SMC Life Science

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Analytical – Instrumentation – Microfluidics – Process Technology

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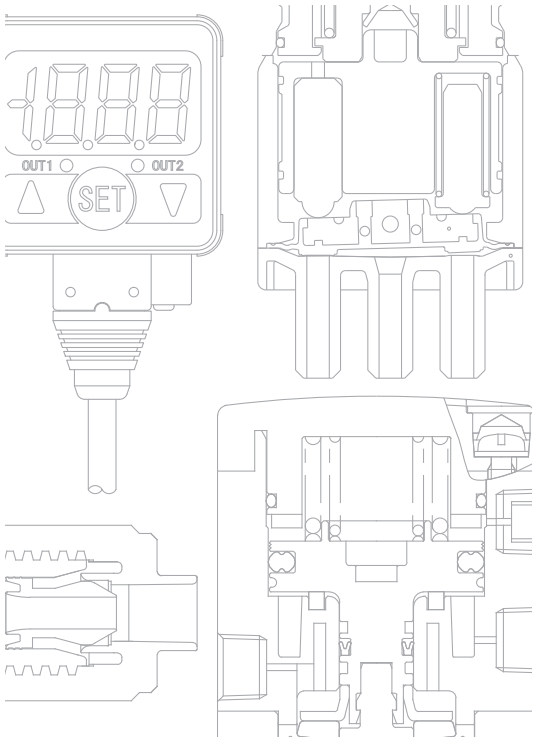

Tsukuba Technical Centre

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Corporate Guide

Life Science Products

SMC is pursuing worldwide customer satisfaction and supporting automation through one of the most advanced product range

The 21st century — with the revolution in global IT, Information Technology, business methods are undergoing great changes. In these quickly developing, ever changing times, customer satisfaction can only be achieved by a clear understanding of our customers' goals and objectives. Therefore, SMC has built an organization that listens carefully to our customers and responds quickly and specifically to their needs. SMC has established a wide spread global network of locations in all major countries of the America's, Europe and Asia showing our active commitment to the world market. SMC supports this global network with a stable supply chain of global products, a high level of technical service and solid communications network to meet our customers' needs and expectations.

Technical Development

Our engineering staff now exceeds 1,360 and are located in Technical centres in Japan, United States, Europe and China.

Quick, clear and detailed responses to customer requests are communicated through our sales group, and our engineers are constantly on the alert for new trends that lead to world class new products.

Sales and Communication Network

With 360 sales offices in 78 countries worldwide, our sales force of over 5,650 maintains close communication with customers.

By establishing a strong base in each country and region with a large experienced sales force, SMC provides the best possible service in the industry. Maintaining close communication with our customers throughout the world keeps our engineering teams and our products at the leading edge of industry.

Production and Supply

Our product line offers 11,000 basic models with over 600,000 variations.
Global production facilities provide a stable supply of products to customers in all markets.

The vast array of products satisfies nearly every application. Fast delivery of these high quality products at competitive costs is accomplished through our unique production system, and by maximizing our local production capabilities, a stable supply of product is guaranteed.

Technical Development

To provide a global engineering network technical centres have been established in the United States, Europe and China, together with Japan

Following the basic concept of developing products from the customer's standpoint, SMC is dedicating a large staff and large financial resources to research and development. This is undertaken to promote research on basic technology with future potential and to produce products that are adapted to the needs of the marketplace in a timely manner. To provide positive and speedy response to the problems presented by customers throughout the world, technical centers have been established in the United States, Europe and China, creating a powerful global engineering network with Japan as its nucleus. All of the technical centers share information and maintain close contact in order to quickly respond to requirements locally, and to offer the same high quality of technical service throughout the world.

Japan Technical Centre has expanded to a twin-tower building from where it will oversee worldwide technical development.

Japan Technical Centre has expanded into a twin-tower building. It will be transformed into a fully equipped facility. At the centre of SMC's research and development division, a staff of 1,050 is engaged in research and development activities for the entire world.

Isolation Liquid 2/3 Port Valve Series LVM

2/3 Port Solenoid Valve Series VDW

3 Port Solenoid Valve Series V060

3 Port Solenoid Valve Series V100

3 Port Solenoid Valve Series VQ100

Ultra Compact Valve Series S070

Proportional Valve Series PVQ

Electric Actuator Series LE□

Electric Gripper

Digital Pressure Switch Series ISE/ZSE

Compact Electro-Pneumatic Regulator. Series ITV

Menbrane Air Dryer Heatless Air Dryer. Series IDG/ID

Custom Engineered Plastic Manifold & Valve Technology

CTC (China

SMC (China) has been e providing tec and currently working to gi

UTC (US Technical Centre) U. S. A.

The UTC has been established to meet the project requirements of customers in North America. The UTC has approximately 140 engineers available for customer support.

ETC (European Technical Centre) U. K.

The ETC has been established in the existing SMC U.K. factory site in Milton Keynes. Here, approximately 60 experienced engineers from SMC European subsidiaries are gathered to handle projects from their respective countries. This has enabled improved communication, faster and more accurate information exchange, and a higher level of customer satisfaction.

Technical Centre) China

Co., Ltd. China Technical Centre
stablished with the objective of
chnical support services to users
y approximately 60 engineers are
ve this technical support.

GTC (German Technical Centre)

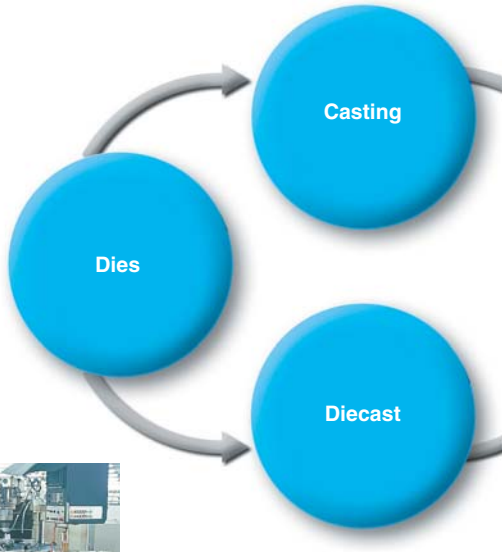
With approximately 50 engineers, we mainly provide technical support to our German customers as German Technical Centre.

Production and Supply

SMC's unique production system achieves high quality, optimised cost and short lead times.

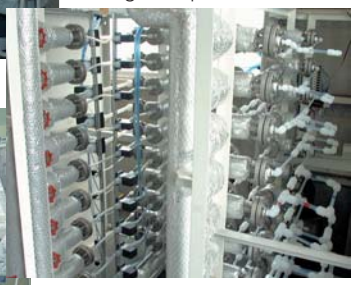
SMC products reflect a market trend towards greater diversification with a vast array of 11,000 basic models and over 600,000 variations. This is made possible by an integrated production system that includes casting, machining, surface treatment, coating, assembly and inspection, all performed in SMC's factories. Furthermore, we use a unique production control system in which instructions for all production operations are performed automatically based on information from orders received. As a result, SMC can secure high quality, optimised cost and a short lead time of its product.

SMC's integrated production system



Laboratory

High temperature test line



Clean room

Test equipment for hydrofluoric and nitric acids

Dies

Aluminum casting machine line

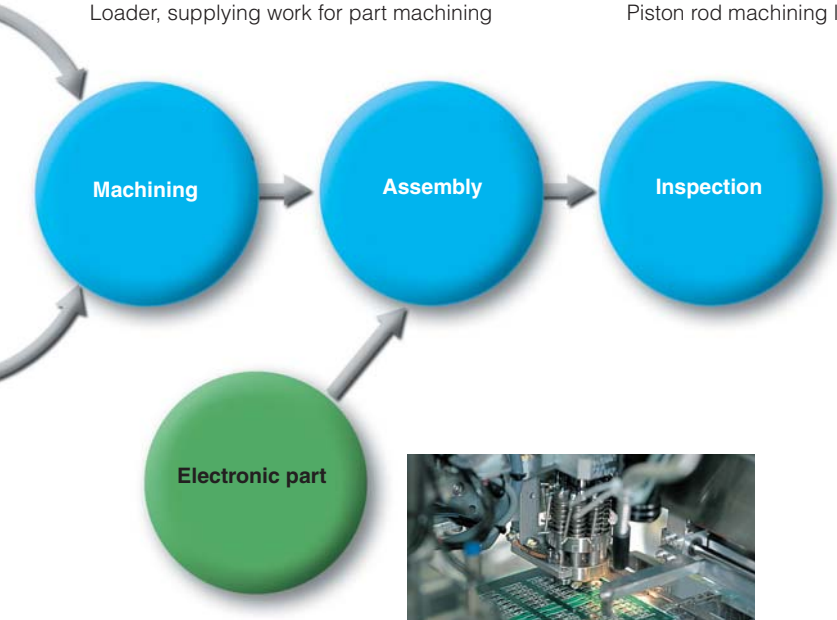
Machining line (6-axis automatic machine tools)

Tool control

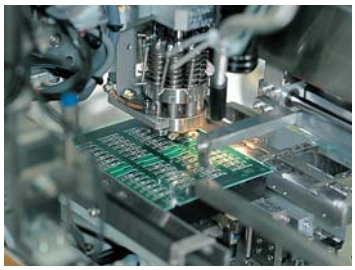
Loader, supplying work for part machining

Piston rod machining line

Coil winding

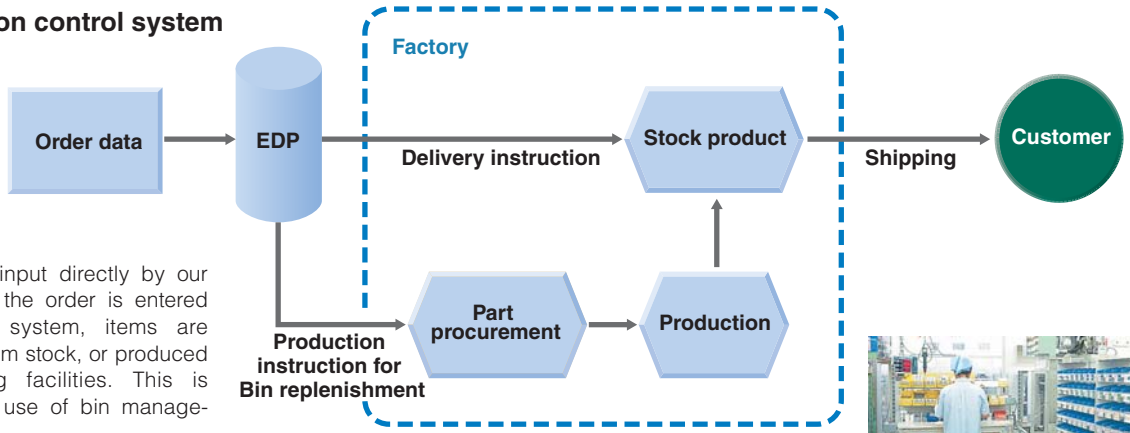


Assembly and inspection of temperature controller



IC chip, being mounted on printed board

SMC's production control system



Customer orders are input directly by our salespersonnel. Once the order is entered into the SMC EDP system, items are automatically drawn from stock, or produced in our manufacturing facilities. This is accomplished by the use of bin management systems.

Bin control shelf

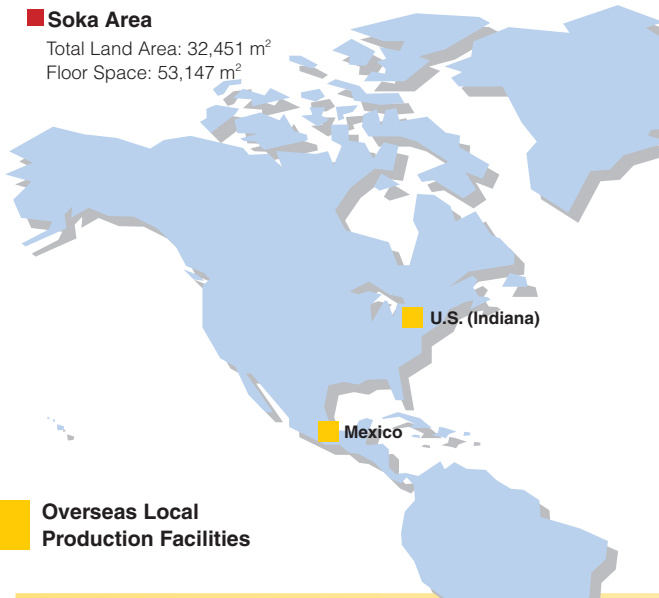
Production and Supply

A global production network supports a stable and continuous supply of high quality products throughout the world.

SMC delivers products for world markets from five key factory locations in Japan, in the Tsukuba district of Ibaragi prefecture and the Soka district of Saitama prefecture, as well as from other key locations in China and Singapore. Additionally, to respond quickly and with increased flexibility to the demands of the local market, overseas production facilities have been established in SMC subsidiaries around the world.

Production Facilities (Japan)

Soka Area
Total Land Area: 32,451 m^2
Floor Space: 53,147 m^2



Overseas Local Production Facilities

U.S.A. SMC Corporation of America (Indiana)

Mexico SMC Corporation (Mexico), S.A. de C.V.

Brazil SMC Pneumáticos do Brazil Ltda.

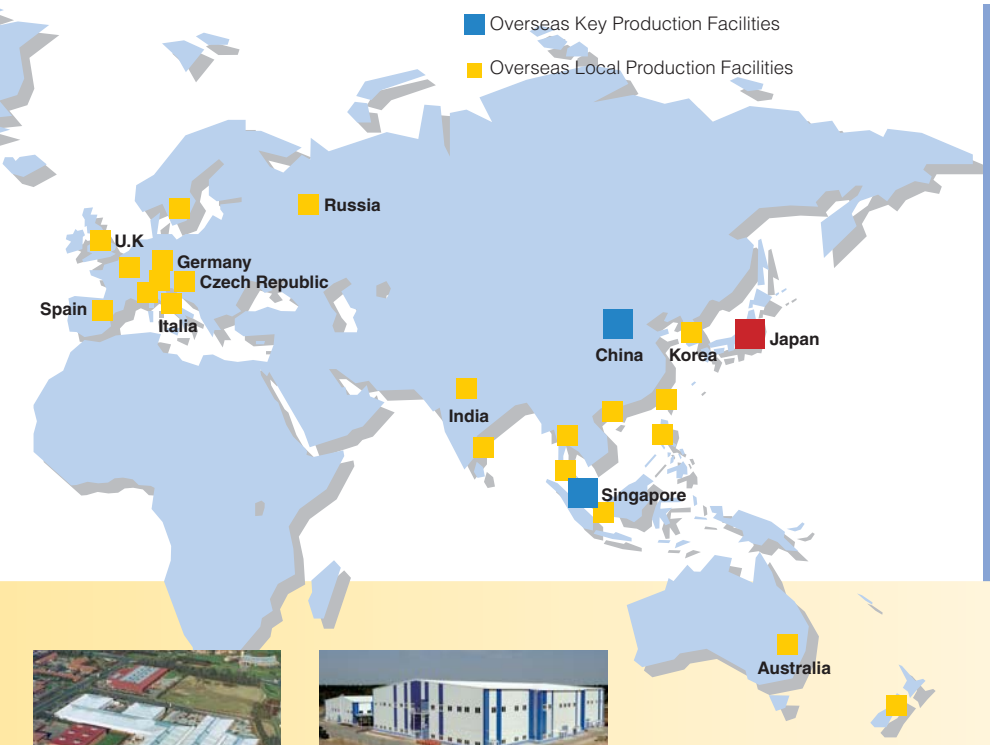
Tsukuba Area
Total Land Area: 171,408 m²
Floor Space: 51,295 m²

Kamaishi Area
Total Land Area: 171,909 m²
Floor Space: 44,990 m²

Tohno Factory
Total Land Area: 78,845 m²
Floor Space: 17,367 m²

Yamatsuri Factory
Total Land Area: 315,761 m²
Floor Space: 39,239 m²

Production Facilities (Japan)
Overseas Key Production Facilities
Overseas Local Production Facilities



Overseas Key Production Facilities

SMC (China) Co., Ltd.
Total Land Area: 172,556 m²
Floor Space: 85,819 m²

SMC (BEIJING) Manufacturing Co., Ltd.
Total Land Area: 345,886 m²
Floor Space: 131,145 m²

SMC Manufacturing (Singapore) Pte. Ltd.
Total Land Area: 47,911 m²
Floor Space: 37,237 m²

U.K. SMC Pneumatics (U.K.) Ltd.

Russia LLC "SMC-RUS"

Czech Republic SMC Industrial Automation CZ s.r.o.

Korea SMC Pneumatics Korea Co., Ltd.

India SMC Pneumatics (India) PVt.Ltd.

Italy SMC Italia S.p.A

Germany SMC Pneumatik GmbH

Australia SMC Pneumatics (Australia) Pty. Ltd.

North/South America

Chile	SMC Pneumatics Chile S.A.
Argentina	SMC Argentina S.A.

Europa/Africa

Switzerland	SMC Pneumatik AG
Austria	SMC Pneumatics GmbH (Austria)
Sweden	SMC Pneumatics Sweden AB
France	SMC Pneumatique S.A.
Spain	SMC España, S.A.

Asia/Oceania

Singapore	SMC Pneumatics (S.E.A.) Pte.Ltd.
Malaysia	SMC Pneumatics (S.E.A.) Sdn.Bhd.
New Zealand	SMC Pneumatics (N.Z.) Ltd.
Hong Kong	SMC Pneumatics (Hong Kong) Ltd.
Taiwan	SMC Pneumatics (Taiwan) Co.,Ltd.
Philippines	Shoketsu SMC Corporation
Thailand	SMC Thailand Ltd.

Sales and Communication Network

Our goal of 30% global market share has been achieved, with local subsidiaries in 50 countries across the world.

Taking its first step in Australia in 1967, SMC continued to move quickly into the international marketplace, and has steadily established local subsidiaries in the major countries around the world. The current total has reached 360 locations in 78 countries. With the expansion of its international network, SMC has earned a solid reputation as a reliable international brand, and has exceeded the goal of “30% global market share”. We will continue to view the world as a single market and further develop our sales organization with even greater energy to provide “customer satisfaction” by responding accurately to individual demands of different customers in countries and regions around the world.

U.S.A.
SMC Corporation of America (Indiana)

Mexico SMC Corporation (Mexico), S.A. de C.V.

Brazil SMC Pneumãticos do Brasil Ltda.

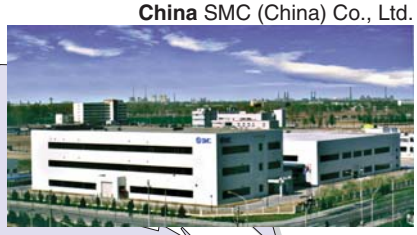
North, Central&South America

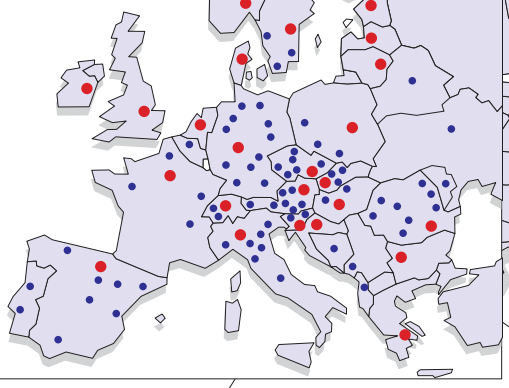
U.S.A.	SMC Corporation of America
Chile/Colombia	SMC Pneumatics Chile S.A.
Mexico	SMC Corporation (Mexico), S.A. de C.V.
Canada	SMC Pneumatics (Canada) Ltd.
Argentina/Uruguay	SMC Argentina S.A.
Bolivia	SMC Pneumatics Bolivia S.R.L.
Venezuela	SMC Neumática Venezuela S.A.
Brazil	SMC Pneumãticos do Brasil Ltda.

U.K. SMC Pneumatics (U.K) Ltd.

Germany SMC Pneumatik GmbH

China SMC (China) Co., Ltd.





France SMC Pneumatique S.A.

Italy SMC Italia S.p.A

Korea
SMC Pneumatics Korea Co., Ltd.

Spain SMC España, S.A.

Taiwan SMC Pneumatics (Taiwan) Co.,Ltd.

Singapore SMC Pneumatics (S.E.A.) Pte.Ltd.

Europa/Africa

Italy	SMC Italia S.p.A
U.K.	SMC Pneumatics (U.K.) Ltd.
Germany	SMC Pneumatik GmbH
Switzerland	SMC Pneumatik AG
Austria	SMC Pneumatics GmbH (Austria)
Sweden	SMC Pneumatics Sweden AB
France	SMC Pneumatique S.A.
Ireland	SMC Pneumatics (Ireland) Ltd.
Spain	SMC España, S.A.
Czech	SMC Industrial Automation CZ s.r.o.
Hungary	SMC Hungary Ipari Automatizálási kft.
Romania	SMC Romania S.r.l.
Slovenia	SMC Industrijska Avtomatika d.o.o.
Slovakia	SMC Priemyselná Automatizáciá s.r.o.
Finland	SMC Pneumatics Finland Oy
Norway	SMC Pneumatics Norway AS
Russia	SMC Pneumatik LLC
Denmark	SMC Pneumatik A/S
Poland	SMC Industrial Automation Polska Sp.z.o.o
Latvia	SMC Pneumatics Latvia SIA
Estonia	SMC Pneumatics Estonia OÜ
Bulgaria	SMC Industrial Automation Bulgaria EOOD
Netherlands	SMC Pneumatics BV
Greece	SMC Hellas EPE
Belgium	SMC Pneumatics N.V./S.A.
Lithuania	UAB “SMC Pneumatics” Lietuva
Croatia	SMC Industrijska Automatika d.o.o.
Kazakhstan	SMC Kazakhstan, LLC
Turkey	SMC Pnömatik A. .
South Africa	Hyflo Southern Africa (Pty.) Ltd. (Distributor)

Asia/Oceania

Australia	SMC Pneumatics (Australia) Pty. Ltd.
Singapore	SMC Pneumatics (S.E.A.) Pte. Ltd.
Malaysia	SMC Pneumatics (S.E.A.) Sdn. Bhd.
New Zealand	SMC Pneumatics (N.Z.) Ltd.
Hong Kong	SMC Pneumatics (Hong Kong) Ltd.
Taiwan	SMC Pneumatics (Taiwan) Co., Ltd.
Philippines	Shoketsu SMC Corporation
China	SMC (China) Co., Ltd.
China	SMC Pneumatics (Guangzhou) Ltd.
Thailand	SMC Thailand Ltd.
India	SMC Pneumatics (India) Pvt. Ltd.
Korea	SMC Pneumatics Korea Co.,Ltd.
Indonesia	P.T. Sinar Mutiara Cemerlang (Distributor)
Israel	Baccara Automation Control (Distributor)
Japan	SMC Corporation

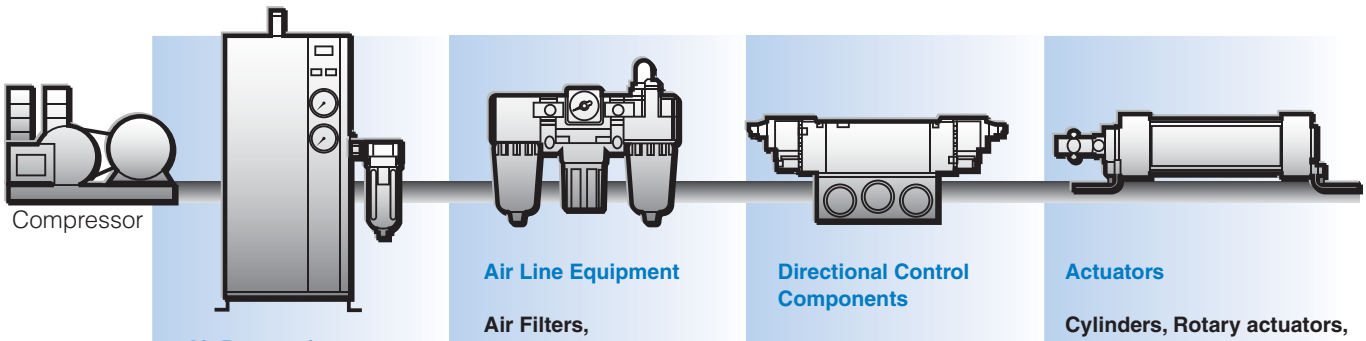
Australia SMC Pneumatics (Australia) Pty. Ltd.

● Head office
● Branch office

11.000 basic models, and 600.000 variations.
A wide range of variations to accommodate diverse applications.

A complete line-up of pneumatic control systems

Customers' needs, today, are in a state of transition, from standardization to diversification. As a general supplier of pneumatic components, SMC provides the ideal products for multiple applications and complete systems. Therefore, a broad range of pneumatic variations is offered for each system component. This complete array of products results in SMC pneumatic systems that are capable of specifically meeting infinitely diverse requirements.



Compressor

Air Preparation Equipment

Air Dryers, Mist Separators
This equipment provides clean dry air through dehumidification and filtration.

Air cleaning equipment

Air Line Equipment

Air Filters, Regulators & Lubricators
This equipment removes foreign particles from compressed air and pressure control to extend life and reduce compressed air costs.

Air line equipment

Directional Control Components

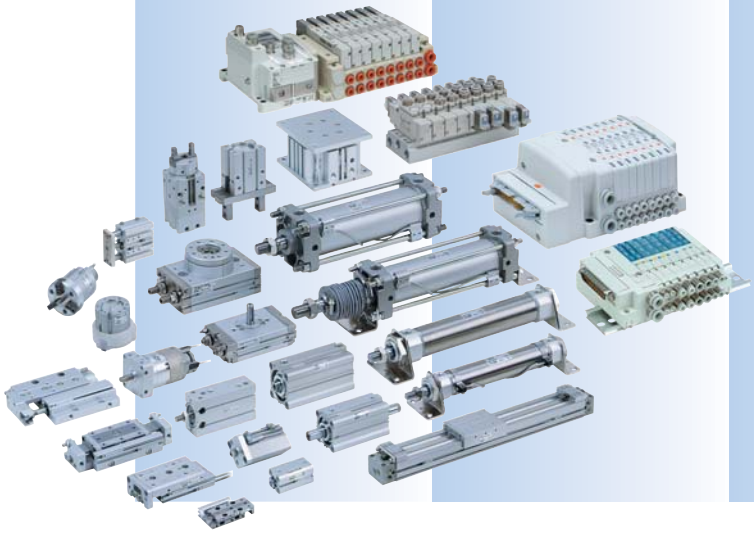
Solenoid valves
These components direct the flow of compressed air that is supplied to cylinders and other actuators.

Solenoid valves

Actuators

Cylinders, Rotary actuators, Grippers
These components use the compressed air switched by directional control components to create force for linear and rotary action.

Air cylinders, Air grippers



SMC products are moving into new-peripherals and pneumatic-related markets.

During the last twenty years SMC products have moved into numerous industrial applications.

SMC products are not confined to the limits of conventional pneumatic control components, but are reaching out to cover peripheral markets as well. SMC products are developed to satisfy unique requirements, and we are committed to developing products for new markets to satisfy all of our customers.

High vacuum products

Clean wet products

Clean room products

Wafer transfer products

Process/Temperature control products

High Technology products

Composite Valve Manifold for Air, Gas and Liquid

Custom Engineered Plastic Manifold & Valve Technology

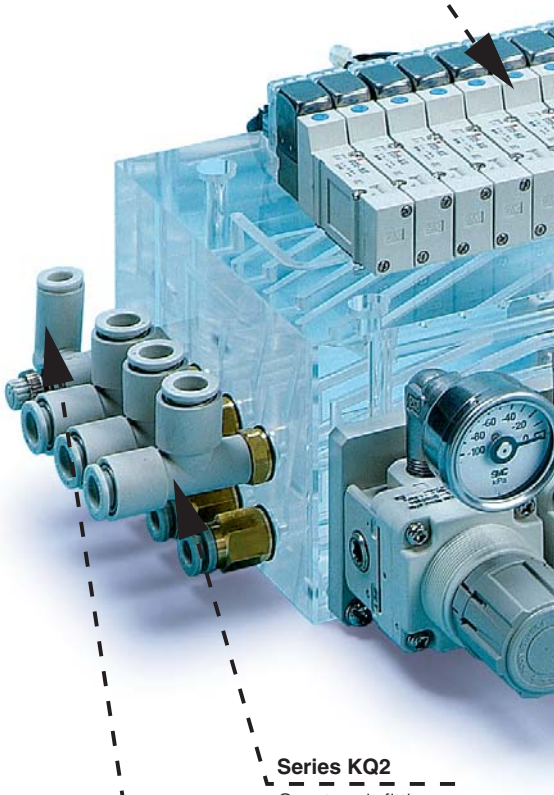
- Reduced Space
- Reduced Weight
- Reduced Installation Time and Error
- Reduced Cost of Ownership

Main specifications of Plastic Manifold Note)

Material	Acrylic, ULTEM, PVC, Polysulpthone, etc.
Fluid	Air, Gas and Liquid
Operating pressure	-100 kPa to 0.7 MPa (30 inHg to 100psi)
Operating temperature	0 to 40°C (32 to 104°F)
Ambient temperature	-5 to 50°C (23 to 122°F)

Note) Contact SMC for details

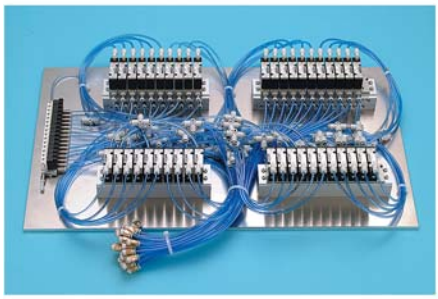
Series SY3000
Solenoid Valves
5 port, Manifold Type



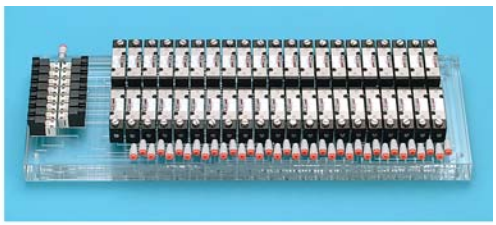
Series KQ2
One-touch fittings

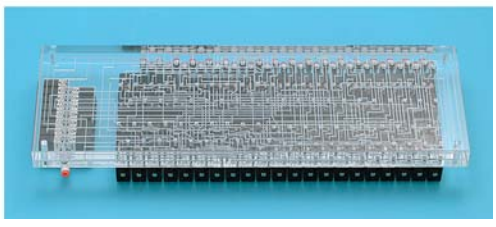
Series AS
Speed Controller

Conventional System



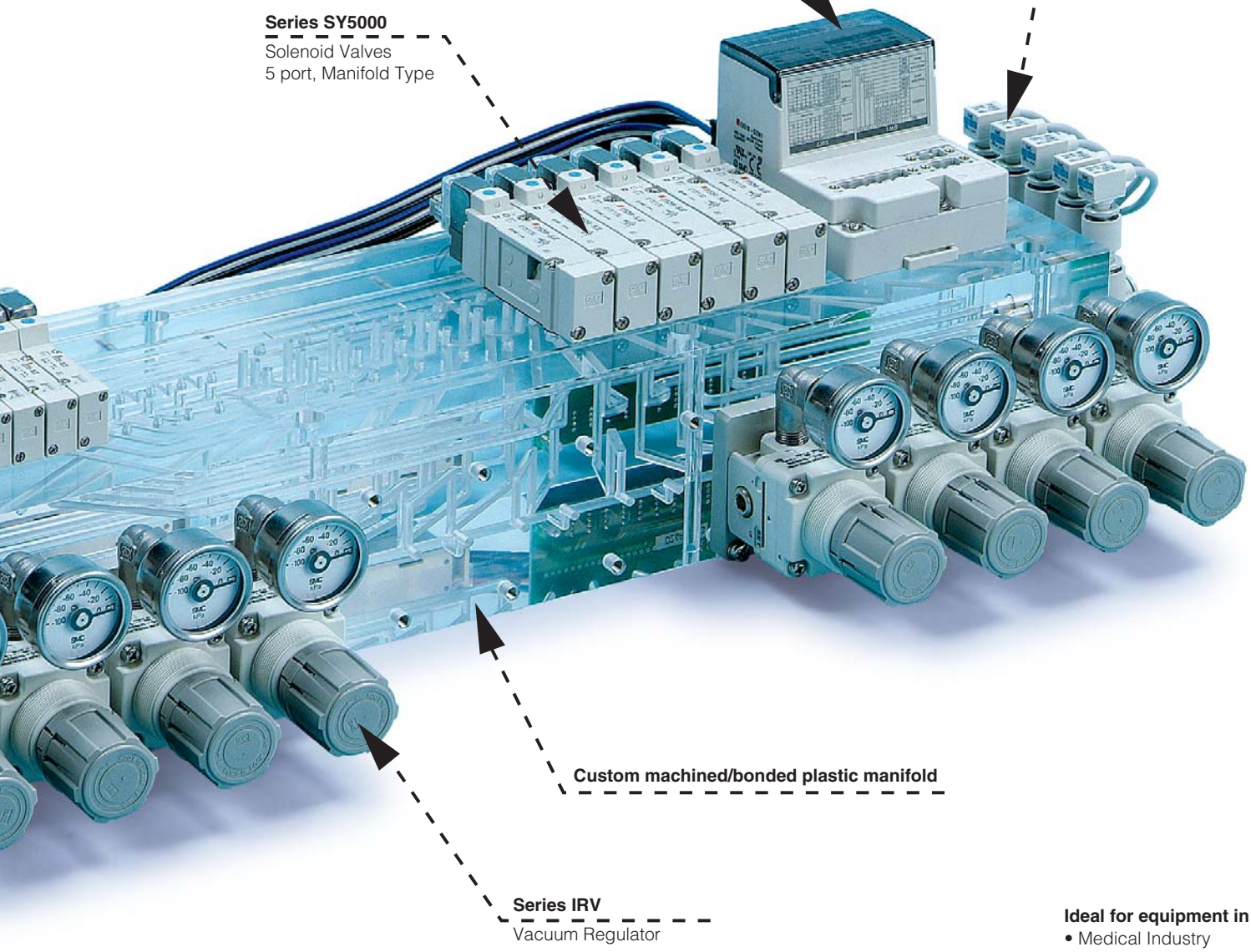
Installation of valves on plastic manifold





SMC offers you the benefit of single Source Supply of plastic manifolds and valves!!

- The widest selection of valves to suit the customers's exact specifications!
- The best in-house design resources enables integrated and compact manifold design!
- The best Before/After-sales services through world-wide network!



Ideal for equipment in

- Medical Industry
- Analytical Industry
- Chemical Industry

Tested and Packed to Customers Specifications

Quality Assurance

Reliable product quality in the global market

To enable our customers throughout the world to use our products with even greater confidence, SMC has obtained certification for international standards “ISO9001” and “ISO14001”, and have created a complete structure for quality assurance and environmental controls. SMC products aspire to meet its customers’ expectations while also considering the company’s contribution in society.

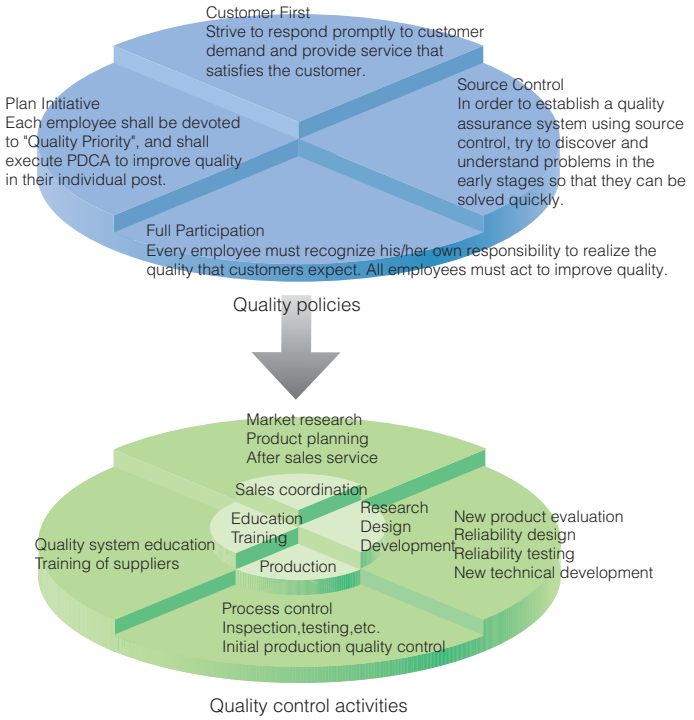
ISO9001 Quality management system

This is an international standard for quality control and quality assurance. SMC has obtained a large number of certifications in Japan and overseas, providing assurance to our customers throughout the world.

ISO14001 Environmental management system

This is an international standard related to environmental management systems and environmental inspections. While promoting environmentally friendly automation technology, SMC is also making diligent efforts to preserve the environment.

SMC’s quality control system



ISO certification obtained

Applicable Products and Services Design,development and manufacture of the following products:

Air preparation equipment
Air line equipment
Directional control components
Actuators
Temperature control equipment
Sensors
Fittings and tubing
Filters
Vacuum equipment

Related Facilities Included in the Registration

Japan Technical Centre (design, development)
Soka Factory No.1 (administration, manufacturing)
Soka factory No.2 (manufacturing)
Tsukuba factory No.1 (manufacturing)
Tsukuba factory No.2 (manufacturing)
Tsukuba factory No.3 (manufacturing)
Kamaishi factory (manufacturing)
Yamatsuri factory (manufacturing)
Tohno factory (manufacturing)
Yoshikawa factory (manufacturing)
Loogistics centre (distribution)
SMC Australia [ISO 9001]
SMC China [ISO 9001]
SMC Germany [ISO 9001]
SMC Hong Kong [ISO 9001]
SMC India [ISO 9001]
SMC Italy [ISO 9001/ISO 9001]
SMC Korea [ISO 9001]
SMC Malaysia [ISO 9001]
SMC New Zealand [ISO 9001]
SMC Norway [ISO 9001]
SMC Singapore [ISO 9001]
SMC Spain [ISO 9001]
SMC Sweden [ISO 9001]
SMC Switzerland [ISO 9001]
SMC Taiwan [ISO 9001]
SMC Thailand [ISO 9001]
SMC U.K. [ISO 9001]
SMC U.S. [ISO 9001]

SMC's Activities for Green Procurement

EU directives

Following the announcement of the latest EU (European Union) directive on environmentally harmful substances, customers requesting Green Procurement options has increased substantially.

WEEE directive
Waste Electrical and Electronic Equipment
* Directive for collecting and recycling electrical and electronic equipment waste

RoHS directive
The Restriction of the use of certain Hazardous Substances in electrical and electronic equipment
* Directive for restricting 6 specific substances contained in electrical and electronic equipment

Mercury, Lead, Cadmium, Hexavalent Chromium, PBB, and PBDE

RoHS directive

The RoHS directive compels EU membership countries to abolish or reduce the use of heavy metals such as mercury, lead, cadmium and hexavalent chrominum as well as bromic fire retardants such as PBB and PBDE by June 30, 2006.

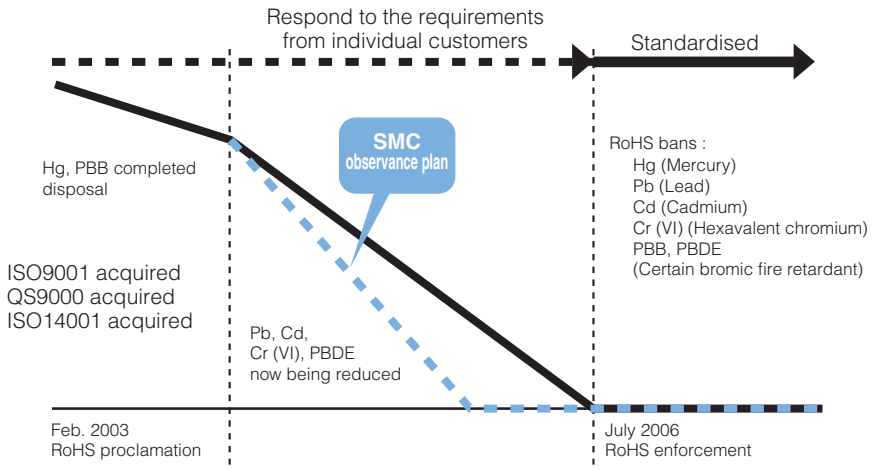
February 2003 RoHS directive proclamation

July 2006 RoHS directive enforcement

The sale of products containing environmentally hazardous substances subject to the RoHS directive will be prohibited in the EU.

Although industrial products, including pneumatic products, are not subject to WEEE & RoHS directives, SMC nonetheless strives to meet the needs of our customers.

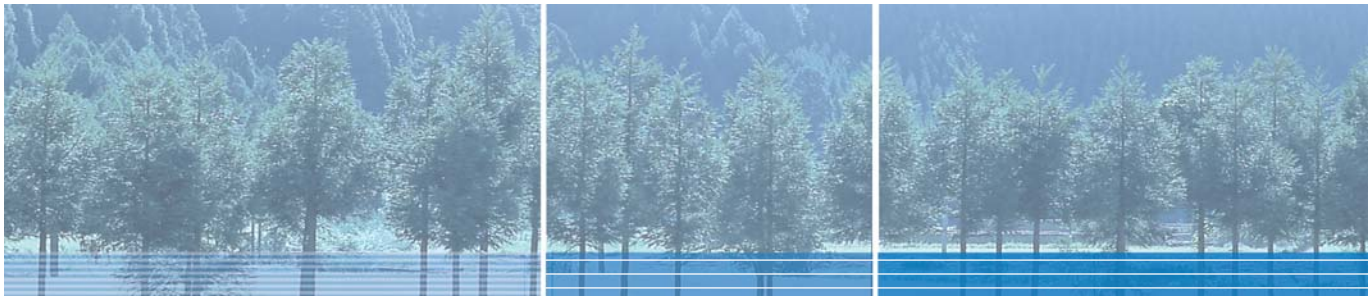
SMC's Product Supply Plan Based On the RoHS Directive



Please consult us when the products containing environmentally hazardous substances out of the scope of the RoHS directive or domestic legal requirements, etc. are required.

Due to revision of RoHS directive, SMC products will be in its scope:
Medical products: From July 2014
Industrial products: From July 2017
Products in its scope need to show the conformity to revised RoHS directive with CE mark.
SMC will try to satisfy your requirements.

RoHS-compliant product supply plan for customers who need them.



Flow Characteristics and Measurement

Liquids

Flow rate:	$Q = N_1 \bullet C_V \bullet \sqrt{\frac{\Delta P}{G}}$
Pressure drop:	$\Delta P = \frac{Q^2 \bullet (G)}{N_1^2 C_V^2}$

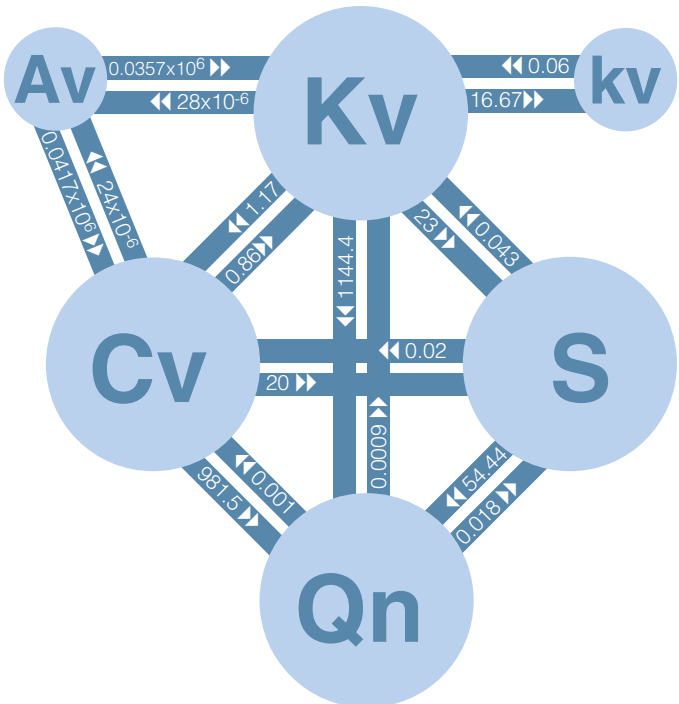
Q = Flow rate m^3/h
ΔP= Pressure drop (bar, absolute) / 1 bar ~ 0.1 MPa
N_1 = Conversion value 0.865
G = Relative density, [water 1.0]
C_V = Valve flow rate

Gases

$Q = N_2 \bullet C_V \bullet \sqrt{\frac{\Delta P \bullet P_2}{G \bullet T}}$	
$^{(1)}Q = \frac{N_3 \bullet C_V \bullet P_1}{\sqrt{G \bullet T}}$	$^{(1)}P_2 \leq \frac{P_1}{2}$

Q = Flow rate m^3/h
C_V = Valve flow rate
N_2 = Conversion value for 137
N_3 = Conversion value for 246
T = Gas temperature °K (°C = + 273)
ΔP = (P_1— P_2) Pressure drop in bar (absolute) / 1 bar ~ 0.1 MPa
P_1 = Supply pressure in bar (absolute)
P_2 = Output Pressure in bar (absolute)
G = Relative density [air 1.0]

Conversion factors for different flow units



Relative density of liquids

Liquid	Relative density related to water G at 20°C
Acetone	0.792
Alcohol	0.792
Benzene	0.902
Gasoline	0.902
Kerosene	0.815
Water	1.000

Relative density of gases

Liquid	Relative density related to water G at 20°C
Ammonia	0.587
Argon	1.38
Acetylene	0.907
Butane	2.07
Helium	0.137
Carbon dioxide	1.529
Methane	0.554
Propane	1.562
Oxygen	1.105
Sulphur dioxide	2.264
Nitrogen	0.967
Hydrogen	0.0695
Air	1.000

The **Kv** conversion value indicates the quantity of warm water (from 5 to 40°C), expressed in m^3/h, flowing through a valve which causes a pressure drop of 1 bar.

kv conversion value is equivalent to the Kv mentioned above, however converted to l/min.

The **Cv**-value common in the USA indicates, the quantity of water at 60°F, expressed in Gal/min, flowing through a valve which causes a pressure drop of 1 psi.

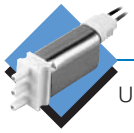
The **Av** flow rate coefficient is indicated in m^2.

Qn indicates the volumetric flow rate of compressed air in l/min passing through a valve when the supply pressure is 6 bar and the pressure drops 1 bar.

Equivalent cross-section **S** [mm^2] This indication determined by air measurement refers to a valve or a whole arrangement of elements and corresponds to the cross-section area of the pertinent orifice plate opening with same flow.

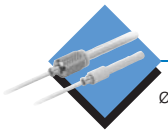
SMC Life Science

Chemical/Liquid Valves

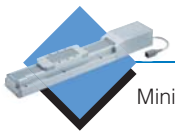


Air Valves

Air preparation



Fittings & Tubing

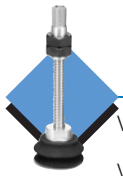


Actuators

Instrumentation

High Purity Components

Temperature Control Equipment



Vacuum Equipment

Super Compact Direct Acting
2/3 Port Solenoid Valve for Chemicals
Series LVM

- Wetted part material:
  - Body plate: PEEK
  - Diaphragm: Choice of EPDM, FKM and Kalrez®
- Service life: 10 million cycles or more (Based on SMC test conditions)
- Valve chamber volume

Unit: μℓ

Series	LVM09/090	LVM10 (For LVM11)	LVM10/100	LVM15/150	LVM20/200
Valve chamber volume	18	11	20	50	84

- Change in volume depending on the open/closed status of the valve (pumping volume)
  0.01 μl or less (Rocker type)
  "Pumping volume" refers to the volume of water that is expelled from the valve chamber by the opening and closing action of the valve (once, with no applied pressure).
  With a normal diaphragm valve, because the valve chamber volume varies depending on the ON or OFF status, a difference in volume is discharged into the outlet side of the valve when the valve is switched from ON to OFF. However, with a rocker type valve, there is almost no change in volume, thus no fluid is discharged into the outlet side of the valve.
- Type with power-saving circuit can be selected.
  Holding power consumption can be reduced substantially.

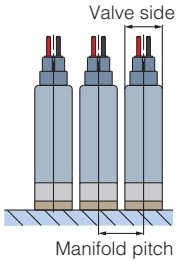
Unit: W

Series		LVM09/090	LVM10/100	LVM15/150	LVM20/200
Power consumption	Inrush	3.3	2.5	5.5	4
	Holding	0.9	1	1	0.6

- Space-saving

Unit: mm

Series	LVM090	LVM10/100	LVM150	LVM200
Valve width	9.5	13	16	20
Manifold pitch	10.5	14	17	21

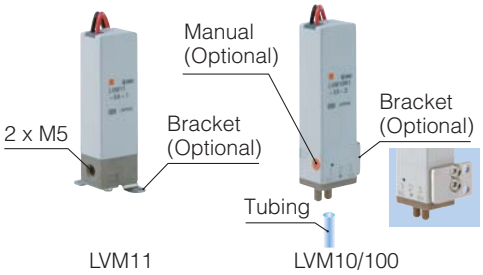


- Applications: Various analytical and inspection equipment
  Analytical instruments for blood, urine, immune system, etc.

Piping/Mounting Variations

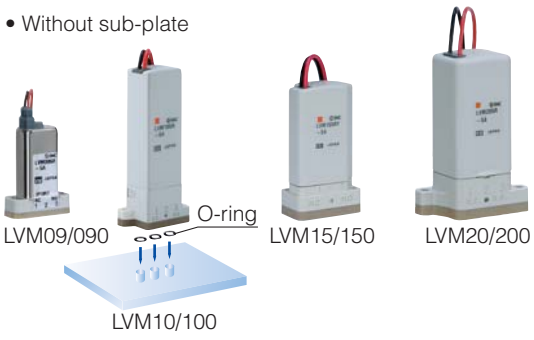
Body ported

- M5 thread
- Tubing type

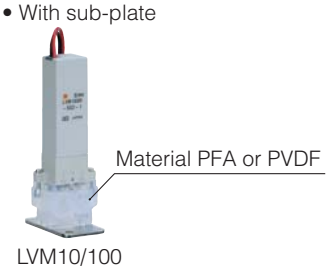


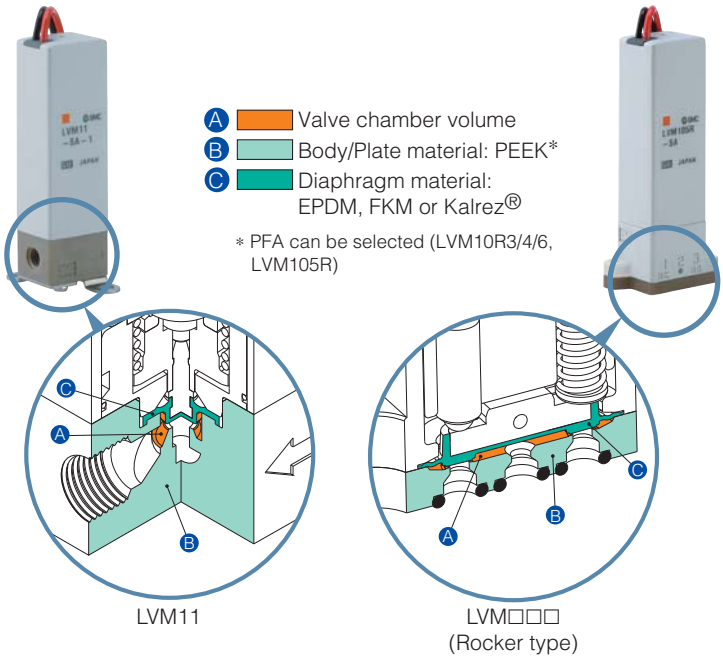
Base mounted

- Without sub-plate



- With sub-plate





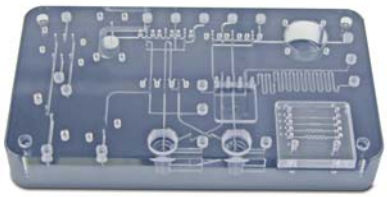
Super Compact Direct Acting
2/3 Port Solenoid Valve for Chemicals
Series LVM

Series Variations

	Model	Valve construction	Valve type	Number of ports	Operating pressure range	Orifice diameter [mm]	Valve width	Flow characteristics				Fluid temperature [°C]	Volume of valve chamber	Weight [g]	Power consumption [W]
								Water		Air					
								Av	Cv	C	b				
	LVM09R3	Diaphragm type direct operated poppet (Rocker type)	N.C.	2	–75 kPa to 0.2 MPa	1.1	9.5	0.43 x 10^{-6}	0.018	0.06	0.2	0 to 50 (with no condensation)	18	20	2
	LVM09R4		N.O.												
	LVM095R		Universal	3											
	LVM11	Diaphragm type direct operated poppet	N.C.	2	0 to 0.25 MPa	1.5	13	0.96 x 10^{-6}	0.04	0.13	0.22		11	30	2.5 at inrush 1 at holding
	LVM10R1	Diaphragm type direct operated poppet (Rocker type)	N.C.	2	–75 kPa to 0.25 MPa	1.4	13	0.72 x 10^{-6}	0.03	0.1	0.2		20	34	1.5
	LVM10R2		N.O.												
	LVM102R		Universal	3											
	LVM10R3		N.C.	2	–75 kPa to 0.25 MPa	1.4	13	0.72 x 10^{-6}	0.03	0.1	0.2		20	34	1.5
	LVM10R4		N.O.												
	LVM10R6		N.C.												
	LVM105R		Universal	3											
	LVM15R3		N.C.	2	–75 kPa to 0.25 MPa (Max. 0.6 MPa)	1.6 (1)	16	0.96 x 10^{-6} (0.36 x 10^{-6})	0.04 (0.015)	0.13 (0.05)	0.22 (0.2)		50	45	5.5 at inrush 1 at holding
	LVM15R4		N.O.												
	LVM155R		Universal	3											
	LVM20R3		N.C.	2	–75 kPa to 0.3 MPa	2	20	1.56 x 10^{-6}	0.065	0.23	0.27		84	80	2.5
	LVM20R4		N.O.												
	LVM205R		Universal	3											

∗ The values for Av and Cv are based on JIS B 2005:1995, C and b are based on JIB B 8390:2000.

Composite Valve Manifold for Air, Gas and Liquid
Custom designed solutions

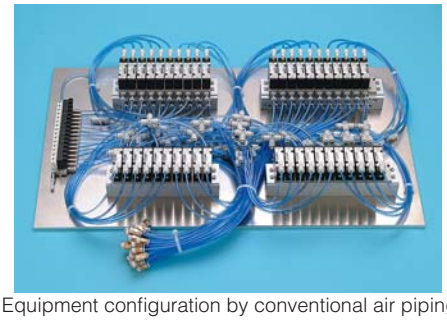


- Space saving
- Simple piping
- Mistakes in piping and wiring are prevented by elimination of complicated piping procedures
- A3 dimensional configuration of fluid passages that is not achievable by drilling or injection molding is materialized by diffusion bonding technology. A variety of layouts are available to satisfy users' needs
- Reduction of the footprint by integrating control equipment such as solenoid valves and sensors on a manifold
- Simple wiring
  - Electrical wiring is simplified by integrating the printed circuit board onto the manifold
  - Wiring labour is significantly reduced by integration of electrical wiring
- Light weight is achieved through use of resin manifolds
  Acrylic, polyethermide, polycarbonate, polysulfone, Vinyl chloride are available
- Custom designed solutions only

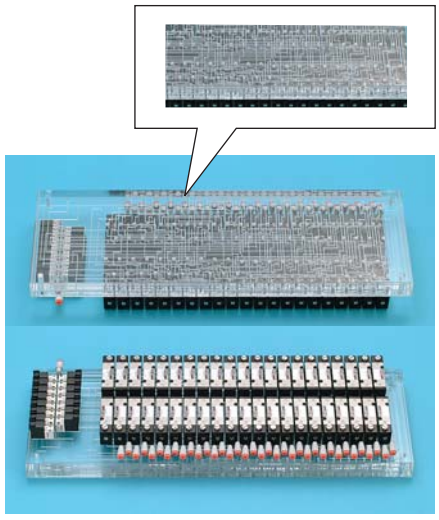
Manifold Specifications

Material	Acrylic Resin (PMMA), Polyvinyl Chloride (PVC), Polyetherimide (PEI), Polysulfone (PSU)
Fluid	Air, Liquid (Check chemical compatibility)
Operating pressure	-100 KPa ~ 0.7 MPa
Ambient temperature	-5 ~ 50°C
Fluid temperature	0 ~ 40°C

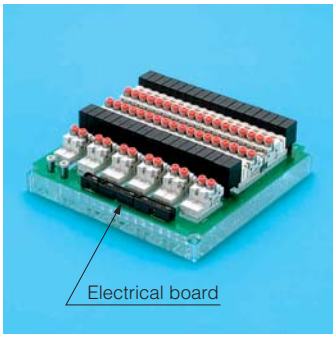
Note) Contact SMC for details.

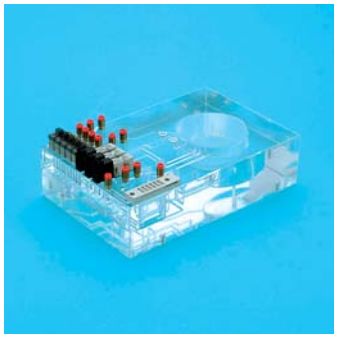


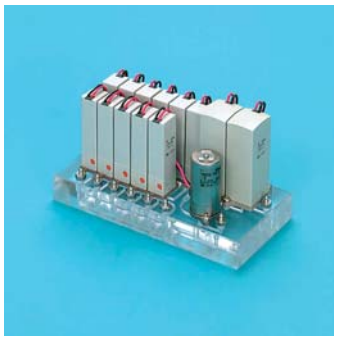
Equipment configuration by conventional air piping



Highly Integrated Resin System

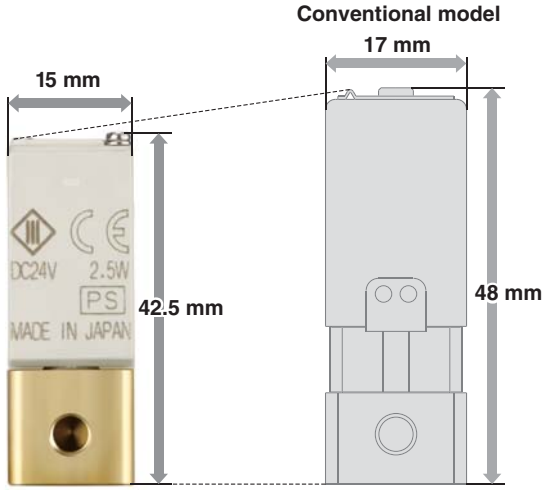






Compact Direct Operated 2 Port Solenoid Valve
Series VDW

- Body material for air
  Aluminum, Resin (PPS)
- Body material for medium vaccum
  C37 (Brass), Stainless Steel
- Body material for water
  C37, Resin (PPS), SUS
- Lightweight 80 g
- Compact
- Environmental performance IP65
- Power consumption 2.5 W (size 1); 3 W (size 2)
- Flame resistance UL94V-0 conformed
- Improved armature durability
- Low-noise construction
- Piping variations: screw piping, one-touch fitting

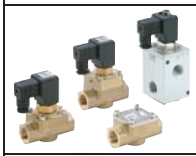


(Compared with Size 1, C37/Stainless steel body)

Compact / Lightweight 2 Port Solenoid Valve
For Air/Water
Series VDW30/40-XF

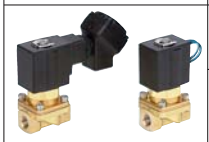
- Compact / Lightweight resin body (PPS). Weight: 120 g (VDW30-XF)
- Power consumption (VDW30-XF):
  - 3 W (Standard)
  - 0.5 W (With power-saving circuit)
- Quick faster function reduces piping labour
- No torque control needed, easy handling

Process Valves for Various Fluids Control
Series VC/VDW/VQ

Series	Type	Orifice size (ømm) [Flow (Cv)]	Port size	Valve * type
	VCB20/30/40 Direct operated 2 port solenoid valve for heated water			
	• Body ported	2~10 [0.16~2.1]	1/8, 1/4, 3/8, 1/2, 3/4	N.C.
	VCC12/13 2/3 port air operated valve for water and chemical-based fluids			
	• Manifold	3.8 [0.33]	1/4	N.C.
	VCH40/400 5.0 MPa Pneumatic Equipment Series			
	• Body ported	16~18 [4.5~6.3]	1/2, 3/4, 1	N.C./N.O.
	VDW Compact Direct Operated 2 Port Solenoid Valve for air, medium vacuum and water			
	• Body ported	1, 1.6, 2.3, 3.2 [0.04~0.30]	M5, 1/8 On-touch fitting: ø3.2, ø4, ø6	N.C.
	VDW30/40-XF Compact / Lightweight 2 Port Solenoid Valve for water and air			
	• Body ported	1~6 [0.04~1.1]	P7, P10 (Quick fastener) C4, C6, C8, C10 (One-touch fitting)	N.C.
	VDW200/300 Compact direct operated 3 port solenoid valve for water and air			
	• Body ported	1~4 [0.03~0.46]	M5, 1/8, 1/4	COM.
	VQ20/30 2 port solenoid valve for air			
	• Body ported • Manifold	3.4~4.8 [0.33~0.81]	ø6, ø8, ø10, ø12	N.C.
	VX21/22/23 Direct operated 2 port solenoid valve for air, medium vacuum, water, oil			
	• Body ported • Manifold	2~10 [0.23~2.21]	3/8, 1/2, 1/8, 1/4 ø6, ø8, ø10, ø12	N.C./N.O.
	VXD21/22/23 Pilot operated 2 port solenoid valve for air, gas, water, oil			
	• Body ported	10~25 [1.9~13]	1/4, 3/8, 1/2, 3/4, 1	N.C./N.O.
	VXP21/22/23 Pilot operated 2 port solenoid valve for steam, air, gas, water, oil			
	• Body ported	10~50 [1.9~49]	1/4, 3/8, 1/2, 3/4, 1, $1\frac{1}{4}$, $1\frac{1}{2}$, 2	N.C./N.O.
	VXZ22/23 Pilot operated 2 port for zero pressure differential/For air, gas, vacuum, water, oil			
	• Body ported	10~25 [1.9~12]	1/4, 3/8, 1/2, 3/4, 1	N.C./N.O.

* N.C.: normally closed; N.O.: normally open; COM.: common

Process Valves for Various Fluids Control
Series VX

Series	Type	Orifice size (ømm) [Flow (Cv)]	Port size	Valve* type
	VXH22 Pilot operated 2 port for hihg pressure/For air, water, oil			
	• Body ported	10 [1.9~2.4]	1/4, 3/8, 1/2	N.C.
	VX31/32/33 Direct operated 3 port solenoid valve for water, oil, steam, air			
	• Body ported • Manifold	1.5~4 [0.08~0.50]	1/8, 1/4, 3/8	N.C./N.O. COM.
	VXA21/22, VXA31/32 Direct operated 2/3 port for air, gas, vacuum, water, oil			
	• Body ported • Manifold	VXA21/22: 3~10 [0.33~2.4] VXA31/32: 1.5~4 [0.08~0.50]	VXA21/22: 1/8, 1/4, 3/8, 1/2 VXA31/32: 1/8, 1/4, 3/8	VXA21/22: N.C./N.O. VXA31/32: COM.
	VXE2, VXED2, VXEZ2 Energy saving type 2 port solenoid valve for air, water, oil			
	• Body ported • Manifold VXE2	2~50 [0.18~49]	1/8, 1/4, 3/8, 1/2, 3/4, 1	N.C.

* N.C.: normally closed; N.O.: normally open; COM.: common

Process Valves for General Pneumatic Fluids
Series VN

Series	Type	Orifice size (ømm) [Flow (Cv)]	Port size	Valve* type
	VNA 2 port valve for compressed air and air-hydro circuit control			
	• Body ported	10~50 [0.88~43]	1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2	N.C./N.O. C.O.
	VNB 2 port valve for flow control			
	• Body ported	7~50 [0.80~43]	1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2	N.C./N.O. C.O.
	VNC 2 port valve for coolant applications			
	• Body ported	7~50 [1.25~100]	1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2	N.C./N.O.
	VND 2 port valve for steam			
	• Body ported	7~50 [1.08~62]	1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, 2	N.C./N.O.

* N.C.: normally closed; N.O.: normally open; C-O.: double acting
Note: Information on our range of pilot valves is shown on page 32 of this catalogue

Process Pump
Series PA□, PB

• Series PA3000/5000
45 ℓ/min

- Compact, large capacity diaphragm type pump.
- A simple configuration makes maintenance easy too:
  A new structural design allows the diaphragm and check valve to be replaced individually
- Self-priming type makes priming unnecessary:
  Able to pump up to 1 m in a dry state (without priming). (At ordinary temperatures with fresh water) Able to pump up to 6 m in a wet state (with priming)
- High abrasion resistance/low dust generation:
  Since it is a diaphragm type there are no sliding parts in the liquid contact area

Variations

Model	Diaphragm material	Check valve material	Body material	Discharge flow rate [ℓ/min]*	Option
PA31□0	PTFE, NBR	PTFE, PFA	ADC12	1 to 20	• Silencer
PA32□0			SCS14		
PA51□0			ADC12	5 to 45	
PA52□0			SCS14		

* Each of the values above indicates use at ordinary temperatures with fresh water.

• Series PAX
10 ℓ/min

- Built-in pulsation attenuator
  A pulsation attenuating function to suppress discharge pressure pulsation is a new built-in feature.
  This controls problems such as discharge piping vibration, scattering of liquid from the discharge outlet, and foaming in tanks. In addition, internalization of this feature makes it unnecessary to provide extra space and separate piping, etc.

Variations

Model	Diaphragm material	Check valve material	Body material	Discharge flow rate [ℓ/min]*	Option
PAX1112	PTFE	PTFE, SCS14	ADC12	0.5 to 10	• Silencer
PAX1212			SCS14		

* Each of the values above indicates use at ordinary temperatures with fresh water.

• Series PB
2 ℓ/min

- Smaller, lighter, 25% reduction in volume (comparison with old-model PB series)
- Long service life: 1.5 times (comparison with old-model PB series)
- Discharge: 8 to 2000 ml/min
- Weight: 0.11 kg
- Low particle generation due to the diaphragm structure
- Flammable fluids can be used. (Air operated)
- Self-priming makes priming unnecessary. Sucks the liquid even if the pump is dry
- Assembled in a clean room. Double packaged (PB1313A)
- Easy to adjust the flow rate by the frequency of ON/OFF of the solenoid valve

Variations

Model	Actuation	Body material	Diaphragm material	Check valve material	Fluid contact part material	* Discharge flow rate (ℓ/min)	Option
PB1011A	Built-in solenoid valve	Polypropylene (PP)	PTFE	PTFE PP	FKM SUS316	8 to 2000	• Silencer • Foot
PB1013A	Air operated					8 to 1000	
PB1313A	Air operated	New PFA		PTFE, New PFA	PTFE		

* Each of the values above indicates use at ordinary temperatures with fresh water.

• Series PA3
13 ℓ/min

- High corrosion resistance:
  - Side body, ports: New PFA
  - Diaphragm/O-rings: PTFE
- Light weight and Compact: 2.1 kg (without foot bracket).
- Long service life: Diaphragm are made from denatured PTFE for superior resistance and longer service life.
- Clean: You can order your process pump assembled in a Clean room environment and double-packaged (Order number PAP331). Side bodies and ports are moulded to achieve a great reduction in dust generation.

Variations

Model		Body material	Diaphragm material	Assembly environment	Discharge flow rate [ℓ/min]	Option
Automatically operated	PA3310	New PFA	PTFE	Standard	1 to 13*	• Foot • Silencer
	PAP3310			Clean room		
Air operated	PA3313			Standard	0.1 to 9	• Foot
	PAP3313			Clean room		

* With 3/8" inlet/outlet tube: 1 to 12

• Series PAF3000/5000
45 ℓ/min

Female thread Tube extension With nut

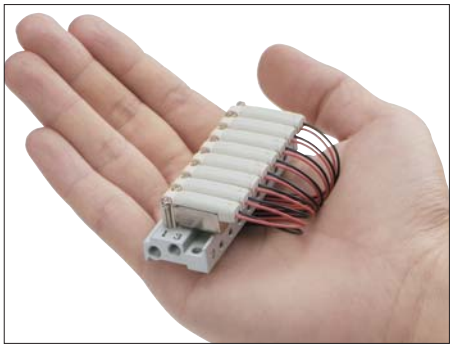
- Body material: New PFA
- Diaphragm/Seal material: PTFE
- Light weight and Compact: 1.3 kg (PAF3000/Air operated, without foot bracket)
- No metallic parts are used (Metal-free), Pump made from fluororesin
- Large flow rate: The flow rate has been increased by 50% even though it is almost the same size as the PA3 series. Max. flow rate: 20 ℓ/min (automatically operated)

Variations

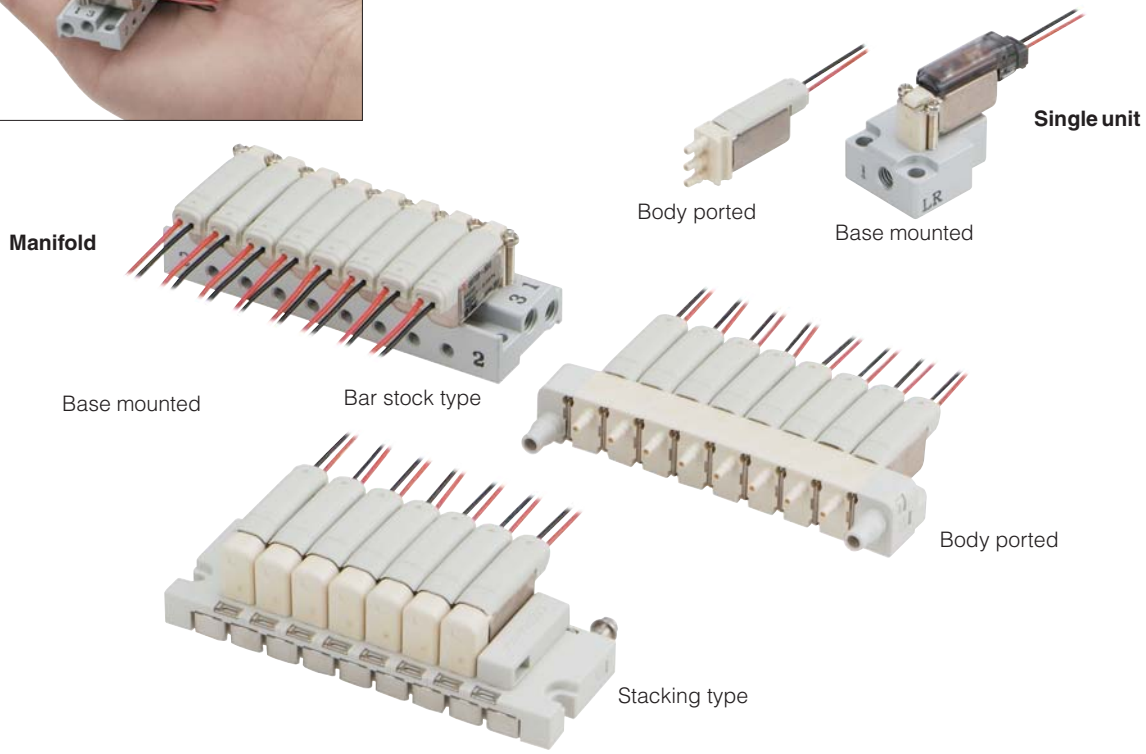
Model		Body material	Diaphragm material	Discharge flow rate [ℓ/min]	Fitting type	Option
Automatically operated	PAF3410	New PFA	Denatured PTFE	1 to 20	Female thread Tube extension With nut	• Foot Note 1) • Silencer Note 2)
	PAF5410			5 to 45		
Air operated	PAF3413			1 to 15		
	PAP5413			5 to 38		

Note 1) Equipped with the PAF5000 series as standard equipment.
Note 2) Automatically operated only.

7 mm Wide, Super Compact Direct Acting
3 Port Solenoid Valve
Series S070

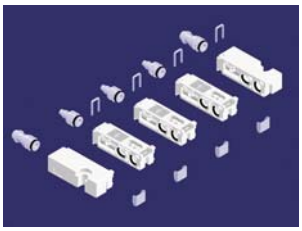


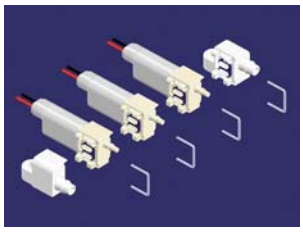
- Valve width: 7mm
- Power consumption: 0.35 W (standard)
  0.1 W (with power saving circuit)
- Sonic conductance: C 0.060 [dm³/(s•bar)]
- Extremely light weight 5 g (Valve single unit)
- Operation noise 38dB(A) or less
- Easy to increase or decrease the number of stations. (Stacking base)



Specifications

Valve construction	Poppet
Fluid	Air / Inert gas / Low vacuum (1.33 x 10^2 Pa)
Maximum operating pressure	0.3 MPa (0.35 W, 0.1 W), 0.5 MPa (0.5 W)
Proof pressure	1 MPa
Ambient and fluid temperature	–10 to 50°C
Lubrication	Not required
Impact/Vibration resistance	30/150 m/s²
Enclosure	IP40
Weight	5 g (single unit valve)
Mounting orientation	Free


Separable base


Stacking type

Solenoid specifications

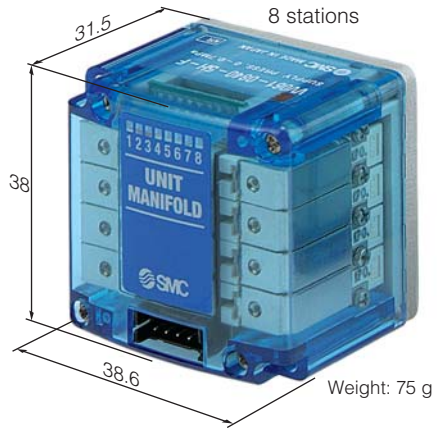
Power consumption	0.35 W (standard), 0.5 W (high voltage), 0.1 W (holding)
Rated coil voltage	3, 5, 6, 12, 24 VDC
Allowable voltage fluctuation	10% of the rated voltage
Coil insulation type	Equivalent to class B

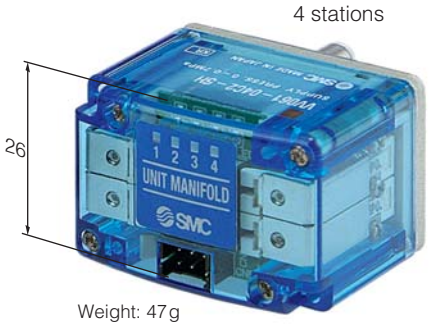
Flow characteristics

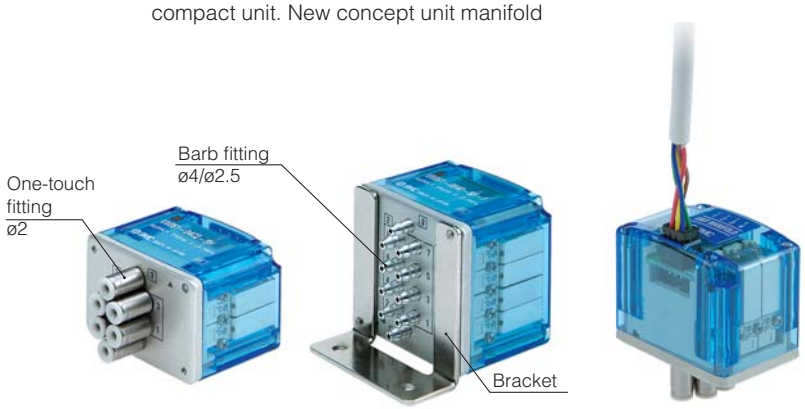
Power consumption	Maximum operating pressure	Flow characteristics			Response time ms	
		C [dm³/(s•bar)]	b	Cv	ON	OFF
0.5 W DC	0.5 MPa	0.042	0.27	0.011	3 or less	3 or less
	0.3 MPa	0.060	0.28	0.016	5 or less	3 or less
0.35 W DC	0.3 MPa	0.042	0.27	0.011	3 or less	3 or less
	0.1 MPa	0.060	0.28	0.016	5 or less	3 or less
0.1 W DC (at holding) with power saving circuit	0.3 MPa	0.021	0.27	0.006	3 or less	6 or less
	0.1 MPa	0.042	0.28	0.011	5 or less	6 or less

Unit Manifold Valve, 3 Port Solenoid Valve
Series VV061

- Directly operated 3 port solenoid valve
- Valve width 6 mm. Mounting the V060 series
- Variety of valve connection options and systems
- Light weight - 4 g
- Valve, PCB, base and fittings are fully integrated, forming a single compact unit. New concept unit manifold

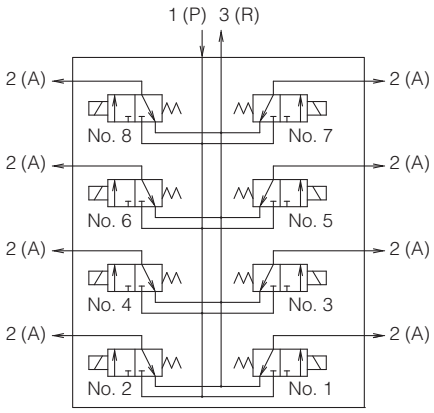


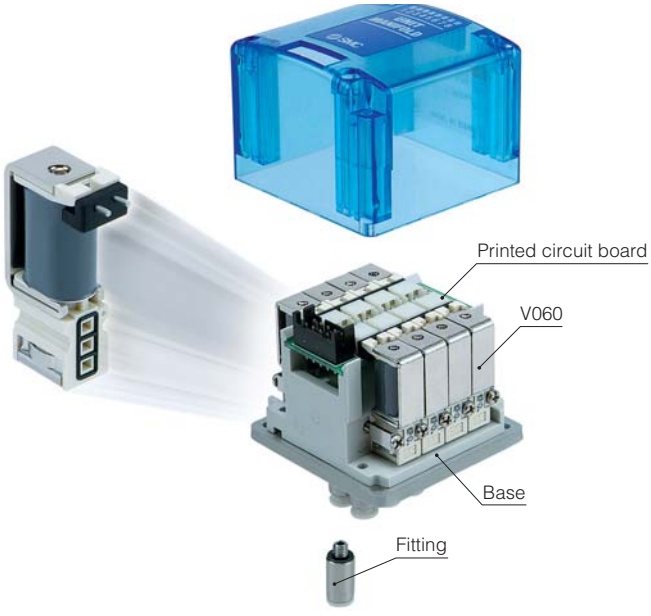




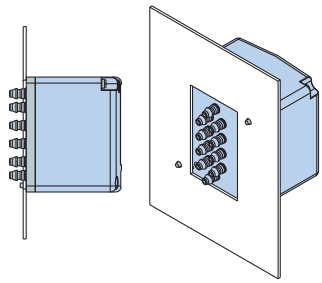
Reduced environmental impact substance RoHS compliant

In case of 8 stations





Panel mount



Unit Manifold Valve Specifications

Fluid		Air	
Operating pressure range	Standard	0 to 0.7 MPa	
	High flow type	0 to 0.3 MPa	
Vacuum specifications	Port	1 (P) port	3 (R) port
	Standard	−100 kPa to 0.6 MPa	−100 kPa to 0 MPa
	High flow type	−100 kPa to 0.2 MPa	−100 kPa to 0 MPa
Power consumption	Standard	0.55 W	
	Power saving circuit (Long and countinuous loading time type)	0.23 W	

Flow Characteristics

Type	Effective area [mm²]	
	1 (P)→2 (A)	2 (A)→3 (R)
Standard	0.07	0.11
High flow type	0.16	0.21

3 Port Solenoid Valve
Series V100

- Power consumption 0.35 W. With power saving circuit 0.1 W
- Coil temperature rises: only 1°C (with power saving circuit)
- Indicator light/surge voltage supressor integrated in the connector body
- Valve width 10 mm

Sonic conductance C: 0.037 (Standard)/C: 0.076 (Large flow capacity)

Series		Flow characteristics		
		C[dm³/(s·bar)]	b	Cv
Standard	V1□4	0.037	0.11	0.008
Large flow capacity	V1□4A	0.076	0.070	0.016

Variations

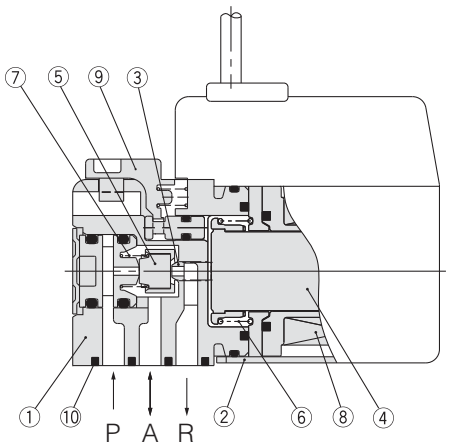
Series		Type of actuation	Operating pressure range [MPa]	Power consumption [W]	
				Standard	With power saving circuit
Standard	V114	N.C.	0 to 0.7	0.35	0.1
	V124	N.O.	0 to 0.7	0.35	0.1
Large flow capacity	V114A	N.C.	0 to 0.7	1	—
	V124A	N.O.	0 to 0.7	1	—

Specifications

Fluid	Air
Ambient and fluid temperature [°C]	–10 to 50 (No freezing)
Response time [ms] Note 1)	ON: 5 or less OFF: 4 or less
Max. operating frequency [Hz]	20
Manual override	Non-locking push, Locking slotted
Lubrication	Not required
Mounting position	Unrestricted
Impact/Vibration resistance [m/s²] Note 2)	150/30
Enclosure	Dust proof

Note 1) Based on dynamic performance test JIS B8374-1981 (standard type: at coil temperature of 20°C, with rated voltage, without surge voltage suppressor)

Note 2) - Impact resistance:
No malfunction resulted in an impact test using a drop impact tester. The test was performed one time each in the axial and right angle directions of the main valve and armature, for both energized and de-energized states. (Value in the initial stage).
- Vibration resistance:
No malfunction resulted in 45 to 2000 Hz, a one-sweep test performed in the axial and right angle directions of the main valve and armature for both energized and de-energized states. (Value in the initial stage)



Component Parts

No.	Description	Material
1	Body	Resin
2	Cover	Stainless steel
3	Push rod	Resin
4	Armature assembly	Stainless steel, Resin
5	Poppet	FKM
6	Return spring	Stainless steel
7	Poppet spring	Stainless steel
8	Coil assembly	—
9	Manual override	Resin

Replacement Parts

No.	Description	Part no.	Material	Note
10	Gasket assembly	V100-31-1A	FKM, Steel	Gasket, 2 screws
11	Sub-plate	V100-74-1	Aluminum die-cast	—

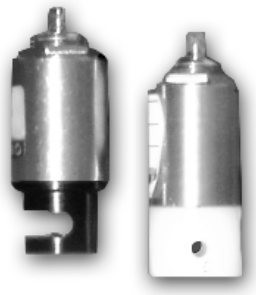
Compact Proportional Valve
Series PVQ

- Service life: Lasts 25 million cycles. (PVQ30)
  Specially coated sliding surface realised 25 million cycles within a set operation range
- Body material:
  - Brass (C36) (PVQ10)
  - Brass (C37) or Stainless steel (PVQ30)
  - Seal material: FKM (PVQ10, PVQ30)
- Valve returns to closed position when power supply is turned off
- Leakage amount: 5 cm3/min or less at OFF
- Can be used for vacuum applications
- Operation noise during opening/closing of the valve reduced.
- Repeatability: 3% or less
  Hysteresis:10% or less
- Oil free option is available as made-to-order

Specifications

Model	PVQ13				PVQ31		PVQ33
Piping type	Base mounted				Body ported		Base mounted
Valve construction	Direct operated poppet				Direct operated poppet		
Valve type	N.C.				N.C.		
Orifice size (mm)	0.3	0.4	0.6	0.8	1.6	2.3	4.0
Max. operating pressure (MPa)	0.7	0.45	0.2	0.1	0.7	0.35	0.12
Flow rate (ℓ/min)	0 to 5	0 to 6		0 to 5	0 to 100		0 to 75
Applied current (Power supply)	0 to 85 mA (24 VDC) 0 to 170 mA (12 VDC)				0 to 165 mA (24 VDC) 0 to 330 mA (12 VDC)		
Port size	M5				1/8		
Fluid	Air, Inert gas				Air, Inert gas		
Ambient temperature	0 to 50°C				0 to 50°C		
Hysteresis	10% or less				10% or less		13% or less
Repeatability	3% or less				3% or less		

Pinch Valve
Series XT34



- SMC series XT34-155 is a compact N.O. air actuated pinch valve When used in conjunction with tubing material, the “pinching” action of the valve can be used to permit or restrain the flow of media. The XT34 is suitable for a wide range of medical applications including:
  - Hematology Analyzers
  - Immunoaassay Analyzers
  - Clinical Chemistry Analyzers
  - Blood Gas Analyzers
  - Medical Diagnostic Equipment
  - Blood Cell Counters
- Features and Benefits
  - Body material is nickel-plated brass
  - Tube holder is constructed of Polyacetal material

Specifications

Max. operating pressure MPa (psi)	0.34 (50)
Min. operating pressure MPa (psi)	0.15 (22)
Operating temperature	0~60°C (32~140°F)
Weight	36 g

Media compatibility

Blood	Reagents
Bleach	Soap
Saline	Water

How to order

Silicon tube size		
	Inside Diameter	Outside Diameter
XT34-155-1	0.062 inch (1.57 mm)	0.187 inch (4.75 mm)
XT34-155-2	0.032 inch (0.81 mm)	0.156 inch (3.96 mm)

Air Preparation

Large Flow Air filter

Series	Port size	Filtration	Notes
	AF Filter		
	M5, G1/8, G1/4, G3/8, G1/2, G3/4, G1	5 µm (Option: 2, 10, 20, 40, 70, 100 µm)	Optional manual or automatic drain
	AFM Mist Separator		
	G1/8, G1/4, G3/8, G1/2, G3/4	0.3 µm	Optional manual or automatic drain
	AFD Micro-Mist Separator		
	G1/8, G1/4, G3/8, G1/2, G3/4	0.01 µm	Optional manual or automatic drain
	AF800/900 Air Filter		
	G1 1/2, G2	Standard 5 µm filter elements	Auto or manual drain

Oil Mist Separators

Series	Port size	Rated flow [ℓ/min (ANR)]	Filtration
	AFF Main Line Filter		
	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	300 to 12000	3 µm
	AM Mist Separator		
	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	300 to 12000	0.3 µm
	AMD Micro-Mist Separator		
	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	200 to 12000	0.01 µm
	AMH Micro-Mist Separator with Prefilter		
	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	200 to 12000	0.01 µm
	AME Super Mist Separator		
	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	200 to 12000	0.01 µm

Odour Removal Filter

Series	Port size	Rated flow [ℓ/min (ANR)]	Filtration
	AMF Odor Removal		
	G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	200 to 12000	0.01 µm

Water separator

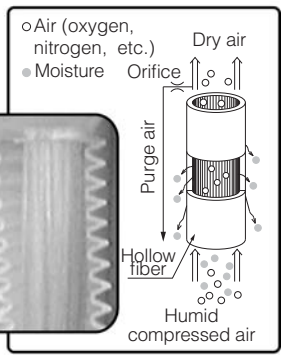
Series	Port size	Max. flow capacity [ℓ/min (ANR)]	Notes
	AMG Water Separator		
	G1/8, G1/4, G3/8, G1/2, G3/4, G1, G1 1/2, G2	300 to 12000	It eliminates the waterdroplets in the compressed air

Water separator

Series	Port size	Notes
	AD Auto drain valve: AD402/600	
	1/4, 3/8, 1/2, 3/4, 1	Drainage is automatically discharged in a reliable manner, without requiring human operators. Highly resistant to dust and corrosion.
	AMJ Drain separator for vacuum	
	1/4, 3/8, 1/2, 3/4, 1	Remove water droplets from air by simply installing in vacuum equipment connection line. Effective for removing water droplets from the air sucked into vacuum pumps and ejectors, etc.
	ADH Heavy duty auto drain: ADH4000	
	1/2	Easy maintenance. Float style auto drain allows automatic drain discharge without electric power.
	AMP Exhaust Cleaner for Clean Rooms	
	1/4, 3/8, 1/2, 3/4	An exhaust cleaner that can be used inside a clean room. Particles of 0.3 µm or larger are 35 particles or less/10 ℓ. Silencing effect: 40 dB (A) or more.
	GP46 Pressure Gauge with Switch	
	1/8, 1/4	A pressure switch function has been added to the gauge. The pressure switch is equipped with a light for verifying operation. The pressure gauge is equipped with a limit indicator. To be used for verifying the supply pressure
	GD40 Pressure differential gauge: GD40-2-01	
	1/8	The pressure differential at the inlet and the outlet of compressed air equipment can be viewed at a glance on the pressure differential gauge. It is ideal for the maintenance control of filters.
	PPA Compact Manometer	
	M5	Pressure measurements can easily be taken any time, anywhere. Back light for easy viewing in dark locations.

Membrane Air Dryer
Series IDG

Dehumidification principle



- Dew point indicator confirms air drying at a glance. (except IDG1) (optional on IDG3, IDG5, IDG3H, IDG5H)
- Compact
- Lightweight
- Space saving
- Also available with fittings for purge air discharge. When purge air discharge is undesirable in the area around the membrane air dryer, it can be discharged to atmosphere via tubing (optional)
- Discharged air noise reduced with built-in silencer. (Except IDG1, IDG3, IDG3H, IDG5, IDG5H, IDG30, IDG30H, IDG30L, IDG50, IDG50H, IDG50L)
- Environmentally friendly (non-freon)
- Power supply not required. A power supply is completely unnecessary. Wiring labour is not required and there is no need to consider electrical standards, etc.
- No vibration or heat discharge. There are no mechanical moving parts as in the case of refrigeration equipment
- Compatible with low dew points. Outlet air atmospheric pressure dew point −40°C (IDG30LA, IDG50LA, IDG60LA) IDG75LA, IDG100LA. Outlet air atmospheric pressure dew point −60°C (IDG60SA, IDG75SA, IDG100SA)

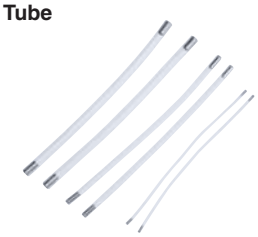
Applications
- Machine tools (air bearings, lasers, etc.)
- Precision measuring equipment (3-D measuring machines)
- Semiconductor manufacturing equipment
  Semiconductor inspection equipment
- Dental equipment
- Chemical analysis equipment
- Ozonizers, Hydrogen gas generating equipment
- Packaging machines, Paper making machines, Food processing machines
- Printed circuit board IC mounting machines
- Fine particle drying, Transfer equipment
- Electrostatic and high grade coating
- Drying and cleaning of precision parts
- Condensation prevention in control panels
- General pneumatic equipment and pneumatic tools

The membrane air dryer uses hollow fibres composed of a macro molecular membrane through which moisture passes easily, but is difficult for air (oxygen and nitrogen) to pass through.
When humid, compressed air is supplied to the inside of the hollow fibres, only moisture permeates the membrane and moves to the outside due to the pressure difference between the moisture inside and outside of the fibres. The compressed air becomes dry air and continues out of the dryer. Part of the dry air from the outlet side is passed through a very small orifice to reduce the pressure and purge the outside of the hollow fibres. The moisture which permeated to the outside of the hollow fibres is discharged to the atmosphere by this purge air. In this way, the partial pressure outside of the hollow fibres remains low and dehumidification is continuously performed.

Flexible piping
Series IDG1

- Low flow rate type tube configuration.
  Outlet air flow rate: 10 ℓ/min (ANR)

Moisture Control Tube
Series IDK

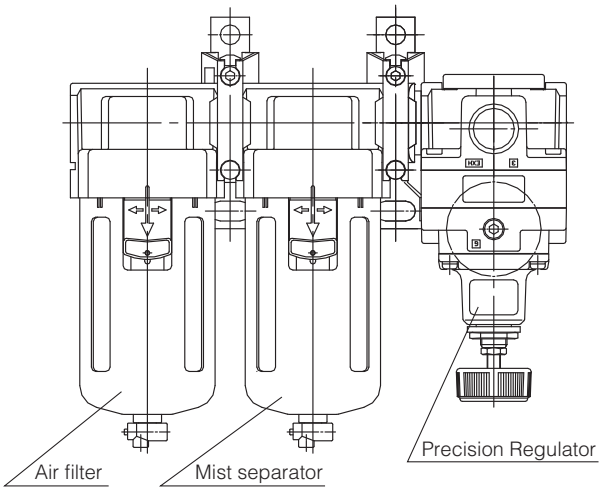


- Prevents condensation in piping for small cylinders/air grippers
- Diffuses water vapour in the piping to the outside

Pressure Control Equipment/Regulator
Series AR

	Series	Application/Characteristics	Port size	Set pressure [MPa]
	Miniature regulator ARJ1020F ARJ210 ARJ310	Direct operated relieving style Back flow function	M5 to 1/8 ø4, ø6	0.1 to 0.7
	Regulator AR10-60	Direct operated relieving style Modular style	M5 1/8 to 1	0.05 to 0.7 0.05 to 0.85
	Regulator with built-in pressure gauge ARG20-40	Built-in pressure gauge Space saving	1/8 to 1/2	0.05 to 0.85
	Pilot operated regulator AR425-925 AR435-935	Internal pilot Relieving style	1/4 to 2	0.05 to 0.85 0.02 to 0.2
	Compact manifold Regulator ARM10/11	Manifold (Common IN or Individual IN) Different types can be mixed on a manifold	ø4, ø6, ø10, ø1/4", ø5/16" 3/8", ø5/32"	0.05 to 0.7
	Miniature manifold Regulator ARM5	Width: 14 mm. The one-touch fitting size can be changed. Backflow function is equipped as a standard.	ø4, ø6 ø5/32", ø1/4"	0.05 to 0.7
	Regulator manifold ARM2500/3000	Manifold (Common IN/Individual IN) Modular style	1/4 , 3/8	0.05 to 0.85
	Direct operated precision regulator ARP20-30-40	Setting sensitivity: 0.001MPa Direct operated relieving style	1/8 to 1/2	0.005 to 0.6
	Regulator with check valve AR20K-60K	Built-in check valve (with back flow function) Direct operated relieving style	1/8 to 1	0.05 to 0.85
	Regulator for 2MPa ARX20	Piston type regulator	1/8 , 1/4	0.05 to 0.85

Precision Regulator
Series IR1000/2000/3000



- Low pressure capability
- Smallest size in series IR1000: Width 35 mm, Weight 140 g
- Expanded regulating pressure range Conventional 0.7 MPa→0.8 MPa
- Relief flow increased by 5 times (Compared to SMC IR201, 401)
- Modular body introduced: Can be combined with AF (air filter) and AFM (mist separator)

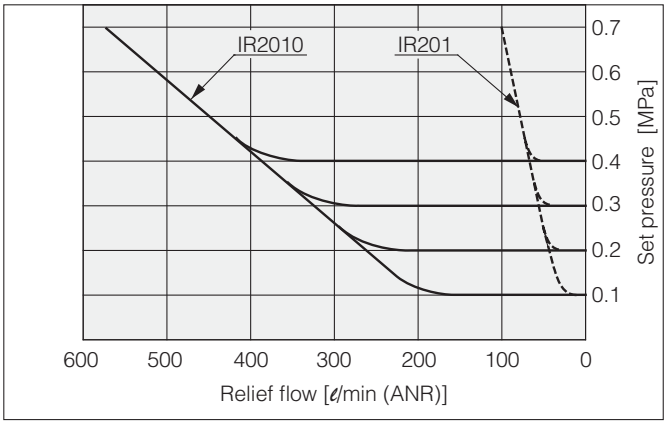
Series Variations

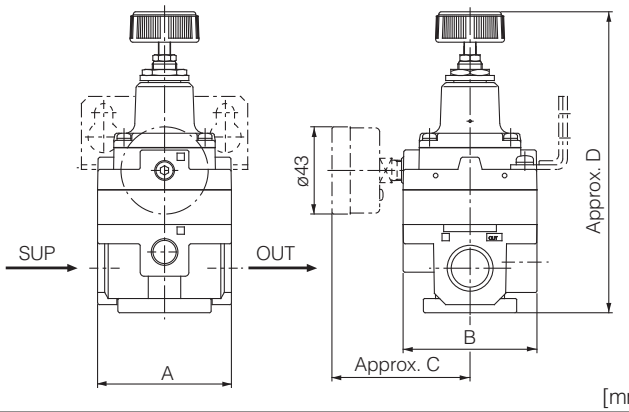
Model		IR1000	IR2000	IR3000
Maximum set pressure	0.2 MPa	●	●	●
	0.4 MPa	●	●	●
	0.8 MPa	●	●	●
Port size	Rc 1/8	●		
	Rc 1/4		●	●
	Rc 3/8			●
	Rc 1/2			●
Accessories	Bracket	●	●	●
	Pressure gauge	●	●	●
Air operated type			●	●

Made-to-Order Specifications

Symbol	Specifications/Content
10–	Clean room
20–	Copper-free and fluorine-free
80–	Ozone resistant
–T	For high temperature
–L	For low temperature (except series IR1000)
–X1	Non-grease specifications
–X465	Digital pressure switch as an accessory (ISE30A)
IRM	Manifold (except series IR2120, IR3000)

Conditions: Back pressure 0.7 MPa

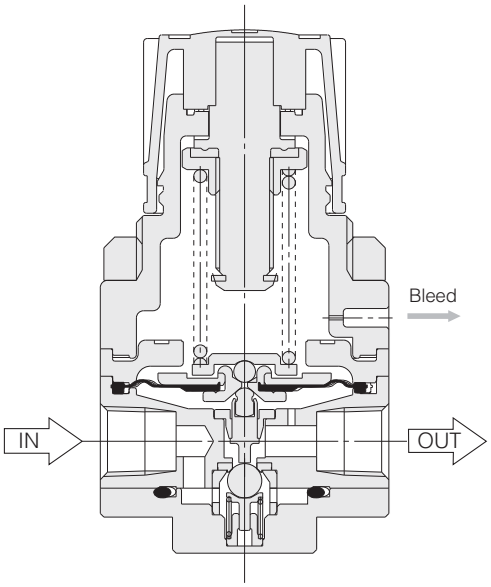




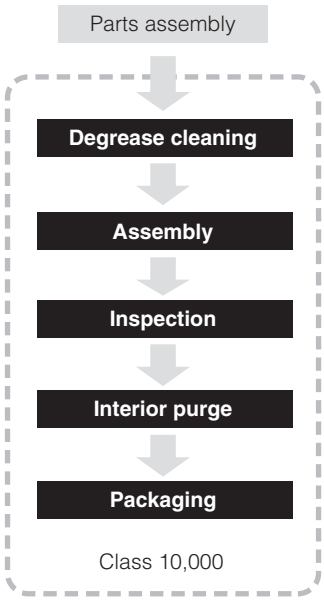
[mm]

Model	A	B	C	D
IR1000	35	35	43	92
IR2000	50	50	60	124
IR3000	66	66	68	148

Precision Clean Regulator
Series SRP
High precision, low flow consumption stainless steel regulator



Manufacturing process



- Achieves flow consumption "under a litre"
  Bleed volume 0.5 ℓ/min (ANR) or less (downstream pressure at 0.2 MPa)
  ∗ Approx. 1/4 of the ARP30 direct operated precision regulator
- Excellent corrosion resistance
  SUS316 is used for all metal parts in contact with the fluid
- Precision
  Setting sensitivity: 0.3% F.S.
  Repeatability: 1% F.S.
- Oil free
  Parts composition with no use of oils
  HFC1416 ultrasonic cleaning of all fluid-contact parts
- Consistent clean room production
  Cleaned, assembled, inspected, and sealed in double packaging in a Class 10,000 environment

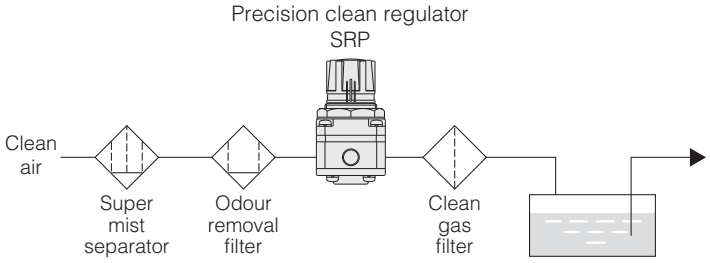
Specifications

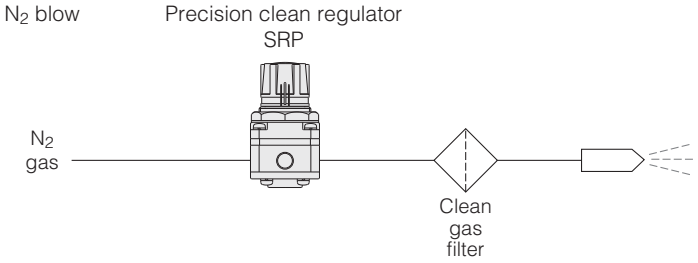
Connection port size		M5, Rc 1/8
Fluid		Air, N_2, CO_2, Ar
Proof pressure MPa		1.5
Maximum operating pressure MPa		1.0
Regulating pressure range MPa	Low pressure type	0.005 to 0.2
	High pressure type	0.01 to 0.4
Ambient and fluid temperature [°C]		0 to 60
Fluid consumption ℓ/min (ANR) Note 1)		0.5 or less
Sensitivity		0.3% of full span
Repeatability		±1% of full span
Fluid-contact parts	Metal	SUS316
	Resin	Fluororesin
	Rubber	Fluoro rubber
	Other	Ceramics
Assembly environment		Clean room class 10000
Parts cleaning		HCFC141b ultrasonic cleaning of all fluid-contact parts

Note 1) At set pressure of 0.2 MPa

Applications

Pressure feed of chemicals





Clean Regulator
Series SRH
Contamination controlled stainless steel regulator

- Outstanding corrosion resistance
  All metal parts in contact with fluid use stainless steel SUS316
- Oil free
  Parts assembled without any use of oils
- 2 types of diaphragm material available
  Depending upon the application, PTFE (Grade A) or fluororubber (Grade B) can be selected for the diaphragm material.
- Designed to minimize residual fluid
  Design includes an intake/exhaust port in the diaphragm compartment which facilitates flow.
  Valve springs are partitioned by the diaphragm.
- Pulsation suppressing design

Specifications

Model		SRH3□□0	SRH4□□0	SRH3□□1	SRH4□□1
Relief mechanism		Non-relief		Relief	
Port size		Rc1/8, 1/4 URJF1/4	Rc1/4, 3/8, 1/2 URJF3/8	Rc1/8, 1/4	Rc1/4, 3/8, 1/2
Fluid	Grade A	Clean air, N_2, Ar, CO_2, Pure water		Clean air, N_2	
	Grade B	Air, N_2, Ar, CO_2, Water		Air, N_2	
Proof pressure		1.5 MPa			
Max. operating pressure		1 MPa			
Set pressure	Low pressure type	0.01 to 0.2 MPa			
	High pressure type	0.05 to 0.7 MPa			
Ambient & fluid temperatures		0 to 60°C (With no condensation)			
Fluid-contact material (metal)		Stainless steel SUS316 (Body is SUS316L)			
Diaphragm material	Grade A	PTFE			
	Grade B	Fluororubber			
Weight		360 g	730 g	360 g	730 g

Consistent clean room production
Washed, assembled and inspected in a Class 100 environment, and sealed in double bags

Regulator (Stainless Steel 316) with Port Sizes Rc 3/4, Rc 1

- Regulator made of stainless steel 316 with port sizes Rc 3/4 and Rc 1
- EPDM or FPM is used for valves (seals), O-rings and diaphragms
- Oil-free
  Oil is not used for any of the parts and all wetted parts are degreased.
  Note) Products must be assembled under normal conditions.

Specifications

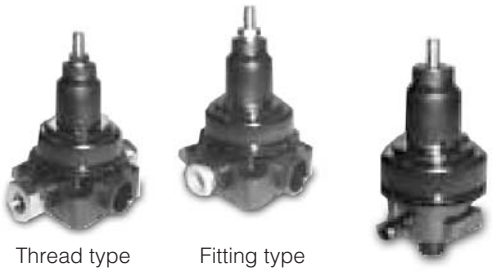
Model	XT13-394-06	XT13-394-10	INA-48-1-06	INA-48-1-10
Port size	Rc 3/4	Rc 1	Rc 3/4	Rc 1
Relief mechanism	Non-relief			
Fluid	Pure water		Air, N_2	
Proof pressure	1.5 MPa			
Max. operating pressure	1.0 MPa			
Set pressure	0.05 to 0.5 MPa			
Ambient and fluid temperatures	5 to 60°C			
Fluid-contact material (metal)	Stainless steel 316			
Diaphragm material	EPDM		Fluororubber	
Mass	2100 g			

Clean Gas Filter
Series SFA/SFB/SFC
Clean AIR Filter
Series SFD

- Integrated production in a clean environment.
  Under a clean environment, all components are washed by ultrasonic wave/ ultra-pure deionized water. Assembly, inspection and antistatic double packaging processes are done in an integrated production system.
- Assembly environment
  Clean room M5.5 (ISO class 7)*
  Clean bench M3.5 (ISO class 5)*
  *Fed.std.209E ( ): based on ISO 14644-1
- Shipping inspection
  At the time of shipment, the SF☐ series clean gas filter, is 100% inspected, and only those that pass our inspection are allowed for delivery.
- Cartridge type
  - 0.1 mm purification test
  - Airtight test
- Disposable type
  - 0.1 mm purification test
  - Helium leak test (SFB, SFC)
  - Airtight test (SFD)

			Series	Filtration	Flow rate ℓ/min (ANR) (Max. flow rate at 0.7 MPa)	Pressure MPa	Temperature °C	Replacement of element
Cartridge type	Disc style		SFA10☐	0.01 µm (Filtering efficiency 99,99%) (Membrane element)	26	0.99	5 to 80	Replaceable
			SFA20☐		70			
			SFA30☐		140			
	Straight style		SFB10☐		45			
			SFB20☐ (Strainer)	Nominal 120 µm (Sintered metallic element)	400			
	Straight style		SFD200	0.01 µm (Filtering efficiency 99,99%) (Hollow fibre elements)	500	1.0 Nitrogen: 0.99 MPa	5 to 45	
	Straight style Made to Order		SFD101 (aluminium)		100			
			SFD102 (Stainless steel)					
Disposable type	Straight style		SFB30☐	0.01 µm (Filtering efficiency 99,99%) (Membrane element)	45	0.99	5 to 120	Non replaceable
	Multiple disc style		SFC10☐		240			
	Straight style		SFD100		100	1.0 Nitrogen: 0.99 MPa	5 to 45	

Special Regulator for Oxygen Concentrator
Series SRA



Thread type Fitting type Barb type

- This regulator is applicable for use with 95% concentration oxygen Oil-free, material resistible against oxygen
- Precise pressure regulation and high repeatability
- Light and compact
- Applicable for use with medical devices

Specifications

Model		SRA200-01	SR200F-08	SRA202-00-X234	SRA202-00-X235
Port size	Inlet	Rc 1/8	ø8 O.D. Tubing	ø4.8 I.D. Tubing	
	Outlet	Rc 1/8	ø8 O.D. Tubing	ø4.8 I.D. Tubing	
Proof pressure		0.45 MPa		0.75 MPa	
Operating pressure	Inlet	0.3 MPa		0.5 MPa	
	Outlet	Set pressure + 0.06 MPa			
Set pressure		0.01 to 0.1		0.13 to 0.15	0.1 to 0.3
Fluid		Oxygen, Air		Argon	
Lubrication		Use no oil and grease			
Relieving structure		Non-relieving type			
Ambient and fluid temperature		0 to 40°C		0 to 40°C	
Flow rate range of operating fluid		0.2 to 6 ℓ/min		0.2 to 5 ℓ/min	0.2 to 2 ℓ/min

How to Order

Thread type
SRA200 – F 01

Thread type

—	Rc
F	G
N	NPT

Port size

01	1/8
02	1/4

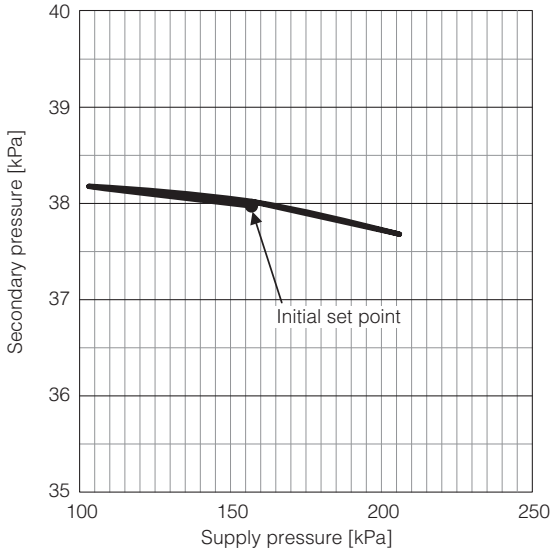
Fitting type
SRA200F – 06

Tubing O.D.

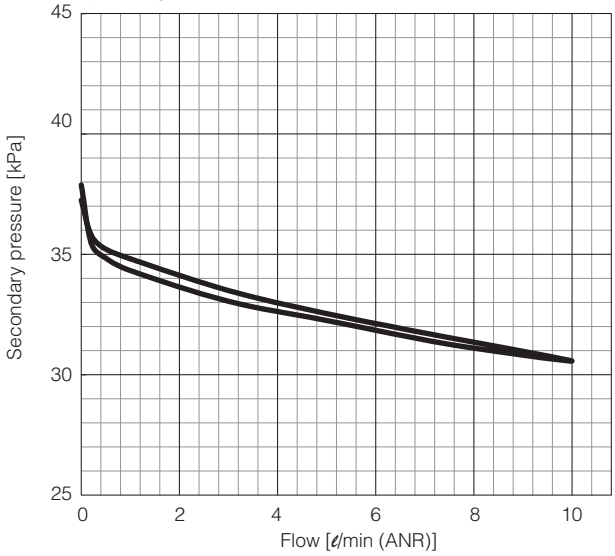
06	6 mm
08	8 mm

Barb type
SRA202 – 00 – X234
SRA202 – 00 – X235

Pressure Characteristics (SRA200, SRA200F)
Initial setting
Supply pressure= 157 kPa
Secondary pressure= 38 kPa
Flow = 5 ℓ/min (ANR)
Operating fluid = Air



Flow Characteristics (SRA200, SRA200F)
Supply air = 157 kPa
Operating fluid = Air



Refrigerated Air Dryer
Series IDFA
High performance, reliable and trouble free compressed air treatment from SMC

- High efficiency heat exchanger
- Ozone friendly refrigerants
- Conforms to stringent ISO8573-1 standards
- State of the art design ensures a constant 3°C pressure dew point
- Environmentally ozone friendly HFC134a and HFC407C refrigerant gases
- Simple control system, incorporating an easy to read evaporator gauge
- Stainless steel heat exchanger providing long life and low pressure drops
- Compact design for ease of installation
- ø10 mm One-touch condensate drain port

Standard Specifications

Model	Operating range			Power supply voltage	Power consumption [W]	Air port connections	Refrigerant	Weight [kg]	Nominal Air Flow Rate [m^3/h (ANR)]		
	Inlet air pressure [bar]	Inlet air temperature [°C]	Ambient temperature [°C]						-,4,- (3°C PDP)	-,5,- (7°C PDP)	-,6,- (10°C PDP)
IDFA3E-23	1.5 to 10	5 to 50	2 to 40 (Relative humidity of 85% or less)	Single phase 230 VAC 50Hz	180	Rc 3/8	R134a (HFC)	18	12	15	17
IDFA4E-23						Rc1/2		22	24	31	34
IDFA6E-23-K	1.5 to 16					Rc 3/4		23	36	46	50
IDFA8E-23-K					208			27	65	83	91
IDFA11E-23-K					385			28	80	101	112
IDFA15E-23-K					470	Rc 1		46	120	152	168
IDFA22E-23-K					760	R1	R407C (HFC)	54	182	231	254
IDFA37E-23-K						R1 1/2		62	273	347	382
IDFA55E-23-L					1130	R2		100	390	432	510
IDFA75E-23-L					1700			116	660	720	822
IDFA100F-40	1.5 to 10	5 to 60	2 to 45 (Relative humidity of 85% or less)	Three phase 400 VAC	2500	R2	R407C (HFC)	245	860	1040	1230
IDFA125F-40					2700	R2 1/2		270	1100	1320	1550
IDFA150F-40						DIN flange 80		350	1340	1690	1920

Note 1) Thread adapters to convert Rc thread to R thread are included with IDFA3E to IDFA15E.
Note 2) The standard condition (ANR) is under the conditions of 20°C at atmospheric preessure and relative humidity of 65%.
Note 3) The performance data for pressure dew point is in accordance with the following operating conditions from ISO 7183: Inlet air pressure: 7 bar; Inlet air temperature: 35°C (saturated); Cooling air temperature: 25°C.

ø2 Piping Series
Series KJ•M•AS•TU

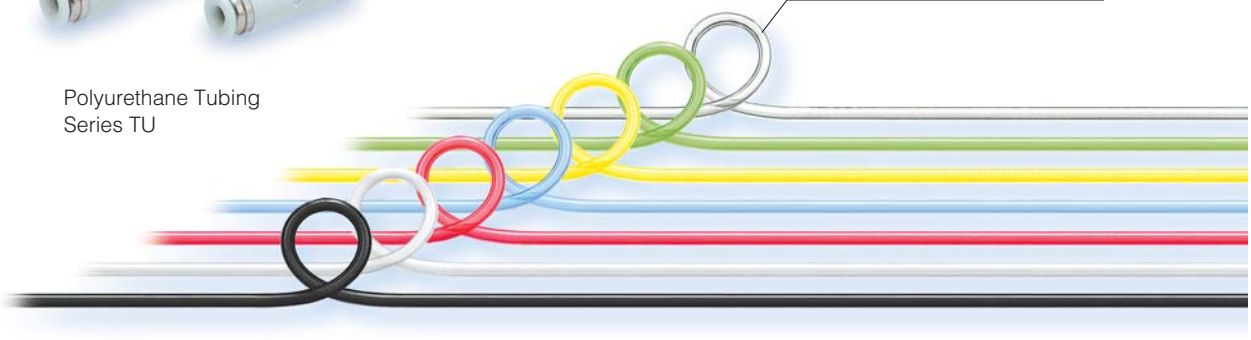
One-touch Mini
Series KJ

Miniature Fittings
Series M

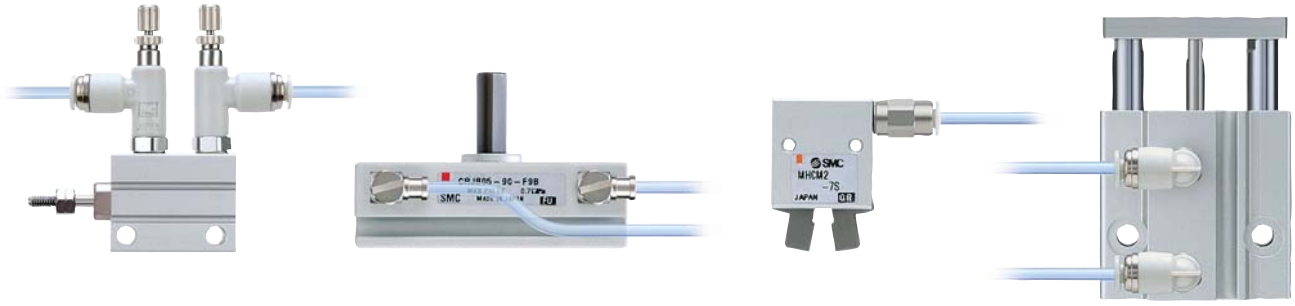
Speed Controller
with One-touch Fittings
Series AS

Minimum bending radius: 4 mm

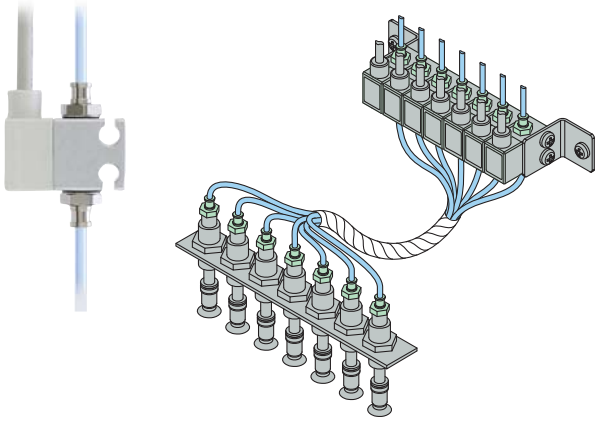
Polyurethane Tubing
Series TU

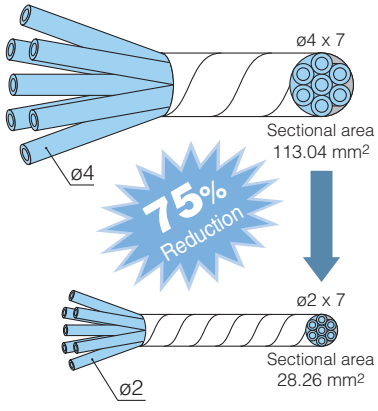


Piping for compact actuators



Piping for compact pressure sensors

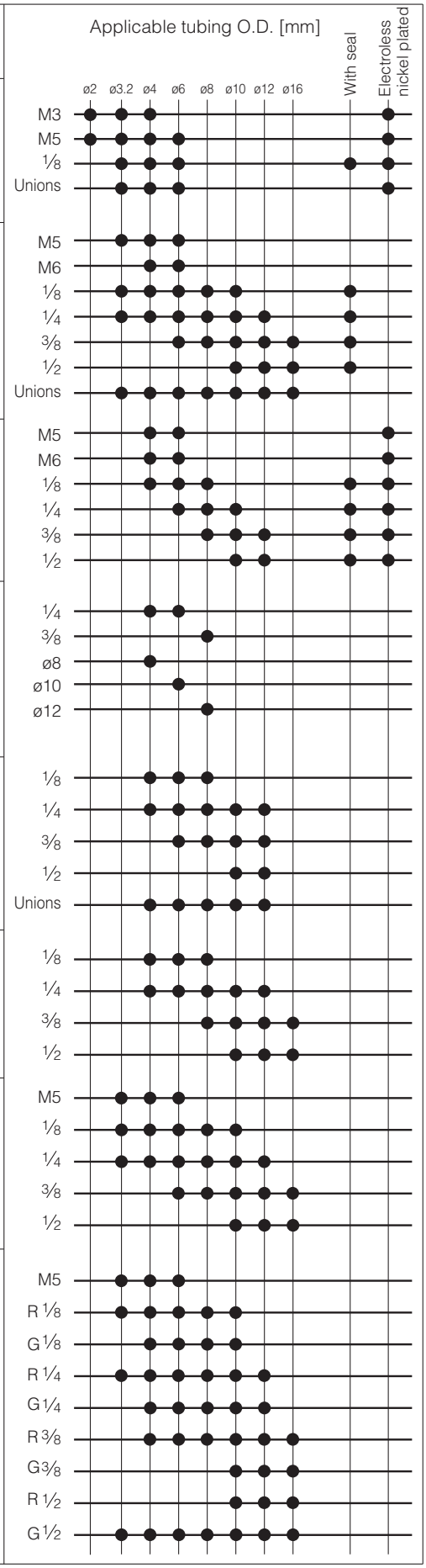




Fittings & Tubing

General Purpose Fittings Series

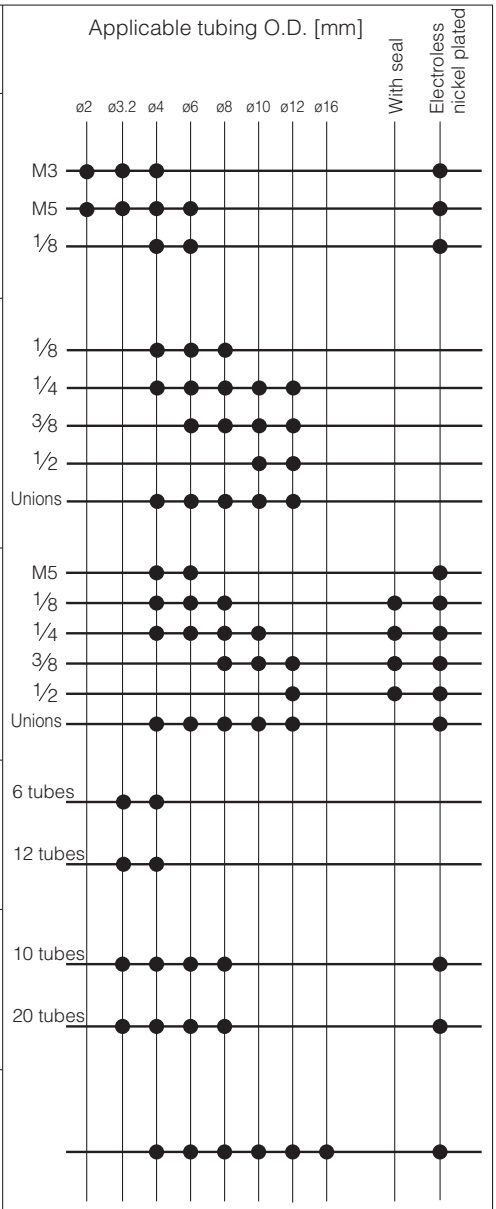
Variations		Applicable tubing material
One-touch Mini **Series KJ** One-touch connection and release Possible to use in vacuum to –100 kPa Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA
One-touch Fittings **Series KQ2** One-touch connection and release Possible to use in vacuum to –100 kPa Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA
Rotary One-touch Fittings **Series KS** (Standard) **Series KX** (High speed) Low-torque rotation for fast swivel and oscillating applications Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA
One-touch Fittings/Manifold **Series KM** One-touch connection and release One-touch In/Out connection for compact and concentrated tubing applications Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA
Insert Fittings **Series KF** Possible to use in vacuum to –101.3 kPa Applicable tubing – Metric size		Nylon Soft nylon Polyurethane Polyolefin Soft polyolefin FEP, Super PFA Denatured PTFE
Stainless Steel 316 Insert Fittings **Series KFG2** Compact and light Rubber material is not used (except swivel elbow) Grease free		FEP, PFA, Modified PTFE, Nylon, Soft nylon, Polyurethane, Soft polyurethane, Hard polyurethane, Polyolefin, Soft polyolefin, antistatic soft nylon, antistatic polyurethane
Stainless Steel 316 One-touch Fittings **Series KQG2** Compact and light Seal parts: Special FKM Grease free		FEP, PFA, Nylon, Soft nylon, Polyurethane, Polyolefin
Metal One-touch Fittings **Series KQB2** Compact and light Grease free		FEP, PFA, Nylon, Soft nylon, Polyurethane, Polyolefin



Fittings & Tubing

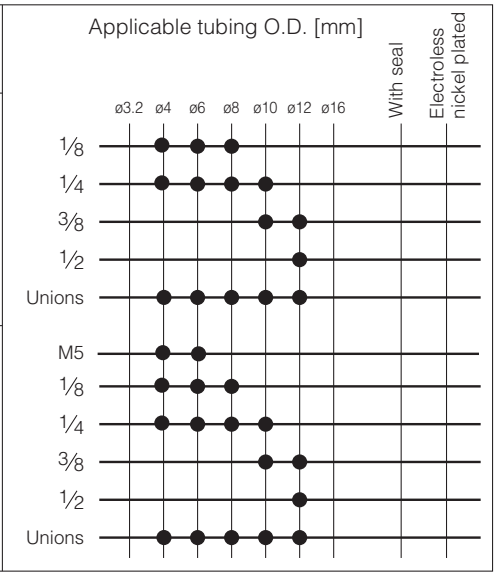
General Purpose Fittings Series

Variations		Applicable tubing material
Miniature Fittings **Series M** Tubing connection/disconnection without use of tools Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP Denatured PTFE
Self-align Fittings **Series H/DL/L/LL** Accepts soft copper tube Applicable tubing – Metric size		Nylon Soft nylon Soft copper (C1220T-0)
Tube Coupler **Series KC** One-touch connection and release Built-in self-seal mechanism Applicable tubing – Metric size		Nylon Soft nylon Polyurethane
Multi-connector with One-touch Fittings **Series DMK** Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA
Rectangular Multi-connector **Series KDM** Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA
Piping Module **Series KB** Centralised distribution of supply air Applicable tubing – Metric size		Nylon Soft nylon Polyurethane FEP PFA



Clean Series Fittings

Variations		Applicable tubing material
For air Blow applications Clean One-touch Fittings **Series KP** Applicable tubing – Metric size		Recomended: Polyolefin Soft Polyolefin
For driving System Air Piping Clean One-touch Fittings **Series KPQ/KPG** Applicable tubing – Metric size		Polyurethane: Serie 10-

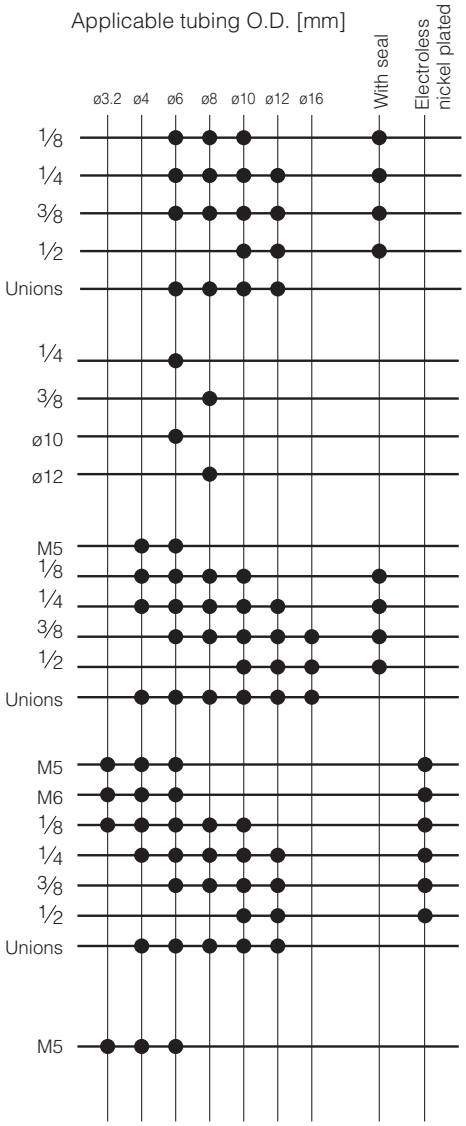


Fittings & Tubing

Fitting Series for Special Environments

Variations	Applicable tubing material
FR One-touch Fittings **Series KR** For use where weld spatter is generated Flame resistant material UL-94, V-0 Applicable tubing – Metric size 	FR Soft nylon FR Double layer
FR One-touch Fittings Manifold **Series KRM** For use where weld spatter is generated Flame resistant material UL-94, V-0 Applicable tubing – Metric size 	FR Soft nylon FR Double layer
One-touch Fittings **Series KG** For use in corrosive environments Stainless series Applicable tubing – Metric size 	Nylon Soft nylon Polyurethane FEP PFA
Antistatic One-touch Fittings **Series KA** For preventing static electricity Applicable tubing – Metric size 	Antistatic Soft nylon Antistatic Polyurethane
Miniature Fittings **Series MS** For use in corrosive environments Stainless steel (SUS316) Applicable tubing – Metric size 	Nylon Soft nylon Polyurethane FEP Denatured PTFE

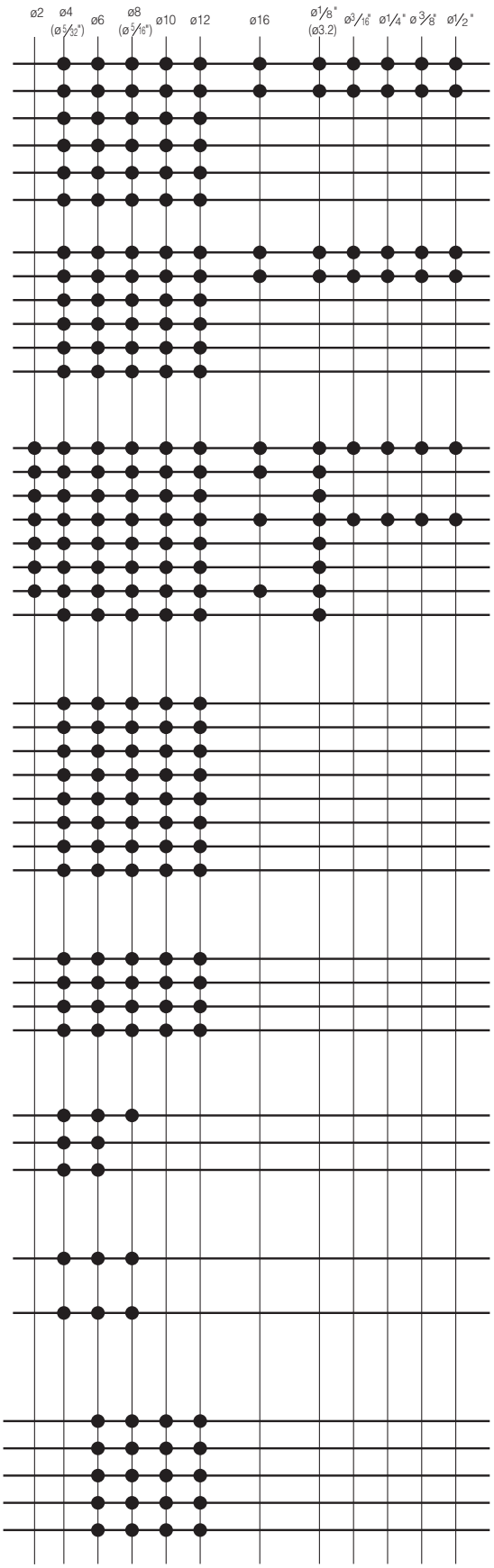
Applicable tubing O.D. [mm]



Fittings & Tubing

Tubing

Variations	Colour	Tubing O.D.
		Metric size [mm] / Inch size [inch]
Nylon Tubing **Series T/TIA**  General tubing 1.5 MPa max. at 20°C	Black, White, Red, Blue, Yellow, Green	
Soft Nylon Tubing **Series TS/TISA**  Slightly flexible 1.0 MPa max. at 20°C	Black, White, Red, Blue, Yellow, Green	
Polyurethane Tubing **Series TU/TIUB**  Flexible 0.8 MPa max. at 20°C	Black, White, Red, Blue, Yellow, Green, Clear, Orange	
Soft Polyurethane Tubing **Series TUS**  Extremely flexible 0.6 MPa max. at 20°C	Black, White, Red, Blue, Yellow, Green, Translucent, Yellow brown	
Hard Polyurethane Tubing **Series TUH**  0.8 MPa standard type, 1.0 MPa for high pressure type	Black, White, Blue, Translucent	
Polyurethane Coil Tubing **Series TCU**  For flexible and moving applications	1 core, 2 cores, 3 cores	
Polyurethane Flat Tubing **Series TFU**  For flexible multi-tube applications	2 cores, 3 cores	
FR Soft Nylon Tubing **Series TRS**  Use in spatter generating atmosphere/Flame resistant material. Flame resistance (Equivalent to UL-94 standard, V-0)	Black, White, Red, Blue, Green	



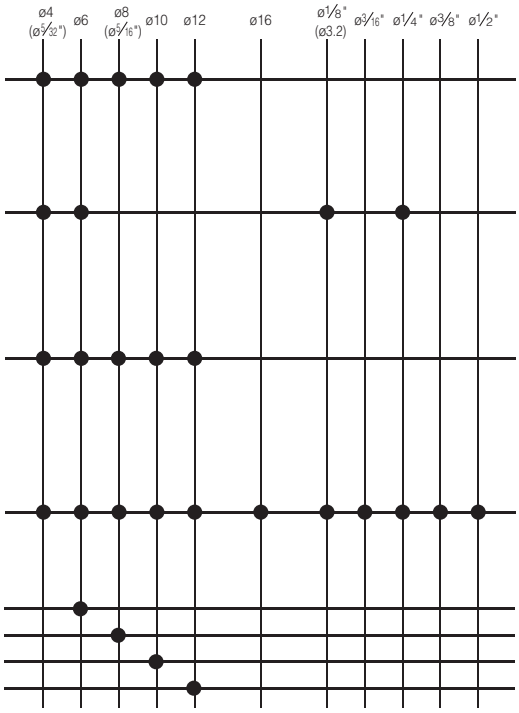
Fittings & Tubing

Tubing

Variations	Colour	Tubing O.D. (Metric size [mm] / Inch size [inch])
FR Double Layer Tubing **Series TRB**  Flame resistance (Equivalent to UL-94 standard, V-0)	Black White Red Blue Yellow Green	
FR Double Layer Polyurethane Tubing **Series TRBU**  Flame resistance (Equivalent to UL-94 standard, V-0)	Black White Red Blue Yellow Green	
Antistatic Polyurethane Tubing **Series TAU** 	Black	
Antistatic Soft Nylon Tubing **Series TAS** For preventing static electricity 	Black	
Super PFA High Purity Fluoropolymer Tubing **Series TL/TIL** Outstanding corrosion resistance. Food Sanitation Law compliant. 	Translucent	
PFA Fluoropolymer **Series TLM/TILM** Outstanding corrosion resistance. Passed The Food Sanitation Act Compliance test and FDA Elution testing 	Black Red Blue Translucent	
FEP Fluoropolymer Tubing **Series TH/TIH** Outstanding corrosion resistance. Food Sanitation Law compliant. 	Black Red Blue Translucent	
Denatured PTFE Tubing **Series TD/TID** Outstanding corrosion resistance. Food Sanitation Law compliant. 	Translucent	
Clean tubing Polyolefin Tubing **Series TPH** 	Black White Red Blue Yellow Green	
Clean tubing Soft Polyolefin Tubing **Series TPS** 	Black White Red Blue Yellow Green	

Tubing O.D.: ø2 ø3 ø4 (ø5/32") ø6 ø8 (ø5/16") ø10 ø12 ø16 ø19 ø25 | ø1/8" (ø3.2) ø3/16" ø1/4" ø3/8" ø1/2" ø3/4" ø1" ø1 1/4"

Fittings & Tubing Tools

	Variations		Colour	Tubing O.D.
Related Products	Multi-tube Holder **Series TM**			
	Tube Releasing Tool **Series TG**			
	Tube Stand & Tube Reel **Series TB/TBR**			
	Tube Cutter **Series TK**	 		
	Double Layer Tube Stripper **Series TKS** The outer layer for double layer tubing, Series TRB, TRBU is peeled off easily.		Orange Yellow Blue Green	

Metric size [mm] | Inch size [inch]

ø4 (ø5/32") ø6 ø8 (ø5/16") ø10 ø12 ø16 ø1/8" (ø3.2) ø5/16" ø1/4" ø3/8" ø1/2"

Rotary Joint	Low Torque Metal Seal Type Rotary Joint **Series MQR**		Number of circuits (number of ports): 1, 2, 4, 8, 12, 16
Blow Gun	Blow Gun **Series VMG**		Pressure loss is less than 1%.
Nozzles	Nozzles for Blowing **Series KN**		Nozzle system for air blowing and back pressure sensing.

S Couplers
Series KK□

S Couplers with sleeve lock
Series KK

Series KK3/4/6

Series KK2

Male thread type

Series	Port size					
	M5	R1/8	R1/4	R3/8	R1/2	R3/4
KK2	●	●				
KK3		●	●	●		
KK4		●	●	●	●	
KK6				●	●	●

Female thread type

Series	Port size				
	M5	Rc1/8	Rc1/4	Rc3/8	Rc1/2
KK2	●				
KK3		●	●	●	
KK4			●	●	
KK6				●	●

Nut fitting type (for reinforced urethane hose)

Series	Applicable hose I.D./O.D. [mm]					
	5/8	6/9	6.5/10	8/12	8.5/12.5	11/16
KK3	●	●	●			
KK4	●	●	●	●	●	
KK6				●	●	●

One-touch fitting type (Straight/Elbow/Bulkhead)

Series	Applicable tubing O.D. [mm]						
	ø3.2	ø4	ø6	ø8	ø10	ø12	ø16
KK2	●	●	●				
KK3		●	●	●	●		
KK4			●	●	●	●	
KK6						●	●

S Couplers without sleeve lock
Series KKH

Male thread type

Series	Port size			
	R1/8	R1/4	R3/8	R1/2
KKH3	●	●	●	
KKH4	●	●	●	●

Female thread type

Series	Port size		
	Rc1/8	Rc1/4	Rc3/8
KKH3	●	●	●
KKH4		●	●

Nut fitting type (for reinforced urethane hose)

Series	Applicable hose I.D./O.D. [mm]				
	5/8	6/9	6.5/10	8/12	8.5/12.5
KKH3	●	●	●		
KKH4	●	●	●	●	●

Stainless steel type
Series KKA

Male/Female thread type

Series	Port size							
	R·Rc1/8	R·Rc1/4	R·Rc3/8	R·Rc1/2	R·Rc3/4	R·Rc1	R·Rc1 1/4	R·Rc1 1/2
KKA3	●	●	●					
KKA4		●	●	●				
KKA6			●	●	●			
KKA7				●	●	●		
KKA8					●	●	●	
KKA9						●	●	●

Energy saving by pressure loss reduction
Series KK130

Male thread type

Series	Port size							
	R1/8	R1/4	R3/8	R1/2	NPT1/8	NPT1/4	NPT3/8	NPT1/2
KK130	●	●	●	●	●	●	●	●

Female thread type

Series	Port size							
	R1/8	R1/4	R3/8	R1/2	NPT1/8	NPT1/4	NPT3/8	NPT1/2
KK130	●	●	●	●	●	●	●	●

Barb fitting type (for rubber hose)

Series	Hose nominal			
	1/4"	1/4"	3/8"	1/2"
KK130	●	●	●	●

Nut fitting type (for fiber reinforced urethane hose)

Series	Applicable hose I.D./O.D. [mm]					
	5/8	6/9	6.5/10	8/12	8.5/12.5	11/16
KK130	●	●	●	●	●	●

One-touch fitting type

Series	Applicable tube O.D.							
	6	8	10	12	1/4"	5/16"	1/4"	5/16"
KK130	●	●	●	●	●	●	●	●

Miniaturization of equipment

• Space Saving Products series now available for further miniaturisation.

CUJ Series

• Mini Free-Mount Cylinder

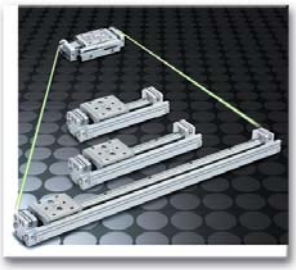
CXSJ Series

• Dual Rod Cylinder

MGJ Series

• Miniature Guide Rod Cylinder

MXY Series



• Air Slide Table
  - Long stroke: Max. stroke: 400 mm

MXP Series

• Air Slide Table
  - Short stroke: Max. stroke: 30 mm

MTS Series

• Precision Cylinder

CRJ Series

• Rotary Actuator
  - Single rack-and-pinion type

MSQ Series

• Rotary Actuator
  - Double rack-and-pinion type

CJ5/CG5 Series

• Stainless Steel Cylinder

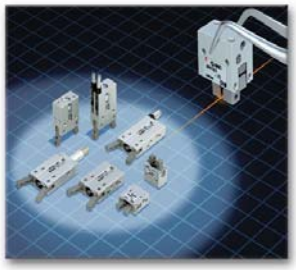
LAT3 Series

• Card Motor

PSE Series

• Pressure Sensors

MH Series



• Air Grippers

Simplified Options
Electric Actuators

Electric Cylinders
Series LZ

- Able to operate the stroke with only ON/OFF signals. It can be operated like an air cylinder
- Simple extension and retraction motion control
- Thrust control
- Suitable for an environment where an air supply is not available
- Two sizes that offer an equivalent thrust to a ø16 and ø25 air cylinder

Basic Specifications

Thrust	Horizontal mounting: Up to 80 N (LDZ□3) Vertical mounting: Up to 40 N (LDZ□3L) Horizontal mounting: Up to 196 N (LDZ□5) Vertical mounting: Up to 100 N (LDZ□5L)
Speed	Up to 200 mm/s
Standard strokes	25, 40, 50, 100, 200 mm
Motor type	24 VDC

∗ Contact SMC for detailed specifications and how to order

e-Rodless Actuator
Series E-MY2

- No programming required
- Realising electric controllability similar to that of an air cylinder by 3 step operation
- Basic Type: Series E-MY2B
- Light-load transfer; combining with another guide; stroke accuracy is required
- Cam Follower Guide Type: Series E-MY2C. Workpiece direct mounting; table and stroke accuracy are required
- Linear Guide Single Axis Type: Series E-MY2H. Workpiece direct mounting without restriction of mounting direction; table and stroke accuracy are required
- Linear Guide Double Axis Type: E-MY2HT. Workpiece direct mounting without restriction of mounting direction; table and stroke accuracy are required especially when a heavy load or moment is applied

Basic Specifications

Maximum load weight		Up to 10 kg (E-MY2□16) Up to 20 kg (E-MY2□25)
Speed	E-MY2B, E-MY2C	10 up to 1000 mm/s
	E-MY2H, E-MY2T	10 up to 2000 mm/s
Standard strokes	E-MY2B, E-MY2C	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000 mm
	E-MY2H, E-MY2T	50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600 mm
Motor type		Stepper with encoder

∗ Contact SMC for detailed specifications and how to order

Card Motor
Series LAT3

- System size reduction: linear motor, linear guide and position sensor integrated into one unit
- 3 in 1: transfer, force control & measurement
- Compact and lightweight: 9 mm thick, 130 g
- Easy programming and operating setting
- High precision and reduced cycle time: max. operating frequency 500 cpm

Basic Specifications

Maximum load weight	Horizontal mounting: 500 g Vertical mounting: 100 g (LAT3□-10, LAT3□-20) Vertical mounting: 50 g (LAT3□-30)
Speed	1 to 400 mm/s
Standard strokes	10, 20, 30 mm
Motor type	Linear motor

∗ Contact SMC for detailed specifications and how to order

More Advanced Options
Electric Actuators

2 Finger Electric Gripper
Series LEHZ

- Compact and light, various gripping forces
- Drop prevention function (self-lock mechanism) is provided
- Energy saving: power consumption reduced by self-lock mechanism
- Gripping check function is provided

Size	Stroke (Both sides) [mm]	Gripping force [N]		Opening/ closing speed [mm/s]	Weight [g]	
		Standard	Compact		Standard	Compact
10	4	6 to 14	2 to 6	5 to 80	165	135
16	6		3 to 8		220	190
20	10	16 to 40	11 to 28	5 to 100	430	365
25	14				585	520
32	22	52 to 130	—	5 to 120	1120	—
40	30	84 to 210	—		1760	—

2 Finger Electric Gripper With Dust Cover
Series LEHZJ

- Sealed-construction dust cover
- Drop prevention function (self-lock mechanism) is provided
- Energy saving: power consumption reduced by self-lock mechanism
- Gripping check function is provided

Size	Stroke (Both sides) [mm]	Gripping force [N]		Opening/ closing speed [mm/s]	Weight [g]	
		Standard	Compact		Standard	Compact
10	4	6 to 14	3 to 6	5 to 80	170	140
16	6		4 to 8		230	200
20	10	16 to 40	11 to 28	5 to 100	440	375
25	14				545	610

2 Finger Electric Gripper
Series LEHF

- Long stroke, can hold various types of workpieces
- Drop prevention function (self-lock mechanism) is provided
- Energy saving: power consumption reduced by self-lock mechanism
- Gripping check function is provided

Size	Stroke (Both sides) [mm]	Gripping force [N]	Opening/ closing speed [mm/s]	Weight [g]
10	16 (32)	3 to 7	5 to 80	340 (370)
20	24 (48)	11 to 28	5 to 100	610 (750)
32	32 (64)	48 to 120		1625 (1970)
40	40 (80)	72 to 180		1980 (2500)

( ): For long stroke specification

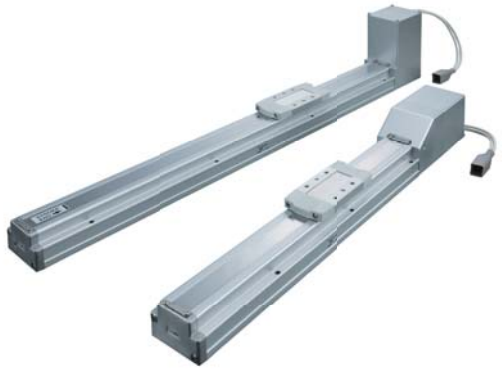
3 Finger Electric Gripper
Series LEHS

- Can hold round workpieces
- Drop prevention function (self-lock mechanism) is provided
- Energy saving: power consumption reduced by self-lock mechanism
- Gripping check function is provided

Size	Stroke/ Diameter [mm]	Gripping force [N]		Opening/ closing speed [mm/s]	Weight [g]	
		Standard	Compact		Basic	Compact
10	4	2.2 to 5.5	1.4 to 3.5	5 to 70	185	150
20	6	9 to 22	7 to 17	5 to 80	410	345
32	8	36 to 90	—	5 to 100	975	—
40	12	52 to 130	—	5 to 120	1265	—

More Advanced Options
Electric Actuators

Electric Actuator Slider Type
Series LEF

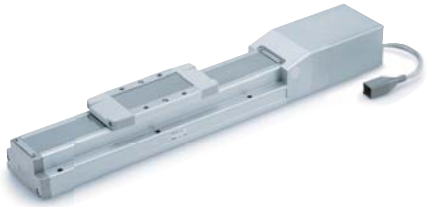


- Low profile actuator (46 mm height for size 16)
- Simple installation: possible to mount the main body without removing the external cover
- Two transmission options: Ball screw / Belt
- Three motor options: Step / Servo motor/AC Servo motor

LEFB (Belt drive)

Size	Stroke [mm]	Work load [kg] horizontal		Speed [mm/s]		Lead equivalent [mm]	Positioning repeatability [mm]
		Step motor (24 VDC)	Servo motor (24 VDC)	Step motor (24 VDC)	Servo motor (24 VDC)		
16	300 to 1000	1	1	48 to 1100	48 to 2000	48	± 0.1
25	300 to 2000	5	2	48 to 1400	48 to 2000		
32	300 to 2000	14	—	48 to 1500	—		

Electric Actuator Slider Type
Series LEFS40



- Maximum workload 60 kg
- Compact design

LEFS (Ball screw drive)

Size	Stroke [mm]	Work load [kg]						Speed [mm/s]			Screw lead [mm]	Positioning repeatability [mm]
		Step motor (Servo 24 VDC)		Servo motor (24 VDC)		AC servo motor (100V/200)		Step motor (24 VDC)	Servo motor (24 VDC)	AC servo motor (100V/200)		
		Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical					
16	100 to 400	9	2	7	2	—	—	10 to 500		—	10	± 0.02
		10	4	10	4	—	—	5 to 250		—	5	
25	100 to 600	20	7.5	11	2.5	20	8	12 to 500		max. 900	12	
		20	15	18	5	20	15	6 to 250		max. 450	6	
32	100 to 800	40	10	—	—	40	10	16 to 500		max. 1000	16	
		45	20	—	—	45	20	8 to 250		max. 500	8	
40	200 to 1000	50	—	—	—	50	15	20 to 500		max. 1000	20	
		60	23	—	—	60	30	10 to 250		max. 500	10	

More Advanced Options
Electric Actuators

Electric Actuator Rod Type
Series LEY

• Parallel Motor Type
Series LEY□

• In-line Motor Type
Series LEY□D

- Ball screw drive actuator with servo motor or step motor
- Positioning repeatability ±0,02 mm
- Standard auto-swtiches can be mounted
- Mounting flexibility three positions for direct mounting and three types of mounting brackets, plus rod end brackets
- Motor mounting direction can be selected
- Long stroke: Max. 500 mm

Size	Stroke [mm]	Pushing force [N]			Work load [kg] vertical			Work load [kg] horizontal			Speed [mm/s]		Screw lead [mm] Note 2)	Positioning repeatability [mm]
		Step motor (24 VDC)	Servo motor (24 VDC)	AC Servo motor Note 1)	Step motor (24 VDC)	Servo motor (24 VDC)	AC Servo motor Note 1)	Step motor (24 VDC)	Servo motor (24 VDC)	AC Servo motor	Step/Servo motor (24 VDC)	AC Servo motor Note 1) Note 3)		
16	30 to 300	38	30	—	2	2	—	6	3	—	15 to 500	—	10	± 0.02
		74	58	—	4	4	—	17	6	—	8 to 250	—	5	
		141	111	—	8	8	—	30	12	—	4 to 125	—	2.5	
25	30 to 400	122	35	131	8	3	8	18	7	18	18 to 500	max. 900/600/–	12	
		238	72	255	16	6	16	50	15	50	9 to 250	max. 450/300/–	6	
		452	130	485	30	12	30	50	30	50	5 to 125	max. 225/150/–	3	
32	30 to 500	189	—	157 (197)	11	—	9 (12)	30	—	30	24 to 500	max. 1200/1200/800 (1000/1000/640)	16 (20)	
		370	—	308 (385)	22	—	19 (24)	60	—	60	12 to 150	max. 600/600/400 (500/500/320)	8 (10)	
		707	—	588 (736)	43	—	37 (46)	60	—	60	6 to 125	max. 300/300/200 (250/250/160)	4 (5)	

Note 1) Valves within brackets refer to in-line motor types LEY32DS.
Note 2) Valves within brackets refer to parallel motor types LEY32S.
Note 3) The allowable speed changes depending on the stroke. Valves as follow a/b/c:
a: max. speed for stroke range to 300
b: max. speed for stroke range to 305 to 400
b: max. speed for stroke range to 405 to 500

Electric Actuator Guide Rod Type
Series LEYG

• Parallel Motor Type
Series LEYG□

• In-line Motor Type
Series LEYG□D

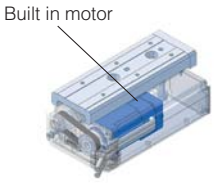
- High rigidity through additional guide rods
- Two motor types available: step motor and servo motor

Size	Stroke [mm]	Pushing force [N]		Work load [kg] vertical		Work load [kg] horizontal		Speed [mm/s]	Screw lead [mm]	Positioning repeatability [mm]
		Step motor (24 VDC)	Servo motor (24 VDC)	Step motor (24 VDC)	Servo motor (24 VDC)	Step motor (24 VDC)	Servo motor (24 VDC)	Step/Servo motor (24 VDC)		
16	30 to 300	38	30	1.5	1.5	6	3	15 to 500	10	± 0.02
		74	58	3.5	3.5	17	6	8 to 250	5	
		141	111	7.5	2	30	12	4 to 125	2.5	
25	30 to 400	122	35	7	5	18	7	18 to 500	12	
		238	72	15	11	50	15	9 to 250	6	
		452	130	29	—	50	30	5 to 125	3	
32	30 to 500	189	—	9	—	30	—	24 to 500	16	
		370	—	20	—	60	—	12 to 150	8	
		707	—	41		60	—	6 to 125	4	

More Advanced Options
Electric Actuators

Electric Slide Table
Series LESH□R

- Compact and space saving by built-in motor.
- Up to 64 points positioning
- Reduced tact time: max. Acceleration 5000 mm/s^2, maximum speed 400 mm/s
- Two mounting positions (top & bottom)



Size	Stroke [mm]	Work load [kg]				Speed [mm/s]	Screw lead [mm]	Positioning repeatability [mm]
		Step motor (Servo 24 VDC)		Servo motor (24 VDC)				
		Horizontal	Vertical	Horizontal	Vertical			
8	50, 75	2	0.5	2	0.5	10 to 200	4	± 0.05
		1	0.25	1	0.25	20 to 400	8	
16	50, 100	6	2	5	2	10 to 200	5	
		4	1	2.5	1	20 to 400	10	
25	50, 100, 150	9	4	6	2.5	10 to 150	8	
		6	2	4	1.5	20 to 400	16	

Electric Slide Table / In-line Motor Type
Series LESH□D

- Compact unit with a reduction in width and height
- Width dimension shortened by up to 45%
- Up to 64 points positioning
- Reduced tact time: max. Acceleration 5000 mm/s^2

Model		LESH8D(A)		LESH16D(A)		LESH25D	
Screw lead [mm]		4	8	5	10	8	16
Thrust [N]	Step motor	15	10	55	35	180	100
	Servo motor	11	7.5	35	20	—	
Work load for vertical mount [kg]	Step motor	0.5	0.25	2	1	4	2
	Servo motor	0.5	0.25	2	1	—	
Maximum speed [mm/s]		200	400	200	400	150	400
Stroke [mm]		50 ~ 75		—	—	50 ~ 150	

Electric Side Table / Symmetrical Type
Series LESH□L

- Space saving achieved when installed in parallel
- Up to 64 points positioning
- Two motor options: Step / Servo motor
- Protection against falling from work pieces

Model		LESH8L□		LESH16L□		LESH25L□	
Stroke [mm]		50, 75		50, 100		50, 100, 160	
Work load [kg]	Horizontal	2	1	6	4	9	6
	Vertical	0,5	0,25	2	1	4	2
Pushing force [N]	Step motor [30 % to 70 %]	6 to 15	4 to 10	23.5 to 55	15 to 35	77 to 180	43 to 100
	Servo motor [50 % to 100 %]	7.5 to 11	5 to 7.5	17.5 to 35	10 to 20	18 to 36	12 to 24
Speed [mm/s]		10 to 200	20 to 400	10 to 200	20 to 400	10 to 150	20 to 400
Pushing speed [mm/s]		10 to 20	20	10 to 20	20	10 to 20	20
Positioning repeatability		± 0,05 mm					
Screw lead [mm]		4	8	5	10	8	16
Operating temp. range		5 to 40°C (no condensation and freezing)					
Operating humidity range		35 to 85% (no condensation and freezing)					
Motor type		LESH□L: Step motor (servo / 24VDC) LESH□LA: Servo motor (24 VDC)					

More Advanced Options
Electric Actuators

Electric Rotary Table
Series LER

- Compact, Electric Rotary Table.
- Up to 64 positioning points.
- Max. Rotation angle 320°.
- Max. Torque 10 Nm.
- Max. acceleration 3000°/s².

Size	Rotating torque [N·m]		Max. speed [°/s]		Positioning repeatability [°]	
	Basic	High torque	Basic	High torque	Basic	High torque
10	0.2	0.3	420	280	±0.05 (End: ±0.01)*	
30	0.8	1.2				
50	6.6	10				

* Value when an external stopper is mounted.

Controller/Driver
Series LEC

LECP1 Controller
- Compatible with actuators Series LES, LEH, LEY, LEF, LER.
- Applicable to 14 points of positioning.
- Speed and acceleration 16-level adjustment vie switches.
- No software to put into operation.

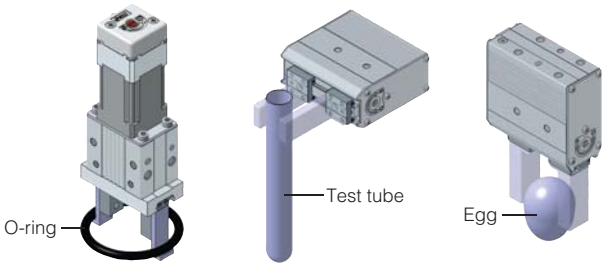
LECP6/LECA6 Controller
- Compatible with actuators Series LES, LEH, LEY, LEF, LER.
- Two types: to control step motor and servo motor.
- Used for positioning up to 64 positions in the positioning or force mode.
- Software or teaching box for programming the parameters.

LECSA Driver
- Compatible with actuators Series LEY, LEF.
- Pulse input type.
- Incremental encoder compatible.
- Compatible motor capacity: 100 W, 200 W, 400 W.
- Software for programming the parameters.

LECSB Driver
- Compatible with actuators Series LEY, LEF.
- Pulse input type.
- Absolute encoder compatible.
- Compatible motor capacity: 100 W, 200 W, 400 W.
- Software for programming the parameters.

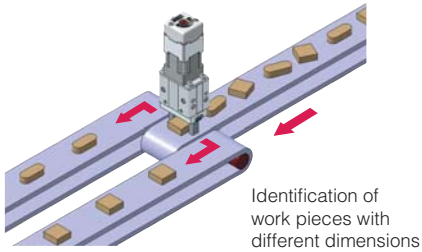
Applications

• Gripping of components that are easily deformed or damaged

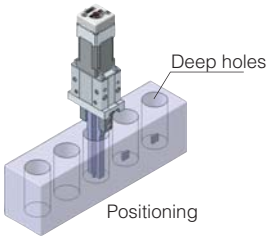


Speed and gripping force control and positioning

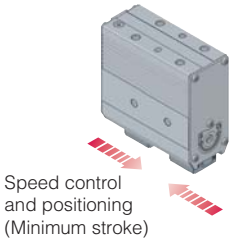
• Alignment and selection of randomly lined parts



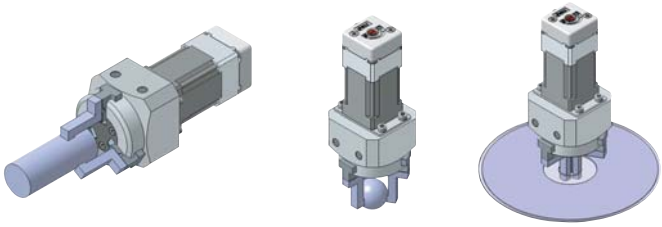
• Gripping in a narrow space



• Soft touch/High frequency

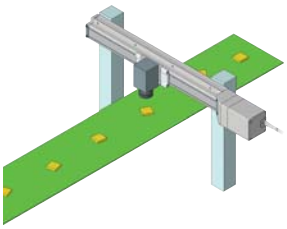


• Gripping of cylindrical and spherical parts

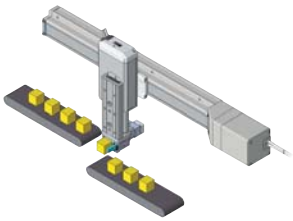


Speed and gripping force control

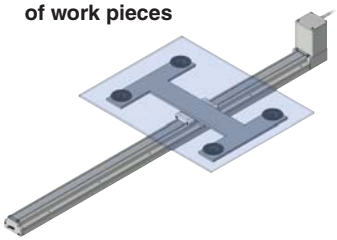
• Precise positioning of work pieces



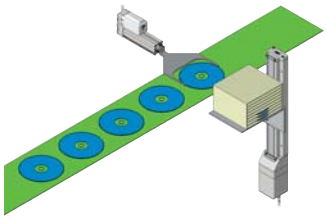
• Pick and place



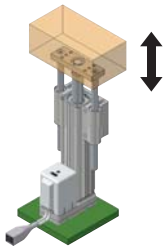
• Load and unload transfer of work pieces



• Vertical transfer

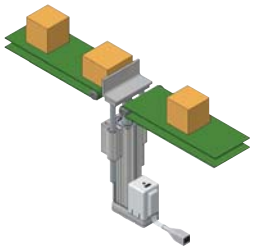


• Lifter



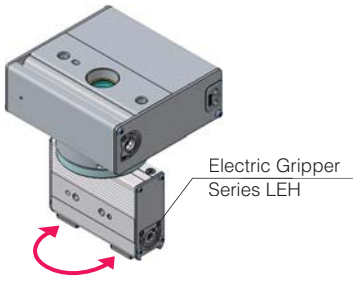
LEYG□M (Slide bearing)
LEYG□L (Ball bushing bearing)

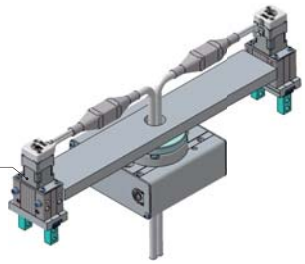
• Stopper



LEYG□M (Slide bearing)

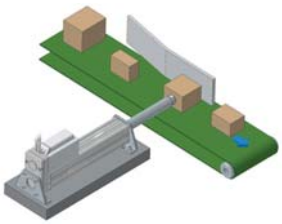
• Rotation



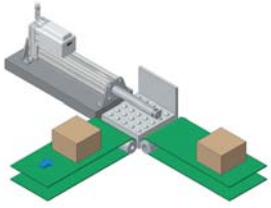


Rotation transfer after gripping
in combination with a gripper

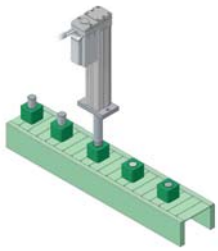
• Pushing operation



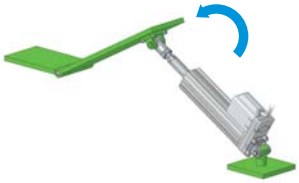
• Delivery



• Press fitting



• Rotation



Electro-Pneumatic Pressure Regulator
Series ITV

- Stepless control of air pressure proportional to an electrical signal
- Sensitivity: 0.2 kPa (100 kPa specification)
- Linearity: Within ±1% (F.S.)
- Hysteresis: Within 0.5 % (F.S.)
- IP65
- CE (Series ITV0000/1000/2000/3000)

Series ITV0000
6 ℓ/min(ANR)*

Series ITV3000
4000 ℓ/min(ANR)

Series ITV1000
200 ℓ/min(ANR)*

- Parts in contact with fluids are oil free.
- Residual pressure is Zero with no electrical signal.

Controller for electro-pneumatic pressure regulator
Series IC

Digital signal is converted to analogue signal.

Series ITV2000
1500 ℓ/min(ANR)*

Electro-Pneumatic Pressure Regulator / Fieldbus compatibility
Series ITV1000/2000/3000

- Fieldbus compatibility added to series ITV1000/2000/3000 specifications.
- Reduced wiring.
- Now with RS-232C serial communications capability.
- CC-Link, DeviceNet, Profibus

∗ Pressure range 0.9 MPa. Supply pressure 1.0 MPa. Set Pressure 0.6 MPa.

	Series	Input	Model	Set pressure range	Sensitivity	Accuracy
Electro-pneumatic pressure regulator	**Series ITV0000** 6 ℓ/min (ANR)* 	Current DC 4 to 20 mA (Sink type) Current DC 0 to 20 mA (Sink type) Voltage DC 0 to 5 V Voltage DC 0 to 10 V	ITV001	0.001 ~ 0.1 MPa	0.2 kPa	Linearity Within ±1% F.S. Hysteresis Within 0.5% F.S.
			ITV003	0.001 ~ 0.5 MPa	1.0 kPa	
			ITV005	0.001 ~ 0.9 MPa	1.8 kPa	
			ITV009	-1 ~ -100 KPa	0.2 kPa	
	Series ITV1000 200 ℓ/min (ANR)* • Parts in contact with fluids are oil free. 	Current DC 4 to 20 mA (Sink type) Current DC 0 to 20 mA (Sink type) Voltage DC 0 to 5 V Voltage DC 0 to 10 V CC-Link compatible DeviceNet™ compatible PROFIBUS DP compatible RS-232C communication	ITV101	0.005 ~ 0.1 MPa	0.2 kPa	
			ITV103	0.005 ~ 0.5 MPa	1.0 kPa	
			ITV105	0.005 ~ 0.9 MPa	1.8 kPa	
	Series ITV2000 1500 ℓ/min (ANR)* 		ITV201	0.005 ~ 0.1 MPa	0.2 kPa	
			ITV203	0.005 ~ 0.5 MPa	1.0 kPa	
			ITV205	0.005 ~ 0.9 MPa	1.8 kPa	
	Series ITV3000 4000 ℓ/min (ANR)* 		ITV209	-1.3 ~ -80 kPa	0.16 kPa	
			ITV301	0.005 ~ 0.1 MPa	0.2 kPa	
			ITV303	0.005 ~ 0.5 MPa	1.0 kPa	
			ITV305	0.005 ~ 0.9 MPa	1.8 kPa	

	Series		Model	Pressure range	Input	Output
Controller	**Series IC** 	Digital signal is converted to analogue signal.	IC1	0.1 MPa	10 bit parallel input 4 points inputs	0 ~ 10 VDC 4 ~ 20 mADC
			IC3	0.5 MPa		
			IC5	0.9 MPa		
			IC9	-0.1 MPa		

* Pressure range 0.9 MPa. Supply pressure 1.0 MPa. Set pressure 0.6 MPa.

Digital Pressure Switch
Series Variations

Individual sensor and controller type

	Sensor				Controller	
Model	PSE53☐	PSE54☐	PSE56☐	PSE550	PSE300	PSE200
						
Fluid	Air		General fluids	Air	Sensor input amount: 1 input	Sensor input amount: 4 inputs
Calibration method					Push-button calibration	
Set pressure range	0 to 1 MPa 0 to −101 kPa 0 to 101 kPa −101 to 101 kPa	0 to 1 MPa 0 to −101 kPa −100 to 100 kPa	0 to 1 MPa 0 to −101 kPa −100 to 100 kPa 0 to 500 kPa	0 to 2 kPa (and specials)	−0.1 to 1 MPa 10 to −101 kPa −100 to 100 kPa −10 to 100 kPa −50 to 500 kPa −0.2 to 2 kPa	−0.1 to 1 MPa 10 to −101 kPa −101 to 101 kPa −10 to 100 kPa
Power supply voltage	12 to 24 VDC ±10% (Ripple p-p 10% or less)					
Temperature characteristics (25°C reference)	±2% F.S. (0 to 50°C)		±2% F.S. (0 to 50°C) ±3% F.S. (−10 to 60°C)	±3% F.S. (0 to 50°C)	±0.5% F.S. (0 to 50°C)	
Repeatability	±1% F.S.	±0.2% F.S.		±0.3% F.S.	±0.1% F.S. ±1 digit	
Hysteresis					Hysteresis mode: Variable Window comparator mode: Variable	Hysteresis mode: Variable Window comparator mode: Fixed (3 digits)
Output	Analogue voltage output		Analogue voltage output Analogue current output		NPN/PNP open collector 2 outputs Analogue voltage output Analogue current output	NPN/PNP open collector 1 CH: 2 outputs 2 to 4 CH: 1 output each
Display (Resolution)					2-colour display (0.1%)	1-colour display (0.1%)
Enclosure	IP40		IP65	IP40	IP40	Front only IP65 The rest IP40
Note					Panel mounting possible Selectable pressure unit Auto shift function Auto preset function	Display calibration function Anti-chattering function Peak hold Bottom hold

Digital Pressure Switch
Series Variations

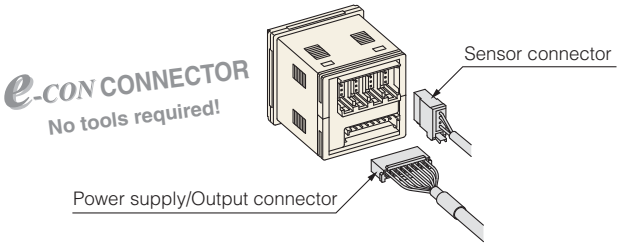
Integrated sensor and controller type

Model	ZSE10 ISE10	ZSE30A ISE30A	ZSE40A ISE40A	ISE70	ISE75 ISE75H	ZSE80 ISE80
						
Fluid	Air				General fluids	
Calibration method	Push-button calibration					
Set pressure range	–0.1 to 1 MPa 0 to –101 kPa –100 to 100 kPa	–105 to 105 MPa 10 to -105 KPa –0.105 to 1.05 MPa	–0.1 to 1 MPa 0 to –101.3 kPa –100 to 100 kPa	–0.1 to 1 MPa	0.4 to 10 MPa 0.5 to 15 MPa	–110 to 110 Kpa 10 to –111 KPa –0.105 to 1.1 MPa –0.105 to 2.2 MPa
Power supply voltage	12 to 24 VDC ±10% (Ripple 10% or less)					
Temperature characteristics (25°C reference)	±2% F.S. (–5 to 50°C)	±2% F.S. (5 to 50°C)	±2% F.S. (–5 to 50°C)	±2% F.S. (0 to 50°C)	±3% F.S. (0 to 50°C)	
Repeatability	±0.2% F.S. ±1 digit	±0.2% F.S. ±1 digit	±0.2% F.S. ±1 digit	±0.5% F.S.		±0.2% F.S. ±1 digit
Hysteresis	Hysteresis mode: Variable Window comparator mode: Variable					
Output	NPN/PNP open collector Analogue voltage output	NPN/PNP open collector Analogue voltage output Analogue current output		1 setting NPN/PNP 2 setting NPN/PNP open collector PNP open collector		NPN/PNP open collector Analogue voltage output Analogue current output
Display (Resolution)	1-colour display (0.1%)	2-colour display (0.1%)		2-colour display (1%)		2-colour display (0.1%)
Enclosure	IP40	IP40	IP65	IP67		IP65
Note	Panel mounting possible DIN rail moutable Selectable pressure unit Anti-chattering function Display calibration function Power saving mode Copy function	Panel mounting possible Selectable pressure unit Anti-chattering function Display calibration function Power saving mode Copy function	Panel mounting possible Selectable pressure unit Anti-chattering function Auto shift function Power saving mode Copy function	Selectable pressure unit Anti-chattering function Display calibration function		R thread, URJ, TJS Panel mounting possible Selectable pressure unit Anti-chattering function Auto shift function Display calibration function Power saving mode Eco mode

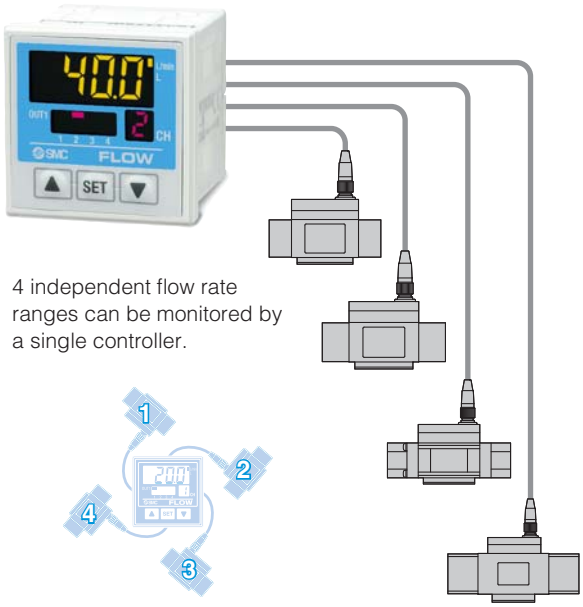
Digital Flow Switch
Series Variations

- Flow rate setting and monitoring are possible with the digital display
- Two types are available: Integrated and Remote type
- Three types of output: Switch, accumulated pulse, and analogu outputs
- Switching from instantaneous flow rate display to accumulated flow display is possible
- Two independent flow rate settings are possible
- Water resistant construction conforming to IP65

Connection



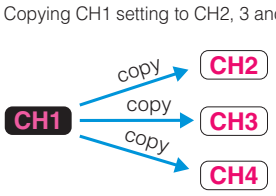
A single controller can monitor the flow rate of 4 different sensors



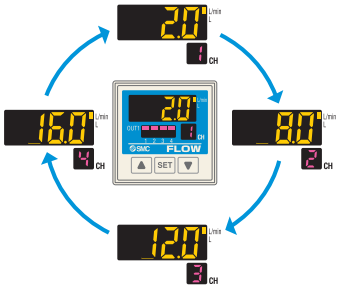
4 independent flow rate ranges can be monitored by a single controller.

Function

Copy function
Possible to copy information from one channel to one or more other channels.



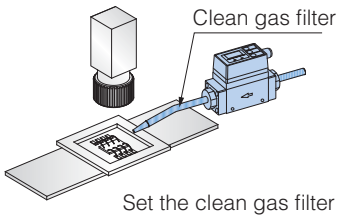
Channel scan function
Allows constant monitoring of the displayed pressure value for each channel.



- Key lock function
- Unit switching function
- Peak value and bottom value holding

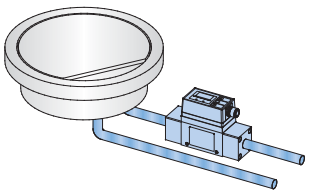
Application Examples

Flow control of N_2 gas to prevent detection camera shimmering and lead frame oxidation

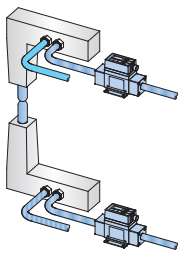


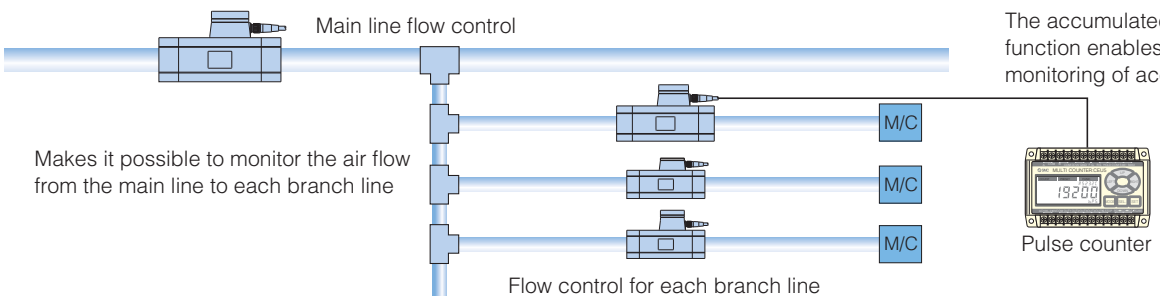
Set the clean gas filter on the outlet side piping of the flow switch.

Flow control of cooling water for wafer temperature regulation and high frequency power supply



Flow control of pressurized cooling water for welding gun





The accumulated pulse output function enables remote monitoring of accumulated flow.

Pulse counter

Digital Flow Switch
Series Variations

Series PFM For Air, N_2, Ar and CO_2

			
Flow rate measurement range [ℓ/min]	Integrated type	Remote type	
		Sensor unit	Display unit
0.2 to 10 (0.2 to 5)	PFM710	PF2A510	PFM3□□
0.5 to 25 (0.5 to 12.5)	PFM725	PF2A525	
1 to 50 (1 to 25)	PFM750	PF2A550	
2 to 100 (2 to 50)	PFM711	PF2A511	

( ): In the case of CO_2

Series PFMV For Dry Air

		
Flow rate measurement range [ℓ/min]	Remote type	
	Sensor unit	Display unit
0 to 0.5	PFMV505	PFMV30□
0 to1	PFMV510	
0 to 3	PFMV530	
-0.5 to 0.5	PFMV505F	
-1 to 1	PFMV510F	
-3 to 3	PFMV530F	

Series PF2A For Air

				
Flow rate measurement range [ℓ/min]	Integrated type	Remote type		
		Sensor unit	Display unit	Display unit (4ch)
1 to 10	PF2A710	PF2A510	PF2A30□	PF2A20□
5 to 50	PF2A750	PF2A550		
10 to 100	PF2A711	PF2A511	PF2A31□	
20 to 200	PF2A721	PF2A521		
50 to 500	PF2A751	PF2A551		
150 to 3000	PF2A703H	—	—	—
300 to 6000	PF2A706H			
600 to 12000	PF2A712H			

Series PF2W For Water

				
Flow rate measurement range [ℓ/min]	Integrated type	Remote type		
		Sensor unit	Display unit	Display unit (4ch)
0.5 to 4	PF2W704(T)	PF2W504(T)	PF2W30□	PF2W20□
2 to 16	PF2W720(T)	PF2W520(T)		
5 to 40	PF2W740(T)	PF2W540(T)		
10 to 100	PF2W711	PF2W511	PF2W33□	

Series PF2D For Deionized Water and Chemicals

			
Flow rate measurement range [ℓ/min]	Remote type		
	Sensor unit	Display unit	Display unit (4ch)
0.4 to 4	PF2D504	PF2D30□	PF2D20□
1.8 to 20	PF2D520		
4.0 to 40	PF2D540		

Series PF3W For Water

			
Flow rate measurement range [ℓ/min]	Integrated type	Remote type	
		Sensor unit	Display unit
0.5 to 4	PF3W704	PF3W504	PF3W30
2 to 16	PF3W720	PF3W520	
5 to 40	PF3W740	PF3W540	
10 to 100	PF3W711	PF3W511	

Series PF3W For Water (PVC Piping)

			
Flow rate measurement range [ℓ/min]	Integrated type	Remote type	
		Sensor unit	Display unit
10 to 100	PF3W711-U25	PF3W511-U25	PF3W30

Ionizer controller ion balance by sensor
Series IZS31

- Ion generation technology: sensing DC, pulsed DC or DC modes
- Easy maintenance individual removable electrodes cartridge. Types:
  - low maintenance
  - rapid elimination of static electricity
- Electrode needle material
  - Tungsten
  - Silicon
  - Stainless steel
- Two types of compact sensors are available:
  - autobalance sensor (high-precision type, body-mounting type)
  - feedback sensor
- Ion balance ±30 V
- Elimination of static electricity in fractions of second
- Aerodynamic cross section
- Controller integrated in the bar
- Low electrical consumption
- Lengths of bar available from 300 to 2300 mm
- Adjustable frequency ranges (until 60 Hz)
- Display and warning alarms
- The support of the air allows the elimination in distances of up to 2 metres

Specifications

Ionizer model		IZS31-mm (NPN specification)	IZS31-mmP (PNP specification)
Ion generation method		Corona discharge type	
Method of applying voltage		Sensing DC, Pulse DC, DC	
Output for emitting electricity		±7000 V	
Ion balance Note 1)		30 V (Stainless electrode needle: 100 V)	
Air purge	Fluid	Air (Clean and dry)	
	Operating pressure	0.7 MPa or less	
	Connecting tubing O.D.	ø4	
Power supply voltage		24 VDC ±10%	
Current consumption	Sensing DC mode	200 mA or less (While standing by: 120 mA or less)	
	Pulse DC mode	Autobalance sensor [Body-mounting type]: 300 mA or less Autobalance sensor [High-precision type]: 200 mA or less (When sensor is not used: 170 mA or less)	
	DC mode	170 mA or less	
Input signal	Emission of static electricity is suspended	Contact input signal with no voltage	
	Maintenance		
Output signal	Static electricity removal is completed	Max. load current: 100 mA Residual voltage: 1 V or less (At load current 100 mA) Max. applied voltage: 28 VDC	Max. load current: 100 mA Residual voltage: 1 V or less (At load current 100 mA)
	Maintenance output		
	Irregularity		
	Sensor monitor output Note 2)	Voltage output 1 to 5 V (Connect a 10 kΩ or larger load.)	
Effective discharge distance		50 to 2000 mm (Sensing DC mode: 200 to 2000 mm)	
Operating ambient temperature, Operating fluid temperature		0 to 50°C	
Operating ambient humidity		35 to 80%Rh (With no condensation)	
Material		Cover of ionizer: ABS, Electrode needle: Tungsten, Monocrystal silicon, Stainless steel	
Shock resistance		10 G	
Compliance with overseas standards / directives		CE (EMC directive: 89/336/EEC, 92/31/EEC, 93/68/EEC, 2004/108/EC, Low voltage directive: 73/23/EEC, 93/68/EEC) UL U.S. Standard for Electrostatic Air Cleaner, UL867, fourth edition CSA Canadian Standard for Electrostatic Air Cleaner, CAN/CSA C22.2 No. 187-M1986	

Note 1) For the case where air purge is performed between a charged object and an ionizer at a distance of 300 mm.
Note 2) For cases where the potential of a charged object is measured using a feedback sensor, the relationship between the potential being measured, the sensor monitor output voltage and the detection range of the sensor will vary depending on the sensor's installation distance.

Ionizer Fan Type
Series IZF10

- Ion balance ±13V
- Compact design and lightweight
- Two types available:
  - rapid deionizing type: 1.5 seconds deionizing time
  - low noise type: 29 dB(A)
- Alarm functions: high-voltage error, electrode needle contamination detector

Specifications

Ionizer model	IZF10-□□	IZF10-L-□□	IZF10-P-□□	IZF10-LP-□□
Ion generation method	Corona discharge type (DC)			
Power supply voltage	24 VDC ±10%			
Output	NPN open collector output		PNP open collector output	
Air flow	0.66 m^3/min	0.46 m^3/min	0.66 m^3/min	0.46 m^3/min
Power consumption	6.1 W or less	3.7 W or less	6.6 W or less	4.8 W or less
Ambient temperature	Operation: 0 to 50°C, Storage: -10 to 60°C			
Ambient humidity	Operation, Storage: 35 to 80% RH (No condensation)			
Weight	280 g (With bracket: 360 g)			

Ionizer nozzle type
Series IZN10

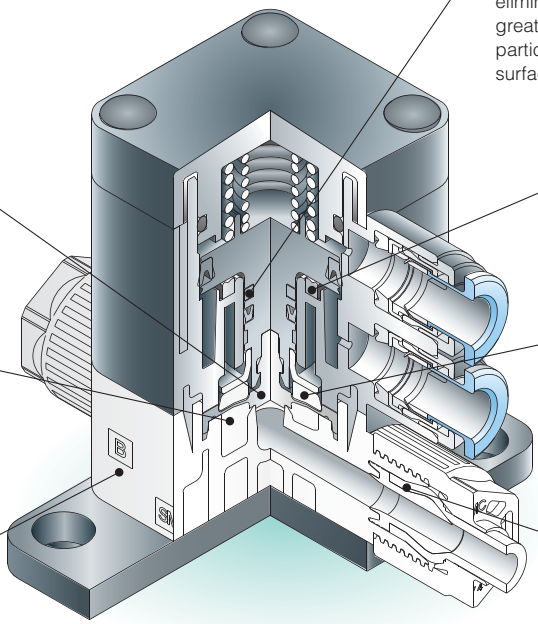
- Ion balance ±15V (±10V with energy saving nozzle)
- Compact: high voltage source integrated in the body
- 3 types of nozzle to adapt several applications:
  - energy saving static electricity elimination nozzle
  - high flow rate nozzle
  - Female threads for piping noozle
- Slim design
- Easy maintenance: possibility of cleaning electrode without losing the assembly angle
- External switch input function (2 inputs)
- Electrode needle contamination detector

Specifications

Ionizer model		IZN10-mm (NPN specification)	IZN10-mmP (PNP specification)
Ion generation method		Corona discharge type	
Method of applying voltage		High frequency AC type	
Discharge output Note 1)		2,500 V	
Ion balance Note 2)	Energy saving static electricity elimination nozzle	Within ±10 V	
	High flow rate nozzle	Within ±15 V	
Ozone generation Note 3)		0.03 ppm (0.05 ppm for energy saving static electricity elimination nozzle)	
Air purge	Fluid	Air (Clean dry air)	
	Operating pressure Note 4)	0.05 MPa to 0.7 MPa	
	Connecting tube size	ø6 / ø1/4 inch	
Power supply voltage		24 VDC ±10%	
Current consumption		80 mA	
Input signal	Discharge stop signal	Connected to GND (ON voltage: 0.6 V or less) Current consumption: 5 mA or less	Connected to +24 V (ON voltage: Between +19 V and power supply voltage) Current consumption: 5 mA or less
	Reset signal		
	External switch signal		
Output signal	Discharge signal	Max. load current: 40 mA Residual voltage: 1 V or less (load current at 40 mA) Max. applied voltage: 28 VDC	Max. load current: 40 mA Residual voltage: 1 V or less (load current at 40 mA)
	Error signal		
	Maintenance signal		
Effective static electricity elimination distance		20 mm to 500 mm	
Ambient and fluid temperature		0 to 55°C	
Ambient humidity		35 to 65%RH	
Material		Housing: ABS, Stainless steel Nozzle: Stainless steel Electrode needle: Tungsten	
Vibration resistance		Durability: 50 Hz, Amplitude: 1 mm, XYZ each 2 hours	
Shock resistance		10 G	
Weight		120 g	
Standards/Directive		CE (EMC Directive: 2004/108/EC) UL U.S. Standard for Electrostatic Air Cleaner, UL867, fourth edition CSA Canadian Standard for Electrostatic Air Cleaner, CAN/CSA C22.2 No. 187-M1986	

Note 1) Measured with a probe of 1000 MΩ and 5 pF.
Note 2) Measured with a distance of 100 mm between the charged object and the ionizer at an air purge pressure of 0.3 MPa.
For the static electricity elimination time, refer to technical data on page 1.
Note 3) Value above background level, measured with a distance of 300 mm from the front of the nozzle at an air purge pressure of 0.3 MPa.
Note 4) Static electricity cannot be eliminated without an air purge.
Also, failure of the air purge can increase internal ozone condensation, adversely affecting the ioniser and peripheral equipment. Be sure to perform an air purge while energising the ioniser.

High Purity Chemical Valve
Series LV□



- Stable Sealing Surface
  Guide ring

  A unique guide ring on the piston rod eliminates lateral motion of the poppet, greatly increasing seal life and reducing particle formation with a stable work surface.

- Prevents Micro-Bubbles
  Diaphragm (PTFE)

  Special diaphragm construction insures gentle opening and closing that prevents the formation of micro-bubbles.

- Low particle generation
  Piston bumper

  A bumper absorbs piston momentum to minimize impact-induced particles.

- Back-pressure resistance and long life
  Buffer

  The diaphragm is supported by a buffer that minimizes deformation, which gives it long life and resistance to back-pressure.

- Minimal dead space

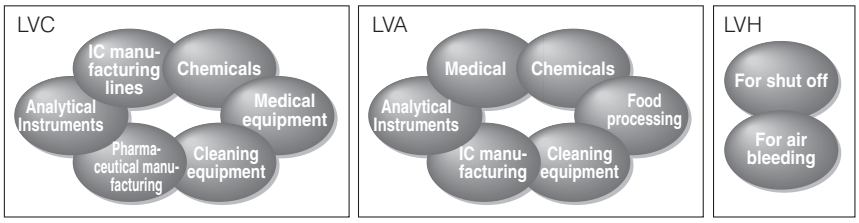
  In addition to a body designed for smooth flow with minimal internal dead space, integral fittings eliminate the possibility of residual liquid in pipe threads.

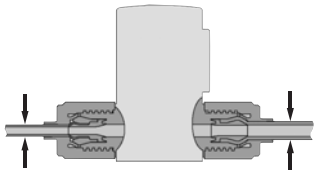
- Different tubing sizes can be selected
  Hyper fitting

- Outstanding corrosion resistance
  Body (New PFA)

  Compatible with chemicals such as acids, bases and ultra DI water.

Main applications and fields





- Eliminates problems due to over tightening
  - Special locking mechanism
  - High flexural strength (tubing supports)

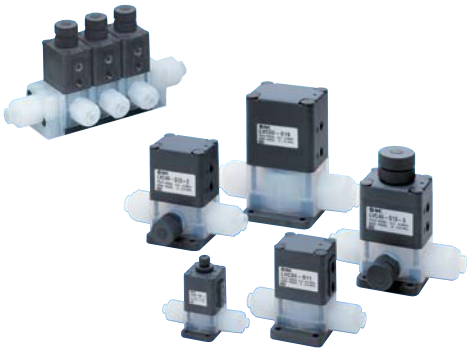
Large Bore Size
Series LVC80-Z
Series LVH80M-Z

- Large bore size
- Air operated: Series LVC80-Z
- Manually operated: Series LVH80M-Z
- Applicable tubing O.D.: 1 1/4", 1 1/2"
- Height: 189 mm
- Lower pilot pressure 0.4 to 0.6 MPa

For organiz solvents
Series LVA-$\frac{D}{T}$G-$\frac{AD}{AN}$
Series LVH-$\frac{D}{T}$G-$\frac{AD}{AN}$

- For organic solvents
- Air operated: Series LVA-$\frac{D}{T}$G-$\frac{AD}{AN}$
- Manually operated: Series LVH-$\frac{D}{T}$G-$\frac{AD}{AN}$
- Body: SUS; Actuator: ADC; Buffer: FKM/EPDM (selectable)
- Can be specified for EP polishing (Made to Order)
- Fitting type: Double-ferrule fittings, metal gasket seal fittings, tubing extension
- Not subjetc to list control under the Export Trade Control Order

Integral Fittings
Series LVC



- N.C./N.O. with same configuration/Double acting
- Compatible with 100°C fluid temperature
- Body material: New PFA

3 port added

Threaded Ports
Series LVA

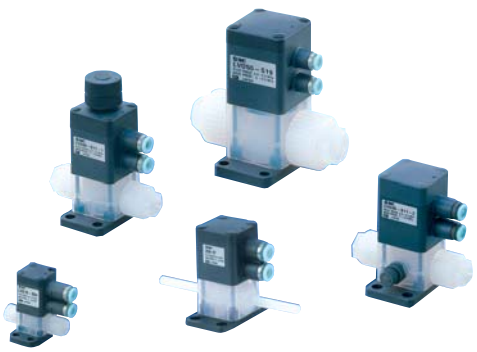
- Diaphragm material PTFE, EPR, NBR are selectable
- Body material: New PFA /Stainless steel/PPS

3 port added

Manual Operation
Series LVH

- Locking and non-locking types available
- Integral fitting type/Threaded type
- Body material: New PFA /Stainless steel/PPS

Compact type
Series LVD

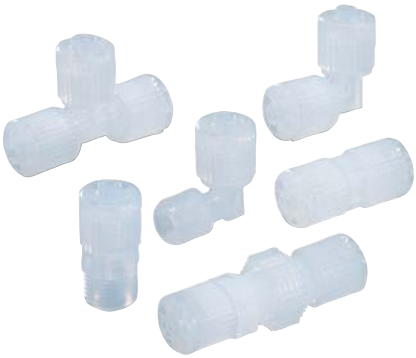


- Compact type is introduced as a new series to complement conventional Series LVC with integral fittings
- Mounting base dimensions conform to SEMI Standard, F65-1101 (Except for LVD10)
- Dimension across inlet/outlet ports: Reduced by up to 29%
- Body: New PFA / Diaphragm: PTFE / Actuator section: PPS

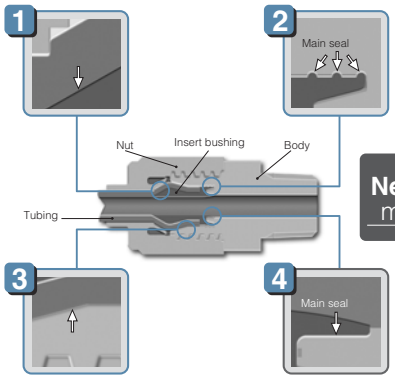
Integral Tubing
(construction)

HYPER FITTING®
Series LQ1•LQ2•LQ3

High Purity Fluoropolymer Fittings & Tubing
Series LQ1•LQ2
SMC high purity series responding to the latest demands in process control



- Quadruple seal construction
  Our new patented high-performance quadruple seal construction, as well as our precision insertion tooling provide maximum leak protection in your process circuitry.



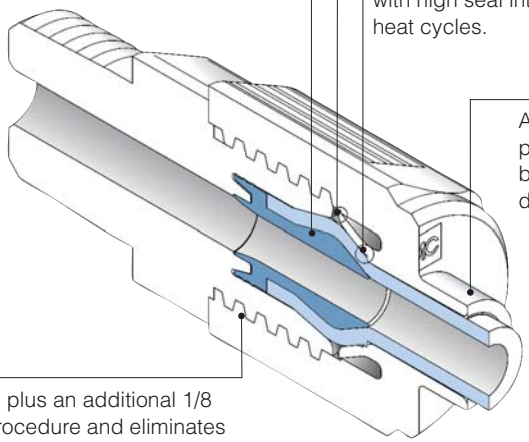
New PFA material

Close adhesion of fittings and tubing facilitates excellent flow through characteristics with minimal liquid residual

Reducer type: The tubing size can be changed by replacing the nut and the insert bushing on the same body.

A seal lock provided for the nut to prevent loosening, and trapezoidal screw threads tightened at a high torque provide a construction with high seal integrity even when subjected to heat cycles.

A tubing support on the nut provides strong resistance to bending and resist crimping deformation of tubing.

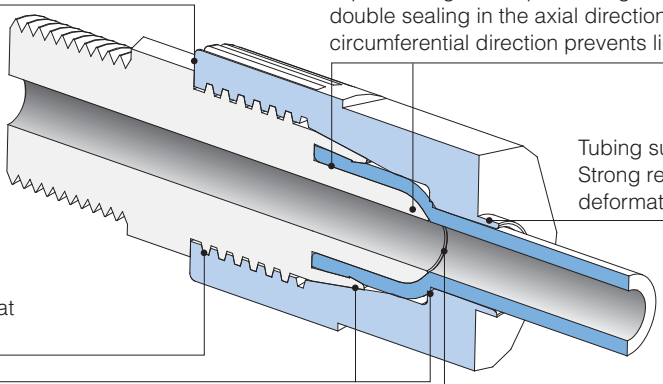


Tightening to the end surface plus an additional 1/8 turn simplifies confirmation procedure and eliminates the need of tightening torque control.

Series LQ3
Collet Type/LQ3

The nut can be easily assembled into the fitting body with no need of alignment.

Triple sealing: The triple sealing construction consisting of double sealing in the axial direction and single sealing in the circumferential direction prevents liquid leakage.



Tubing supports:
Strong resistance to tube bending and deformation.

Locking:
Trapezoidal thread that withstands heat stress prevents oblique nut insertion.

Locking: 2 stage pressing construction of the Collet end ensures sealing and tube locking. The cylindrical part is also provided with the tube locking mechanism. Improved sealing and tube retention.

Improved flow-through characteristics:
Excellent flow-through characteristics are achieved by minimizing liquid deposit.

LQ$^{1}_{2}$ Series

□ : Only for series LQ1 ■ : Common to series LQ1 and LQ2

Series		Shape	Size	Port size							Tube O.D.														
											Metric size								Inch size						
				None	1/8"	1/4"	3/8"	1/2"	3/4"	1"	ø3	ø4	ø6	ø8	ø10	ø12	ø19	ø25	1/8"	3/16"	1/4"	3/8"	1/2"	3/4"	1"
Connector LQ$^{1}_{2}$H	Male		1	–	○	–	–	–	–	–	○	○	–	–	–	–	–	–	○	–	–	–	–	–	–
	Female		2	–	○	○	–	–	–	–	–	●	○	–	–	–	–	–	●	●	○	–	–	–	–
Elbow LQ$^{1}_{2}$L	Male		3	–	–	○	○	–	–	–	–	–	●	●	○	–	–	–	–	–	●	○	–	–	–
	Female		4	–	–	–	○	○	–	–	–	–	–	–	●	○	–	–	–	–	–	●	○	–	–
Run tee LQ$^{1}_{2}$R	Male		5	–	–	–	–	○	○	–	–	–	–	–	–	●	○	–	–	–	–	–	●	○	–
	Female		6	–	–	–	–	–	○	○	–	–	–	–	–	–	●	○	–	–	–	–	–	●	○
Branch tee LQ$^{1}_{2}$B	Male																								
	Female																								
Union elbow LQ$^{1}_{2}$E			1	○	–	–	–	–	–	–	○	○	–	–	–	–	–	–	○	–	–	–	–	–	–
Union tee LQ$^{1}_{2}$T			2	○	–	–	–	–	–	–	–	●	○	–	–	–	–	–	●	●	○	–	–	–	–
Panel mount union LQ$^{1}_{2}$P			3	○	–	–	–	–	–	–	–	–	●	●	○	–	–	–	–	–	●	○	–	–	–
Union LQ$^{1}_{2}$U			4	○	–	–	–	–	–	–	–	–	–	–	●	○	–	–	–	–	–	●	○	–	–
Union flange LQ1F			5	○	–	–	–	–	–	–	–	–	–	–	–	●	○	–	–	–	–	–	●	○	–
			6	○	–	–	–	–	–	–	–	–	–	–	–	–	●	○	–	–	–	–	–	●	○

Note 1) Standard size ○ With Reducer ●
Note 2) The union flange is only available with LQ1 (Size 4, 5, 6).

Item \ Model	LQ1 Series						LQ2 Series			
	LQ1□10	LQ1□20	LQ1□30	LQ1□40	LQ1□50	LQ1□60	LQ2□20	LQ2□30	LQ2□40	LQ2□50
Maximum operating pressure (at 20°C)	1.0 MPa						1.0 MPa			
Operating temperature	0 to 200°C						0 to 200°C			
Applicable tubing size: mm size	ø3 to ø25						ø4 to ø19			
Applicable tubing size: inch size	1/8"~1"						1/8"~3/4"			

Fluoropolymer tubing
Series TL/TIL

• Material: Super PFA

FEP tubing
Series TH/TIH

• Material: FEP

Custom design temperature control and cooling water related equipment

Thermo-Chiller
Series HRS
Circulating Fluid Temperature Controller

- Internationtal standard: CE. UL
- Cooling capacity (50 Hz) 1100 W/1700 W/2100 W/4700 W
- Lightweight 43 kg / 69 kg
- Temperature stability: ±0.1°C
- Temperature range setting: 5 to 40°C
- Options
  - With earth leakage breaker
  - With automatic water fill function
  - High pressure pump
  - DI water applicable

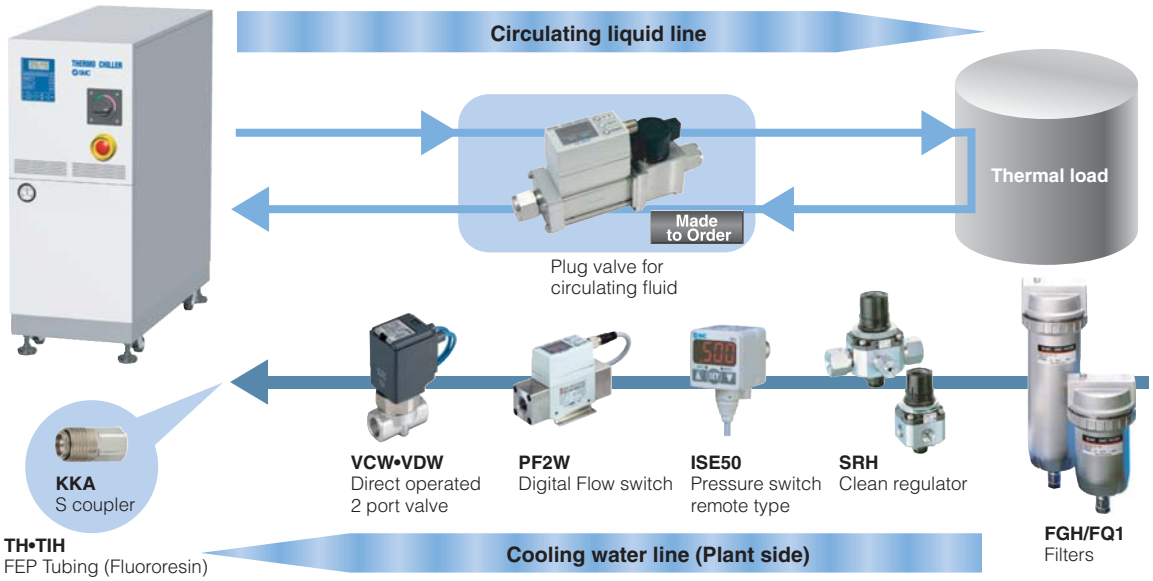
Thermo-con
Series HEC
Circulator Electronic Cooling / Heating Type

- Temperature stability: ±0.01°C to 0.03°C
- Set temperature range: 10°C to 60°C
- Cooling capacity: 600 W, 1200 W
- Type of circulating fluid: Water, Fluorinated chemicals
- International standards: CE, UL
- This originally developed heat exchanger achieves a large cooling capacity with a compact body

Thermoelectric Bath
Series HEB
Constant Temperature Bath Electronic Cooling / Heating Type

- Set temperature range: –15°C to 60°C
- Temperature stability: ±0.01°C
- Type of fluid: Water, Fluorinated chemicals
- International standards: CE, UL
- Low temperature distribution is achieved by stirring fluid up-and-down and around the tank

Temperature control peripherals
Our most suitable products for circulating liquid and cooling lines used in temperature control equipment



Applications for Thermo-Chiller/Thermo-con

• Medical devices

- X-Ray Tube cooling / digital X-ray-detector / CT
- MRI
- Lithotripter
- Laser applications

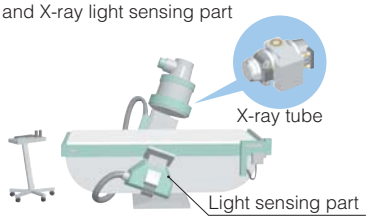
• Analyser

- Clinical Anlalyser
- Spectrometry
- Incubator
- Material Analyser (i.e. Chromatography)
- Electron Microscope

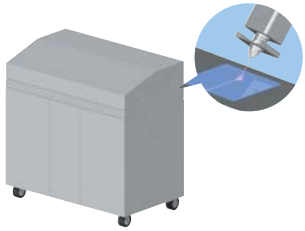
• Pharma / Biotechnology

- Packaging
- Labaratory
- UV-Sterilisation
- Bioreactors
- Coating / Plasma Gernerators

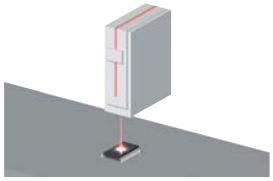
X-ray (digital) instrument
- Temperature control of X-ray tube and X-ray light sensing part



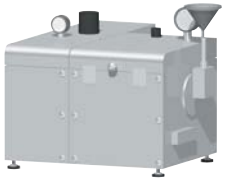
Laser machining
- Cooling of laser irradiated part



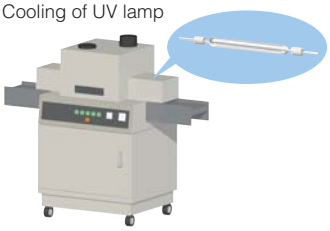
Laser marker
- Cooling of laser irradiated part



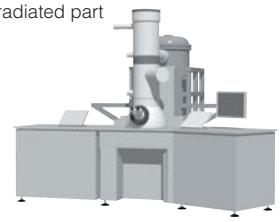
Atomising device (food and cosmetics)
- Temperature control of sample and device



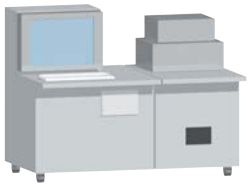
UV curing device (printing, painting, bonding and sealing)
- Cooling of UV lamp



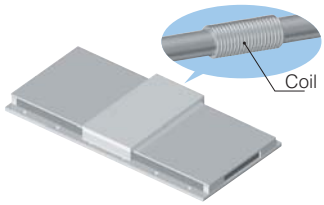
Electronic microscope
- Temperature control of electron-beam irradiated part



Ultra sonic wave inspection machine
- Temperature control of ultra sonic wave laser part

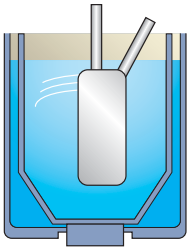


Linear motor
- Temperature control of moving coil



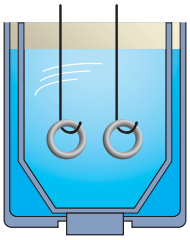
Applications for Thermo-Bath

Semiconductor manufacturing



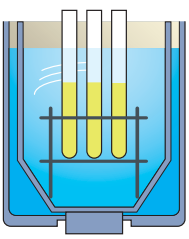
Evaporation of chemicals for MOCVD
Temperature control of diffusion gas

Various tests



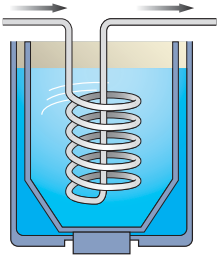
Thermal test with immersion

Physical and chemical analysis



Temperature control of various samples,materials and parts

Various chemical processes



Indirect temperature control of chemicals and liquids with high viscosity

Vacuum Equipment

Air suction filter
Series ZFC

- Prevents vacuum equipment trouble due to airborne contaminants
- Space saving
- Installation and removal are easy with One-touch fittings
- Cartridge type with replaceable element

Model

Model		Port size (Applicable tubing O.D.) IN side, OUT side	Recommended flow rate [ℓ/min (ANR)]	Weight [g]
Metric size	ZFC050-02	ø2	2	4.9
	ZFC050-23	ø3.2	7	4.3
	ZFC050-04	ø4	10	
	ZFC100-04	ø4	10	11.5
	ZFC100-06	ø6	20	
	ZFC200-06	ø6	30	21.5
	ZFC200-08	ø8	50	
Inch size	ZFC051-01	ø1/8"	7	4.3
	ZFC051-03	ø5/32"	10	
	ZFC101-03	ø5/32"	10	11.5
	ZFC101-07	ø1/4"	20	
	ZFC201-07	ø1/4"	30	21.5
	ZFC201-09	ø5/16"	50	

Note) Flow rate when the initial pressure drop is 3 kPa or less.

Specifications

Fluid	Air, Nitrogen
Operating pressure	–100 to 0 kPa
Vacuum release pressure	Max. 0.5 MPa
Operating and ambient temperature range	0 to 60°C (No freezing)
Filtration	10 µm
Element differential pressure resistance	[ZFC10□, 20□] 0.15 MPa [ZFC05□] 0.10 MPa

Air suction filter
Series ZFB

Model

Model		Port size (Applicable tube O.D.) IN side, OUT side	Recommended air flow [ℓ/min (ANR]	Weight [g]
Metric size	ZFB100-04	ø4	10	22
	ZFB100-06	ø6	20	22
	ZFB200-06	ø6	30	30
	ZFB200-08	ø8	50	30
	ZFB300-08	ø8	75	39
	ZFB300-10	ø10	75	39
Inch size	ZFB101-05	ø3/16"	20	22
	ZFB101-07	ø1/4"	20	22
	ZFB201-07	ø1/4"	30	30
	ZFB301-11	ø3/8"	75	40
	ZFB401-13	ø1/2"	100	62

Specifications

Fluid	Air/Nitrogen
Operating pressure	–100 to 0 kPa
Proof pressure	0.5 MPa
Operating and ambient range	0 to 60°C (Non-freezing)
Filtration	30 µm
Element differential pressure resistance	0.15 MPa
Applicable tube material	Nylon/Soft Nylon/Polyurethane

Air suction filter
Series ZFA

Model

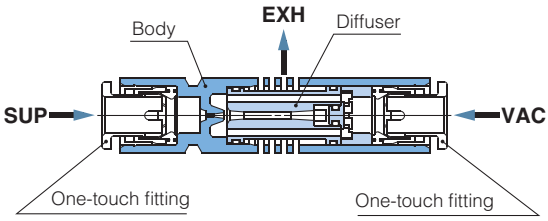
Model	Port size	Recommended air flow [ℓ/min (ANR)]	Weight [kg]
ZFA 100	1/8	50	0.14
ZFA 200	1/4	200	0.19

Specifications

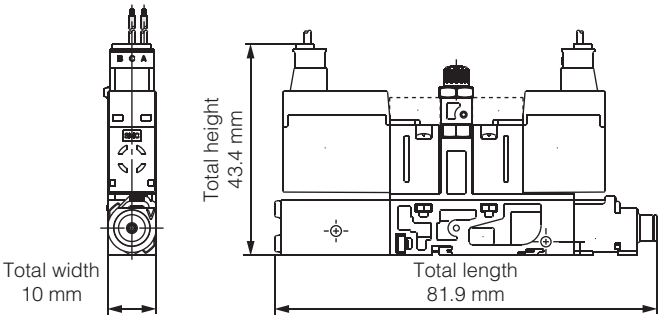
Fluid	Air/Nitrogen
Operating pressure range	–100 to 0 kPa
Proof pressure	0.5 MPa
Operating temperature range	5 to 60°C
Filtration	30 µm
Element differential pressure resistance	0.15 MPa

Vacuum Ejector, In-line type
Series ZU
Space-saving ejector that can be installed in-line with the piping

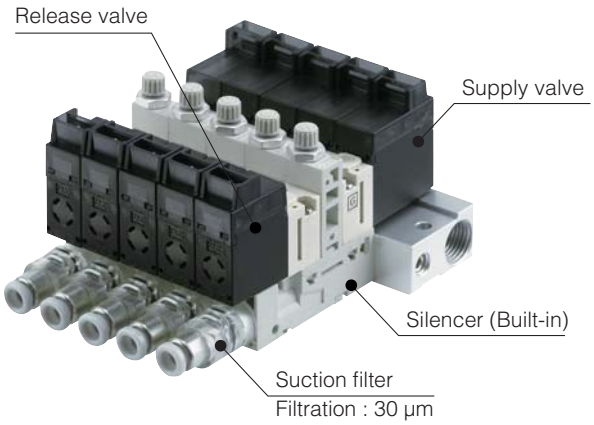
- 6 mm fittings to connect into pipework
- Integrated exhaust
- Very lightweight and compact
- Choice of 2 nozzle diameters and 2 vacuum levels



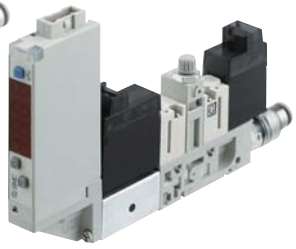
Compact Vacuum Unit
Series ZB



Weight 46 g



Manifold



Single unit

Ejector Specifications

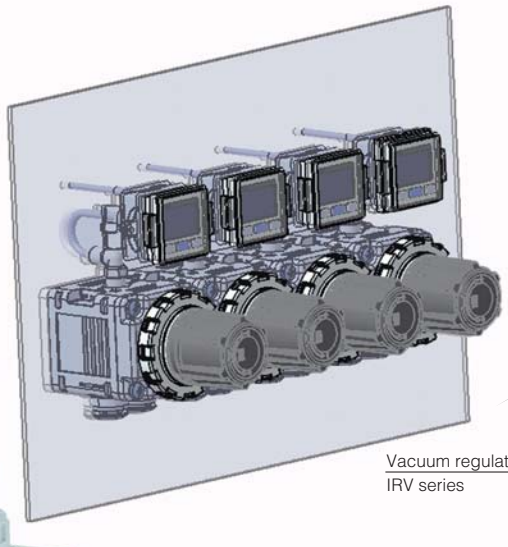
Model	ZB03		ZB04		ZB05	ZB06
Supply valve type	Large flow (N.C.)	Latching	Large flow (N.C.)	Latching	Large flow (N.C.)	Large flow (N.C.)
Nozzle size [mm]	0.3		0.4		0.5	0.6
Supply pressure range [MPa]	0.2 to 0.55					0.3 to 0.55
Standard supply pressure [MPa]	0.35	0.4	0.35	0.45	0.35	0.5
Air consumption [ℓ/min (ANR)]	3.5	4	6.5	8.5	10	18
Maximum suction flow [ℓ/min (ANR)]	2		3.5		4.5	7
Maximum vaccum pressure [kPa]	–86		–90			

Vacuum regulator
Series IRV

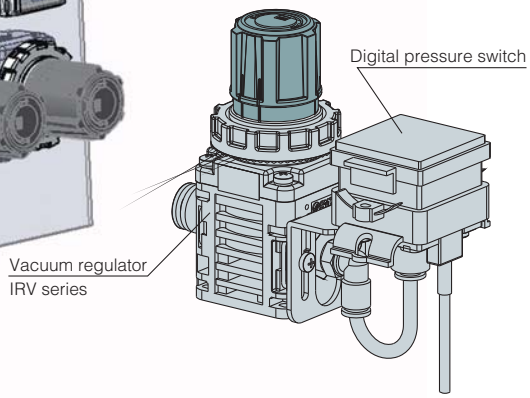
IRV10 series IRV20 series

- Single sided connections series. For ease of installation and panel mounting
- Weight reduced by 20% (Compared with the existing IRV2000 with IRV20 fitting)
- Maximum flow (Over twice the flow of the existing models)
- 140 ℓ/min (ANR). Conventional model IRV1000: 60 ℓ/min (ANR)
- 240 ℓ/min (ANR). Conventional model IRV2000: 100 ℓ/min (ANR)

Single-sided piping

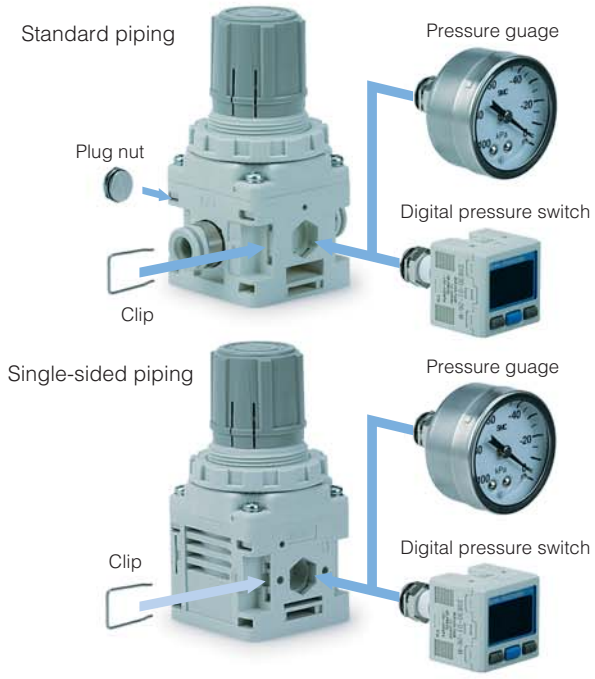


Integrated digital pressure switch for panel mounting (Made to Order)



Standard piping

• Easy to attach/detach the pressure gauge or digital pressure switch due to attachment by clip.
VariationsStandardconnectionsMounting direction of the pressure gauge or digital pressure switch can be changed. (Standard connections only)



• Multiple mounting angles (in 60 increments) for the pressure gauge or digital pressure switch.

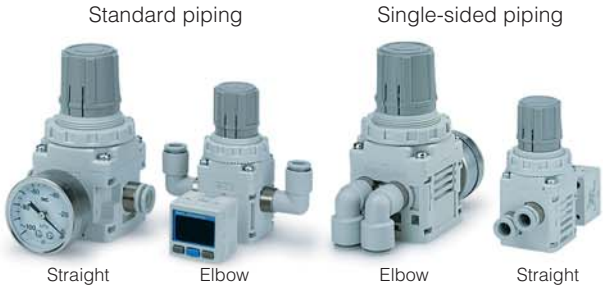
Mounting Variations

Standard piping

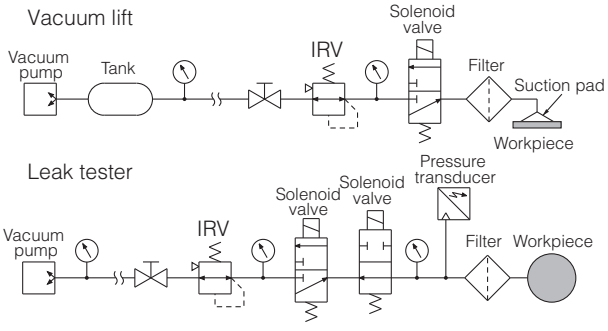
Single-sided piping

• Built-in one-touch fittings
Different size options for both fitting types

Type of fitting	Applicable tubing O.D. [mm]	Series	
		IRV10	IRV20
Straight Elbow	ø6	●	●
	ø8	●	●
	ø10	—	●
	ø1/4"	●	●
	ø5/16"	●	●
	ø3/8"	—	●



Example of Applications



Specifications

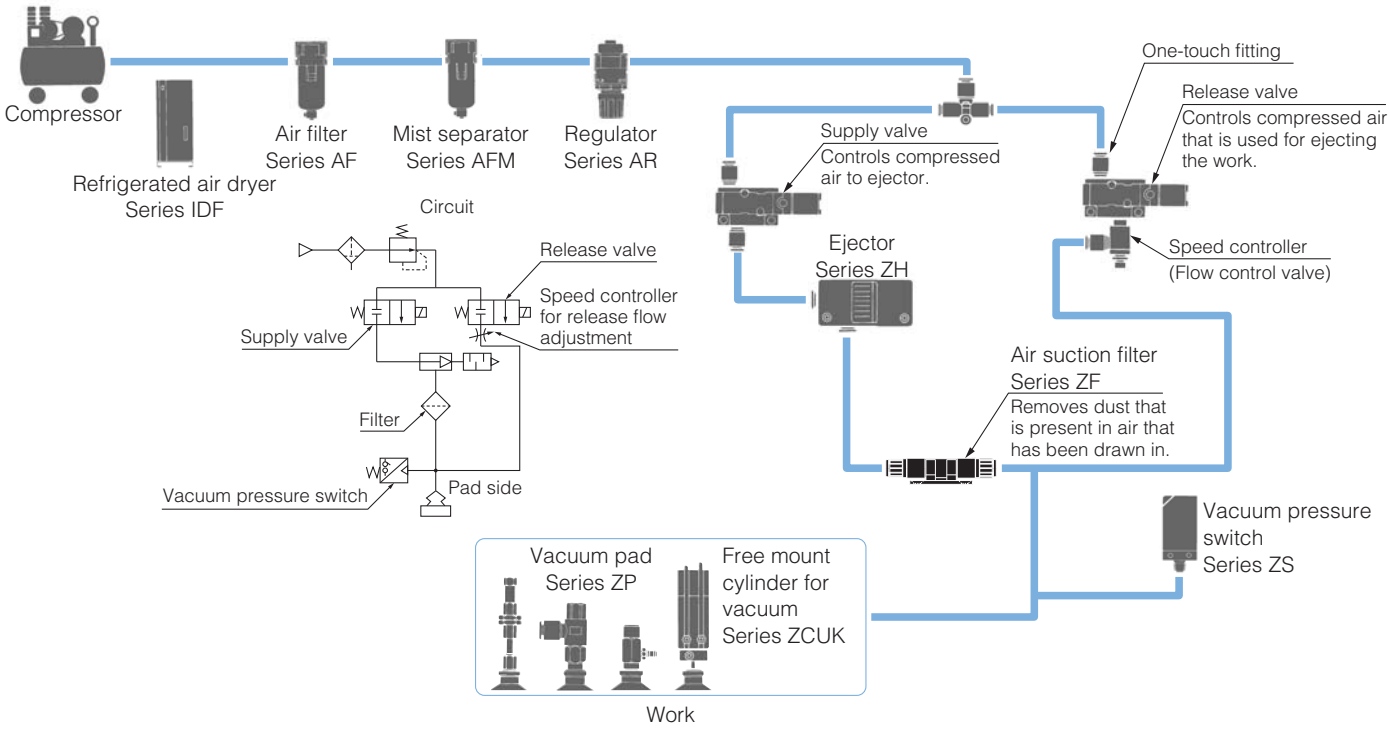
Model		IRV10	IRV20
Fluid		Air	
Set pressure range Note 1)		–100 to –1.3 kPa	
Atmospheric intake consumption Note 2)		0.6 ℓ/min (ANR) or less	
Knob resolution		0.13 kPa or less	
Ambient and fluid temperature		5 to 60°C	
Weight (Without accessories)	Standard piping	135 g	250 g
	Single-sided piping	125 g	

Note 1) The range varies in accordance with the vacuum pump pressure.
Note 2) The product normally takes in air from the atmosphere.

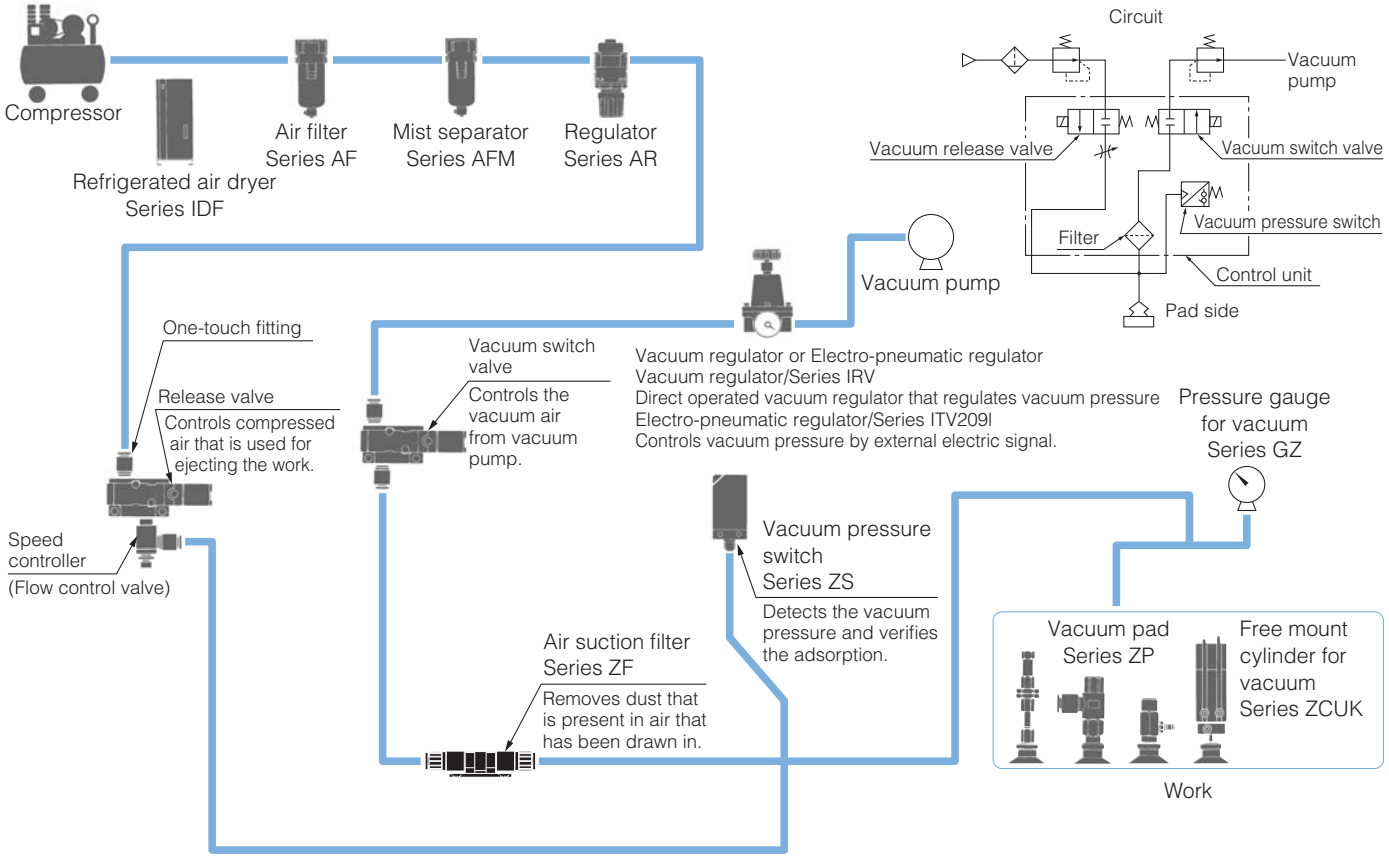
Vacuum equipment
Application examples

- Field: Semiconductor, electronics, automotive assembly, food processing and medical equipment, all types of manufacturing assembly equipment
- Machinery: Robotic hand/material handling, automotive assembling machines, automatic transfer equipment, pick and place, printing machinery
- Application: Vacuum adsorption transfer, vacuum adsorption retention, vacuum generated air flow

Application to Ejector System



Application to Vacuum Pump System



SMC International Training
Integral SOLUTIONS for the development of the professional skills required by industry.

The training division of SMC Corporation has a clear commitment to offer training adapted to the needs of industry; focused on the development of the professional skills required for the most diverse sectors (Automotive, Pharmaceutical, Semiconductors, Food processing, etc.).

The experience of the SMC International Training team in both the industrial and the educational fields, has allowed the development of a wide range of training systems, adapted to all kind of needs and budget.

www.smctraining.com

AUTOSIM-200
Automation Simulator

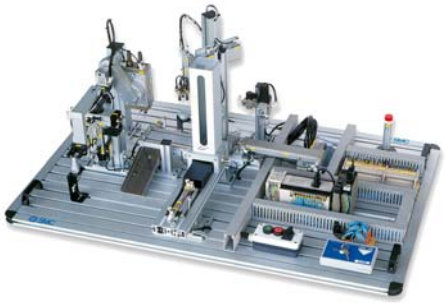
ENS-200
Energy saving trainer

HAS-200
Highly Automated System

FMS-200
Flexible Manufacturing System

MAS-200
Modular Assembling System

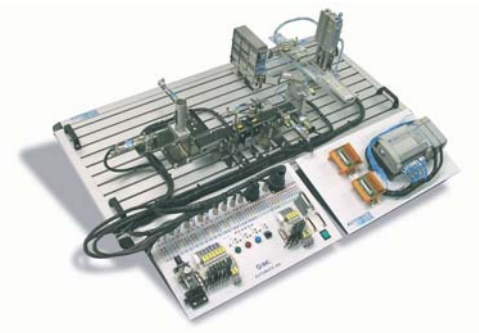
IPC-200
Industrial Process Control



MAP-200
Manipulation Systems

PNEUTRAINER-200 Pneumatics/
Electro-pneumatics

VAC-200
Vacuum Trainer



AUTOMATE-200
Your mate in Automation!

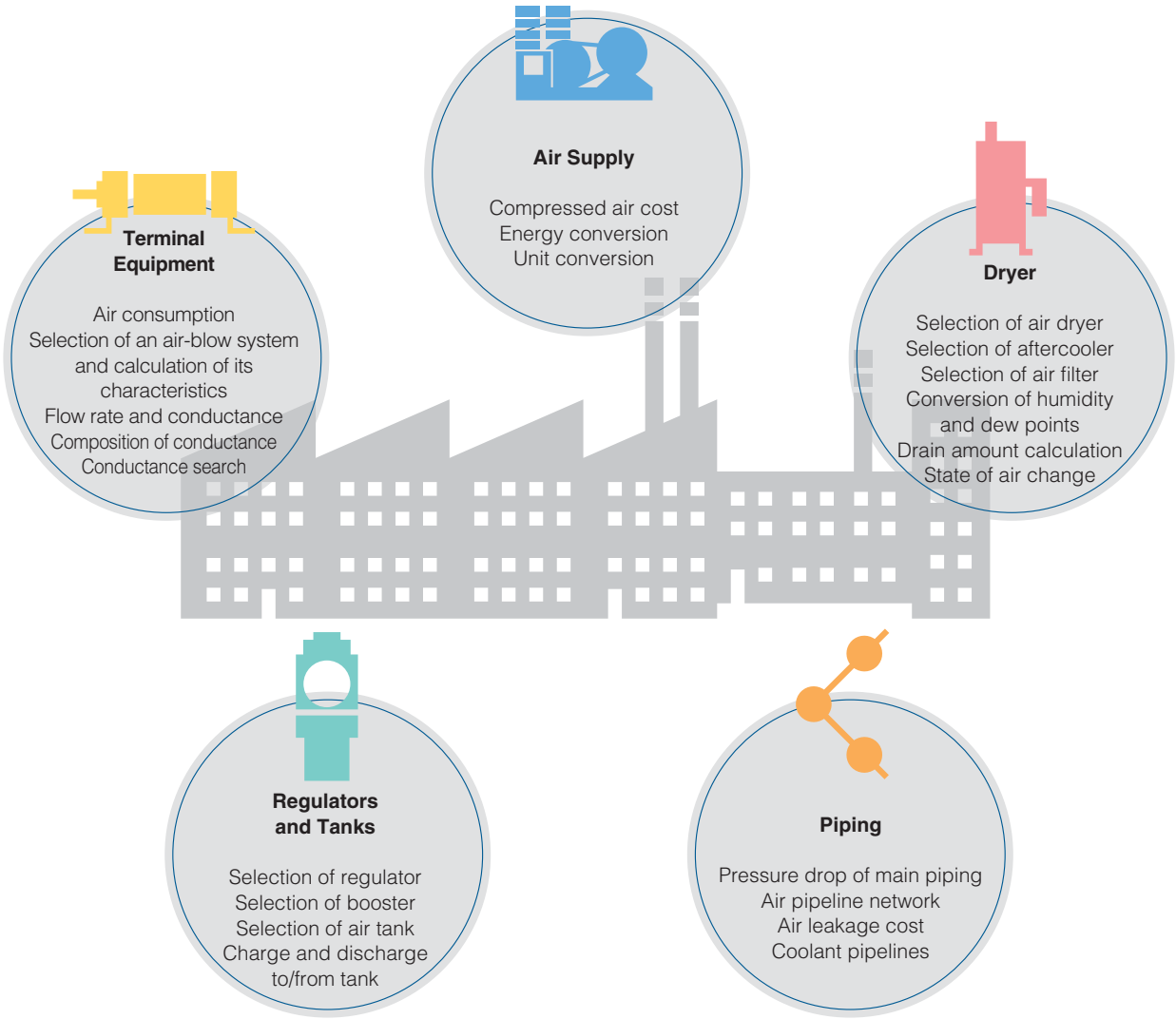
PNEUMATE-200
Your mate in Pneumatics!

Energy Saving Program

This program contributes to the energy savings of a pneumatic system
from the design stage to analysis of the present state and simulation of possible improvements.

Main added features and improvements
- Calculation of gas, liquid, and steam
- Conductance search
- Pressure/Flow rate graph
- Simplified input operation

This energy saving program was developed to provide a better understanding about the different states of air (e.g. consumption, flow, pressure, and humidity) between the air supply and related equipment within a facility.



Supply of "Energy saving program Ver.3-Web service version"
"Energy saving program" is available by installing it to your computer after downloading the program from SMC's website (http://www.smceu.com).
It provides both Japanese and English versions.

SMC and Advanced Pressure Technology
APTech

In spring 2007, SMC Corporation Japan purchased Advanced Pressure Technology – better known as AP-Tech - from its directors.

Based in Napa, California, USA, AP-Tech was founded in the late 1980´s by Rene Zakhour. Rene´s objectives were to provide products with uncompromising quality, performance and reliability from a company offering exceptional service and technical support – almost identical values to those which SMC has based its successful approach to business.

From July 2008, our European customers can now purchase – through SMC Pneumatik GmbH – AP-Tech´s excellent range of high quality products made exclusively for both the PV and Semiconductor Industries.

These include a great range of High Purity Gas Regulators which are made, tested and packaged in ultra high clean room conditions, thereby ensuring excellent levels of quality (ISO 9001 standard).

If you´d like more information of AP-Tech products ask your local representative for more information today.

July 2008

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