



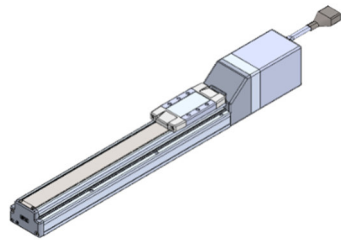
Instruction Manual

Electric Actuator / Slider type

compatible with manifold controller

Series LE2FS

Motor: Step motor (servo 24 VDC) with Battery-less absolute encoder



The intended use of this Electrical Actuator is to convert an electrical input signal into mechanical motion.

1 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.

⁽¹⁾ISO 4414: Pneumatic fluid power — General rules and safety requirements for systems and their components.

ISO 4413: Hydraulic fluid power — General rules and safety requirements for systems and their components

IEC 60204-1: Safety of machinery - Electrical equipment of machines. Part 1: General requirements

ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1: Robots

- Refer to the product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

	Danger	Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
	Warning	Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
	Caution	Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

Warning

- Always ensure compliance with relevant safety laws and standards. All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- Electromagnetic compatibility
This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances.
- Special products (-X#, -D#) might have specifications that are different from those shown in the specifications section. Contact SMC for specific drawings.

2 Specifications

2.1 LE2FS16 series

Model		LE2FS16			
Stroke [mm]	Note 1)	50 to 500			
Max. work load [kg]	Horizontal	10	15	18	
	Vertical	3	6	12	
Pushing Force [N]	Note 3) 4) 5)	23~41	44~80	86~154	
Speed [mm/s]	Stroke [mm]	to 400	10~800	4~400	3~195
		401 to 450	10~700	5~360	3~170
		451 to 500	10~600	5~300	3~140
		Acceleration / deceleration speed [mm/s ²]	Horizontal	10,000 max.	
	Vertical	5,000 max.			
Pushing speed [mm/s]	Note 6)	1 to 50			
Positioning repeatability [mm]		±0.02	±0.015		
Lost motion [mm]	Note 7)	0.1 max.			
Screw Lead [mm]		10	5	2.5	
Impact/Vibration resistance [m/s ²]	Note 8)	50 / 20			
Actuation method		Ball screw (LE2FS*D) Ball screw + Belt (LE2FS*R/L)			
Guide type		Linear guide			
Operating temperature [°C]		5 to 40			
Operating humidity [%RH]		90 or less (no condensation)			
Motor size [mm]		□28			
Motor type		Battery-less absolute (Step motor 24 VDC)			
Encoder		Battery-less absolute			
Power supply voltage [V]		24 VDC ±10%			
Power consumption [W]	Note 9) 11)	58 max.			
Lock Type	Note 10)	Non magnetizing lock			
Holding force [N]		20	39	78	
Power consumption [W]	Note 11)	4			
Power supply voltage [V]		24 VDC ±10%			

2.2 LE2FS25 series

Model		LE2FS25				
Stroke [mm]	Note 1)	50 to 800				
Max. work load [kg]	Horizontal	15	26	40	40	
	Vertical	2	6	12.5	15	
Pushing Force [N]	Note 3) 4) 5)	41~81	67~135	132~265	255~511	
Speed [mm/s]	Stroke [mm]	to 400	20~1200	12~850	6~450	3~225
		401 to 450	20~1100	12~750	6~400	3~225
		451 to 500	20~1100	12~750	6~400	3~225
		501 to 600	20~900	12~540	6~270	3~135
		601 to 700	20~630	12~420	6~230	3~115
		701 to 800	20~550	12~330	6~180	3~90
Acceleration / deceleration speed [mm/s ²]	Horizontal	10,000 max.				
	Vertical	5,000 max.				
Pushing speed [mm/s]	Note 6)	1 to 35				
Positioning repeatability [mm]		±0.02	±0.015			
Lost motion [mm]	Note 7)	0.1 max.				
Screw Lead [mm]		20	12	6	3	
Impact/Vibration resistance [m/s ²]	Note 8)	50 / 20				
Actuation method		Ball screw (LE2FS*D) Ball screw + Belt (LE2FS*R/L)				
Guide type		Linear guide				
Operating temperature [°C]		5 to 40				
Operating humidity [%RH]		90 or less (no condensation)				
Motor size [mm]		□42				
Motor type		Battery-less absolute (Step motor 24 VDC)				
Encoder		Battery-less absolute				
Power supply voltage [V]		24 VDC ±10%				
Power consumption [W]	Note 9) 11)	72 max.				
Lock Type	Note 10)	Non magnetizing lock				
Holding force [N]		47	78	157	294	
Power consumption [W]	Note 11)	8				
Power supply voltage [V]		24 VDC ±10%				

2 Specifications (continued)

2.3 LE2FS32 series

Model		LE2FS32					
Stroke [mm]	Note 1)	50 to 1000					
Max. work load [kg]	Horizontal	40	50	68	68		
	Vertical	4	10	16	20		
Pushing Force [N]	Note 3) 4) 5)	60~140	90~209	176~411	341~796		
Speed [mm/s]	Stroke [mm]	to 400	24~1100	16~750	8~450	4~125	
		401 to 450	24~1100	16~750	8~450	4~125	
		451 to 500	24~1100	16~750	8~450	4~125	
		501 to 600	24~1100	16~750	8~450	4~125	
		601 to 700	24~930	16~620	8~310	4~125	
		701 to 800	24~750	16~500	8~250	4~125	
		801 to 900	24~610	16~410	8~200	4~100	
		901 to 1000	24~500	16~340	8~170	4~85	
		Acceleration / deceleration speed [mm/s ²]	Horizontal	10,000 max.			
			Vertical	5,000 max.			
Pushing speed [mm/s]	Note 6)	1 to 30					
Positioning repeatability [mm]		±0.02	±0.015				
Lost motion [mm]	Note 7)	0.1 max.					
Screw Lead [mm]		24	16	8	4		
Impact/Vibration resistance [m/s ²]	Note 8)	50 / 20					
Actuation method		Ball screw (LE2FS*D) Ball screw + Belt (LE2FS*R/L)					
Guide type		Linear guide					
Operating temperature [°C]		5 to 40					
Operating humidity [%RH]		90 or less (no condensation)					
Motor size [mm]		□56.4					
Motor type		Battery-less absolute (Step motor 24 VDC)					
Encoder		Battery-less absolute					
Power supply voltage [V]		24 VDC ±10%					
Power [W]	Note 9) 11)	93 max.					
Lock Type	Note 10)	Non magnetizing lock					
Holding force [N]		72	108	216	421		
Power consumption [W]	Note 11)	8					
Power supply voltage [V]		24 VDC ±10%					

2.4 LE2FS40 series

Model		LE2FS40				
Stroke [mm]	Note 1)	150 to 1200				
Max. work load [kg]	Horizontal	26	60	75	80	
	Vertical	4.5	4.5	25	40	
Pushing Force [N]	Note 3) 4) 5)	48~112	72~167	141~329	273~637	
Speed [mm/s]	Stroke [mm]	to 400	30~1200	20~1000	10~500	5~225
		401 to 450	30~1200	20~1000	10~500	5~225
		451 to 500	30~1200	20~1000	10~500	5~225
		501 to 600	30~1200	20~1000	10~500	5~225
		601 to 700	30~1200	20~900	10~440	5~220
		701 to 800	30~1140	20~760	10~350	5~175
		801 to 900	30~930	20~620	10~280	5~140
		901 to 1000	30~780	20~520	10~250	5~125
		1001 to 1100	30~660	20~440	10~220	5~110
		1101 to 1200	30~570	20~380	10~190	5~95
		Acceleration / deceleration speed [mm/s ²]	Horizontal	10,000 max.		
	Vertical	5,000 max.				
Pushing speed [mm/s]	Note 6)	1 to 30				
Positioning repeatability [mm]		±0.02	±0.015			
Lost motion [mm]	Note 7)	0.1 max.				
Screw Lead [mm]		30	20	10	5	
Impact/Vibration resistance [m/s ²]	Note 8)	50 / 20				
Actuation method		Ball screw (LE2FS*D) Ball screw + Belt (LE2FS*R/L)				
Guide type		Linear guide				
Operating temperature [°C]		5 to 40				
Operating humidity [%RH]		90 or less (no condensation)				
Motor size [mm]		□56.4				
Motor type		Battery-less absolute (Step motor 24 VDC)				
Encoder		Battery-less absolute				
Power supply voltage [V]		24 VDC ±10%				
Power [W]	Note 9) 11)	93 max.				
Lock Type	Note 10)	Non magnetizing lock				
Holding force [N]		75	113	225	421	
Power consumption [W]	Note 11)	8				
Power supply voltage [V]		24 VDC ±10%				

2 Specifications (continued)

- Note 1) Non standard strokes are available as special orders, contact SMC.
 Note 2) Maximum payload at acceleration / deceleration of 3000 mm/s².
 Work load varies depending on the velocity and acceleration. Refer to the catalogue for the "Speed vs payload graph". Furthermore if the cable length exceeds 5 m, then it will decrease by up to 10% for each 5 m.
 Note 3) Pushing force accuracy is ±20% (F.S.).
 Note 4) The setting range for the "Pushing force" is from 25% to 45% (LE2FS16), 25% to 50% (LE2FS25), 30% to 70% (LE2FS32 and LE2FS40). The pushing force setting range varies depending on the duty ratio and pushing speed. Refer to the catalogue for the "Thrust Conversion Graph".
 Note 5) Speed and thrust vary depending on the cable length, load, installation conditions, etc. If the cable length exceeds 5 m, the speed / thrust will decrease by up to 10% for every 5 m (max. 20% reduction for 15 m).
 Note 6) When transporting and pushing a workpiece, operate the actuator with the "Horizontal Load capacity" or less.
 Note 7) A reference value for correcting an error in reciprocal operation.
 Note 8) Impact resistance: In a drop impact test, no malfunction in the axial and perpendicular direction to the lead screw. The test was performed with the actuator in the initialized state.
 Vibration resistance: 45 to 2000 Hz for 1 sweep, no malfunction occurred in the axial and perpendicular direction to the lead screw. The test was performed with the actuator in the initialized state.
 Note 9) Indicates the maximum power when operating the actuator only.
 Note 10) Only applies to actuators supplied with a lock.
 Note 11) For an actuator with lock, add the power consumption for the lock.

2.5 Actuator weight [kg]

Series	LE2FS16D (with In-line motor)									
Stroke	50	100	150	200	250	300	350	400	450	500
Weight	0.91	1.00	1.10	1.19	1.28	1.37	1.47	1.56	1.65	1.75
Lock	0.19									

Series	LE2FS16L/R (with Parallel motor)									
Stroke	50	100	150	200	250	300	350	400	450	500
Weight	0.86	0.96	1.05	1.14	1.24	1.33	1.42	1.52	1.61	1.70
Lock	0.19									

Series	LE2FS25D (with In-line motor)															
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Weight	1.55	1.69	1.83	1.97	2.11	2.25	2.39	2.53	2.67	2.81	2.94	3.08	3.22	3.36	3.50	3.64
Lock	0.34															

Series	LE2FS25L/R (with Parallel motor)															
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800
Weight	1.59	1.73	1.87	2.01	2.15	2.29	2.43	2.57	2.70	2.84	2.98	3.12	3.26	3.40	3.54	3.68
Lock	0.33															

Series	LE2FS32D (with In-line motor)																			
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Weight	2.63	2.84	3.05	3.25	3.46	3.67	3.87	4.08	4.29	4.49	4.70	4.91	5.12	5.32	5.53	5.74	5.95	6.15	6.36	6.57
Lock	0.63																			

Series	LE2FS32L/R (with Parallel motor)																			
Stroke	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
Weight	2.70	2.91	3.12	3.33	3.53	3.74	3.95	4.15	4.36	4.57	4.78	4.98	5.19	5.40	5.61	5.81	6.02	6.23	6.43	6.64
Lock	0.64																			

Series	LE2FS40D (with In-line motor)																			
Stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1100	1200
Weight	4.11	4.38	4.71	5.09	5.24	5.46	5.78	6.00	6.31	6.54	6.84	7.08	7.37	7.62	7.90	8.17	8.44	8.71	9.25	9.79
Lock	0.65																			

Series	LE2FS40L/R (with Parallel motor)																			
Stroke	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1100	1200
Weight	4.26	4.52	4.86	5.23	5.39	5.61	5.92	6.14	6.45	6.69	6.98	7.23	7.52	7.77	8.05	8.31	8.58	8.85	9.39	9.94
Lock	0.64																			

3 Installation

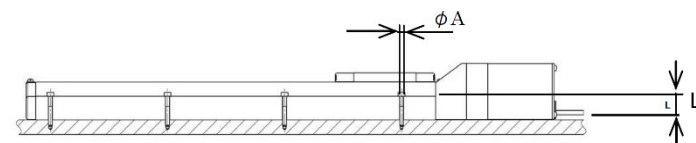
Warning

- Do not install the product unless the safety instructions have been read and understood.
- Do not use the product in excess of the allowable specifications.

3. Installation (continued)

- Insufficient flatness of a work piece or actuator mounting surface can cause play in the guide and increased sliding resistance. In the case of overhang mounting (including cantilever), use a support plate or support guide to avoid deflection of the actuator body.
- When mounting the actuator, use all mounting holes. If all mounting holes are not used, this will not maintain the specified performance. e.g. the amount of displacement of the table will increase.
- When mounting the actuator or workpiece, use screws with adequate length, but with length less than the maximum thread depth. The use of screws that are too long can touch the body and cause malfunction.
- Tighten screws to the recommended tightening torque. Tightening the screws with a torque higher than recommended may cause malfunction, whilst tightening with a torque lower than recommended can cause displacement of the mounting position, or dropping of the work piece.
- Be sure to use positioning pins on the body mounting reference plane for accurate and secure actuator mounting and for running parallelism.

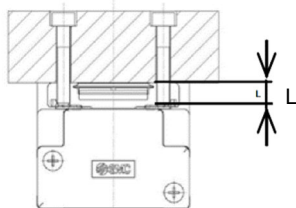
3.1 Actuator mounting



Model	Screw size	Max. tightening torque [N.m]	Ø A [mm]	L [mm]
LE2FS16	M3	0.63 ±10%	3.5	23.5
LE2FS25	M4	1.5 ±10%	4.5	24
LE2FS32	M5	3.0 ±10%	5.5	30
LE2FS40	M6	5.2 ±10%	6.6	31

3.2 Work piece Mounting

- In order to prevent the work piece fixing screws from damaging the table, use screws at least 0.5 mm shorter than the maximum thread depth. Longer screws can damage the body and cause failure.



Model	Screw size	Max. tightening torque [N.m]	L Max. thread depth [mm]
LE2FS16	M4 x 0.7	1.5 ±10%	6
LE2FS25	M5 x 0.8	3.0 ±10%	8
LE2FS32	M6 x 1.0	5.2 ±10%	9
LE2FS40	M8 x 1.25	12.5 ±10%	13

3.3 Mounting

Warning

- Do not make any alterations to the product. Alterations made to this product may lead to a loss of durability and damage to the product, which can lead to injury and damage to other equipment and machinery.
- When an external guide is used, connect the moving parts of the product and the load in such a way that there is no interference at any point within the stroke.
- Do not scratch or dent the sliding parts of the table or mounting face etc., by striking or holding them with other objects. The components are manufactured to precise tolerances, so that even a slight deformation may cause faulty operation or seizure.
- Do not use the product until it has been verified that the equipment can be operated correctly. After mounting or repair, connect the power supply to the product and perform appropriate functional inspections to check it is mounted correctly.

3. Installation (continued)

- When mounting the actuator or attaching the work piece, do not apply strong impact or large moment. If an external force over the allowable moment is applied, it may cause looseness in the guide unit, an increase in sliding resistance or other problems.
- Allow sufficient space for maintenance and inspection.
- The electric actuator and its peripheral devices should be installed on a fire-proof material. Direct installation on or near a flammable material may cause a fire.
- Take measures to ensure that the operating temperature of the actuator and its peripheral devices are within the range of the specifications. The actuator should be installed with 50 mm or more space between each side of it and other equipment or components.

3.4 Environment

Warning

- Do not use in an environment where corrosive gases, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.
- Avoid use in the following environments:
 - Locations where a large amount of dust and cutting chips are airborne.
 - Locations where the ambient temperature is outside the range of the temperature specification (refer to specifications).
 - Locations where the ambient humidity is outside the range of the humidity specification (refer to specifications).
 - Locations where strong magnetic or electric fields are generated.
 - Locations where direct vibration or impact is applied to the product.
 - Areas that are dusty, or are exposed to splashes of water and oil drops.
- At an altitude of 1000 meters or higher. Heat dissipation and withstand voltage will decrease. Contact SMC for further details.
- Do not use in an environment where the product is directly exposed to liquid, such as cutting oils.
- Install a protective cover when the product is used in an environment directly exposed to foreign matter such as dust, cutting chips and spatter.

3.5 Lubrication

Caution

- SMC products have been lubricated for life at manufacture, and do not require lubrication in service.
- If a lubricant is used in the system, refer to the catalogue for details.
- The recommended grease is lithium grade No.2

Apply for	Grease Pack order No.
Ball screw and Guide	GR-S-010 (10 g)
	GR-S-020 (20 g)

4 Wiring

4.1 Wiring

Warning

- Adjustment, mounting or wiring changes should not be carried out before disconnecting the power supply to the product. Electric shock, malfunction and damage can result.
- Do not disassemble the cables.
- Use only specified cables. Use only specified cables otherwise there may be risk of fire and damage.
- Do not connect or disconnect the wires, cables and connectors when the power is turned ON.

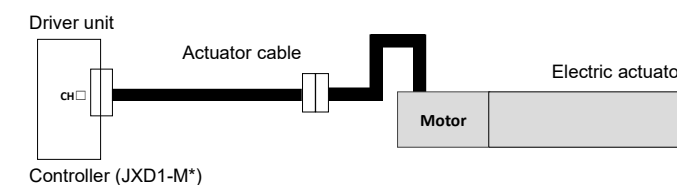
4 Wiring (continued)

Caution

- Take appropriate measures against noise. Noise in a signal line may cause malfunction. As a countermeasure separate the high voltage and low voltage cables, and shorten the wiring lengths, etc.
- Do not route input/output wires and cables together with power or high voltage cables. The product can malfunction due to noise interference and surge voltage from power and high voltage cables close to the signal line. Route the wires of the product separately from power or high voltage cables.
- Confirm correct insulation. Poor insulation of wires, cables, connectors, terminals etc. can cause interference with other circuits. Also there is the possibility that excessive voltage or current may be applied to the product causing damage.
- Take care that actuator movement does not catch cables.
- Avoid bending cables at sharp angles where they enter the product. Avoid twisting, folding, rotating or applying an external force to the cable.
- Do not allow the cable near to the actuator to move repeatedly. The motor cable is not a robotic type cable. Secure the cable between the actuator and the connector to prevent movement.
- When the actuator cable is bent repeatedly, do not store them in a movable wiring duct smaller than the specified bending radius (for cable lengths up to 10 m: bend radius = 56 mm min.; for cable lengths up to 15 m: bend radius = 77 mm min.).

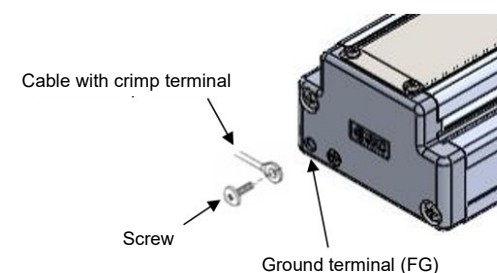
4.2 Wiring of Actuator to Controller

- Connect the actuator to the manifold controller using an actuator cable (SMC part number JX-CP-D-*).



4.3 Actuator Ground connection

- The Actuator must be connected to ground to shield the actuator from electrical noise.
- The screw and cable with crimping terminal and toothed washer should be prepared separately by the user.
- The ground cable cross sectional area should be 2 mm² minimum.
- The ground connection should be a dedicated D-class ground connection (resistance less than 100Ω). Avoid shared grounding points with other devices.



5 How to Order

Refer to the catalogue on the SMC website (URL: <https://www.smcworld.com>) for the How to Order information.

6 Outline Dimensions (mm)

Refer to the drawings / operation manual on the SMC website (URL: <https://www.smcworld.com>) for Outline dimensions.

7 Maintenance

7.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly electricity and compressed air can be dangerous.
- Maintenance of electromechanical and pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the power has been discharged and the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical or pneumatic connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.
- Incorrect handling can cause an injury, damage or malfunction of the equipment and machinery, so ensure that the procedure for the task is followed.
- Always allow sufficient space around the product to complete any maintenance and inspection.

7.2 Periodical Maintenance

Frequency	Appearance Check	Internal check	Belt Check
Daily before operation	✓	✓	✓
Every 6 months*	✓	✓	✓
Every 1,000 km*	✓	✓	✓
Every 5 million cycles*	✓	✓	✓

- Following any maintenance, always perform a system check. Do not use the product if any error occurs, as safety cannot be assured if caused by any un-intentional malfunction.

7.3 Appearance Check

- The following items should be visually monitored to ensure that the actuator remains in good condition and there are no concerns flagged;
 - Loose Screws,
 - Abnormal level of dust or dirt,
 - Visual flaws / faults,
 - Cable connections,
 - Abnormal noises or vibrations.

7.4 Internal parts check

- Lubricant condition on moving parts.
- Loose or mechanical play in fixed parts or fixing screws.

7.5 Belt Check

- If one of the 6 conditions below are seen, do not continue operating the actuator, contact SMC immediately.

- Tooth shaped canvas is worn out.** Canvas fibre becomes "fuzzy", rubber is removed, and the fibre gains a white colour. The lines of fibre become very unclear.



7 Maintenance (continued)

- **Peeling off or wearing of the side of the belt.**

The corner of the belt becomes round and frayed, with threads beginning to stick out.

- **Belt is partially cut.**

Belt is partially cut. Foreign matter could be caught in the teeth and cause flaws.



- **Vertical line of belt teeth.**

Flaw which is made when the belt runs on the flange.

- **Rubber back of the belt is softened and sticky.**

- **Crack on the back of the belt.**



8 Limitations of Use

8.1 Limited warranty and Disclaimer/Compliance Requirements

- Refer to Handling Precautions for SMC Products.

9 Product disposal

This product should not be disposed of as municipal waste. Check your local regulations and guidelines to dispose of this product correctly, in order to reduce the impact on human health and the environment.

10 Contacts

Refer to www.smcworld.com or www.smc.eu for your local distributor / importer.

SMC Corporation

URL : <http://www.smcworld.com> (Global) <http://www.smc.eu> (Europe)
 SMC Corporation, 4-14-1, Sotokanda, Chiyoda-ku, Tokyo 101-0021, Japan
 Specifications are subject to change without prior notice from the manufacturer.
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