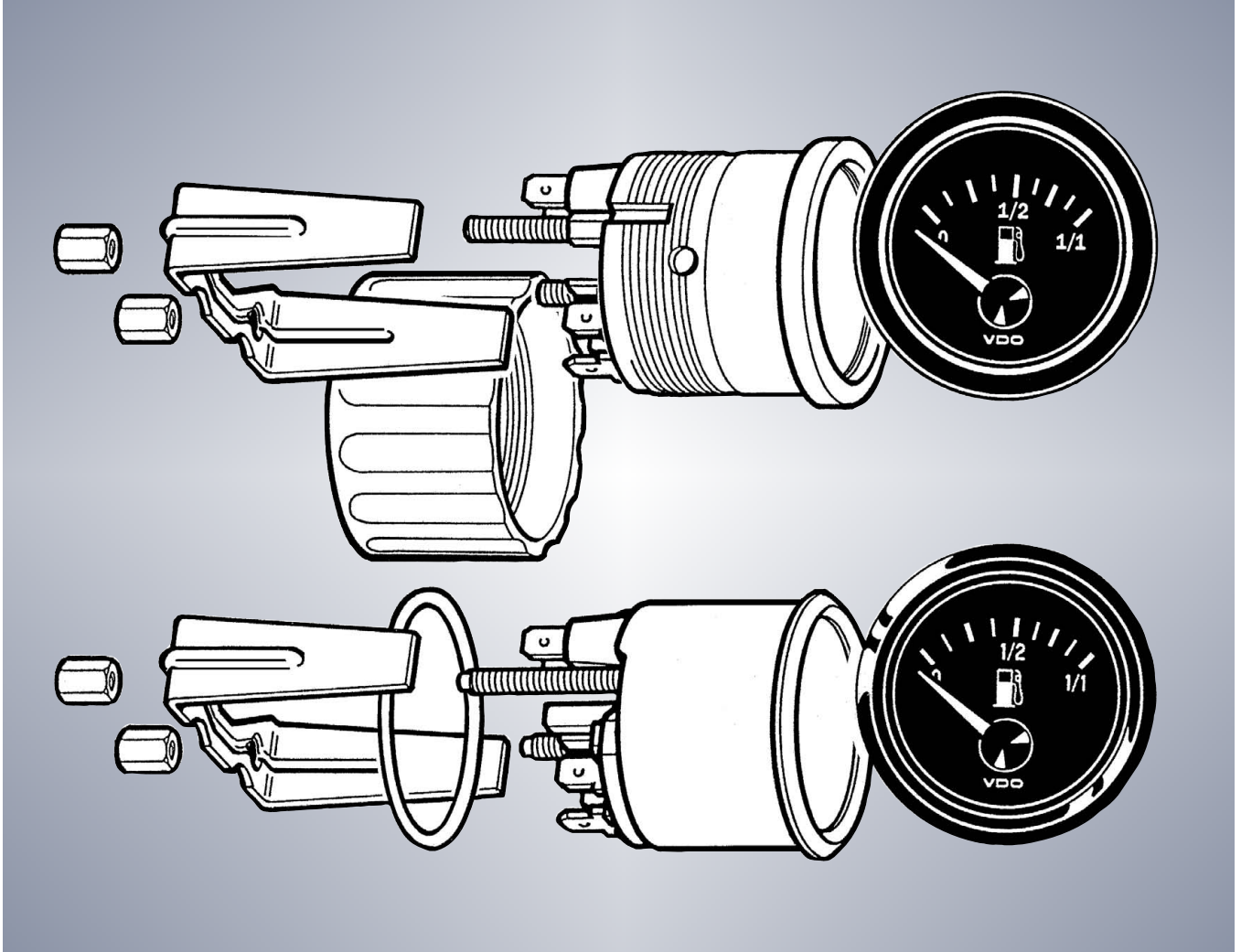


VDO cockpit vision / international

Instruments



www.siemensvdo.com

Technical Product Manual

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

Contents	Page
2.1 General informations	2 - 2
2.2 Technical data	2 - 4
2.3 Speed sensor	2 - 8
2.4 Wiring diagrams	2 - 9
2.5 Setting	2 - 11
2.6 Operation	2 - 16
2.7 Speed display	2 - 17
2.8 Testing instructions	2 - 18
2.9 Instruments survey	2 - 21

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.

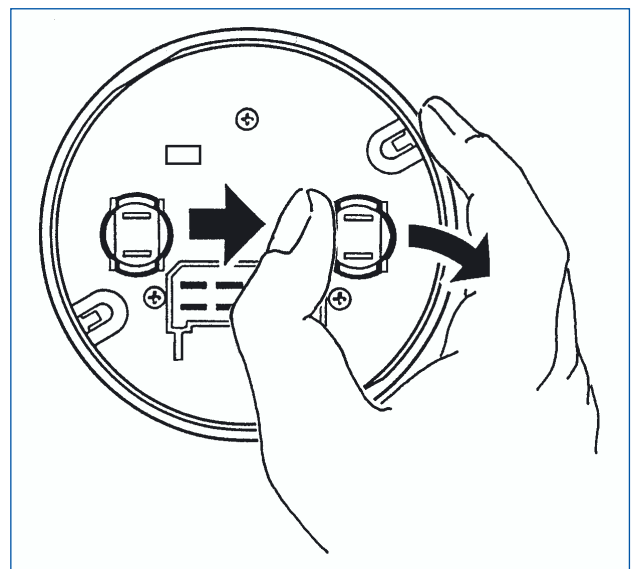
A pushbutton in the front lens is provided for setting and operation of the instrument.



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

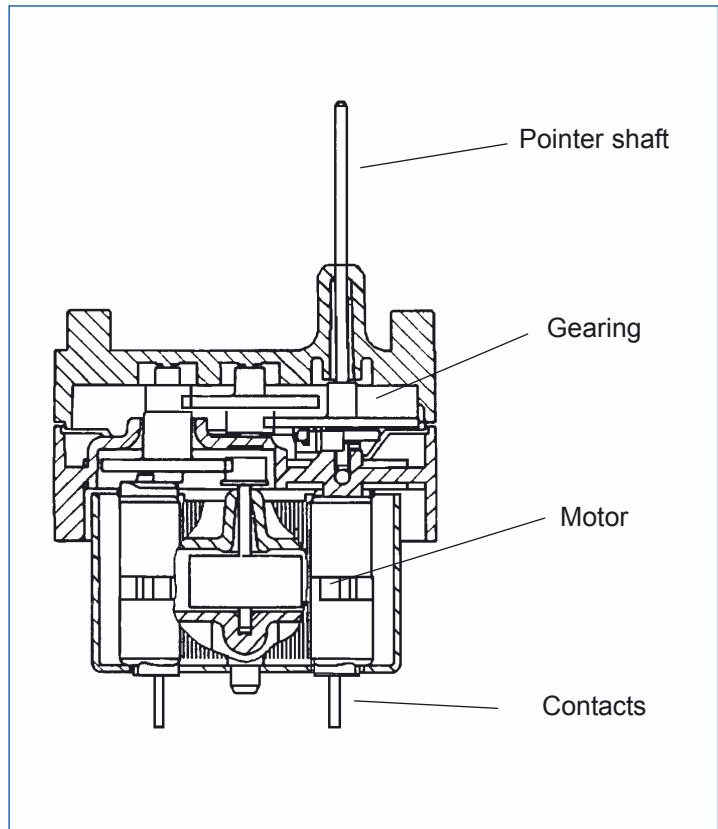
Stepper motor movement

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 sinusoidal 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 ($\sin^2\varnothing + \cos^2\varnothing = 1$).

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.

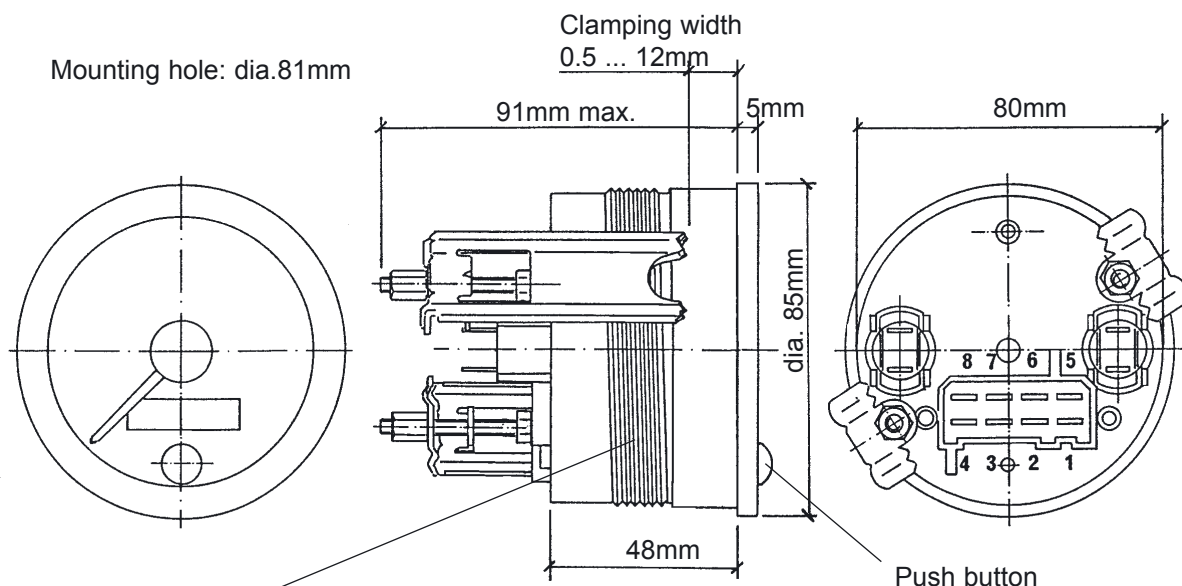


2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.2 Technical Data

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

VDO cockpit vision
Ø 80 mm Backlight



Thread for clamp ring
(clamping width 0.5 ... 12mm
or 12 ... 23mm)

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

Pin assignment:

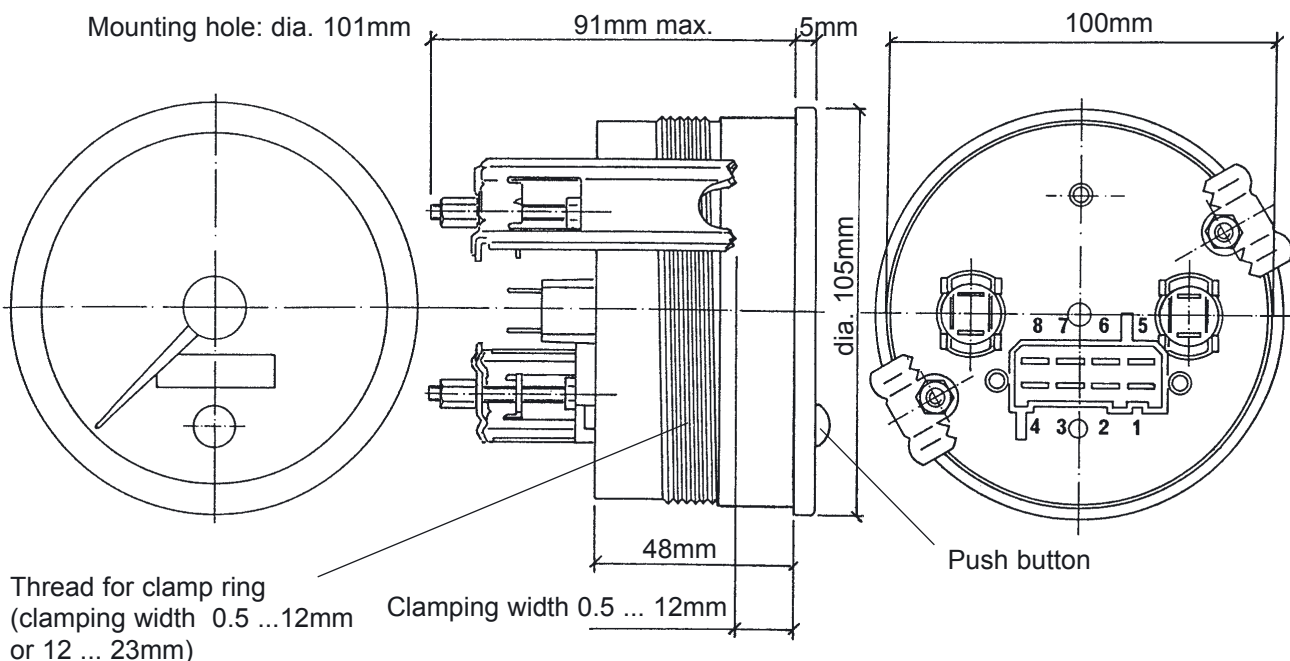
- Pin 2: + 12 V for sensor
- Pin 3: Ground (terminal 31)
- Pin 4: + 10 ... + 31 V (terminal 15)
- Pin 6: + 12 V for open collector sensor
- Pin 7: Ground for 2-pole sensor wire
- Pin 8: Input sensor signal

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 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

VDO cockpit vision
Ø 100 mm Backlight



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

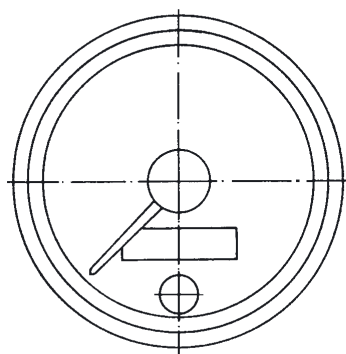
VDO cockpit international

Ø 80 mm

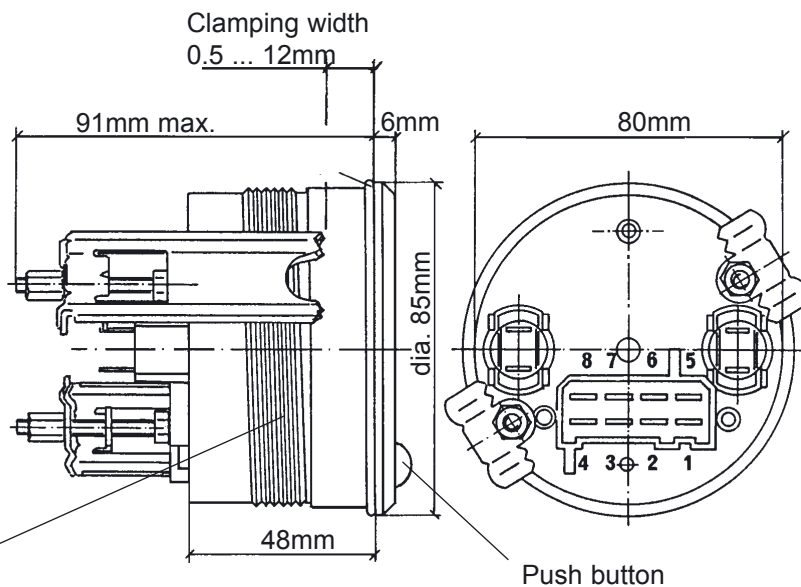
Floodlight



Mounting hole: dia. 81mm



Thread for clamp ring
(clamping width 0.5 ... 12mm
or 12 ... 23mm)



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

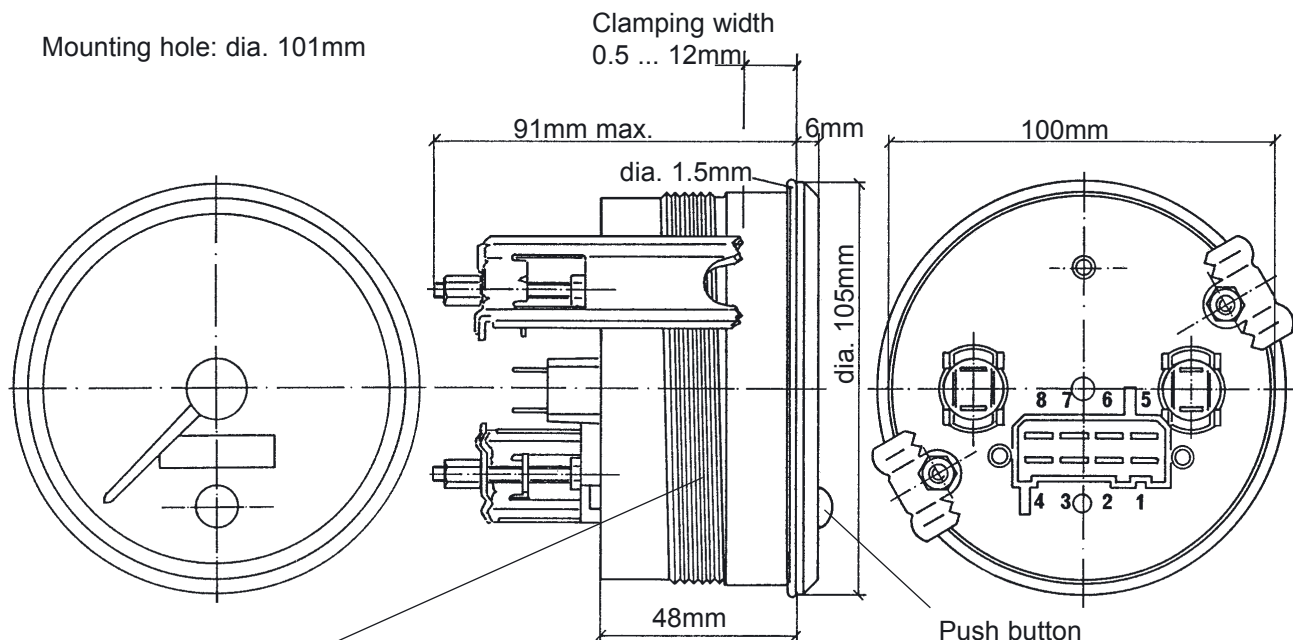
Ø 100 mm

Floodlight



Mounting hole: dia. 101mm

Clamping width
0.5 ... 12mm



Thread for clamp ring
(clamping width 0.5 ... 12mm
or 12 ... 23mm)

Ratio

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

Pin assignment:

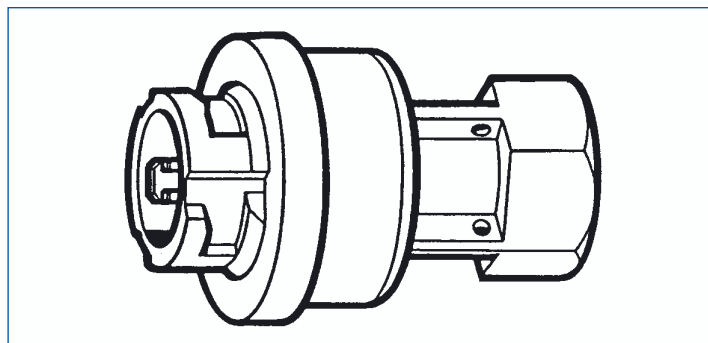
- Pin 2: + 12 V for sensor
- Pin 3: Ground (terminal 31)
- Pin 4: + 10 ... + 31 V (terminal 15)
- Pin 6: + 12 V for open collector sensor
- Pin 7: Ground for 2-pole sensor wire
- Pin 8: Input sensor signal

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

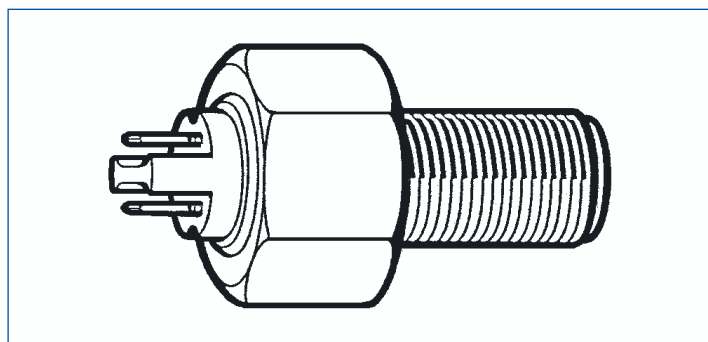
2.3 Speed Sensor

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

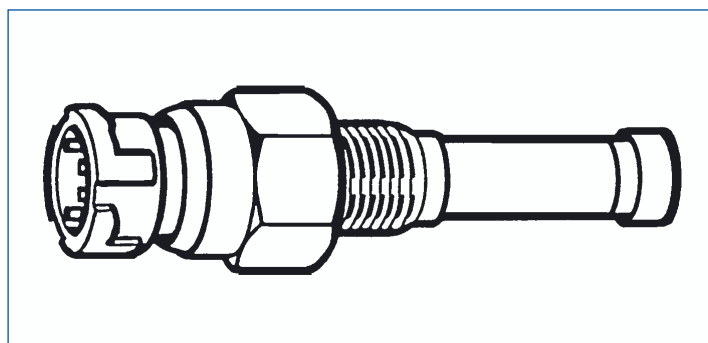
- **Hall sensor**



- **Inductive sensor**



- **Blocking oscillator sensor**

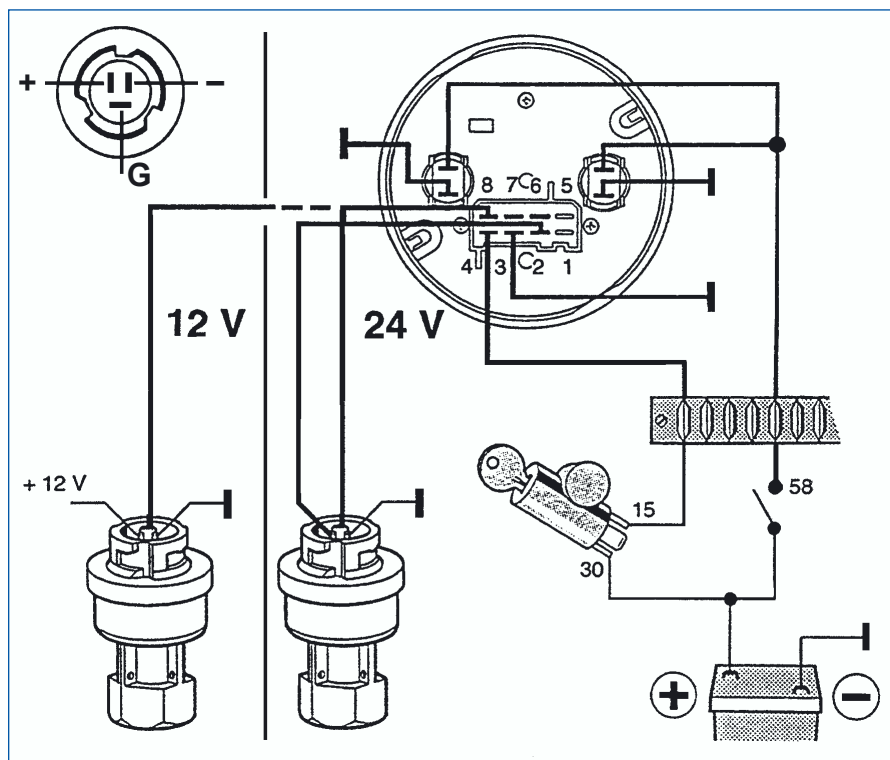


If the vehicle is already equipped with a speed sensor. Request a data sheet of this sensor. Ask your vehicle manufacturer or VDO Kienzle whether the speed sensor can be used.

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

2.4 Wiring Diagrams

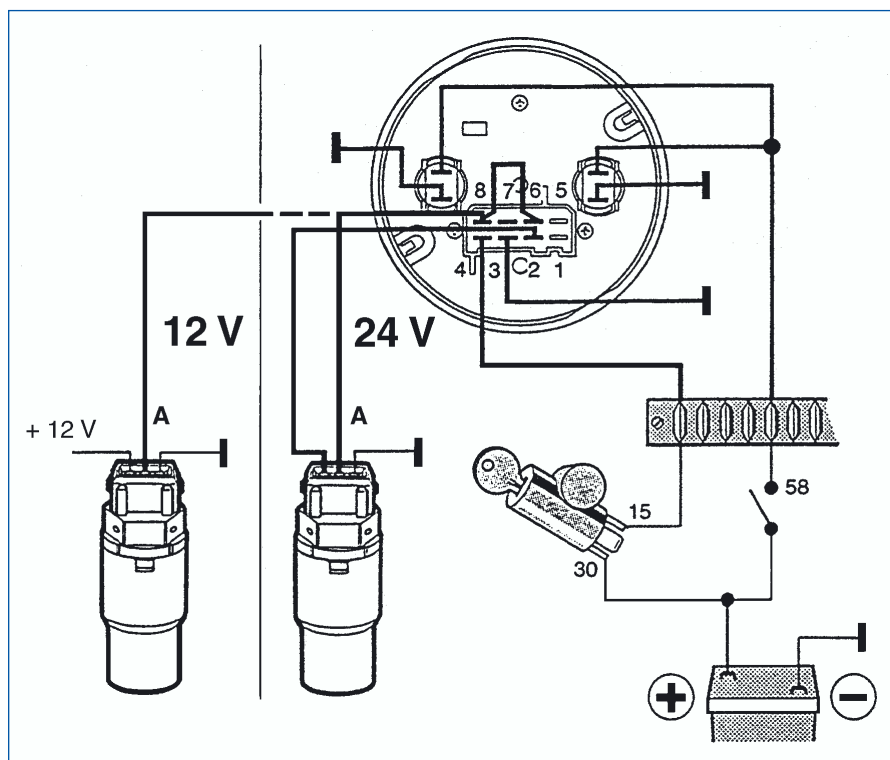
Hall sensor



Hall sensor

with 'open collector' output

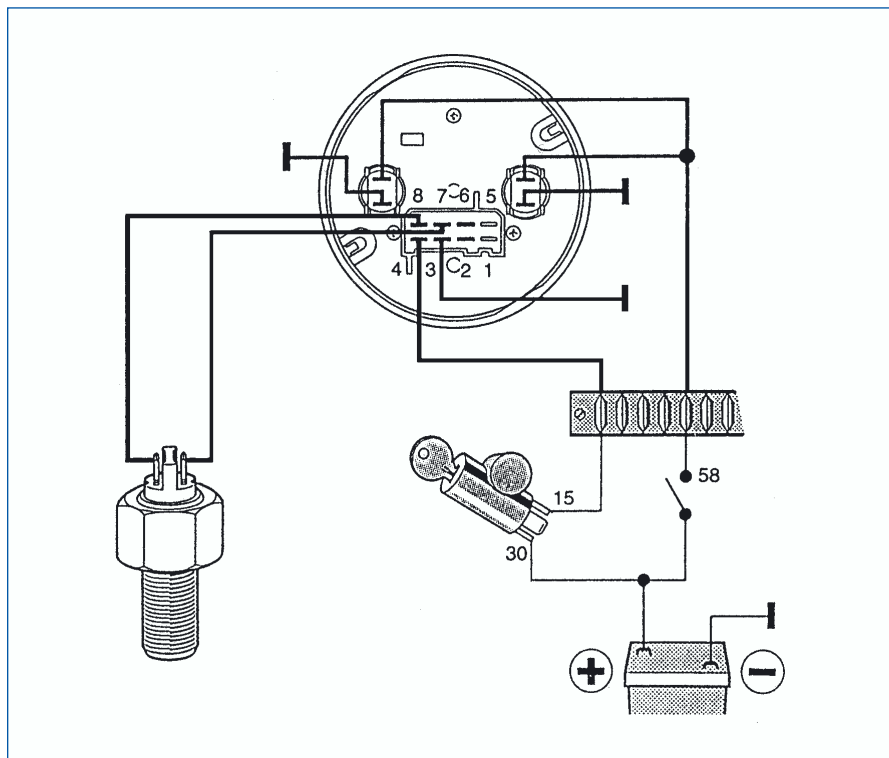
Pins 6 and 8 must be bridged for hall sensors with open collector output.



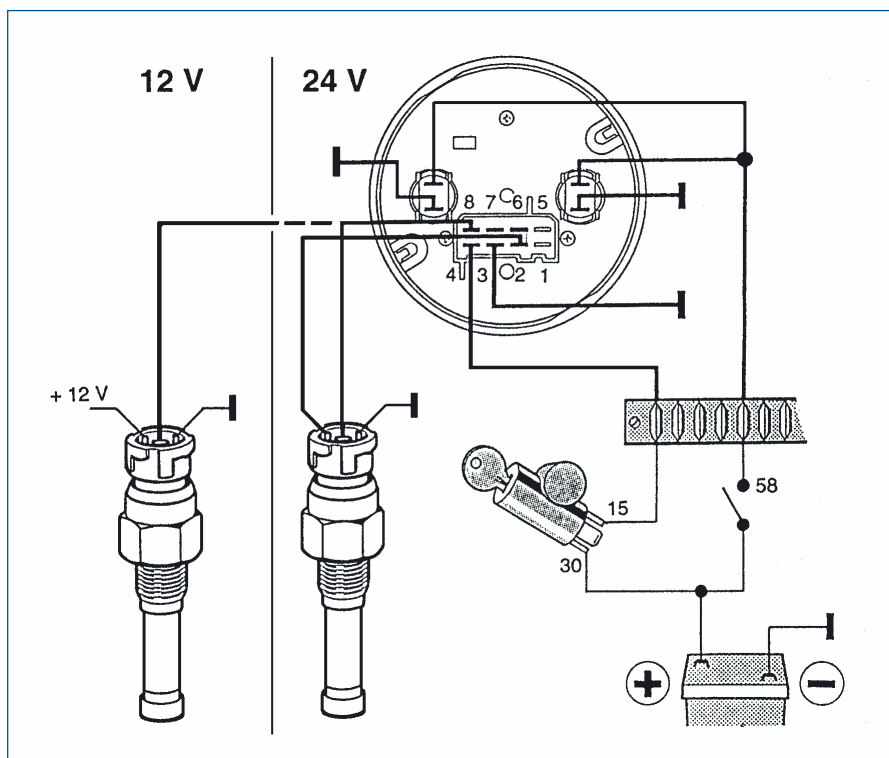
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

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 $\pm 1 \%$.
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:

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

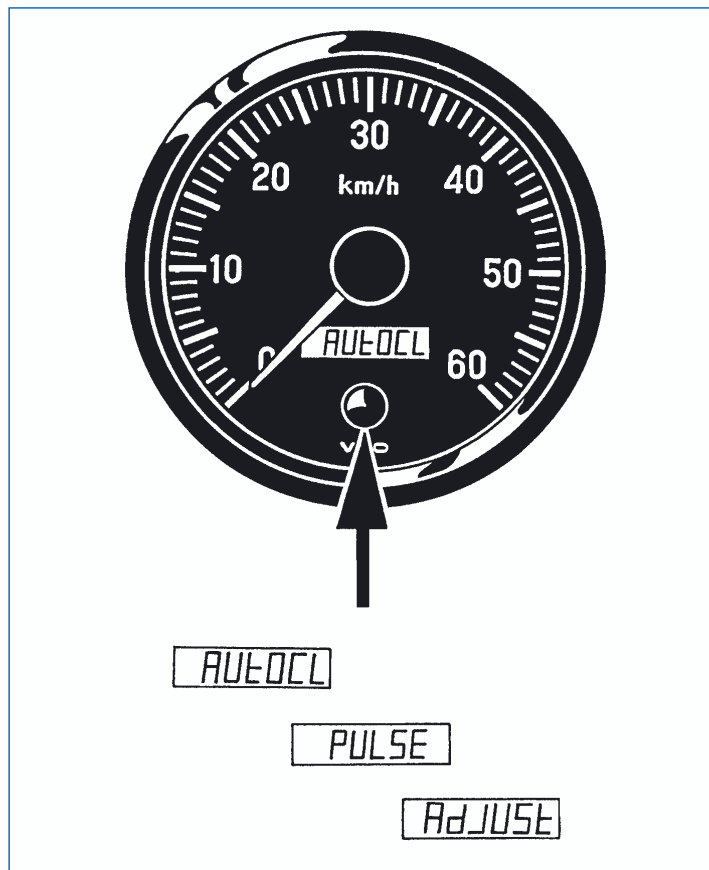
Or see your national laws (directives).

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.



bUttOn

StArt

P 50000

E 1768

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

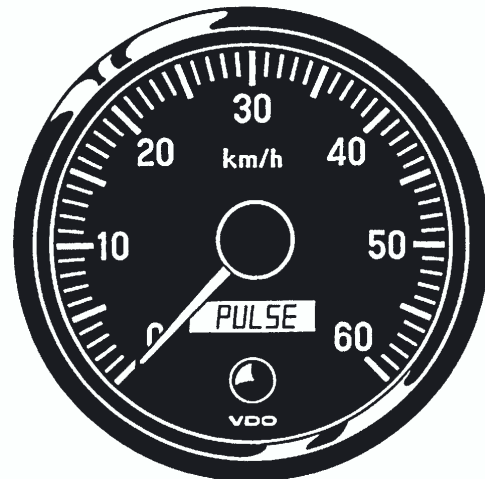
2.5 Setting

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 'AUTOCAL'). 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'.



UP

dn

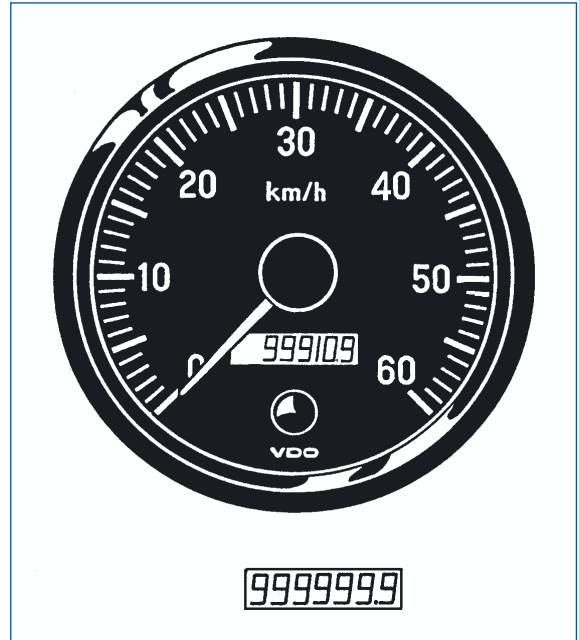
2. Electronic Speedometer (dia. 80 mm/dia. 100 mm)

2.6 Operation

Only efficient 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').

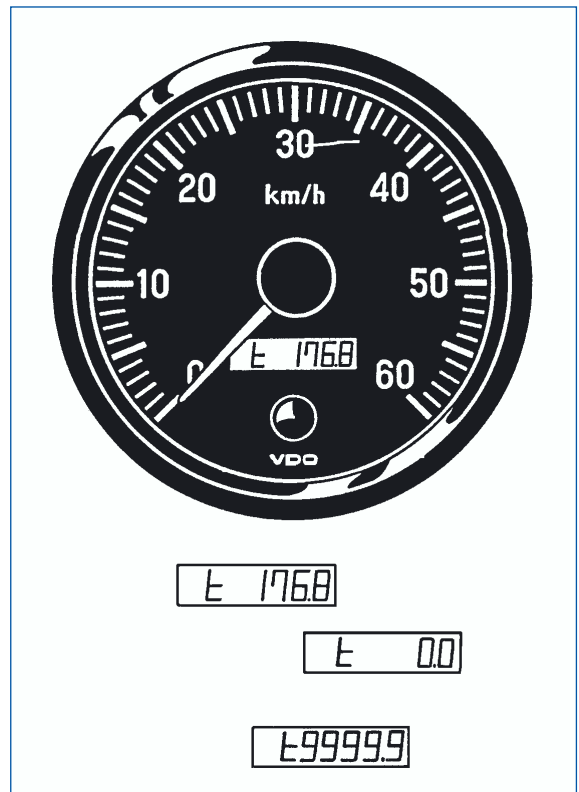
The total distance function counts the total mileage in kilometer or miles up to 999999.9 max..
This display cannot be reset.



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

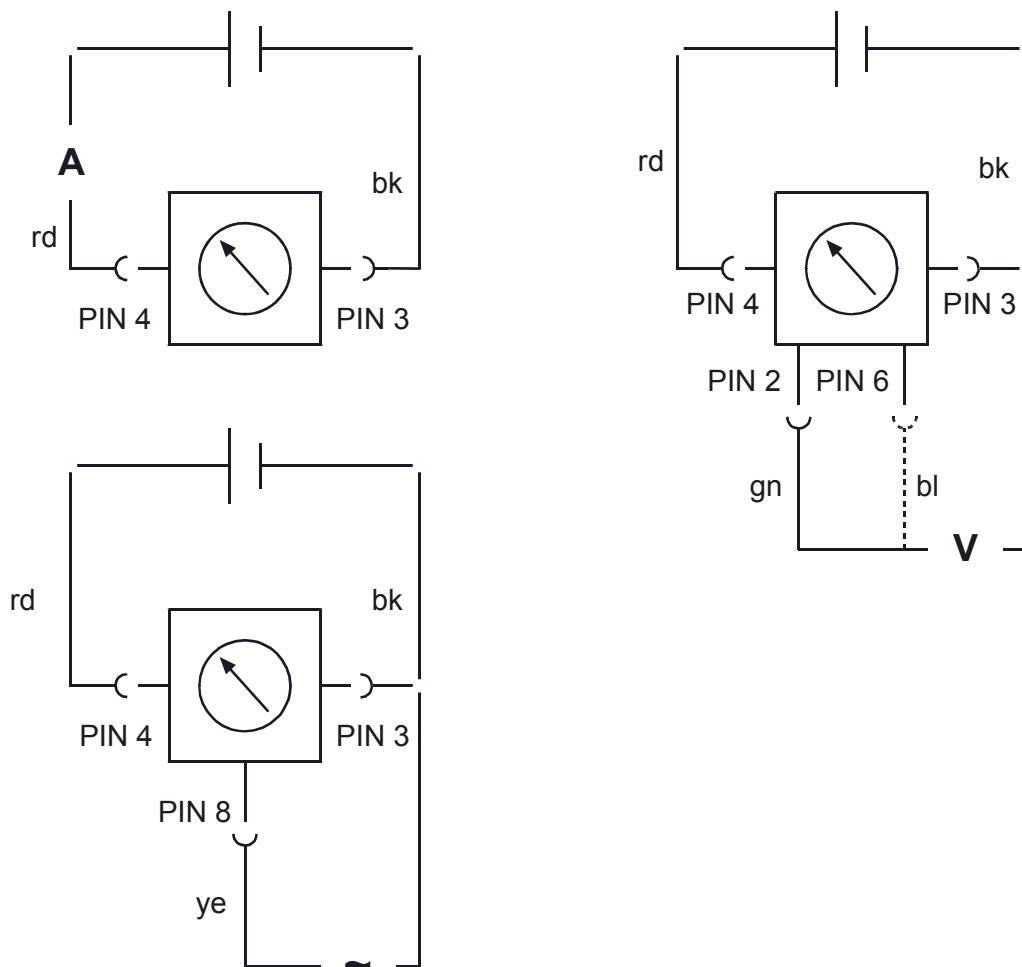
Test accessories	1x Power supply
	1x Test cable No. 2 } contained in test cables kit
	1x Measuring cable } X12-019-101-001
	1x Frequency generator
	1x Ammeter
	1x Voltmeter

Connector pin allocation

1	2	3	4
5	6	7	8

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  $U = 18V \pm 2V$


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  $I = 52 \pm 5.2 \text{ mA}$

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  $U = 14.5 \pm 2 \text{ V}$

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.

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

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.

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

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

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

Example:

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

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

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

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

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-...

[illegible]

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



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 directive 75/443/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 $\pm 1\%$.
- 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:

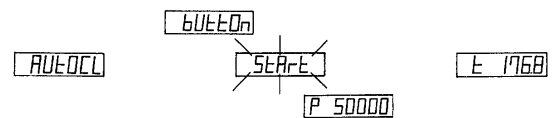
$$0 \leq V1 - V2 \leq \frac{V2}{10} + 4 \text{ km/h}$$

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 'bUtOn' 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.

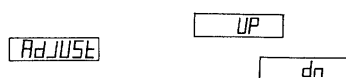
The function **'PULSE'** can be used to check the pulse/distance ratio stored by automatic calibration (function **'AUtOCL'**). The stored pulse/distance ratio is displayed (e.g. 'P 50000'), and the digits start flashing, beginning with the digit before the last one.

VDO cockpit vision, VDO cockpit international, VDO modulcockpit II

Operating Instructions For Electronic Speedometer

SIEMENS VDO
A u t o m o t i v e

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

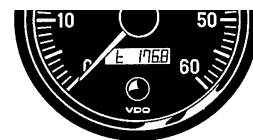
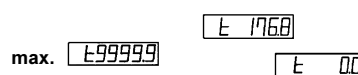


Briefly pushing the button alternates the total distance display (e.g. '99910.9') with the partial distance display (e.g. 't 176.8').

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 "9999.9". This display is reset to "0.0" 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 "0.0".



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.

