SMC

SAFETY AND PROFITABILITY

Your safety in our focus

Expertise
Passion
Automation

SMC Machinery Safety – our general approach

Keeping the big picture in mind

Looking at safety and processes separately does not increase productivity or create added value!

Although machinery safety serves to protect employees from harm, here at SMC we know from experience: you can achieve many more benefits by creating inherent machinery safety – including higher profitability.

This results largely from the potential to elevate productivity and tap into fully engineered solutions.

Safe and advanced machine design means higher productivity and enhanced control of operation. In parallel, looking at things holistically leads to several competitive value outcomes, for example improved machine uptime.

Aside from that, safety can also improve productivity – e.g., through easier troubleshooting, reduced scrap and increased operator efficiency.

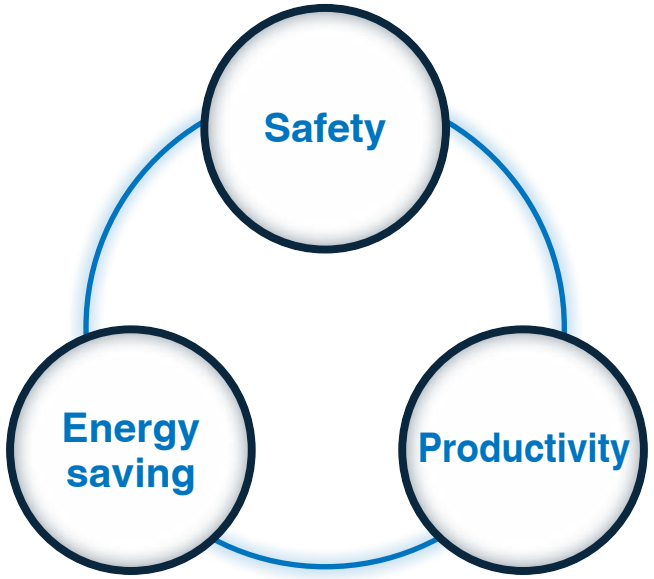
Machinery safety is an integral and important part of the development process. As a proven and competent technology partner, SMC helps you to implement safe, reliable and economic solutions – creating tangible added value and higher profitability.

SMC supports you in integrating safety considering the overall machine process and your specific requirements to optimize the productivity and overall profitability of your solution.

Safety & Profitability

Added value & higher profitability through machine safety

For SMC, profitability results from considering safety an integral part of the machine process and the combination of all relevant influencing factors, which can be summarized in three main thematic complexes.



Machine safety, considering process influences, cycle times, energy losses, etc., can increase profitability:

Safety with efficiency

Considering the impact of safety systems on the machine throughput, operational availability, energy consumption etc. will lead to safety with efficiency. SMC has many proven ideas to achieve safety functions for many types of machine in many industrial applications areas. Just switching it all off is not always the only option!

Reducing implementation costs with efficiently engineered safety

By focusing on the actual levels of risk and the matching safety measures, then it means that the safety solutions implemented can just meet the performance levels required and excessively complex and costly solutions can be avoided. Simpler but perfectly adequate solutions generally tend to be far easier to install and easier to maintain during the operational life of the machine. Failure to adequately maintain safety systems is an easily avoidable cause of accidents in many cases.

Efficient safety solutions

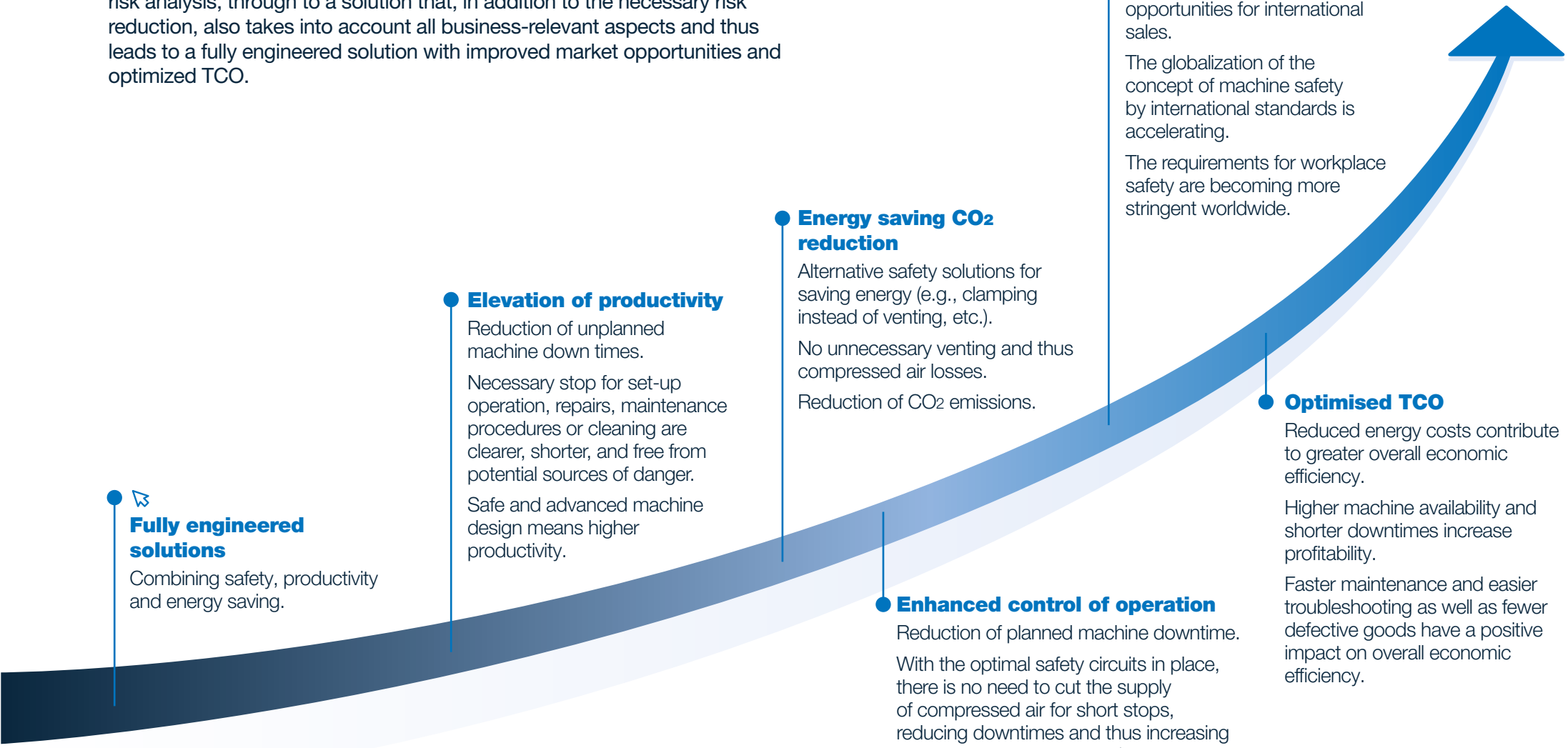
Everyone benefits from an efficient safety solution. The machine builders can minimize the cost of legislative compliance, and the machine operator can benefit from the efficiencies in operation in terms of running costs and throughput whilst being assured of the safety of the operators.

Reducing implementation costs with efficiently engineered safety

As well as securing the safety of the personnel, operators, maintenance and in some cases, passers-by, the impact on the performance of the machine needs to be considered during the safety design process. Segregation of zones of risk can mean the need to reduce pressure or vent pressure in the whole machine can be avoided; with the consequent energy wastage, extended re-pressurization and delayed restart time. SMC has zoned solutions for controlling units and valve manifolds.

A holistic approach guarantees the highest level of profitability

Starting with the source of danger identified in the course of the mandatory risk analysis, through to a solution that, in addition to the necessary risk reduction, also takes into account all business-relevant aspects and thus leads to a fully engineered solution with improved market opportunities and optimized TCO.



Fully engineered solutions

Combining safety, productivity and energy saving.

Elevation of productivity

Reduction of unplanned machine down times.

Necessary stop for set-up operation, repairs, maintenance procedures or cleaning are clearer, shorter, and free from potential sources of danger.

Safe and advanced machine design means higher productivity.

Energy saving CO_2 reduction

Alternative safety solutions for saving energy (e.g., clamping instead of venting, etc.).

No unnecessary venting and thus compressed air losses.

Reduction of CO_2 emissions.

Enhanced control of operation

Reduction of planned machine downtime.

With the optimal safety circuits in place, there is no need to cut the supply of compressed air for short stops, reducing downtimes and thus increasing productivity by about 5-7 %.

Easier troubleshooting, reduced scrap and increased operator efficiency.

Improved market opportunities

Machine safety not only protects European markets and their machine builders, but also offers opportunities for international sales.

The globalization of the concept of machine safety by international standards is accelerating.

The requirements for workplace safety are becoming more stringent worldwide.

Optimised TCO

Reduced energy costs contribute to greater overall economic efficiency.

Higher machine availability and shorter downtimes increase profitability.

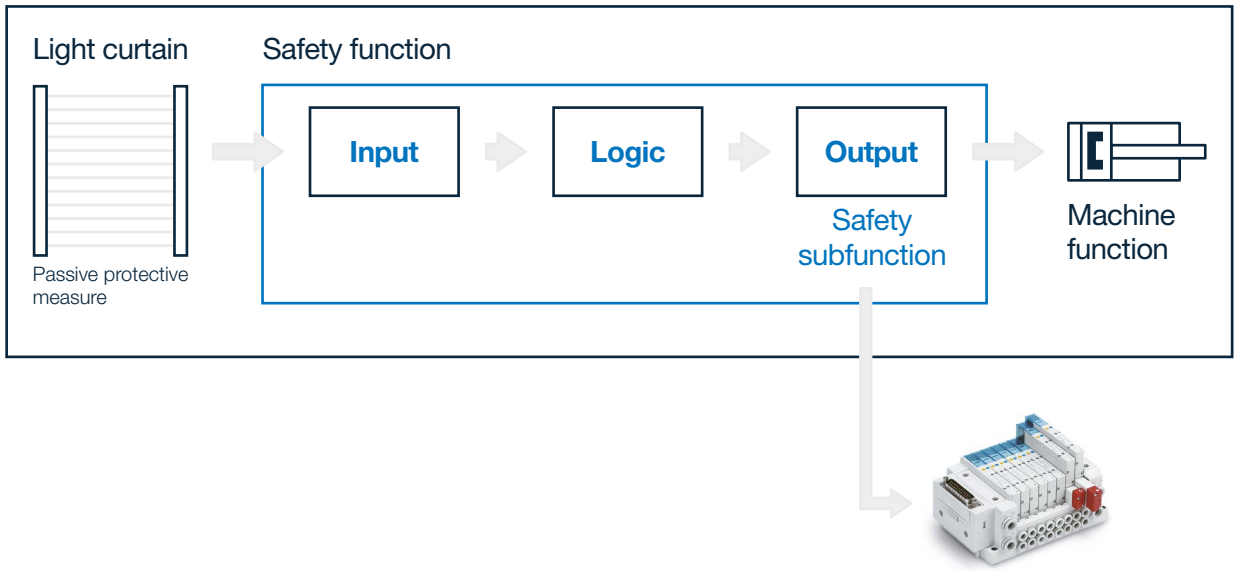
Faster maintenance and easier troubleshooting as well as fewer defective goods have a positive impact on overall economic efficiency.

Pure implementation of a safety function – or optimized adaptation to the process requirements?

In principle, an overall safety function (taking into account defined hazards) serves as a protective measure to reduce risks and to establish or maintain a safe machine state.

Using defined safety sub-functions that are suitable for each individual case and are part of the overall safety function, the machine functions are brought or maintained in a safe state by one or more components (e.g., separation of the drive from the energy supply by a valve).

Overall safety function

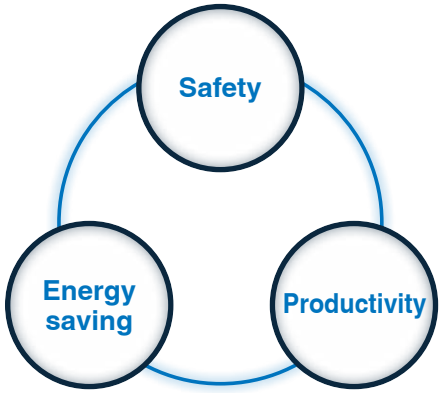


Safety & Process

What impact does a safety function and its practical implementation have?

- On the overall process?
- What possible limitations arise in practice?
- How does the safety function affect the OPEX?

SMC supports you in integrating safety functions considering the overall machine process and your specific requirements to optimize the productivity and overall profitability of your solution.



SMC – your partner in safety

What are the similarities between a car and a bar of chocolate?

None at all, and their production process even less… with one exception:
the requirements of machine safety!

SMC - Your local partner in machine safety

Our team of safety experts, together with teams of experts around the world specialized in the characteristics of each industry, is readily available to answer any questions and provide local support.

Your safety in our focus

Maximum safety for your machines and operators.

Increased profitability through added values.

Ensuring safety, building confidence. SMC is an innovative, reliable and strong partner for pneumatic and electrical automation technology. We provide our customers with comprehensive safety validated solutions throughout a plant's lifecycle, ensuring flexibility, productivity, and user safety for all machine types, from simple designs to highly complex systems.

Our ISO 13849-compliant safety components and innovative solutions are built to achieve the highest possible level of risk minimization, leading to significant improvements in your Overall Equipment Effectiveness (OEE).

Technical partnership

SMC – leading experts with a passion for industrial automation and safety

SMC is pursuing worldwide customer satisfaction supporting machine safety through the most advanced technologies.

Our comprehensive support capabilities

Discover more

SMC Corporation global market share

30 %

We are global – Always close to you...

One-to-one support

80 Countries

7,900 Sales engineers

23,000 Employees worldwide

Customised solutions

38 Production sites worldwide

5 Technical centres

SMC and The Sustainable Development Goals

Healthy, safe and secure working environment

Among other things, safety is one of SMC's fundamental objectives – we take it seriously!

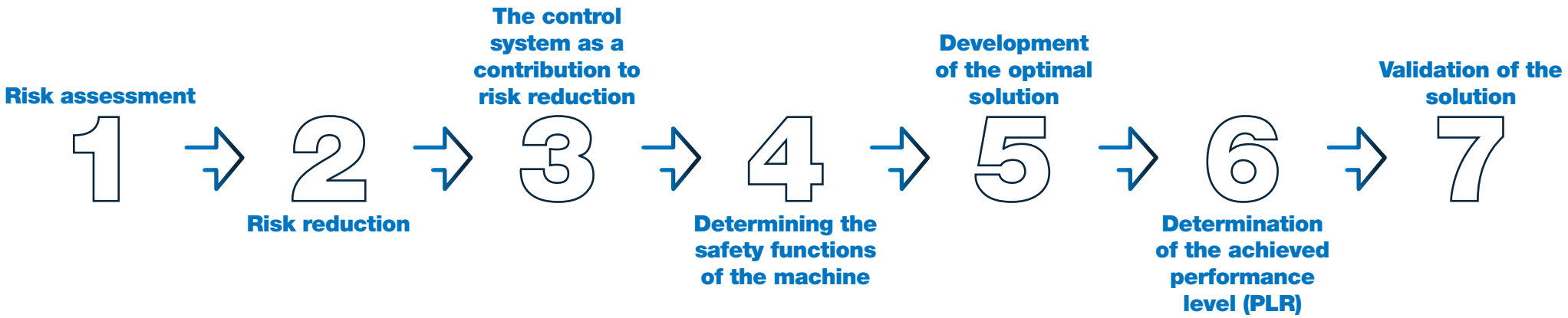
Machine safety services

We accompany and support you on your way to optimal safety

Understanding processes and their dynamics, knowing all the specific features and characteristics of a system, and ensuring optimal performance makes SMC your safety expert.

We support you from conception and design to validation, working with you to create the optimal solution.

From risk assessment to optimal safety functionality, worry-free with SMC.



Questions. Answers.

The proper placing of machines and safety-related applications on the market requires knowledge of sound legal principles and begins with the design and construction of your system.

Rely on SMC´s expertise and knowledge of the machinery directive's requirements for successful CE certification.

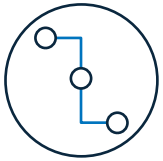
Focus on solutions

In addition to hazard analysis and risk assessment, SMC especially focus on the design of safe control systems.

We support you in aligning the necessary safety requirements with process and operational objectives and in finding the optimal solution for your application.

Guidelines & standards research

Support with risk assessments and questions regarding various guidelines, standards and performance levels.



Definition of the safety chain

Support in identifying all safety functions and designing their implementation in accordance with ISO 13849 and other relevant regulations.

Safety-relevant key indicators

SMC provides you with all the necessary characteristics for SMC components and supports you in calculating the safety function according to ISO 13849.

Conceptualization

We provide you with comprehensive support in developing circuit diagrams and concepts – from simple circuits to ready-to-install, CE-compliant complete solutions.

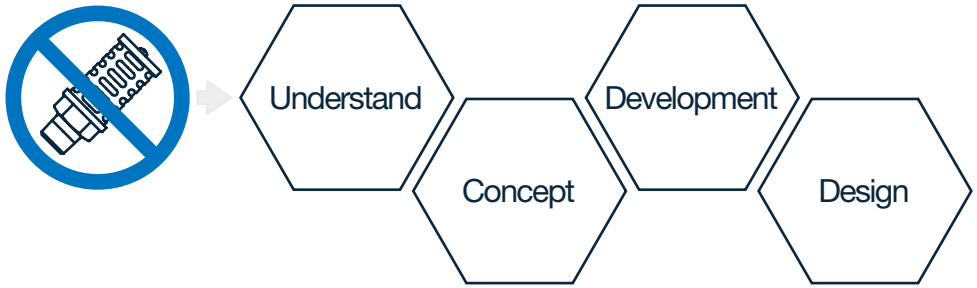
Validation

We support you in testing and analysing your safety system according to ISO 13849-2.

Training

SMC offers customized training and advanced training courses on safe control with a focus on pneumatics and electrics.

Engineered solutions



Safety is more than just venting the system in case of a fault

Despite advances in safety technology, safety is often still represented by simply venting the system in the event of a fault, often as a defined standard for decades and without taking into account the actual sources of danger and more suitable countermeasures.

Potential problem areas

1. Venting may take too long – the damage has already occurred before the safety function becomes effective!
2. The system must first be ventilated when restarting (possibly with a slow pressure increase), which increases the duration of the unplanned machine downtime.
3. Complete venting can lead to unforeseen machine conditions (e.g., unknown positions of pneumatic drives, products coming loose due to insufficient pneumatic holding force, etc.) and damage to products or equipment.
4. Energy costs increase due to complete ventilation!

The solution

It goes without saying: every machine is different and necessitates a specific approach.

Therefore, machine safety requires engineered solutions

SMC provides innovative ideas to create added value and competitive advantages. PneuSAFE, for example, offers a variety of predefined solutions that combine safety with competitive advantages.

We have competent and professional solutions available. From individually designed machines to highly complex systems, we not only meet all requirements for user and operational safety, but also for flexibility and productivity.

From the right component to the ready-to-install solution

SMC supports you at all relevant levels; whether it is about selecting the optimal component for a specific safety function or providing a ready-to-install solution in your application.

Safety product range

SMC offers a comprehensive product range for the implementation of your safety functions

For safety-related controls (SRP/CS), recommended validated products as well as safety components can be installed as decided by the safety system designer. However, this must be evaluated during the course of the system analysis.

Safety component

According to the Machinery Directive 2006/42/EC, Article 2 (c), a safety component is a component.

- Which serves to fulfil a safety function,
- Which is independently placed on the market,
- The failure and/or malfunction of which endangers the safety of persons, and
- Which is not necessary in order for the machinery to function, or for which normal components may be substituted for the machinery to function.

Recommended validated component

Recommended validated products is a SMC term, which means that the product has been validated to the requirements for a SRP/CS – Safety related part of a control system defined by ISO 13849-1.

Only such products may be used as part of an SRP/CS. Product validation by SMC grants approval in the form of reliability data documents.

Such products are (in contrast to safety components) not covered by the scope of the Machinery Directive.

Discover safety in focus

Don't waste time looking for the right component

Supporting tool set

SMC provides a comprehensive tool set so you can work quickly and independently

Safety in focus

From the required safety function to the optimal solution

Discover our safety components certified according to the Machinery Directive 2006/42/EC together with our recommended validated products suitable for specific safety functions and system architectures.

The right products form the basis of the perfect solution

SMC offers a comprehensive range of recommended validated products and safety components that form the functional basis for your specific solution.

But together with SMC you can achieve much more: tangible added value and higher profitability.

Safety functions – suitable SMC components

Select the required safety function and get suitable SMC components, both for single-channel and dual-channel system architectures.

Safe Stopping and Closing (SSC)

Safe Brake Control (SBC)

Two Hand Control (THC)

Safely-Limited Speed (SLS)

Safe De-Energisation (SDE) or Safe Venting (SVE)

Residual Pressure Release (RPR)

Safely-Limited Torque (SLT) or Safely-Reduced Pressure (SRP)

Safe Energisation (SEZ)

Input/Output with PROFIsafe

Safe Equilibrium of Torque (SET) or Force (SEF)

Prevention of Unexpected Start- up (PUS)

Output with PROFIsafe

Safe Last Position (SLP)

Safe Pressure Monitor (SPM)

Safe Torque Off (STO)

Safe Direction (SDI)

Safe Valve Position (SVP)

Discover safety in focus

Don't waste time looking for the right component

PneuSAFE

From the required safety function to the optimal solution

PneuSAFE, SMC´s latest and free of charge online tool with various TÜV verified circuit solutions for the most common safety functions and related applications is the perfect starting point for creating the most suitable solution.

Create a pneumatic safety circuit in minutes with PneuSAFE

1

Required safety function

or

Non-machine specific application

2

Required system architecture

Single channel

CH1

Dual channel

CH1

CH2

3

Standardised safety solutions

For immediate application or as a starting point for the development of your application-specific solution together with SMC

What does PneuSAFE offer?

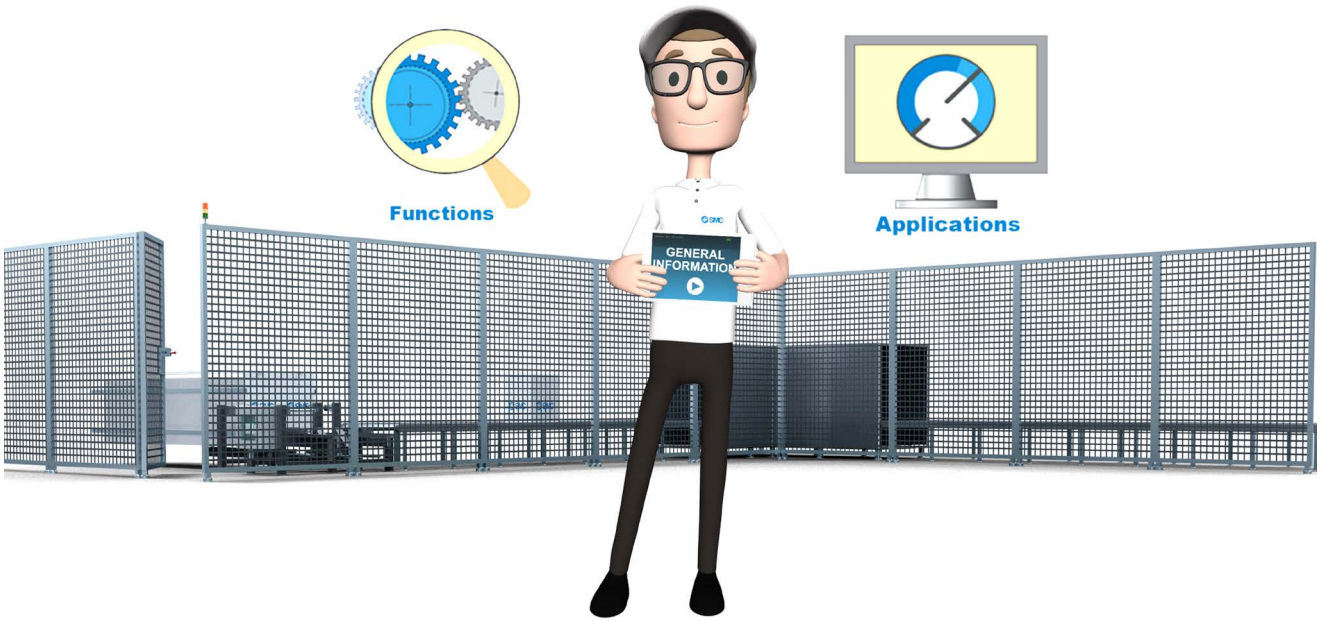
- PneuSAFE is the unique SMC toolbox for **safety solutions, offering standardised safety solutions** for the first time, each consisting of a TÜV-verified circuit diagram, a parts list and detailed user instructions
- Suitable solutions for the chosen safety function or application can be selected based on the specific descriptions.

Discover more on PneuSAFE

Your toolbox for safety solution

What are the essential features of PneuSAFE?

- Different approaches for solving individual safety functions
- All solutions in PneuSAFE have been checked and verified by TÜV Rheinland
- Possibility of individual adaptation of circuit diagrams using SMC's PneuDraw circuit drawing software
- Explanatory animation videos for many solutions
- Each solution consists of a circuit diagram / block diagram / parts list / detailed description.



SISTEMA library

Safety relevant data and parameters

Obtain all safety-relevant key figures and download the **SISTEMA** files you require. This free software tool, together with our validated product data, will help you to build your safety function in a quick and reliable way.

(A free-of-charge safety-integrity software tool to evaluate machine applications, provided by the IFA Institute for Occupational Safety and Health in Germany).

SISTEMA library file

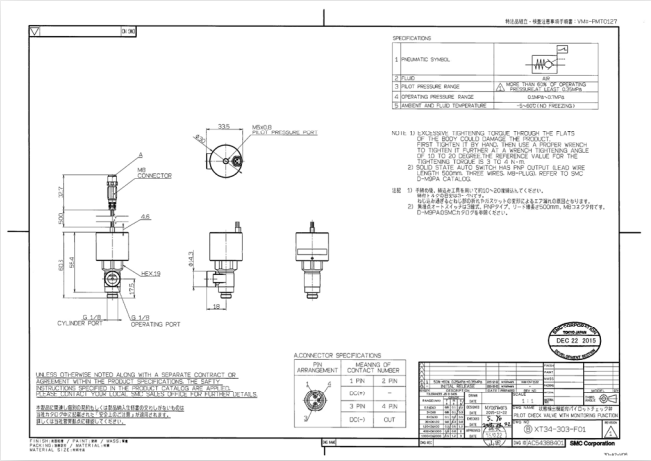
Included languages: EN

File type: ZIP

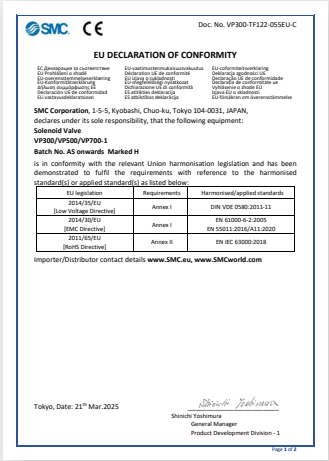
File size: 0.267 MB

Discover more on SISTEMA

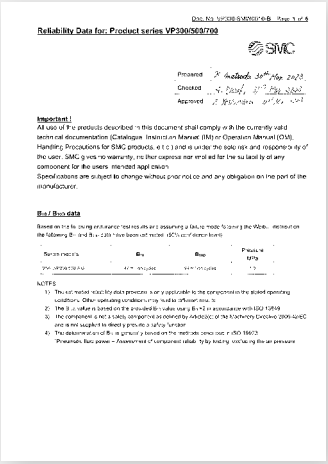
Your online library of technical data for SMC components



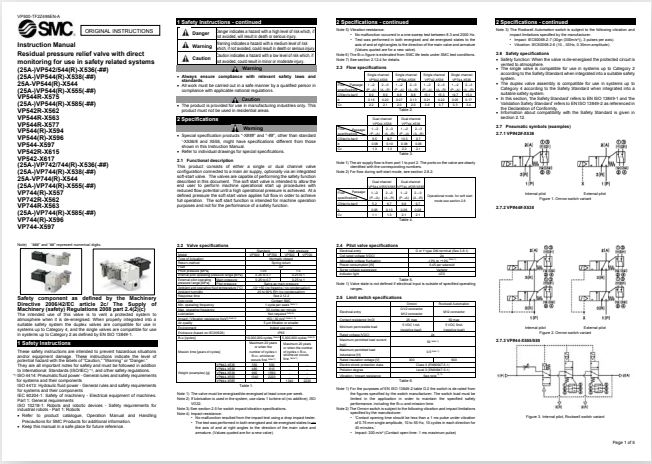
Drawings



Declarations of conformity



Reliability data



Instruction manuals

ePLAN® library

Top performance for pneumatic and electrical circuit diagrams

Are you asking for best support when developing machines and facilities? At the same time, you are longing for an optimized workflow? SMC has an ideal solution by offering you an extensive library with EPLAN macros.

Macros are provided for both, electrical circuit diagrams (electric P8) and pneumatic circuit diagrams (fluid). These macros are available either in product compilations via EDZ-file download here on this page or individually for each product via the EPLAN data portal.

- **Extensive article data**: actuators, grippers, valves, air preparation, sensors, fieldbus systems etc.
- **Simple navigation**: the ePLAN Data Portal offers a search function and a manufacturer-specific catalogue
- Contains additional item data
- **Direct link to the SMC online catalogue**: technical details, CAD download, etc.
- Available in following **languages**: English, German, Spanish, French and Italian
- **Process optimization** in development and planning
- You **save time** and, hence, **reduce your costs**.

Discover more

ePLAN electric P8

Here you can find our macros and article data for electrical wiring diagrams.

ePLAN fluid

Here you can find our macros and article data for pneumatic circuit diagrams.

ePLAN data portal

You will find all our macros and article data also in the ePLAN data portal.

SMC configurators

We know that designing a safe machine or application can be a difficult task, SMC's software will save time and prevent mistakes. Among our numerous engineering tools, the following configurators are of particular support in the area of machine safety.

Valve configurator ⊕

Design the manifold that meets your safety application´s demands with our multi-purpose flexible valve, the SY new series with various options for safety applications.

FRL configurator ⊕

Design your specific F.R.L. unit which not only gets you the exact air quality you need but also provides safety-specific options like residual pressure relief valves, soft start-up valves or pressure sensors used in monitoring systems.

Advantageous SMC solutions

Easier maintenance and troubleshooting with a well-designed SMC solution

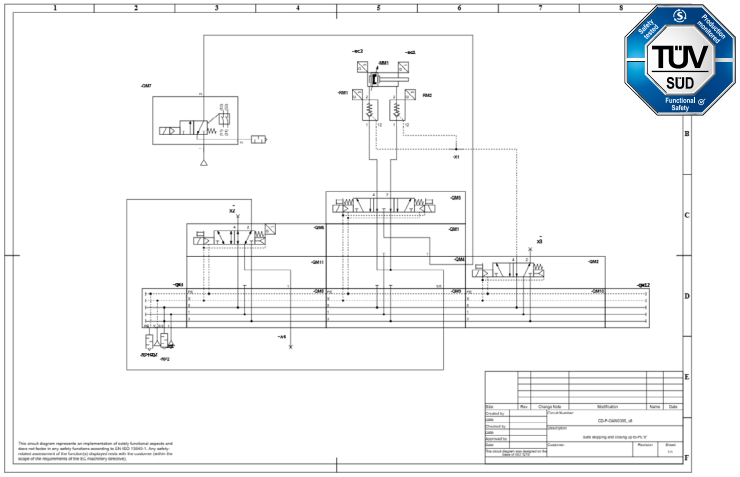
Interruptions to production operations due to necessary maintenance work and unplanned machine downtimes due to troubleshooting should be kept as short as possible without compromising the safety of the operating personnel.

A predefined solution from SMC offers high safety as well as easy and fast troubleshooting and maintenance through the combination of three safety functions in one solution:

- SSC – Safe stopping and closing (up to PLd / Cat.3)
- PUS – Prevention of unexpected start-up (up to PLd / Cat.3)
- RPR – Residual pressure release (up to PLc / Cat.1).

Discover more on PneuSAFE

Your toolbox for safety solutions



Advantages

- Safe shutdown before venting the system for maintenance work or troubleshooting
- Simple and quick work in the safety area thanks to pressure release (actuators can be moved by hand)
- 2 channels maintain the stopped position
- The solution can be adapted to the given requirements.

Your benefits

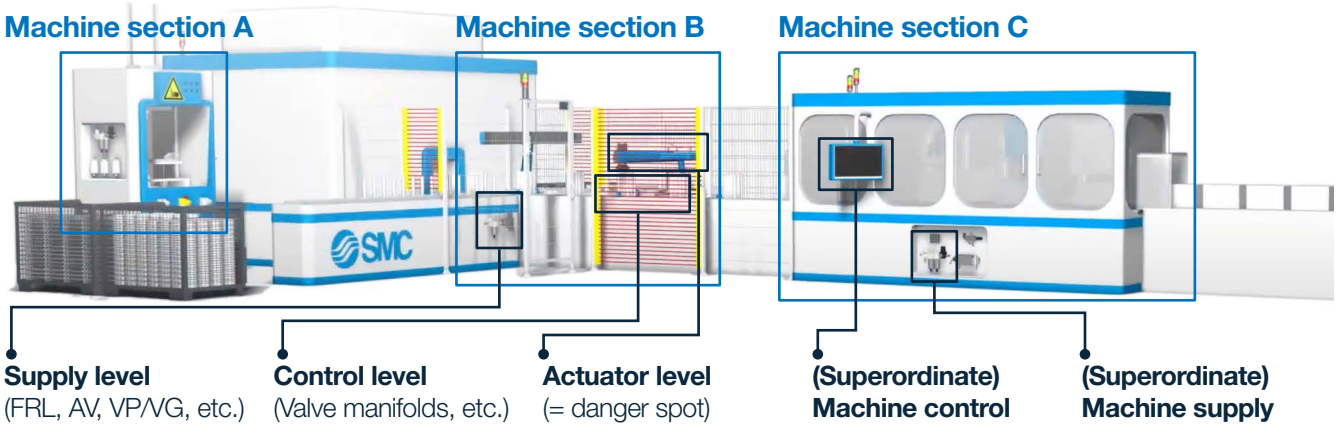
- Fast troubleshooting
- Reduction of unplanned machine downtimes
- Higher productivity
- Less motivation for operators to manipulate the system.

Targeted safety through segmentation

A machine must not be regarded in terms of Safety as a single unit in its overall design, but it is divided into different functional areas.

In these functional areas there are different safety requirements (safety functions and subfunctions) due to specific interfaces with the operating personnel in the different operating modes of the machine.

Overall machine



Overarching safety

Safety-related functions at this level affect the entire machine! (e.g., classic emergency stop, disconnect electrical power and vent pneumatic pressure)

Disadvantages:

- Far-reaching influence on the overall process
- Corresponding energy losses
- Restarting the machine takes more time
- Additional process engineering measures (to prevent damage to products and/or equipment during restart).

Sectional safety

Safety-related functions at this level only affect defined local sub-areas of a machine and can intervene – depending on the respective safety function – at the appropriate level.

Advantages:

- Functionally limited effects (only directly affected areas or actuators / drives are influenced)
- Lower energy consumption
- Restarting the production process is faster and easier
- Targeted safety measures increase efficiency and productivity.

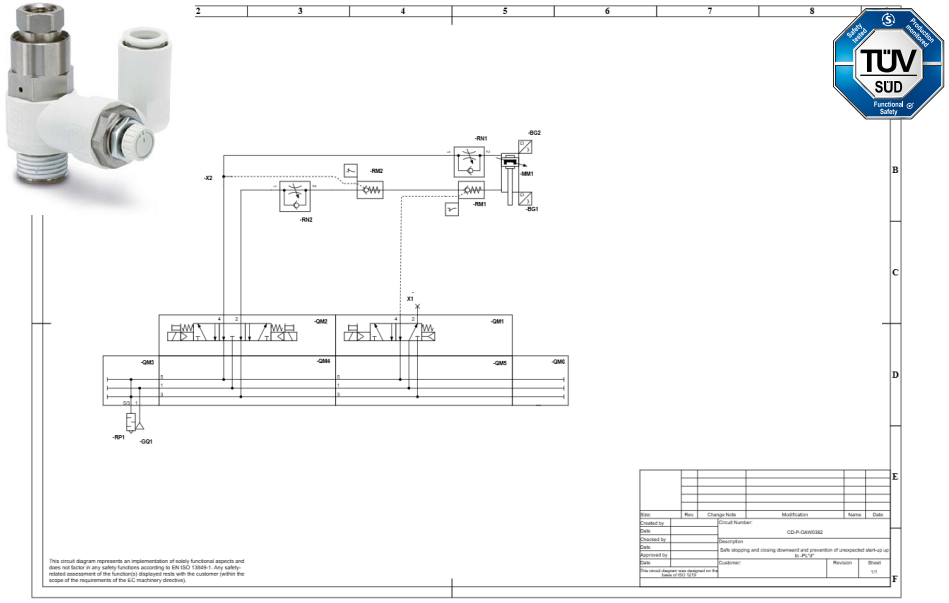
Saving compressed air costs through cylinder clamping instead of venting the entire system

The solution of safe venting in the event of a fault, which is often used in industrial practice, contains a cost trap that is often not taken into account.

Another predefined solution from SMC enables the reduction of air losses by safely stopping and securing a dangerous actuator in both travel directions.

SSC – Safe stopping and closing (up to PLd / Cat.3).

PUS – Prevention of unexpected start-up (up to PLd / Cat.3).



Discover more on PneuSAFE

Your toolbox for safety solutions

Advantages

- Reduction of air losses due to venting the entire system in the event of a fault or in specific operating modes of the machine
- The solution is suitable for both vertical and horizontal applications
- 2 channels maintain the stopped position
- The solution can be adapted to the given requirements.

Your benefits

- Immediate stopping of the dangerous actuator
- Lower energy costs
- Preventing actuator movements in the event of a fault
- Higher productivity.

Saving costs with fully certified PROFIsafe remote I/O module with integrated valve manifold

With a centralized system you will no longer have any need for safety relays. Using centralized F-PLCs, machine builders can network together the centralized safety controls to share both safe and non-safe configuration and program data as required by the application.

The use of remote safety I/Os by these controls provides you with the design freedom to position safety I/Os at various locations around the machine.

SMC´s fieldbus system for Input/ Output with PROFIsafe EX245-FPS Series

Advantages

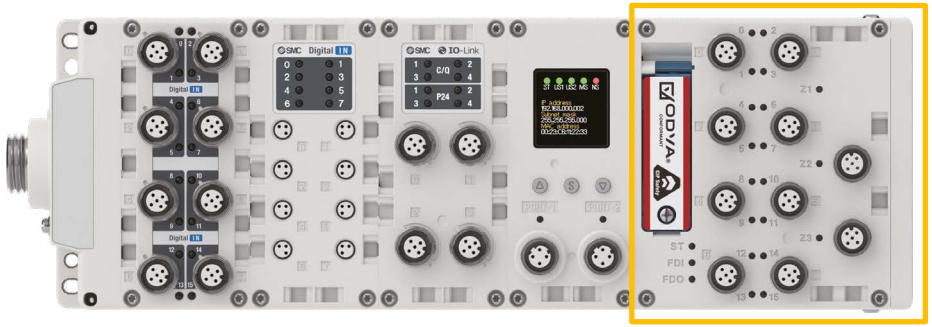
- Compatible with fibre optic (SCRJ) or copper Ethernet connectors (M12-D-coded, RJ45), and with push-pull or 7/8” 24VDC voltage supply connectors
- As a fully PROFIsafe solution, the wiring is internally integrated for each power zone (no separate wiring is required)
- Both external safe inputs (four input ports with two safe inputs for each port) and integrated safe outputs across four power zones
- Fully certified PROFIsafe serial interface unit for use in safety applications up to PL e according to EN ISO 13849-1 and SIL 3 according to IEC 62061/IEC 61508.

Your benefits

- Simplified commissioning and troubleshooting
- Easy start-up
- Reduced installation and labour costs
- Easier final safety validation of all implemented safety functions.

Simplified layout and reduced wiring with CIP safety Input/Output module EX600FVC□

With the CIP safety input/output module for the EX600 series safety communication fieldbus system you will gain advantages through the integration of safety and general purpose I/O into one manifold.



CIP Safety

SMC´s CIP safety I/O module EX600-FVC

Advantages

- The safety I/O module implements CIP safety over the EtherNet/IP™ protocol for SMC pneumatic valves and I/O.
- Designed for use up until IEC 61508/IEC 62061 SIL 3 and ISO 13849 PL e, Cat.3
- Control safe input, safe output, valves (up to 128 solenoids) and ITV modules (ITV module only with EX600-FVC2).
- By turning off the safety output (3 outputs) according to a command from the safety PLC, the power supply to the valve and external devices is cut off, and a safe state is entered.
- Up to 16 safety input compatible devices can be connected, such as residual pressure exhaust valve and other main valve position detection devices, and laser curtains.

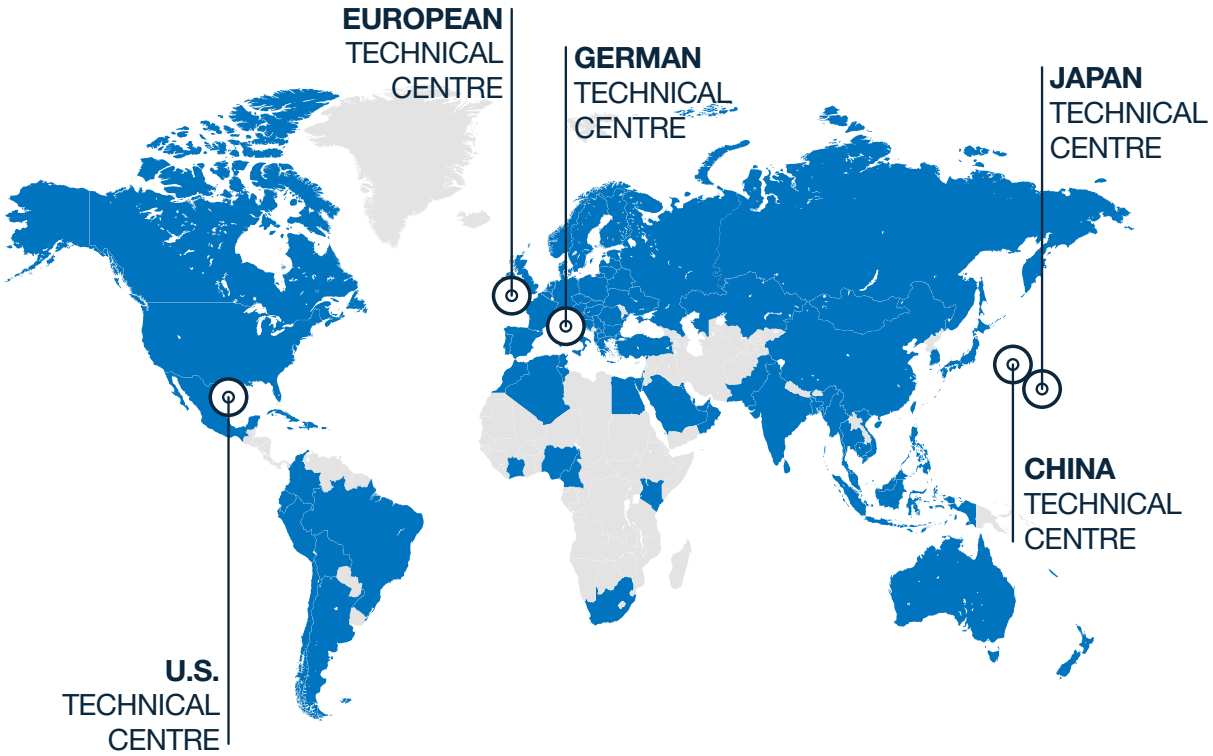
Your benefits

- No extra safety input/output units are required
- Compatible with different SMC valve series
- Simplified system layout
- Reduced wiring efforts and space requirements
- Lower installation and labour costs.

Our support network

SMC's worldwide commitment

One of the things we do best at SMC is **being close to our customers**. Local support, on a global scale.



With **support** in over **500 locations** across **80 countries** and regions **worldwide**, our sales force of **7000 experts** maintains **close communication with customers**.

SMC Business Continuity Plan

Sustainable growth also means ensuring uninterrupted operations

We are committed to ensuring that SMC is prepared for any emergency and that our business activities will not stop in the event of such circumstances. SMC aims to fulfil our product supply responsibilities and maintain our customers' trust by contributing to both sustainable growth and the expansion of technological innovations.

SMC, as a comprehensive manufacturer of automatic control equipment that supports automation, is able to promptly provider products that meet our customers' needs anywhere in the world.

Production BCP
Ensure customer order fulfilment

Reliable delivery for you thanks to our 9 global logistic centres and 38 production sites worldwide. Moreover, flexibility to rapidly respond to any sudden change in the manufacturing environment.

Finance BCP
Safe & Solid financial base

In the event of an emergency, SMC can provide a safe and solid financial base (with cash, deposits, and equity capital) that will sufficiently cover the working capital and funds needed to rebuild buildings and the equipment required for business continuity. This is done to provide peace of mind to our customers and workers alike.

Information security BCP
Vital data kept safe

Strengthen information security for protection against computer viruses and cyberattacks, plus the installation of data centres to establish a disaster recovery system. Your information is safe with us.

Engineering BCP
Consistent technical support

2,000 engineers at our 5 technical centres around the globe.

Sales BCP
Consistent sales support

7,000 sales engineers worldwide ready to recommend the best solution for you. Over 80 global locations to make sure that wherever you are, we are there too.

Discover more

Expertise
Passion
Automation

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