Best practices to reduce cost and improve performance of your filtration skid
We are pneumatic.
We are electric.
We are 30,000 technology-neutral solutions.

→ WE ARE THE ENGINEERS OF PRODUCTIVITY.

Maximum productivity for you and your customers - this is our mission.

Our know-how, our holistic approach and our love of detail have made us a global leader in automation technology – and the world market leader in basic and further technical training.

With over 60 years' experience in factory and process automation, we are the right partner for you. Always able to provide an appropriate solution which is characterized by security, simplicity, efficiency and competency.

Security
We want you to feel secure during each and every phase of our collaboration. And confident that you are increasing your productivity. You can rely on our specialists as well as the quality of our products and processes – always and everywhere. This is what we stand for as a family-run company with a long tradition in factory and process automation.

Simplicity
We make your work easier. From the first idea and product selection through to after sales. We reduce complexity with new product generations and software tools for quick product selection and configuration – simplicity is our philosophy. This gives you more time for the really important things: your core business and customers.

Efficiency
Save energy, materials and effort and reduce both your CO\textsuperscript{2} emissions and your operating costs. With advice and services from Festo for tailored, economical and intelligent solutions. This is how you permanently increase the productivity of your company.

Competency
Work with experts who understand your industry. We have been setting trends in automation for decades. We smooth the way to maximum productivity with experience and dedication. Our experience is the key to your success: from consultation through to development, training, seminars and products. That is competency in action.
In the design phase – Reduce engineering time and fabrication costs

Reduce cabinet size
Terminals and connections with IP65/67 ratings are suitable for mounting directly on the frame, reducing both cabinet cost and improving performance by moving pneumatic pilot valves closer to actuators.

Online engineering tools
Work with a supplier supplying CAD files and 3D models to shorten design time. Utilize available engineering tools online to optimize valve and tubing sizes, reducing product costs and improving energy efficiency.

Cost effective controls and software
CODESYS is an accepted software/hardware-independent control solution based on IEC 61131-3 and will provide the largest impact on project costs. Standalone or embedded in an HMI or valve/electrical terminal, it will communicate with leading ethernet and fieldbus protocols.

Integrate I/P onto valve terminal
For applications requiring proportional pressure control, embed the I/P directly on the same terminal as the pneumatic valves. This reduces I/O count, supply lines, simplifies installation and number of components mounted on skid.

Best opportunity to impact cost is at design phase

VPPM I/P provides proportional pressure directly from electrical I/O and valve terminal

Engineering tools from Festo to assist with component sizing and selection

CPX electrical terminal with local CODESYS controller communicating via Ethernet/IP
In the fabrication phase – Shorten assembly time to free up floor space and ship to customer quicker

**Bulkhead mounted valves**
For valves terminals mounted inside cabinet, use of multipole plates significantly reduces assembly costs and materials because there is only one cut out, no time is required for short runs of tubing inside the cabinet and multiple bulkhead connections are not required.

**Integrated flow controls**
Using valve terminals with integrated flow controls to control process actuator speed. This eliminates installation time at actuator, ensure longer process valve life, reduces chance of water hammer, and shortens bill of materials.

**Assembly can account for up to 20% of total skid cost**

**Kitting**
For designs what are commonly repeated, a single part number and shipping container can reduce procurement costs, simplify stock and vendor management, simplify scheduling, and reduce packaging waste.

**Configure terminals using L5K files**
For systems utilizing Ethernet/IP on a Rockwell™ RSLogix platform, using L5K files allows for quick and simple import and export of all parameters to the valve terminal or electrical I/O terminal. A repeatable solution that will reduce time during assembly and during field service.

**Reduce TCO – your savings potential with CPX**

<table>
<thead>
<tr>
<th>Component</th>
<th>Savings Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>System costs</td>
<td>60%</td>
</tr>
</tbody>
</table>
| O&M, Soft
ware | 35% |
| I/O channel price | 30% |
| Start-up costs | 30% |
| Stillstands | 20% |
| Vorchzeit | 10% |
| CMPX/CMAX | 50% |

Savings potential from integrated CPX/MPA terminal

CPV valve terminal with integrated flow controls

CPV valve terminals with multipole bulkhead mount
In the operational and field service phase – Improve skid performance and reduce field service costs

**16 bit analog I/O**

Using high resolution I/O for applications such as filter integrity testing will provide data quicker and most accurately, increasing uptime of skid.

**Internal diagnostics & conditioning monitoring**

Point diagnostics, such as failed solenoid, broken wire or short circuit is available for I/O, I/O, and pneumatic valves. Therefore the controller is able to pinpoint and communicate locally or remotely exactly where an issue has occurred.

**Compressed air flow meter**

Installing a simple flow meter at the air preparation unit will provide volumetric air consumption for a cycle or real time consumption rate. Comparing these values over time against factory test can be an advanced indicator of failing actuator, broken tube, or inefficient scrub operation.

**Local controller for modular skids**

An electrical I/O or valve terminal can host an embedded controller for local subroutines. This offers excellent opportunity for standardizing on modules which can be scaled up or linked together as part of a larger filtration system.

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**Error memory**

- Last 40 messages
- With timestamp
- Detects sporadic errors

**Short circuit can be selection**

- Per channel
- Per module
- Per valve

**Undervoltage per module**

- Electronics -25%
- Load -10%/valves -25%
- Emergency off ≤10V

**Undervoltage per valve block**

- Auxiliary power supply to valves monitored separately
- Load/valves -25%

**Upper/lower limit value**

- For each analogue channel
- Voltage
- Current
- Temperature
- Pressure
- Counting

**Access range of device and valve diagnostics locally or via controller software**

**Compressed air flow and consumption data displayed on HMI**

**Utilize performance data for preventative diagnostics**

**Flow meter SFAW integrated into filter regulator assembly**

**SFAB flow meter for inline applications**

**4 channel 16 bit analog input card CPX-4AE for higher resolution data**
Festo CPX/MPA. The most complete integrated platform for electrical and pneumatic process control and automation

The CPX is the highly competent electrical terminal handling I/O and communication

**Flexibility**
Interchangeable fieldbus nodes support to leading SCADA/PLC protocols. As the application requirement changes the platform can adapt

**Performance**
Integrated 4 channel pressure sensors directly into I/O terminal eliminates field pressure sensors and reduces I/O count

**Economical**
Choose terminal strips (IP20) for installation inside cabinet or M8/M12 connections (IP67) for installation directly on skid

**Safety**
Dual channel galvanically isolated power supply zones give you isolation capacity to Cat. 4

**Diagnostics**
Point level diagnostics for electronics and pneumatics are available via local LED, handheld, Festo software, via integrated web server, or over fieldbus/ethernet to supervisory SCADA/PLC

**Powerful**
Available with an embedded CoDeSys controller based on IEC61131-3, the terminal can provide autonomous control or handle local subroutines while communicating with supervisory SCADA/PLC

**Economical**
Ethernet/IP communication node available with integrated switch and full DLR support

**Safety**
Removable face plate allows technician to replace I/O card without removing wiring or cabling to block

**Complete**
Range of high density analog and digital, RTP, thermocouple I/O, including 16 bit analog inputs for better instrument resolution

Versatility through competency: CPX communicates in multiple languages and is suited for numerous control concepts
The MPA is the complete high capacity valve terminal

**Flexible**
Simple to change or add I/O or valve modules as projects evolve

**Convenience and economical**
Interface plate to combine pneumatics and electronics on one terminal reduces the number of nodes, terminals, and cabling inside cabinet fieldbus connections

**Convenience**
Color coding valves can match manual override, LED and pneumatic output for quicker installation and validation

**Safety and convenience**
Optional hot swap allow for single valve replacement while terminal remains pressurized

**Expandable**
For economical decentralized control concept, simple connection to additional valve terminal or I/O blocks up to 30 feet away. Whether on the terminal or decentralized, node supports up to 512 I/O depending on fieldbus protocol limits

**Simplicity**
Integrated proportional pressure regulator combined with capability to handle inert gases eliminates the need for I/P's mounted on skid and reduces I/O count

**Economical**
Reduce installation costs by bulkhead mounting terminal to control cabinet wall with multipole plate

**Safety**
Isolate pneumatic zones for safety shut down, isolated pressure zones or air filtration levels

**Versatile**
Combine multiple valve sizes on one terminal to handle both piloting and higher flow requirements

**Performance**
Integrate flow control and pressure regulators to control forces and open/close speed of actuators

**Universal and flexible**

DeviceNet, EtherCAT, EtherCAT POWERLINK

**TCP**

**TCP**