



Innovations 2016

Boosting your competitiveness

Innovation 2016

The natural evolution towards boosting our customers competitiveness

“Nowadays innovation is about being able to adapt; to evolve quickly enough in response to the increasingly changing realities. What matters now is how our products coupled with our technical expertise can assist our customers in ‘keeping up’”.

It is fair to say that our customers are not really worried about cylinders, valves, chillers or actuators; what concerns them is to be competitive, to adapt to their markets fast enough, to be efficient, to have a safe working environment and to reduce their carbon footprint.

So our responsibility towards them is not only about supplying innovative products or solutions, it is also about having a holistic view of their day-to-day worries and necessities, and working hard to be the best so that they become the best.

To achieve this, along with our engineers in Japan developing new products, our engineers worldwide tackle key issues in industry and provide comprehensive services; all of it enlivened with our firm commitment of being closed to our customers along the way.



For SMC innovation is understanding what is important to our customers.

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Innovation – Evolution and Revolution

Innovation is the process of translating an idea into a service that creates value for customers. The idea on which it is based must be replicable at an economical cost and must satisfy a specific need. Innovation involves the deliberate application of information, imagination and initiative to derive greater value.

For us this greater value is simply about competitiveness

Apart from invention, innovation also means changing and adapting business models to the environment to maintain the growth and success of our businesses. The market is laying out routes and setting trends that we must understand and master to stay profitable

Evolution means working close to you to boost your competitiveness

This involves innovative thinking and creative problem solving in order to improve your production and performance.

Innovation is no longer about presenting revolutionary products with the most advanced technologies. **We understand innovation nowadays as having an integrated view of our customer's process and industry trends** in order to be able to contribute with our knowledge to help them be more competitive.

SMC – Innovation: the Evolution from words to deeds

At present there are a number of trends, tendencies, conceptualizations and norms that are clearly setting the pace in the race towards competitiveness. They have evolved from buzzwords to “must words”, as they refer to key concepts and procedures that are already guiding the industry into the future.

We have gained a profound educational and practical understanding of them in order to put at our customer's disposal our knowledge, our experts, our solutions and our determination to work together in maintaining **compliance with standards, efficient production management** and the **overall profitability** any business requires.

We have selected for this catalogue four of these trends, as an example of our **commitment to innovation in the industry and to you.**

Nowadays boosting competitiveness is achieved through:



06 Machinery Safety: because we all need to feel safe

The Evolution towards safety engineering together

Machinery safety can be challenging, due to the complexity inherent in the abundant standards and procedures included in the Directive. Our proposal is to give you educational and operational ...▶▶

“What does it take to make a machine safe?”



28 Continuous Improvement. Is it really new? Is it really a trend?

Continuous Improvement – Because it is in our DNA

To continuously improve is natural for us, as it is for our Japanese roots. The Kaizen philosophy has underpinned our success, and led us to achieve worldwide ...▶▶

“Boosting our customers' efficiency through Continuous Improvement is in our DNA”



58 Industry 4.0: THE evolution

Our Evolution – Towards competitive manufacturing together

We must evolve from the ethereality of the concept into reality and practicality. After all, we are talking about automation, the day to day reality for all of us. It is evolved, more digital, highly ...▶▶

“The answer that automation needed”



68 Energy Saving: just call it saving

The Evolution towards saving together

In the new arena of energy-related competition, the first step, as with anything else, is to understand energy usage, and from that point to the final step of reducing the ...▶▶

“Energy saving as a way of gaining a competitive advantage”

Machinery Safety: because we all need to feel safe

According to Maslow's hierarchy of needs, safety is a human necessity that needs to be fulfilled; and Abraham Maslow placed it in the second level of the pyramid, immediately after the completion of physiological needs. We all need to feel secure. And the working environment is and should not be an exception.

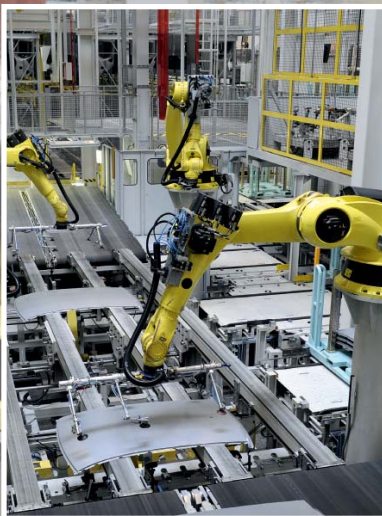
This is even more important considering the fact that machinery and equipment in general in virtually every industry are surrounded by hazards. Mechanical and electrical hazards, badly designed safeguards, inadequate operating controls, or just an unplanned emergency stop can cause injuries of some sort to workers.

Safety requirements and all the potential hazards in a working environment have led to comprehensive Directives and standards in order to guide the process towards guaranteeing safe workplaces.

However, one thing is agreeing with that and another is fully understanding the question: "what does it take to make a machine safe?"

This is what we see every day at our customer's facilities: an obvious **desire for fulfillment coupled with tons of uncertainty**, questions and concerns.

Is Machinery Directive 2006/42/EC of concern to my organization? How do I perform a risk assessment? Who is responsible for the CE Marking: machine builder or the end user? Is this going to affect my cost-efficiency? Will the machine's productivity be compromised?



The Directive and the standards – From enemies to allies.

Nowadays, machinery safety is perfectly framed in a European Directive and a set of related standards that establish the process and the requirements, whose **compliance ensures that a machine can be declared as safe**. They can certainly be overwhelming; but it is just a question of fully understanding them, through guidance, education and operational training.

To ensure safety, the first thing to be done is to evaluate the risks.

For Machinery, safety risk assessment is guided by the ISO 12100:2012 which "specifies basic terminology, principles and a methodology for achieving safety in

the design of machinery. It specifies principles of risk assessment and risk reduction to help designers in achieving this objective". This is the key point in safety engineering, as a **good initial design** driven by the risk assessment **will end up saving costs**.

In this step you would be answering questions such as: which are the potential risks my machine could cause? What happens if the security function does not work? Which security functions are more appropriate in each risk situation? etc. It is a matter of **anticipating different risk scenarios**, evaluating them and reducing risk to the minimum possible level.

What does it take to make a machine safe?

Once the risk assessment has been carried out and areas with high risk potential have been identified and will be tackled through safety functions, other standards come into play, such as the ISO 13849-1/2:2013.

In particular, the **ISO 13849-1**, one to the latest standards to appear on the safety scene, is intended to make the process of risk reduction more quantitative by using scientific calculations to determine acceptable machine safety performance levels, and avoid judgment calls. This new approach implies a great **improvement in terms of the definition of safety functions**.

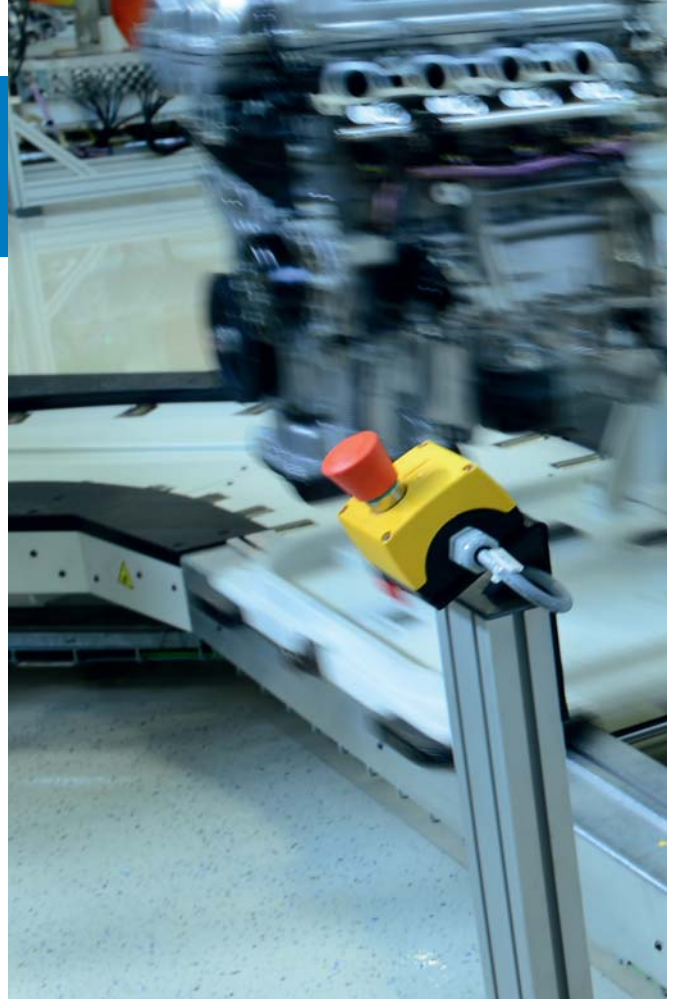
This later standard, for the design and validation of security functions at a performance level, or other standards such as IEC61508 or IEC62061, more related to electrical and electronic components, and a few others included in the Machinery Directive 2006/42/EC, try to address the safety issue from a holistic point of view; we are not talking any more about the safety of individual components but about safety in a more functional way. **It is about design with safety in mind.**

Safety engineering can be cost-efficient

Machinery safety can definitely be cost-efficient. As noted before, it all starts with a comprehensive understanding of the standards, the procedures, the systems and the components available. This will **avoid** getting drowned in the complexity of the directive and norms, which can end up **“over-securing” your machine**.

The most sophisticated solution is not always required. A proper risk assessment and security function analysis will determine the security level required in a given component.

The more time and effort is dedicated to the design, to ensure that all components work together towards the maximization of productivity while ensuring the highest safety, by minimizing the risks, the more cost efficient the whole process will be. Even more importantly it will guarantee having a secure machine.



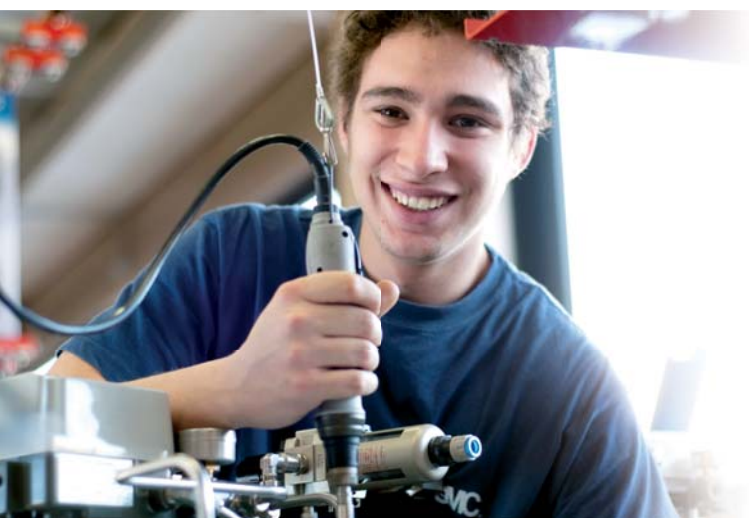
The Evolution towards safety engineering together

Machinery safety can be challenging, due to the complexity inherent in the abundant standards and procedures included in the Directive. Our proposal is to give you educational and operational support through all the steps: risk assessment, analysis of the security function and the selection of the most appropriate individual component that guarantees the required safety level.

It is our purpose to go beyond presenting individual components and solutions for safety engineering; our evolution involves being close to our customers throughout the whole process, mainly in the design stages in order to ensure a safe machine, in a cost-effective way.

So, **what does it take to make a machine safe?** Education, training, understanding, evaluation, thorough consideration of alternatives, guidance. And this is much easier and more pleasant when done in company, don't you think?

See an example of our **Machinery Safety Solutions** on page 10.



The most versatile all-purpose valve

5 Port Solenoid Valve **Series SY3000/5000/7000**

Main benefits

- **Improved productivity** with outstanding reliability and reduction in cycle time.
- **Reduced installation costs** and assembly time with remarkable flexibility in design.
- **Space saving** with improved operability.
- **Air savings** by driving higher capacity cylinders and using mixed mounting valves.



Simple and quick valve replacement offers labour savings.

Easy replacement compared to stacking manifold types.



Space saving / Improved operability.

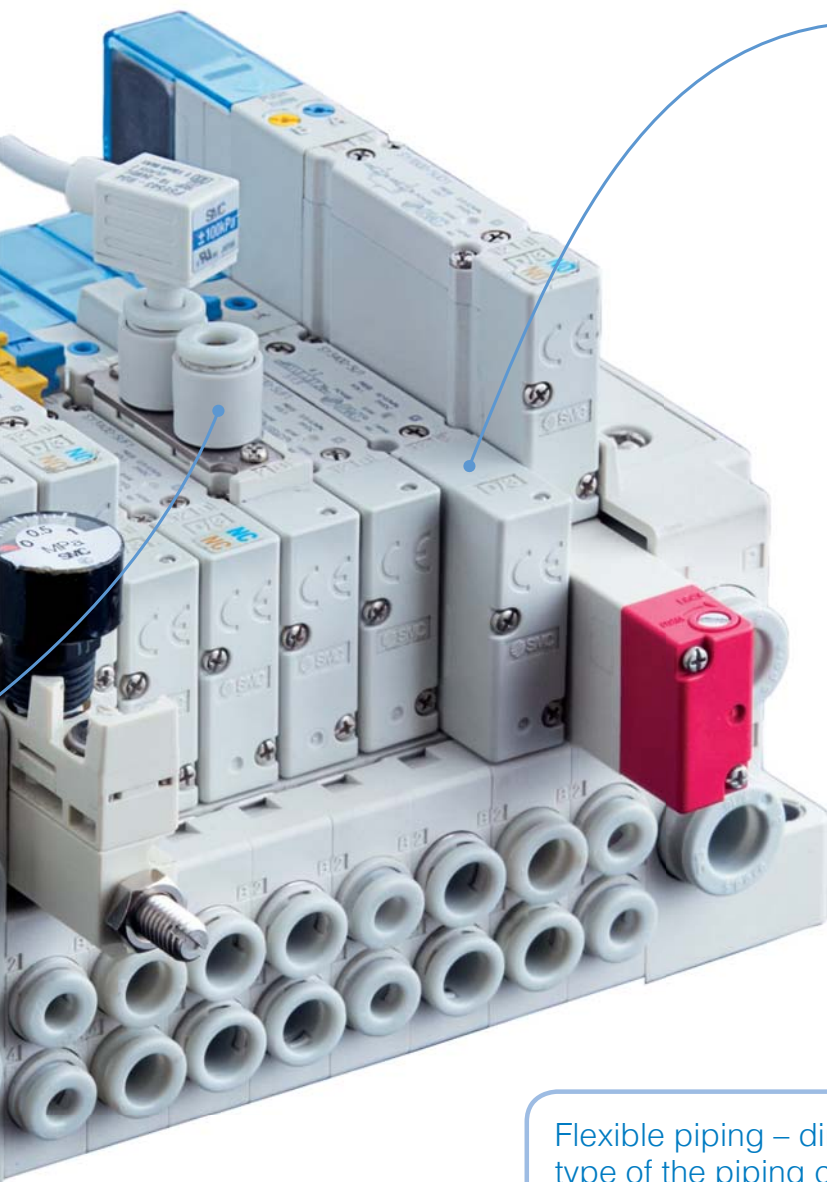
- Wiring, piping and operation are integrated on one side. Multiple layer type is available as an option. This saves space in the lateral direction.
- Bottom ported is also available providing space saving. Bottom ported reduces the footprint and enables the separation of electrical and pneumatic connection.



The Experts opinion:

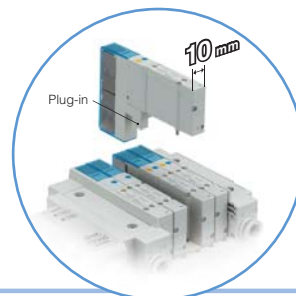
Besides its adaptability to varied demands, its most reported benefit is its cost-effectiveness. Smaller sizes hold the capacity of bigger ones.

MR. KURT MEILI, TEAM LEADER PRODUCT MANAGEMENT, SMC SWITZERLAND.



Mixed mounting is possible in the same manifold.

Different sizes (SY3000/5000 or SY5000/7000) can be mixed!
Possible to reduce installation space, the number of serial units and wiring.



Compact size and high flow.

Outstanding flow characteristics while maintaining compact size, ensures the required flow in your application.

Flexible piping – direction, size and type of the piping can be changed.

To mount the piping on top, on the side and mixed.

Back pressure check valve.

This prevents cylinder malfunction caused by the exhaust from other valves.

More information on the SY series?



<http://SY.smc.eu/en>

Meeting tomorrow's machine safety standards today

ISO13849-1 Safety Standard Compliant Valves **Series VP/VG**

Main benefits

- **Safety improved** with higher security in design and integration of machines through safety components according to International Safety Standards ISO 13849-1.
- **Labour savings** with easy to use and maintain residual pressure release valves.

Series VP542-X536/ VP742-X536

Residual pressure release valve with position detection sensor.

Safety Standard ISO 13849-1 for category 2.

Series VG342-X87

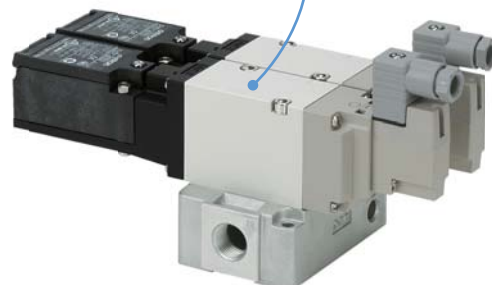
Dual residual pressure release valve with position detection sensor.

Safety Standard ISO 13849-1 for categories 3 and 4, compliant with Performance Level e.

Series VP544-X538/VP744-X538

Dual residual pressure release valve with position detection sensor.

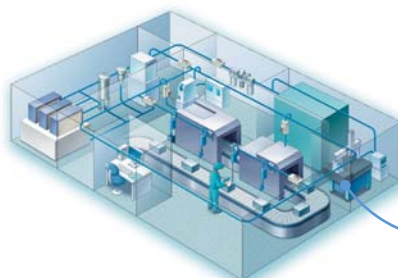
Safety Standard ISO 13849-1 for categories 3 and 4.



Application examples

These valves apply to safety-related parts of control systems regardless of the technology and type of energy used (mechanical, hydraulic and electrical), for all kinds of machinery.

With the use of these valves, the total safety of the machinery can be upgraded to category levels 2, 3 or 4.



Position detection valve with redundancy

VG342-□-X87

VP544-□-X538



More information on the VP/VG series?



<http://VP-VG.smc.eu/en>

A poppet valve directly designed to reduce your costs

3 Port Solenoid Valve, Direct Operated Poppet Type **Series VT307**

Main benefits

- **Energy saving** thanks to the low power consumption.
- **Flexibility** with its universal porting type, the same valve can be used with different functions.
- **Longer valve life** when ozone is generated in the pneumatic line thanks to its HNBR rubber seals.



Low power consumption.

- Energy-saving type: 1.8 W
- Standard type: 4 W

Low concentration ozone resistant:

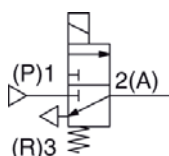
- HNBR rubber seal

Wide variety of valve options.

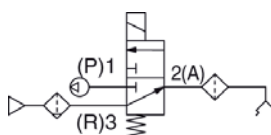
- Continuous duty type
- Vacuum specification type (-101.2 kPa to 0.1 MPa)
- Energy-saving type
- Energy-saving type + Vacuum specification type

Application examples

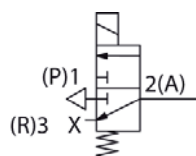
Blow-off valve



Valve for vacuum



Pressure release valve



More information on the VT307 series?



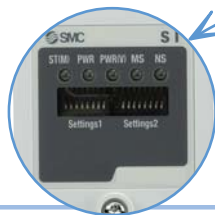
<http://VT307.smc.eu/en>

Flexible, easy to install & maintain fieldbus unit

Fieldbus System, PROFINET Compatible **Series EX600-SPN**

Main benefits

- **Labour savings** with reduced installation and wiring time, easy to connect/remove individual units, and easy to connect to input/output devices.
- **Cost savings** through optimisation of the size and cost of the manifold.
- **Improved flexibility** with availability of both digital and analogue input/output units.
- **Improved efficiency with easy maintenance** thanks to a self-diagnosis function.



Self-diagnosis function and LED display.

- Possible to ascertain the maintenance period and identify the parts that require maintenance.
- In combination with the **Handheld Terminal**, it allows the setting of parameters and monitoring of I/O signals.



Centralised multipoint fieldbus system for digital and analogue I/O.

- Up to 9 I/O units, either digital or analogue, can be connected in any order.
- Possible to connect various input and output devices to the digital/analogue I/O units.

Output analogue device

Electro-pneumatic regulator



Input analogue device

Pressure sensor



Flow sensor



Output digital device

Solenoid valve



Others

Indicator light
Relay
Buzzer

Input digital device

Pressure switch



Flow switch

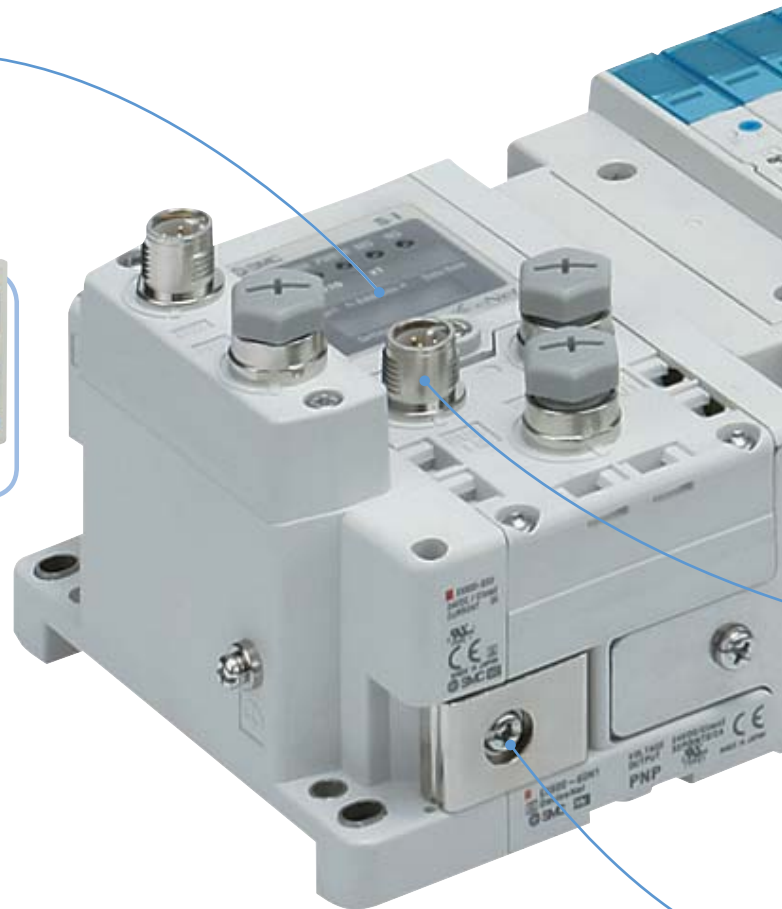


Auto switch



Others

Proximity sensor
Photoelectric switch
Limit switch



The Experts opinion:

This is our most capable fieldbus unit. We have devised it with the aim of facilitating and simplifying its set up and day-to-day running to the greatest possible extent.

MR. ALEXANDER HOFBAUER, PRODUCT MANAGEMENT - SOLENOID VALVES AND SERIAL TRANSMISSION SYSTEM, SMC AUSTRIA

IP67 enclosure protection.

EX600 compatible with other fieldbus protocols.



DeviceNet

EtherNet/IP

EtherCAT

CC-Link

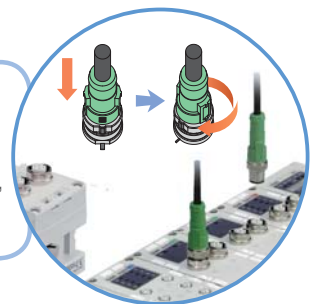
Suitable for complex control in factory automation applications, as it is compatible with one of the most widely used communication protocols.



SY3000/5000/7000 manifold solenoid valve compatible.

SPEEDCON compatible connectors.

- Just insert and rotate 1/2 turn.
- Three connectors: for fieldbus inputs and outputs, and for handheld terminal.



Joint type connection method for connecting/removing units.

- Unique clamping method to prevent screws falling out.
- Easy to separate the unit just by loosening bracket screws.



More information on the EX600 series?



<http://EX600.smc.eu/en>

The cost effective solution for your communications

Fieldbus System, EtherNet/IP™ Compatible **Series EX260-SEN**

Main benefits

- **Cost savings** through a cost effective serial interface solution.
- **Space savings** with product equipment size reduction thanks to compactness and cabling with daisy-chain wiring communication.
- **Easy operation setting** leads to labour savings.
- **Quick connection with reduced installation and start times.**

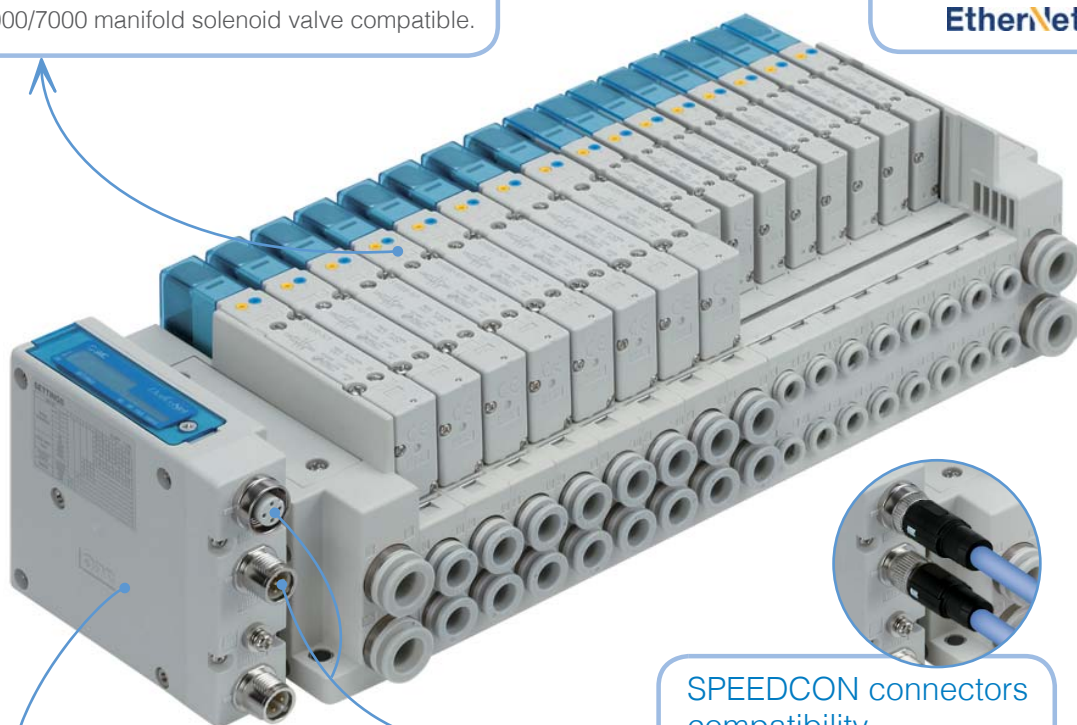
Valve output system.

Output device for driving 5 port solenoid valves.

- Drives up to 32 solenoids, and up to 24 stations.
- SY3000/5000/7000 manifold solenoid valve compatible.

Suitable for control of process and other industrial applications.

EtherNet/IP



Internal terminal resistor.

ON/OFF switching is possible with an internal terminating resistor.

SPEEDCON connectors compatibility.

- Just insert and rotate 1/2 turn.
- IP67 enclosure protection.

Daisy-chain wiring communication.

- Daisy-chain results in branch connector savings
- not necessary to use branch connectors.
- Wiring and piping possible from the same direction.

- IP67 enclosure protection.
- EX260 compatible with other fieldbus protocols.



PROFI® **DeviceNet** **PROFI**®
NET

EtherCAT **CC-Link**

More information on the EX260 series?



<http://EX260.smc.eu/en>

Compact, Simple & Flexible

2/3 Port Mechanical Valve **Series new VM100/200**

Main benefits

- **Little mounting space required** due to its compact size.
- **Long, trouble-free life** under stringent operating conditions thanks to its simple construction.
- **Flexibility** for machine design thanks to the several mounting and piping options and actuators available.



Available in vacuum applications (VM100):

-100 kPa to 1 MPa (VM200: 0 to 1 MPa)

Easy actuator replacement is possible.

Actuators are interchangeable.

More information on the VM series?



<http://VM.smc.eu/en>

Actuator variations

Mechanical operation

Roller lever



One-way roller lever



Straight plunger



Roller plunger



Cross roller plunger



Manual operation

Toggle lever



Push button (Mushroom)



Colour: Red, Black, Green, Yellow

Push button (Extended)



Colour: Red, Black, Green, Yellow

Push button (Flush)



Colour: Red, Black, Green, Yellow

Twist selector (2 position)



Colour: Red, Black, Green, Yellow

Key selector (2 position)



Twist selector (3 position)



Colour: Red, Black, Green, Yellow

Foot pedal (VM200 only)



Quicker, safer and more cost-effective

Pressure Relief 3 Port Valve **Series VHS**

Main benefits

- **Air supply and exhausting time reduction and cost saving.**
- **Energy saving** air consumption: efficient switching without air bleeding.
- Product with **high safety measures.**



Double action

Push the handle and then turn, **2-step** action prevents accidental use.



Indicator window.

- SUP: Supply
- EXH: Exhaust

OSHA Standard
Occupational Health and
Safety Administration



Locking holes.

Prevent accidental start-ups while personnel are cleaning or servicing equipment.

High flow-rates:

Up to 8270 l/min

Energy Saving:

Zero blow-by of the air during switching of the handle.

Application examples

- The VHS depressurises the air line and its equipment allowing safe maintenance works.
- This depressurisation function protects the equipment during the long production stops, extending its operating life.



More information on the VHS series?



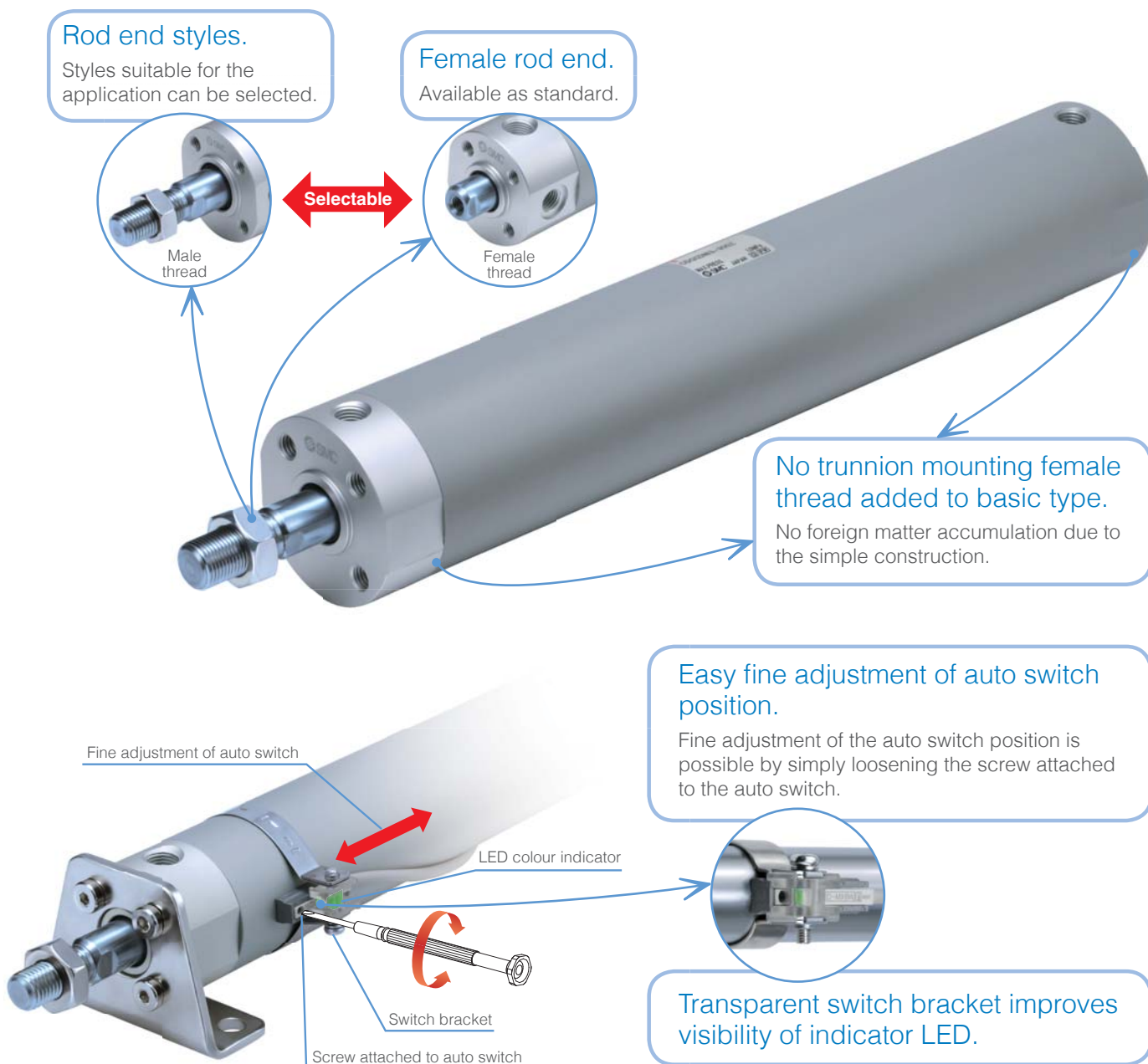
<http://VHS.smc.eu/en>

Basic Round Cylinder with a premium dash

Air Cylinder **Series CG1**

Main benefits

- **Shorter total length** using the female rod end.
- **Reduced assembly and maintenance costs** thanks to the fine adjustment of the auto switch position by just loosening one screw.
- **Simple construction and no foreign particle accumulation** thanks to the basic mounting with no trunnion mounting female thread.



More information on the CG1 series?



<http://CG1.smc.eu/en>

The ISO cylinder that adapts to you

ISO 15552 Profile & Round Tube Tie-Rod Cylinder **Series C96/CP96**

Main benefits

- **Cycle time and cushioning time shortened** with a double cushion of air and bumper.
- **Reduced impact noise** at the stroke end thanks to the bumper.
- **Lightweight machines** due to its lighter construction.



Minimum piston rod deflection enhances the accuracy levels of your machine.



C96



Improved mounting accuracy ensures a secure position of the cylinder during machine operation.

Many options available as standard:

Non-rotating rod, smooth cylinder, ATEX compliant cylinder, tandem cylinder, heat or cold resistant cylinder, cylinder with parts made of stainless steel, among others

Various mounting bracket options.

Mounting brackets can be combined according to the operating conditions: axial foot, rod and head flanges, centre trunnion, single and double clevis, pivot brackets, floating joint, rod clevis and piston rod ball joint.



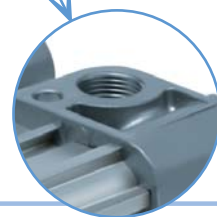
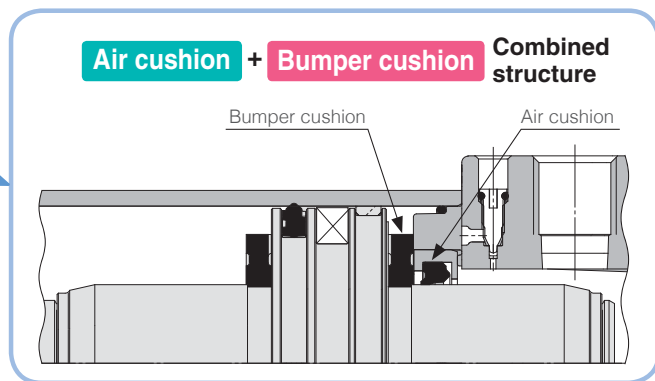
CP96



The Experts opinion:

At SMC, we have been designing cylinders for 45 years; with the C(P)96 our engineers have designed the ISO that provides other engineers with maximum design flexibility.

MR. MICHAEL LOSERT, MANAGER SALES ENGINEERING, SMC GERMANY.



The easy adjustment of the cushion valve allows optimum control of air cushion.

Since the adjustment of the cushion valve is performed with a hexagon wrench key, even fine control can be easily accomplished.



Possibility to slide auto switches in from all four sides without the need to use auto switch brackets.

More information on the C96/CP96 series?



<http://C96-CP96.smc.eu/en>

Packed with features, simply the best

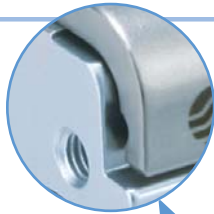
Air Slide Table **Series MXQ-Z**

Main benefits

- **No distortions, oscillations or vibrations** due to the compact and low centre of gravity design.
- **Energy saving** if the MXQ□B type is used for downsizing.
- **Reduced deflection** as the stroke adjuster is positioned in the centre.

Reduced in height and weight with thinner table.

- Thin table made of a special stainless steel.
- Durable material with high strength.



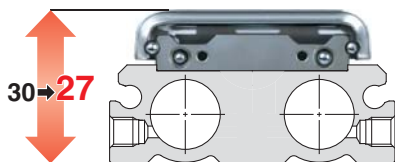
Various stroke adjusters.

- Metal Stopper with Bumper.
- Shock Absorber.
- Rubber Stopper.



Double ported type MXQ□A

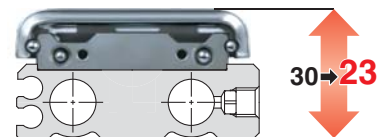
Increase flexibility of wiring and piping with piping ports and auto switch mounting grooves on both sides.



For MXQ12A

Low thrust with high rigidity type MXQ□B

Combination with a cylinder of one bore size smaller increases rigidity according to thrust. Possible to reduce in height.



For MXQ8B



The Experts opinion:

As the pioneers of air slide table development, we can confidently say that these are the best products on the market today.

MR. COLIN GIBSON, TECHNICAL MANAGER ACTUATORS GROUP, SMC EUROPEAN TECHNICAL CENTRE.



Round auto switches (D-M9□) can be mounted directly without spacer.

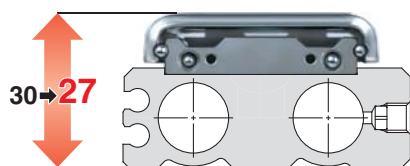
Many functional options.

- With buffer mechanism: protects workpieces and tools by eliminating impact at the extension stroke end.
- With end lock: holds the cylinder's home position to prevent dropping of the workpiece even if the air supply is cut off.
- Axial Piping: centralised piping in axial direction to maintain clear space around the body.

Allowable kinetic energy improved by reducing weight of the movable parts.

Single side ported type MXQ□C

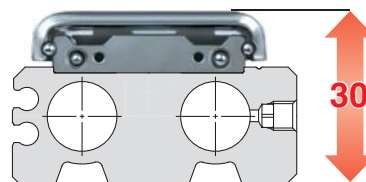
Better visibility for auto switches. Indicator LED can be checked from one side when used with short stroke.



For MXQ12C

Height interchangeable type MXQ□

Height interchangeable with the existing MXQ series.



For MXQ12

More information on the MXQ-Z series?



<http://MXQ-Z.smc.eu/en>

Are you up for increasing cylinder durability?

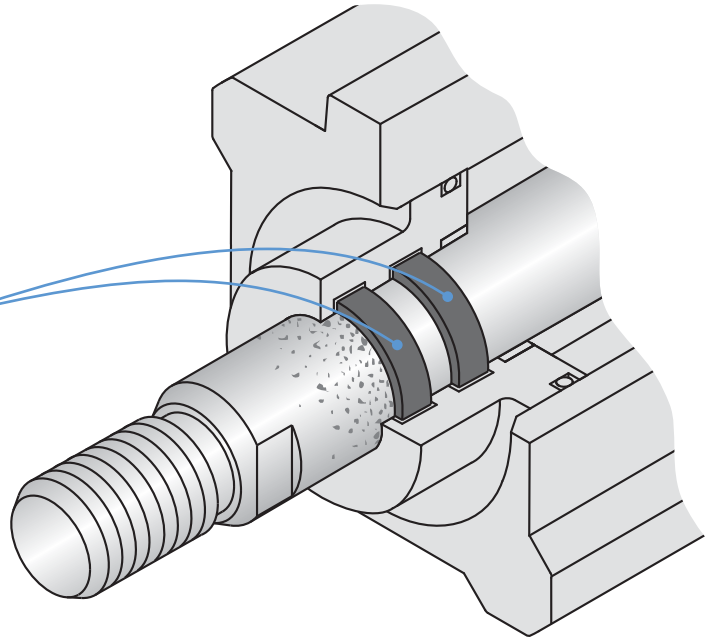
Cylinders with Stable Lubrication Function **Series CM2, CG1, CA2, CQS, CQ2, MXQ-A, MGP, CXS**

Main benefits

- **Cost reduction and no maintenance** thanks to its long life.
- **Interchangeability with the standard model** as it can be mounted in the same place as the standard model.

Special for micro-powder of 10 to 100 μm thanks to the 2 lube retainers added.

- Entry of dust and foreign particles is prevented.
- Grease film is formed on the piston rod surface to improve the durability.



4 times more durable in micro-powder environments than the standard model.

(In accordance with SMC test conditions)

Overall length and mounting dimensions of the mounting bracket are the same as the standard model.

(Except in Series CXS and in sizes 6 and 8 of the Series MXQ)

Applicable Cylinders

Air Cylinder
Series CM2
Ø 20 to Ø 40

RoHS



Air Cylinder
Series CG1
Ø 20 to Ø 100

RoHS



Air Cylinder
Series CA2
Ø 40 to Ø 100

RoHS



Compact Cylinder/Compact Type
Series CQS
Ø 20 and Ø 25

RoHS



Compact Cylinder
Series CQ2
Ø 32 to Ø 100

RoHS



Air Slide Table
Series MXQ□A
Ø 6 to Ø 25

RoHS



Compact Guide Cylinder
Series MGP
Ø 20 to Ø 100

RoHS



Dual Rod Cylinder
Series CXS
Ø 6 to Ø 32

RoHS

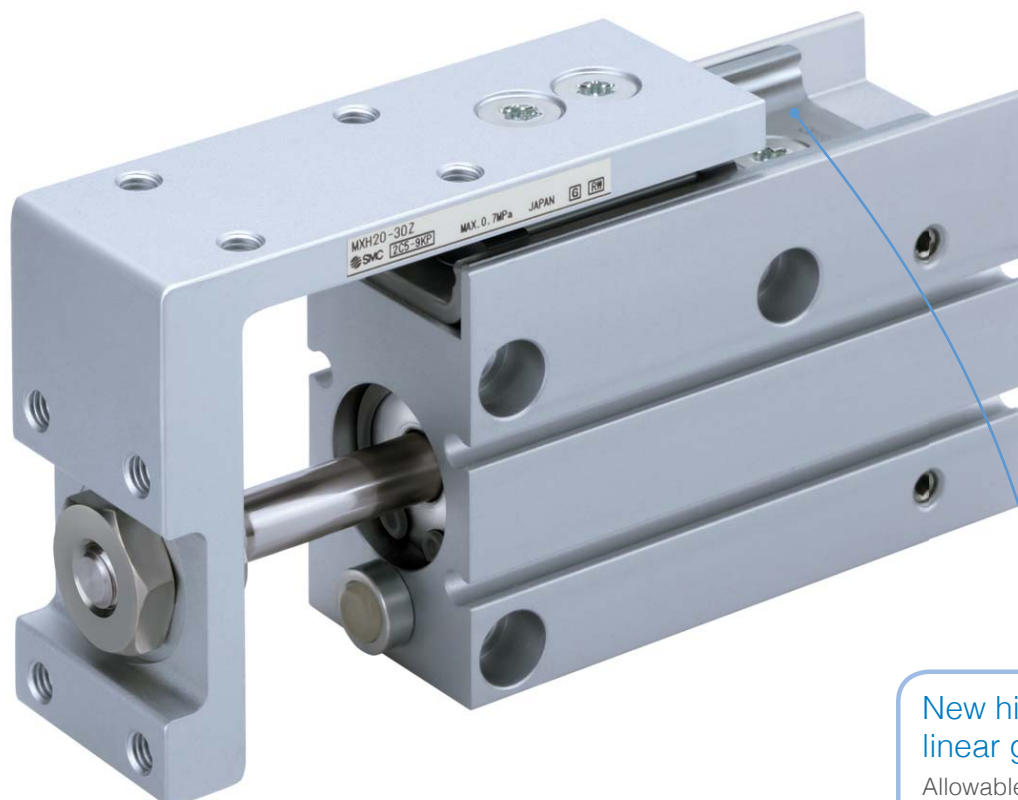


Ideal for long distance executions

Compact Slide Table **Series MXH-Z**

Main benefits

- **Bigger distances to the workpiece** allowed thanks to the new high rigidity linear guide and to the increased allowable moment.
- **Lightweight machines** due to its lighter construction.
- **Minimum deflection** at the extended position of the table because of its high travelling parallelism accuracy.



New high rigidity linear guide.

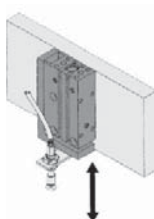
Allowable moment increased by up to 240 %

High traveling parallelism accuracy:

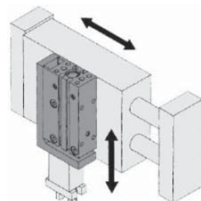
- 0.05 mm or less in strokes 5 to 30 mm
- 0.1 mm or less in strokes 40 to 60 mm

Application examples

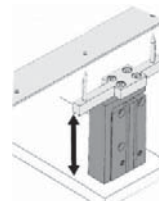
Precision adsorption.



Parts transportation.



Positioning pin.



More information on the MXH-Z series?



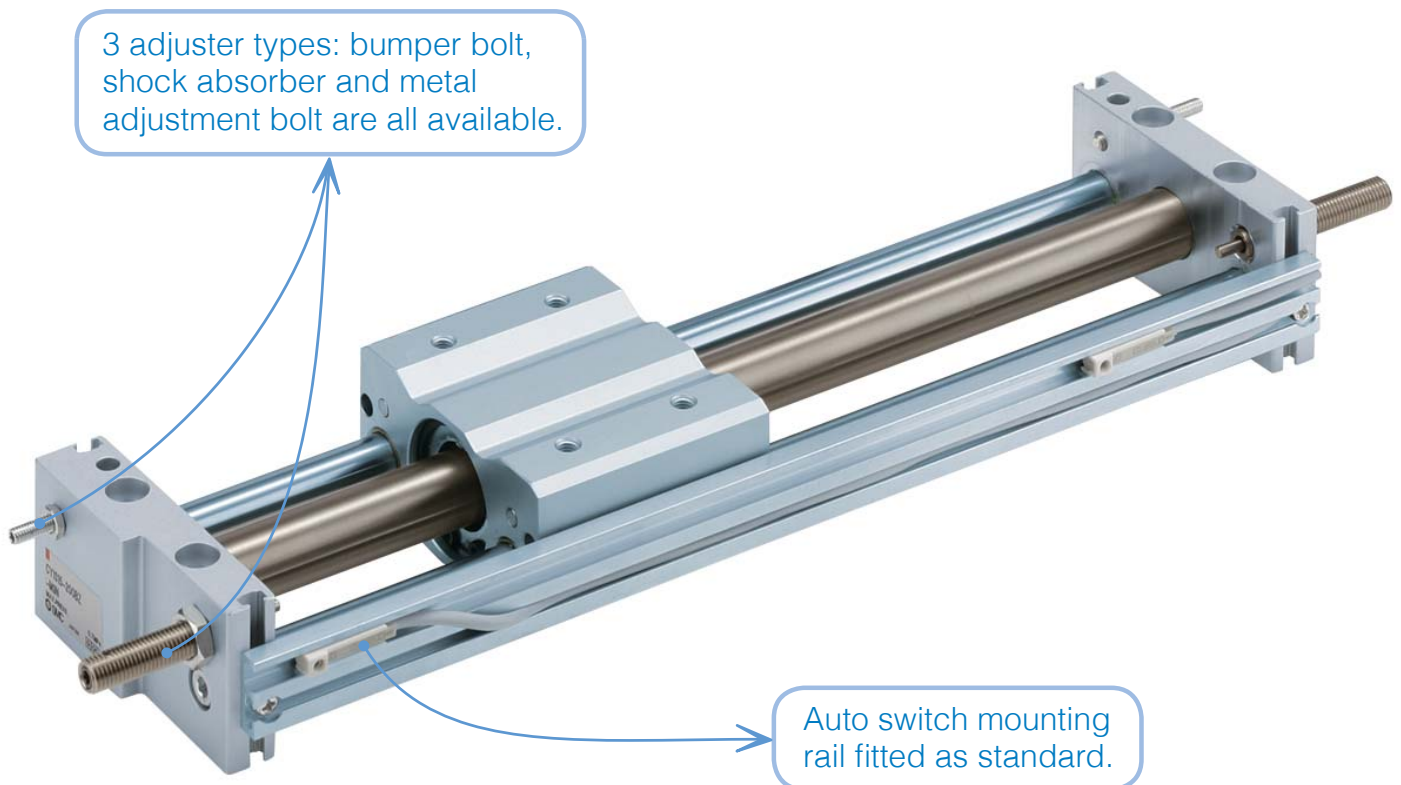
<http://MXH-Z.smc.eu/en>

The space saving solution for low speed applications

Magnetically Coupled Rodless Cylinder, Slide Bearing Type **Series CY1S**

Main benefits

- **Lightweight machines and space savings** due to its lighter construction and its reduced length.
- **Improved durability and reduced maintenance costs** due to the mounting of lube-retainers.
- **Flexibility in the auto switch mounting** with the auto switch mounting rail and the mounting of the switches at any position.



- Lube-retainers are mounted on the internal and external surfaces of the cylinder tube to maintain the lubrication.
- Bilateral and centralised piping types available.

More information on the CY1S series?



<http://CY1S.smc.eu/en>

The accuracy you need when working with large pieces

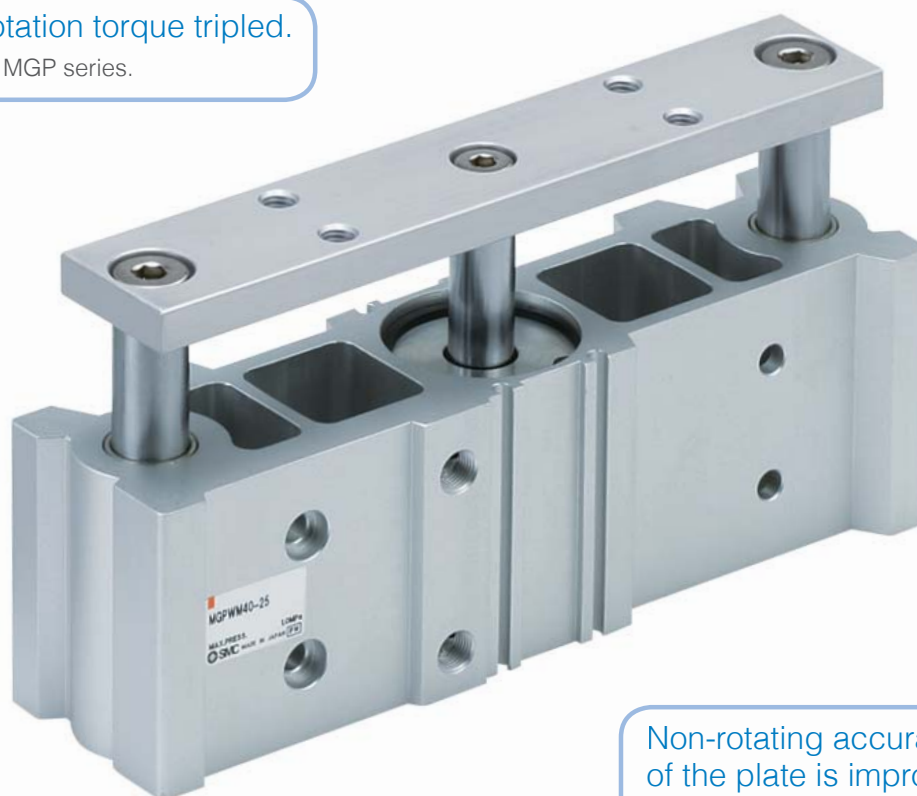
Compact Guide Cylinder, Wide Type **Series MGPW**

Main benefits

- It **increases the range of applications** in which MGP series can be used as it adds the possibility of working with large pieces or pieces with eccentric loads as a pusher or lifter.
- **Good performance and rigidity** thanks to its guide construction and to the improvement of its technical characteristics in comparison with the basic type.

Plate allowable rotation torque tripled.

In comparison with the MGP series.



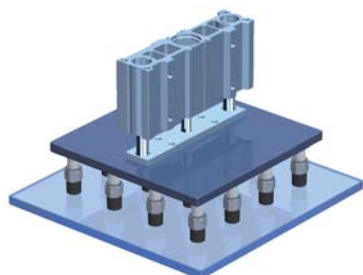
Non-rotating accuracy of the plate is improved.

With respect to the MGP series.

Equivalent weight to the MGP series.

Application examples

Transfer of large workpieces and workpieces with eccentric loads.



More information on the MGPW series?



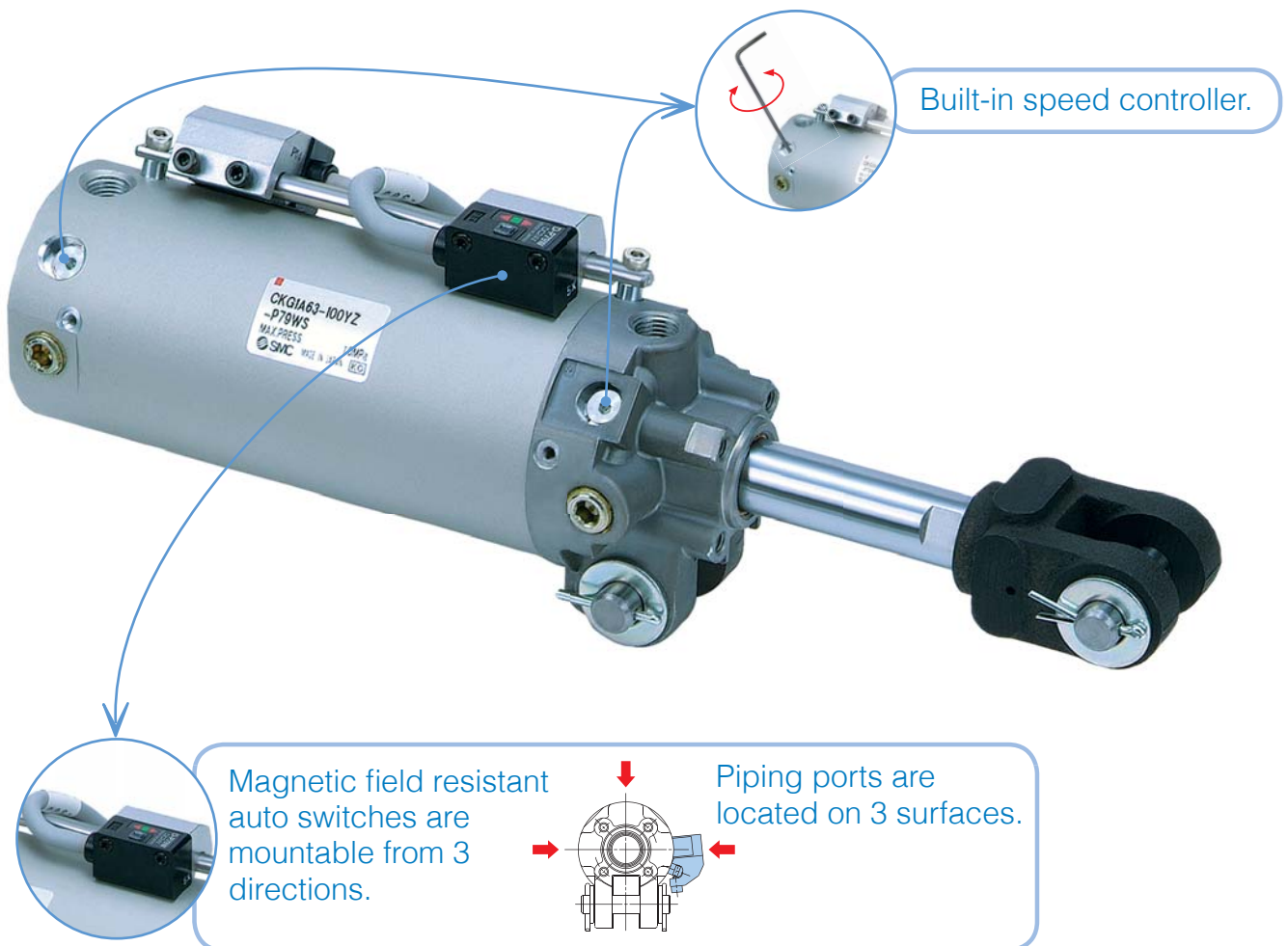
<http://MGPW.smc.eu/en>

It provides the smooth performance you need

Clamp Cylinder **Series CK1**

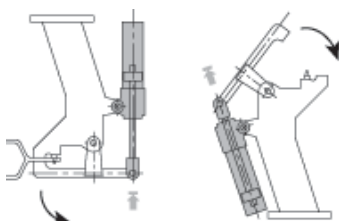
Main benefits

- **Fine-tuning of performance and labour cost savings** for adjusting the cylinder speed thanks to the 4.5 turn adjustment range of the speed valve.
- **Flexible Air Cushion** as it can be selected in one or both ends and adjusted as needed.
- **Space saving** due to the length reduction and the built-in speed controller construction.



Application examples

Clamping



More information on the CK1 series?



<http://CK1.smc.eu/en>

The lightweight option for misalignment

Floating joint, Lightweight Type **Series JC**

Main benefits

- **Long operating life** thanks to the dustproof cover.
- **Reduces the wear of the cylinders**, extending their service time.
- **Guaranties correct operating of equipment and components.**



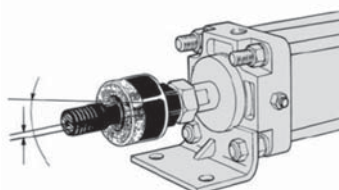
With dust cover to protect the joint.

Light weight mitigates lateral loads to air cylinders. It compensates any misalignment between the workpiece and the air cylinder.

- Rotating angle $\pm 5^\circ$
- Allowable eccentricity ± 0.5 to 1 mm

Application examples

For any application where the joint needs to absorb any “off-centring” or “loss of parallel accuracy” between the cylinder and the driven body.



More information on the JC series?



<http://JC.smc.eu/en>

Continuous Improvement.

Is it really new?

Like it or not, society, the environment and technology are subject to rapid changes. We operate, live and breathe in a world that is under constant change, constant evolution. The world of manufacturing changes, moves and evolves too. **Trends come and go but the necessity to continue being competitive remains. The way to keep going under this competitive pressure is to continuously improve.**



Kaizen – Small changes for long-term lasting improvements

Continuous improvement is Kaizen. Kaizen is continuous improvement. More precisely, it means Change (KAI) Good (ZEN). The term stems from the Japanese culture and dates back to 1930 and Sakichi Toyoda, founder of Toyota. It was first introduced to western culture by Masaaki Imai in his book "Kaizen: The Key to Japan's Competitive Success" in 1986.

It is used to describe a company culture where everyone, from the CEO to the front desk clerk, regularly evaluates his or her work and thinks of ways to improve it. The concept is that **small steps on a regular basis will lead to large improvements over time.**

Improvement does not necessarily mean investment, but to optimise current resources

Kaizen is a mind-set, not a tool. It is not a destination but a journey. One of its main virtues lies in the fact that in the majority of cases it is not imperative to invest resources to improve. This philosophy is based on leveraging existing resources, the main one being a resource that is normally undervalued: **intellectual capital.**

Each person who is involved in operations has the potential to identify opportunities for improvement. Kaizen offers the possibility to exploit this capital to secure continuous improvement with a minimal investment.

改 善

Kai

Zen



Is it really a trend?

LEAN Manufacturing - a concrete tool to streamline processes and achieve business efficiency

Lean manufacturing also involves the idea of continuous improvement, but it has a concrete destination: **to reduce waste**. Lean is the opposite of Fat, so in simple terms it is aimed at “trimming” production processes so as to eliminate the “useless fat”.

The Lean approach is based on finding efficiencies and removing wasteful steps that don't add value to the end product. There are 8 categories of waste that the business should monitor: overproduction, waiting, inventory, transportation, over-processing, motion, defects and workforce.

TPM is kaizen applied to maintenance programmes

This trendy term describes one of the tools for implementing Lean Manufacturing (thus Kaizen).

Total Productive Maintenance is a maintenance philosophy that **requires the total participation of the work force**. TPM incorporates the skills and availability of all employees with the focus on improving the overall effectiveness of the facility. Effectiveness is improved by eliminating the wastage of time and resources.

TPM emphasizes all aspects of production, as it seeks to incorporate maintenance into the everyday performance of a facility.

Developed in the 50s, TPM stands on 8 pillars, starting with the 5Ss. Focused improvement, Autonomous maintenance or Quality Maintenance (all 8 pillars are shown in Figure 1) are all aimed at proactively improving the reliability of machines.

Staying competitive will always be a must, and thus the essence of continuous improvement will remain

5S, TPM, TQM, Lean Manufacturing are just the tools to implement continuous improvement. These tools and trends might change, disappear or evolve. But the essence that they represent will remain, as **competitiveness will always be a must** in a manufacturing reality and continuous improvement the way to achieve it.

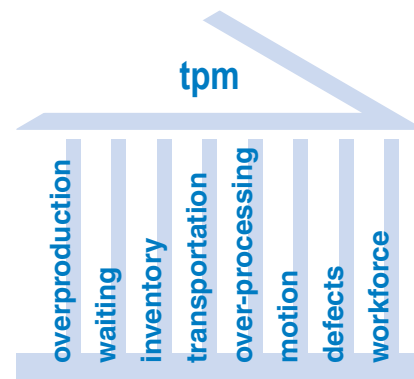


Figure 1

Boosting our customers' efficiency through Continuous Improvement is in our DNA

See some examples of our **Continuous Improvement** products on pages 8, 20 and 38.

Continuous Improvement – Because it is in our DNA

To continuously improve is natural for us, as **it is for our Japanese roots**. The Kaizen philosophy has underpinned our success, and led us to achieve worldwide leadership.

So we know what we are talking about.

Its foundation is the people: people's creativity and their involvement in the organization's goal of long-term competitiveness. An emphasis on commitment and people is very much in line with the way we see our relations with customers. Continuous improvement for us is to put resources at the customer's disposal to address skill gaps, offer concrete solutions that increase productivity and reduce waste, by supporting across all 8 pillars of the TPM or by continuously enhancing our products so they adapt better to the ever changing necessities of our customers.

People working together towards the goal of improving to maintain competitiveness. This is what we always offer our customers: working with them; **continuously improving for them; continuously improving with them.**

It is different, that's crystal clear

Modular F.R.L. Units **Series AC-B**

Main benefits

- **Better visibility and improved lifetime** with transparent bowl guard.
- **Time and space savings in maintenance.**
- **Handling and labour savings**, with easier control and easy and quick in-hand maintenance and replacement of elements.
- **Improved visibility** thanks to different pressure gauge options.
- **Improved resistance to chemicals and improved robustness against shocks** with optional bowls.

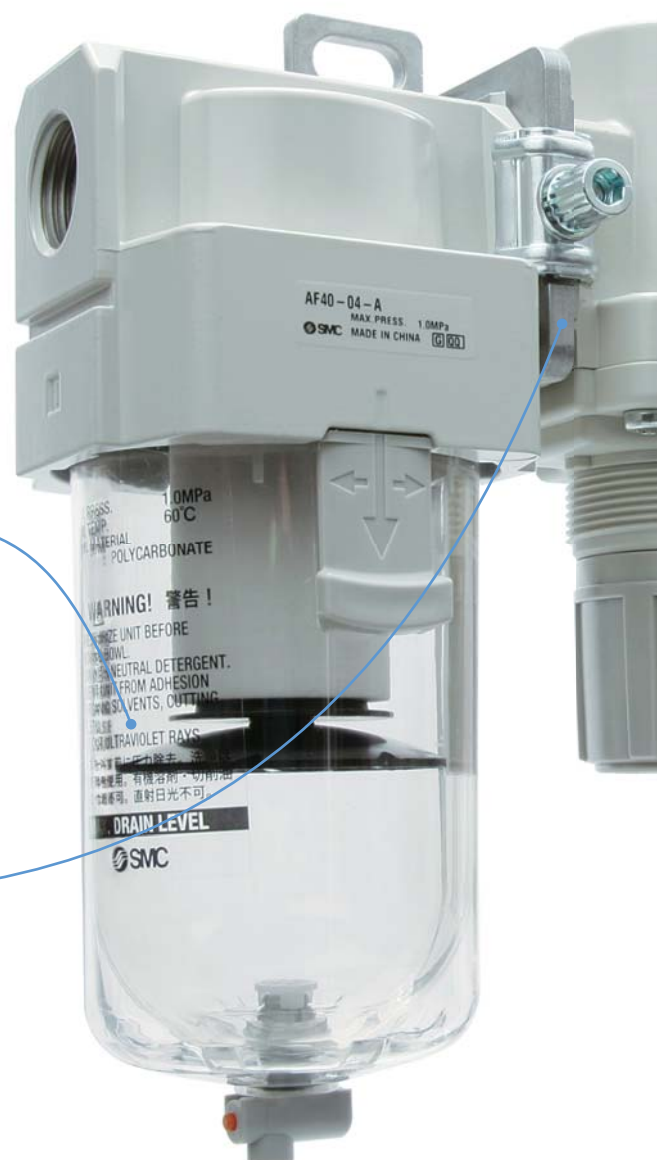
Transparent polycarbonate double layer structure bowl guard available, with 360° visibility, weight reduction and better resistance to rust or corrosion.

- Possible to monitor the condensate inside the filter case and the remaining oil amount in the lubricator from anywhere.
- Environmental resistance since the inner bowl is completely protected with a polycarbonate bowl guard.



Modular connection with a new bracket system.

Initial tightening by hand.



The Experts opinion:

Our worldwide leadership in pneumatics means that you can be sure that we provide a truly first class FRL unit.

MR. RICHARD DRIVER, TECHNICAL MANAGER VALVES AND AIR EQUIPMENT, SMC EUROPEAN TECHNICAL CENTRE.

Integrated and selectable pressure gauges and switches.



Round type pressure gauge



Square embedded type pressure gauge



Digital pressure switch



More visual and useful bowl locking system.

- Adapted convex body.
- Coincident with the bowl lock button.

In-bowl assembled element construction – the element and the bowl are in one piece.

- Reduced time and space for maintenance.
- Easy and quick in-hand replacement / manipulation.
- Compact with height reduction and lightweight.

Interchangeability with existing AR series by panel mounting.

Bowl material selectable.

- Polycarbonate – standard type.
- Metal type – with and without level gauge.
- Nylon.

More information on the AC-B series?



<http://AC-B.smc.eu/en>

Blowing gases at high pressure? Do it accurately

5.0 MPa High Pressure Electro-Pneumatic Regulator **Series ITVX**

Main benefits

- **Suitable to assist gases (air, N₂, O₂, Ar) at high pressures** in laser beam machining.
- **Energy savings** due to less than 3 W power consumption.
- **Space savings** due to its compactness, and lightweight.

Fluorine grease.

Parts in contact with fluid.

Accurate and stepless control of air pressure provided, up to 3.0 MPa, in proportion to an electric signal.

- Maximum supply pressure: 5.0 MPa
- Set pressure range: 0.01 to 3.0 MPa
- Stability: $\pm 1\%$ F.S.
- Maximum flow rate: 3000 l/min

M12 cable connector.

Available in straight type and right angle type.



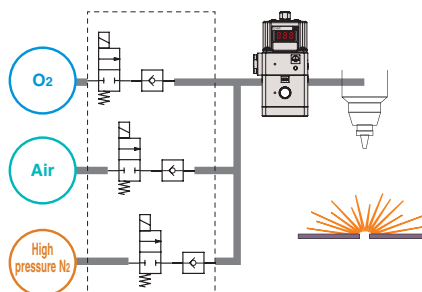
Connection options.

L-bracket and flat bracket.



Application examples

Laser beam machine (oxy-fuel welding, oxy-fuel cutting).



More information on the ITVX series?



<http://ITVX.smc.eu/en>

Accurate control for high pressure applications

3.0 MPa High Pressure Electric-Pneumatic Regulator **Series ITVH**

Main benefits

- **Suitable for use in laser beam machines** where a high pressure control is needed for applications such as driving, sealing or proof pressure testing.
- **Energy savings** due to less than 3 W power consumption.
- **Space savings** due to its compactness, and lightweight.

Preset input type available.

4 preset pressures can be set.

Fluorine grease.

Parts in contact with fluid.

Accurate and stepless control of air pressure provided, up to 2.0 MPa, in proportion to an electric signal.

- Maximum supply pressure: 3.0 MPa
- Set pressure range: 0.2 to 2.0 MPa
- Stability: $\pm 1\%$ F.S.
- Maximum flow rate: 3000 l/min

M12 cable connector.

Available in straight type and right angle type.

Connection options.

L-bracket and flat bracket.

Application examples

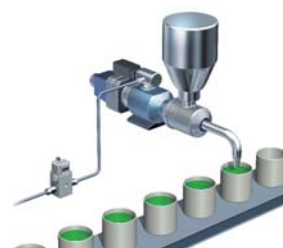
Proof pressure test.



Leak tester.



Discharge rate control.



More information on the ITVH series?



<http://ITVH.smc.eu/en>

Air quality in positive and negative pressure

In-line Air Filter **Series ZFC**

Main benefits

- **Simplicity in filter selection and reduction in stock.**
- **Labour and time savings** with easy piping, easy replacement of the element, increased resistance to degreasing, and improved visualisation of both the filtration element and the existence of foreign matter.
- **Increased life** with chemical resistance to environments.
- **Space savings** with flexible in-line mounting orientation.

Lock mechanism.

Prevents dispersal of components when loosened.



Selectable body material, with grease free o-ring.

- Polycarbonate: resistant to alcohol.
- Nylon: resistant to coolant oil.

Positive and negative pressures in a single resin unit.

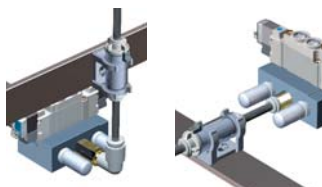
- High flow rates: up to 350 l/min under positive pressure.
- 2 levels of filtration rating available: 5 µm, 10 µm.

Application examples

Improvement of air quality for air blow.



Flexible mounting orientation.



One-touch fittings.

- Mounted on both sides.
- Wide range and different bores available on IN and OUT sides.

More information on the ZFC series?



<http://ZFC.smc.eu/en>

Simplify things

Clean Exhaust Filter **Series SFE**

Main benefits

- **Cost and space reduction** because air can be directly exhausted in a clean room; there is no need for piping for exhaust and relief air.
- **Cost reduction** due to installation of fewer elements as the same product includes a filter and a silencer.
- **Mounting flexibility** with its 3 different mounting variations.



3 mounting variations:

- One-touch fitting type
- Plug-in type
- Male thread type

Bracket available

2 in 1: a Filter and a Silencer at the same time.

High precision filtration.

- Cleanliness class: 4. ISO 14644-1.
- Filtration rating: 0.01 μm .
- Filtration efficiency: 99.99 %.

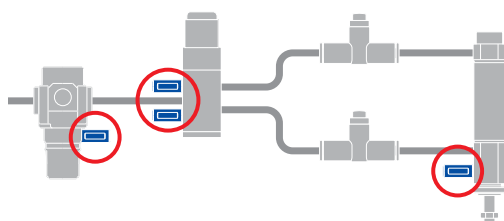
Includes silencer function.

Noise reduction: 30 dB or more.

Flow capacity: from 3 to 200 l/min.

Application examples

Design to be able to directly exhaust air inside a clean room.



More information on the SFE series?



<http://SFE.smc.eu/en>

Your filter regulator for corrosive environments

Filter Regulator, Special Specifications **Series AW-X2622**

Main benefits

- **Suitable for corrosive environments** according to NACE International Standards.
- Appropriate for usage in **environments with a wide range of temperatures**.
- **Correct operation with high inlet pressures**.

Stainless steel 316 as external parts material.

Body, bonnet and bowl.

NACE International Standards compliant.

NACE provides standards for corrosion prevention and control used by a multitude of industries where corrosion is a key concern.

Possibility to select both body size and port size.

- AW30-X2622, with port sizes 1/4, 1/8.
- AW40-X2622, with port sizes 1/4, 1/8, 1/2, 3/4.

Stainless Steel 316 and Special Temperature Environment (-40 °C) Specifications.

- Ambient and fluid temperature: -40 to 80 °C (no freezing).
- Set pressure range: 0.05 to 0.85 MPa.
- Maximum operating pressure: 2 MPa.



More information on the AW series?



<http://AW-X2622.smc.eu/en>

Fully resistant on the inside and on the outside

2-Layer Soft Fluoropolymer Tubing **Series TQ**

Main benefits

- **Longer operating life.**
- **Compatible with a wide range of chemicals.**
- **Efficient washing away of circulating fluid.**

The TQ series unites the best properties of two frequent materials in one single tube.



Integrated moulding.

Both layers are extruded together.
Peeling is not necessary.

Both layers are translucent
for a better fluid visualisation.

Inner layer: Fluoropolymer.

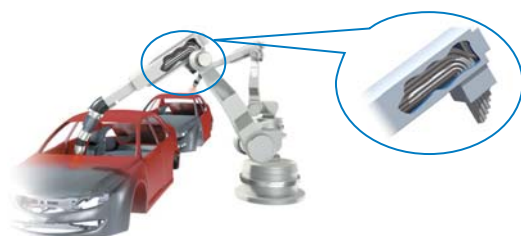
Chemical resistance.

Outer layer: Nylon

Abrasion resistance.

Application examples

Suitable for narrow spaces with a intense friction with corner-edges, between the pipes or any other surface.



More information on the TQ series?



<http://TQ.smc.eu/en>

Multiple lines, multiple colours, single easy identification

Flat Tubing **Series TU, TUS & TUZ**

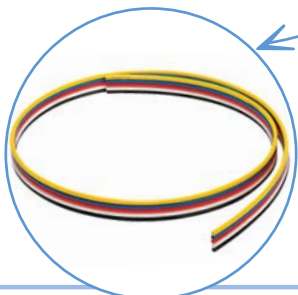
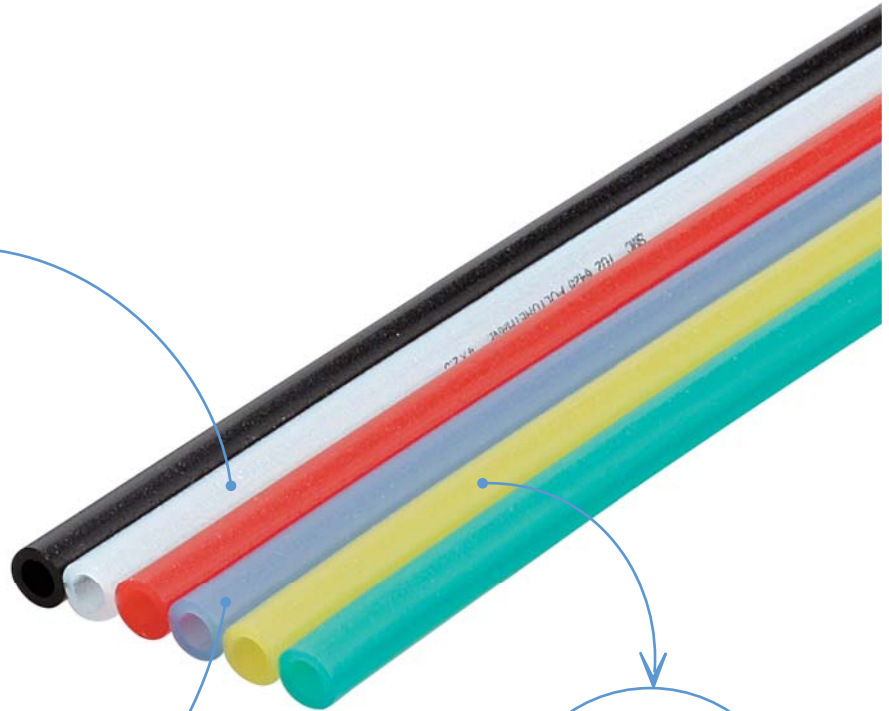
Main benefits

- Users can **identify and manage the tubing by colours** thanks to its multi-colour specification.
- **Cost and time saving** as there is no need to bind it.



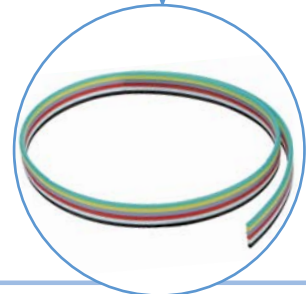
Series TU: Polyurethane

- Tubing O.D.: Ø 2 to Ø 12 mm.
- Tubing length: from 1 to 100 m.
- Number of cores: 2 to 6 (Roll/Reel).
- 8 Colours: black, white, red, blue, yellow, green, clear and orange.



Series TUS: Soft Polyurethane

- Tubing O.D.: Ø 4 to Ø 12 mm.
- Tubing length: from 1 to 20 m.
- Number of cores: 2 to 5 (Roll).
- 8 Colours: black, white, red, blue, yellow, green, translucent and yellow-brown.



Series TUZ: Wear resistant

- Tubing O.D.: Ø 4 to Ø 12 mm.
- Tubing length: from 1 to 100 m.
- Number of cores: 2 to 6 (Roll).
- 6 Colours: black, white, red, blue, yellow and green.

More information on the TU series?



<http://TU.smc.eu/en>

The open window to easy flow control

Speed Controller with Indicator **Series AS-FS**

Main benefits

- **Reduced setting and control time** thanks to the window indicator.
- **Improved visibility** with a wide viewing angle of the inclined indicator window.
- **Easy assembly and maintenance** thanks to a knob that facilitates the adjustment and locking.
- **Reduced labour time** with improved insertion and removal of the tube.
- **High resistance to corrosion** due to its body materials.

Large push-lock type knob.

- It is scaled with four different marks every 90° for easy fine adjustment and set-up operation.
- The needle can be locked/unlocked without the need of any tool.



Numerical indication and control of the rotational number of the flow adjustment needle.

- Possible to select the orientation of the indicator window.
- The inclined position provides a wide viewing angle.



Wide range of models available in a wide variety of tubing sizes (from Ø 2 to Ø 16) and port sizes (from M5 to 1/2).

- Inch / metric sizes selectable.
- Uni-thread type available.
- Standardisation of electroless nickel plating type, stainless steel type and G thread (face seal) type.

More information on the AS-FS series?



<http://AS-FS.smc.eu/en>

Speed control at the push of your hand

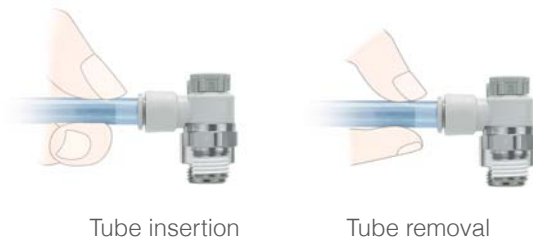
Speed Controller with One-touch Fitting, Push Lock type **Series AS□□□1F-□A**

Main benefits

- **Easy assembly and maintenance** with easier adjustment and locking.
- **Robustness with improved resistance to vibrations** and prevention of deformation due to over-tightening.
- **Improved process quality** thanks to improved adjustment reproducibility.
- **Improved reproducibility of flow rate** with mechanical stopper.
- **Good appearance and high resistance to corrosion.**

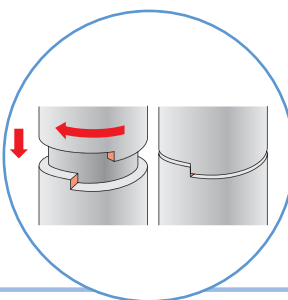
One-touch fitting with improved tube insertion and removal.

The position of the fitting is high enough that it is possible to insert or remove the tube easily with the fingers.



Tube insertion

Tube removal



Mechanical stopper - zero position.

- The knob position is stable when fully closed (with no flow rate) thanks to the contact face rotating stopper.
- The number of handle rotations determines small variations in the flow rate.



The Experts opinion:

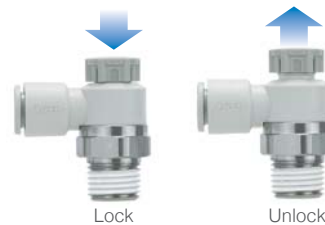
Our engineers have developed this speed controller with simplicity in mind. With one click your actuator will run at just the speed your application needs.

Ms. SABRINA SCHEFFL, PRODUCT MANAGEMENT - PNEUMATIC PIPING EQUIPMENT, SMC AUSTRIA.



Large push-lock type knob with marks every 90°.

- Easy fine adjustment and set-up operation with an expanded and scaled knob.
- Easy locking with its push-locked needle lock.



Flexible design achieved with a wide product portfolio available in a wide variety of tubing sizes (from Ø 2 to Ø 16) and port sizes (from M5 to 1/2).

- Both elbow and universal types available.
- Inch/metric sizes selectable, with colour differentiation in the release button for easy distinction of both meter-in/meter-out and inch/metric sizes.
- Addition of electroless nickel plating AS-F, and stainless steel type AS-FG.
- Standardisation of G thread type.
- Uni-thread type available AS-F-U□.
- Several made to order to suit specific applications:
 - with vaseline lubricant -X12
 - with restrictor (without check valve) -X214
 - grease-free with restrictor (without check valve) -X21
 - clean series 10-

More information on the AS1F-A series?



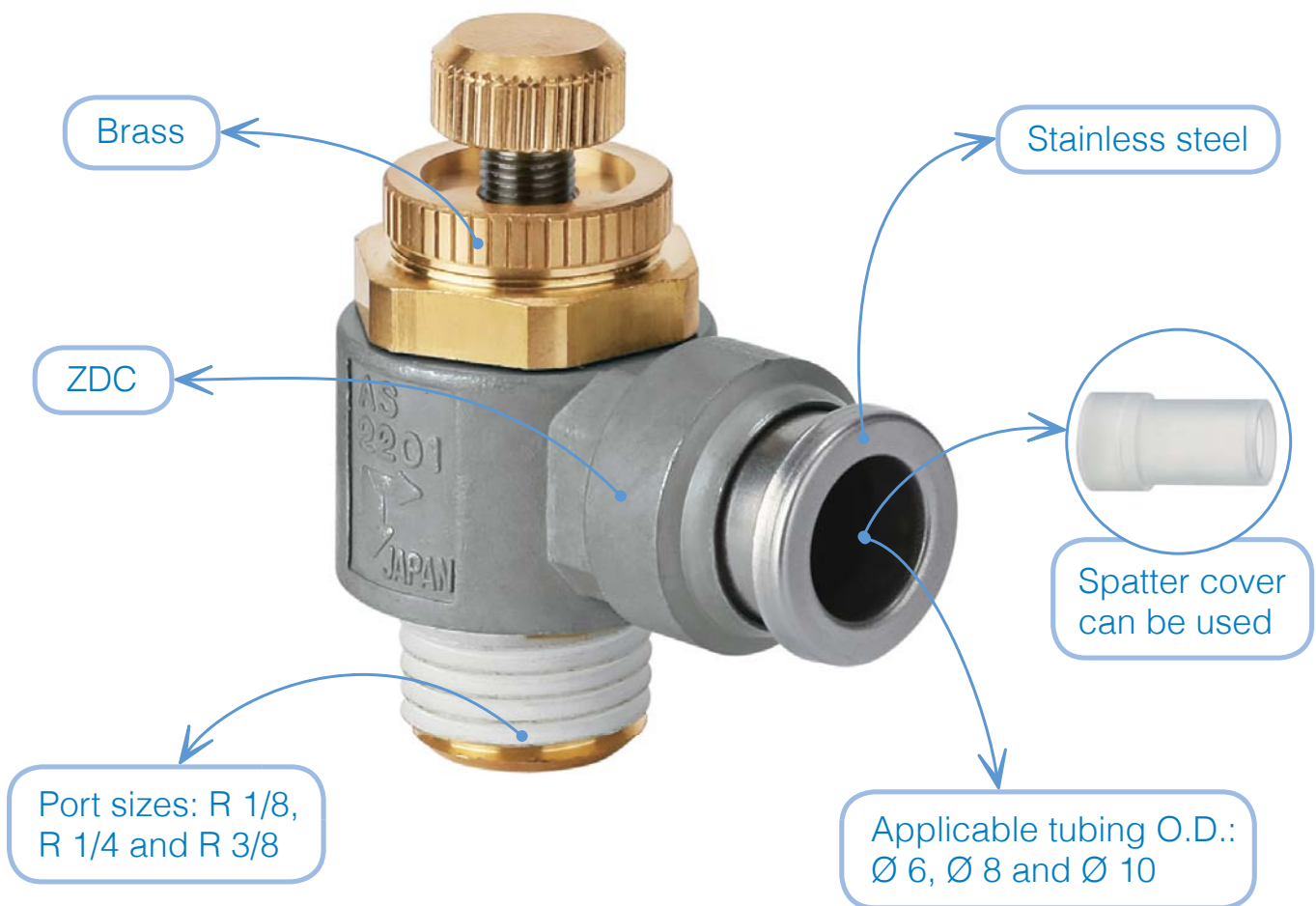
<http://AS1F-A.smc.eu/en>

Control speed in welding applications

Metallic Speed Controller with One-touch Fitting **Series AS-X737**

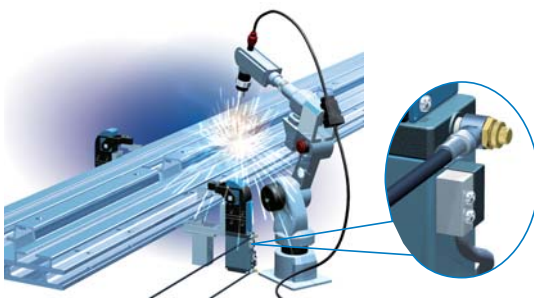
Main benefits

- **Cost savings and long life** as a result of its high environmental resistance thanks to its metallic exterior.
- **Prevention of adhesion and entry of welding spatters** when using the spatter cover.
- **Maintenance savings** as good visibility is guaranteed with the transparent spatter cover.



Application examples

Where welding spatter is scattered.



More information on the AS-X737 series?



<http://AS-X737.smc.eu/en>

Labour cost savings thanks to the "3-step setting"

Digital Gap Checker **Series ISA3**

Main benefits

- **Check-up time reduction** - seat conditions can be checked.
- **Money savings** - Considerable reduction in energy consumption & labour time.
- Suitable for **use in quiet environments**.

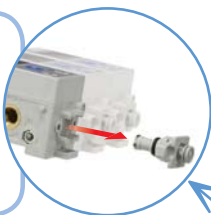
Two screens enable various information to be checked:

- Check at a glance if the workpiece is placed or not!
- The sub screen display can be selected from 6 display options.



Easy maintenance.

The internal orifice part can be removed for cleaning. It is not necessary to remove the piping or metal connection fitting for cleaning when the product is installed in the user's equipment.



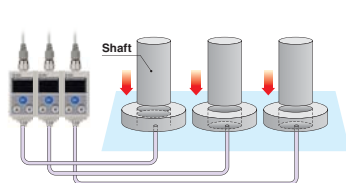
Easy setting by the digital display: 3 step setting (Snapshot function).

Detection principle without exhaust air:

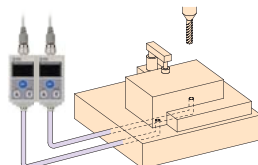
- Exhaust noise: Zero.
- 60 % reduction of air consumption.

Application examples

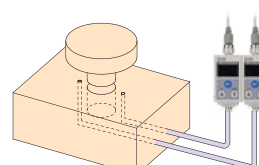
Confirmation of the datum level for press fitting of a shaft.



Confirmation of close contact with the datum level for machining.



Confirmation of close contact with the workpiece for machining.



More information on the ISA3 series?



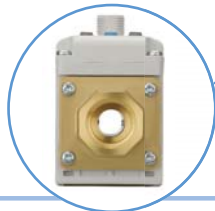
<http://ISA3.smc.eu/en>

Visible cost reduction

Electromagnetic Type Digital Flow Switch **Series LFE**

Main benefits

- **No clogging** with smooth fluid passage and no obstacles or moving parts in the fluid path.
- **Cost reduction** through good visibility and flexible mounting after initial installation.
- **Energy saving** with low pressure loss.
- **Improved life** with no degradation.
- **Maintenance free** application.



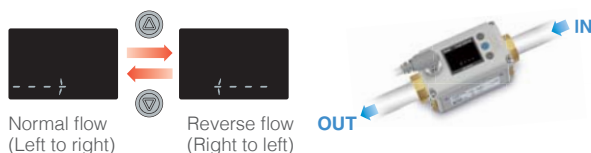
Fluid passage is free of obstacles, moving parts or electrodes.

Fluid flow direction can be changed after installation.

Default flow direction (normal flow).



Change of flow direction after installation.



More information on the LFE series?



<http://LFE.smc.eu/en>



The Experts opinion:

We have gone an extra mile by supplying a flow switch with a 3-colour screen for instant visual checking of the conditions, even of the reverse flow, to facilitate our customers control requirements.

MR. MATTEO ARCARI, SALES MANAGER - INSTRUMENTATION & FLUID CONTROL, SMC ITALY.

Reverse flow error
(Code LLL)



3-colour / 2-screen display.

- Repeatability of the display is $\pm 2\%$ regardless of response time (selectable from 0.25 to 5 seconds).
- Reverse flow can be detected and shown in the main screen.
- Flow direction is displayed in sub-screen.

Suitable for water, water-soluble coolant or any fluids with electric conductivity of $5\ \mu\text{S}/\text{cm}$ or more. Independently of the viscosity.

Highly flexible, with compact and lightweight design.

- Integrated/remote types:

Integrated display type.

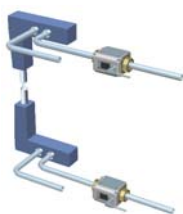
Separate sensor and remote monitor.



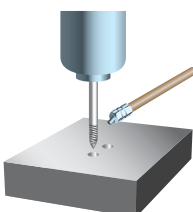
- Variations according to rated flow range:
LFE1: 0.5 to 200 l/min
LFE2: 2.5 to 100 l/min
LFE3: 5 to 200 l/min
- Selectable analogue output: current / voltage.

Application examples

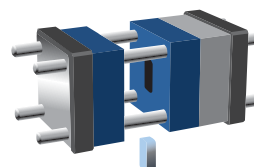
Flow control for pressurised cooling water for welding gun.



Flow control for water-soluble coolant.



Flow control for cooling water for metal mould.



Complete and accurate fluid control

Digital Flow Switch for Water **Series PF3W**

Main benefits

- **Design flexibility and space reduction** by using the remote sensor type.
- **Compactness** by using the integrated display type.
- **Wide range of applications** with a PVC piping type that allows monitoring fluids with a viscosity of 3 MPa·s [3 cP] or less.
- **Labour savings** with easy operation, improved visibility and optimised and simultaneous monitoring of both flow rate and temperature.

Wide fluid monitoring range.

- Flow range: line up to 250 l/min.
- Applicable fluids: water, ethylene glycol aqueous solution, deionised water, chemical.
- Fluid temperature: up to 90 °C as standard, 70 °C for PVC piping model.

Flexible design achieved with:

- Wide range of monitoring solutions:

Integrated display

- With/without temperature sensor.
- With/without flow adjustment valve.

Remote type

- Flexible design and space saving.
- Flow indicator to visually check the status of the sensor.

PVC piping type

- Chemical resistance to meet liquid crystal glass board related applications.
- Available on integrated display and remote types.



Remote sensor unit



Digital flow monitor
(3-colour display)



- Compactness and reduced piping space.
- Analogue output availability: 1-5 V, 4-20 mA.



The Experts opinion:

Not only does it provide great accuracy but it also gives the option of monitoring the temperature, which for some applications really makes the difference.

MR. MARIO SÁNCHEZ, MARKETING MANAGER, SMC SPAIN.



Rotatable 3-colour / 2-screen integrated display with visual indicator.

- Simultaneous precision and real-time monitoring of both fluid flow rate - main screen - and other values - sub screen - such as accumulated value, peak/bottom value, or line name, among others.
- Display can be rotated in increments of 45° to suit the installation conditions.



Built-in temperature sensor (option).

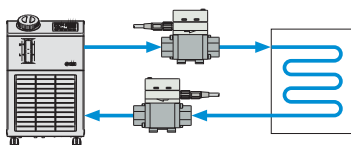
Simultaneous monitoring of both flow rate and temperature of the fluid.

Flow adjustment valve (option).

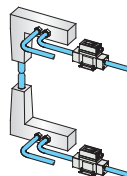
Space saving and reduced labour for piping.

Application examples

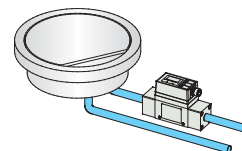
Monitor the flow of the main piping in a factory.



Automotive and machine tools.



Semiconductors and liquid crystal.



Others: monitor the flow of the main piping in a factory, water-treatment facilities using PVC piping...

More information on the PF3W series?



<http://PF3W.smc.eu/en>

3 solutions for fast and effective static removal

Bar Type Ionizer **Series IZS40/41/42**

Main benefits

- **Reduced labour time and production costs** with quick installation, easy operation and equipment monitoring.
- **Improved efficiency in production performance** by reducing manufacturing mistakes and non-quality costs.
- **Safety increased**, with improved safer machine operation.

Low maintenance electrode cartridges.

Minimises contamination of electrode needles by discharging compressed air at the surface of the needles.

- Two types of static electricity elimination cartridges available: energy saving and high speed.
- Two types of electrode needle materials available: tungsten and single crystal silicon.



Wireless remote controller (IZS41/42)

Accurate and quick remote setting of several ionizers, up to 16 units, from up to 5 m away.

Safety functions:

- Electrode cartridge drop prevention function.
- Drop prevention cover.



Three models of bar ionizers.

IZS40 - Basic Type (AC/DC ion discharge)

Simple operation: only ON/OFF required.

IZS41 - High Speed Type (AC/DC/sensing AC ion discharge)

Rapid elimination of static electricity by a feedback sensor.

The feedback sensor detects the polarity of an object and measures the voltage.



IZS42 - Dual AC Type

Implementation of independent Dual AC type, thus reducing the potential amplitude and the amount of ions given to the workpiece and allowing for a closer installation.



The Experts opinion:

Static electricity is responsible for quality issues and high rejection rates. New IZS will resolve this once and for all.

MR. MARCUS KOHLBECK, HEAD OF PRODUCT MANAGEMENT, SMC AUSTRIA.

Several alarms.

Guarantee correct operation and allow equipment monitoring.



e-connector used to supply power and to connect grounding for reference potential.

SNSR

To connect an auto-balance sensor or a feedback sensor (only IZS41). The auto-balance sensor reduces the adjustment and maintenance time.

Link - Transition wiring may be used.

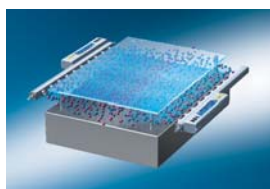
Up to 8 units of IZS41, or up to 5 units of IZS42 can be connected.

Power

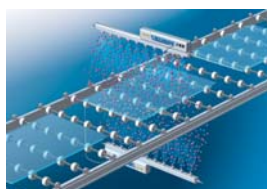
I/O ports to be connected to the ionizer for power supply, grounding and controlling ionizer.

Application examples

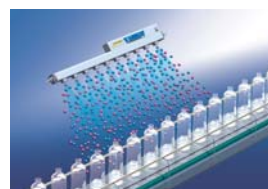
Eliminating static electricity on a glass substrate.



Eliminating static electricity on an electric substrate.



Eliminating static electricity on PET bottles.



More information on the IZS40 series?



<http://IZS40.smc.eu/en>

Great in measurement capabilities and compact in size

Digital Flow Switch **Series PFMB**

Main benefits

- **Reduction in stock** for covering a wider range of applications with a single switch for air and N₂.
- **Space savings** through compactness.
- **Design flexibility, with labour and time savings** through reduction in piping installation work.
- **Easy reading display.**
- **Product life extended** thanks to increased resistance against moisture and foreign matter inside the flow path.



2-colour display with reverse mode.

Possible to rotate/adjust the orientation of the display to make it easier to read (when installed in the reverse air flow direction).

Remote control possible with accumulated pulse.

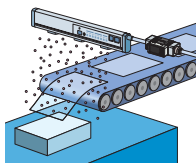
Flexible design.

Several piping variations and mounting options.

Flow adjustment valve integrated as an option.

Application examples

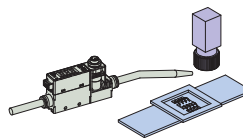
Control of purge air flow of ionizer.



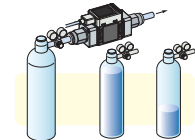
Flow control of the air for spray painting.



- Flow control of N₂ gas to prevent lead frame oxidation.
- N₂ blow prevents distortion of camera image due to air turbulence.



Accumulated indication shows the operating flow rate or residual amount (of N₂ etc.) in a gas cylinder.



More information on the PFMB series?



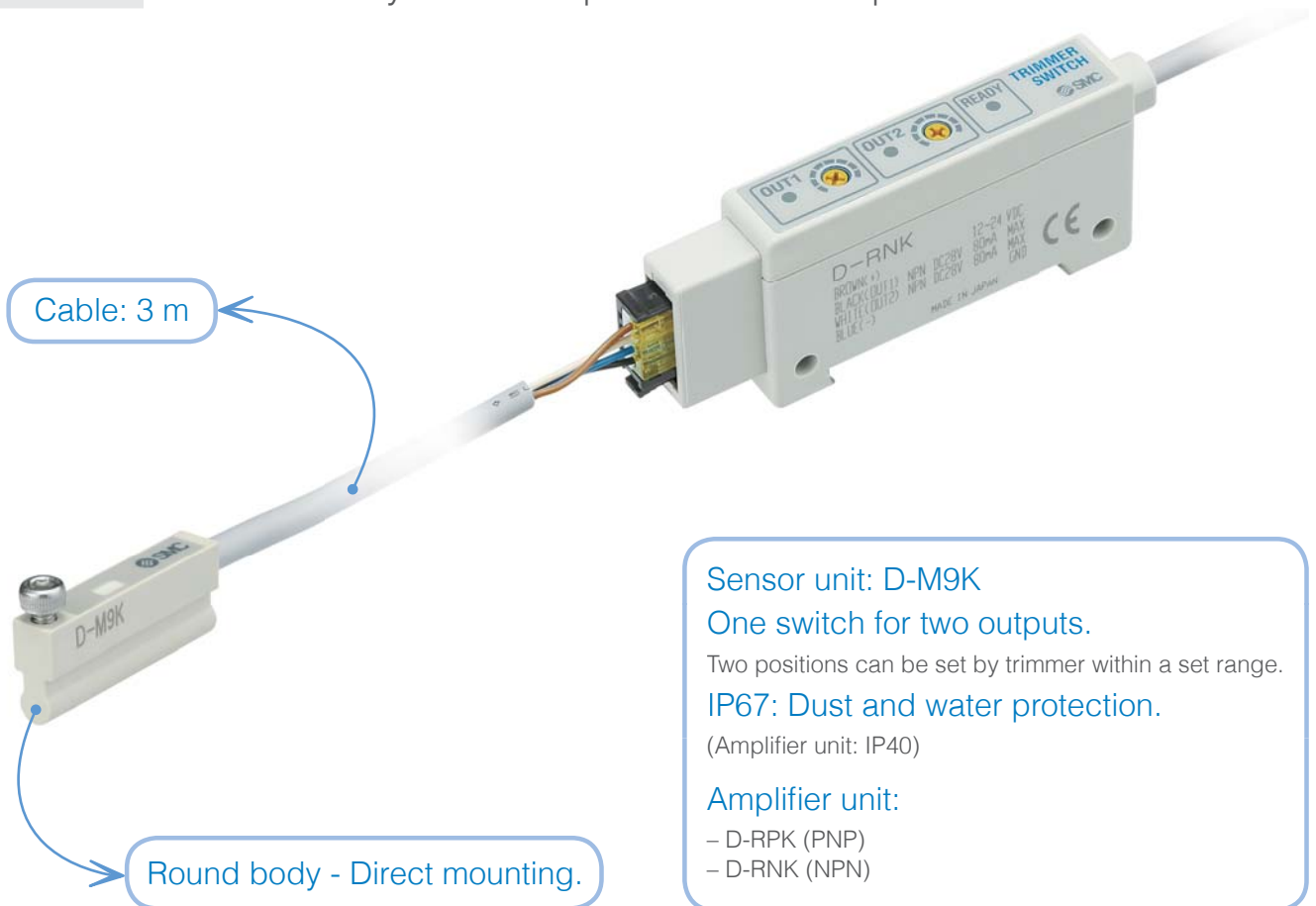
<http://PFMB.smc.eu/en>

Forget all about mounting brackets

Trimmer Auto Switch Sensor Unit **Series D-M9K**

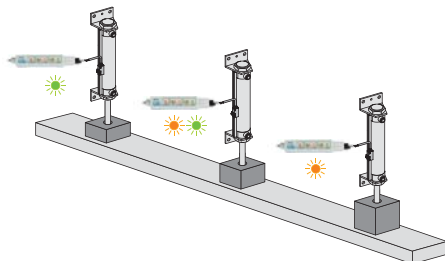
Main benefits

- **Sensor unit mounting labour reduced** due to the fact that round sensor units can be mounted directly in the actuators.
- **Flexibility** as the cable length can be decided by the customer and various sized workpieces can be detected with only one switch.
- **Cost reduction** because if the sensor or amplifier is broken, the client will only need to replace the broken part.

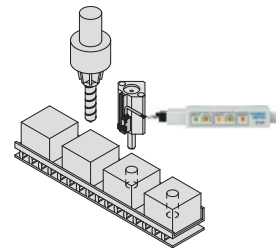


Application examples

For checking height of a workpiece.



For checking depth of the machined hole.



More information on the D-M9K series?



<http://D-M9K.smc.eu/en>

Triple savings at the right temperature

Thermo-Chiller **Series HRSH**

Main benefits

- **Cost savings with energy savings.**
- **Reduced labour time**, with easy operation and control, and reduced maintenance work.
- **Space savings**, with overall machine size kept to a minimum.
- **Temperature stability** even in winter.
- **Increased productivity and maximum machine performance** with optimisation of process quality.

Improved maintenance performance with advance control functions that provide optimum reliability.

- Large self-diagnosis and check digital display.
- Front access to electrical components (not for HRSH090).
- Optional fluid fill port for the circulating fluid (not for HRSH090).
- Easy check of the circulating fluid (only HRSH090).
- Tool-less inspection and cleaning of air-cooled condenser.



Reduced power consumption with a triple inverter.

- The triple inverter individually controls the compressor motor, the fan and the pump, thus optimising control of the number of motor rotations depending on the load.



- The inverter pump has a power reducing effect since there is no need for different piping conditions, for any bypass valve for adjustments.



The Experts opinion:

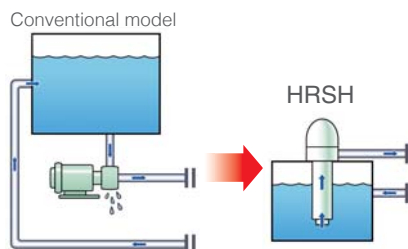
Our drive for energy efficiency for the benefit of the environment and the competitiveness of our customers have driven us to develop our latest thermo-chiller with reduced power consumption.

MR. ADRIAN DICA, GROUP LEADER IN "VALVES AND AIR EQUIPMENT SECTION", SMC EUROPEAN TECHNICAL CENTRE.



Use of a mechanical seal-less immersion pump.

No need to check the pump leakages periodically or to replace the seal (not for HRSH090).



Heating function available even with no heater.

- Circulating fluid can be heated by using the exhaust heat (hot gas) from the compressor circuit.
- Temperature stability even in winter.

Compact and lightweight.

It uses an integrated pump, a small tank, and an aluminium air-cooled condenser.

Cooling capacity: from 9.5 to 25 KW.

Cooling methods: air/water-cooled.

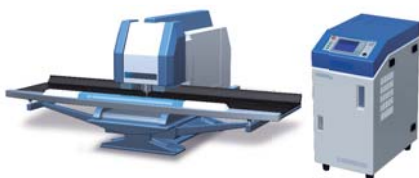
Temperature range: 5 to 35 °C.

Temperature stability ± 0.1 °C.

Application examples

Laser beam machine/Laser welding machine.

Cooling of the laser oscillation part and power source.



Arc welding machine.

Cooling of the power source.



High frequency induction heating equipment.

Cooling of the heating coils, high frequency power source and around inverters.



More information on the HRSH series?



<http://HRSH.smc.eu/en>

Great temperature stability for standard mounting

Peltier-Type Chiller, Thermo-con/Rack Mount Type **Series HECR**

Main benefits

- **Saves installation and piping time** due to its standard dimensions.
- **Increased productivity and maximum machine performance** with optimisation of process quality thanks to the excellent temperature stability.
- **High accurate temperature control** possible with its excellent temperature stability.

Mountable in a 19-inch rack.

It can be mounted together with multiple equipment in a rack.

Fluid fill port and circulating fluid window placed in the front.

Low power consumption.

Low noise level.

- Compressor-less structure means no moving parts.
- The number of fan rotations depends on the load when the cooling load is low the fan rotations are less.



Application examples

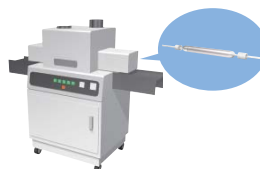
Laser machining.

Cooling of laser irradiated part.



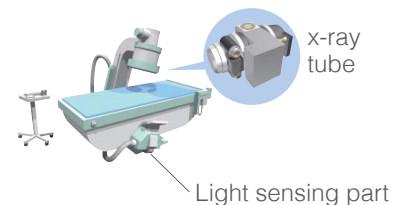
UV curing device (printing, painting, bonding and sealing).

Cooling of UV lamp.



X-ray (digital) instrument.

Temperature control of X-ray tube and X-ray light sensing part.



The Experts opinion:

We reckon standard not only means average but also product compliance coupled with standout features to give our customers that extra that is "nice-to-have".

MR. ROBERTO MARTÍNEZ DE LAFUENTE, HEAT EXCHANGERS PRODUCT MANAGER, SMC SPAIN.



Self-diagnosis and check display.

- 14 alarms: Several types of alarm codes and conditions can be displayed.
- 3-step simple operation: digital display panel with information and buttons.

Excellent Temperature Stability:
±0.01 to 0.03 °C

Set temperature range: 10 to 60 °C

Cooling capacity: 200 W (HECR002) and 1 kW (HECR010)

Heating capacity: 600 W (HECR002) and 2 kW (HECR010)

Learning control function:

Temperature control by external temperature sensor

Application examples

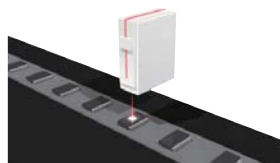
Electronic microscope.

Temperature control of electron-beam irradiated part.



Laser marker.

Cooling of laser irradiated part.



Ultrasonic wave inspection machine.

Temperature control of ultrasonic wave laser part.



More information on the HECR series?



<http://HECR.smc.eu/en>

Improve the performance & reliability of your machine

Thermo-Chiller, Compact Type **Series HRS**

Main benefits

- **Space savings**, with overall machine size and weight kept to a minimum.
- **Reduced labour time and maintenance work**, with easy operation and control, and optimum reliability.
- **Increased productivity and maximum machine performance** with optimisation of process quality.

Advanced control functions

- Convenient functions.
- Self-diagnosis function and check display.
- Communication function provided with serial communication (RS232C / RS485) and contact I/Os, for remote control and operation.

Front and back ventilation

Possible to install close to a wall on both sides.

Improved maintenance performance.

- Large digital display.
- Easy check of the circulating fluid.
- Shaped or easy supply of the circulating fluid.
- Addition of a magnet pump.
- Tool-less maintenance of air-cooled condenser.

Heating function available even with no heater.

Temperature stability even in winter.

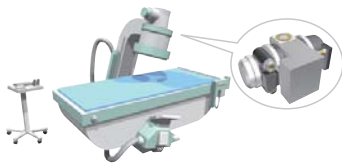
Removable casters.

Easy carrying and handling.

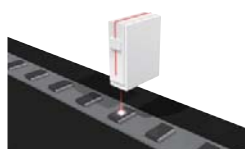
Cooling capacity: 1100 to 4700 W
Temperature stability: ± 0.1 °C
Temperature range: 5 to 40 °C
Cooling methods: air/water-cooled.

Application examples

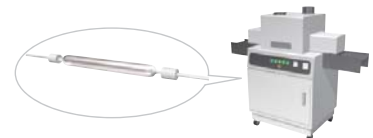
X-ray (digital) instrument.
Temperature control of X-ray tube and X-ray light sensing part.



Laser marker.
Cooling of laser irradiated part.



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



More information on the HRS series?



<http://HRS.smc.eu/en>

Temperature stability that guarantees process quality

Peltier-Type Thermoelectric Bath **Series INR-244**

Main benefits

- **Easy operation and control**, with reduced maintenance work due to the lack of refrigerant.
- Can be used in quiet environments.
- Useful for applications where a big bath is necessary.
- **Space savings:** suitable for use in reduced spaces.

Liquid bath.

Square type with capacities up to 39 L.



Control functions.

- Alarms (high/low temperature, stop, controller, etc.)
- Offset function.
- Serial communication function via RS-232C or RS-485.

Peltier element.

Low vibration and high accuracy.

Cooling capacity: 140 to 320 W

Heating capacity: 300 to 700 W

Temperature stability: $\pm 0.03^\circ\text{C}$

Temperature range: 0 to 60°C

Cooling methods: air/water-cooled.

Temperature sensor.

Direct measurement of liquid temperature, with excellent display accuracy.

Built-in circulating pump.

The agitation by the built-in circulating pump reduces the temperature distribution inside the bath.

Application examples

Temperature control of source gas for MO-CVD or diffusion furnace.



Temperature control of sample and reagent.



Conductivity meter.



More information on the INR-244 series?

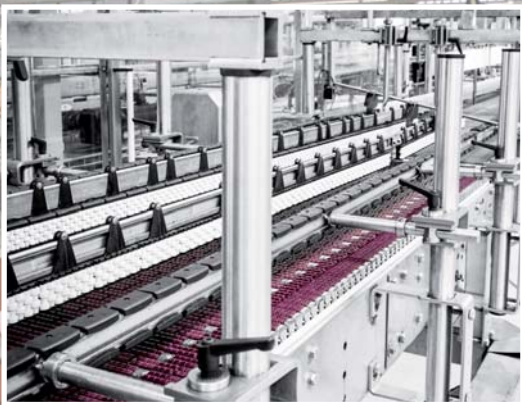


<http://INR-244.smc.eu/en>

Industry 4.0: THE evolution

From the “You can have it any colour as long as it's black” statement from Henry Ford – the greatest exponent of the second industrial revolution with his revolutionary methods of mass production – to the current production arena involving mass production with high levels of customization and low volumes, over a century has passed, and many things have changed for the better.

Nowadays **we are immersed in an Industrial Evolution** (or another Revolution, according to some). An Evolution that lacks a clear definition, or even an agreed name; some of the suggestions are: 4th Industrial Revolution, Industry 4.0, Smart Manufacturing, Internet of Things ...



The answer that automation needed

Nevertheless, however it is referred to, it entails the answer that automation needed. Markets have evolved considerably and currently customer demands change rapidly and require high levels of customization, and product life cycles have shortened; and all this in turn necessitates production **systems that are extremely flexible**, while still maintaining their **cost-effectiveness**.

According to BCG¹ Industry 4.0 will transform the design, manufacture, operation and service of products and production systems. Connectivity and interaction between parts, machines, and humans **will make production systems as much as 30 % faster and 25 % more efficient** and will elevate mass customization to new levels.

1. Boston Consulting Group – Global Business Consulting Firm.

enable last-minute changes to production. As machine data analysis becomes easier, this impacts directly in the form of **nearly error-free manufacturing**; which will avoid faults, and **enhance overall quality**.

The great availability of data and information will optimize decision-making.

Industry 4.0 solves some of the challenges facing the world today, such as resource and energy efficiency and the related technologies, as well satisfying the demands of Machinery Safety. Data sharing and deeply communicative technologies provide **new ways** for companies **to integrate** their **customers' needs** and preferences into their development and **production processes**.

As a way to increase competitiveness – not sci-fi: plain reality

Smart factories, smart production and processes allow individual customer requirements to be met and mean that even one-off items can be manufactured profitably. They

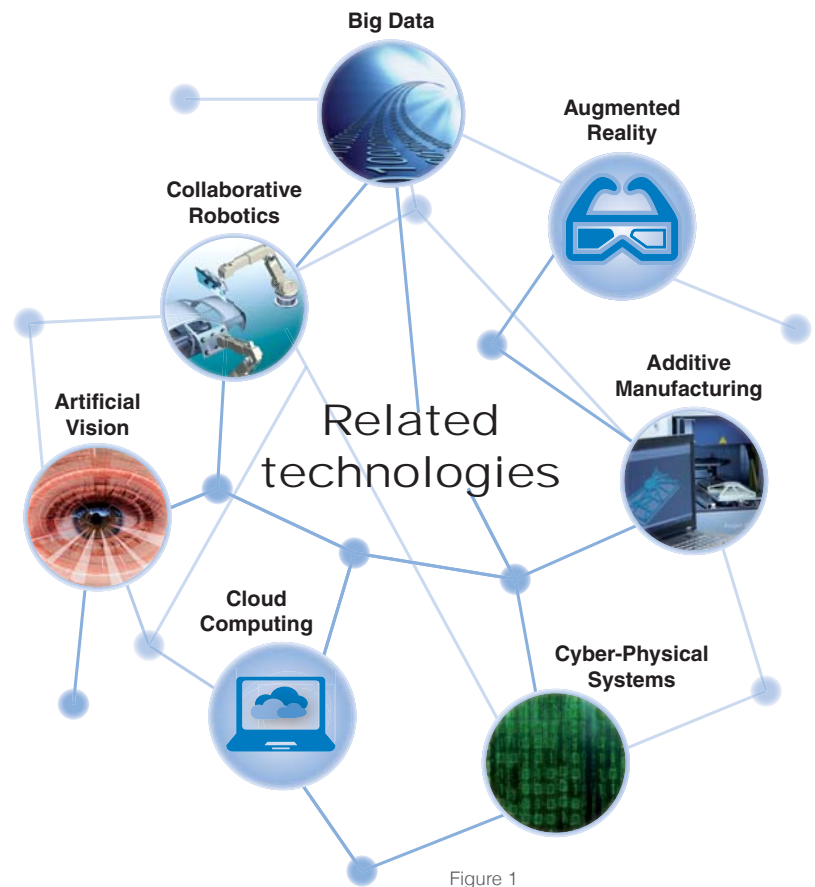
The answer that automation needed

Is Industry 4.0 for you?

Industries and countries will embrace Industry 4.0 at different rates and in different ways. Industries with a high level of product variants, such as the **automotive** and **food-and-beverage** industries, will benefit from a greater degree of flexibility that can generate productivity gains, for example, and industries that demand high quality, such as **semiconductors** and **pharmaceuticals**, will benefit from data-analytics-driven improvements that reduce error rates. (BCG - *Industry 4.0: The Future of Productivity and Growth in Manufacturing Industries*).

This evolution is compounded of 7 dimensions, including collaborative robotics, cyber-physical systems, augmented reality and Big Data. (All 7 technologies are shown in Figure 1). For some industries and some processes all of them will apply, and for others few or maybe even none. This is certainly not a panacea for all ills, but it will definitely have a positive impact on many.

See some examples of our solutions for **Industry 4.0** in the Instrumentation chapter.



Our Evolution – Towards competitive manufacturing together

We must evolve from the ethereality of the concept into reality and practicality. After all, we are talking about automation, the day to day reality for all of us. It is evolved, more digital, highly data-driven, more advanced and more “Smart”; ultimately: this is automation.

We must increase our in-depth knowledge of the 7 different technologies and extract from them what can be applied to the various automation realities our sales engineers meet every day. And with the same objective we pursue every time we meet with our customers: to help them to increase competitiveness in their automation requirements.

Let’s be “Smart” together. Let us be your Automation-match so we can go forward together **towards future-proof production systems**. It will be less overwhelming in company, don’t you think?

It will live up to your expectations

Angle Seat Valve for Steam, Air and Heated Water **Series VXB**

Main benefits

- **Cost reduction** because of its long service life.
- **Reduced maintenance cost** thanks to the strong construction and to reducing the entry of foreign objects.
- **Reliability improved** with its high sealing and minimal leakage.

Body material

Bronze, Stainless
Steel 316L equivalent



Port size:
3/8, 1/2, 3/4



Long service life:

Air: 5 million cycles.

Steam: 3 million cycles.

High sealing-Minimal leakage:

Minimal internal air leakage: **10 cm³/min or less**
(Very much better tightness than any PTFE sealed valve).
High sealing thanks to a rubber seal made of a **special FKM**.

Insulated adapter type.

Available for high temperature fluids

Application examples

Steam cookers.



Sterilisers for food containers.



Boilers.



The Experts opinion:

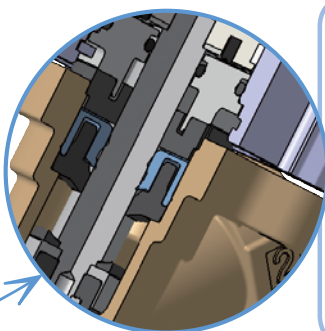
An angle valve needs to be sturdy, unalterable by contaminants. That is the idea behind VXB; you can expect the same performance throughout its million cycles.

MR. PHILIPPE LE PROVOST, SPECIALIST PRODUCT INSTRUMENTATION & FLUID CONTROL, SMC FRANCE.



Pilot port location

Can be placed in 3 of its 4 sides



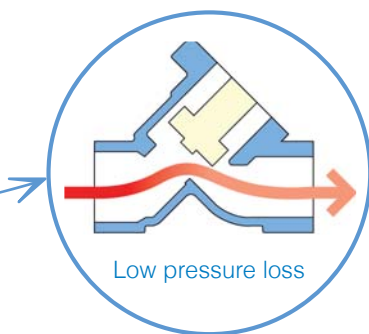
Special construction:

A **protective seal** prevents foreign particles from getting inside when the valve is open.

A **resin scraper** functions during the main valve stroke as a guide and prevents foreign particles from getting in.

Squeeze seal with scraper function added to shut off fluid leakage.

A **guide bushing** gives smooth shaft movement, prevents misalignment and lengthens the squeeze seal life.



Application examples

Sterilisation of filters in a filling machine for milk.



Industrial laundry machines.



Sterilisers for medical equipment.



More information on the VXB series?



<http://VXB.smc.eu/en>

The multipurpose compact fluid valve

Pilot Operated 2 Port Solenoid Valve **Series VXD**

Main benefits

- **Extended service life** as its durability has improved with a special construction.
- **Piping labour reduced** thanks to the built-in one-touch fitting version developed.
- **Energy savings** as a direct consequence of its low power consumption.



Air



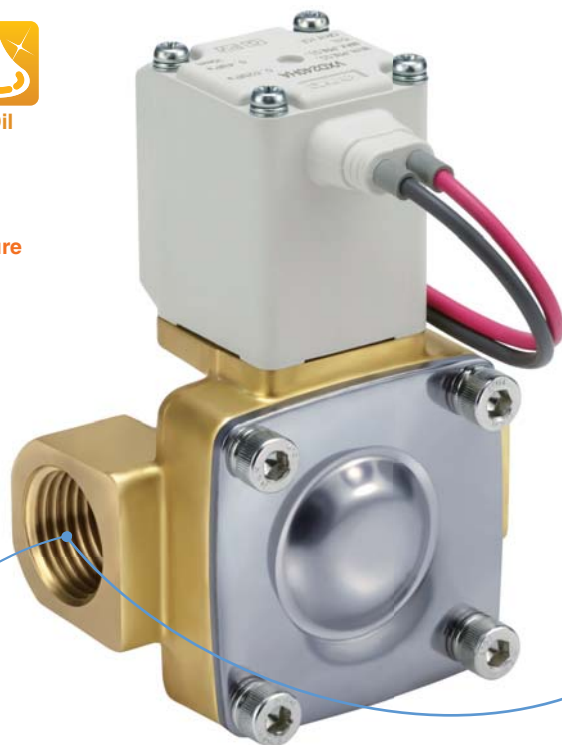
Water



Oil

Heated water
(99 °C)

High temperature oil (99 °C)



Body material.

Air

Aluminium (VXD2 $\frac{3}{A}$)Resin (VXD2 $\frac{3}{A}$)

(C37) Brass

Stainless steel (VXD2 $\frac{4}{B}$ to 2 $\frac{6}{D}$)

Water/Oil/Heated water/High temperature oil.

(C37) Brass

Stainless steel (VXD2 $\frac{3}{A}$ to 2 $\frac{6}{D}$)

Piping variations

Thread piping, One-touch fitting
(G 1/4 to G 1) (Ø 10 to Ø 12 mm)

Flame resistance UL94V-0 conformed.

IP65 degree of protection.

Electrical entry "Faston" type terminal is IP40.

Low noise construction.

Impact noise reduced by the rubber buffer.

Improved armature durability.

Power consumption.

4.5 W (VXD23 to 25), **7 W** (VXD26).

More information on the VXD series?



<http://VXD.smc.eu/en>

When the application requires zero differential pressure

Pilot Operated 2 Port Solenoid Valve / Zero Differential Pressure Type **Series VXZ**

Main benefits

- **Extended service life** as its durability has improved with an improved construction.
- **Piping labour reduced** thanks to the built-in one-touch fitting version developed.
- **Suitable to be used in quiet environments** due to the reduced noise generation.



Air



Water



Oil

Heated water
(99 °C)High temperature
oil (99 °C)

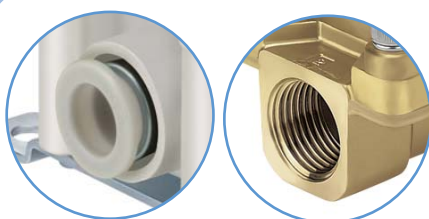
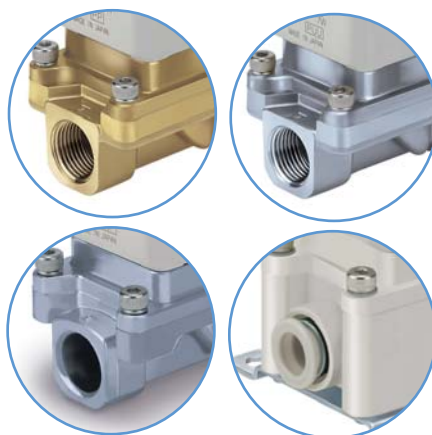
Body material.

Air

Aluminium, Resin (VXZ2³_A)

Water/Oil/Air/Heated water/
High temperature oil.

(C37) Brass, Stainless steel.



Piping variations

Thread piping, One-touch fitting
(G 1/4 to G 1) (Ø 10 to Ø 12 mm)

Can be used at 0 m hydraulic head!

Min. operating pressure differential: 0 MPa.

Flame resistance UL94V-0 conformed.
IP65 degree of protection.

Electrical entry "Faston" type terminal is IP40.

Low noise construction.

Impact noise reduced by the rubber buffer.

Improved armature durability.

More information on the VXZ series?



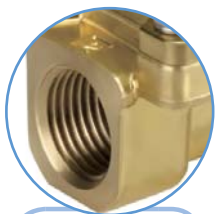
<http://VXZ.smc.eu/en>

Reduce your costs in steam applications

Pilot Operated 2 Port Solenoid Valve / Zero Differential Pressure Type **Series VXS**

Main benefits

- **Cost reduction** because of its long service life and its reduced power consumption.
- **Reduced maintenance cost** thanks to the strong construction and to reducing the entry of foreign objects.
- **Applicable with low pressure fluids** due to the zero differential pressure construction.



Port sizes:

G 1/4 to G1



Steam

Can be used with heated water.

Long service life: 3 million cycles.

Minimum operating pressure differential: 0 MPa

No fluid pressure required for the valve operation.

Body material.

Brass, Stainless steel.



Power consumption.

12 VA (VXS23/24)

15 VA (VXS25/26)

Double guide rings:

- Stable sliding performance.
- Improved scraper performance reduces the entry of foreign objects.

High sealing-Minimal leakage:

- Minimal internal air leakage: 1.0 cm³/min or less (Very much better tightness than any PTFE sealed valve).
- High sealing with a piston main valve and a rubber seal made of special FKM.

Flame resistance UL94V-0 conformed.

IP65 degree of protection.

Low noise construction.

Impact noise reduced by the rubber buffer.

Improved armature durability.

More information on the VXS series?



<http://VXS.smc.eu/en>

Withstands high temperature

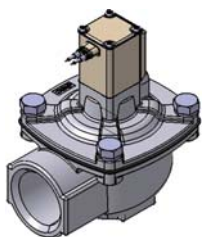
2 Port Solenoid Valve / Air Operated Valve for Dust Collector **Series VXF**

Main benefits

- **High speed response** thanks to the double diaphragm structure.
- **Quick discharge of the bags** due to a large orifice sizes and large discharge flow rates.
- **Low noise, low compressor power consumption and a wider range of pressure to be specified for cleaning the filter** as the minimum operating pressure is small.

Piping variations

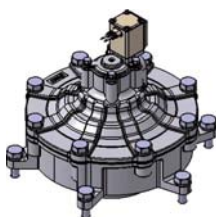
Direct Piping Type



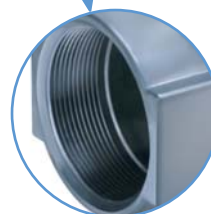
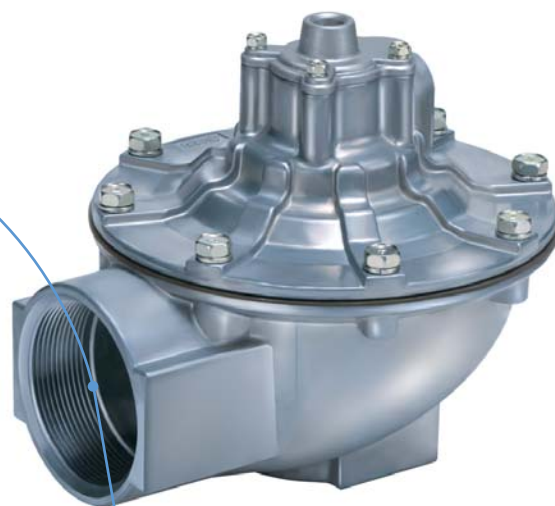
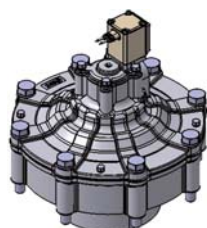
Flange Type



Flange Body I Type



Flange Body II Type



Port sizes:

G 3/4 to G 4

Dedicated Controller: Series VXFC



Large orifice sizes:

From 22 to 100 mm

Large discharge flow rate:

Up to more than 1000 L

Power consumption:

4.5 W (Size 21, 22, 24, 25, 26, 27, 28), 8 W (Size 23)

Low noise construction.

Impact noise reduced by the rubber buffer

Improved armature durability.

Flame resistant UL94V-O conformed.

IP65 degree of protection.

Electrical entry "Faston" type terminal is IP40

More information on the VXF series?



<http://VXF.smc.eu/en>

Version for high temperature
(maximum 100 °C) is already
available.

Improve the performance of your sorting application

High Speed 2 Port Valve **Series SX10**

Main benefits

- **Sorting performance improved** due to the high speed response times.
- **Production increased** thanks to the high frequency rates.
- **Cost reduction** because of its long service life and its energy saving type with low power consumption.

High speed response times:

ON at 0.45 ms

OFF at 0.4 ms

High frequency rates:

Up to 1200 Hz

Long service life:

More than 5000 million cycles.

Energy saving type

With low power consumption available: 4 W

Filter attached type available



More information on the SX10 series?



<http://SX10.smc.eu/en>



The Experts opinion:

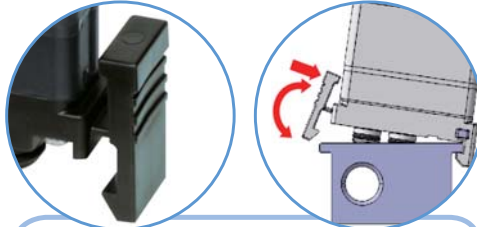
The determining factors in high speed applications such as optical sorting of beans, rice, glass, plastics, pills etc., are footprint and switching times. The SX10 is one of the smallest and fastest valves on the market.

MR. SCOTT PRITCHARD, BUSINESS DEVELOPMENT MANAGER - LIFE SCIENCE AND SCIENTIFIC PRODUCTS , SMC PNEUMATICS (UK) LTD.



Slim dimensions:

The width of both types is 9 mm



Easy installation and removal

In the quick disconnect type.

2 Mounting types available



Quick disconnect type



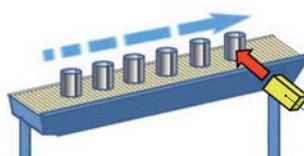
Screw mount type

Application examples

Colour sorting: grains (rice, soybeans...), tablets, pellets, garbage for recycling...



Pulse blower: Blowing off foreign objects, cleaning solutions, etc.



High speed 2 port valve

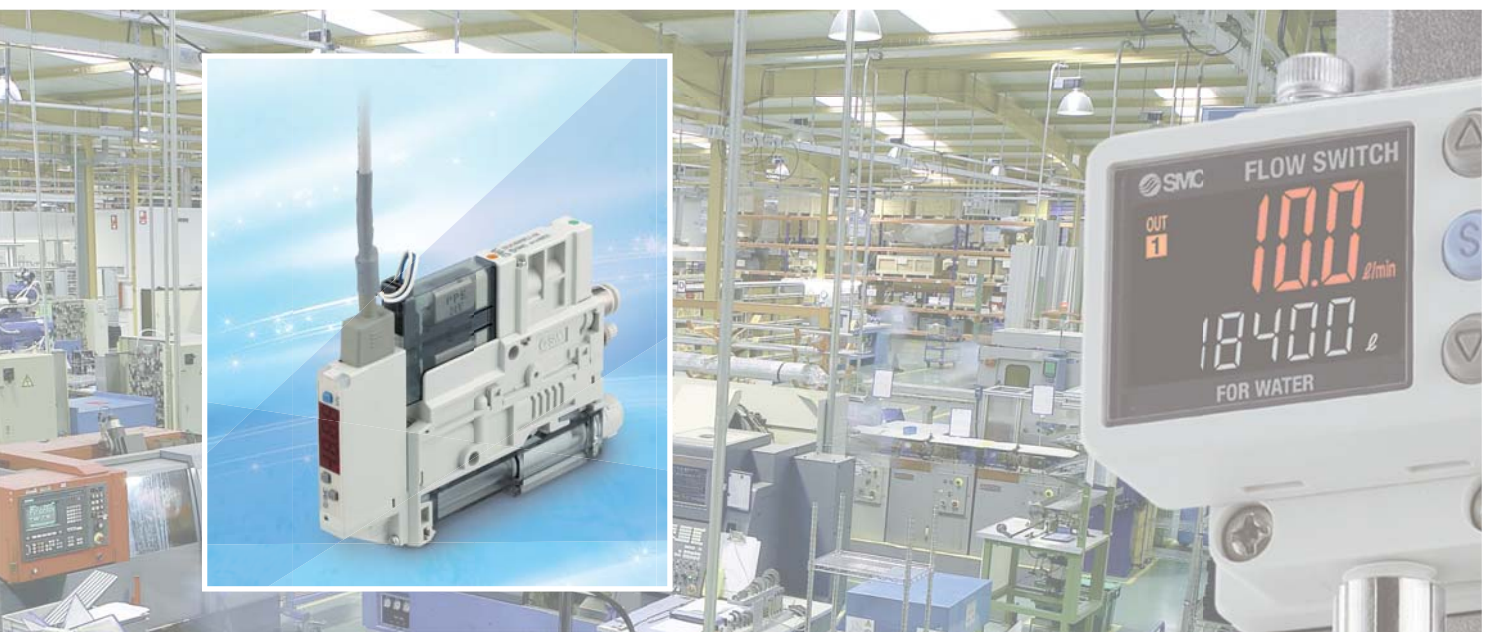
Energy Saving: just call it saving

The human body requires energy in the form of food and drink to perform day-to-day activities, and manufacturing operates in much the same way.

The transformation of materials and information into goods for the satisfaction of human needs requires energy. The use of that energy to transform raw materials into consumer products is also a major source of environmental pollution. The large-scale use of energy for industrial operations in Europe (32 % of the total energy consumed) is responsible for significant CO₂ and other greenhouse gas emissions.

Guaranteeing a sustainable future for the generations to come will only be achieved through the **reduction of greenhouse gas emissions**. This reduction of emissions can be achieved through the implementation of energy conservation (avoidance of energy usage) and energy efficiency (reduction in the amount of energy consumed).

In 2012, the European Union published the **Energy Efficiency Directive**, to address this specific issue and also to assist Europe in reaching its 20 % energy efficiency target by 2020.



The ISO 50001 & EN 16247-1 – The upstarts

This Directive is already part of our lives in the form of the energy efficiency labels to classify household appliances or Energy Efficiency certificates for the sale or rental of buildings. In the industry, as from December 2015, Energy Saving Audits are mandatory for large companies and will be strongly recommended for SMEs. The standards ISO 50001 (Energy Management Systems) and EN 16247-1 (Energy Audits) will become increasingly prominent just as the ISO 9001 and the ISO 14001 standards were before them.

Towards Energy effectiveness – The design

Energy efficiency is only part of the story. Being energy effective means both designing for efficiency and choosing the right technologies and energy sources.

Engineers and designers have a big role to play. By understanding energy, how it is converted into useful forms, and where it is lost, engineers and designers can rethink the way things are made, and **use energy more wisely**.

And without forgetting ... Energy efficient usage

Coupled with the design is the usage. Let's put it this way: it is pointless buying an A+++ fridge if the door is then left open for several minutes. In the same way, once the machine is designed to be efficient, we must think about **how we use the energy wisely in the production process**.

Energy saving as a way of gaining a competitive advantage

An important note: It's not only about global warming but about gaining a competitive advantage

Energy efficiency could mean a competitive advantage for those businesses establishing it within their business priorities. **Savings in the region of 25-30 % are achievable**¹ because unlike labour or capital, the use of energy as a production factor is far from being optimized, so the improvement potential is substantial.

1. According to the Fraunhofer institute. Europe's largest application-oriented research organization.



The Evolution towards saving together

In the new arena of energy-related competition, the first step, as with anything else, is to understand energy usage, and from that point to the final step of reducing the energy intensity of the manufactured products, we want to be at your side.

From assistance in the design stages and through the guidance on energy usage, we want to stand by your side. We can offer you our know-how, our expertise, our support, training, so that our customers can achieve energy efficient production, and the **efficient manufacturing** that will bring them competitiveness in the short, medium and long term.

Furthermore, we are well aware of the overuse of energy saving terminology and know that it is sometimes rather intangible, so when we are addressing this topic with our customers, we translate it into what really matters: euros. Mindful of the fact that cost-reduction is the first thing on our customers' minds these days, monetary value is the language we need to talk, and that's why **this is really all about saving together**.

See some examples of our **Energy Saving** solutions on pages 56 and 74.



The all-in-one energy saving vacuum solution

Vacuum Unit, Vacuum Ejector & Vacuum Pump System **Series ZK2**

Main benefits

- **High efficiency with reduced running costs.**
- **Easy installation and maintenance**, with workpiece drop prevention and simplified wiring and programming.
- Suitable for mounting on moving tools thanks to **its compactness and lightness.**
- **High flexibility** of use thanks to versatile configuration.

All in one design with integrated components results in compactness and lightness.

Versatile configuration with vacuum unit variations:

Single unit vacuum ejector

Individual, bracket mounting, DIN rail mounting.

Single unit vacuum pump system

Individual, bracket mounting, DIN rail mounting.

Manifolds up to 10 stations with different wiring options: D-sub connector, flat ribbon cable, individual wiring

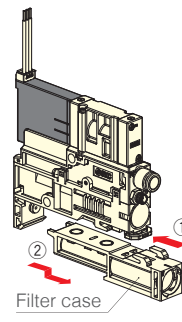
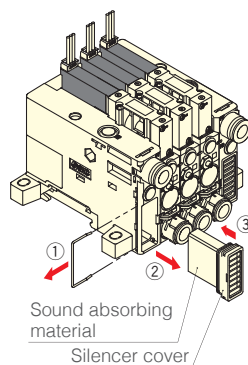
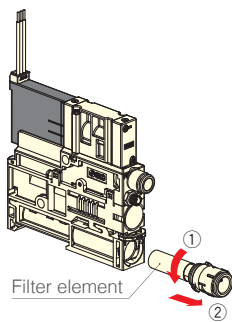
With or without DIN rail mounting.

Easy maintenance:

Transparent filter case for visual checking.

Installation of filter element and sound absorber without screws.

Possible to remove and clean the filter case in case of dirt inside.



The Experts opinion:

With the fact, that vacuum applications can be rather air inefficient in mind, we have designed this solution to tackle the problem and cut air consumption greatly.

MR. MARINO COLOMBO, PRODUCT MANAGER, SMC ITALY.

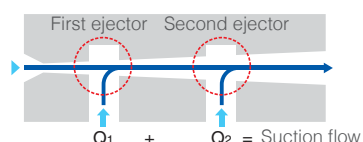


Dual 2 port valve (release valve / supply valve).

- Supply valve with self-holding function (except for energy-saving digital pressure switch option).
- Interlink between supply valve and release valve.
- Power saving pilot valve (0.37 W).

More efficient two-stage ejector.

- Evacuation efficiency improved (suction/consumption ratio):
 - Suction flow 50 % increased.
 - Air consumption 30 % reduced.

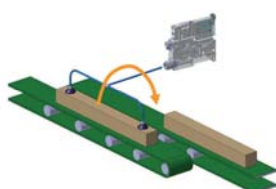


Digital pressure switch for vacuum with energy saving function.

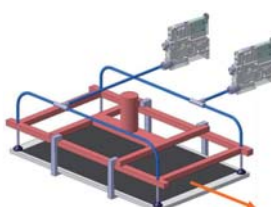
- More than 90 % air consumption reduction.
- Not available for vacuum pump system.

Application examples

Transfer.



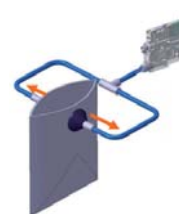
Panel conveyor.



Packaging.



Packaging.



More information on the ZK2 series?



<http://ZK2.smc.eu/en>

Totally resistant to corrosion

Stainless Steel Vacuum Ejector **Series ZH-X267**

Main benefits

- **Long life**, with corrosion and rust prevented thanks to its construction and materials.
- **Suitable for hygienic environments** because it is grease-free.
- **Quick identification of the product.**
- It can be **easily mounted in narrow spaces**.



Laser printing

Part number printed in the body with laser.



All stainless steel manufacture, with compact and simple design, and free of grease and sealant.

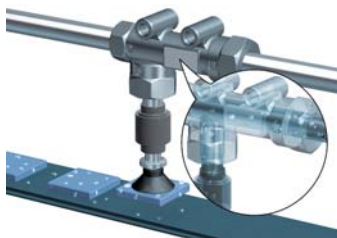
- (SCS13: equivalent to stainless steel 304).
- Maximum operating temperature: 260 °C.
 - Maximum vacuum pressures: -88 kPa and -49 kPa.
 - Nozzle diameters: Ø 0.5, Ø 0.7 and Ø 1.0 mm.

Easy mounting.

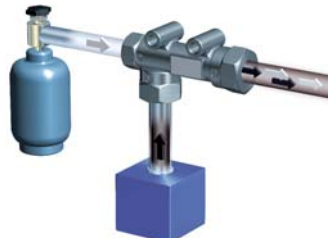
Provided with mounting holes for secure the body.

Application examples

Adsorption of wet workpieces.



Mixing 2 types of inert gas.



An environment where it is exposed to water.



More information on the ZH-X267 series?



<http://ZH-X267.smc.eu/en>

Reliable for even the most challenging handling

Vacuum Pad **Series ZP3**

Main benefits

- **High flexibility of use** thanks to a wide range of pads, adapters and buffers.
- **Space-saving** equipment and piping.
- **Reduced labour costs** with easy workpiece removal, mounting and repeatability.
- **High reliability.**
- **Accident prevention** avoiding pad coming off failures.
- **Effective and durable** vacuum components.

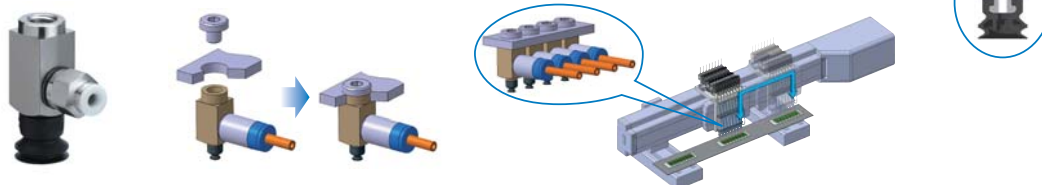
Overall length shortened.

In pads with/without adapter and buffers.



Improved pad adapters:

- Adapter fixing boss (lateral vacuum inlet) for easy mounting and repeatability.
- Improved pad-adapter joint construction that prevents pad from coming off.



Wide range.

- New pad diameters and variations with shot-blasted surface, micro-dents and bumps.
- More buffer variations: compact buffer body, and new short stroke type.
- Wide selection of piping: male/female thread, barb/one-touch fitting.

More information on the ZP3 series?



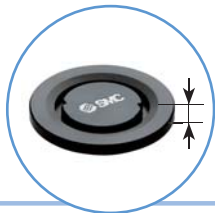
<http://ZP3.smc.eu/en>

The solution for gentle transport

Non-Contact Gripper **Series XT661**

Main benefits

- **High flexibility** for gentle suction and handling workpieces of different sizes, shapes, weights and/or materials.
- **Mark-free transport** with minimised workpiece contact.
- **Minimal installation and maintenance.**



Low profile cyclone type

- Greatly reduced thickness and increased lightness.
- Suitable for being mounted on a robot arm.

Maximum detection distance:
10 mm.

Grease-free.

Can be disassembled
and the inside cleaned.



With multi-port

The presence of a workpiece can be checked by installing a sensor.

Two working principles result in two gripper types.

Cyclone type - air is discharged in the whirling direction.

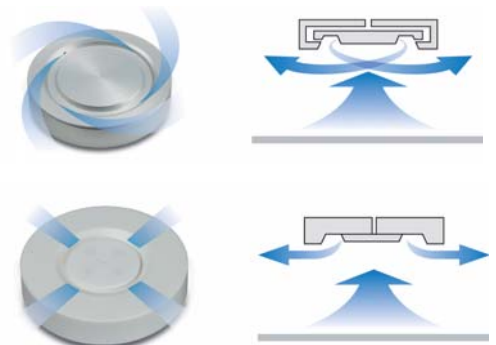
Air savings with cost savings.

- Large suction area and even pressure dispersion.
- High lifting force - up to 44 N lifting force - with low air consumption.

Bernoulli type - air is discharged radially.

Safer workpiece transfer with reduced vibration.

- Available in round and square shape.
- Amplitude of the workpiece during gripping reduced.
- Reduction of rotation load due to non-directionality of whirlwind air.



Application examples

Non-contact transfer, for workpieces with holes, with uneven and/or viscous surface, or thin/air-permeable workpieces among others.



Non-contact transfer with a robot arm.



More information on the XT661 series?



<http://XT661.smc.eu/en>

Lower your maintenance costs

Aluminium High Vacuum Angle Valve **Series New XLA**

Main benefits

- **Reduced maintenance cost with material savings.**
- **Improved durability.**
- **Excellent resistance against fluorine corrosion and improved quality** with minimal contamination from heavy metals of semiconductor wafers.
- **Faster with shortened exhaust timings.**
- **Space savings.**

Possible to replace the bellows.

The bonnet assembly is prepared as a replacement part.



Aluminium body.

Minimal outgassing that leads to uniform baking temperature; excellent thermal conductivity; compact and lightweight etc.

New bellows design provides long life-span.

Variety of options:

Heater available as an option.



Auto-switches are mountable.



More information on the XLA series?



<http://XLA.smc.eu/en>

The valve you can trust in high vacuum

Normally Closed High Vacuum Solenoid Valve **Series XSA**

Main benefits

- **Applicable in high vacuum** due to its low minimum operating pressure differential.
- **Reliability improved** thanks to its high sealing and minimal leakage.
- **Flexibility** with 2 types of fitting.

High sealing-Minimal leakage.

- Sealing performance has been improved with a larger spring.
- Internal leakage: 1.3×10^{-9} Pa m³/s.
- External leakage: 1.3×10^{-11} Pa m³/s.

Minimum operating pressure differential: 1×10^{-6} Pa (abs).

2 types of fittings.

Compression fitting



Face seal fitting

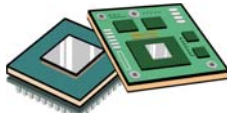


Application examples

Photovoltaic cell manufacturing.



Semiconductor manufacturing.



LCD manufacturing.



Medical



Food



More information on the XSA series?



<http://XSA.smc.eu/en>

Solution for narrow spaces and heavy workloads

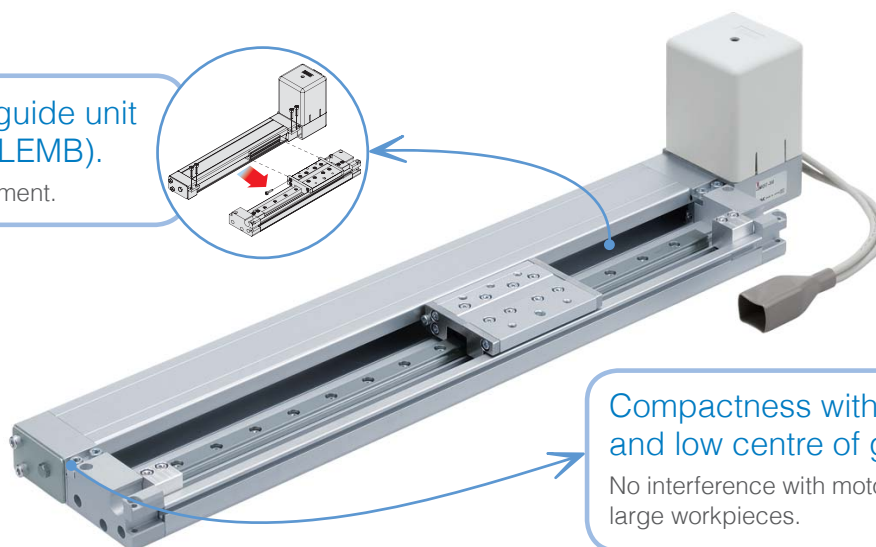
Low Profile Guide Slider Electric Actuator **Series LEM**

Main benefits

- **Space savings**, suitable to be used in narrow and reduced spaces.
- **Productivity increase with cycle time reduction.**
- **Cost and labour savings**, with reduced maintenance and machine stops, and with end-to-end operation similar to an air cylinder.
- **Easy to control** positions with the possibility of mounting auto-switches.

The drive unit and guide unit are separable (not LEMB).

Easy attachment / detachment.



Compactness with low profile and low centre of gravity.

No interference with motor even with large workpieces.

Selectable guide mechanism, step motor mounting direction and control method.

Guide mechanism:

LEMB
Basic type



LEMC
Cam follower type



LEMH
Linear guide single shaft type



LEMHT
Linear guide double shaft type

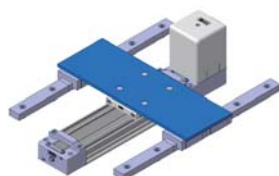


Motor mounting direction: top/bottom, right/left.

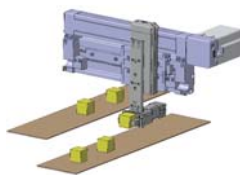
Control method: LECP1, LECP2 (specific controller for LEM with stroke study function that automatically registers both end positions), LECP6.

Application examples

Load and unload transfer of workpieces.



Pick and place (applications where space is limited).



More information on the LEM series?



<http://LEM.smc.eu/en>

Our most powerful electric actuator

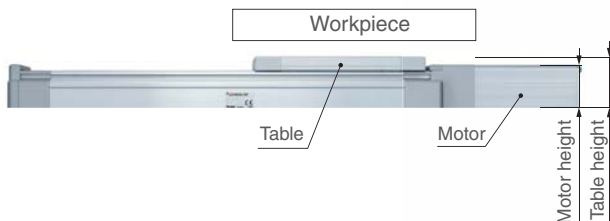
High-Rigidity Electric Actuator, Slider Type **Series LEJ**

Main benefits

- **Deflection reduced**, thus allowing support of eccentric loads with high accelerations.
- **Reduced machine dimensions and space savings**, with no interference with motor even with large workpieces.
- **Productivity increased** with high-speed transport.
- **Labour savings**, with easy mounting of the main body.

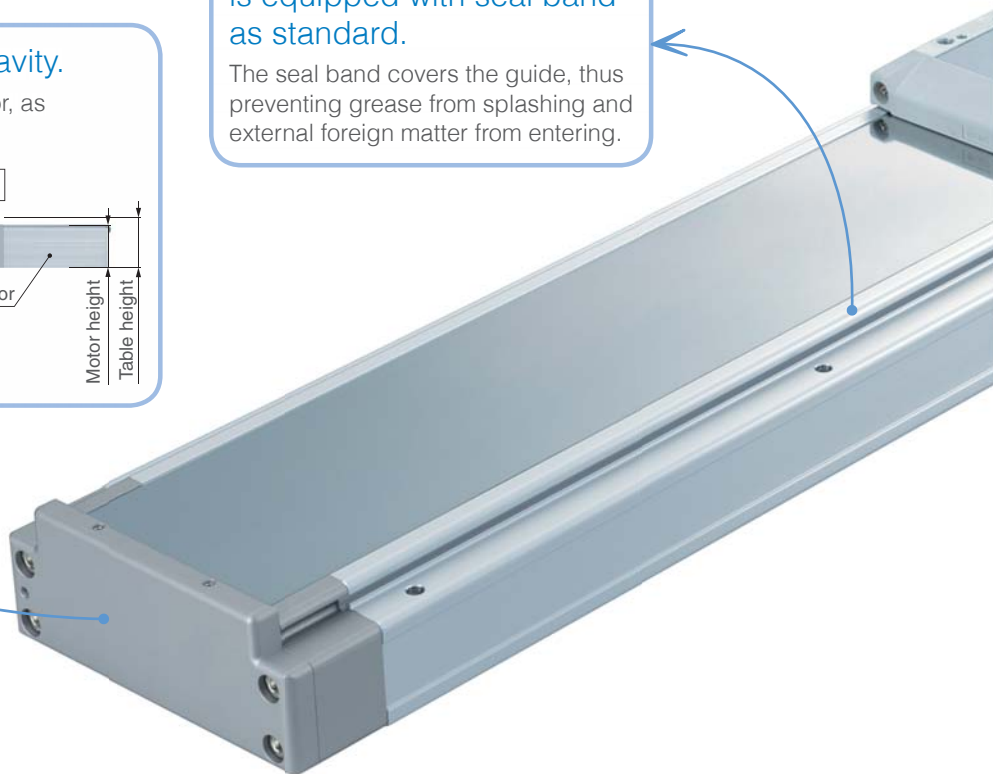
Low profile and low centre of gravity.

Workpiece does not interfere with the motor, as table height is greater than motor height.

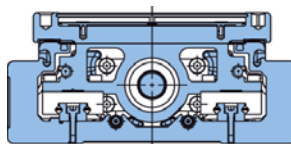


Dustproof construction, as it is equipped with seal band as standard.

The seal band covers the guide, thus preventing grease from splashing and external foreign matter from entering.



Double axis linear guide construction provides high-precision and high-rigidity. Even further improved position repeatability and lost motion with the high-precision type, series (11-)LEJSH.



Linear guide (Double axis)

Position repeatability: ± 0.01 mm
Lost motion: 0.05 mm

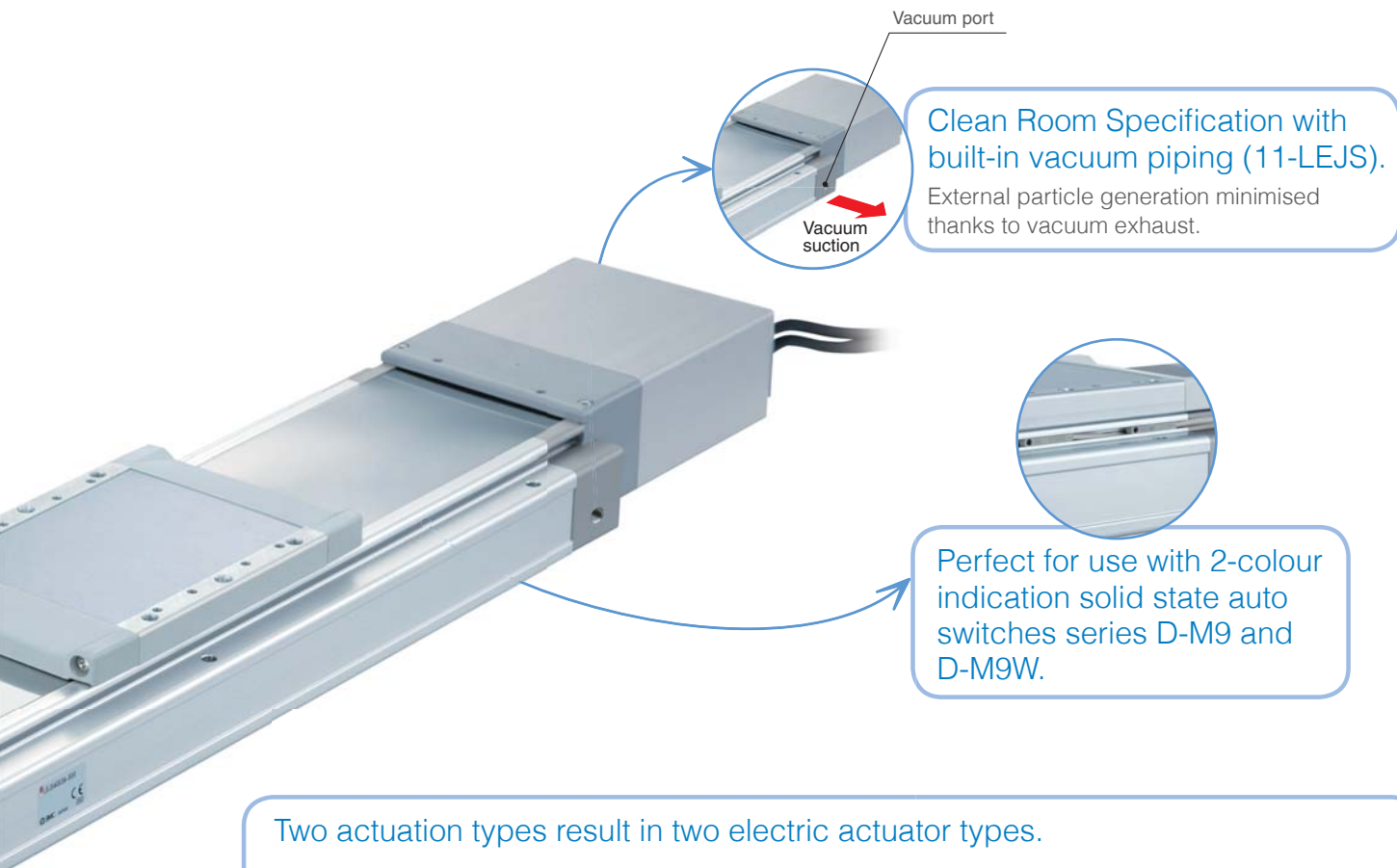
Compatible drivers: AC Servo Motor LECSA/LECSB/LECSB/LECSS/LECYM/LECYU.



The Experts opinion:

LEJ meets the needs of those applications requiring a solid and robust actuator. In simple terms its been designed to move heavy loads with absolute precision.

MR. ANDREA TRIFONE, PRODUCT & PROJECT MANAGER - ELECTRICAL ACTUATORS, SMC ITALY



Two actuation types result in two electric actuator types.

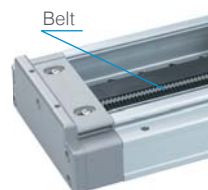
Ball Screw Drive LEJS - suitable for repeatable accurate positioning.

- Max. workload: 85 kg (horizontal).
- Positioning repeatability: ± 0.02 mm.
- Max. stroke: 1500 mm.
- Max. speed: 1200 mm/s.
- Max. acceleration/deceleration: 20000 mm/s²



Belt Drive LEJB - suitable for long-stroke high-speed and light-load transfer.

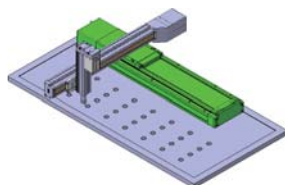
- Max. workload: 20 kg (horizontal).
- Positioning repeatability: ± 0.04 mm.
- Max. stroke: 3000 mm.
- Max. speed: 3000 mm/s.
- Max. acceleration/deceleration: 20000 mm/s²



Application examples

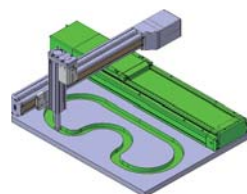
Pick and place

Recommended driver: LECSS□



Glue dispensing/High speed trajectory is available

Recommended driver: LECSS (SSCNET III)



More information on the LEJ series?



<http://LEJ.smc.eu/en>

Compact & robust actuator for transfer applications

Electric Slide Table, Compact Type **Series LES**

Main benefits

- **Space savings** with production equipment size reduction.
- **Productivity increase** with cycle time reduction and vertical speed increase.
- **Labour savings**, with easy and flexible mounting of the table.
- **Safety improved** with optional drop prevention function.
- **Lifetime increased** due to dustproof specification.

Vertical workload increased.

The amount of weight reduced on the moving parts of the table can be added to the vertical work load and speed.

Compact and lightweight with low section.



Table type and motor selectable.

LES□R
Basic type



LES□L
Symmetrical type



LES□D
In-line motor type



Two types of motor:

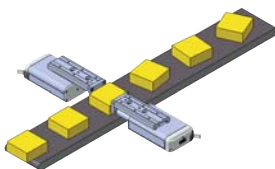
- Step motor (servo/24 V DC): ideal for high load transfer at a low speed and pushing operation.
- Servo motor (24 V DC): stable at high speed and suitable for silent operations.

Optional drop prevention function - self-lock mechanism.

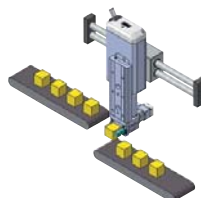
Prevention of workpieces dropping in case of power failure.

Application examples

Positioning of pallets on a conveyor.



Z motion for pick and place.



More information on the LES series?



<http://LES.smc.eu/en>

Pulse control for your electric actuator

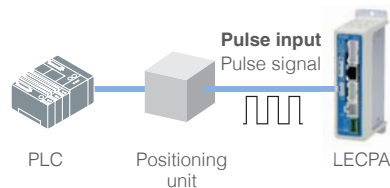
Step Motor Driver, Pulse Input Type **Series LECPA**

Main benefits

- **Direct control** of an electric actuator by a positioning unit.
- **Reduced installation time and labour savings** with easy operation and setting.
- **Flexibility, security and reliability** in the operation, monitoring and control thanks to selectable entry mode, return-to-origin command signal and separated power supply, among other features.

Control by pulse signals.

Capable of positioning at a selected position by pulse train signals.



Easy and quick to program either with easy-setting software or teaching box.

Two available setting data entry modes:

- Easy mode for basic step data setup.
- Normal mode for further detailed setup.



Compatible electric actuators: LEY(G), LEF, LES, LER, LEP, LEH



Optimum performance and reliability with positioning, speed and thrust control via several features and functions

Examples: actuator control, separated power supply, return to origin, alarm detection function, data input method and operation with specified thrust.

Several inputs and outputs provide optimum automation level for many applications.



More information on the LECPA series?



<http://LECPA.smc.eu/en>

Get remote control through a single device

Fieldbus-Compatible Gateway Unit for Electric Actuators **Series LEC-G**

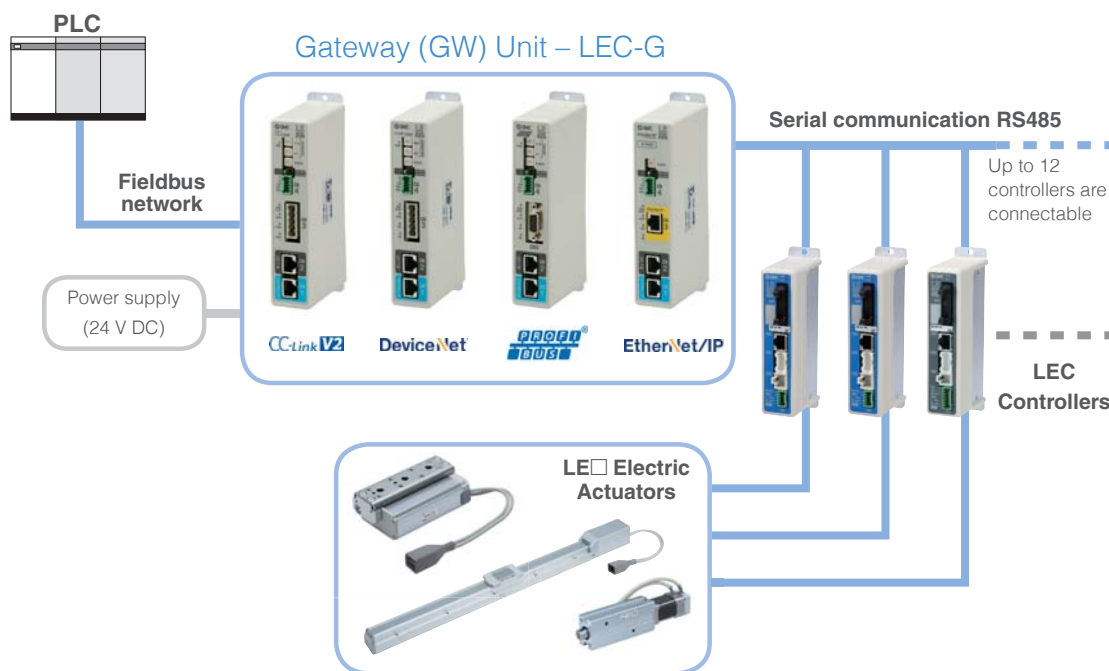
Main benefits

- **Direct connection to fieldbus networks**, thus leading to cost savings through less wiring.
- **Labour savings** with simplified control systems and wiring.
- **Space savings** with production equipment size reduction.
- **Flexibility in the operation and control.**

All LEC controllers are not directly connected to the PLC, but to the LEC-G, thus reducing wiring and installation labour.

With a conventional system, all controllers are connected directly to the PLC.

However, with LEC-G, all LEC controllers are processed from the PLC through the gateway unit.



Three operation modes, depending on how to interpret data in the memory of the gateway.

Step data input mode - the actuator uses preset step data of the controller (parallel I/O).

Numerical data input mode - the actuator uses values, such as position and speed, sent directly from the PLC.

Step data wiring mode - the actuator uses editable step data of the controller (parallel I/O) that can be changed through the gateway unit.

The Experts opinion:



LE-Servo is the optimum choice between Pneumatics and AC Servo. The LEC-G fieldbus gateway gives you total control over the movements in your machine, and you can connect several electrical actuators.

MR. MARCUS RYDSTEDT, PRODUCT SALES MANAGER, SMC SWEDEN



Conversion unit for fieldbus network and LEC serial communication, with the following applicable fieldbus protocols:

CC-Link **V2**

PROFI[®]
NET

Device**Net**

Ether**Net/IP**



Configuration either with easy-setting software or teaching box.

Applicable LEC controllers: LECP6, LECA6.

With these controllers, LEC-G can control the following electric actuators: LEF, LEY, LES, LEL, LEP, LER, LEH, LEM.



More information on the LEC-G series?



<http://LEC-G.smc.eu/en>

Complete in its capacities, simple in its adjustment

AC Servo Motor Controller, Pulse Input Type **Series LECS**

Main benefits

- **Productivity increase** with high working rate.
- **Cycle time reduced** with better performance in positioning.
- **Production safety and quality improved** through easy alarm monitoring.
- **Cost and labour savings** through less wiring.
- **Improved robustness against noise.**

With display setting function.

Allows for monitoring and setting different parameters/values depending on the model.



Compatible electric actuators: LEY(G), LEF, LEJ



Several types to suit requirements.

LECSA (Pulse input type for incremental encoder):

Positioning type, with up to 7 positioning points by point table.

LECSB (Pulse input type for absolute encoder): 10/6 parallel inputs/outputs.

LECS (CC-Link direct input type for absolute encoder):

Suitable for multipoint positioning, being possible to set position data/speed data and operation start/stop.

LECSS (SSCNET III type for absolute encoder):

Optimum for interpolation and with enhanced noise resistance by using fibre optics for communication.

LECSS-T (SSCNET III/H type for absolute encoder):

Optical communication protocol with STO - Safe Torque Off - function (in accordance with IEC61800-5-2) and homing done by Z-phase, ideal for machines with axis motion.

More information on the LECS series?



<http://LECS.smc.eu/en>

High performance for highly demanding applications

AC Servo Motor Driver, MECHATROLINK Compatible **Series LECY**

Main benefits

- **Enhanced safety**, preventing the drive from restarting unexpectedly.
- **Wiring, material and labour savings**, with no need for separate components and simpler positioning without need for auto-switches.
- **Suitable for interpolation in axis motion**.
- **Improved productivity and accuracy** with high working rate and better performance in positioning.



Lock cable integrated with motor cable.

STO - Safe Torque Off - function in accordance with IEC61800-5-2

Drive prevented from restarting unexpectedly, providing quicker responses than conventional solutions.

Compatible electric actuators: LEY(G), LEF, LEJ



Position control, speed control and torque control can be achieved.

Homing can be performed by mechanical end stop.

Simple positioning possible without need for external auto-switches.

Product variation:

LECYM Series (MECHATROLINK-II Type)

- Number of connectable drivers: 30 units.
- Transmission distance: maximum 50 m (in total).
- Maximum communication speed: 10 Mbps.
- Minimum communication cycle: 250 μ s.

LECYU Series (MECHATROLINK-III Type)

- Number of connectable drivers: 62 units.
- Transmission distance: maximum 75 m (between stations).
- Maximum communication speed: 100 Mbps.
- Minimum communication cycle: 125 μ s.

More information on the LECY series?



<http://LECY.smc.eu/en>



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