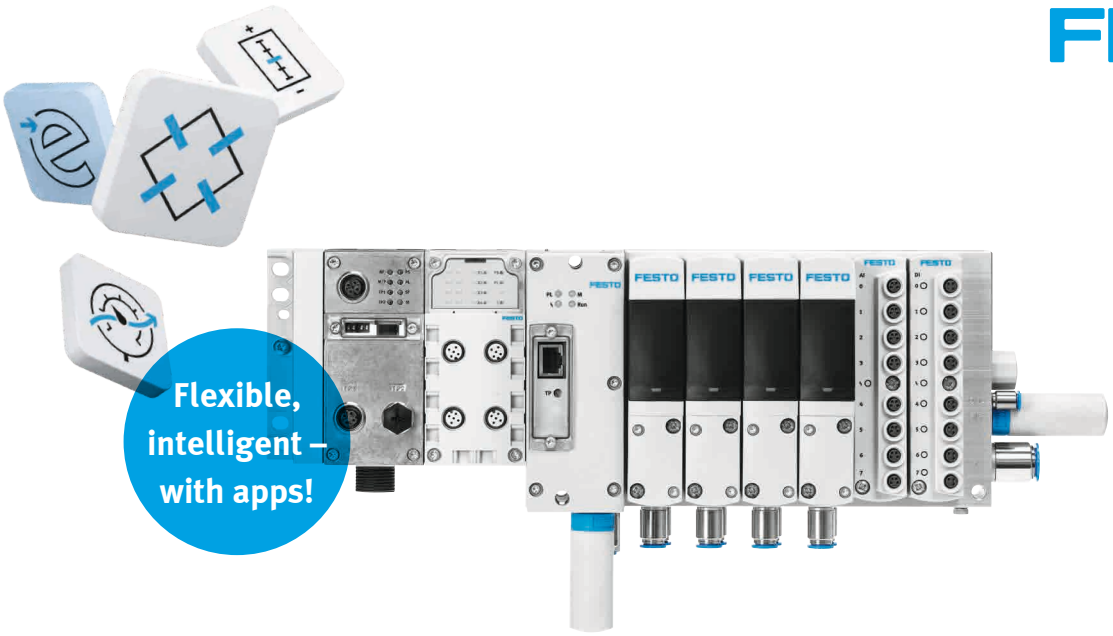
Festo Motion Terminal VTEM



Digitised pneumatics

Highlights

- Many functions in one component thanks to apps
- Reduced complexity and time to market
- Greater profitability and knowledge protection
- Easy traceability
- Predictive maintenance
- Less installation effort
- Increased energy efficiency
- Ideal for Industry 4.0

The Motion Terminal VTEM uses the world's first valve that has its functions controlled by apps. The intelligent technology consisting of pneumatics, sensors, electronics and software enables many motion and monitoring tasks. With the VTEM, you get your system ready for Industry 4.0.

Motion made easy and very flexible
Fast travel, individual pressure build-up, ramp functions, specific travel time and gentle travel into the end position: VTEM does all of this with just one piece of hardware. You benefit from a simpler design process, easier commissioning and higher productivity through shorter cycle times.

Once the parameters are programmed, they can be conveniently duplicated, which is ideal for series machine builders. And presets greatly reduce setup times on individual systems.

Improving process reliability and quality
The integrated sensors regulate the pressure and flow rate and record other parameters such as speed and temperature. This is advantageous if you want to use predictive maintenance or traceability, without any additional costs.

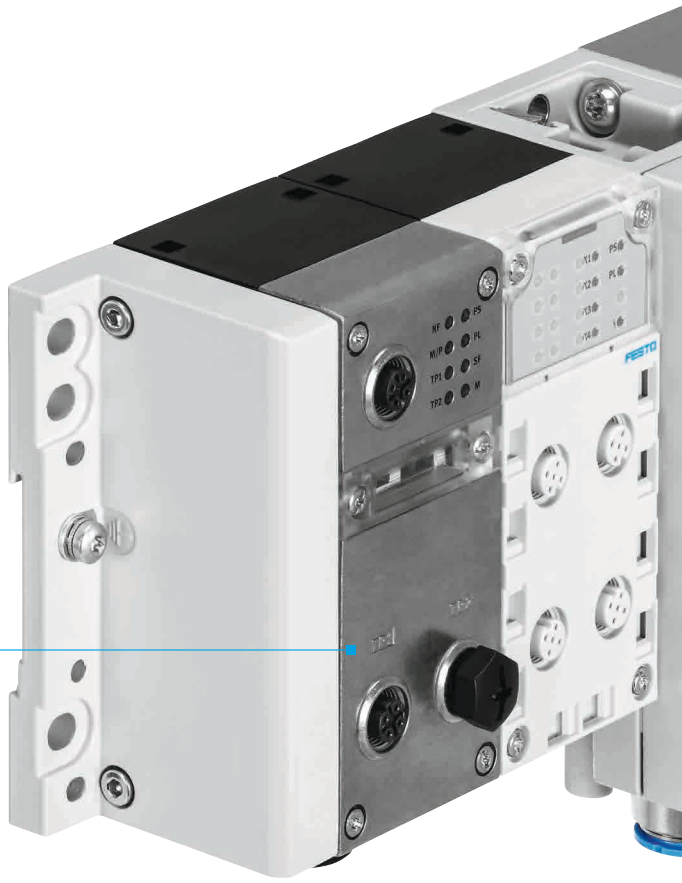
Economical and energy efficient
You can precisely define the entire motion sequence and reduce compressed air consumption by up to 70% with VTEM. In addition, you can test individual functions in advance on the machine, thus avoiding having to make corrections.

Discover a new level of flexibility – one piece of hardware for all functions!

Numerous functions can now for the first time be combined using the same hardware – all thanks to the VTEM. There no longer is a need to make any changes, integrate additional parts or for time-consuming installation. With the suitable Motion App, you can change the motion at the press of a button, whether for a simple change in the valve functions, gentle travel into the end positions, energy-efficient movements or proportional characteristics. Even within an app, you can adjust the parameters for each stroke as often as necessary.

A wide range of products, functions and complete solution packages are integrated into the Festo Motion Terminal. The combination of one valve technology with a powerful controller, integrated sensors and smart apps leads the way to a new era in terms of flexibility.

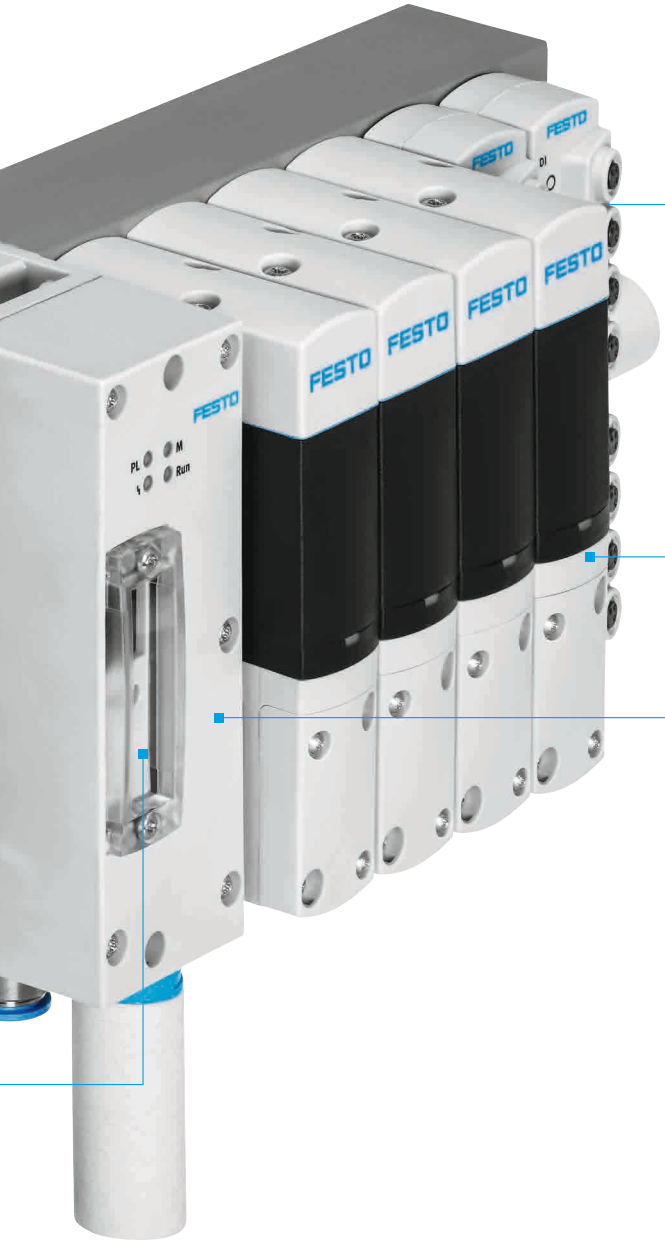
Apps are the key to almost limitless function integration for the valves of the Motion Terminal
They will
- reduce the complexity of your systems,
- speed up your engineering processes and
- enable you to continuously and flexibly adjust your machine throughout its entire lifecycle.



CPX module
CPX supports all standard bus protocols. This gives you the option of using many different controllers and end user specifications, as well as all the usual digital and analogue input/output modules. An integrated CODESYS controller and OPC-UA for Industry 4.0 are available on request.

CPX-CTEL
The installation system allows you to integrate up to four standard valve terminals cost-effectively as no extra fieldbus nodes are required. This makes combining different technologies effortless.

Ethernet WebConfig interface
When it comes to efficient parameterisation, you have the choice to either use an intuitive WebConfig user interface via the PC's web browser or to easily access the (PLC) machine control system as usual, without additional configuration software. You can test the motion sequences directly on the machine without a higher-level controller.



Input module
Up to 16 analogue or digital inputs for direct control applications, such as positioning and Soft Stop. The necessary data is recorded and transmitted by sensors mounted directly on the standard actuator.

Valve
The app-controlled valve consists of four 2/2-way diaphragm poppet valves, which are controlled by four piezo pilot valves. The integrated stroke and pressure sensors provide optimal control and transparent condition monitoring.

Controller with Motion App
The core of the Motion Terminal offers decentralised intelligence and rapid control. The controller controls the Motion Apps centrally as well as the respective functions of the individual valves.

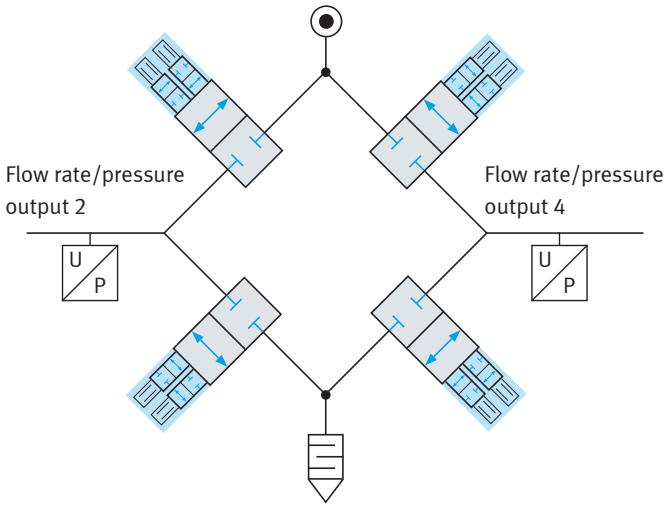
Motion Apps
- Directional control valve functions
- Proportional directional control valve
- Supply and exhaust air flow control
- Leakage diagnostics
- ECO drive
- Proportional pressure regulation
- Model-based proportional pressure regulation
- Flow control
- Selectable pressure level
- Presetting of travel time
- Soft Stop
- Positioning

Here's how it works:
Simply configure your Motion Terminal to your requirements:
→ **www.festo.com/config/vtem**

Unique: one valve terminal for a huge range of functions

The new valve technology for the Festo Motion Terminal can be used for a wide range of products, functions and complete solution packages. The only prerequisite is a valve design with multiple degrees of freedom for actuation, as well as integrated data acquisition and processing suitable for an intelligent system. The reduction to just one valve variant provides both machine builders and operators with huge economic benefits.

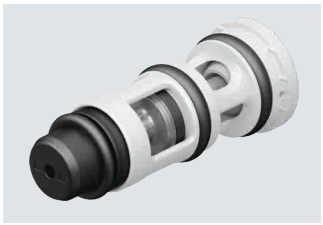
Bridge circuit in the valve



Piezo pilot valve

2x 2/2-way valves in one cartridge

Diaphragm poppet valve



The bridge circuit in the valve of the Festo Motion Terminal is an innovative valve system that is based on the basic elements of pneumatic valve functions.

- Four 2/2-way valves (diaphragm poppet valves) are connected in series to form a full bridge
- Each diaphragm poppet valve (grey) is proportionally piloted and controlled by two piezo valves (blue)
- Sensors monitor the stroke of each poppet valve, while pressure sensors monitor the pressure at ports 2 and 4

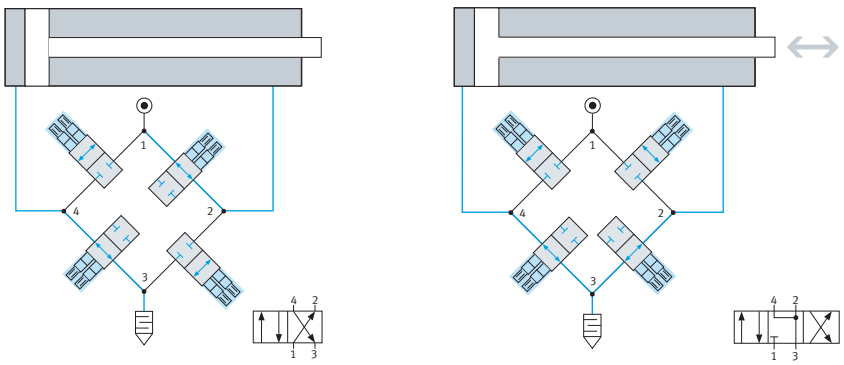
All four pilot cartridges (blue) form a total of eight proportionally controlled 2/2-way valves.

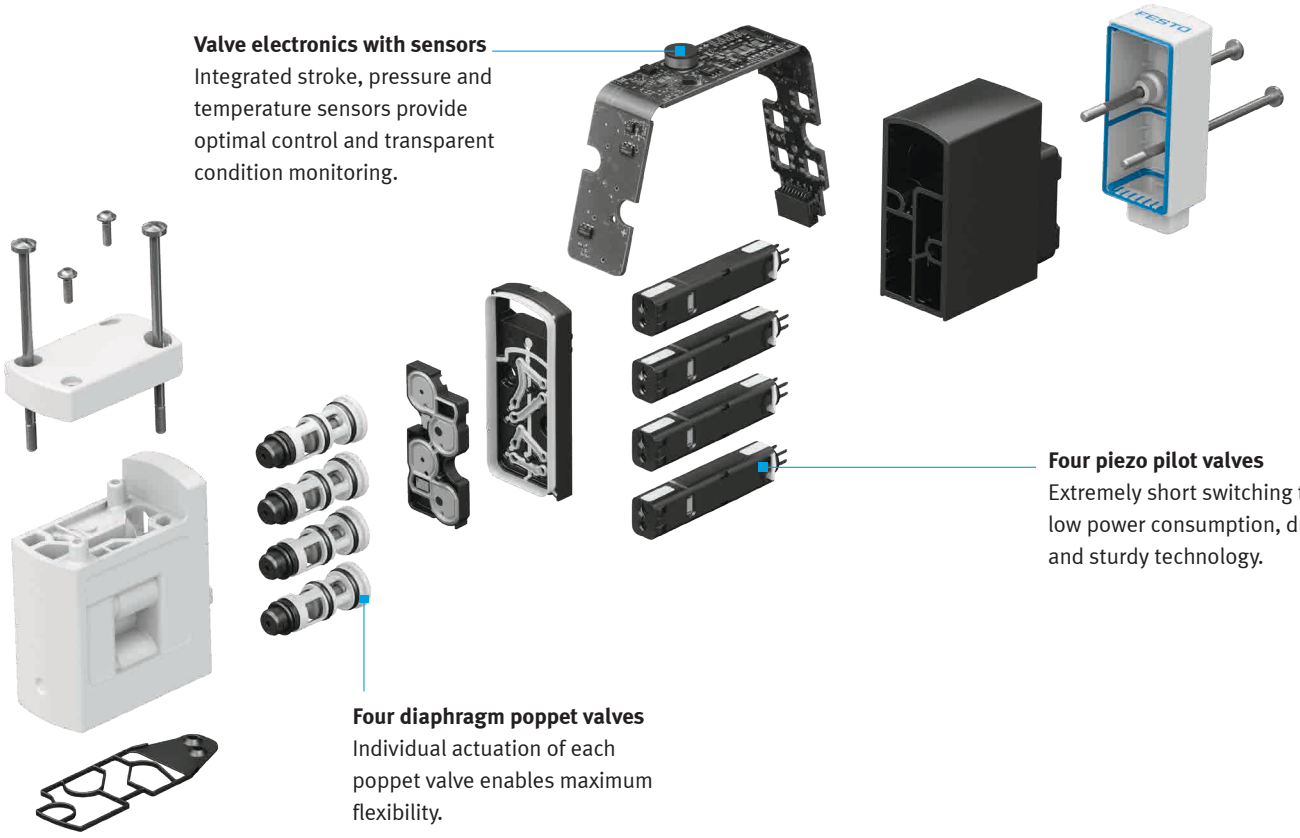
Save lots of components by using 1 instead of 50
Combining the valve with a controller and integrated sensors replaces up to 50 individual components like flow control valves, shock absorbers, etc.

Thanks to the integrated sensors and proportional actuation with independent pressurisation and exhausting, a wide range of conventional valve functions and full system solutions, such as Soft Stop, can now be executed with one identical valve.

You can still individually configure VTEM to your requirements, e.g. with different bus systems, I/O modules, etc.

From simple directional control valve functions to complex motion tasks

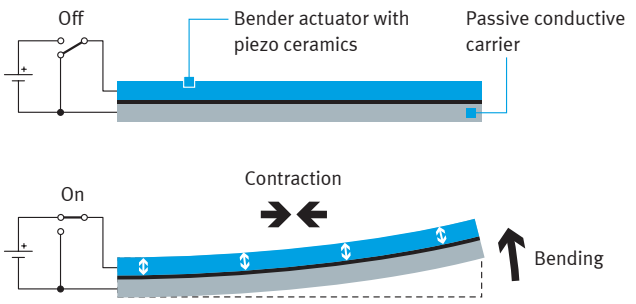




Self-learning and self-adjusting
Every valve slice in the Festo Motion Terminal has analogue pressure and stroke position sensors that continuously exchange their data with the controller. The self-learning function constantly compares the setpoint and actual data, and immediately corrects the parameters in case of deviations. If the target values are not achieved, an error message is output. This warning allows you to pause production in good time, thereby preventing greater damage. This means, for example, that external load cells are no longer needed for status monitoring during pressing procedures.

The combination of integrated sensors and software-based models not only saves money, it also simplifies the entire system, from conceptualisation to modernisation.

This is how piezo technology works

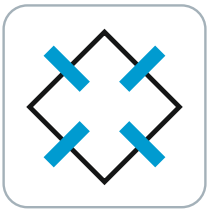


The benefits of piezo valves

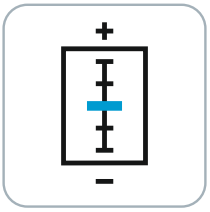
- Continuous, extremely precise proportional regulation
- High energy efficiency thanks to incredibly low power consumption
- No operating noise
- No heat build-up
- Extremely long service life with more than 300 million switching cycles

Flexibility and standardisation go hand in hand with our Motion Apps

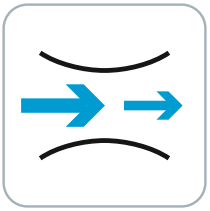
The Festo Motion Terminal offers you benefits along the entire value chain, from the conceptualisation to the modernisation of your machine. The Motion Apps, which control a single piece of hardware, are an integral part. They make it easy to standardise your applications while offering unparalleled levels of flexibility when it comes to motion and monitoring tasks. The result is significant savings and increased productivity. More apps are already being planned.



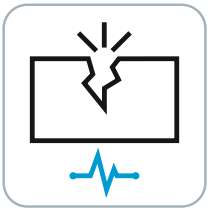
Directional control valve functions
Maximum flexibility for special purpose machines or mass-produced systems. You can modify the standard directional control valve function as often as necessary, for example from 4/2-way to 4/3-way or 3/2-way, even during operation. This enables you to respond to a large number of requirements at the touch of a button.



Proportional directional control valve
You can now use proportional control for all directional control valve functions for the first time, using your selected degree of opening between 0 and 100%. For a smooth start-up, for example, you can even specify how quickly this should happen.



Supply and exhaust air flow control
Would you like to avoid time-consuming manual adjustments and do away with separate one-way flow control valves? The supply and exhaust air flow control function allows you to conveniently and quickly adjust the speed at the touch of a button, with no risk of unauthorised manipulation. This means that you can program motion sequences with different flow control valve settings.

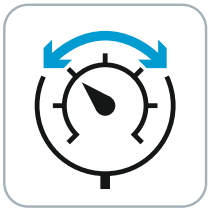


Leakage diagnostics
Reduce system downtime with preventive maintenance and faster fault detection. Separate diagnostic cycles and defined threshold values enable you to detect and localise individual leakages in the application operated by the Festo Motion Terminal.

ECO drive
Reduce costs by operating your actuator with the minimum pressure necessary for the load. This eliminates the rise in pressure in the drive chamber at the end of the motion, allowing energy savings of up to 70%. With a single DSBC32-100 with a 2 kg load, this is a saving of approx. €100 a year.

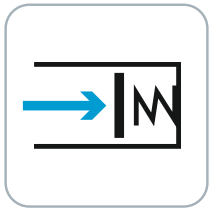
Selectable pressure level
Save energy by setting the pressure and speed individually for each product. You can even vary this within a stroke: for example quick start-up, smooth travel into the end position, powerful press-fitting and energy-saving return stroke with reduced pressure. By adjusting the flow control valve setting for exhaust air, you can conveniently control the speed, and at the same time achieve shorter cycle times.

Presetting of travel time
Boost your productivity by significantly reducing your cycle times. The targeted control of pressure and exhaust air increases the performance of your drive. At the same time, you achieve maximum stability in operation. By continuously comparing the setpoint and actual default values, the system parameters are constantly adjusted. The system automatically adjusts the values in the case of influences such as increased friction or wear. Commissioning is quick, easy and intuitive, without having to adjust settings.

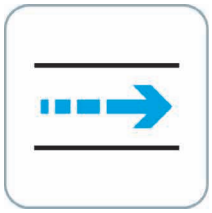


Proportional pressure regulation
Control pressure and vacuum digitally – simultaneously and individually on up to 16 independent channels. With one VTEM you can thus replace 16 pressure regulators and make great savings on hardware and space. At the same time, you can also significantly minimise tubing and wiring effort and reduce potential sources of errors.

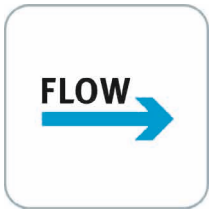
Model-based proportional pressure regulation
With model-based regulation, there's no need for external sensors. By storing a few basic parameters for the system, such as tube length, tube diameter and cylinder size, the anticipatory control system ensures maximum accuracy, as the app can compensate for a drop in pressure and volume using the control technology.



Soft Stop
Move heavy loads extremely dynamically and still reduce the cycle times by up to 70%! Soft Stop ensures smooth movements, in particular into the end position – without any shock absorbers. This increases the lifespan of your system, considerably minimises maintenance and boosts your productivity. Moreover, the Motion Terminal learns as it works: all parameters are continuously adjusted to meet the specified setpoint values for a consistent travel time.



Positioning
The cylinder can be positioned freely along the entire working stroke during screwing operations or when supplying different workpieces. You can easily control the cylinder movement by specifying limits for the parameter speed, acceleration and jerk. By specifying limit values, the cylinder can travel smoothly to the work area. For selected series with strokes of up to 500 mm.



Flow control
Digitally regulate the flow rate of compressed air and gases up to 600 l/min – for several independent channels at the same time. For precise metering, simply combine the integrated sensors with external flow sensors. This saves energy and costly gases.

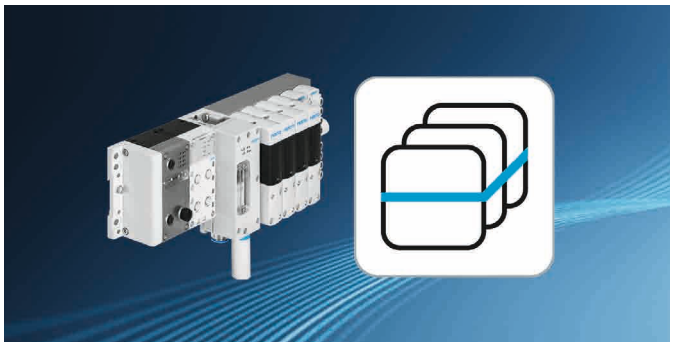
This is how it works: selecting Motion Apps

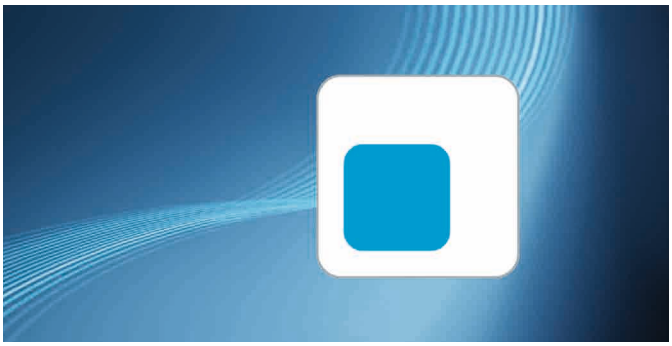
You can order the Festo Motion Terminal via the Online Shop, just like you would normally order a valve terminal. The familiar configuration interface now has several new features, including selection and purchasing of the necessary Motion App licences, which are then saved to the controller before it is shipped out.

Motion Apps: purchasing and using licences

Motion Apps from the Basic package can be used without any restriction at all valve positions of the Motion Terminal. Licences for individual apps, on the other hand, have to be bought separately for each valve function used. The valve position can be freely selected and changed. For example, if you require two proportional pressure regulation functions at the same time, you will need to buy two Motion App licences.

Alternatively, you can adjust the schedule for your process so that the two proportional pressure regulation functions are used in sequence, one after the other. All licences are linked to a particular Motion Terminal and cannot be transferred to other Motion Terminals. They do not expire.





Basic package
Regardless of how you configure your Festo Motion Terminal, with two, four or eight valves, with or without digital/analogue input modules, the following Motion App licences are always included free of charge with the hardware for all valve positions. You can use these licences as often as required for the particular Motion Terminal.

- Directional control valve functions
- Proportional directional control valve
- Supply and exhaust air flow control
- Leakage diagnostics
- ECO drive

Individual apps
Selectively expand the range of functions of your Motion Terminal. Each licence is for one valve position. When used at the same time, additional licences have to be purchased.

- Selectable pressure level
- Presetting of travel time
- Proportional pressure regulation
- Model-based proportional pressure regulation
- Soft Stop
- Positioning
- Flow control

The demo licence – try all the Motion Apps.
When you buy a Festo Motion Terminal, you will also receive a free demo licence for 30 days. You can use this to try out other Motion Apps, from Selectable pressure level to Positioning and Soft Stop.

Buying additional app licences
Do you need another app now that your Festo Motion Terminal has been delivered? Then simply download it using the Product Key in our App World! → **www.festo.com/appworld**

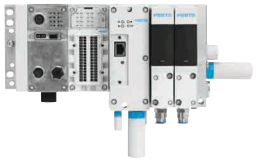
Important:
For the Motion Apps ECO drive, Presetting of travel time and Soft Stop, you will need the fast input module CTMM and other sensors from the range of accessories for the Festo Motion Terminal.

Variants and technical data

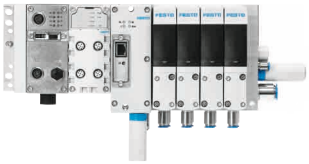
Here is an overview of the available variants

Always ready to go: the successful, tried-and-tested electric automation platform CPX. With CPX, you can integrate the fieldbus or Industrial Ethernet nodes you need, plus additional I/O modules, subordinate installation systems such as CTEL, or CODESYS controllers with an OPC UA interface. VTEM and CPX are therefore the perfect partners.

VTEM with 2 valves



VTEM with 4 valves

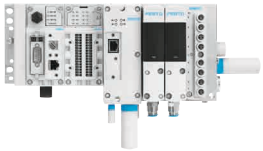


VTEM with 8 valves

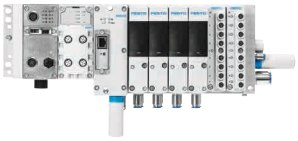
Position transmitter SDAP

50 mm

VTEM with 2 valves and 1 input module

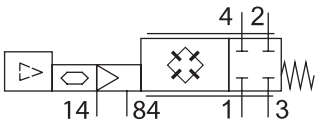


VTEM with 4 valves and 2 input modules



VTEM with 8 valves and 2 input modules

Input modules CTMM: analogue and digital

Technical data	
Fieldbus/Industrial Ethernet nodes via the CPX terminal	PROFIBUS DP, PROFINET, EtherCAT®, Ethernet/IP, DeviceNet®, CC-LINK®, Powerlink, Sercos, Modbus/TCP
Other CPX modules	Various I/O modules CPX-CEC-C1-V3 for CODESYS embedded control with OPC-UA CTEL for subordinate installation systems
Valve functions  (circuit symbol for all functions)	Can be allocated using the Motion App Directional control valve functions: 2x2/2 C; 2x3/2 C; 2x3/2 O; 3/2 O +3/2 C; 4/2, 4/3 C; 4/3 P; 4/3 E C= closed; O= open; P= pressurised; E= exhausted More Motion Apps: Proportional directional control valve, Proportional pressure regulation, Model-based proportional pressure regulation, Leakage diagnostics, Supply and exhaust air flow control, ECO drive, Presetting of travel time, Selectable pressure level, Soft Stop, Positioning and Flow control
Motion Terminal input modules CTMM	Analogue/digital, each with max. 8 inputs per module
Grid dimension [mm]	28
Standard nominal flow rate [qnN]	480 l/min
Maximum number of valve positions	2, 4 or 8 valves
Valve switching time [ms]	8.5
Manual override	Using WebConfig via Ethernet interface
Lubrication	NSF-H1
Grade of filtration for compressed air used [µm]	40
Suitable for vacuum	Yes
Operating pressure [bar]	–0.9 ... +8
Pilot air	Internal or external, min. 3 bar
Pneumatic ports 2 and 4	G1/8
Pneumatic ports 1 and 3	G3/8
Degree of protection	IP65
Operating voltage	24 V DC ±10%
Ambient temperature [°C]	+5 ... +50

Make the most of process advantages along the entire value chain

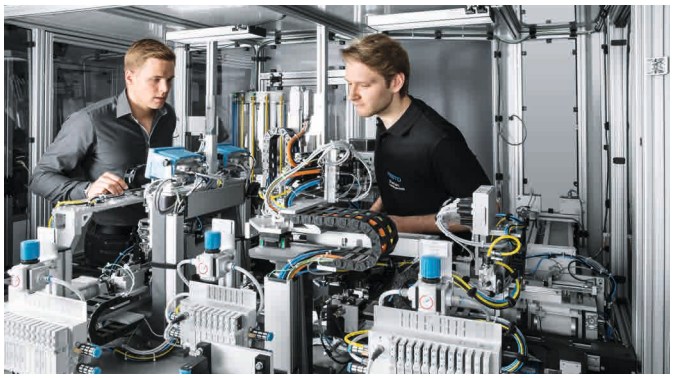
The digitised pneumatics of the Festo Motion Terminal usually pays off quickly and along the entire value chain. The benefits range from faster planning and design to simpler procurement and logistics, as well as easier commissioning and parameterisation. More productive operation and the ability to quickly and easily convert or modernise your system as well as reduce energy consumption will also speed up the return on investment.

Flexible, fast and economical – get to pole position with just a few clicks!

Enjoy maximum flexibility and stand out from the competition: changes to requirements during the design or operation of a system will soon be child's play. With the Festo Motion Terminal, you can change functions and process parameters easily at the click of a mouse – with no extra costs for subsequent modifications.

You will also save a huge amount of time – up to 60% – during operation, as you will be using fewer components and no longer have to make manual adjustments.

Reliable processes – protected knowledge! Digital function integration is the key



Increase your process reliability: with the Festo Motion Terminal, you can set up your pneumatic systems to ensure absolute reproducibility, make your modifications transparent and prevent manual tampering.

Last but not least, you can also protect your design knowledge, as the digital functions remain hidden and cannot be determined by looking at the hardware.

Maximum effectiveness for the entire system and longer component service life

Benefit from increased availability: the integrated sensors and matching Motion Apps make condition monitoring and diagnostics for accurate preventive maintenance easier than ever before. Motion Apps like Soft Stop also reduce troublesome vibrations, replace wear-prone shock absorbers and reduce cycle times by up to 30%.

Self-regulating Motion Apps, such as Presetting of travel time, facilitate longer operating times in spite of changing parameters, such as increasing wear.

Boost productivity along the entire value chain

The Festo Motion Terminal will increase your profitability – and that of the operator. For instance, you can now proportionally regulate two pressures using just one valve. This saves costs and time.

An integrated approach ensures energy-efficient operation. Low-energy piezo pilot valves reduce current consumption by 90%, while Motion Apps such as ECO drive reduce your compressed air consumption by up to 70%. There's no need for shock absorbers or flow control valves, thus significantly reducing your spare parts consumption.

Standardisation and reduced complexity thanks to one valve technology for many tasks

The Festo Motion Terminal reduces complexity and supports maximum standardisation. It now allows up to 50 different components and a wide range of functions to be packed into one valve. And soon, it will pack in even more! This will speed up your engineering process and reduce the number of different spare parts that the operator has to keep in stock.

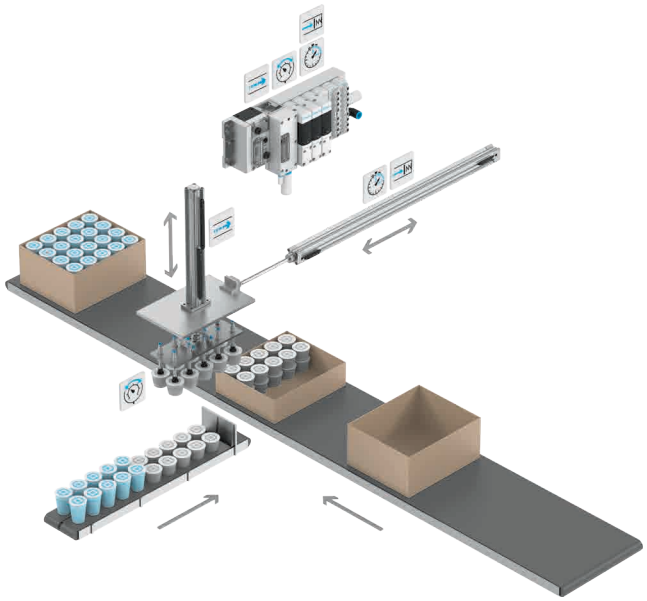
How can the Festo Motion Terminal help you to shape the production of the future?

With the Festo Motion Terminal, your system can always be modernised with new functions or its performance can be improved thanks to digitised pneumatics – no hardware modifications are required. Last but not least, the digital pneumatics also allows you to create new business models in line with Industry 4.0. Put simply: more data + higher process quality and information density = new approaches. Let's think about that together!

More all-round productivity and efficiency in many areas of application

The Festo Motion Terminal really comes into its own in the pneumatic regulation of motion, pressure and flow rate. The following three applications are examples of the variety of freely combinable motions that are possible with the Motion Terminal, including for retrofitting your system. You will find details of these applications and more possibilities on our website.

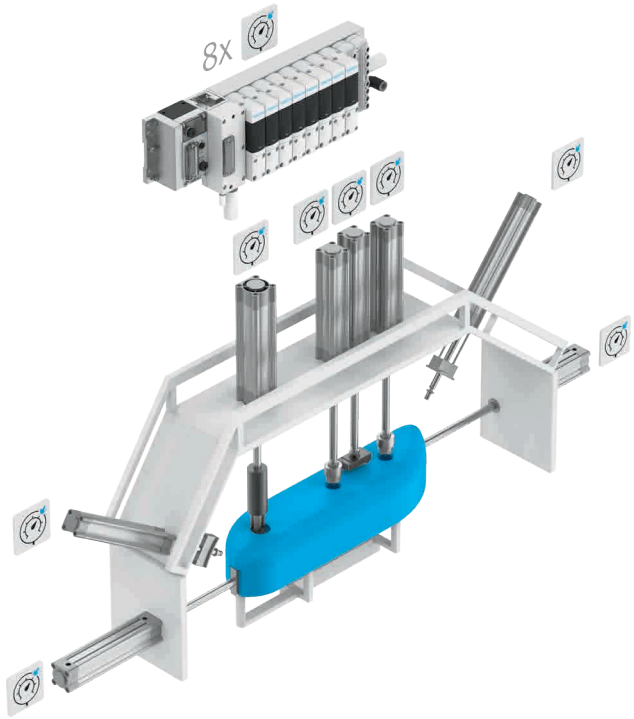
Highly flexible pick & place



With the Motion Terminal VTEM, you can realise all the functions in your pick & place application in just one system. There is no longer a need for components like shock absorbers, flow control valves, etc. Since Motion Apps now take over many tasks and replace complicated mechanical structures, the design process is much easier. The process data can be read out at any time so you can respond quickly to deviations and thus ensure consistent quality.

- **Highly flexible**
- **Greatly reduced changeover times**
- **Shorter cycle times**

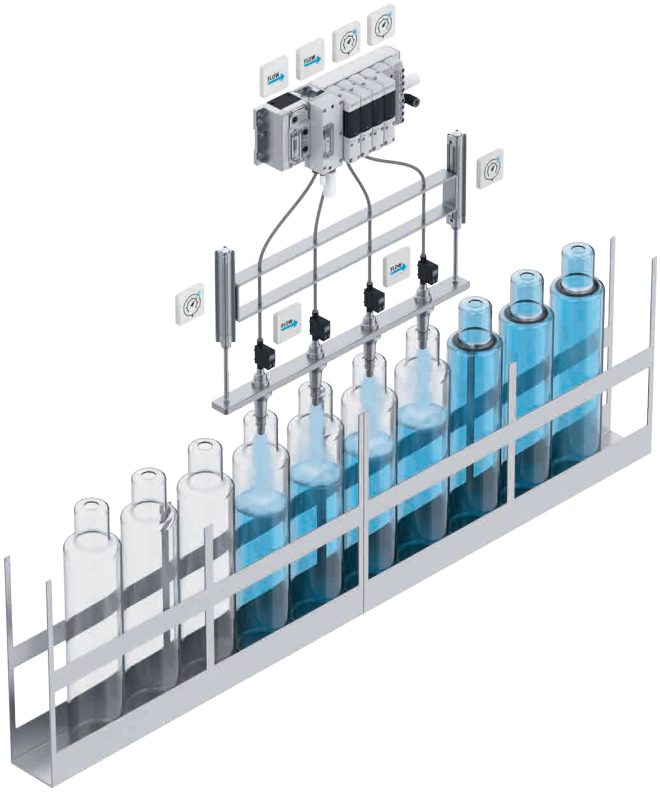
Perform complex processes in parallel



The Motion App “Selectable pressure level” lets you control up to eight double-acting cylinders that simultaneously perform different machining operations on a plastic tank. The digitised pressure control allows the correct working pressure to be set for each individual cylinder without any external sensors. You can thus achieve optimum process reliability and save compressed air in many areas.

- **Reliable**
- **Shorter cycle times**
- **Easy to duplicate**

Control several flow rates simultaneously



The Motion App “Flow control” makes the process of filling containers such as bottles with nitrogen or other gases more cost-effective. The flow is controlled for up to 8 channels at the same time. Thanks to precise dosing, you also save a significant amount of nitrogen. Digitised nitrogen control is tamper-proof, flexible, and, thanks to the Motion App “Selectable pressure level”, even shortens cycle times.

- **Multi-channel control**
- **Saves nitrogen**
- **Shorter cycle times**

Other applications you might find interesting

- Smooth and vibration-free swivelling
- Reliable machine tooling operations
- Fast and reliable pressing in of flexible materials
- Flexible gripping with end-of-arm tools
- Intelligent control of constant web tension
- Safe, gentle and fast handling of delicate components

Take a look: → **www.festo.com/vtem/application**

Quick check: how could the Motion Terminal benefit you?

- Do I use more than two proportional valves in my application?
- Do I want to avoid using shock absorbers?
- Do I want to save more than 70% on cylinder travel time?
- Do I want to significantly reduce the number of components installed in my machine, and thus the effort involved in ordering and assembling them?
- Do I want to adapt the force used to the product and regulate it dynamically across the entire stroke, even with intermediate positions?
- Do I want to substantially increase energy efficiency?
- Do I want to optimise my system by retrofitting it to make it more intelligent and faster?
- Do I want to increase transparency in my production process with options for predictive maintenance and traceability?

If you answered “yes” to one or more of these questions, then it’s worth taking a look at the Festo Motion Terminal VTEM.

Save energy: new approaches to energy efficiency

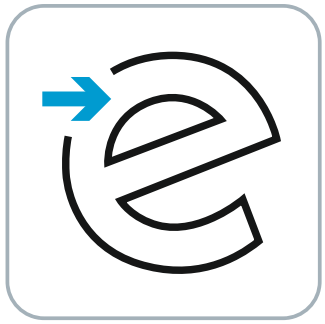
The technology of the Festo Motion Terminal uses an integrated approach to energy-efficient operation of pneumatic automation technology. The terminal includes low-energy piezo valves for the pilot stage, specially developed Motion Apps for energy-efficient operating modes and a leakage diagnostic function.

Basic low-energy technology
The low-energy piezo valves reduce the energy consumption for the pilot control stage by up to 90% – with a pilot valve having a service life of up to 300 million switching cycles.

Apps for energy-efficient operation
The Motion Apps “ECO drive” and “Selectable pressure level” allow operators to control energy consumption more selectively in the future. The two Motion Apps will generate savings of up to 70%. More apps will follow.

One app for leakage detection
The Motion App “Leakage diagnostics” with its separate diagnostic cycles and defined threshold values enables reliable leakage monitoring for pneumatic systems connected to the Festo Motion Terminal, thus ensuring that leakages are detected early.

This is how the Motion App ECO drive works

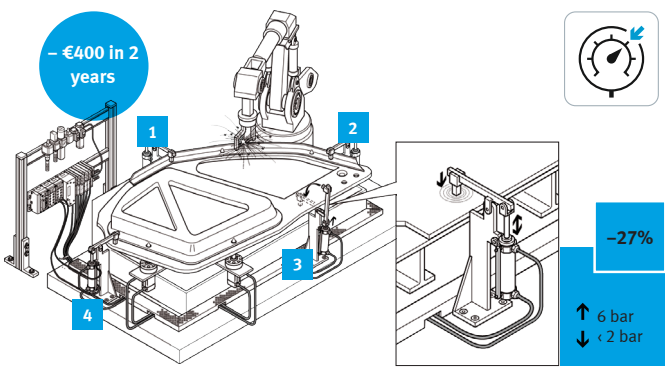


By controlling the flow of supply air, this Motion App keeps the pressure in the drive during motion to the minimum required by the load and advancing speed. If the load to be moved changes, the pressure is automatically increased or reduced.

The proximity sensor detects when the end position has been reached and the Motion Terminal shuts off the air supply. This prevents unproductive further pressurisation at the supply pressure level, but also means that the force cannot be increased above the minimum required. This Motion App is therefore not designed for pressing and holding functions in the end position.

Here’s how easy it is to save money with the Motion App “Selectable pressure level”

Choose the right pressure and speed for every stage of your application. You can easily optimise the pressure level for the advance and return stroke, different product sizes and process steps such as press-fit processes, thus significantly reducing your energy consumption.



Digitised pneumatics for Industry 4.0

Intelligent systems with appropriate software and apps are a key part of Industry 4.0. These systems can communicate with one another and execute processes autonomously using their existing interfaces. The apps in the Motion Terminal allow a level of function integration unlike any seen before. What's more, many of these apps are self-learning, i.e. they continuously check process parameters and correct them if necessary.

Gain added value and a technological edge

With the app-based Motion Terminal, Festo is digitising pneumatics and propelling it into the future. When you buy a Motion Terminal, you buy more than just a component: VTEM offers you entirely new approaches to solutions. Having access to new information and being able to process it provides you with added value and gives you a technological edge. It also provides you with huge benefits in engineering, design and programming, and ultimately increases your competitiveness and productivity.

What benefits does the Motion Terminal already offer for Industry 4.0?

Adaptability for greater productivity

- Change formats using parameter records without the need for manual pressure regulators
- Modify the apps/functions during operation
- Process reliability is guaranteed thanks to self-regulating, autonomous adjustment, e.g. during presetting of travel time
- Flexible production e.g. through remote control of supply and exhaust air flow

Digitalisation for reduced complexity

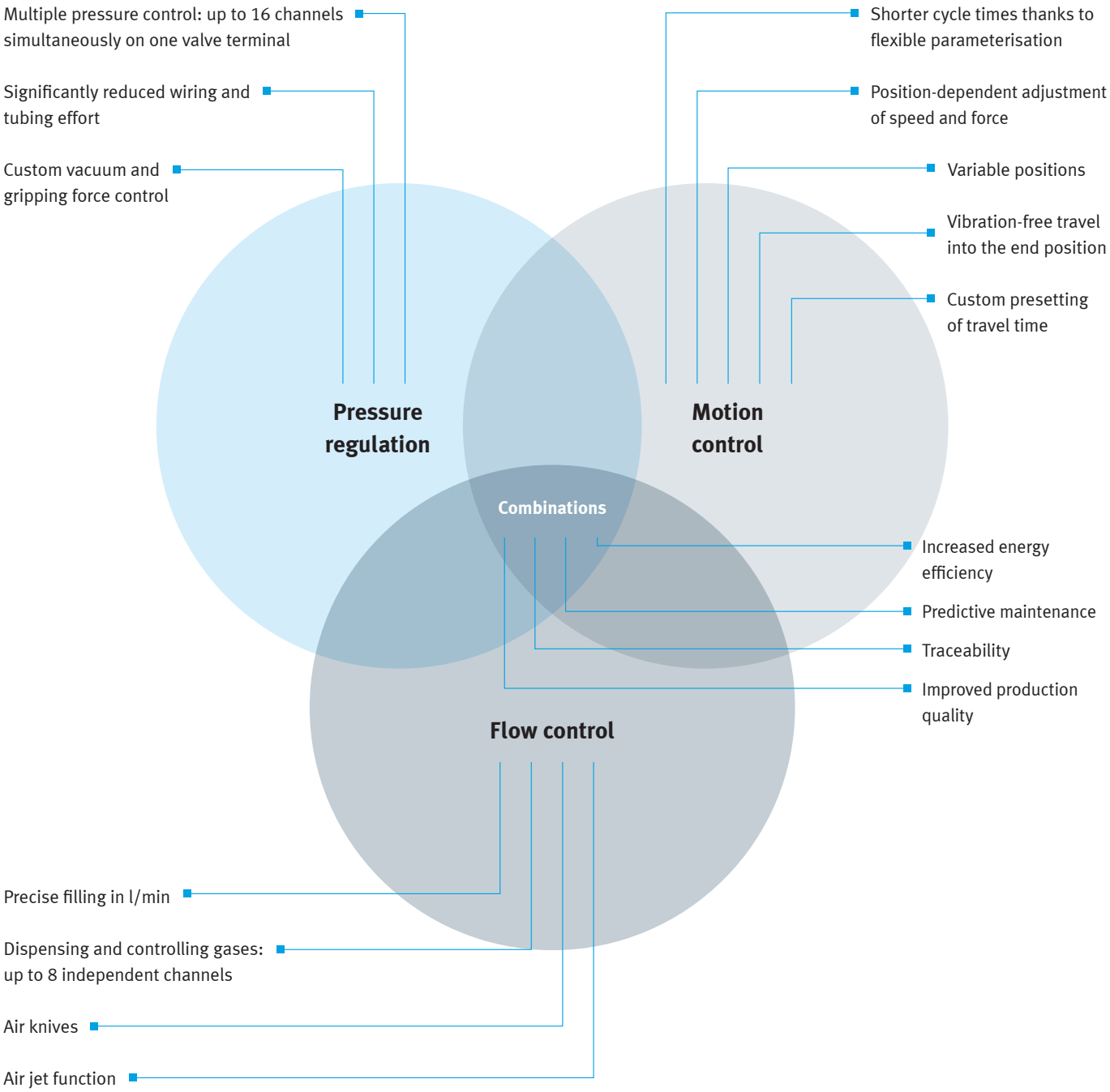
- Save on additional components with digital function integration
- Product key as a digital copy

Standardised networking, data-based decisions

- OPC-UA using the automation platform CPX
- Preventive maintenance using condition monitoring apps such as "Leakage diagnostics"

Your formula for success: the perfect combination of motion, pressure and flow rate

Top in every field: the Motion Terminal really comes into its own in pneumatic regulation of motion, pressure and flow rate. When you combine these three areas in an application, the incredible potential offered by digitised pneumatics quickly becomes clear. The app-controlled pneumatics, the valve structure with many more degrees of actuation freedom and the integrated data acquisition and data processing make pneumatics fit for the future, especially for Industry 4.0. The benefits of this digitalisation are found in all stages of the value chain, both for OEMs as well as for end users.



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