

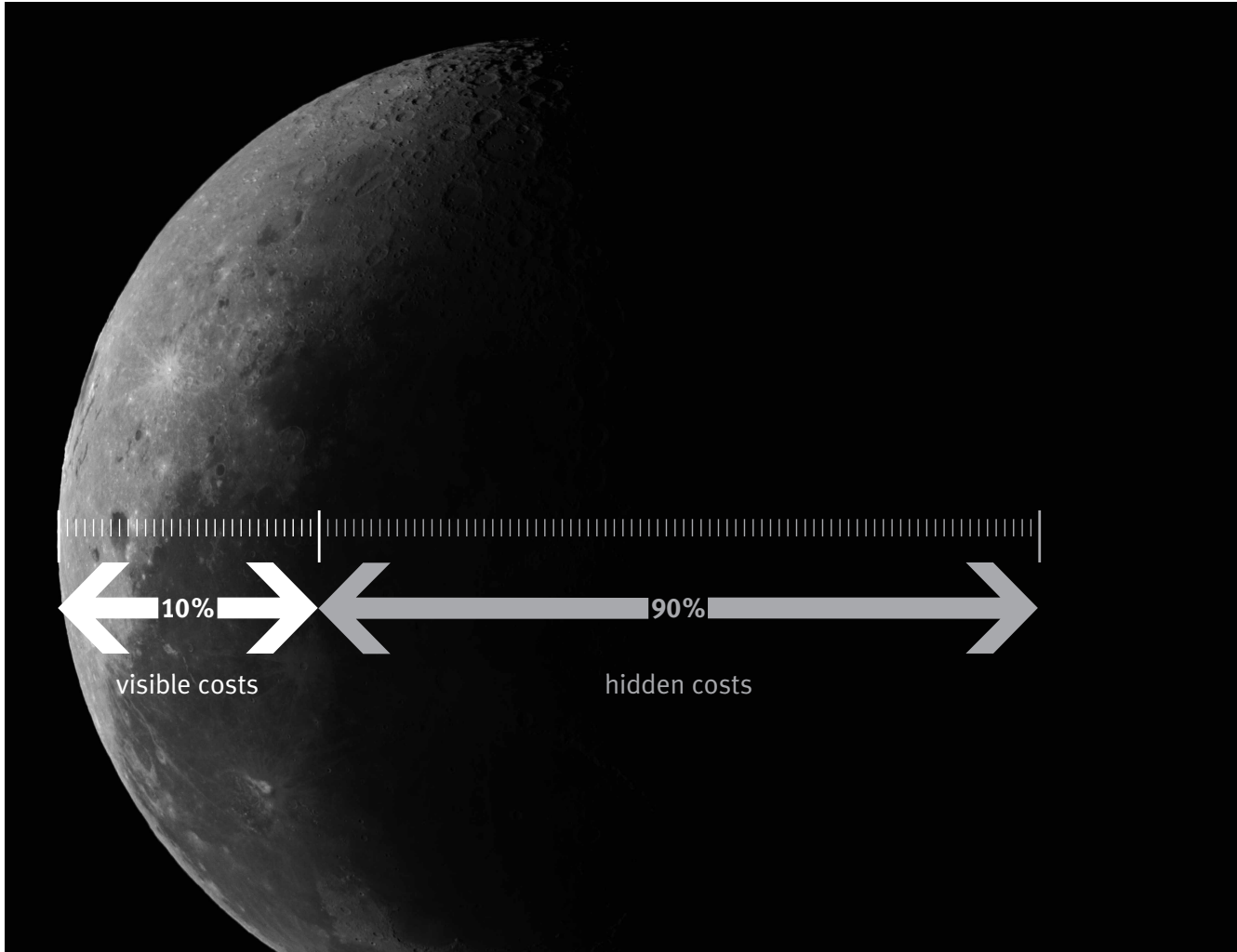
10 steps for optimising valve terminals

FESTO



Handy hints for
pneumatics,
electrics & networking

The facts surrounding optimum TCO



Customers are always looking for optimum performance and maximum efficiency, preferably combined with minimum costs. Anyone who has to worry about the total cost of ownership (TCO) of a system will know that the pure component costs may well account for only a very small proportion. The remaining costs are often not as obvious. Planning foresight can therefore play a key role in reducing total costs – also in the case of pneumatics, electrics & networking.

This guide contains specific tips on how to get the most out of your budget and thus cut costs.

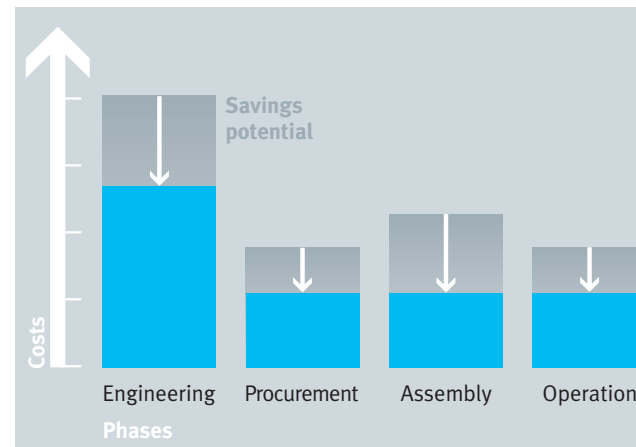
1. Achieve a reduction in ROI:

Improved concepts for decentralisation and maintenance

10 tips for optimisation	Page
1. Achieve a reduction in ROI: Improved concepts for decentralisation and maintenance	5
2. Optimise cycle time by up to 30%: System optimisation through simulation	6
3. Cut flow rate by up to 50%: Decentralised concept	7
4. Optimise machine usage: New diagnostic features and strategies	8
5. Reduce installation space by up to 70%: Three possibilities	10
6. Increase efficiency by up to 60%: Function integration	11
7. Cut costs by up to 50%: Central installation with valve and I/O optimisation	12
8. Increase performance while reducing price by up to 40%: More highly integrated I/O modules	13
9. Cut overhead costs by up to 34%: Decentralised valve terminal in CPI system MPA	14
10. Decrease number of protection classes and ports: Concepts for protected installation space/control cabinet	15

Help minimise your total cost of ownership (TCO) by reducing cycle times by 5 or 10%, whilst increasing productivity. This formula for a decentralised machine concept often pays off, as it often takes only a few weeks or months to break even (achieve a return on investment) with regard to the higher costs of pneumatics/electrical engineering.

New diagnostic concepts also contribute towards your competitiveness, not to mention the fact that they improve TCO for your end customers. To sum up, you can enjoy reduced downtime, for instance through channel-oriented diagnosis, as well as increased machine availability thanks to condition monitoring and optional preventive maintenance.



An option that is attractive for larger companies is remote maintenance, which opens up entirely new prospects for service concepts, maintenance, and the structuring of guarantees or maintenance contracts.

2. Optimise cycle time by up to 30%: System optimisation through simulation

The cycle time for a pneumatic control chain depends on several factors, such as flow rate, tubing cross section and length, valve response time, and also properties of the drive and cushioning. Precise results can be obtained through simulation.

The table below lists sample parameters, indicating when fast valves are more important and when a higher flow rate is required.



Short-stroke cylinder ADN



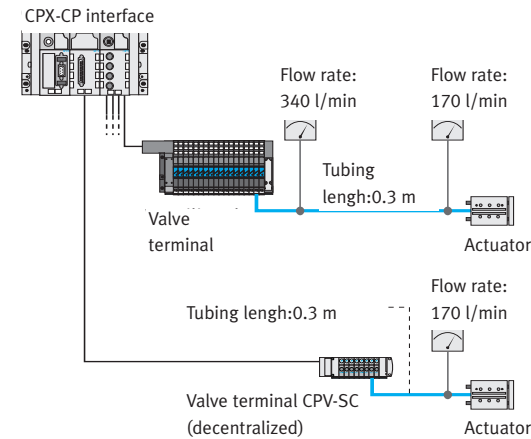
Standard cylinder DNC

Valve type	CPE10	MH2	MH3	MH4
Flow rate [l/min]	400	100	200	400
Valve response time [ms]	14	2	3	4
Costs [%]	100	100	110	120
Cycle time [ms]	20	14	12	12
ADN-32-5 [%]	100	70	60	60
Result		Same price but 30% more efficient	10% more expensive but 40% more efficient	20% more expensive but 40% more efficient
Cycle time [ms]	125	318	164	97
DNC-32-160 [%]	100	254	132	77
Result		Same price, 154 % slower	10% more expensive, 32 % slower	20% more expensive, 23 % more efficient

3. Cut flow rate by up to 50%: Decentralised concept

Examine your installation. Can small valve terminals be mounted near the application? Can they be mounted on moving handling modules or robots?

The illustration shows a possible configuration, where all valve terminals can be mounted on moving parts, and cables suitable for chain link trunking are available for both multi-pin plug and fieldbus connections.



Look into the matter – and speak to your specialists at Festo!

Tubing type designation	Internal- ϕ [mm]	Maximum flow rate	Loss after 1 m	Loss after 2 m	Loss after 5 m
PUN-4x0.75	2.5	170	48 %	63 %	76 %
PUN-6x1.0	4.0	500	42 %	57 %	73 %
PUN-8x1.25	5.5	1,200	47 %	60 %	74 %
PUN-10x1.5	7.0	1,800	36 %	50 %	67 %
PUN-12x2.0	8.0	2,400	34 %	48 %	65 %

4. Optimise machine usage:

New diagnostic features and strategies

Keywords for maximum performance and process reliability include an optimised approach to strategic diagnosis, diagnosis using various methods and selectable depth of diagnosis. For example:

Increased depth of diagnosis: channel-oriented

Downtime can be reduced by up to 8 times as a result of precise error detection for I/Os and valves. At the same time, you can enjoy increased reliability thanks to features such as the monitoring of a short circuit, or open load in the event of an interruption in an electrical connection or solenoid coil.

New depth of diagnosis: integrated

The new second-level and third-level diagnosis methods for the valve terminal MPA are more reliable, safer and more economical.

New electrical modules that have serial internal linking, special Festo valve ASICs and software expertise can be used, for instance, to monitor the switching operation of the pilot control by analysing the solenoid coil's control current. One other thing that is new is pressure monitoring using integrated pressure sensors, which report the pressure on the MPA or from the process.

Condition monitoring systems (CMS): foresighted

CMS prevents downtime by means of precautionary measures, such as preventive maintenance for a valve, drive unit, sensors or the connected mechanics. End-to-end CMS for valves complete with pre-

processing in the valve terminal is only available from Festo. Yet another benefit is that you no longer overlook maintenance and service intervals, and can transfer them to production-free or low-production times.

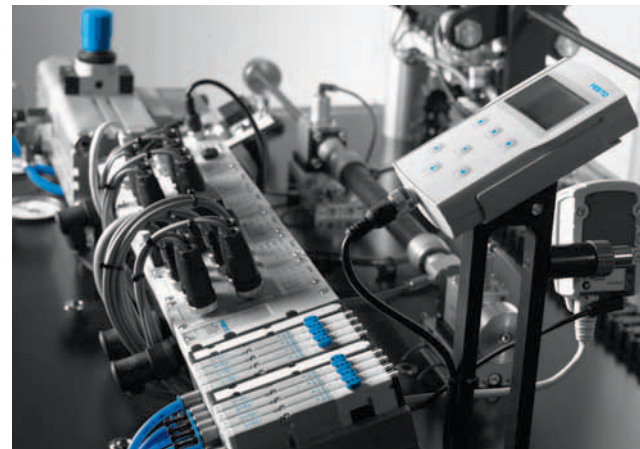
CPX Web Monitor: comprehensive

CPX Web Monitor is a comprehensive solution that provides top technological performance and is nevertheless simple to use for Festo plug and work®. Without any programming effort, error messages and both digital and analogue process parameters are visible in

standard browsers. The solution is an optional extra for all valve terminals connected to CPX via an Ethernet connection (CPX-FEC, FB32, FB33).

What's more, a wide range of IT services are included, such as SMS or e-mail alerts, data transfer for statistical analysis, and visualisation of status and parameter signals.

A live demo is provided at www.festo.com/en/cpx-web-monitor.



5. Reduce installation space by up to 70%: Three possibilities

1. Centralised or decentralised valves and I/O modules

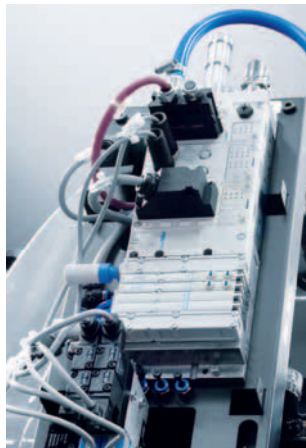
As a rule of thumb, the closer to the application, the smaller the amount of space that is needed. For example, up to 70% can be saved by using CPV-SC with multi-pin Sub-D plug rather than CPA10 (see point 3). This is also true in electrical terms, as a multi-pin plug connection may take up less space than a fieldbus connection. A potential space saving of up to 40% can therefore be made!

2. 50% reduction in space thanks to improved I/O modules with more channels per module

- 8DI rather than 4DI
- 16DI rather than 8DI
- 8DO rather than 4DO
- 4AI rather than 2AI

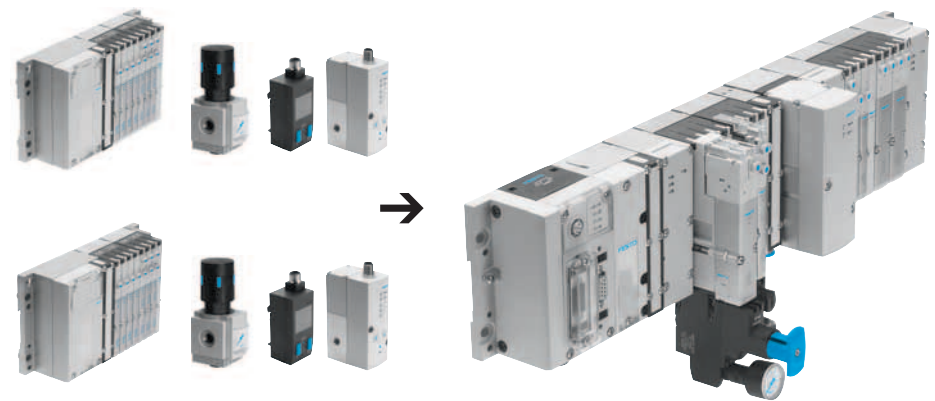
3. Choice of decentralised I/O modules from a triple platform saves space

- Compact – takes up minimum space
- Sturdy – aluminium housing, metal thread
- Economical – high channel density



6. Increase efficiency by up to 60%: Function integration

Integrating functions saves space, simplifies mounting, commissioning and programming, and greatly reduces the costs involved in these tasks. Modules for temperature recording, manual pressure regulators, pressure sensors or proportional valves can now be ordered fully integrated into CPX/MPA, pre-fitted, parameterised and tested.



7. Cut costs by up to 50%:

Central installation with valve and I/O optimisation

The concentration of numerous valves and I/Os at a single point leads to savings.

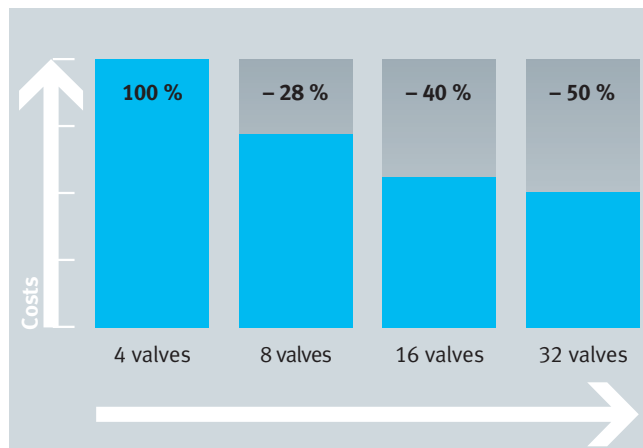
Examples for CPX/VTSA on Ethernet IP:

- Channel price for 4 5/2 valves 100%
- Channel price for 8 5/2 valves 28% reduction
- Channel price for 16 5/2 valves 40% reduction
- Channel price for 32 5/2 valves 50% reduction

Examples for CPX/MPA on Profibus:

- Channel price for 16 3/2 valves 100%
- Channel price for 32 3/2 valves 16% reduction
- Channel price for 64 3/2 valves 24% reduction
- Channel price for 128 3/2 valves 28% reduction

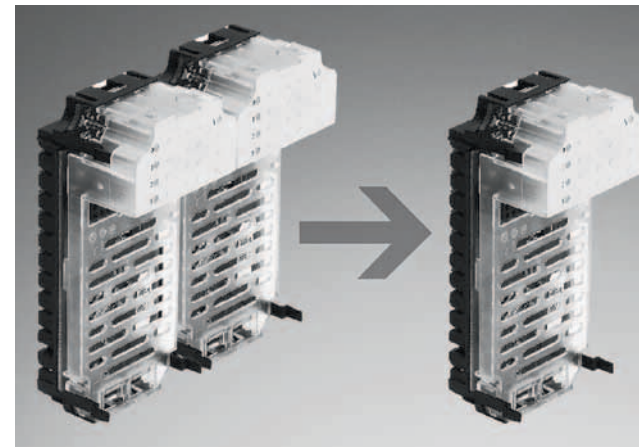
Channel price comparison



8. Increase performance while reducing channel price by up to 40%: More highly integrated I/O modules

Examples:

- 8DI rather than 4DI: 40% reduction
- 16DI rather than 8DI: 25% reduction
- 8DO rather than 4DO: 15% reduction
- 4AI rather than 2AI: 20% reduction

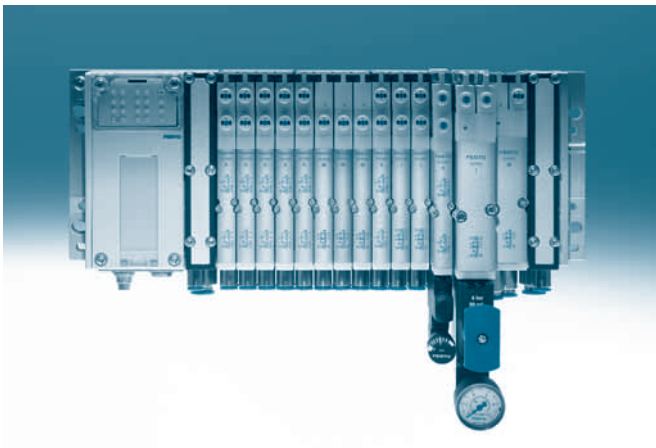


9. Cut overhead costs by up to 34%:

Decentralised valve terminal, type MPA, in CPI system

This is achieved through a high number of I/Os per module, supplemented by highly economical I/O modules.

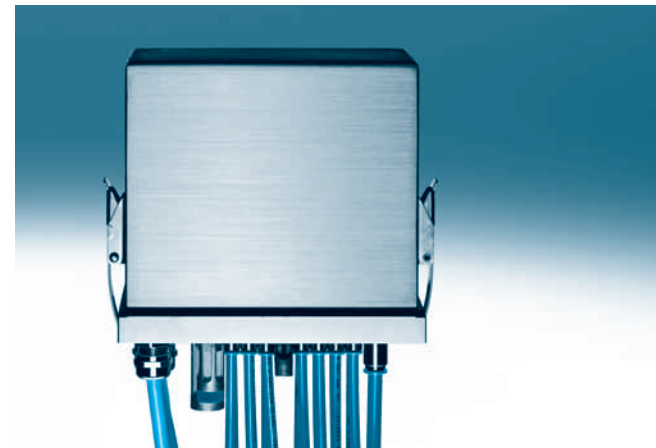
The advantages of decentralised machine concepts, including maximum performance, unlimited modularity and extremely flexible networking, can at last be consistently combined with MPA. In fact, they can even be combined with those of a central concept, thanks to an MPA interface in the CPI installation system.



10. Decrease number of protection classes and connections: Concepts for protected installation space/control cabinet

Examples:

- IP20 CageClamp connection technology for the control cabinet – flexible, reliable and fast
- Individual wiring or multi-pin plug in the control cabinet to reduce hardware costs
- Pneumatic multi-pin plug for CPV – extremely space-saving, both in the control cabinet and in the field
- Direct CageClamp machine mounting in IP20; cover for CPX accommodates IP65/67



This checklist is merely a guide, because only those can optimise who know where the hidden potential is. Further information can be found in our “All systems running” brochure, and in our valve terminal system overview, both of which we would be happy to send to you.

For details of specific optimisation methods, please consult your technical consultants, who will be delighted to help.

Festo AG & Co. KG

Ruiter Strasse 82
73734 Esslingen
Germany
Phone +49/711/347-0
Fax +49/711/347-21 44
service_international@festo.com
www.festo.com

53094 EN0702