

**AVENTICS** 

**ALL UNDER PERFECT  
CONTROL**  
SOLUTIONS FOR  
COMMERCIAL VEHICLES

**Pneumatics**  
It's that easy





# Switching and controlling – our solutions provide the critical impulses

Commercial vehicles are always subject to high loads and thus must also function reliably under extreme conditions. Reliability has top priority – it doesn't pay to compromise! This is why our specifically developed pneumatic and electric components are the top choice. They're uncompromisingly efficient.

## Individual customer solutions always give optimum results

Over the years we have collaborated with our customers to develop a product portfolio precisely tailored to meet the needs of commercial vehicles. With cross-technology expertise, we can provide our customers with professional consulting and specific products that guarantee optimum performance and safety, environmental protection, driving comfort, and cost efficiency.

- Technological competitive edge
- Operational reliability
- Energy efficiency and low emissions
- Service life and costs

Our components are designed to deliver the highest performance, even when the going gets tough. Extreme temperature fluctuations, electromagnetic fields, road salt, vibrations, flying stones, ice, oil, or cleaning with high-pressure cleaners are all in a day's work. Our products and systems can also be tailored to suit your needs. Take advantage of our experience and contact us to discuss your applications!

### 04 Customer-specific solutions

From initial discussion to series production

### 06 Customer proximity

Certificates

Country-specific cooperation

International AVENTICS locations

### 08 Product overview and applications

10 Engine applications

14 Transmission applications

16 Clutch applications

### 17 Product engineering process

### 18 Outfitter applications

# From initial discussion to series production



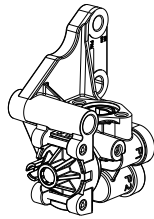
► Only those who truly understand the system can perfectly match the components to each other.

## Cooperation in development, production and logistics

Every new AVENTICS product, whether an individual component or an entire system, follows the same clearly structured path: from the first consultation, to start of production, and finally delivery. The first step along the path to a creative solution is a consultation with the customers to define their tasks and search for solutions, followed by the creation of models, simulations, and prototypes and finally construction of the first pre-series designs. After initial function and concept checks, we implement additional test phases until the start of production.



Initial discussion, consulting, and finding a solution



Development and construction



First conception samples



Simulation and concept testing

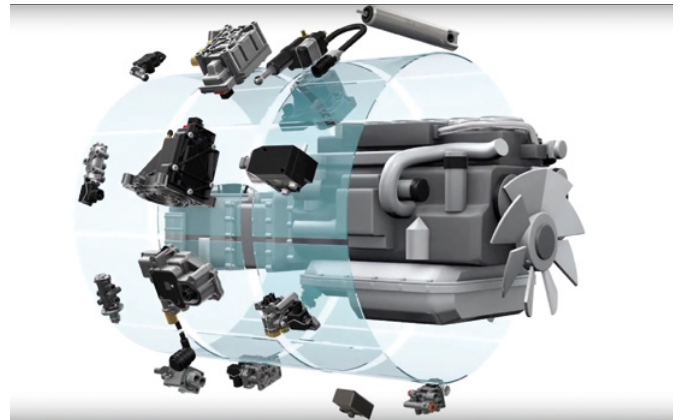
# Tailor-made for you

## Quality and reliability – tailored to your requirements

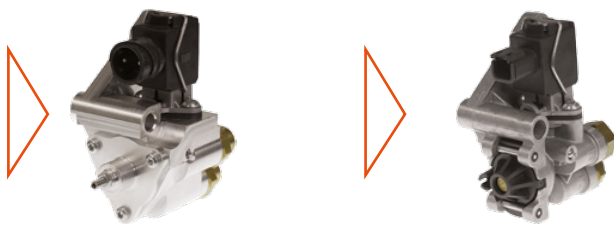
We are able to achieve quality assurance, trust in the marketplace, and customer satisfaction through our constantly high quality, “best-in-class” products, competent consultation, and professional engineering. Demand the best for your applications – in both technical and economic terms.

We will show you that customized solutions are not only the better alternative but are also more cost-effective. Our components for engine, clutch, and transmission controls can withstand harsh environmental conditions, such as extreme climate fluctuations and vibrations, and optimally meet required quality standards.

- Customer-specific product development
- Customer-specific adaptation of existing pneumatic solutions from the AVENTICS product range
- Modified standard components



- ▲ A versatile product portfolio for powertrains: Electrical and pneumatic components for engines, clutches, and transmissions.



B-sample – pre-series production and test phases

D-sample – pre-series under series conditions



- ◀ Series product: Mechanical truck engine pressure regulator for extreme operating conditions.

## Customer wishes turned into products

Understand, visualize, comprehend, install, test – when creating a customer-specific product we follow an established process that is clearly structured. Around the world, our work is based on the same processes and principles. Our project organization for the product engineering process (PEP) provides the organizational framework and offers commonly agreed goals and coordinated deadlines for efficient and smooth processes (see page 17).

# At home all over the world

## We speak your language

To us, close collaboration with our customers is one of the most important factors for success. Our solutions always result from a joint creative process in working together with the customer. This requires a common understanding – with regard to both technology and language. Our developers, technicians, and Key Account Managers have internationally based expertise, know what they are talking about, are at home all over the world, and provide you with support in your native language. This makes the process much easier and more efficient. Talk to us today!

- Our certified project management has an international focus
- We have development centers and production sites in Europe, the Americas, and Asia
- Our Key Account Managers and engineers are always close to the customer, providing you with on-site support



- ▲ If you are looking for a reliable partner with industry-specific expertise who is used to optimally implementing customer-specific tasks, you have come to the right place at AVENTICS.

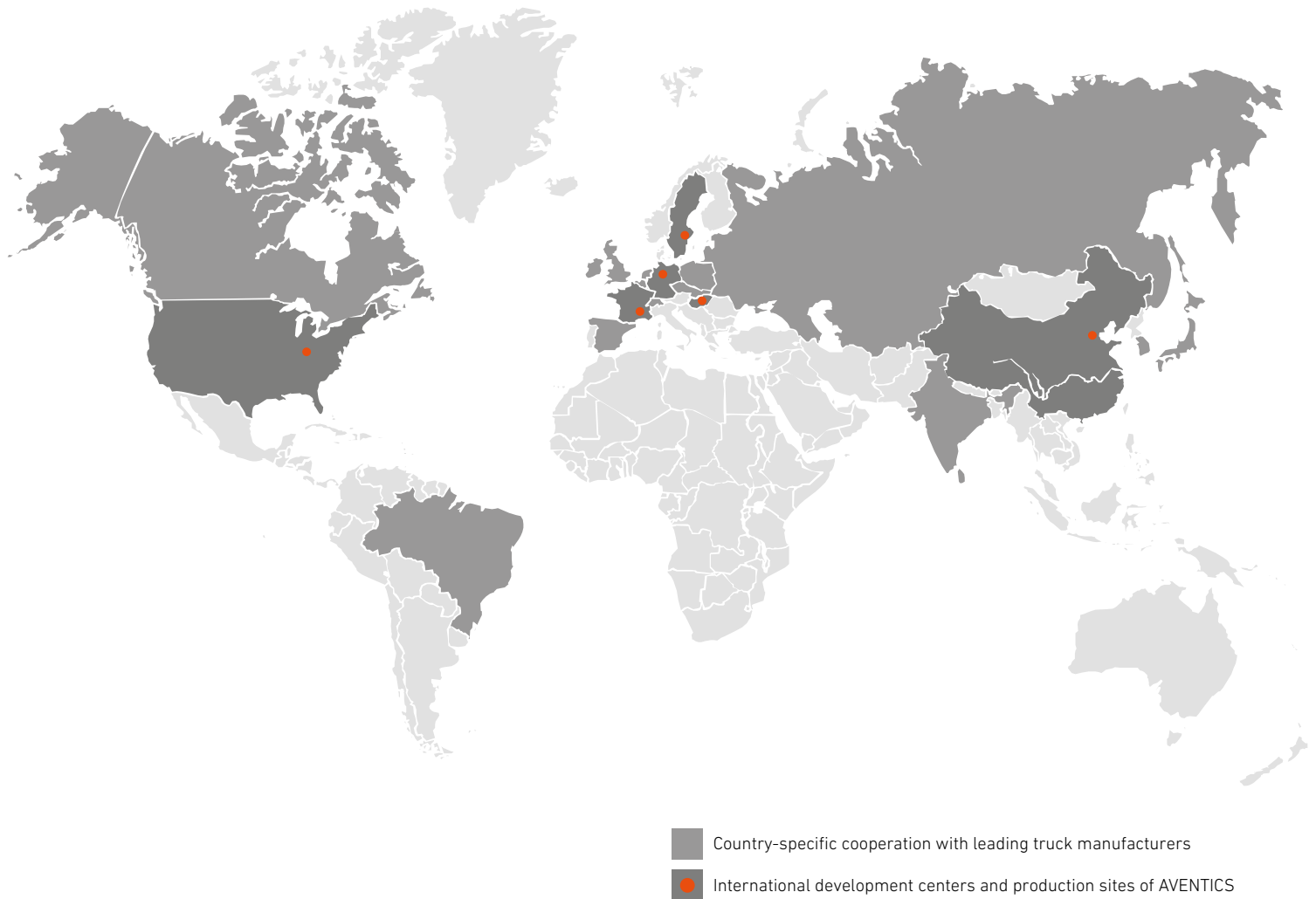
## Innovative and certified

Exemplary quality and environmental management – your tasks are in good hands at AVENTICS.

- Our process-oriented quality management system is certified in accordance with ISO/TS 16949
- Implementation of environmentally friendly solutions. From development to production and logistics – AVENTICS is certified according to ISO 14001
- Energy-efficient – our energy management system is certified according to ISO 50001
- Quality-oriented – our quality management is certified according to ISO 9001



# At home all over the world



## References to be proud of

We have long-standing business relations with the key manufacturers of the three largest truck production markets in the Americas, Europe, and Asia. Our quality management has been repeatedly audited by numerous customers, confirming our status of an authorized partner who is allowed to deliver directly to the manufacturing lines of top truck manufacturers. In addition, our components are also at home at the various levels of the supplier pyramid around the world.

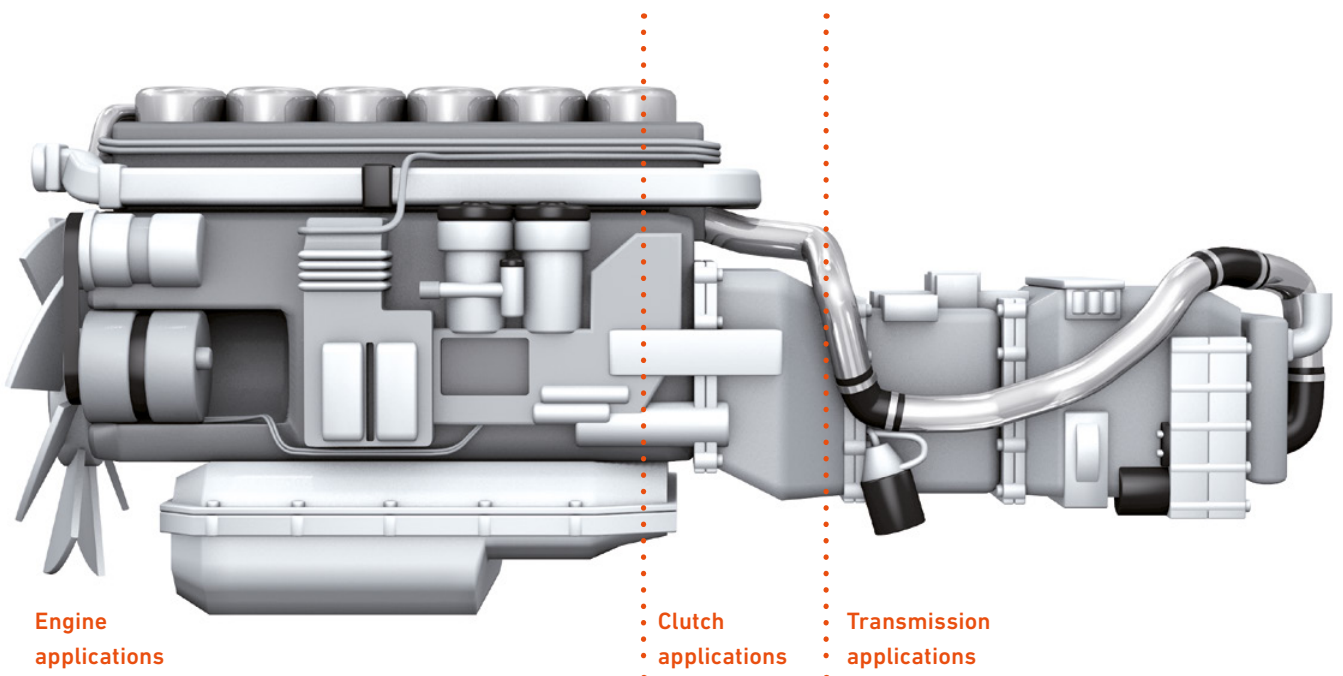
# For those who want to achieve more

Engine, clutch, transmission - AVENTICS control components ensure operational reliability. The product range is as multi-faceted as the tasks of our customers. A comprehensive range based on a future-proof platform strategy.

## Product overview and applications

A large product range allows for a variety of possible functional solutions. The individual components for example facilitate shifting in transmissions and clutch controls, ensure compliance with emission standards via exhaust gas recirculation, guarantee optimal performance in variable-geometry turbochargers or provide for a gentle engine braking.

- 2/2-, 3/2-, and 4/2-way valves
- Cylinders and cylinder valve units
- Electropneumatic pressure control valves (E/P)
- Valve units
- Electrical actuators





Product groups		Engine	Transmission	Clutch	Outfitter
	<b>Electropneumatic pressure control valves</b> <ul style="list-style-type: none"> <li>Low hysteresis</li> <li>High regulation precision</li> <li>Exemplary dynamics</li> <li>Adaptation to customer application through software</li> </ul>	✓✓✓	–	✓✓	✓
	<b>Complex control units</b> <ul style="list-style-type: none"> <li>Pressure regulation via switching valves</li> <li>Customer application software can be integrated</li> <li>Fail-safe switch: exhausted output line</li> </ul>	–	✓✓✓	–	✓✓
	<b>Electropneumatic valve units</b> <ul style="list-style-type: none"> <li>Speed control possible</li> <li>With 2/2 or 3/2-way valve</li> <li>Fast switching times</li> <li>Particularly durable</li> </ul>	✓✓	✓✓✓	✓✓✓	✓✓
	<b>Cylinders</b> <ul style="list-style-type: none"> <li>Excellent power-to-weight ratio</li> <li>High force density</li> <li>Wide temperature range</li> <li>100% duty cycle</li> </ul>	✓✓✓	–	–	✓✓
	<b>Directional control valves with different actuation options</b> <ul style="list-style-type: none"> <li>NO or NC function</li> <li>Flexible use</li> <li>Robust technology with a long service life</li> <li>Resistant to overloading</li> </ul>	✓✓	✓✓✓	–	✓✓
	<b>3/2-way valves, operated directly</b> <ul style="list-style-type: none"> <li>Fast switching times</li> <li>Flexible use</li> <li>Resistant to overloading</li> <li>Low power consumption</li> </ul>	✓✓	✓✓✓	✓✓	✓✓
	<b>Universal electrical actuators</b> <ul style="list-style-type: none"> <li>High regulation precision</li> <li>Compact design</li> <li>Can be used in a wide temperature range</li> <li>Flexible use</li> </ul>	✓✓✓	–	–	–
	<b>Exhaust gas control valves (EGR)</b> <ul style="list-style-type: none"> <li>Designed for the heated side of the engine</li> <li>Exemplary dynamics</li> <li>For the control of hot exhaust air</li> <li>Precise flap positioning</li> </ul>	✓✓✓	–	–	–
More information on pages		10 - 13	14 - 15	16	18 - 19

▲ The table gives you an overview of the most important product groups and indicates the most frequent applications for these groups.

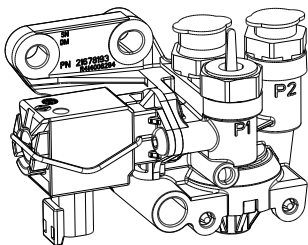
# Pneumatic or electrical – AVENTICS is your one-stop source for both technologies

## Pneumatic actuators for engines

For years, AVENTICS has been manufacturing pneumatic cylinders and valves for a great variety of switching and control tasks in the powertrains of commercial vehicles. Pneumatic control components can considerably optimize engine functions at various points. The environmentally friendly use of compressed air from the turbocharger for low-pressure applications is just one example of a state-of-the-art innovation. Our solution: the dual-source pressure regulator.

- Use of charge air for low-pressure consumers
- Reduction of fuel consumption

Using a downstream power turbine in a turbo-compound engine unfortunately results in pollution of the oil in the turbocharger. To prevent this from happening, the bearing housing must be pressurized to ensure that no oil from the crankcase enters the turbo compound. Switching to compressed air from the turbo reduces the air consumption of the compressor, lowering the fuel consumption. The choice of the right technology is not as obvious for all applications as for this one – often it also comes down to a question of product philosophy.



◀ Dual-source pressure regulator

## Electrical actuators for engines

Electrical drives have become increasingly efficient over the years, making them a sound control alternative for specific tasks within the powertrains of commercial vehicles. They can be used to control rotatory or linear motion not only for comfort functions, but also in a wide variety of engine control functions. Based on our experience with pneumatic components we have consistently expanded our product portfolio to include solutions with electrical actuators. This has further strengthened our position as specialists for drive and control technology in commercial vehicles – to your benefit. We can advise you on the optimal solution for your individual application, independently of the specific technology – whether pneumatic or electrical, at any rate “best in class”.

## Electrical actuators with “best-in-class” performance

Depending on the customer requirements, components from AVENTICS can be used to achieve torques of up to 15 Nm, with peaks reaching up to 40 Nm. High-performance variants are designed to perform reliably even in extreme work environments with temperatures of up to 150°C. With a setting accuracy to less than 0.5°, compliance with the high requirements of current exhaust gas standards is ensured. As additional benefits, the components feature low leakage and highly dynamic properties.

## Communication and diagnosis

The components are also very flexible in terms of communication and diagnosis functions. We implement different systems depending on customers' control philosophy. Our product portfolio includes solutions with CAN bus (Controller Area Network), PWM (pulse width modulation), as well as analog controls. When it comes to diagnosis functions we offer company-specific developments or diagnostic services based on the Unified Diagnostic Services (UDS) protocol.

### Mechanical pressure regulator valve

The valve switches between two supply sources. Optimized pressure supply selection reduces fuel consumption.

- The integrated pressure regulator guarantees a constant pressure in the operating line



- Working pressure: 0.5 – 10 bar
- Mechanically fixed output pressure
- Operating voltage: 12V or 24V

### Non-return valve

To increase the service life of pneumatic components and actuators.

- Protection from high counter pressures
- Protection from contamination
- Also available with integrated pressure sensor on request

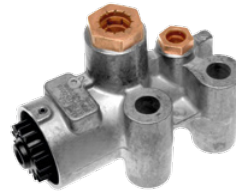


- Nominal diameter: 5 mm
- Working pressure: 0 – 9 bar
- Opening pressure: 30 ± 20 mbar

### Mechanical pressure regulator with fixed set point

To increase the service life of pneumatic components and actuators.

- Protection from pressure spikes
- Pressure limitation for different applications



- Nominal diameter: 2 mm
- Working pressure: 2 – 10 bar
- Regulated pressure range: 2 – 8 bar
- Integrated filter 200 µm

### Electropneumatic pressure control valve

These highly dynamic valves convert a control signal into pneumatic pressure, which is used to control various actuators.

- To meet highest emission standards in exhaust gas recirculation (EGR), to control the power of the turbocharger (WG) or the engine brake

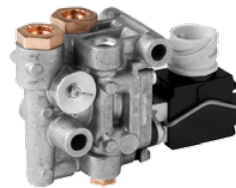


- Nominal diameter: 3 mm or 5 mm
- Working pressure: up to 10 bar
- Regulated pressure range: up to 7.5 bar
- Operating voltage: 12V or 24V
- Control signal: PWM signal

### Electrically operated switching valve

Multi-functional valve for general switching functions.

- Low power consumption
- Various valve functions possible



- Nominal diameter: 1.2 – 4 mm
- Switching time: < 30 ms
- Working pressure: 4 – 10 bar
- Operating voltage: 12V or 24V

### Single-acting working unit with spring return

To control butterfly valves.

- Integrated sensor for position monitoring
- Integrated exhaust air routing



- Cylinder diameter: 25 mm
- Stroke: 20 – 200 mm
- Nominal voltage: 16V

### Single-acting cylinders with spring return

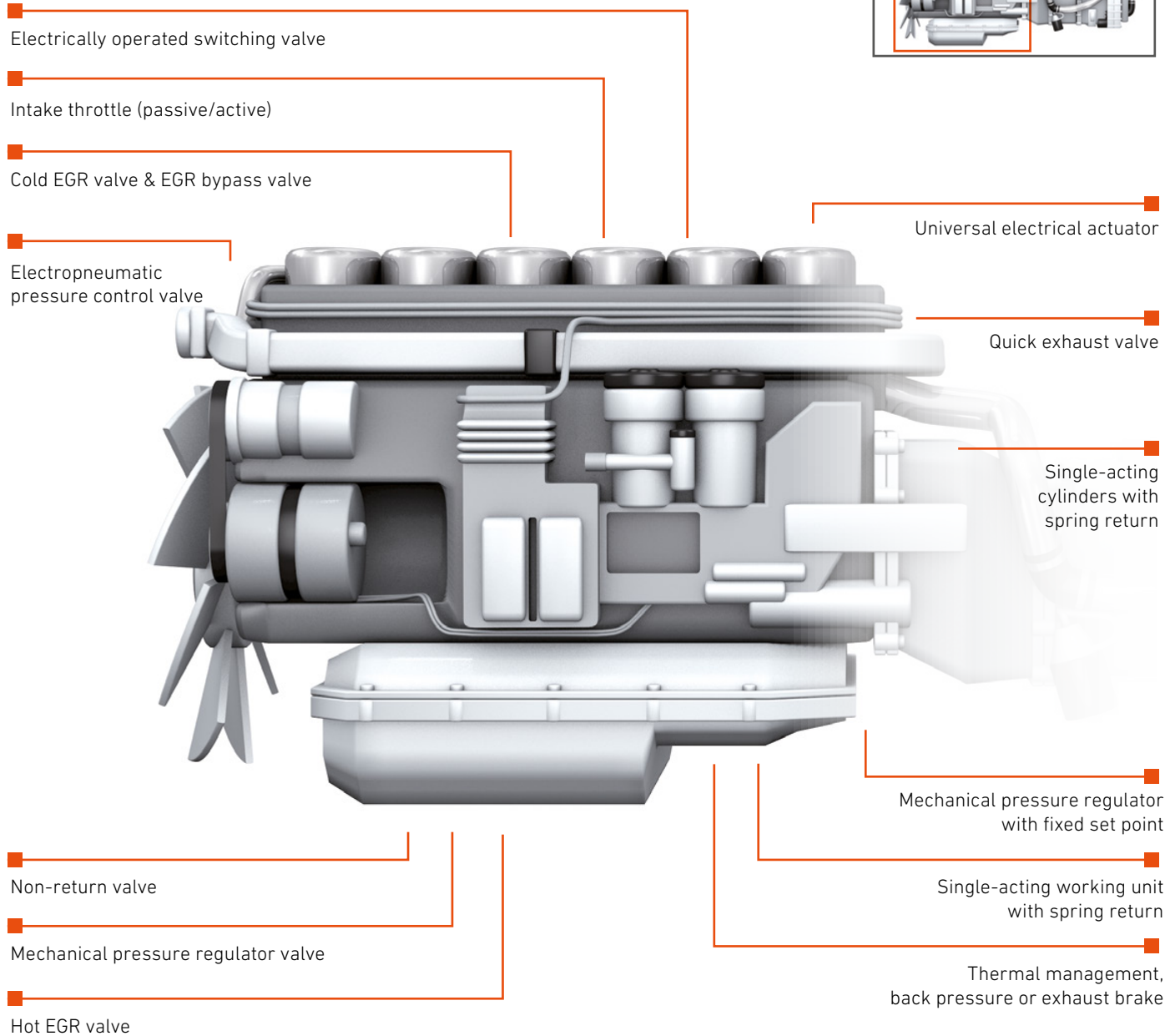
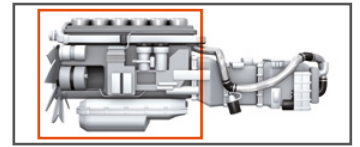
For precise, continuous control of butterfly valves.

- Also available in a high-temperature variant
- Optionally available with an integrated sensor for position monitoring
- Further configurations available



- Cylinder diameter 40 mm
- Stroke: 60 mm

**Engine applications**

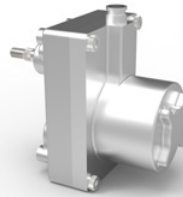


<b>Best in class package</b>	Weight – compressed design with optimized materials Space claim – reduced package, directly coupled actuation
<b>Best in class value</b>	Local for local: regional presence, manufacturing and supply Full portfolio: complete product portfolio with common technology Competitively priced: industry recognized manufacturing excellence with global presence
<b>Best in class performance</b>	Prior to their market launch our products are validated according to industry-specific standards.
<b>Best in class service</b>	We are at your service, on-site and around the world. We tailor our services and products to your requirements.

**Universal electrical actuator**

Adaptable actuator for precise positioning of flap valves in multiple engine applications.

- Suitable for application on the hot side of the engine
- Compact designs for different torque levels
- Flexible customer interface for integrated or remote applications



- Torque capability: 5Nm – 15Nm
- Operating voltage: 12V oder 24V
- Control signal: multiple
- Cooling: optional

**High flow poppet EGR valve**

Water cooled actuator with outstanding low leakage and low pressure drop. Available in pressure balanced or non-balanced configurations.

- Industry best response times, high pressure seal at closed position
- On/Off or proportional controlled



- Bore sizes: 25 – 45 mm
- Operating voltage: 12V or 24V
- Control signal: multiple
- Cooling: water cooled

**Hot EGR valve**

Water cooled actuator with outstanding precision and low leakage. Available in single or dual flap configuration.

- Precise & reliable operation
- High flow / low pressure drop

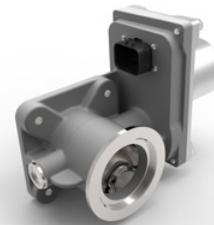


- Bore sizes: 30 – 70 mm
- Operating voltage: 12V or 24V
- Control signal: multiple
- Cooling: water cooled

**Cold EGR valve & EGR bypass valve**

Weight optimized actuator for high torque applications in narrow assembly spaces.

- Compact, integrated package, robust sealing
- Minimal pressure drop, BLDC or PMDC option
- Suitable for highly corrosive environment



- Bore sizes: 30 – 60 mm
- Operating voltage: 12V or 24V
- Control signal: multiple
- Cooling: passively cooled

**Thermal management, back pressure or exhaust brake**

Water cooled actuator with maximum torque delivery for command authority.

- Optimized for exhaust management
- Able to absorb high pressure gradients
- Integrated compressed package for minimal space claim



- Bore sizes: 50 – 120 mm
- Operating voltage: 12V or 24V
- Up to 40Nm peak torque
- Control signal: multiple
- Cooling: water cooled

**Intake throttle (passive)**

Cost optimized intake throttle valve.

- Available with various inlet/outlet configurations
- Compact package, designed for harsh environments
- OBD capable, BLDC or PMDC option



- Bore sizes: 50 – 120 mm
- Operating voltage: 12V or 24V
- Control signal: multiple
- Cooling: passively cooled

**Intake throttle (Active)**

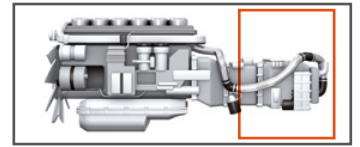
High performance intake throttle valve with Various Inlet/Outlet Configurations at compact packaging.

- Designed for Harsh Environments, OBD Ready
- Specialized Coating for Corrosion Protection (Option)



- Bore sizes: 50 – 120 mm
- Operating Voltage: 12 V or 24 V
- Control signal: multiple
- Cooling: passively cooled

Transmission applications



2x3/2-way valve, electrically operated

Electrically operated switching valve

2x3/2-way valve, mechanically operated

3/2-way valve NO, mechanically operated

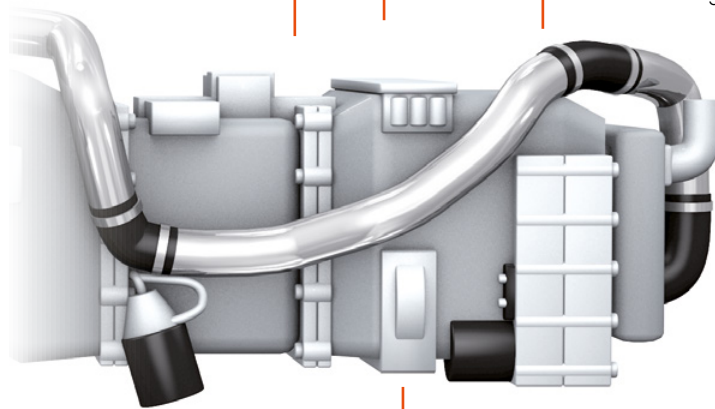
Pressure regulator with 2/2-way valve NO and NC

4/2-way valve, pneumatically operated

4/2-way valve, electrically operated

4/2-way valve, mechanically operated

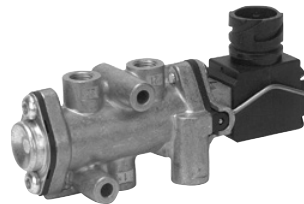
Working unit



**4/2-way valve, electrically operated**

Fast switching times and a long service life, even under tough conditions (extreme vibrations, temperature fluctuations).

- Interlock functions in manual transmission
- Selection of shifting range in transmission



- Nominal diameter: 3.6 mm
- Switching time: < 50 ms
- Working pressure: 4.5 – 10 bar
- Operating voltage: 12V or 24V

**4/2-way valve, pneumatically operated**

Fast switching times and a long service life, even under tough conditions (extreme vibrations, temperature fluctuations).

- Interlock functions in manual transmission
- Selection of shifting range in transmission



- Nominal diameter: 3.6 mm
- Switching time: < 50 ms
- Working pressure: 4.5 – 10 bar

**Working unit**

Cost efficiency through a reduction in assembly times, the number of air connections used, and the installation dimensions.

- Pressure regulator, filter, switching valve, and cylinder – all integrated into a single housing

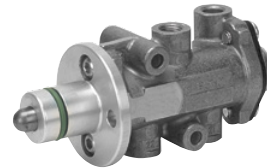


- Nominal diameter: 3.6 mm
- Switching time: < 50 ms
- Working pressure: 6 – 10 bar
- Pressure limiter: up to 5.5 ±0.5 bar
- Operating voltage: 12V or 24V
- on demand also with pneumatical activation

**4/2-way valve, mechanically operated**

Long service life, even under tough conditions (extreme vibrations, temperature fluctuations).

- Locking functions in manual transmission
- Selection of shifting range in transmission



- Nominal diameter: 3.6 mm
- Working pressure: 0 – 10 bar

**3/2-way valve, mechanically operated**

Long service life, even under tough conditions (extreme vibrations, temperature fluctuations).

- Interlock functions in manual transmission
- Selection of shifting range in transmission



- NO or NC function
- Nominal diameter: 2.6 – 3.4 mm
- Working pressure: 0 – 10 bar

**Complex control units**

High performance and precise control thanks to electronic regulation of the integrated valves.

- Regulation and control functions in the transmission
- Additional external valves can be actuated
- Retarder control



- Nominal diameter: 2 – 3.7 mm
- Regulated pressure range: 0 – 6 bar
- Precision ± 0.25 bar
- Control: CAN bus

**Electrically operated switching valve**

Multi-functional valve for general switching functions.

- Low power consumption
- Various valve functions possible



- Nominal diameter: 4 mm
- Switching time: < 30 ms
- Working pressure: 4 – 10 bar
- Operating voltage: 12V or 24V

**2x3/2-way valve, electrically operated**

A joint compressed air connection for easy assembly and cost reduction.

- Locking functions in manual transmission
- Selection of shifting range in transmission



- Nominal diameter: 4 mm
- Switching time: < 30 ms
- Working pressure: 4.5 – 10 bar
- Operating voltage: 12V or 24V

**2x3/2-way valve, mechanically operated**

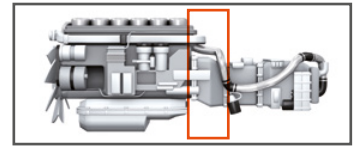
Up to 3 switching positions can be realized with this NO-NO valve.

- Intended for direct fitting to the transmission
- Selection of shifting range in transmission

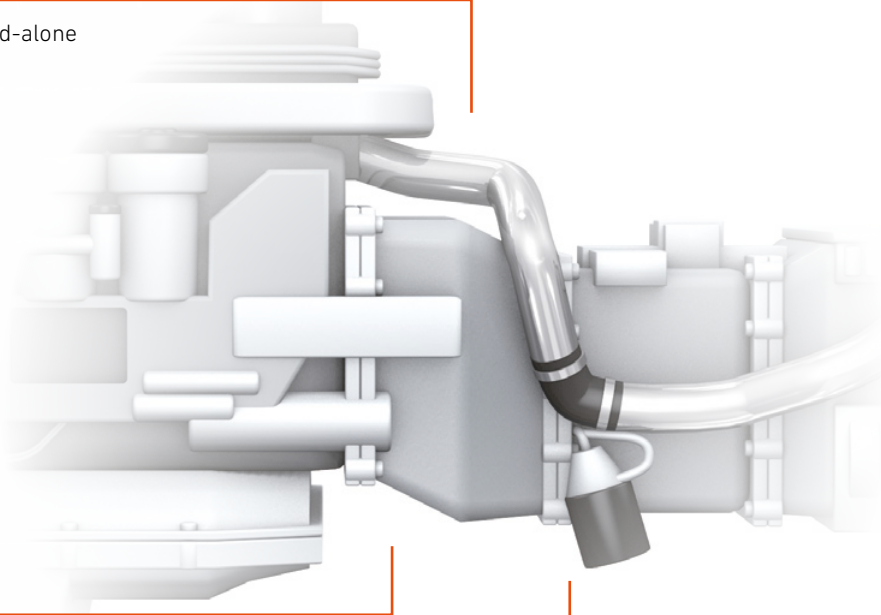


- Nominal diameter: 2.6 – 3.4 mm
- Working pressure: 4 – 10 bar

**Clutch applications**



Clutch valve unit – stand-alone



Clutch valve unit – mechanically integrated

Clutch valve unit – electrically integrated

**Clutch valve unit – stand-alone**

Clutch unit for stand-alone installation. Air is guided through external tubing. Alternatively, routing of the working pressure can be integrated into the housing base.

- For controlling the clutch actuation cylinder e.g. in AMT or Clutch by wire systems



- Valve function: 4x2/2
- Nominal diameter: 2 – 3.7 mm
- Switching time: < 10 ms
- Working pressure: 4 – 10 bar
- Operating voltage: 12V or 24V

**Clutch valve unit – mechanically integrated**

The housing of the valve unit also acts as the cover for the clutch actuation cylinder.

- For controlling the clutch actuation cylinder e.g. in AMT or Clutch by wire systems



- Valve function: 4x2/2
- Nominal diameter: 2 – 3.7 mm
- Switching time: < 10 ms
- Working pressure: 4 – 10 bar
- Operating voltage: 12V or 24V

**Clutch valve unit – customer specific**

Customer adapted solutions for integration of additional functions e.g. transmitting sensor signals through integrated cable harness. Optionally, routing of the working pressure can be integrated into the housing base.

- For controlling the clutch actuation cylinder e.g. in AMT or Clutch by wire systems

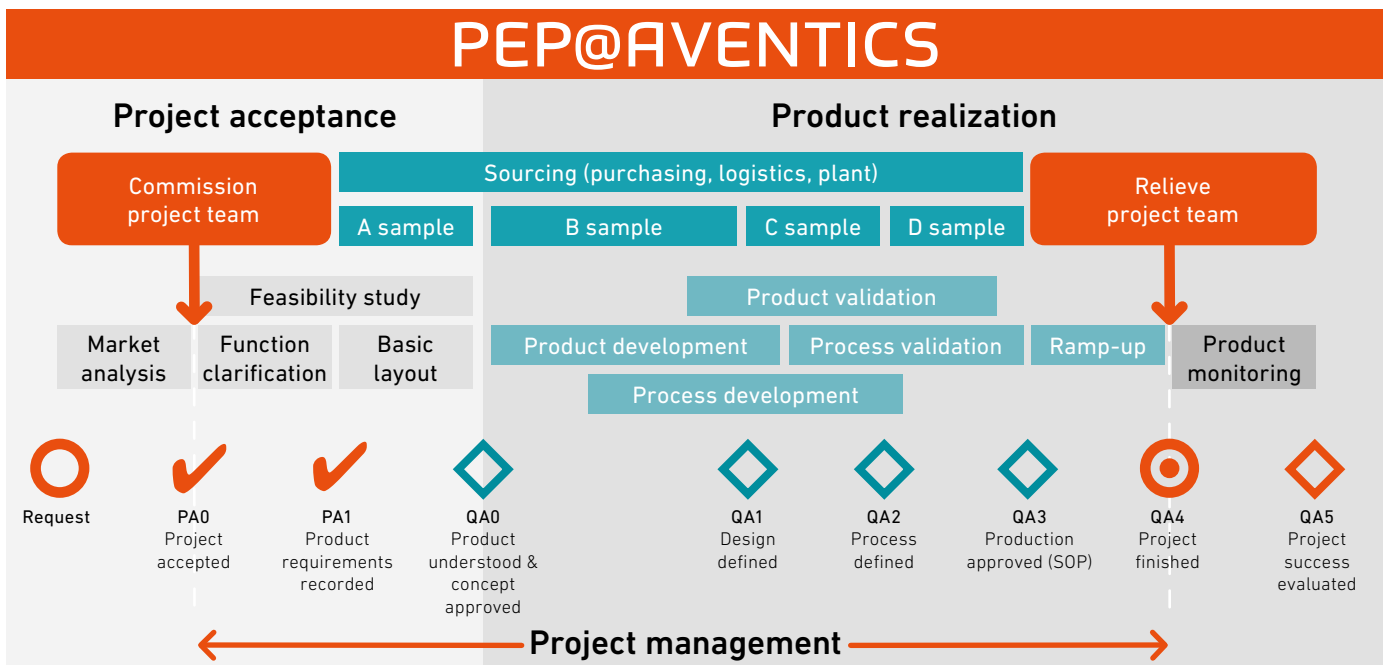


- Valve function: 4x2/2
- Nominal diameter: 2 – 3.7 mm
- Switching time: < 10 ms
- Working pressure: 4 – 10 bar
- Operating voltage: 12V or 24V



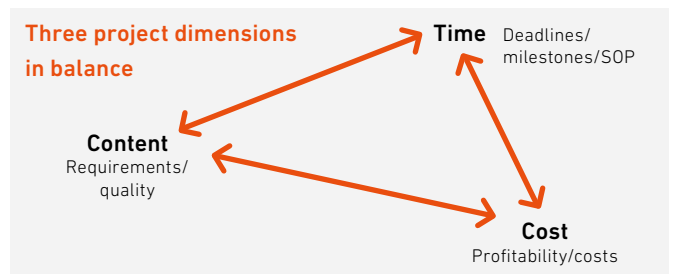
# PEP@AVENTICS – how it works: Well structured, efficiently organized

We consistently follow a proven plan and don't leave anything to chance when it comes to implementing your projects. Our product engineering process (PEP) ensures product functionality coupled with profitability and market-driven development times (time-to-market). It incorporates the milestones QA0 to QA3 and ends with the product observation following QA5.



## Guardrail, highway, GPS

The product engineering process fulfills three main functions: As a **guardrail**, it provides the project team with both safety and enough leeway for project handling to optimally reach the target. As a **highway**, the PEP enables fast process progress with milestones to assess the current project status and to coordinate the further route. As a **GPS**, the process requires a clear definition of targets and realistic planning right from the beginning onward. Deviations from the 'route' are detected early on and corrective measures are introduced.



▲ Over the entire course of the project, the three project dimensions are kept in balance. A change to one of the three dimensions generally has effects on the other two.

# That's not all!

Our products have much more to offer. On the one hand, consider the many tasks in the outfitter industry: special functions that can find a safe and efficient solution in pneumatics. On the other hand, we are constantly implementing new customer solutions that expand the range of potential applications of our products or optimize existing ones. Because there's always room for improvement.

## Special solutions for special-purpose vehicles

Including equipment options for trucks; refrigerator, refuse-collection and fire-fighting vehicles; and sweepers or concrete pumps. The components are extremely versatile in their application: they are both powerful and sensitive, as well as highly robust. The vehicle equipment sector, such as customized components and systems for manufacturers of trailers, attachments, and special-purpose vehicles, is a growing application area.



◀ Cylinder valve unit for positioning and adjusting brushes



◀ Cylinder valve combinations and valve blocks for handling garbage containers



## Automated extinguishing technology

Modern fire-fighting vehicles are equipped with complex extinguishing technology that must be able to reliably perform various functions at all times and under extreme conditions. In addition to this necessary reliability, AVENTICS offers customized, vehicle-specific solutions with high flexibility in their configuration: from compressed air preparation and valve control to the actuator.



▲ Valve systems with maintenance unit, complex control with CANopen bus technology  
 - Valve system, CD01 series  
 - Maintenance units, NL2 series



▲ Pneumatic cylinders  
 Specific cylinders actuate the individual elements of the extinguishing system  
 - Profile cylinder, PRA series

# Fit for Outfitters

## Pneumatic door openers

To simplify loading and unloading and therefore make the processes as cost-efficient as possible, we have implemented a patented system for the simultaneous loading of trailers and trucks without uncoupling. With roll-up gates, trucks and trailers are connected directly – pneumatic cylinders are responsible for actuating the gates and also locking them in the open position.



- ◀ Pneumatic cylinders
  - Cylinders for temperatures down to -40°C
  - Metal scrapers to protect against damage from ice and abrasive pollution
  - Optionally with a guide unit
  - Tie rod cylinder, TRB series

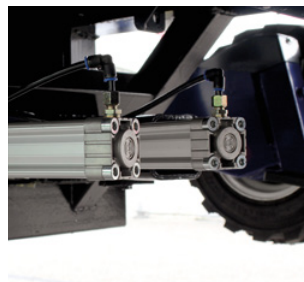


- ◀ Control cabinets
  - Protection against environmental influences
  - With integrated pressure regulation
  - Control cabinet tailored to customer

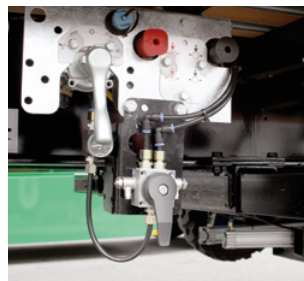
## Secure and quick locking

Truck-mounted forklifts are particularly advantageous if no loading ramp or other devices such as forklifts or loading cranes are available.

For transportation, safety-related measures have to be taken to secure the truck-mounted forklift from falling. To minimize the time needed to secure the forklifts, the transportation safety devices on this truck are operated pneumatically.



- ◀ Pneumatic cylinders
  - Specific cylinders actuate the transportation safety device locking mechanism.
  - Profile cylinder, PRA series



- ◀ Control panel
  - Simple control of all pneumatic elements on a well-organized control panel.
  - Panel with 4/2-way valve

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