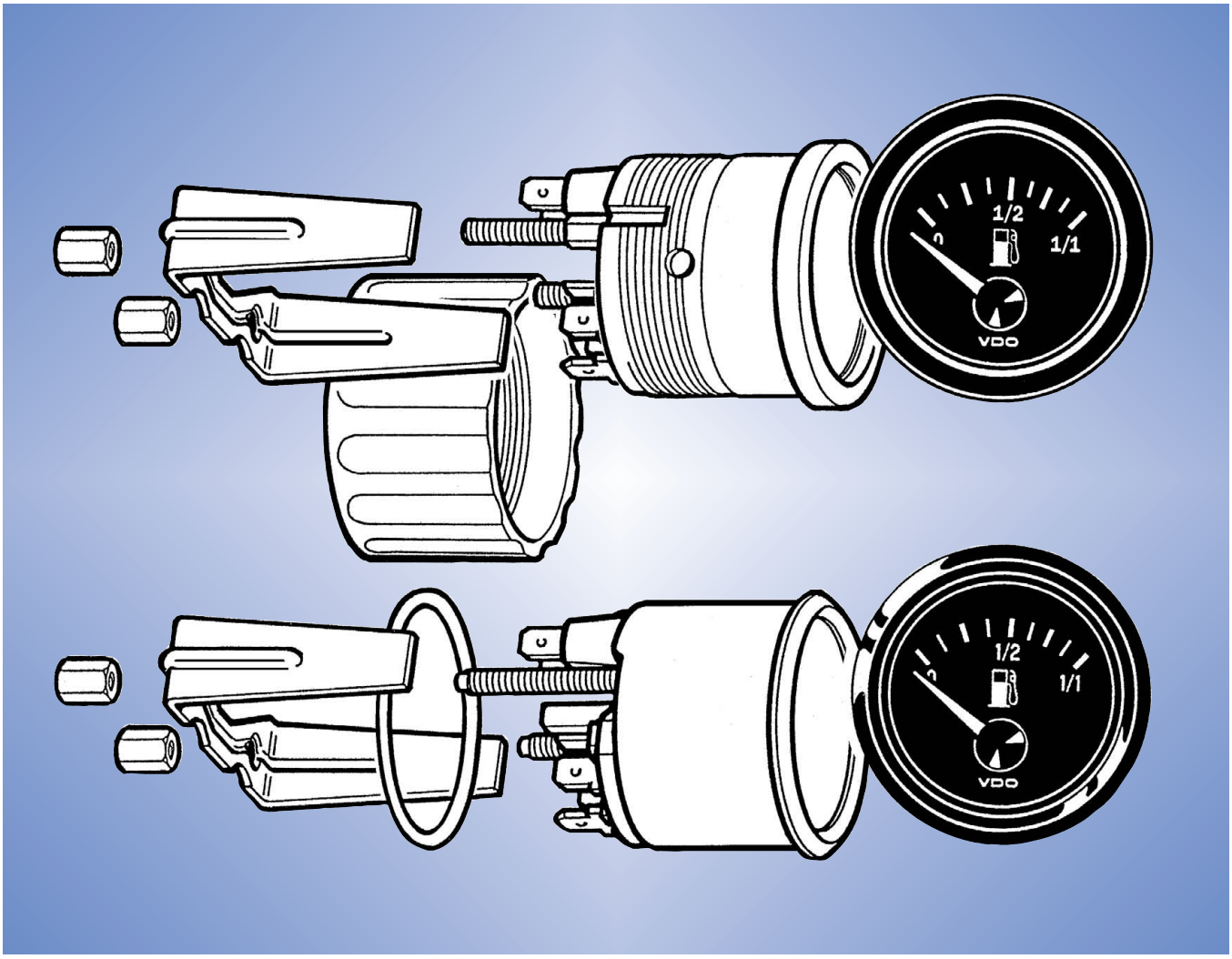
VDO cockpit vision / international

Instruments



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Technical Product Manual

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SIEMENS VDO

Technical Product Manual

VDO cockpit vision VDO cockpit international

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Technical Product Manual

VDO cockpit vision VDO cockpit international

Overview Of Chapters

Technical Product Manual

VDO cockpit vision VDO cockpit international

Overview Of Chapters

Technical Product Manual

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1. General Informations

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VDO cockpit vision VDO cockpit international

1. General Informations

1.1 VDO cockpit vision — Backlight

Rated voltage: **12-volt or 24-volt**

Design

Bezel:	brass, black, rectangular version
Lens:	nonreflective
Deflector:	black
Dial:	plastic (polycarbonat) for translucent backlighting dialgraphics: black background with white characters
Pointer:	plastic (polycarbonat) for translucent backlighting, red, for high temperature
Housing:	plastic (flame retardant) 52 mm / 80 mm / 100 mm diameter or steel, zinc-plated and chromatized (ammeter, turbocharger gauge)
Mounting:	bracket, steel, zinc-plated and chromatized or clamp ring, plastic
Illumination:	backlight clear or variable (green and red colour caps)
Connections:	blade connectors 6.3 x 0.8 mm exception: Ammeter (screw connection)

Marking (label):

manufacturer, country of origin
production date
rated voltage
part number(s)
specific: CE sign, resistance value

(Supersedes VDO cockpit and VDO mobilcockpit)

1. General Informations

1.2 VDO cockpit international — Floodlight

Rated voltage:	**12-volt or 24-volt**

Design

Bezel:	brass, black, triangular version
Lens:	nonreflective
Deflector:	black
Dial:	aluminium for instrument housing diameter 52 mm or plastic for instrument housing diameter 80 mm / Ø 100 mm dialgraphics: black background with white characters
Pointer:	aluminium, red (pointer hub: plastic, black)
Housing:	steel, zinc-plated and chromatized or plastic (diameter 52 mm: tachometer, clock, operating hours counter, pyrometer; diameter 80 mm / 100 mm: all instruments)
Mounting:	bracket, steel zinc-plated and chromatized or clamp ring, plastic (plastic instruments)
Illumination:	floodlight clear (operating hours counter without illumination)
Connections:	blade connectors 6.3 x 0.8 mm exception: ammeter (screw connection)

Marking (label):

manufacturer, country of origin
production date
rated voltage
part number(s)
specific: CE sign, resistance value

(Supersedes VDO proficockpit)

1. General Informations

1.3 Safety Instructions

1.3.1 Installation

- The product was developed, manufactured and inspected in compliance with the basis safety reof the EC Directives and in accordance with the generally recognised present level of technology. The product must only be used for service in land-bound vehicles (with the exception of motorcycles) or in stationary systems.

Prior to installation of the product, please observe the following instructions:

- For proper installation of the product, basic knowledge of motor vehicle electrical and mechanical equipment is required in order to prevent damage.
- Write down all the data of volatile electronic memories.
- Remove the ignition key from the ignition lock.Then disconnect the minus pole of the battery (including the minus pole of any auxiliary batteries).
  When the minus pole of the batteries are disconnected, all volatile electronic memories lose their input values.
- Failure to disconnect the minus pole of the battery can cause short-circuits in the vehicle electrical system and then result in cable fires, battery explosions and damage to other electronic systems.
- Prior to installation of the product, refer to the motor vehicle registration documents for information on the vehicle type and any special equipment features and refer to the design plans for further information on the positions of fuel, hydraulic, compressed-air and electrical lines.
- Use the product as intended. Do not change or modify.
  Improper use, alteration or modification of the product can result in injuries, property damage or environmental damage or have an effect on safety.

During installation of the product, please observe the following instructions:

- Observe the safety instructions of the manufacturers of the vehicle, system, motor and tools in each instance!
- Select the installation location so that the product and its components:
  - do not affect or hinder any functions of the vehicle or system.
  - are not damaged by any functions of the vehicle or system.
  - do not obstruct the driver's view.
  - are not positioned in locations where the driver and front-seat passenger can strike their heads in case of an accident.
  - are not positioned in the mechanical and electrical airbag area.
  - have sufficient clearance behind the drilled holes or installation opening.
- Do not make drilled holes or installation openings in supporting or stabilising braces or struts!

Following installation of the product, please observe the following instructions:

- Connect the ground cable firmly to the minus pole of the battery.
- Enter / program the values of the volatile memories again.
- Check all (!) vehicle functions.
- When measuring the voltages and currents in the vehicle, only use multimeters or diode testing lamps that are designed to be used for such measurements. The use of conventional testing lamps can cause damage to the control units or other electronic systems.

Special cases:

- Please be extremely careful whenever you must perform any required work on the running motor. Wear suitable working clothes only, since risk of suffering injuries such as bruises or burns exists. If your hair is long, wear a hairnet.

1. General Informations

1.3.2 Electrical Connection

Connect the cables according to the electrical terminal connection diagram.
Incorrect terminal connections can cause in short-circuits!

Safety instructions:

- Danger of short-circuits due to defective connecting points or pinched cables!
  All connections of the voltage supply system must therefore be soft-soldered or provided with weldable joint connectors and sufficiently insulated.
  You may use commercially available standard-type crimp connectors to make other connections.
  Make sure the ground connections are perfectly made!
  Insulate any cable ends that are not required!
- Take the cable diameter into account!
  A reduction of the cable diameter will result in higher current density. This can cause overheating of the affected cable section!
- Cables must be stripped using a wire stripper only. Adjust the wire stripper to prevent any strands from being damaged or cut off!
- Crimped connections must be made using a pair of cable crimping pliers only.
- When installing the cables, use the existing cable conduits and cable harnesses, but do not install the cables parallel to the ignition cables or cables that run over to high-capacity power consumers! Fasten the cables with cable straps or adhesive tape!
- Make sure the cables are not subjected to pulling, pressing or shearing forces!
- If the cables are run through drilled holes, protect the cables by means of rubber sleeves or similar parts.

1.3.3 Assembly

- Before assembly, an equalization of potential between the assembly worker and the module must be effected in order to prevent a destruction by a discharge of static electricity.

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

Contents **Page**

Installation instructions

999-165-001: VDO cockpit international
999-165-002: VDO cockpit vision

See file ‘Installation Instructions (MA)’.

Operating instructions (copy)

See enclosures TU00-0777-0010502 page 1 and 2.

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.1 General Informations

The electronic speedometer has been designed for land-bound vehicles only (with the exception of motorcycles).

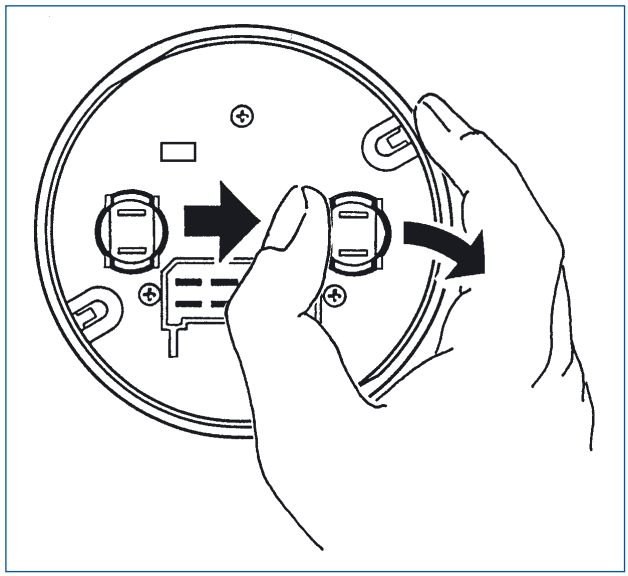
The instrument has an analog speed display, and a liquid crystal display for the distance (displaying total distance or partial distance alternatively).

Hall sensors, inductive sensors or blocking oscillator sensors can be used as speed sensors.

A pushbutton in the front lens is provided for setting and operation of the instrument.

The electronic speedometer should be installed by a Mannesmann VDO Kienzle workshop or an authorized specialised workshop.

The lamp sockets are clipped in.
To replace the light bulb, carefully, with the thumb, push the lamp holder out to the side.



2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.1 General Informations

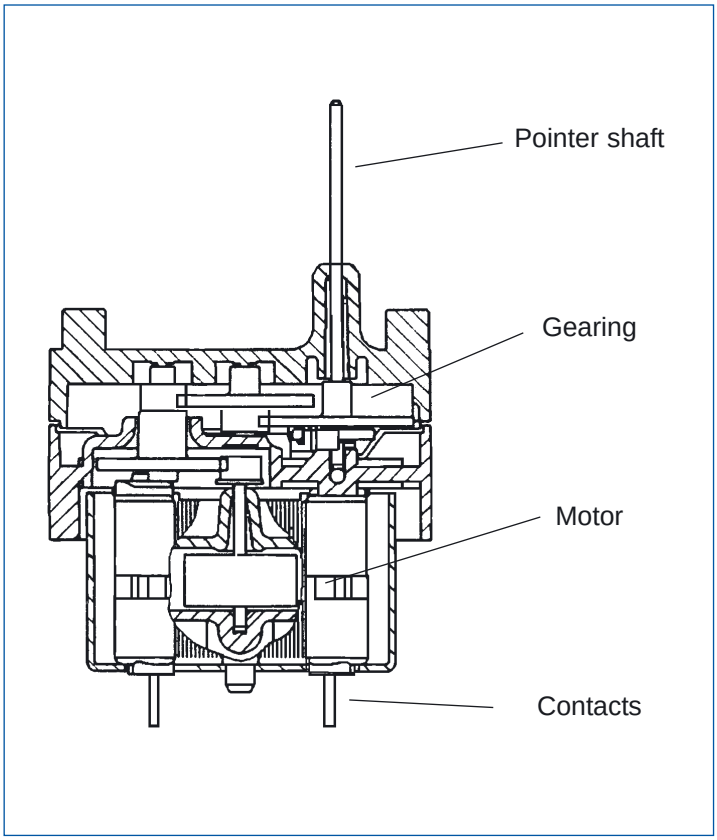
Designation of function
Stepper motor movement

The drive for this display system is a stepper motor, comprising a permanent magnet rotor within a crossed winding arrangement. A zero backlash gearbox at the output ensures a high drive torque and fine resolution. The gearbox has a reduction ratio of 43.2 : 1 and an internal mechanical stop. The stepper motor drive was developed specially by VDO for this product.

The drive produces a bipolar sinusodial variable voltage using digital pulse width modulation. There is a 90° phase difference (sine-cosine) between the voltages on the two motor coils. This rotates the electromagnetic field through equidistant angular steps with a constant length resultant vector ($\sin^2Ø + \cos^2Ø = 1$).

The motor torque is therefore constant at each step with zero cogging. At the pointer one motor step equals 0.065°.

The stepper motor parameters and the design of VDO control-driver electronics are carefully matched to ensure reliable operation of the system under all conditions. Optimised control algorithms ensure a visually smooth pointer motion.



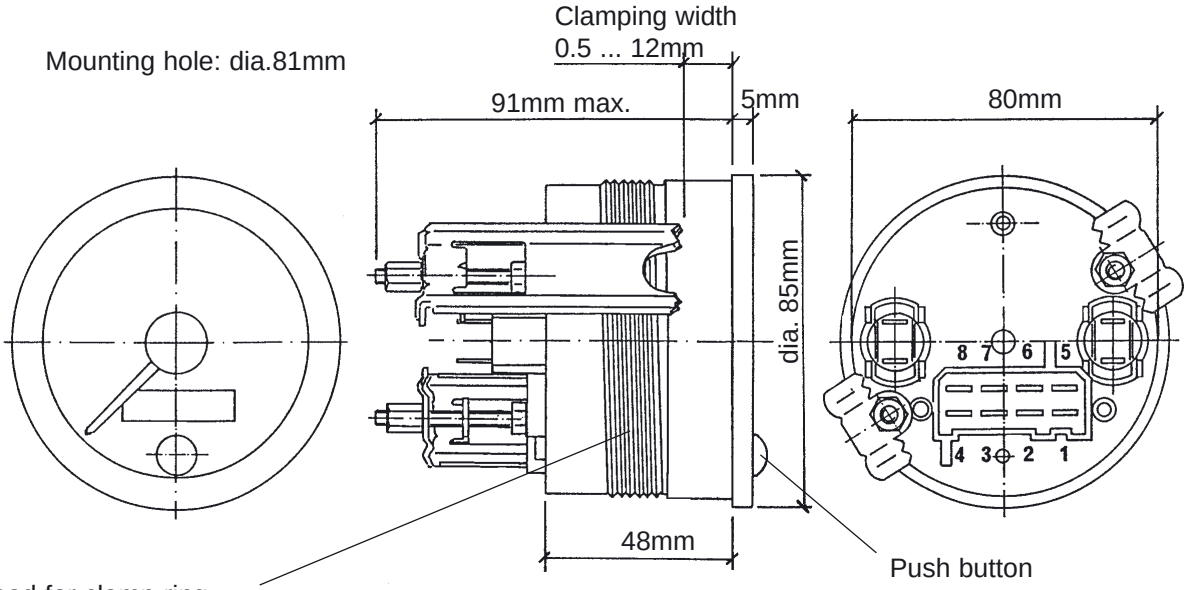
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.2 Technical Data

VDO cockpit vision

Ø 80 mm Backlight

Operating voltage:	10 ... 31 V
Input voltage:	U_{low}: 0 V U_{high}: min. 1 V
Movement:	stepper motor
Pickup:	hall sensor or inductive sensor or blocking oscillator sensor or speed signal from electronics
Current consumption:	< 100 mA (120 mA with illumination)
Operating temp.:	– 20°C ... + 70°C
Storage temperature:	– 30°C ... + 85°C
Illumination:	2 light bulbs 12 V, 2 W 4 colour caps (2 green and 2 red)
Protection:	IP64 DIN 40050 from the front, housing "ozon"-proof, "UV"-proof, CE approved, reverse-polarity protection
EMC test:	according to EN 13309 and ISO 13766
Vibration resistance:	max. 1g eff., 25 ... 500 Hz, duration 8h, f: 1 octave/min.
Nominal position:	NL 0 to NL 90, DIN 16257



Ratio
500 ... 399990 pulses/km or mile
(adjustable)

Pin assignment:
Pin 2: + 12 V for sensor
Pin 3: Ground (terminal 31)
Pin 4: + 10 ... + 31 V (terminal 15)
Pin 6: + 12 V for open collector sensor
Pin 7: Ground for 2-pole sensor wire
Pin 8: Input sensor signal

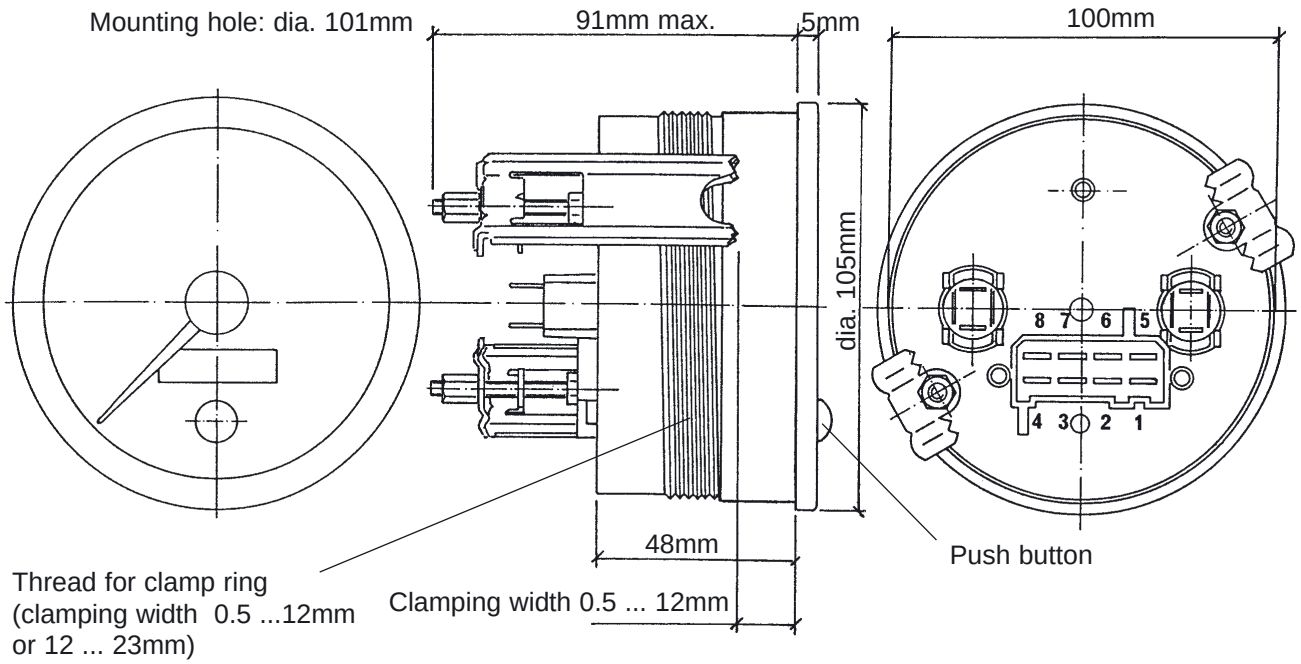
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.2 Technical Data

VDO cockpit vision

Ø 100 mm Backlight

Operating voltage:	10 ... 31 V
Input voltage:	U_{low}: 0 V U_{high}: min. 1 V
Movement:	stepper motor
Pickup:	hall sensor or inductive sensor or blocking oscillator sensor or speed signal from electronics
Current consumption:	< 100 mA (120 mA with illumination)
Operating temp.:	– 20°C ... + 70°C
Storage temperature:	–30°C ... + 85°C
Illumination:	2 light bulbs 12 V, 2 W 4 colour caps, 2 green and 2 red
Protection:	IP64 DIN 40050 from the front, housing "ozon"-proof, "UV"-proof, CE approved, reverse-polarity protection
EMC test:	according to EN 13309 and ISO 13766
Vibration resistance:	max. 1g eff., 25 ... 500 Hz, duration 8h, f: 1 octave/min.
Nominal position:	NL 0 to NL 90, DIN 16257



Ratio
500 ... 399990 pulses/km or mile
(adjustable)

Pin assignment:
Pin 2: + 12 V for sensor
Pin 3: Ground (terminal 31)
Pin 4: + 10 ... + 31 V (terminal 15)
Pin 6: + 12 V for open collector sensor
Pin 7: Ground for 2-pole sensor wire
Pin 8: Input sensor signal

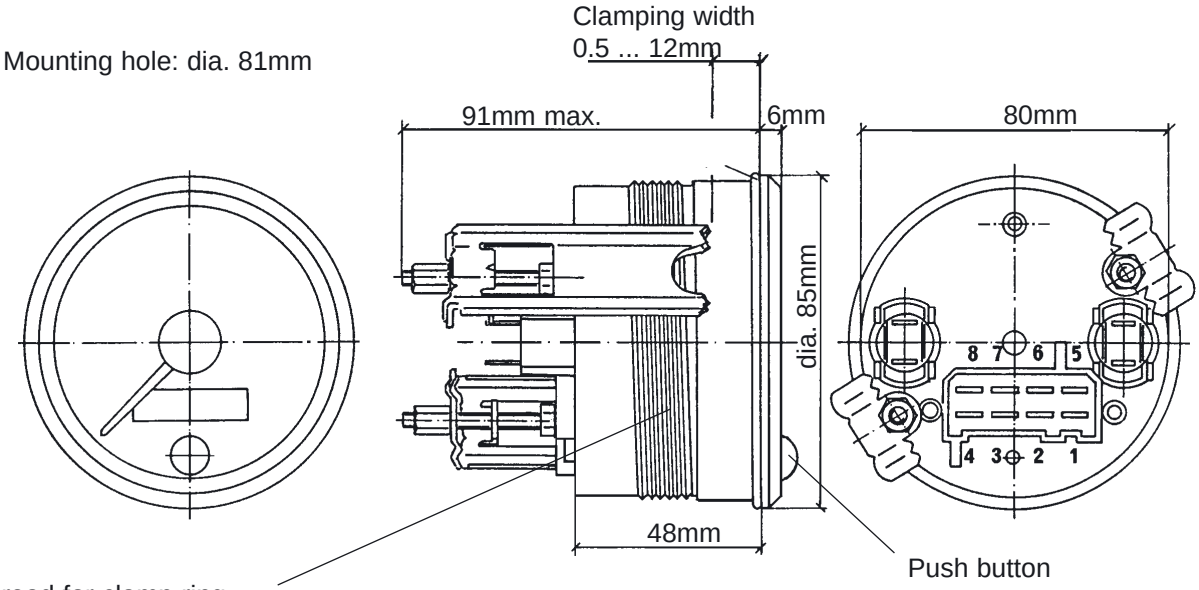
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.2 Technical Data

VDO cockpit international

Ø 80 mm Floodlight

Operating voltage:	10 ... 31 V
Input voltage:	U_{low}: 0 V U_{high}: min. 1 V
Movement:	stepper motor
Pickup:	hall sensor or inductive sensor or blocking oscillator sensor or speed signal from electronics
Current consumption:	< 100 mA (120 mA with illumination)
Operating temp.:	– 20°C ... + 70°C
Storage temperature:	– 30°C ... + 85°C
Illumination:	2 light bulbs 12 V, 2 W
Protection:	IP64 DIN 40050 from the front, housing "ozon"-proof, "UV"-proof, CE approved, reverse-polarity protection
EMC test:	according to EN 13309 and ISO 13766
Vibration resistance:	max. 1g eff., 25 ... 500 Hz, duration 8h, f: 1 octave/min.
Nominal position:	NL 0 to NL 90, DIN 16257



Ratio
500 ... 399990 pulses/km or mile
(adjustable)

Pin assignment:
Pin 2: + 12 V for sensor
Pin 3: Ground (terminal 31)
Pin 4: + 10 ... + 31 V (terminal 15)
Pin 6: + 12 V for open collector sensor
Pin 7: Ground for 2-pole sensor wire
Pin 8: Input sensor signal

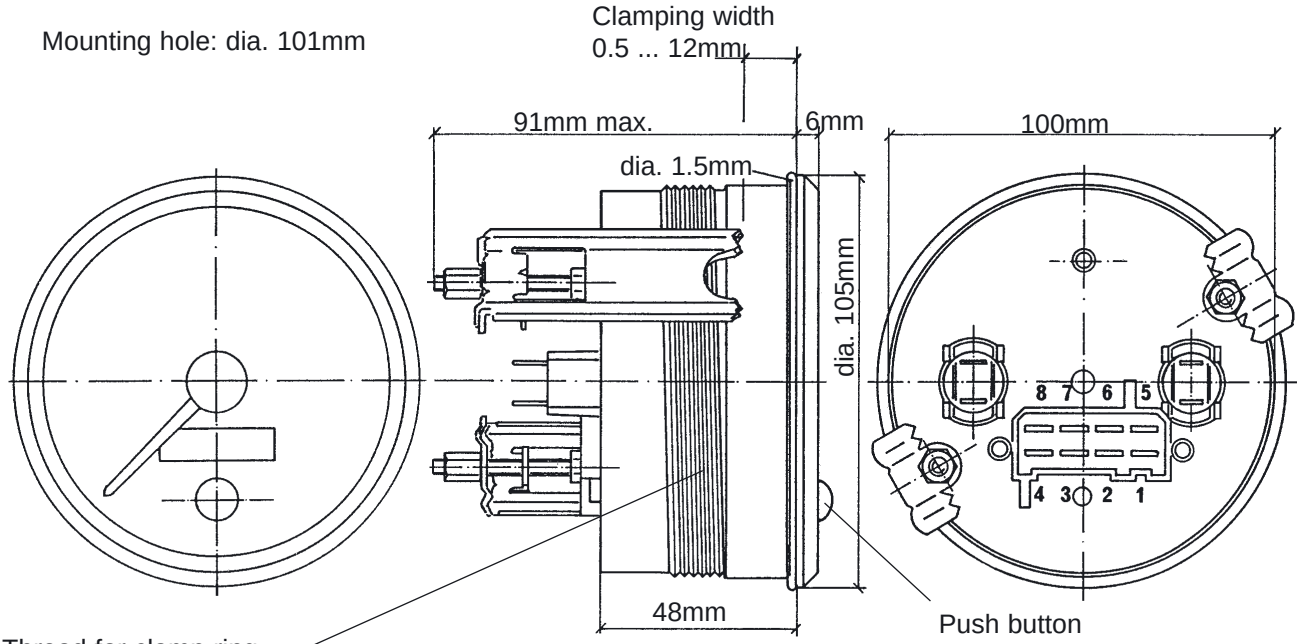
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.2 Technical Data

Operating voltage:	10 ... 31 V
Input voltage:	U_{low}: 0 V U_{high}: min. 1 V
Movement:	stepper motor
Pickup:	hall sensor or inductive sensor or blocking oscillator sensor or speed signal from electronics
Current consumption:	< 100 mA (120 mA with illumination)
Operating temp.:	– 20°C ... + 70°C
Storage temperature:	– 30°C ... + 85°C
Illumination:	2 light bulbs 12 V, 2 W
Protection:	IP64 DIN 40050 from the front, housing "ozon"-proof, "UV"-proof, CE approved, reverse-polarity protection
EMC test:	according to EN 13309 and ISO 13766
Vibration resistance:	max. 1g eff., 25 ... 500 Hz, duration 8h, f: 1 octave/min.
Nominal position:	NL 0 to NL 90, DIN 16257

VDO cockpit international

Ø 100 mm Floodlight



Ratio
500 ... 399990 pulses/km or mile
(adjustable)

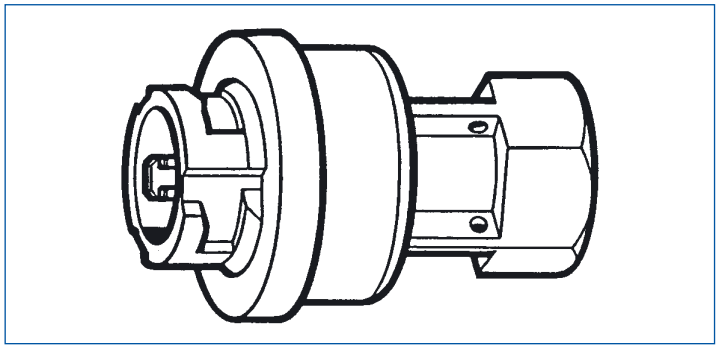
Pin assignment:
Pin 2: + 12 V for sensor
Pin 3: Ground (terminal 31)
Pin 4: + 10 ... + 31 V (terminal 15)
Pin 6: + 12 V for open collector sensor
Pin 7: Ground for 2-pole sensor wire
Pin 8: Input sensor signal

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

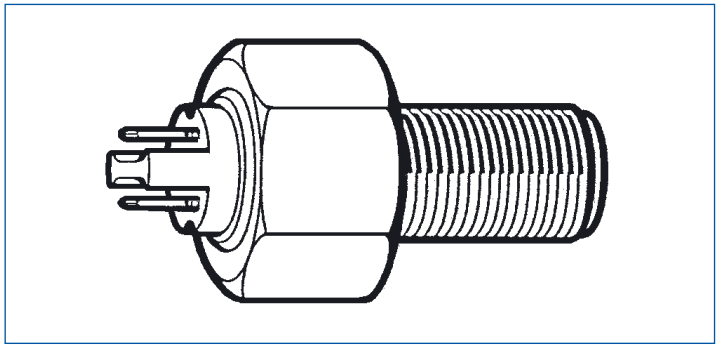
2.3 Speed Sensor

The speed sensor needed to operate the instrument is not included with the speedometer.
The following sped sensors (see data sheets for sensors) can be used:

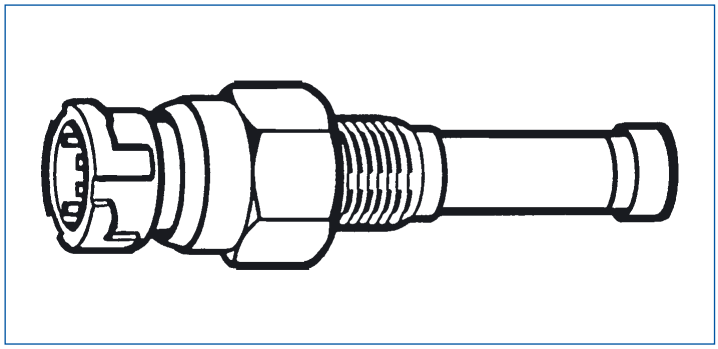
- **Hall sensor**



- **Inductive sensor**



- **Blocking oscillator sensor**

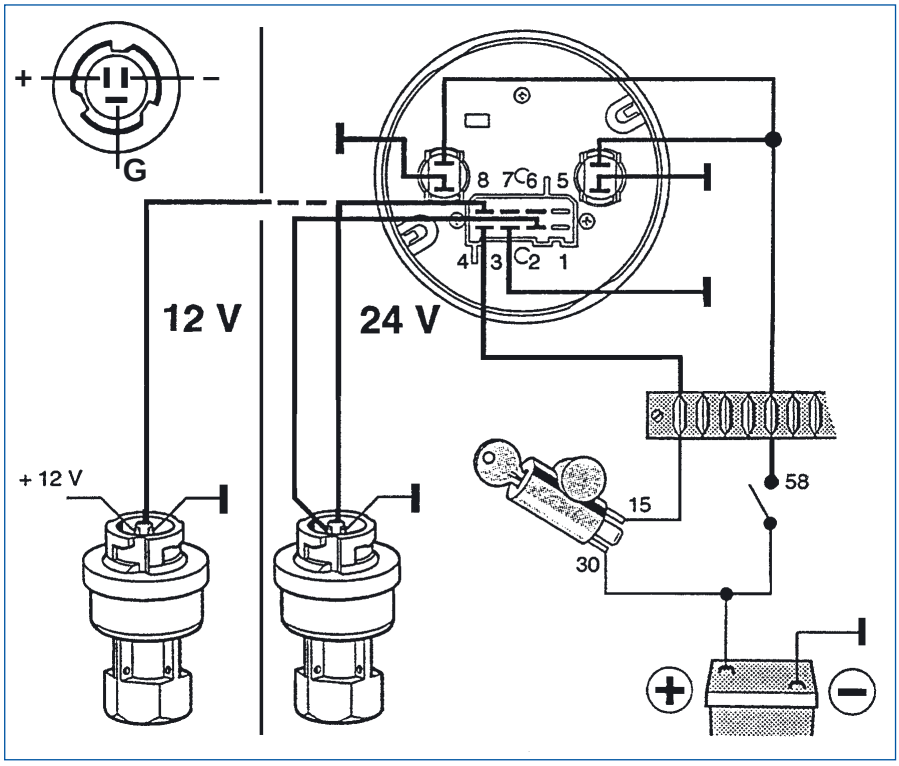


If the vehicle is already equipped with a speed sensor. Request a data sheet of this sensor. Ask your vehicle manufacturer or VDO Kienzle whether the speed sensor can be used.

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

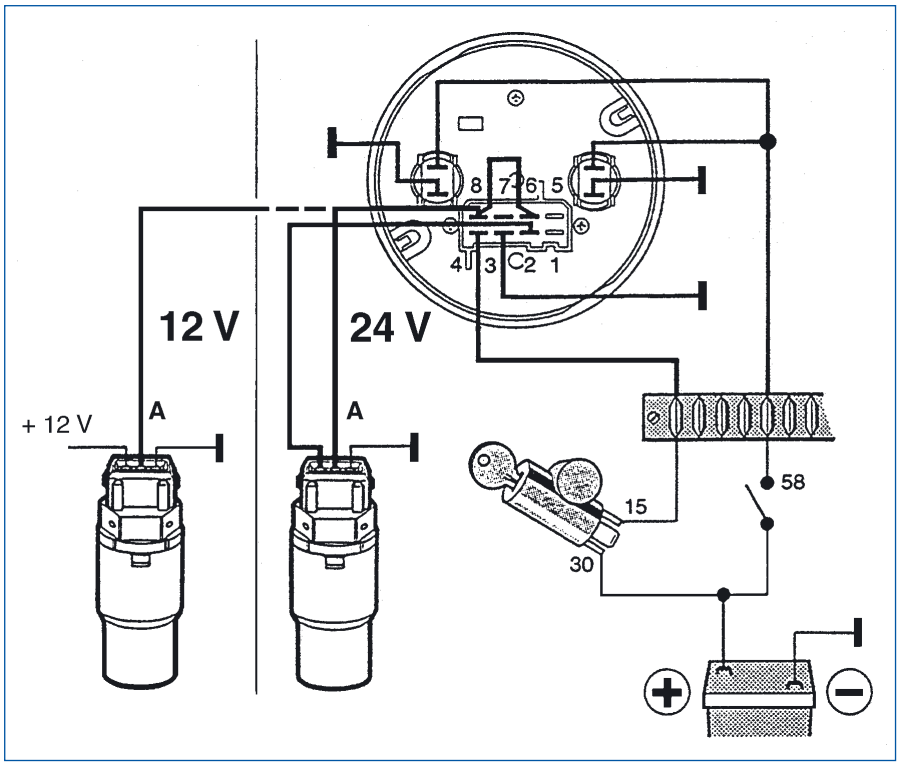
2.4 Wiring Diagrams

Hall sensor



Hall sensor
with ‘open collector’output

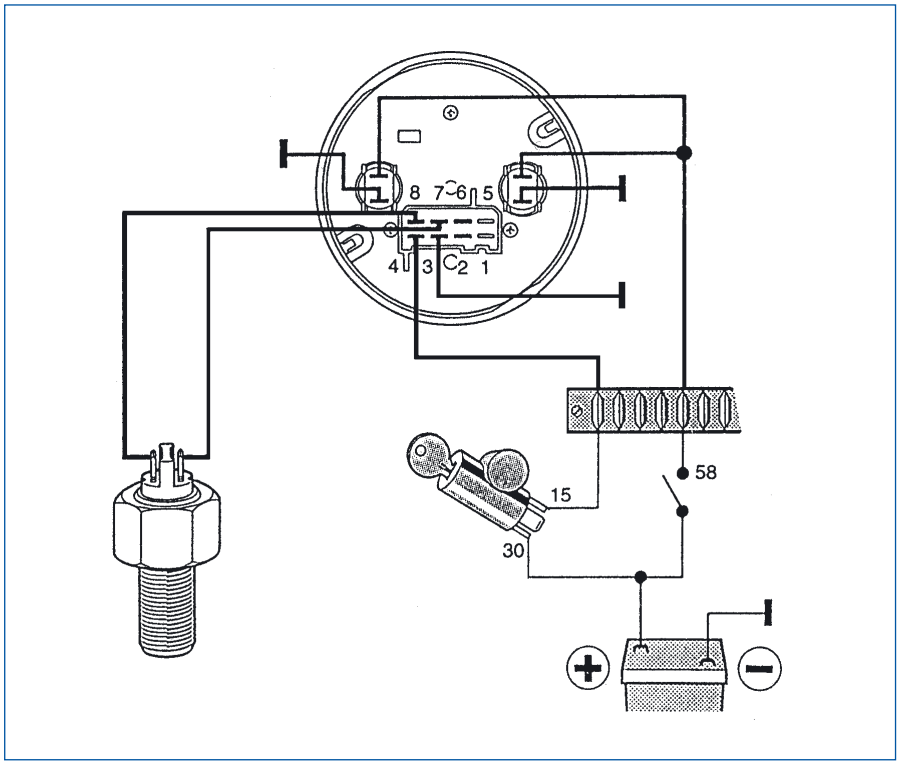
Pins 6 and 8 must be bridged for hall sensors with open collector output.



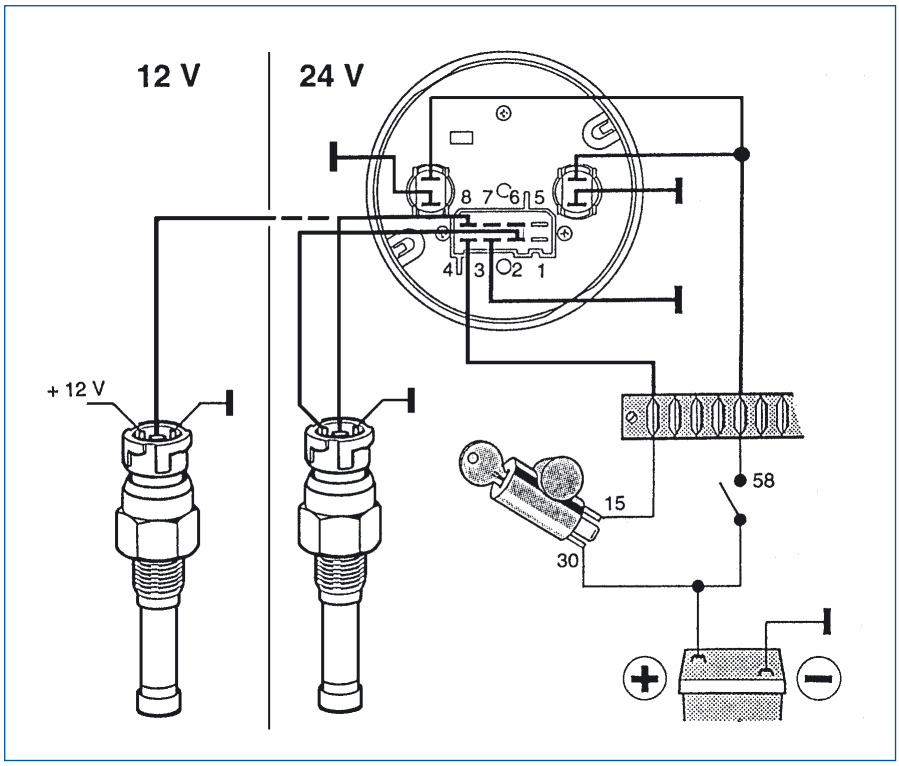
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.4 Wiring Diagrams

Inductive sensor



Blocking oscillator sensor



2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.5 Setting

3 alternatives can be used for setting the instrument:

2 options for pulse/distance ratio setting:

Function “AUtOCL” - automatic calibration by driving a measured distance (1 km or 1 mile).

Function “PULSE” - enter a known pulse/distance ratio.

1 possibility for fine adjustment of the speed indication:

Function “AdJUSt” - Calibration using a reference speed indication (roller test bench).

Note: Respect the tolerances per directive 75/443/EEC when calibrating the speed indication.

1. The vehicle is tested at the following speeds: 40 km/h, 80 km/h and 120 km/h or 80 % of the maximum speed specified by the manufacturer if it is lower than 150 km/h.

2. The error limit of the instrument used for the measurement of the effective vehicle speed shall not exceed ± 1 %.

3. If a measuring track is used, it shall be level and dry, and have a sufficiently non-skid surface.

4. The displayed speed shall never be lower than the effective speed. At the speed specified under 4. and at the intermediate values the difference of speed V1 displayed by the speedometer and effective speed V2 shall have the following equation:

$$0 \leq V_1 - V_2 \leq \frac{V_2}{10} + 4 \text{ km/h}.$$

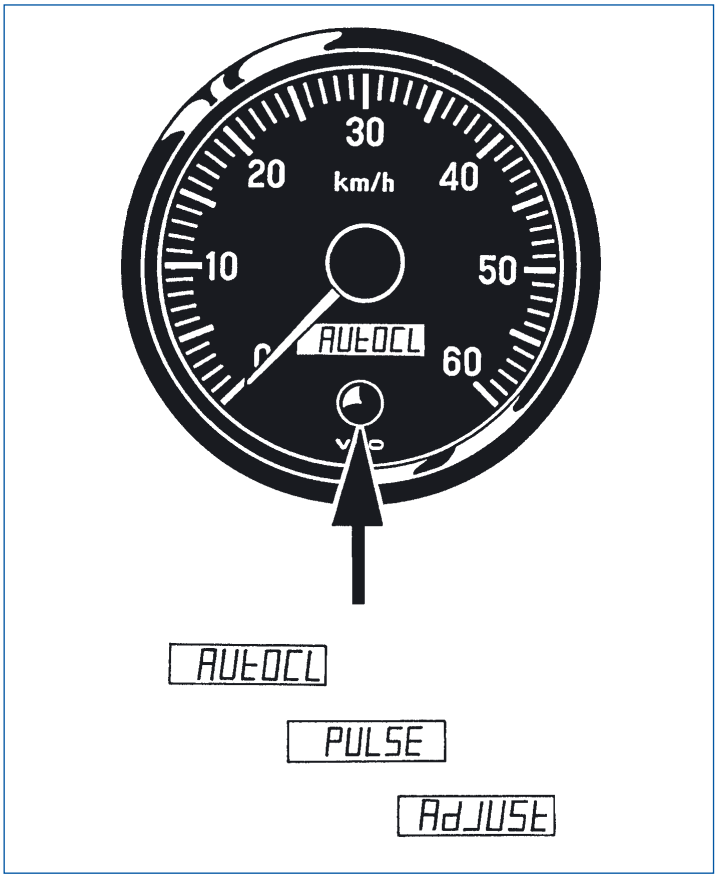
Or see your national laws (directives).

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.5 Setting

Selection of the functions

Push button in front lens and hold in. Switch the ignition (operating voltage) on.
The display alternates between ‘AUtOCL’, ‘PULSE’ and ‘AdJUSt’ at 2 seconds interval. Select a function by releasing the pushbutton when this function is displayed.



2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.5 Setting

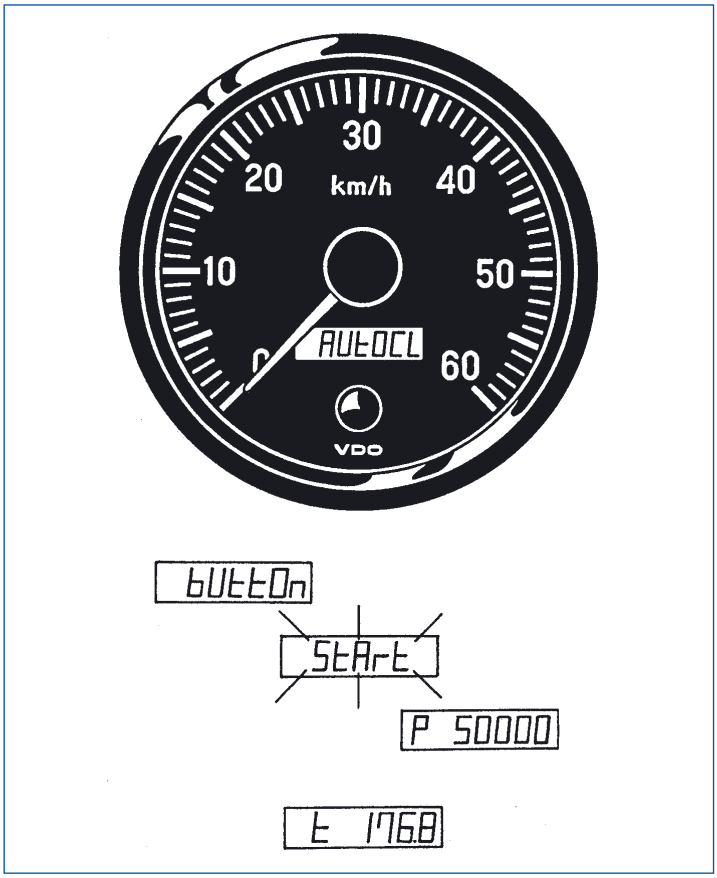
Function 'AUtOCL'

After selection of the function 'AUtOCL' the display changes to 'bUttOn' after 3 seconds:

Ask a passenger to assist with the calibration!
No speed is displayed during the measuring drive!

During the drive exactly at the beginning of the measuring track (1km or 1mile) push the button briefly, the display flashes 'StArt'. Drive the test track with as constant a speed as possible. Exactly at the end of the measuring track again briefly push the button. The determined pulse/distance ratio is displayed if it is between 500 and 399990 pulses (e.g. 'P 50000', which corresponds to pulse/distance ratio 50000). The calibration is completed if the display changes to total or partial distance display.

Repeat the calibration if the display flashes 'F00' (no pulses). The sequence is the same as described above.



2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

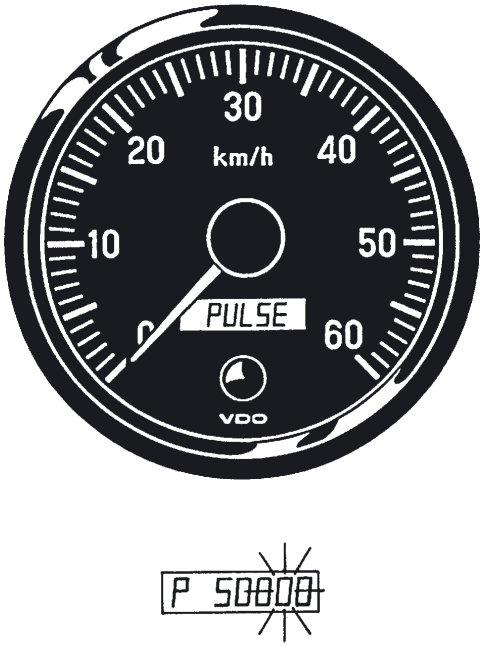
2.5 Setting

Function 'PULSE'

After selection of the function 'PULSE' the display shows 'P 50000', for instance, after 3 seconds, with the digit before the last one flashing start entering the pulse/distance ratio immediately.
The flashing digit is changed by pushing the button (adjustable pulse/distance ratio 500 to 399990). After entry of the pulse/distance ratio the display changes to total or partial distance display, the calibration is completed.

A new setting is required if the digit before the last one is flashing in the display after pulse/distance ratio setting. The sequence is the same as described above.

The function 'PULSE' can be used to check the pulse/distance ratio stored by automatic calibration (function 'AUtOCL'). The stored pulse/distance ratio is displayed (e.g. 'P 50000'), and the digits start flashing, beginning with the digit before the last one.



2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.5 Setting

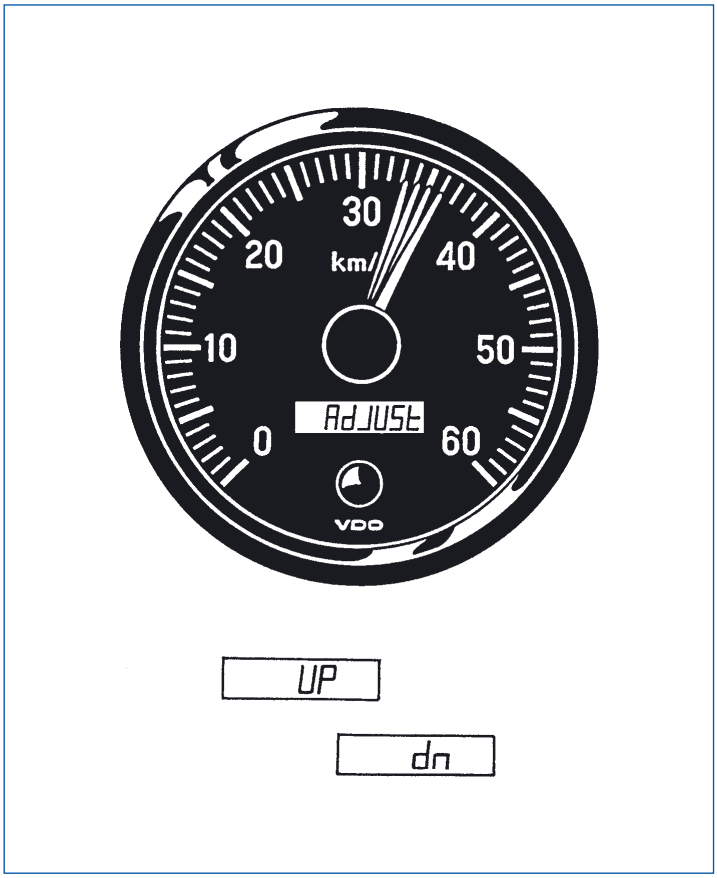
Function ‘AdJUSt’

After selection of the function ‘AdJUSt’ the display alternates between ‘UP’ and ‘dn’ (down) after 3 seconds.

Only use this function on the roller test bench!
The fine adjustment is only possible between 30 % and 100 % of the indicating range. No pulse/distance ratio counting takes place during fine adjustment.

Pushing and holding the button when ‘UP’ is displayed increases the pointer indication (‘dn’ will lower it accordingly). Initially the change of the indication will be very slow for a very precise adjustment. Releasing the button for a short time repeats the cycle. The rate of pointer indication change increases when the button is held for a longer time. Release the button when the pointer indication corresponds to the reference speed. After 1 minute the display shows total or partial distance. Fine adjustment has been completed.

A wrong pulse/distance ratio entry (function ‘PULSE’) exists if the display starts flashing during fine adjustment. The pulse/distance ratio is either below 500 or above 399990.
Repeat the calibration with the function ‘PULSE’.



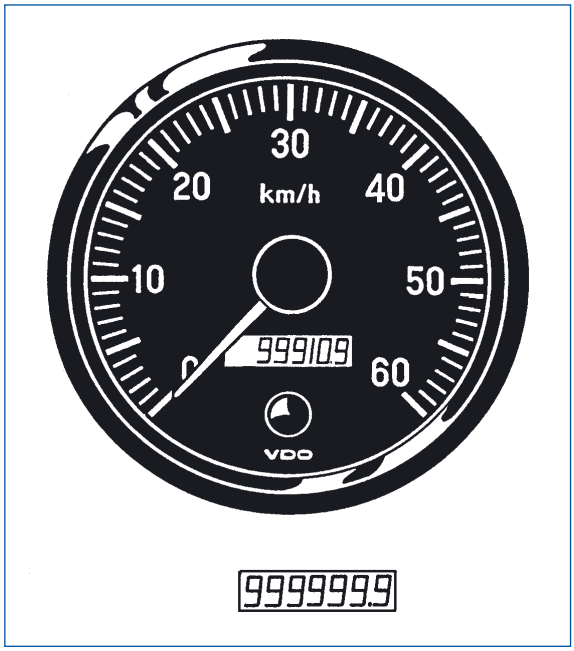
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.6 Operation

Only efficent when ignition is switched on.

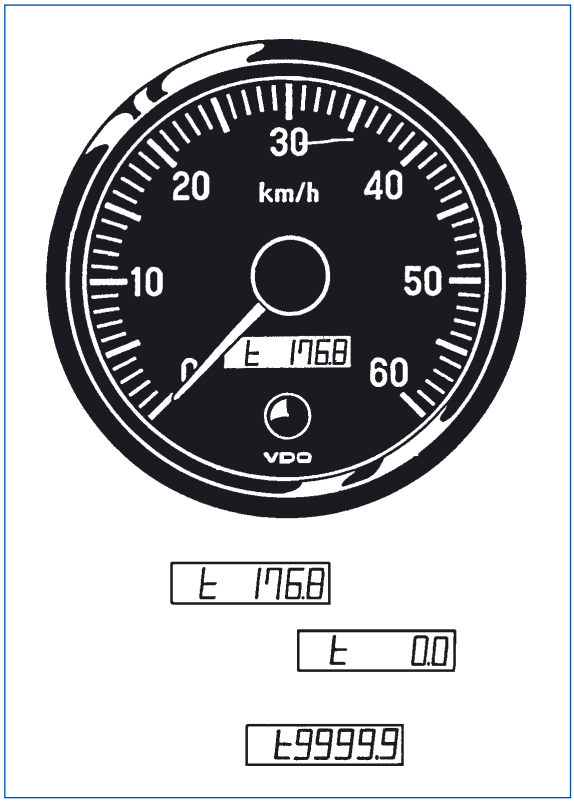
Briefly pushing the button alternates the total distance display (e.g. ‘99910.9’) with the partial distance display (e.g. ‘ t 176.8’).

The total distance function counts the total mileage in kilometer or miles up to 999999.9 max..
This display cannot be reset.



The partial distance function counts the mileage in kilometer or miles up to ‘t9999.9’.
This display is reset to ‘t0.0’ by pushing the button (for 2 seconds approximately).

Pushing the button for 2 seconds when total distance is displayed will also reset the partial distance to ‘t0.0’.



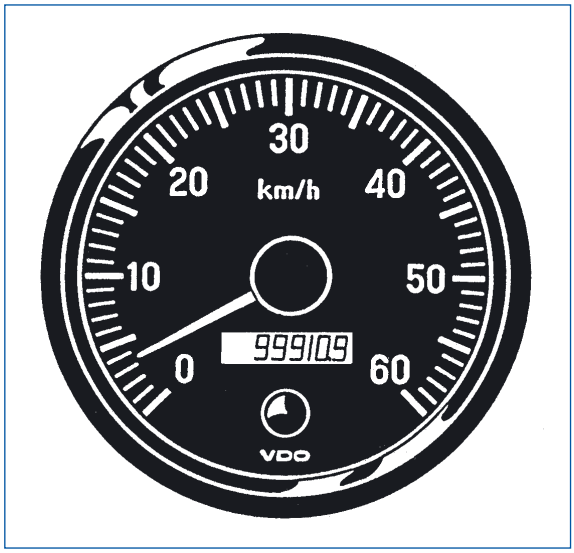
Trip and total distance remain stored after the operating voltage is switched off.

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.7 Speed Display

Note:

When ignition is switched off, the pointer remains at the last speed indicated, until the ignition is switched on again, without starting the engine, the pointer will then return to the zero position.



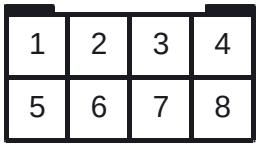
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.8 Testing Instruction

Test accessories

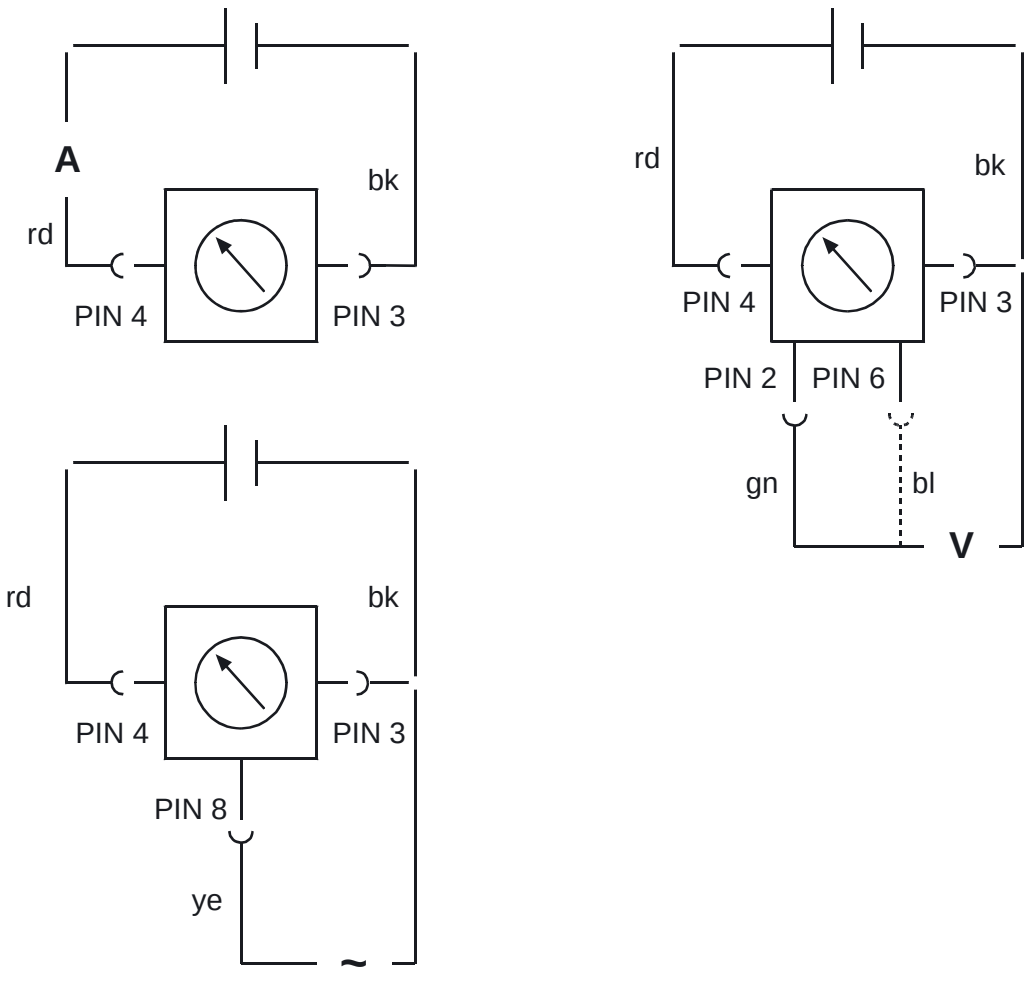
1x Power supplyl
1x Test cable No. 2 } contained in test cables kit
1x Measuring cable } X12-019-101-001
1x Frequency generator
1x Ammeter
1x Voltmeter

Connector pin allocation



Pin 2 + 12 V for sensor
Pin 3 Ground
Pin 4 + 10V to + 31V
Pin 6 + 12 V for open collector sensor
Pin 8 Sensor signal input

Test circuit diagram



2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.8 Testing Instruction

Test method description

Basic setting: 12V to 24V instruments	➡	U = 18V ± 2V

Measurement of current consumption

Connect instrument with test cable No. 2 as shown in test circuit diagram I.

Range of values: 12V to 24V instruments ➡ I = 52 ± 5.2 mA

Test of outputs pin 2 and pin 6

Connect instrument with test cable No. 2 as shown in test circuit diagram II.

Range of values: 12V to 24V instruments ➡ U = 14.5 ± 2 V

Test of distance counter

Connect instrument with test cable No. 2 as shown in test circuit diagram III.

Connect a square wave signal to pin 8 of the connector. The frequency depends on the maximum speed and the pulse/distance ratio. Use the formula given under ‘Pointer position test’, section b, for the accurate calculation of the maximum square wave frequency. The amplitude is in the range 1 to 10 V.
After connection of the operating voltage the display will show the total or the partial distance. Set the frequency generator to 0 Hz, and slowly raise the frequency until the counter starts counting (e.g. at 60 km/h, 1 minute = 1 kilometer).

It is only possible to zero the total odometer reading with the testing software (see chapter 18.2.6).

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.8 Testing Instructions

Pointer position test

a) Zero point test

Connect instrument with test cable No.2 as shown in test circuit diagram III.
Connect the operating voltage and check pointer deviation. The allowed deviation is ±1 degree of angle.

b) Full scale indication test

Connect instrument with test cable No.2 as shown in test circuit diagram III.

$$f_{max} = \frac{\text{speed x pulse/distance ratio (K)}}{3600}\ [Hz]$$

c) Speed indication test

At 40 km/h, 80 km/h and 120 km/h or 80% of full scale if it is lower than 150 km/h.
Connect instrument with test cable No. 2 as shown in test circuit diagram III.

$$f_{max} = \frac{\text{speed x pulse/distance ratio (K)}}{3600}\ [Hz]$$

Note:

Respect the tolerances per directive 75/443/EEC or your national laws (directives) when testing the speed indication.

The directive 75/443/EEC says that the following relation must exist between the displayed (per speedometer) and the effective speed (per test fixture):

v_1 = displayed speed v_2 = effective speed

$$0 \le V1 - V2 \le \frac{V2}{10} + 4\ km/h.$$

Examble:
Speedometer, full scale 300 km/h, pulse/distance ratio (K) = 6000 pulses/km

$$f_{max} = \frac{\text{speed x pulse/distance (K)}}{3600}\ [Hz]$$

The maximum tolerance of this speedometer (at 500 Hz = full scale) is:

$$[v_1 - 300 \le \frac{300}{10} + 4\ km/h] = [v_1 - 300 \le +\ 34\ km/h]$$

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.9 Instruments Survey

VDO cockpit vision (Backlight) dia. 80 mm / dia. 100 mm **Part No. 437-015-. . .**

Dial		Special feature	Part No.
Range	Imprint		
0 ... 200 km/h	km/h	dia. 80 mm, 12 - 24 V 12 V illumination	**001K**
0 ... 300 km/h	km/h	dia. 80 mm, 12 - 24 V 12 V illumination	**002K**
▲ 0 ... 140 mph / 220 km/h	MPH, km/h	dia. 80 mm, 12 - 24 V ● 12 V illumination, dual scale	**016C**
0 ... 200 km/h	km/h	dia. 100 mm, 12 - 24 V 12 V illumination	**007G**
0 ... 300 km/h	km/h	dia. 100 mm, 12 - 24 V 12 V illumination	**008G**
▲ 0 ... 220 mph / 360 km/h	MPH, km/h	dia. 100 mm, 12 - 24 V 12 V illumination, dual scale	**009G**
▲ 0 ... 140 mph / 220 km/h	MPH, km/h	dia. 100 mm, 12 - 24 V ● 12 V illumination, dual scale	**017C**

▲ range stated first is outer range

● with clamp ring instead of stud bolts and brackets

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.9 Instruments Survey

VDO cockpit international (Floodlight) dia. 80 mm **Part No. 437-035-. . .**

Dial		Special feature	Part No.
Range	Imprint		
0 ... 60 km/h	km/h	dia. 80 mm, 12 - 24 V 12 V illumination	**001C** **001G**
0 ... 120 km/h	km/h	dia. 80 mm, 12 - 24 V 12 V illumination	**002C *** **002G**
0 ... 200 km/h	km/h	dia. 80 mm, 12 - 24 V 12 V illumination	**003C *** **003G**
0 ... 80 km/h	km/h	dia. 80 mm, 12 - 24 V 12 V illumination	**012C**
▲ 0 ... 50 mph / 80 km/h	MPH, km/h	dia. 80 mm, 12 - 24 V ● 12 V illumination, dual scale	**013C ***
▲ 0 ... 85 mph / 135 km/h	MPH, km/h	dia. 80 mm, 12 - 24 V ● 12 V illumination, dual scale	**014C**
▲ 0 ... 120 mph / 190 km/h	MPH, km/h	dia. 80 mm, 12 - 24 V ● 12 V illuminatio, dual scale	**015C**
▲ 0 ... 50 km/h / 30 mph	km/h, MPH	dia. 80 mm, 12 - 24 V ● 12 V illumination, dual scale	**017C**

▲ range stated first is outer range

● with clamp ring instead of stud bolts and brackets * phase-out

2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.9 Instruments Survey

VDO cockpit international (Floodlight) dia. 100 mm Part No. 437-035-. . .

Dial		Special feature	Part No.
Range	Imprint		
0 ... 120 km/h	km/h	dia. 100 mm, 12 - 24 V 12 V illumination ▼	**011C**

▼ with profile rubber ring instead of stud bolts and brackets

VDO cockpit international (Floodlight) dia. 100 mm Part No. 437-055-. . .

Dial		Special feature	Part No.
Range	Imprint		
0 ... 60 km/h	km/h	dia.100 mm, 12 - 24 V 12 V illumination	**001C *** **001G**
0 ... 120 km/h	km/h	dia.100 mm, 12 - 24 V 12 V illumination	**002C** **002G**
▲ 0 ... 50 mph / 80 km/h	MPH, km/h	dia.100 mm, 12 - 24 V 12 V illumination, dual scale ●	**004C**
▲ 2 ... 85 mph / 135 km/h	MPH, km/h	dia.100 mm, 12 - 24 V 12 V illumination, dual scale ●	**005C**
▲ 0 ... 120 mph / 190 km/h	MPH, km/h	dia.100 mm, 12 - 24 V 12 V illumination, dual scale ●	**006C**
0 ... 80 km/h	km/h	dia.100 mm, 12 - 24 V 12 V illumination	**009C**

▲ range stated first is outer range

● with clamp ring instead of stud bolts and brackets * phase-out

VDO cockpit vision, VDO cockpit international, VDO modulcockpit II

Operating Instructions For Electronic Speedometer

SIEMENS VDO Automotive

1. Setting

3 alternatives can be used for setting the instrument:

2 options for pulse/distance ratio setting:

Function **'AUtOCL'**- automatic calibration by driving a measured distance (1 km or 1 mile)

Function **'PULSE '**- enter a known pulse/distance ratio

1 possibility for fine adjustment of the speed indication:

Function **'AdJUSt '**- calibration using a reference speed indication (roller test bench)

Note: Respect the tolerances per directive75/443/EEC when calibrating the speed indication. A reference to them is made in § 57 StVZO, chapter 4, requirements, states:

4.3.5 The vehicle is tested at the following speeds: 40 km/h, 80 km/h and 120 km/h or 80% of the maximum speed specified by the manufacturer if it is lower than 150 km/h.

4.3.6 The error limit of the instrument used for the measurement of the effective vehicle speed shall not exceed ± 1 %.

4.3.6.1 If a measuring track is used, it shall be level and dry, and have a sufficiently non-skid surface.

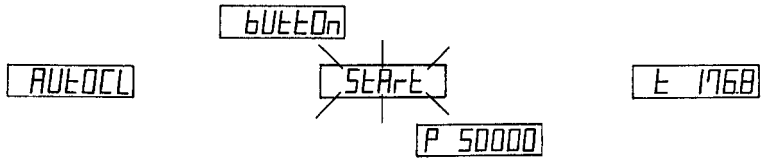
4.4 The displayed speed shall never be lower than the effective speed. At the speed specified under 4.3.5. and at the intermediate values the difference of speed V1 displayed by the speedometer and effective speed V2 shall have the following equation:

$$0 \leq V1 - V2 \leq \frac{V2}{10} + 4 \text{ km/h}$$

1.1 Selection Of The Functions

Push button in front lens and hold in. Switch the ignition (operating voltage) on. The display alternates between 'AUtOCL', 'PULSE' and 'AdJUSt' at 2 seconds interval. Select a function by releasing the push button when this function is displayed.

1.2 Function 'AUtOCL'



After selection of the function **'AUtOCL'** the display changes to 'bUttOn' after 3 seconds:

Ask a passenger to assist with the calibration!
No speed is displayed during the measuring drive!

During the drive exactly at the beginning of the measuring track (1 km or 1 mile) push the button briefly, the display flashes 'StArt'. Drive the test track with as constant a speed as possible. Exactly at the end of the measuring track again briefly push the button. The determined pulse/distance ratio is displayed if it is between 500 and 399990 pulses (e.g. 'P 50000', which corresponds to pulse/distance ratio 50000). The calibration is completed if the display changes to total or partial distance display.

Repeat the calibration if the display flashes 'F00' (no pulses). The sequence is the same as described above.

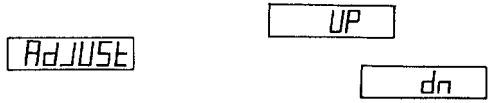
1.3 Function 'PULSE'

After selection of the function **'PULSE'** the display shows 'P 50000', for instance, after 3 seconds, with the digit before the last one flashing start entering the pulse/distance ratio immediately. The flashing digit is changed by pushing the button (adjustable pulse/distance ratio 500 to 399990). After entry of the pulse/distance ratio the display changes to total or partial distance display, the calibration is completed.

A new setting is required if the digit before the last one is flashing in the display after pulse/distance ratio setting. The sequence is the same as described above.

The function 'PULSE' can be used to check the pulse/distance ratio stored by automatic calibration (function 'AUtOCL'). The stored pulse/distance ratio is displayed (e.g. 'P 50000'), and the digits start flashing, beginning with the digit before the last one.

1.4 Function 'Adjust'



After selection of the function **'AdJUSt'** the display alternates between 'UP' or 'dn' (up/down) after 3 seconds.

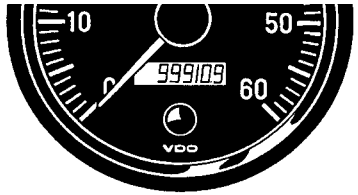
Only use this function on the roller test bench!
The fine adjustment is only possible between 30% and 100% of the indicating range. No pulse/distance ratio counting takes place during fine adjustment.

Pushing and holding the button when 'UP' is displayed increases the pointer indication ('dn' will lower it accordingly). Initially the change of the indication will be very slow for a very precise adjustment. Releasing the button for a short time repeats the cycle. The rate of pointer indication change increases when the button is held for a longer time. Release the button when the pointer indication corresponds to the reference speed. After 1 minute the display shows total or partial distance. Fine adjustment has been completed.

A wrong pulse/distance ratio entry (function 'PULSE') exists if the display starts flashing during fine adjustment. The pulse/distance ratio is either below 500 or above 399990. Repeat the calibration with the function 'PULSE'.

2. Operation

max. 999999.9



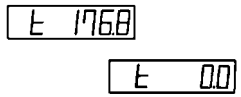
Briefly pushing the button alternates the total distance display (e.g. '99910.9') with the partial distance display (e.g. 't 176.8').

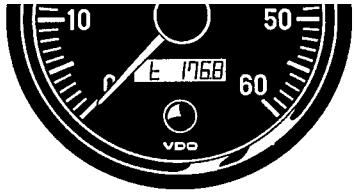
The total distance function counts the total mileage in kilometers or miles up to 999999.9 max.. This display cannot be reset.

The partial distance function counts the mileage in kilometers or miles up to "t9999.9'.
This display is reset to 't0.0' by pushing the button (for 2 seconds approximately).

Pushing the button for 2 seconds when total distance is displayed will also reset the partial distance to 't0.0'.

max. t9999.9





Trip and total distances remain stored after the operating voltage is switched off.

3. Speed Display

Note:

When ignition is switched off, the pointer remains at the last speed indicated, until the ignition is switched on again, without starting the engine, the pointer will then return to the zero position.