

## Suspended Pedals

VDO Pedal unit SAE J1843 / X10.445/000/001



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# 1. Product

## 1.1 Features and Functions

The pedal unit consists of a base plate and pedal assembly which is to be mounted inside the passenger compartment. A return spring plus a friction unit for distance-related force hysteresis serves the purpose of duplication the forces applied to the pedal. Feedback from 2 potentiometers is translated by 2 internal electronic circuits into:

1. an analogue voltage signal „WP“ corresponding to pedal position,
2. 2 switches „idle“ and „run“ (idle validation switch) which are activated when the pedal is moved from the idle-speed position.

## 1.2 Operating Conditions

Operating temperature: -40 °C to +80 °C

Storage temperature: -40 °C to +85 °C

Degrees of protection: IP 54 DIN 40050-9

The pedal unit is designed for cabin with respect to ambient temperature, vibration resistance and protection class.

## 1.3 Mechanical Data

### 1.3.1 Actuation Angle

Actuation angle:  $20^{\circ} \text{ }^{+2^{\circ}} / \text{ }^{-1^{\circ}}$

### 1.3.2 Pedal Forces

	Acceleration	Deceleration
Idling:	25 ±5 N	17.5 ±5 N
End position (WOT):	42.5 ±5 N	32.5 ± 5 N
Pull-out strength of the cable	> 60 N	

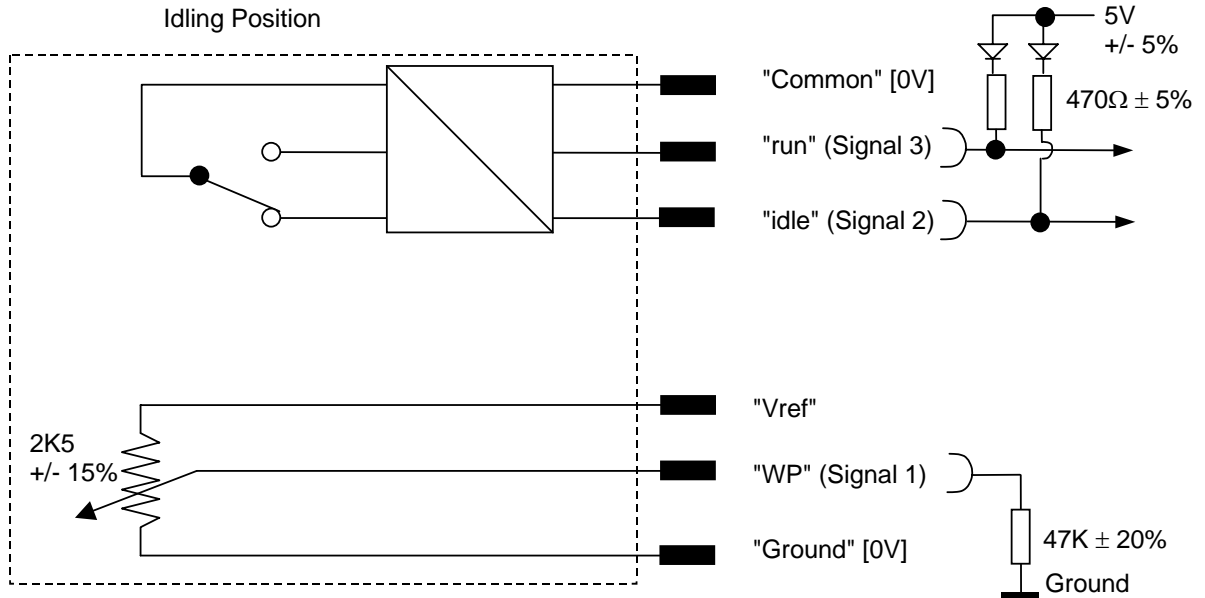
## 1.4 Electrical Data

All inputs and outputs are short-circuiting protected against ground. Power must be externally fused. The unit is not protected against polarity inversion.

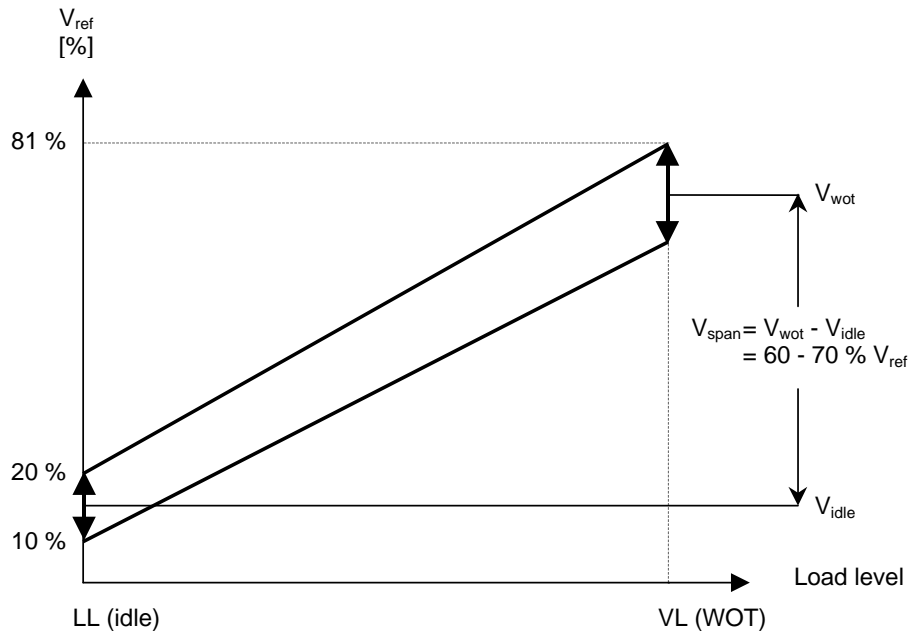
1.4.1 Connector Pin Allocation

Connector pin allocation per customer drawing.

1.4.2 Circuit Diagram for Replacement

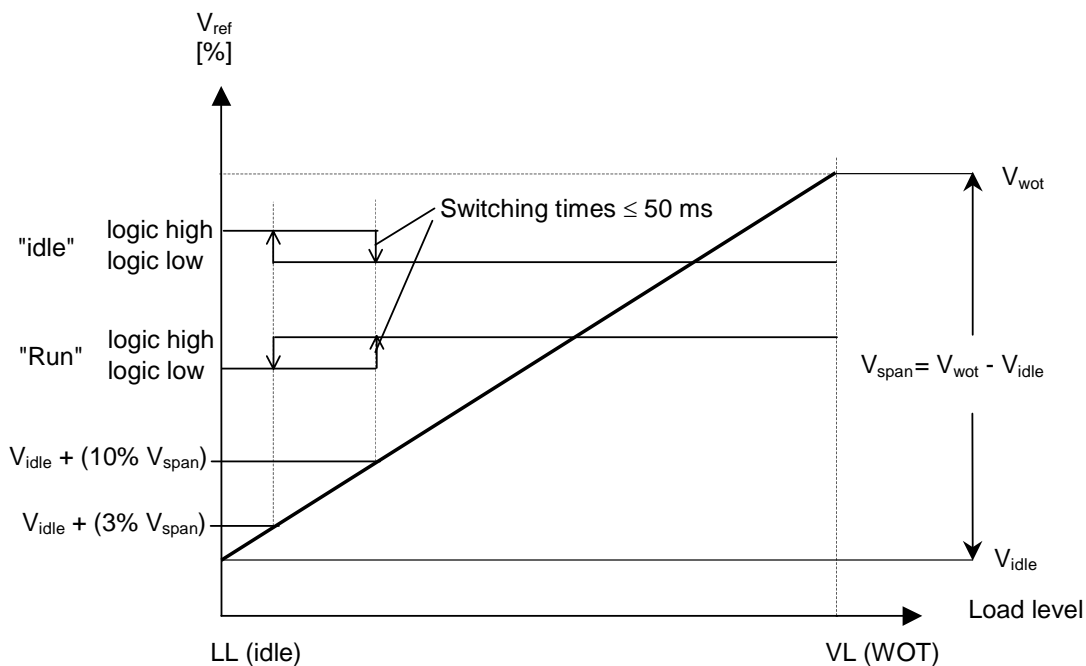


1.4.3 Analogue Signal "V<sub>ref</sub>" (Signal 1)



Linearity:  $\pm 3.5\%$ .

1.4.4 Signals for Idle Speed control "Idle" (Signal 2) and "Run" 3 (Signal 3)

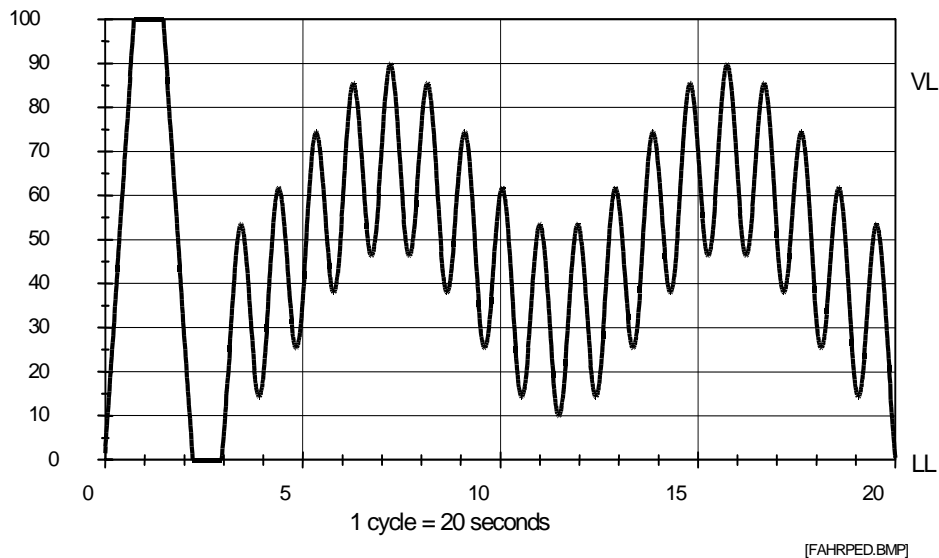


Logic high  $\leq 0.5$  V referred to "common" / logic low  $\geq 3.5$  V referred to "common"

## 1.5 Qualification / Service Life Test

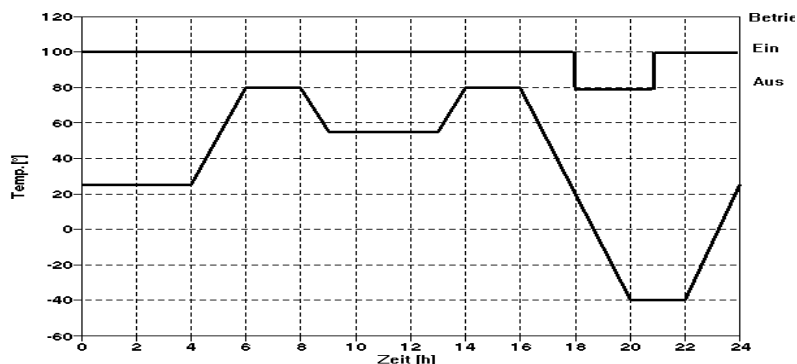
### 1.5.1 Combined Temperature, Climate and Endurance Test

#### Actuation Cycles



5x10<sup>5</sup> cycles, operating force at stop: 300N

#### Temperature Cycle during Service-Life Test



Temperature of test environment

#### Damp Heat Cycling according to DIN IEC 60068-2-30 Variant 2

Test temperature: 55°C.

Operating during 10 % of service-life cycles

#### Storage Temperature according to DIN IEC 60068-3-1A

24 hours: store at -40 °C

6 hours: store at RT, then perform function test

24 hours: store at +100 °C

6 hours: store at RT, then perform function test

**1.5.2 Snap Test**

The pedal lever in full load position is suddenly released; the internal return spring returns it against the internal idle stop.  
 Number of cycles: 1000

**1.5.3 Maximum Application Force**

Maximum application force: 1000 N (vertical on the pedal plate)  
 Number of cycles: 20

**1.5.4 Vibration Test Broad Band according to DIN EN 60068-2-64**

Frequency range [Hz]	Spectral acceleration density / gradient [g <sup>2</sup> /Hz] / [dB/Oct]	Effective total acceleration [gRMS]	Testing time per axis direction [h]
20 - 50	0,32	5	8
50 - 1000	-6	5	8

Other details: Test at room temperature, lever in idle position.

**1.5.5 Shock Test according to DIN IEC 50A**

Three consecutive shocks are applied in both directions of each of the 3 axes vertical to each other.  
 Other details: Test at room temperature, lever in idle position.

**1.5.6 Test of Protection Type according to DIN 40050-9**

Protection type

**1.5.7 Insulation Test according to QPV 01.18-01**

Measuring of the isolation resistance between current-carrying parts and housing. The isolation resistance must be > 500 KΩ at a test voltage of 500 V.

**1.5.8 Flame Test according to DIN 75200**

The complete unit is tested for flammability while in the mounting position, the pedal plate being subjected to flames.

## 1.6 Electrical Testing

### 1.6.1 Interference Pulse Stability according to DIN ISO 7637-3

The function may deviate from the specification for the duration of the pulse. After the pulse the function must again meet the specification.

	Setting	Duration	Tolerable disturbances
Pulse 1	Us = - 30 V t1 = 0,5 s	500 pulses	none
Pulse 2	Us = + 30 V t1 = 0,5 s	500 pulses	none
Pulse 3a	Us = - 60 V at 50Ω	10 min per connection	none
Pulse 3b	Us = + 40 V at 50Ω	10 min per connection	none

## 1.7 Electrostatic Discharge (ESD) according to ISO/TR 10605

A discharge circuit with 330pF and 1k5Ω is used.

The device under test is not energized. The connector pins receive contact discharges of ± 8 kV or air discharges of ± 12 kV.

Each pin is tested with 5 positive and 5 negative discharges.

## 1.8 EMV

These tests determine how the device under test with its cable harness and connected periphery is affected by received RF radiation. This test is only a reference measurement. The behaviour of the device under test may differ when installed in the vehicle; a separate test by the customer is required.

The pedal unit is operated in idle position. Monitor that the switching signals "idle" (signal 2) and "RUN" (signal 3) remain inactive during the continuous frequency change.

### 1.8.1 Radiated disturbances on the strip line according to DIN 40839-4

- Frequency range: 1 MHz to 220 MHz
- Field strength: 100 V/m (corresponds to disturbance degree 3)
- Type of modulation: AM
- Modulation in deep: 80 %
- Modulation frequency: 60 Hz and 1000 Hz

The maximum frequency step should be 1 MHz, the minimum dwell time per frequency 300 ms.

### 1.8.2 Radiated disturbances according to 72/245/EWG due to version 95/54/EG

BCI test according to EC directive, but without certification.

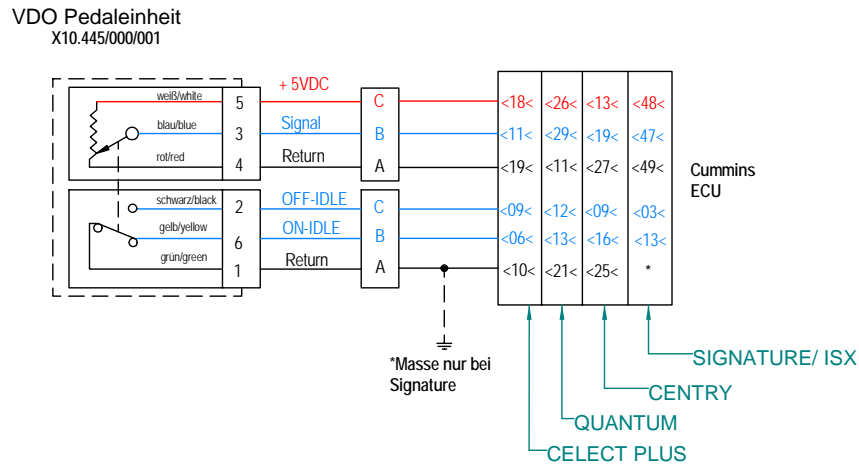
The certification of the complete system installed in the vehicle must be carried out by the customer.

- Frequency range: 1 MHz to 1 GHz
- Current feed: 60 mA
- Type of modulation: AM
- Modulation in deep: 80 %
- Modulation frequency: 60 Hz and 1000 Hz



## 1.9 Connections / Applications

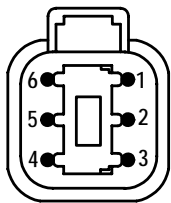
Specified for Cummins Select / Centry /Quantum and Signature Controls !



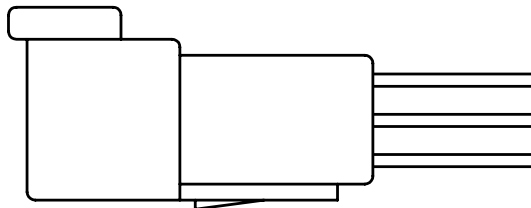
Colour	Assignment VDO/ Cummins	Stranded wire cross-section	Connector (Deutsch)
Green	Common/ Return	20 AWG – 0,6 mm <sup>2</sup>	1
Black	Run/ Off Idle	20 AWG – 0,6 mm <sup>2</sup>	2
Red	Ground/ Return	20 AWG – 0,6 mm <sup>2</sup>	4
Blue	WP/ Signal	20 AWG – 0,6 mm <sup>2</sup>	3
Yellow	Idle/ On Idle	20 AWG – 0,6 mm <sup>2</sup>	6
White	Vref/ + 5VDC	20 AWG – 0,6 mm <sup>2</sup>	5

\*Matching connector for the Pedal Unit: Deutsch, DT 06 – 6 S (not supplied by VDO).

### Deutsch Connector (Receptacle) DT 06 - 6 P



View From Front



1.9.1 Error Information

Cummins CELECT- or CENTRY-Engine Control Unit

Error code/ Error lamp	PID(P)/ FMI	Possible Sources of Error	Symptoms
131/ red	P91/ 3	Actuator position signal of Pedal Unit (Pin 4), above max. voltage.	RPM limiting
132/ red	P91/ 4	Actuator position signal of Pedal Unit (Pin 4), below min. voltage.	RPM limiting
431/ yellow	P91/ 2	Voltage output of Pedal Unit (Pin 2 and Pin 5), idle-speed switch does not activate (both circuits open).	No RPM adjustment possible
432/ red	P91/ 13	<u>Idle-speed switch activated</u> : idle-speed setting achieved (Pin 5) or idle-speed setting exceeded (Pin 2) although the corresponding pedal position (position signal) gives the opposite command to the engine control unit.	RPM limiting our adjustment of incorrect RPM (present RPM)
551/ yellow	P91/ 2	Voltage output of Pedal Unit (Pin 2 and Pin 5), idle-speed switch activates both simultaneously (both circuits closed).	No RPM adjustment possible

**Note:** The pin designation used in connection with the sources of error refer to the pedal unit.

Error code = Cummins error code in Compulink™ and Echeck™.  
 PID/ FMI = Optional error code SAE J 1587 in Echeck™.