Continental Trading GmbH
Kruppstrasse 105
60388 Frankfurt
Germany
Phone: +49 69 40805-0
Fax: +49 69 40805-210
industrial@vdo.com
www.vdo.com

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Pedals for commercial and special-purpose vehicles

- Robust
- Electronically controlled
- Flexible installation

The future of mobility begins with the innovations of the present

A passion for mobility allows us to reach new heights, continue on a path and redefine limits. As a global supplier we focus on our core competencies: innovations and technically sophisticated solutions. And we implement them. Faster, more efficient and more successfully than others. Our mission: To be the best in the industry – designing future mobility in a manner that is safer, more comfortable and sustainable.

We have been developing a number of different products and solutions for commercial and special-purpose vehicles for over 80 years. Requirements are changing on a continuous basis. Increasing traffic density, increasingly scarce resources and an increasing awareness of safety and the environment continue to present us with new challenges.

We view these requirements as opportunities – particularly in the area of commercial vehicles we are able to rely on the comprehensive know-how of our specialists who work in a variety of different business segments. As the market and technology leader for technographs, along with our control and monitoring systems for drive trains and onboard electronics, onboard units for toll recording, telematics units and display instruments, we are ensuring the economic and ecological progress of the commercial vehicle industry today, tomorrow and in the future.

Reliability at the step of the pedal

Stress requirements – rough yet intelligent

As varied as commercial and special-purpose vehicles (on-off highway vehicles) are, they pose the same demands on central components such as the pedal: With vehicle service lives of 15 to 20 years under extreme conditions, durability is the major concern. It is also a reason why these vehicles are in their own and very specialised group. It's an area we know well: our Commercial Vehicle Organisation specialises in the enormous bandwidth of special-purpose vehicles up to special bus and commercial vehicle applications.

In the course of the last 25 years our solutions have proven themselves to be reliable and long-lasting. At the same time we have developed a wide range of pedals which include both standard components as well as customer-specific solutions. In an application environment without standardised interfaces, such a broad product range enables us to find the suitable pedal type to meet engine requirements.

Today we supply pedals and sensors for both buses and commercial vehicles and virtually every kind of special-purpose vehicle: ranging from material handling machinery, construction machinery, agricultural and forest equipment to airport ground equipment.

Part of the electronic controls

Despite the obvious significance of their mechanical quality, pedals must also meet a variety of additional requirements: With the strengthening of the exhaust gas guidelines which also apply to off-highway vehicles (e. g., EPA Tier 3 and Tier 4; EU levels IIIa and IIIb), the electronic controls of engines – and hence electronics pedals – will become standard. Therefore the reliable, professionally validated integration of robust mechanics as well as wear-and-tear free and robust electronics for precise, mechatronic all-in-one solutions will be just as important. It is one of our core strengths: We have been developing pedals and associated sensor systems for electronic throttle controls for 15 years.

Innovative power and experience

Working with us provides you with a partner that can cover even the most varied, organisational and technical requirements and contributes a high degree of know-how transfer and extensive project experience. Continuous development results in solutions which support technological, production-related and economic targets equally.

The right solution for almost every application

Mechatronics for the most demanding conditions

Our portfolio includes pedal solutions for floor installation as well as suspended pedals, but also designs where pedals and external mechanics/sensor systems must be placed separately because of space requirements. We supply hand throttle solutions for special applications, such as agriculture.

Functionally reliable and ergonomic

All our pedals designed for use with commercial and special-purpose vehicles work according to the same, extremely robust, principle: Contactless and non-wearing Hall-Sensor systems convert each respective pedal position into an electric signal, which is forwarded to engine controls and where it displays the driver's torque requirements as the target value.

In addition to mechanical durability, the quality features of our pedals also include redundant design for both return springs and the redundancy principle at the signal output on two channels (in accordance with the engine management specification). Depending on the design, pedals may be designed with an additional pressure point for a kick-down to full throttle, which triggers a targeted gear change for automatic transmissions.

In order to provide the driver with optimum vehicle control even during jerky movements, the pedal is also fitted with a hysteresis function.

High degree of flexibility

Since our pedal solutions are based on modular components, they can be easily adapted to a respective application, while at the same time offering the high quality standard of generically developed products. Pedal designs currently in use for floor installation include 31°, 39° or 45° pedal angles and 17.5° delay angles.

The flexibility offered by our solutions is also evident at the respective signal output: Generally speaking, the integrated electronics can make available both analogue signals as well as digital (pulse width modulated) PWM signals. Conventional interfaces which are in use worldwide can be used for connections to engine controls. Of course we also implement customer-specific solutions in addition to our standard connectors.

Current pedal solution with separate sensor system and mechanics: type AA1

Current floor pedal, type FMP

Pedals with suspended design, optionally available with aluminium lever (type SPM) or plastic lever (short design, type SPPS and long design, type SPPL)

Pedal angle sensor unit with sensor, type HS1

Continues improvement – next generation

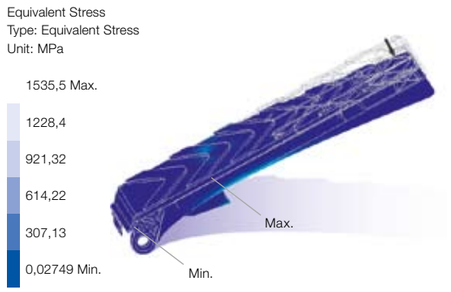
New pedals: 2009 evolution level

We are targeting our long-standing experience in development and applications for a preparation of a new generation of standard pedals with a modular design for series production. The new designs are even more optimised for production than before and thus open up economic advantages. At the same time we use Hall-Sensors with a further developed design (HS2) for the new generation pedals, which feature a much simpler design and also offer additional technical advantages. This includes an even better electromagnetic compatibility (EMV/EMC). In order to provide our customer with investment security, we can also fit the new sensors for CAN bus protocols on request.

The very successful validation of the new sensors in connection with the new pedals already includes a lot of know-how. Results confirm a technologically and economically convincing solutions range, which is just as diverse and robust as the current generation – with increased flexibility.

New sensor design

The contactless HS2 sensor has a molded 6-pole connector (Delphi Packard Metri Pack 150). Starting options include analogue single plus idle validation switch, double analogy as well as the single or double digital (PWM). In addition to standard voltages of 5 volt, the sensor is also available on request at up to 48 volt supply voltage, making it suitable for use in electrically-operated industrial vehicles.



Prototype of the new FMPnew pedal for floor installation. In the development stage, Finite Element Analysis (FEA) was used to ensure the durability of the step plate.

New HS2 Hall-Sensor with optimised EMV properties for the new pedal designs

Design and measurements of suspended pedals

New hand throttle solution for use with agricultural machinery, among others

FMPnew pedal for floor installation

Customer-specific solutions tractor pedal AP1 (illustration to left) and underfloor mounted UP1 pedal (illustration to right) for industrial vehicles

Suspended pedals

A standard design for applications using suspended mounted pedals is now at an advanced development stage; it can be combined with customer-specific levers. The new optimised HS2 sensor is also used for the “SPnew” generation.

Hand throttle and special sensor solutions

The new special solutions offers additional application possibilities: Thus two new hand throttle solutions are available which can be operated either by lever (HT2) or by turn-switch (HT3). Vehicle manufacturers can obtain the new externally installed sensor operations (type AA2 and AA3) in order to adapt their own pedals.

Floor mounted pedals

The new design for floor mounted installation consists of a glass fibre filled nylon base, that allows for the implementation of up to five pedal angles (30° to 50°) in 5° increments in one single component. The associated step plate with a operating angle of 20° may be made of plastic (PA66 with 33 % GF) or aluminium, depending on customer requirements. Compared to the current design, the new “FMPnew” generation is easier to install. At the same time its design quality is also very suitable for driver cabins that feature a visually demanding design.

Customer-specific solutions

A special tractor pedal (AP1) to be used in tractor cabins (e.g., on agricultural tractors or backhoes) is currently in the development stage; with its flexible lever design it can be easily adapted to a number of different installation conditions.

A solution involving the installation of the pedal in the cabin floor, with sensor systems/mechanics placed below, is currently in the preparation stage (type UP1).