



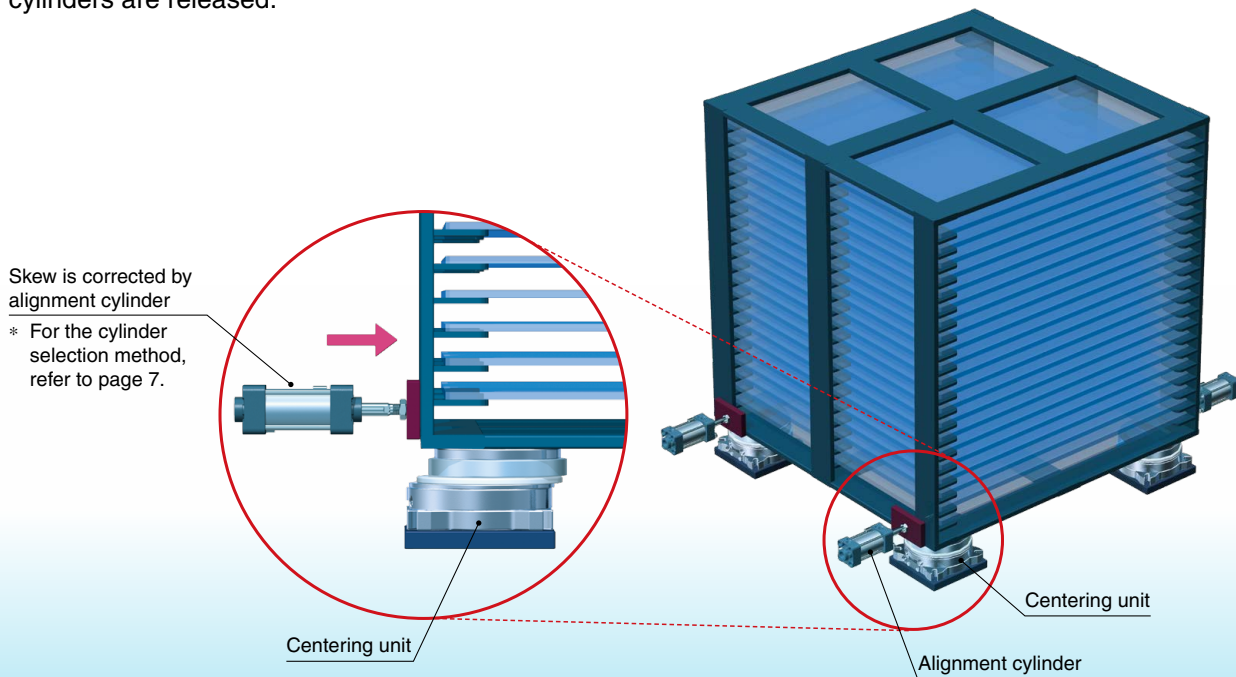
2 Is stored in rack



3 Alignment of cassette/table lock

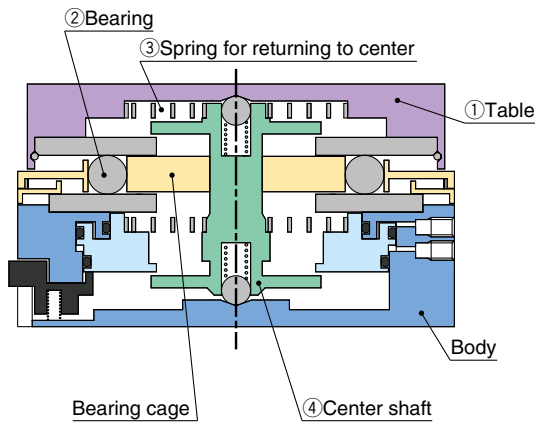
The alignment cylinder corrects skewed workpieces and aligns the liquid crystal cassettes.

After alignment, the table of the centering unit is locked to maintain the corrected position even after the alignment cylinders are released.

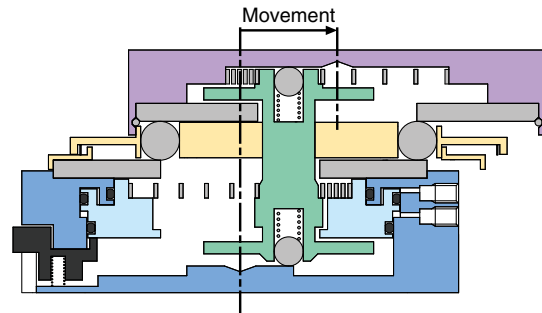


Working Principle

Neutral (Centering) condition



Movable condition

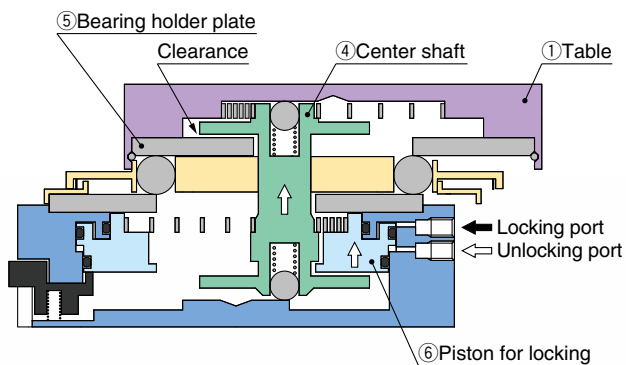


- When a force is applied to ① the table in the lateral direction, ② the bearing slides. When the bearing slides, ③ the spring for returning to center also expands and contracts.
- When the force in the lateral direction is released, ④ the center shaft is returned to the neutral position by ③ the spring for returning to center.

Lock Mechanism

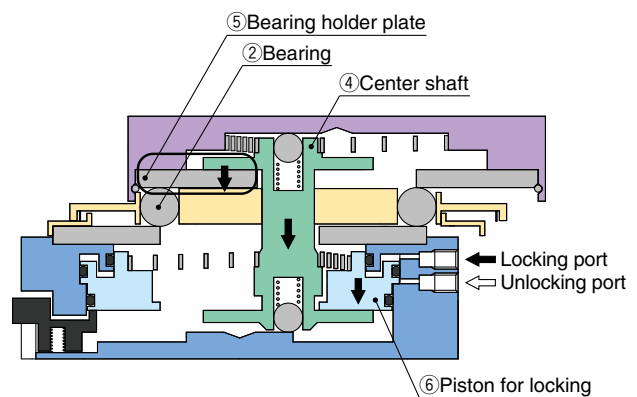
Unlocked condition

The table becomes free when unlocked.



Locked condition

The table is locked in place when locked.



- When air is supplied from the locking port, ⑥ the piston for locking descends and pushes ④ the center shaft down. When ④ the center shaft lowers, ⑤ the bearing holder plate is pressed, and the table is locked.
- When air is supplied from the unlocking port, ⑥ the piston for locking ascends and releases the lock.

Centering Unit **MACM Series**

How to Order



MACM 4 - 20 S P - X131

Centering unit

Max. allowable load weight

Symbol	Allowable load weight
2	2 kN
4	4 kN
6	6 kN
10	10 kN

Stroke

Symbol	Stroke (Applicable model)
12	12 mm (MACM2)
20	20 mm (MACM4)
30	30 mm (MACM6)
50	50 mm (MACM10)

Vacuum port

Nil	No
V	Yes

Sensor option (Location of sensor mounting bolts)

Nil	None	
P	Port side	
B	Port back side	

Table option

S	Stainless steel (Cut finish)
G	Stainless steel (Polished finish)*1
U	Ultra high molecular weight polyethylene
N	Cast nylon

*1 Equivalent to a hardness of HRC50

Specifications

Model	MACM2-12	MACM4-20	MACM6-30	MACM10-50
Max. allowable load weight [kN]	2	4	6	10
Stroke [mm]	12	20	30	50
Table center movable range [mm]	ø24	ø40	ø60	ø100
Centering accuracy [mm]	±1 or less			
Mounting direction	Horizontal only (Wall or bottom mounting is not available.)			
Cylinder for lock	Action	Double acting		
	Fluid	Air		
	Operating temperature [°C]	0 to 60		
	Operating pressure [MPa]	0.4 to 0.7		
	Proof pressure [MPa]	1		
Lubrication	Non-lube			
Weight [kg]	0.7	1	2	7

MACM Series

Dimensions

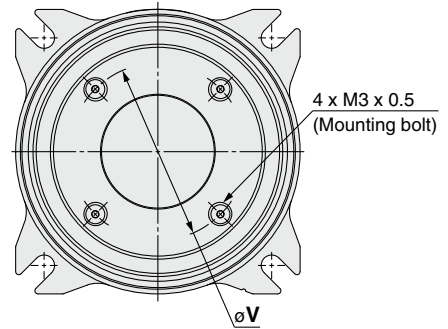
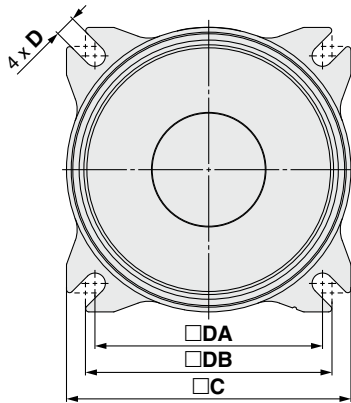


Table option: S, G

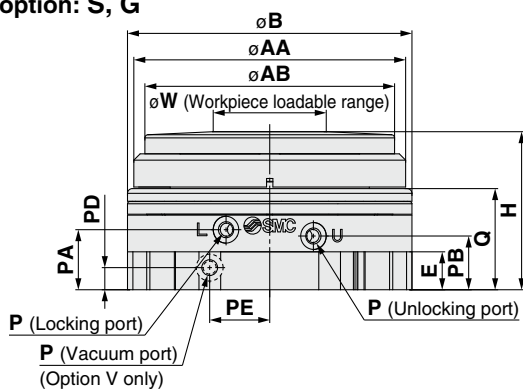
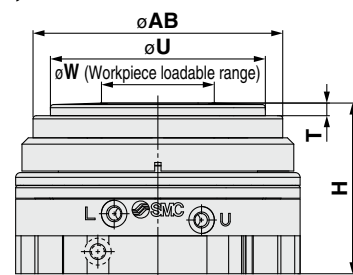
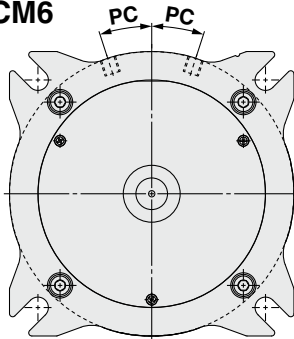


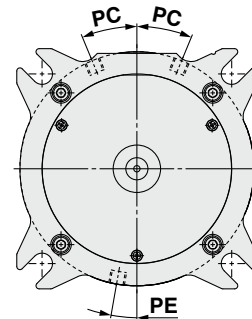
Table option: U, N



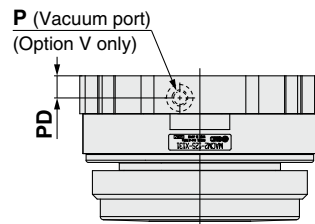
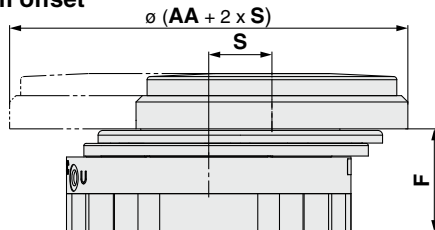
MACM4, MACM6



MACM2, MACM10



At maximum offset

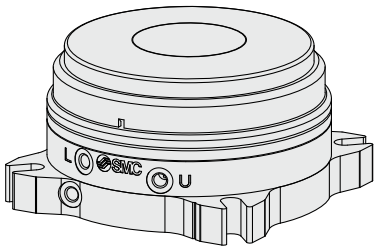


Dimensions

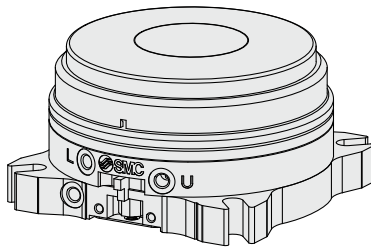
Model		AA	AB	B	C	D	DA	DB	E	F	H	P	PA	PB	PC	PD	PE	Q	S	T	U	V	W								
MACM2	S, G										46																				
	U	68	63	74	76		60	64		30	52				22.5°		10°	27.4	12	6											
	N										50									4	54	44	32								
MACM4	S, G										50																				
	U	86	79	90	90	6.6	72	78	12	32.5	56	M5 x 0.8	19	17	18°	7		19	32	20	6										
	N										54																		4	68	56
S, G										53																					
MACM6	U	118	99	125	125		97	113		33.8	59																				
	N										57																				
	S, G										77																				
MACM10	U	185	152	197	198	11	152	178	18	53.8	83		31	24	13°																
	N										81																				
	S, G																														

Dimensions

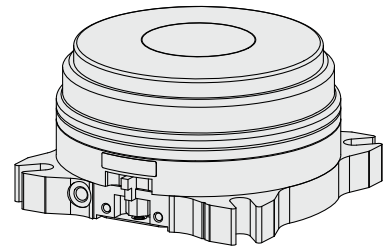
Sensor option: Nil



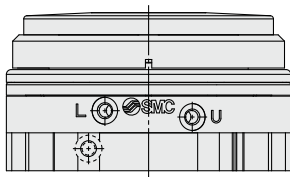
Sensor option: P



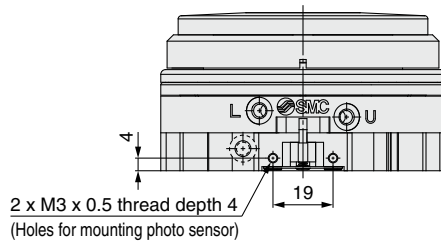
Sensor option: B



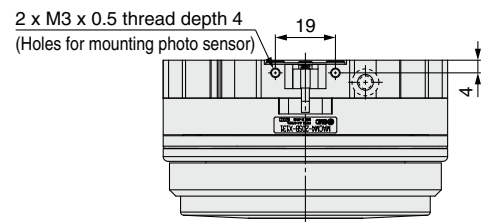
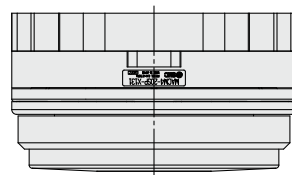
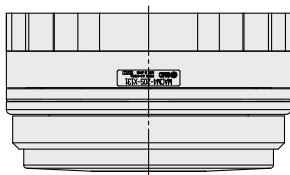
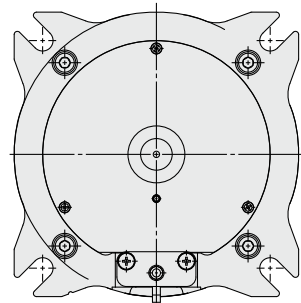
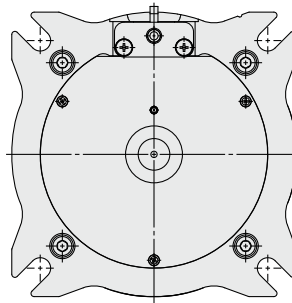
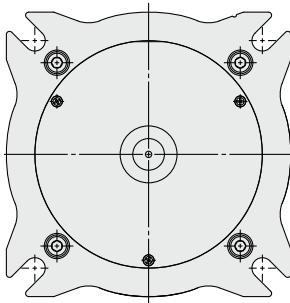
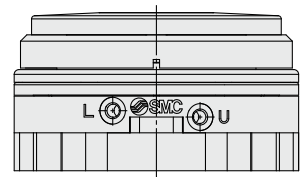
Sensor option: Nil



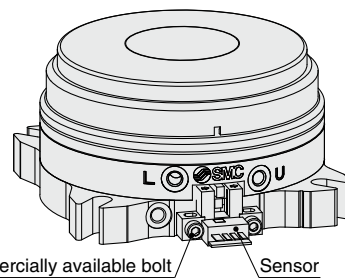
Sensor option: P



Sensor option: B



Mounted example of **EE-SX671** made by OMRON



- * The above photo sensor made by OMRON and mounting bolts should be provided by the customer.
- * Mounting position adjustment may be required depending on the individual differences of the sensor.



MACM Series

Specific Product Precautions 1

Be sure to read this before handling the products. Refer to page 9 for safety instructions. For actuator precautions, refer to the “Handling Precautions for SMC Products” on the SMC website: <http://www.smcworld.com>

Operating Precautions

⚠ Caution

1. Use the product within the movable range.
2. Use the product within the allowable load weight.
3. Load workpieces within the load range.
4. Do not use the product in applications where excessive external force or impact force is applied to it.

Improper handling includes the following:

- Apply impact on the side of the table to move it to full stroke
- Continuously move the table in a circle while the table is at full stroke
- Repeatedly reciprocate the table at full stroke
- Hold the body and swing the table

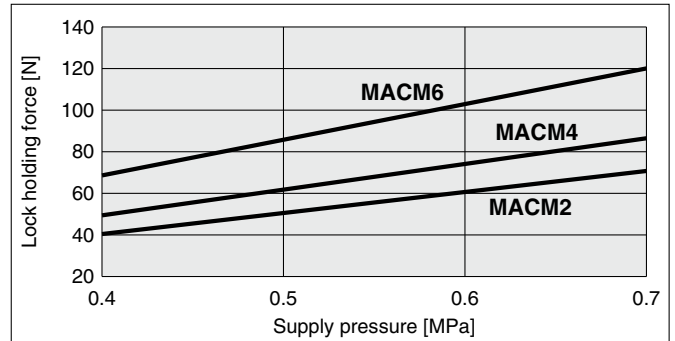
6. Prevent over strokes.
7. Secure the table in place when transporting the product or the equipment it is mounted on.
8. This is not a clean room series product.
9. Condensation (water droplets) may occur in the piping depending on the piping conditions and operating conditions. Consider the use of a moisture control tube (IDK series) or a quick exhaust valve (AQ series) in order to prevent condensation from occurring. For details, refer to “Precautionary measures against condensation in a pneumatic system” (P-E01-11).
10. When loading a workpiece on the centering unit or when using an up/down cylinder to put the centering unit in contact with the workpiece, set the collision speed to 10 mm/s or less.

Design

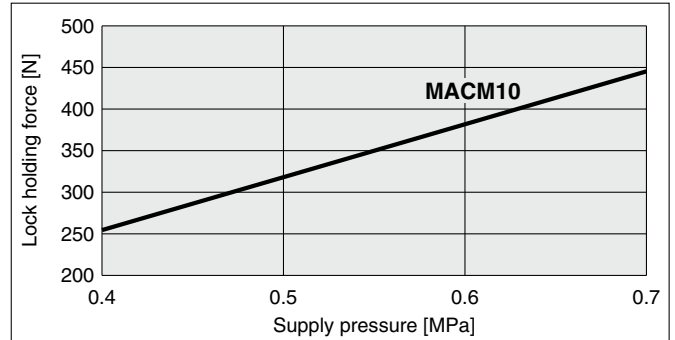
⚠ Caution

1. The holding force (reference value) when the table is locked is shown below. Take care not to apply a force that exceeds the holding force.

MACM2 to 6



MACM10



2. When selecting an alignment cylinder, it is necessary to select a product whose force is at least 0.05 times (as a rough guide) the load weight to compensate for the coefficient of friction of the internal bearing and the resistance of the spring for returning to center.
3. It is possible to machine thread holes on the top surface of the table. Contact SMC for further details on the special precautions regarding thread holes.
4. Do not use in environments where the product could be exposed directly to foreign matter such as powdered dust, blown dust, cutting chips, spatter, etc. (A malfunction caused by the ingress of foreign matter is likely to occur.)



MACM Series Specific Product Precautions 2

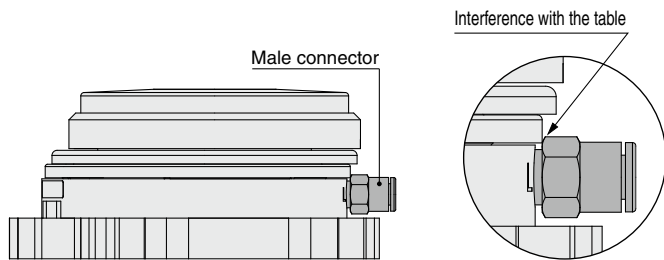
Be sure to read this before handling the products. Refer to page 9 for safety instructions. For actuator precautions, refer to the “Handling Precautions for SMC Products” on the SMC website: <http://www.smcworld.com>

Caution for Mounting Fittings

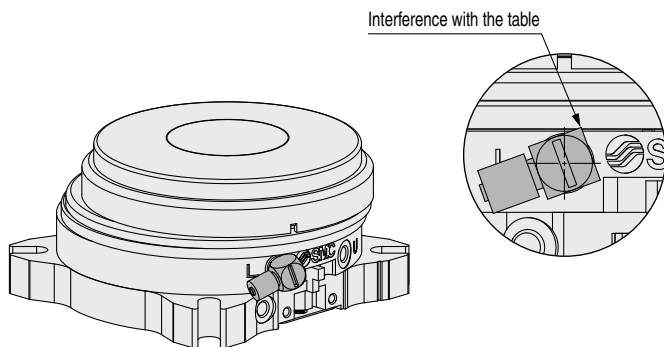
<One-touch Fittings and Hose Nipples>

Model		MACM2-12	MACM4-20	MACM6-30	MACM10-50
Port size		M5 x 0.8			
Male connector (with hexagon socket head)	KQ2S23-M5□	●	●	●	●
	KQ2S04-M5□	●	●	●	●
	KQ2S06-M5□	●	—	—	●
Male connector	KQ2H02-M5□	●	●	●	●
	KQ2H23-M5□	●	●	●	●
	KQ2H04-M5□	●	●	●	●
	KQ2H06-M5□	●	—	—	●
Male elbow	KQ2L02-M5□	●	●	●	●
	KQ2L23-M5□	●	●	●	●
	KQ2L04-M5□	●	●	●	●
	KQ2L06-M5□	●	●	●	●
Hose nipple	M-5H-4	●	●	●	●
	M-5H-6	●	—	—	●
Hose elbow	M-5HL-4	●	△	△	●
	M-5HL-6	●	—	—	●
	M-5HLH-4	●	△	△	●
	M-5HLH-6	●	—	—	●

●: Mountable △: Interference may occur depending on the direction. —: Interference will occur.
* For elbows, the piping is either horizontal or downward facing.



This figure shows a mounting interference example of the KQ2H06-M5 male connector.





This figure shows a mounting interference example of the M-5HL-4 hose elbow.


* Refer to the **Web Catalog** for details on One-touch fittings and hose nipples.

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.

Caution

SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

Safety Instructions

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.



Centering Unit *MACM* Series