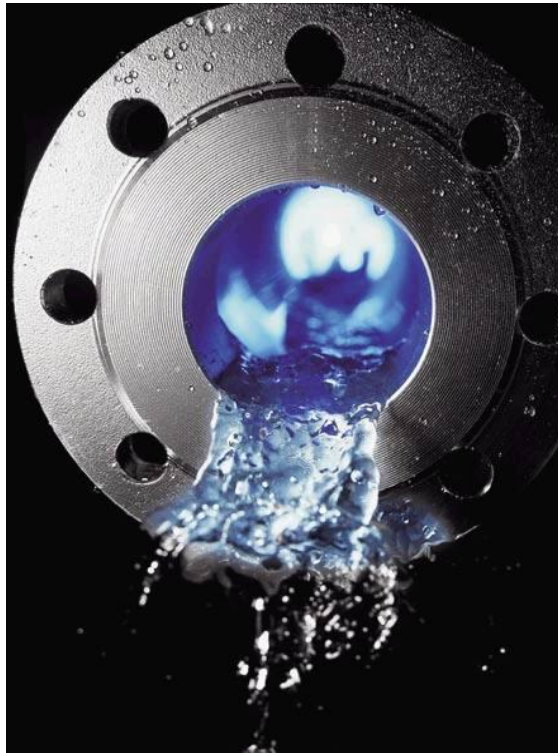


Pneumatic Control Loops Save Water And Energy With Fixed-bed Filters



Dr.-Ing. Wolfgang Rieger

**Festo AG & Co KG
Esslingen, Germany**

Festo - An Independent Family Owned Company



Festo TechnologyCenter and Headquarter, Esslingen



Festo Cylinderproduction and Customer Service Center, St. Ingbert

Facts, figures, data:

Business sector

- Automation: Automation technology
- Didactic: Learningsystems, training and consulting

Year of foundation

- 1925

Turnover (Group)

- 1.7 billion Euros (2008)

Employees (Group)

- Around 13.500 employees globally

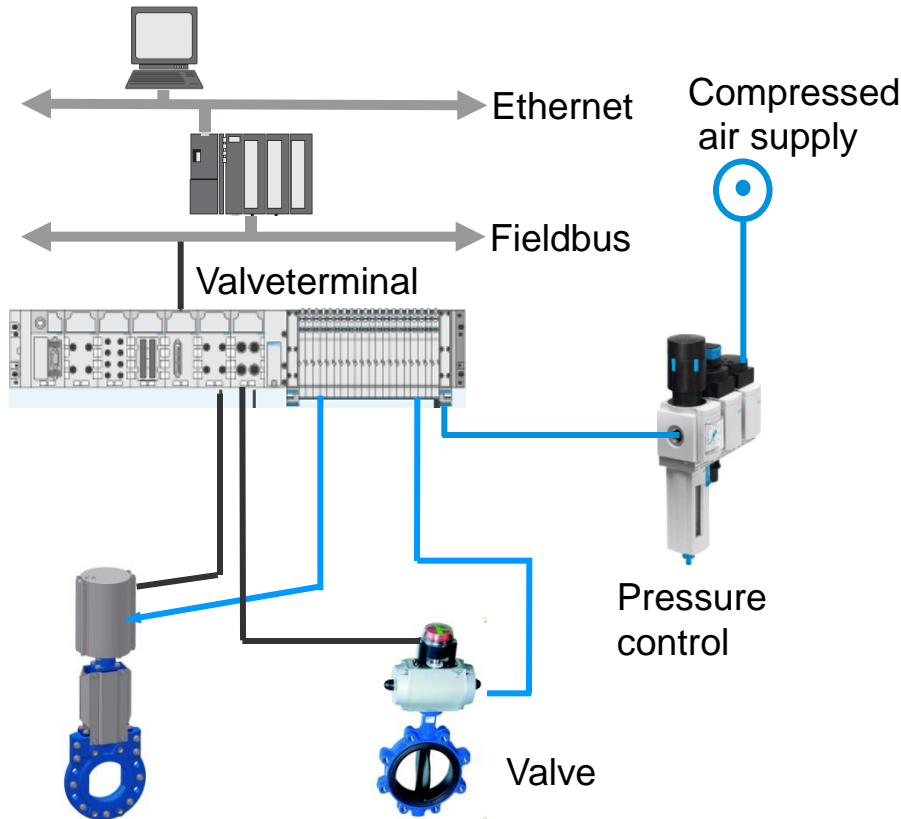
R&D turnover

- 9,5% of turnover

Companies

- 58 independent national companies

Festo automation solutions in water/wastewater treatment plants

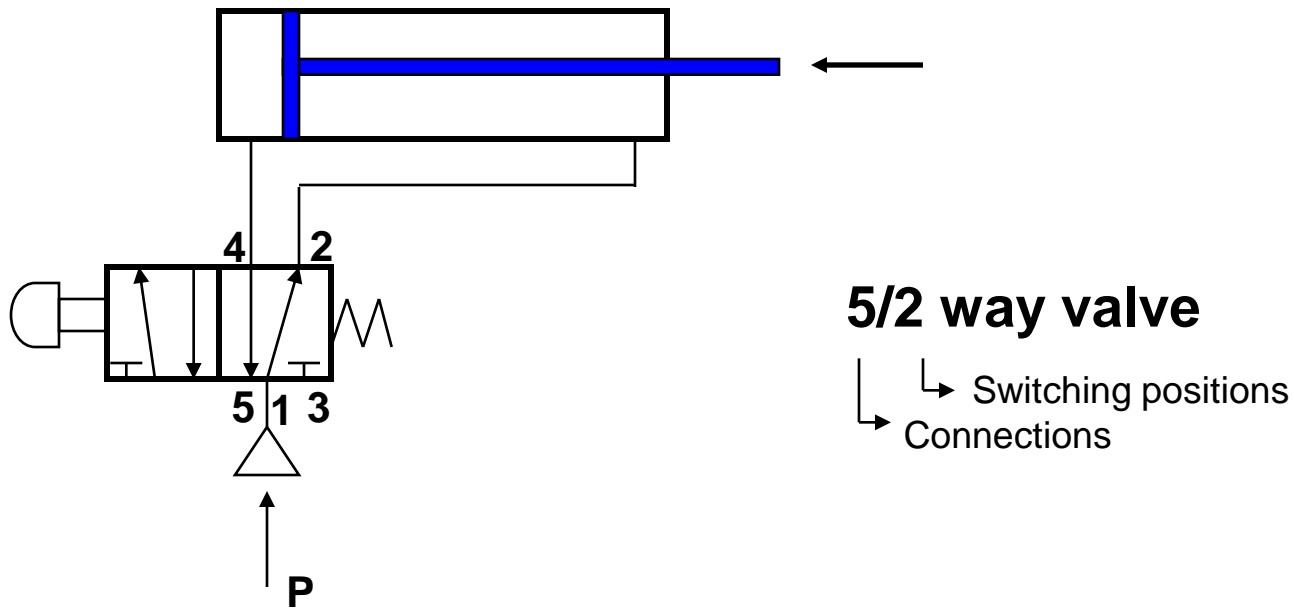


- Complete automation solution from the valve up to the process control level
 - Valveterminal instead of single solenoid valve
 - Customised solution
 - All components well orchestrated
-
- Clear defined interfaces
 - Significant cost saving
- = one stop provider**

- Since more than 15 years
- Several hundred references on all continents

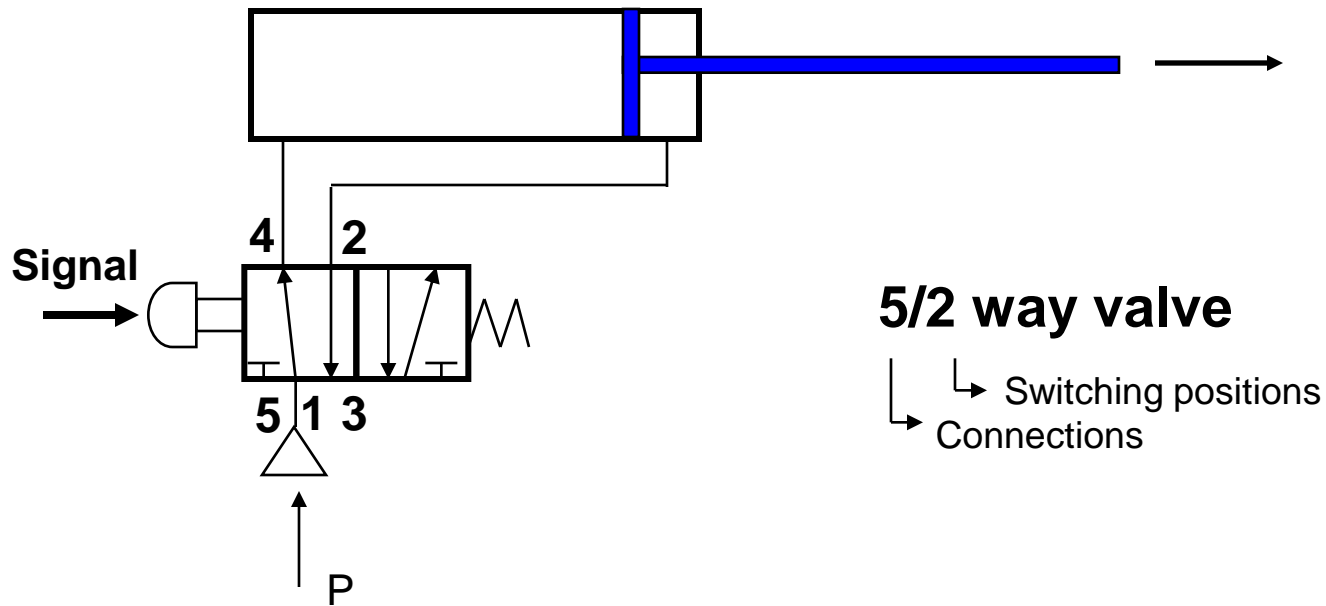
Pneumatics - how does it work ?

Example 1: Directional control valve – double acting actuator



Pneumatics - how does it work ?

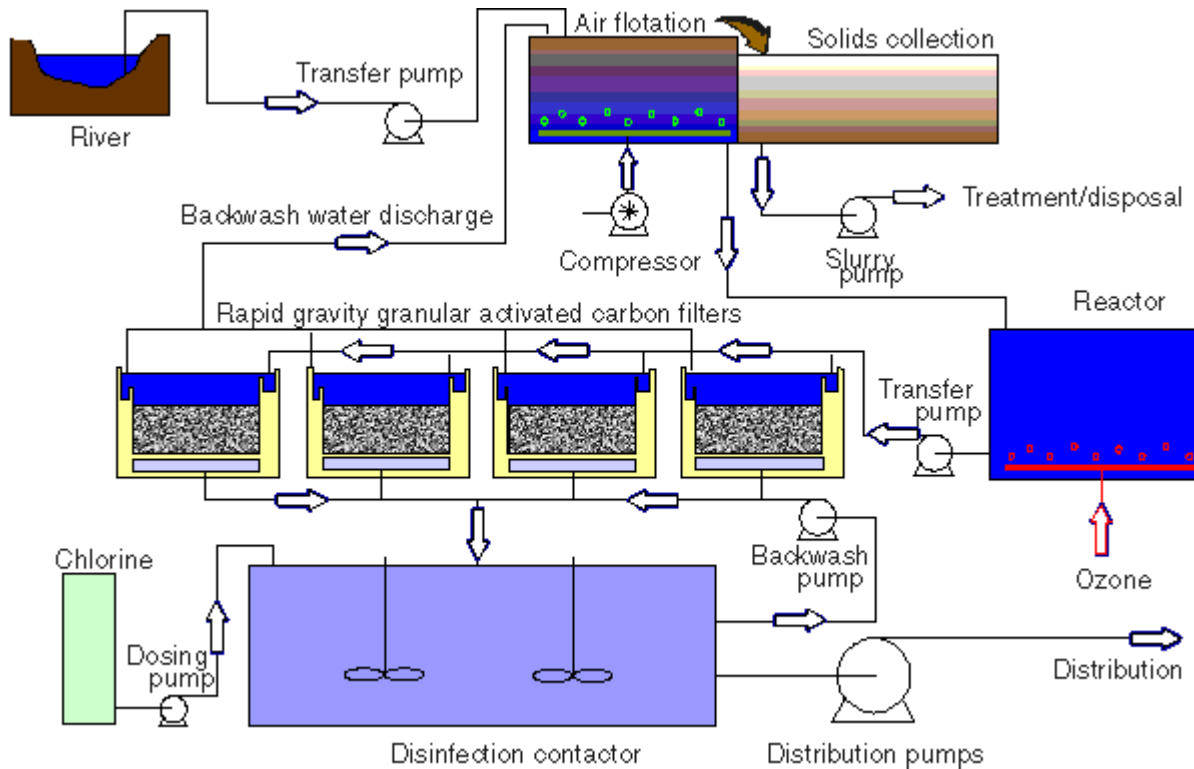
Example 1: Directional control valve – double acting actuator



5/2 way valve

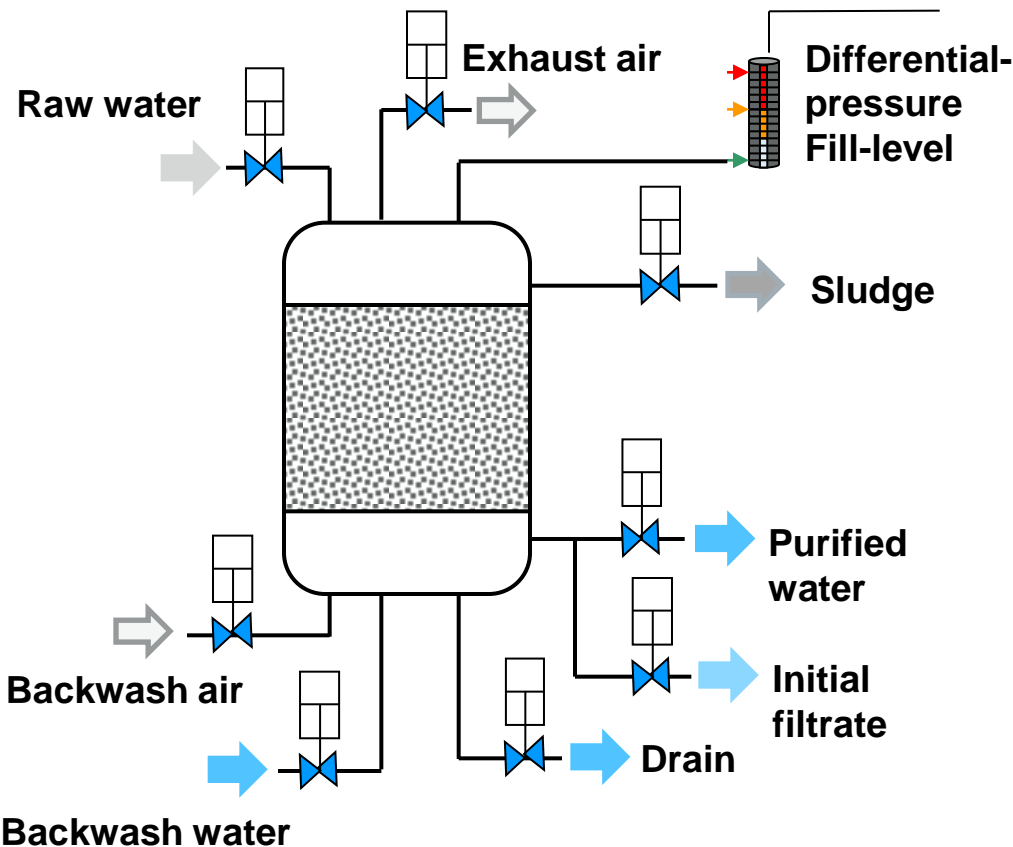
↙ ↘ Switching positions
 ↙ ↘ Connections

Schematic layout common water plant



Filter unit is an important element in the water treatment process

Schematic diagram of a fixed-bed filter in a waterworks



Handwheel or automation?

Advantages of automated filters:

- Savings in energy water
- Extended filter lifetime

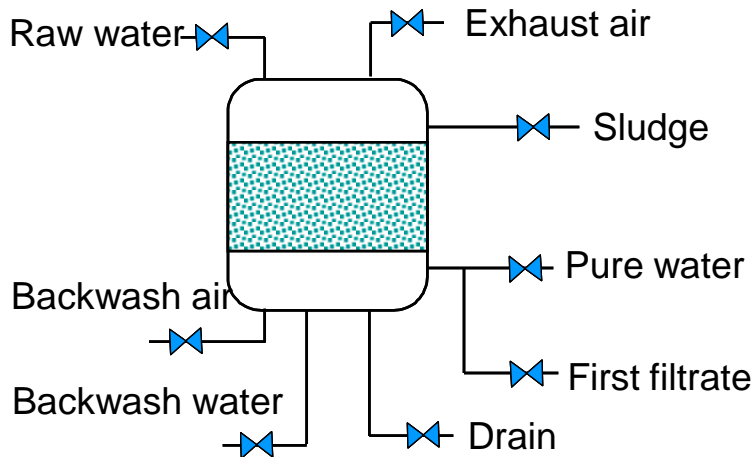
Which type of actuator?

- Hydraulic
- Electric
- Pneumatic

Cost comparison electric – pneumatic actuation

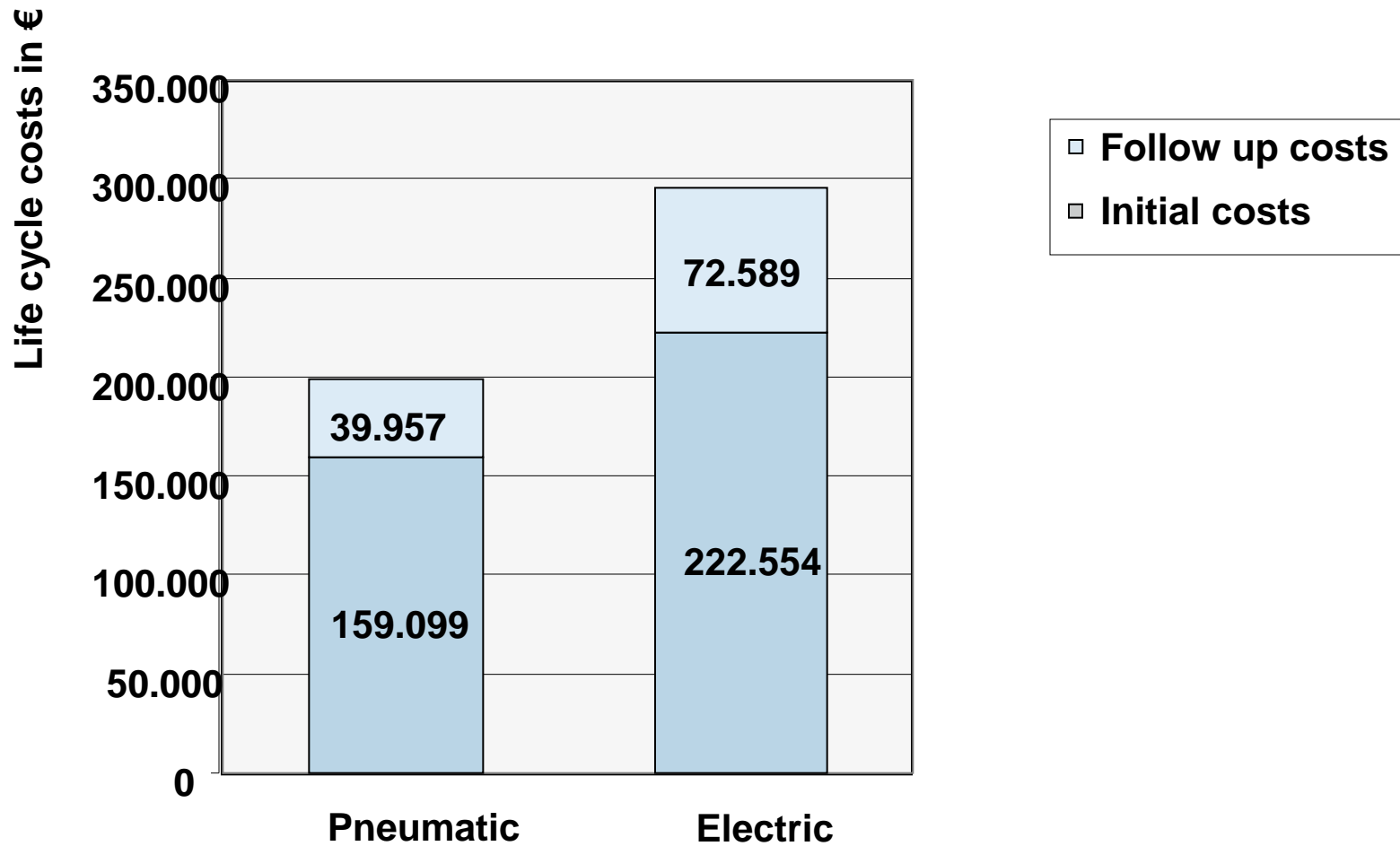
Example

- 8 Filter units with 8 valves each
- valve operation: 7 open/close , 1 controlled
- Calculated by University of Braunschweig
- Calculation basis: Life cycle costing for 25 years



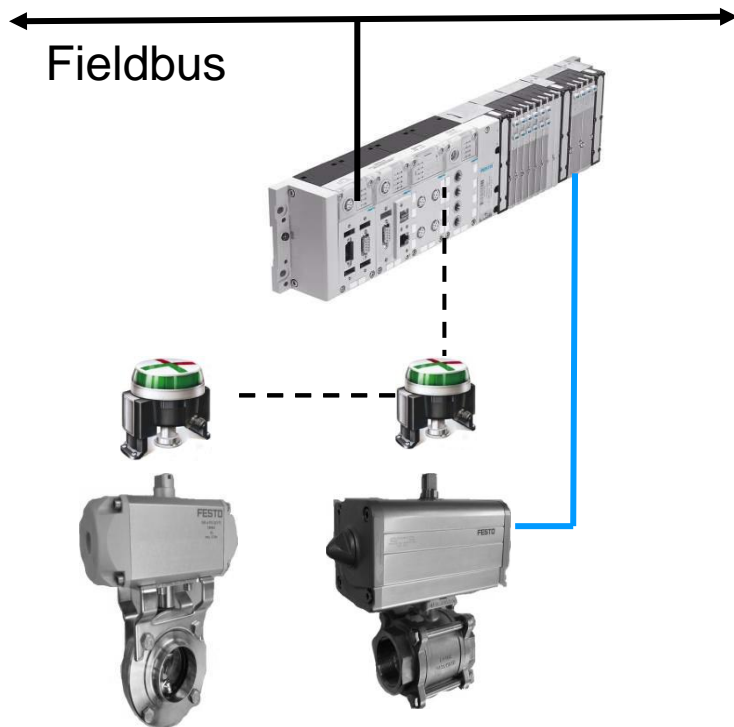
Description	Valve type	Size	Function	Pneumatic actuator	Electric actuator
Raw water	Plunger valve	DN 250	controlled	DRD-26 + positioner	SAR 7.5 + G\$ 63.3
First filtrate	Butterfly valve	DN 250	Open/close	DRD-50	SA 07.1 + G\$ 50.3
Drain	Butterfly valve	DN 50	Open/close	DRD-8	SA 07.1 + G\$ 50.3
Backwash water	Butterfly valve	DN 400	Open/close	DRD-225	SA 10.1 + G\$ 80.3
Backwash air	Butterfly valve	DN 250	Open/close	DRD-50	SA 07.1 + G\$ 50.3
Raw water	Butterfly valve	DN 250	Open/close	DRD-50	SA 07.1 + G\$ 50.3
Exhaust air	Butterfly valve	DN 100	Open/close	DRD-8	SA 07.1 + G\$ 50.3
Sludge	Butterfly valve	DN 400	Open/close	DRD-225	SA 10.1 + G\$ 80.3

Results

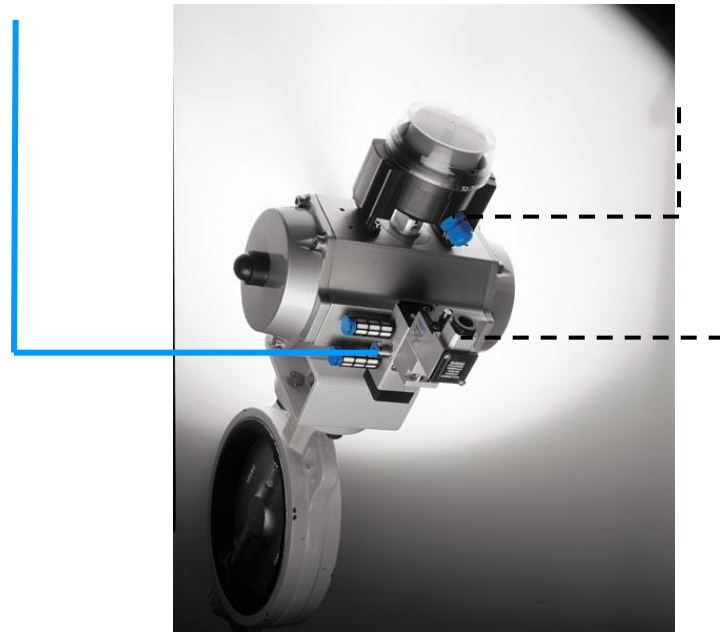


Automation concepts for fixed-bed filters

Automation with valveterminal

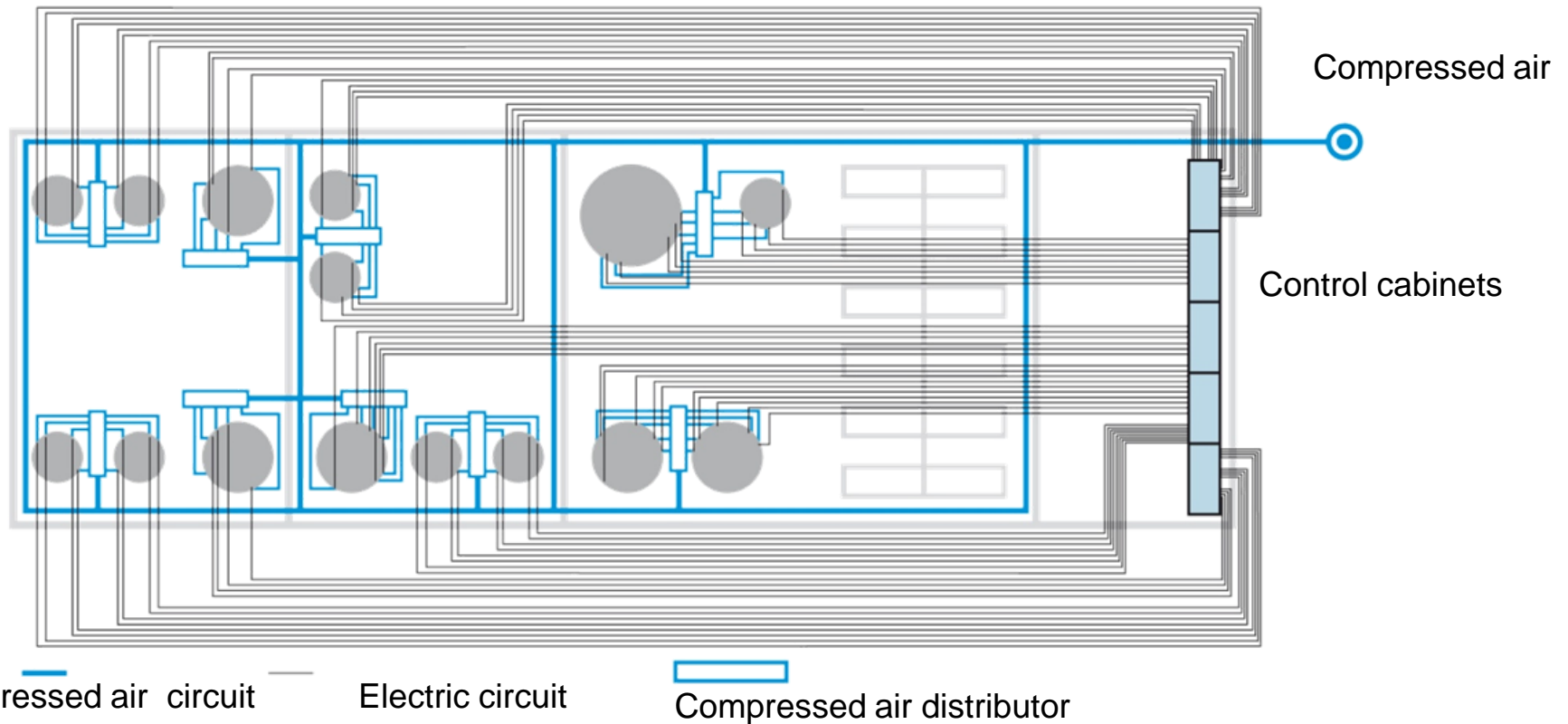


Automation with single solenoid valve, direct mounted

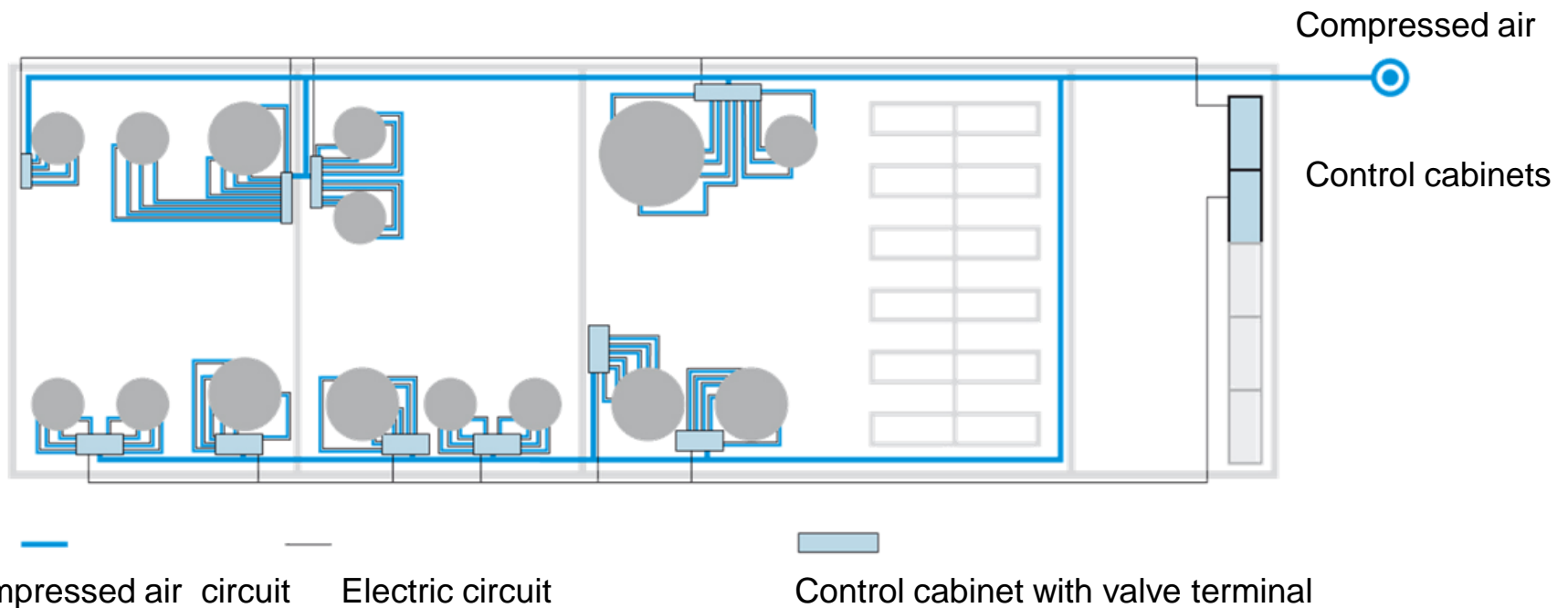


Automation architecture with individual valves

Example: Production plant for detergents, about 100 valves

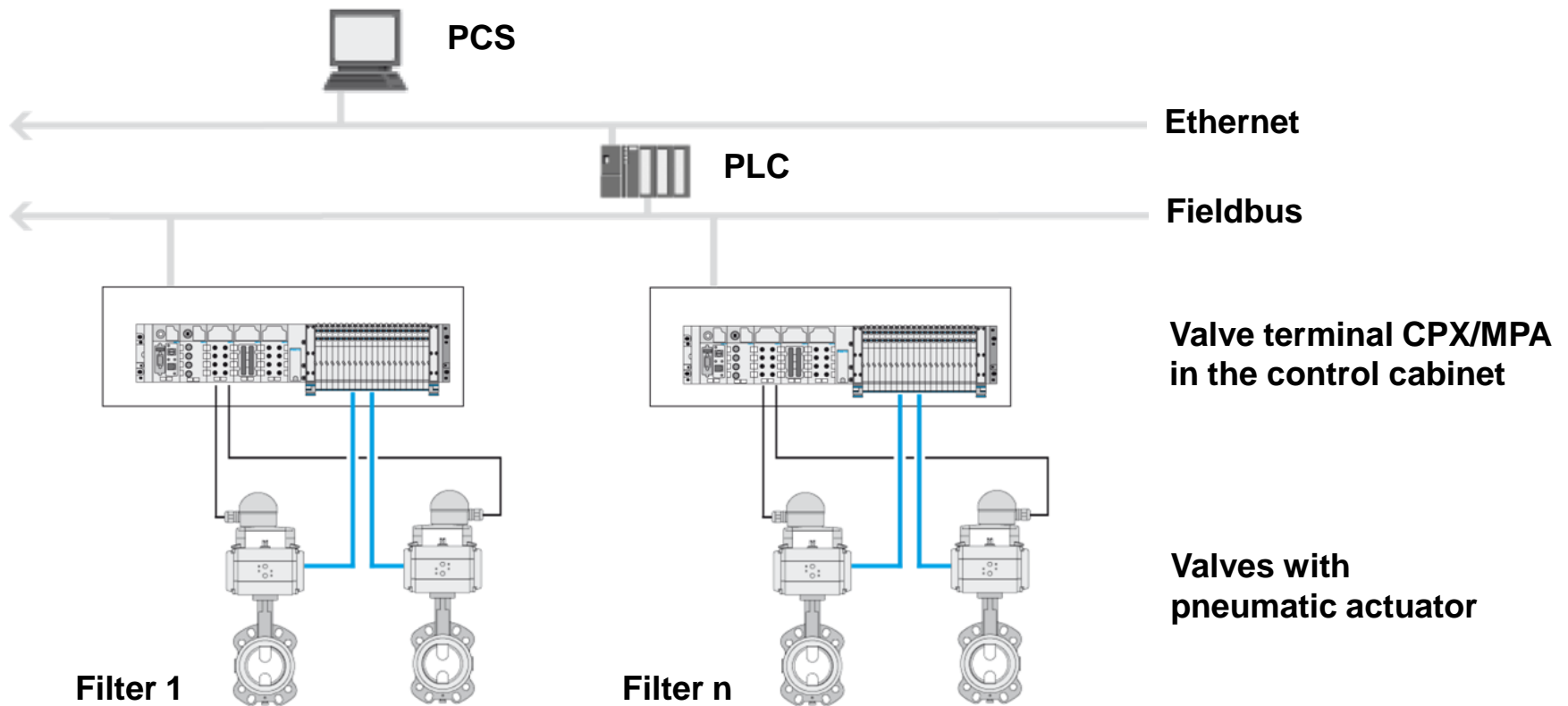


Automation architecture with valve terminals

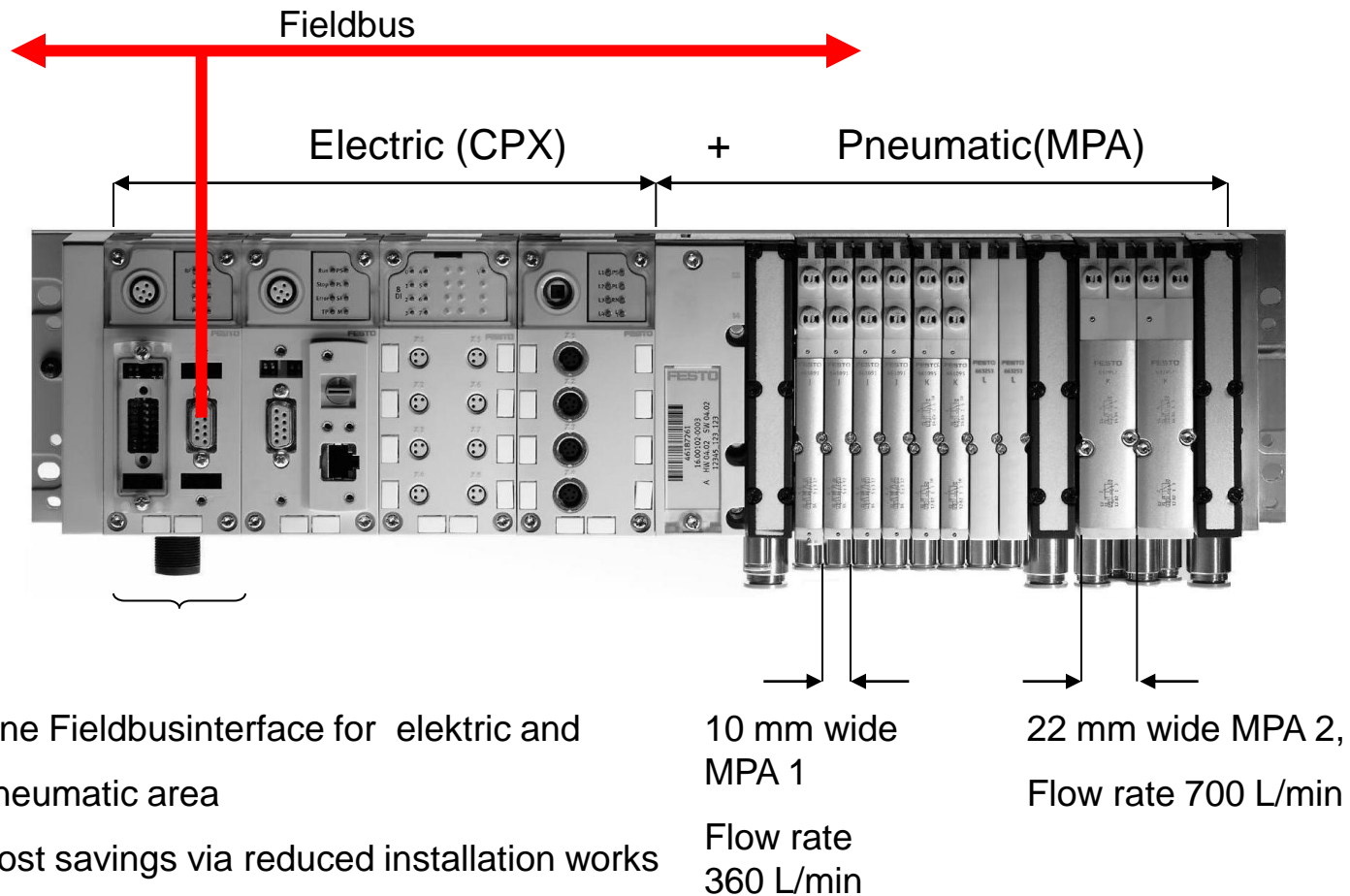


**Results of cost comparison – individual valves versus valve terminal concept:
Savings 14 – 42% (different areas: Indoor, outdoor, Ex-zone 1, Ex-zone 2)**

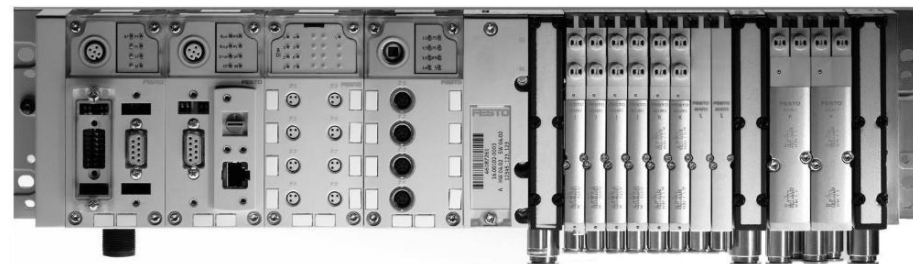
Automation structure for fixed-bed filter with valve terminal as central component



Structure of CPX/MPA-Valveterminal



Features of the CPX/MPA-Valveterminal



- Local control unit
- Automatic-/Manual operation
- Statusinformation via LED
- Mono- or bistable solenoid valves
- Digital and analogue In-/Outputs
- Diagnosis und Parameterization

Advantages:

- Saving of installation costs
- More transparency on the individual levels
- Faster commissioning and fault elimination
- Easy expansion of installation

Valve terminal in control cabinet with convenient manual control panel



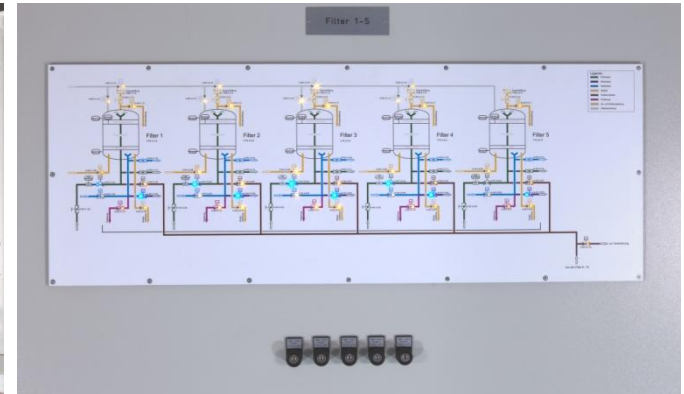
Decentral I/O-Level

- Valveterminal with Field bus
- Solenoid valves
- Digital and analogue I/O's
- Modular structure

Comfortable manual control panel:

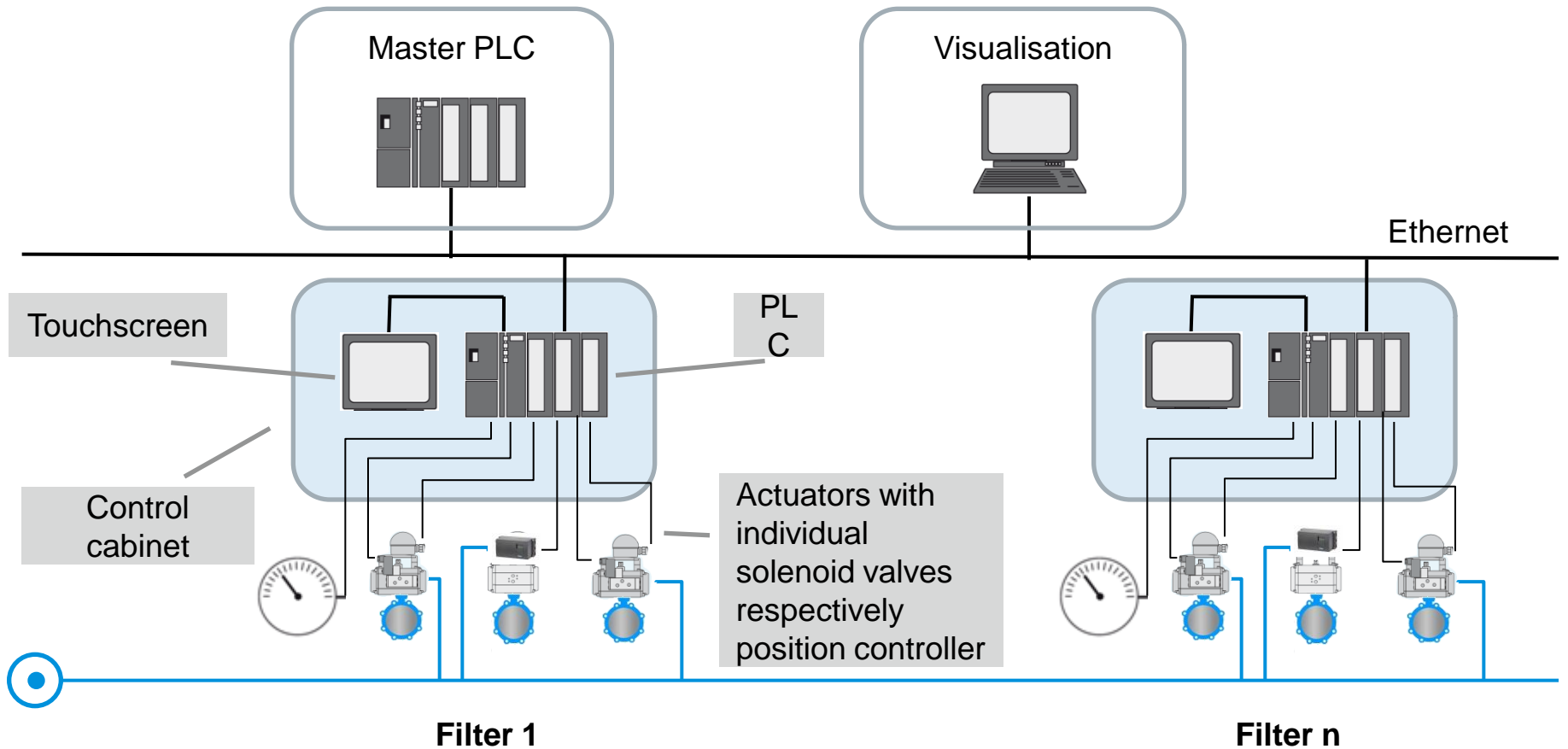
- Start up
- Revision, Checking
- Fieldbus always active

Valve terminal in control cabinet with schematic plant diagram



- Features of this variant:
- Control system for 5 filters
 - More convenient
 - Compact design

Conventional automation solution with individual solenoid valves and actuators with position controller



Conventional automation solution with individual solenoid valves and actuators with position controller



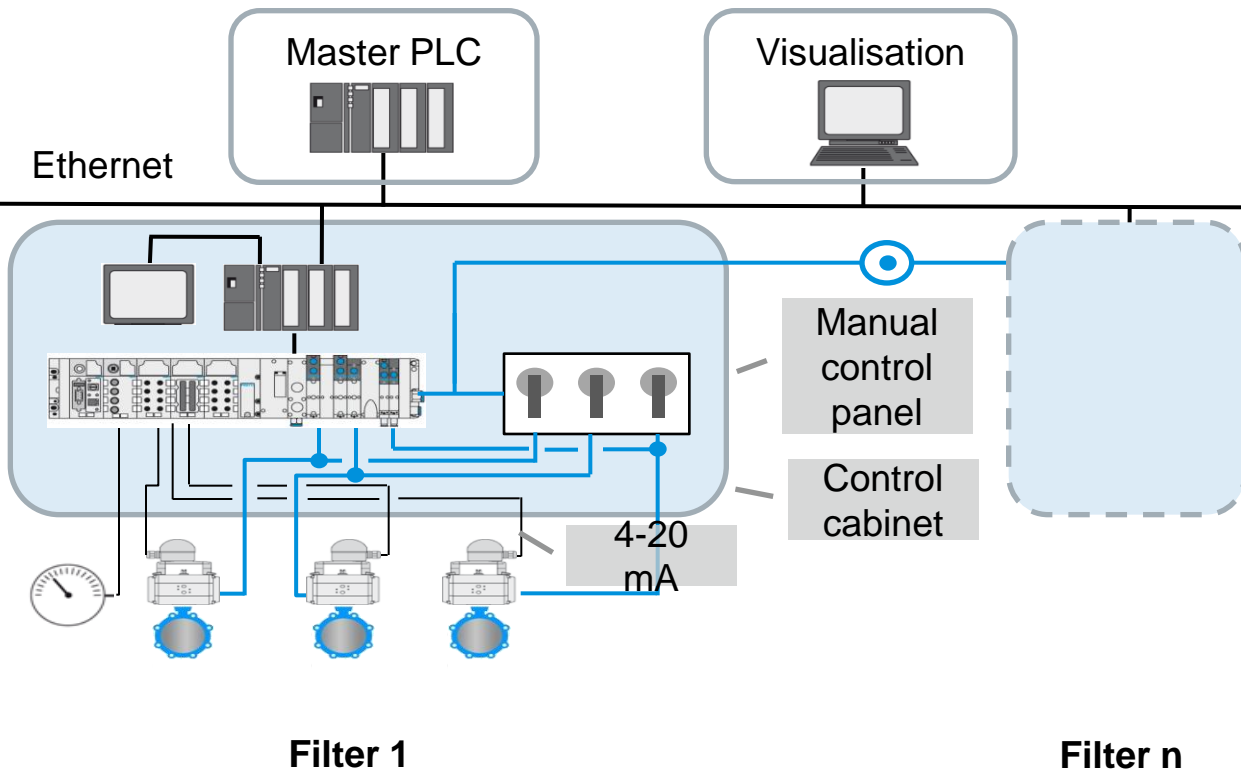
Five process valves per filtration unit

- Water Inlet: penstock (open/close)
- Sludge outlet: penstock (open/close)
- Wash Air: butterfly valve (open/close)
- Wash Water: butterfly valve (open/close)
- Water outlet: butterfly valve (controlled)

Valve automation concept

- Single solenoid valves at the actuators
- Positioner for the outlet valve

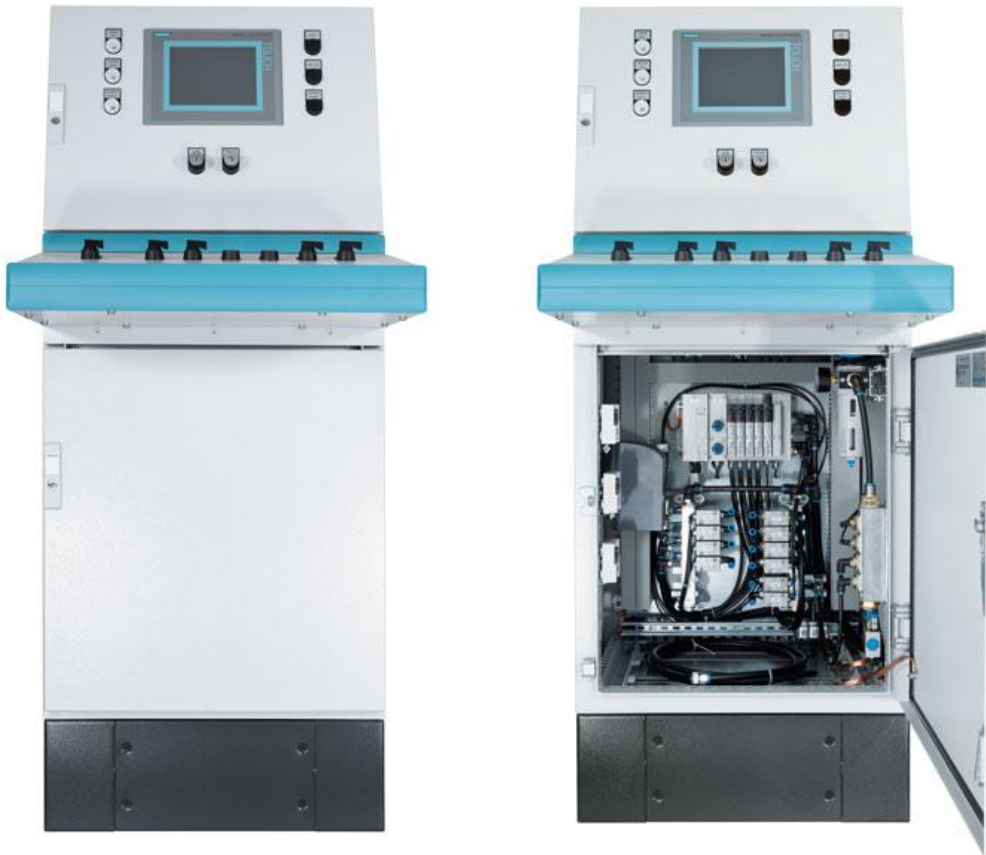
Festo automation solution with valve terminal and integration of position controller function into control cabinet



Advantages compared with a conventional solution

- Lower compressed air quality possible
- Higher flow rates of solenoid valves allow fast motions
- Control valve can be adjusted via manual control panel even without el. Power
- Control parameters can be changed directly on the control Cabinet
- More economical

Bamag Egypt and Festo



The innovative automation solution for the filterunit is a joint development of both companies.

Please visit us at our booth - Thank you for your attention

