5. Electronic Tachometer (dia 52 mm)

Contents **Page**

5.1 General informations 5 - 2
5.2 Technical data 5 - 4
5.3 Pulsing 5 - 6
5.4 Wiring diagram 5 - 7
5.5 Dropping resistor for 24 V 5 - 8
5.6 Setting 5 - 9
5.7 Testing instructions 5 - 14
5.8 Instruments survey 5 - 16
5.9 Installation instructions 5 - 17

5. Electronic Tachometer (dia 52 mm)

5.1 General Informations

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

The instrument has an analog engine speed display in RPM x 100.

The instrument is pulsed by terminal 1 of the ignition coil in the case of petrol engines (4, 6, 8 cylinders, four-stroke), by terminal W of the alternator in the case of diesel engines.

The instrument is set by 3 coding switches at the back of the instrument and a potentiometer on the side of the instrument housing.

The lamp socket is pushed in. To replace the light bulb simple pull the lamp holder out.

5. Electronic Tachometer (dia 52 mm)

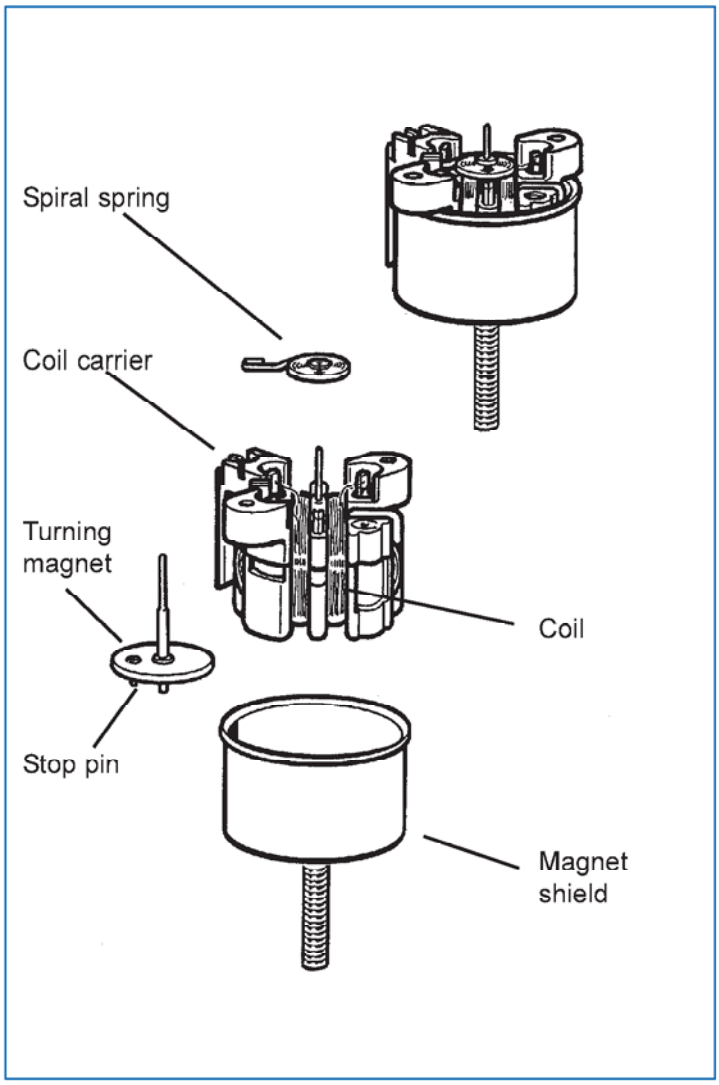
5.1 General Informations

Designation of function
Movement: System Ke (to 320°)
(Turning magnet ratio measuring movement, pointer deflection up to 320°)

A turning magnet ratio measuring movement is the main component of the tachometer. It converts the current pulses from the sensor to an analog display on a dial. An electronic circuit converts varying current pulses to unified pulses, which are fed to the turning magnet movement. The turning magnet ratio measuring movement applies the principle of the current ratio of two separate coils. Two stationary coils generate a magnetic field as a function of the current flowing through them. The magnetic field resulting from these two fields moves a two-pole magnet disc carrying a pointer. The pointer deflection is a function of the ratio of the two currents flowing through the coils.

A shielding casing prevents the effect of external magnetic fields.

The special electronic system controlling the movement permits a pointer deflection of 320°. The rotation is limited by a pin on the turning magnet moving in a groove of the coil carrier; the opposing force is generated by a spiral spring.



5. Electronic Tachometer (dia 52 mm)

5.2 Technical Data

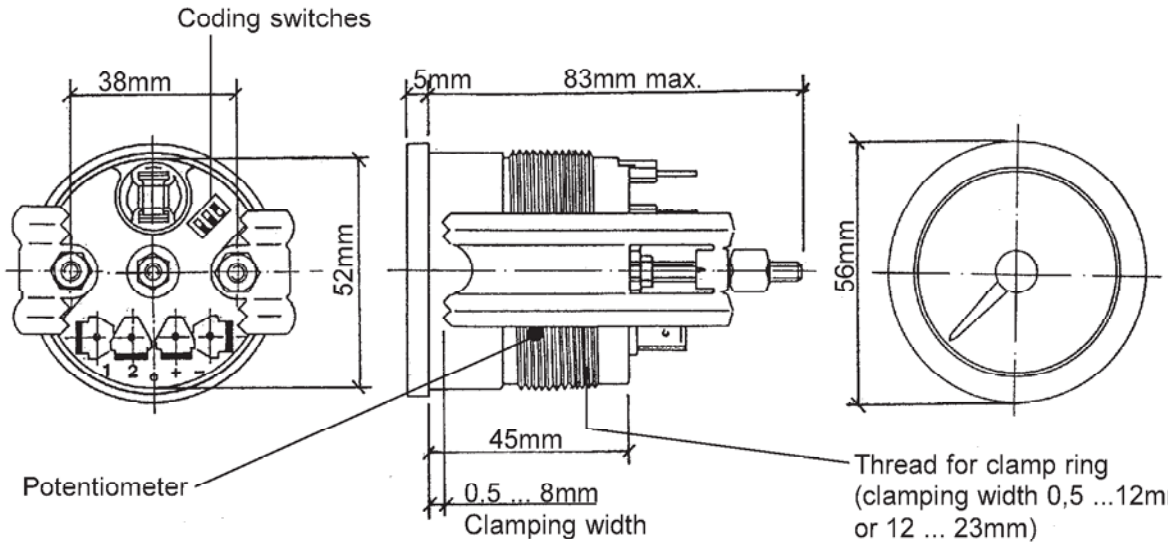
Operating voltage:	10.8 ... 16 V
Input voltage:	U_{low}: max. 5 V U_{high}: min. 7.5 V
Movement:	System Ke (→ 320°)
Pickup:	terminal 1 ignition coil (petrol engine) terminal W alternator (diesel engine)
Current consumption:	< 100 mA (without illumination)
Operating temp.:	– 20°C ... + 70°C
Storage temperature:	– 30°C ... + 85°C
Illumination:	1 light bulb 12 V, 1. 2 W 2 colour caps (green and red)
Protection:	IP64 DIN 40050 from the front, housing 'ozon' proof 'UV' proof CE approved, reverse-polarity protection
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

dia. 52 mm Backlight

6 ... 25 pulses/revolution (adjustable)

Mounting hole: dia. 53mm



Pin assignment:
Pin +: +12 V, terminal 15
Pin –: Ground, terminal 31
Pin 2: Signal input, terminal 1 or W

Option:
dropping resistor for 24 V
with light bulb 24 V, 1.2 W
(operating voltage: 21 ... 32 V)

5. Electronic Tachometer (dia 52 mm)

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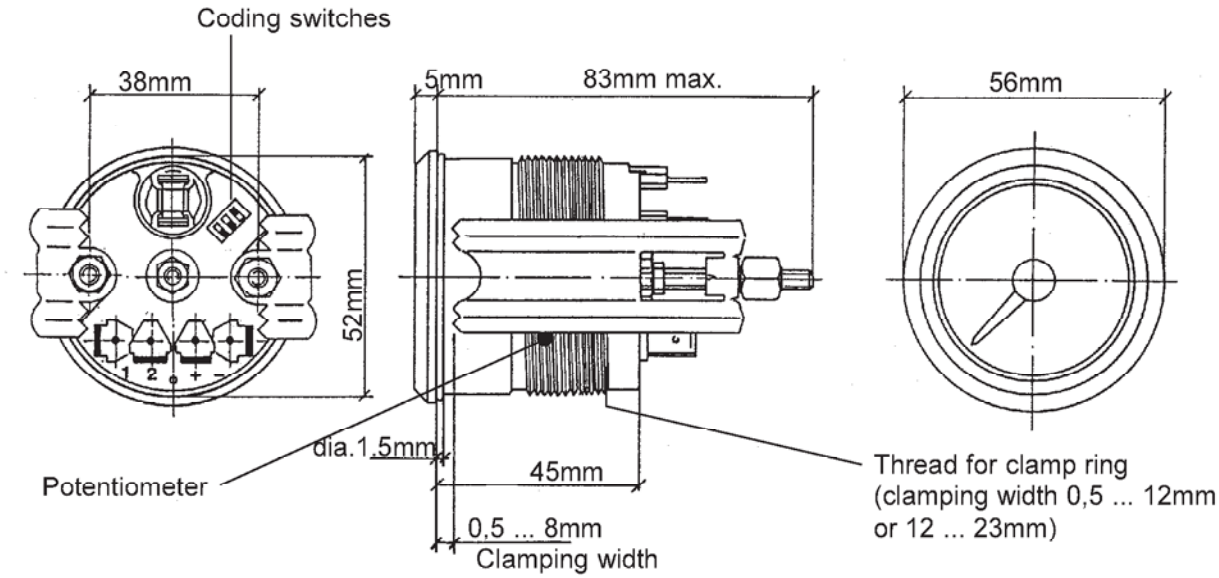
Nominal position:	NL 0 to NL 90, DIN 16257

VDO cockpit international
dia.Ø 52 mm Floodlight

6 ... 25 pulses/revolution (adjustable)

Mounting hole: dia. 53mm



Pin assignment:
Pin +: +12 V, terminal 15
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Option:
dropping resistor for 24 V
with light bulb 24 V 1.2 W
(operating voltage 21 ... 32 V)

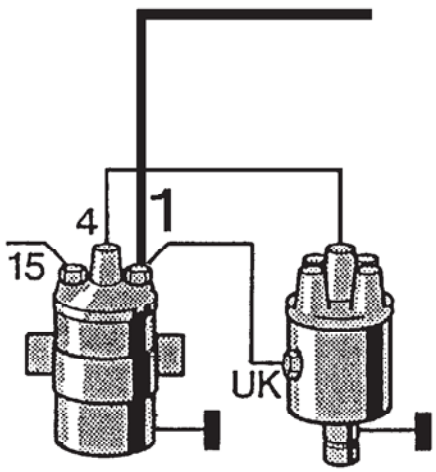
5. Electronic Tachometer (dia 52 mm)

5.3 Pulsing

Tachometer connection at pin 2.

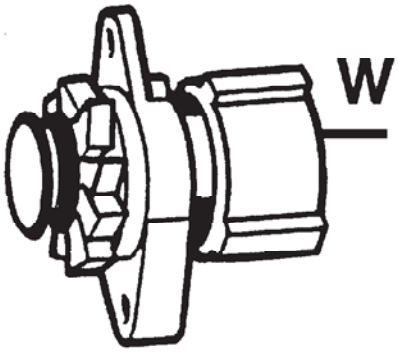
In vehicles with petrol engines the pulse is obtained at terminal 1 of the ignition coil in the case of conventional ignition systems (having one ciol only) or an additional terminal on special ignition systems.
In the case of special ignition systems (such as transistor/coil ignition systems, electronic and fully electronic ignitions) please consult the vehicle manufacturer or the ignition system manufacturer about the correct terminal.

Conventional ignition system



The pulse on vehicles with diesel engines is obtained at alternator terminal W.

Alternator

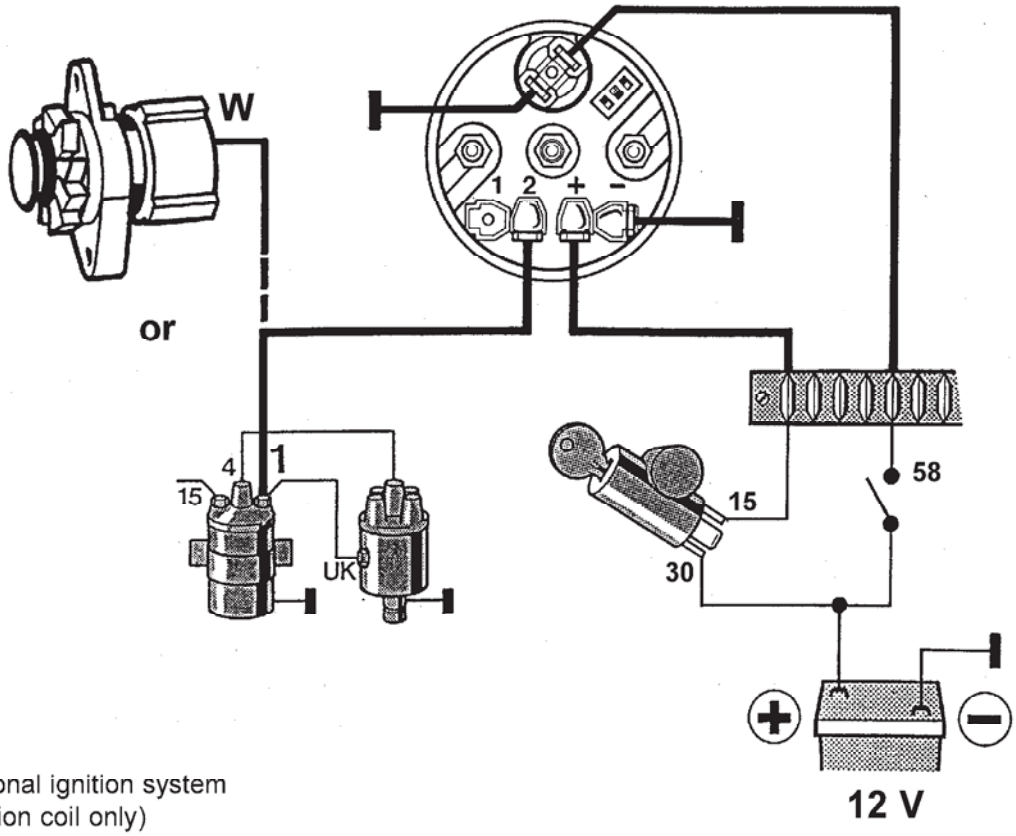


The ignition must be off and the battery minus connection disconnected when connecting the cable.

5. Electronic Tachometer (dia 52 mm)

5.4 Wiring Diagram

Alternator



Conventional ignition system
(one ignition coil only)

5. Electronic Tachometer (dia 52 mm)

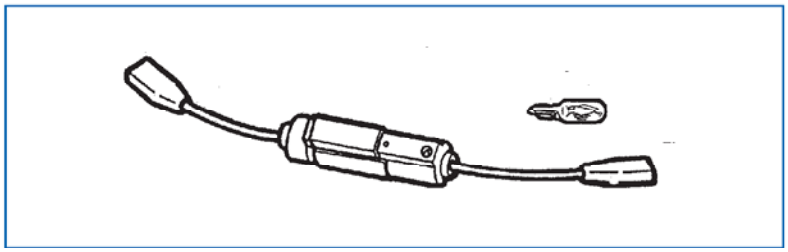
5.5 Dropping Resistor For 24 V

The electronic tachometer (nominal voltage 12V) can also be used with a nominal voltage of 24V if an external dropping resistor (option) is installed in the plus line(terminal 15).

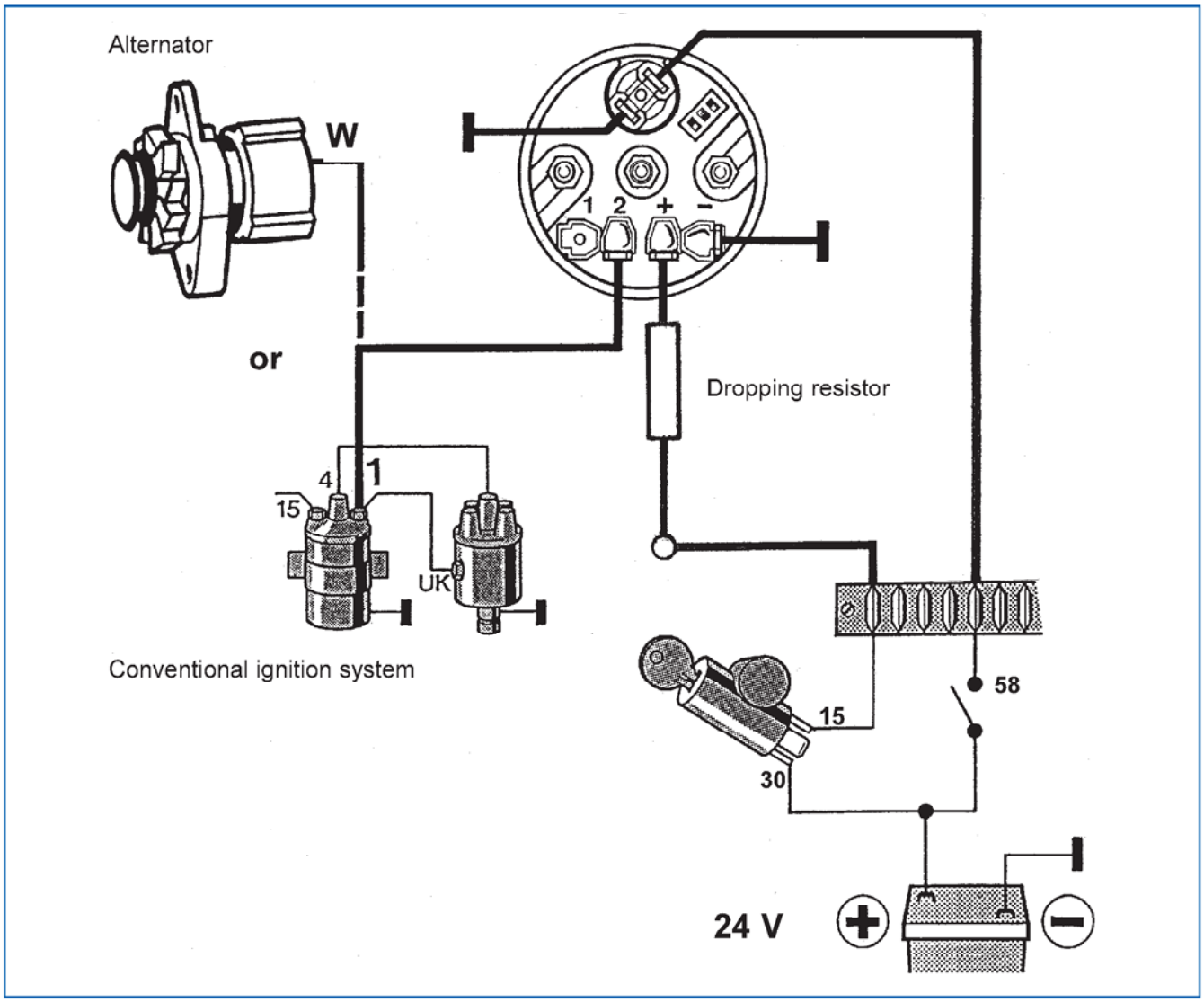
Connect this dropping resistor directly to pin + of the instrument, then connect it to the plus line (terminal 15). In this case the operating voltage range is 21V to 32V.

Replace 12V light bulb by 24V light bulb.

The dropping resistor is supplied with
24 V 1.2 W light bulb.
Part No.: 800 005 011 G



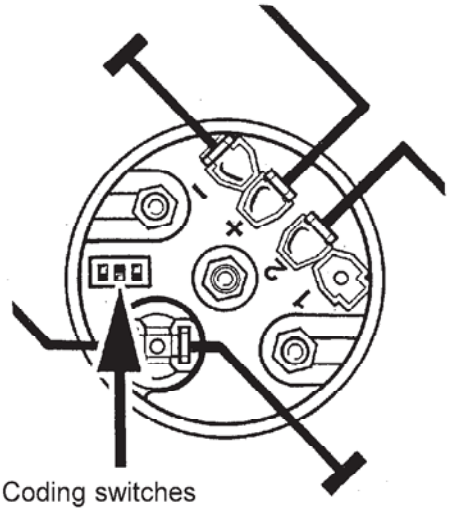
Wiring diagram

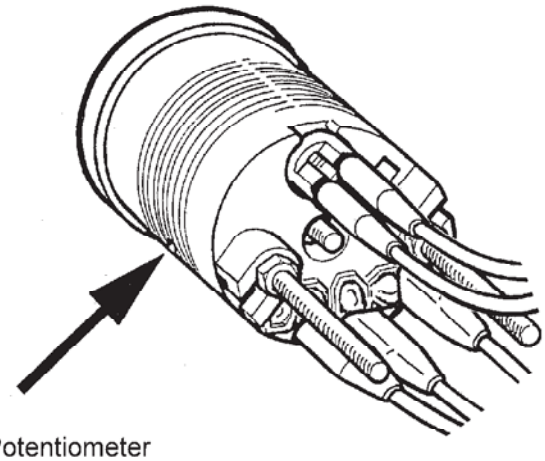


5. Electronic Tachometer (dia 52 mm)

5.6 Setting

The electronic tachometer is adjusted at the back of the instrument by 3 coding switches and a potentiometer on the side of the instrument housing.





Petrol engine setting

For petrol engines (4, 6 or 8 cylinders) and connection to terminal 1 (only one ignition coil) either only use the coding switches for setting or use the coding switches (coarse setting) and use the potentiometer (fine adjustment) for setting. Possible settings per coding table (see page 5 - 10).

Diesel engine setting

For the diesel engine and connection to terminal W of the alternator use the coding switches (coarse setting) and the potentiometer (fine adjustment) for setting.
Roughly set the pulse ratio (pulses at the terminal W output of the alternator for one engine revolution) per coding table (see page 5 - 11) with the coding switches . Make the fine adjustment with the potentiometer. Compare the engine speed indication with a reference measuring instrument (hand-held tachometer)
(see page 5 - 13).

5. Electronic Tachometer (dia 52 mm)

5.6 Setting

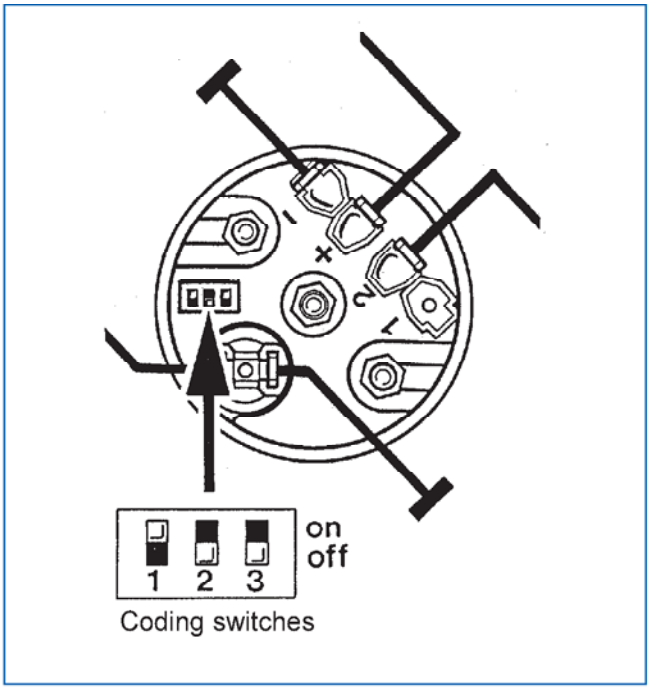
Petrol engine setting

Coding table

Petrol engine, terminal 1 (one ignition coil)						
Switches			Cylinders	Stroke	⚠ Do **not** change the potentiometer setting! Changing the potentiometer setting will cause wrong readings.	Use a reference tachometer to set the potentiometer ▼
1	2	3				
on	off	off	4	4	x	
on	off	off	5	4		x
on	off	on	6	4	x	
on	on	off	8	4	x	

▼ The adjustment must be made by two people, one of them adjusting the instrument, the other one using the hand-held tachometer (reference tachometer), see page 5 -13.

Example:
on, off, off
(4 cylinders, four-stroke)



Coding switches

5. Electronic Tachometer (dia 52 mm)

5.6 Setting

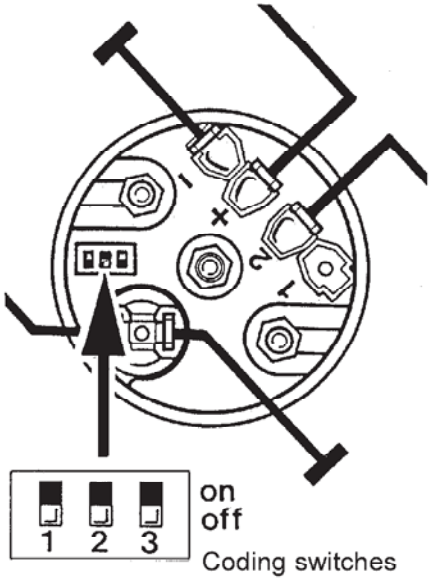
Diesel engine setting

Set the coding switches per coding table if the pulse ratio is known (coarse setting).

Coding table

Diesel engine, terminal W					
Switches			RPM		
1	2	3	4000	6000	8000
off	off	off	6 - 9	8 - 12	6 - 9
off	off	on	9 - 13	12- 17	9 - 13
off	on	off	13 - 20	17 - 24	12 - 18
			Pulses per revolution		

Example: off, off, off
(at 6000 RPM 10 pulses per revolution)



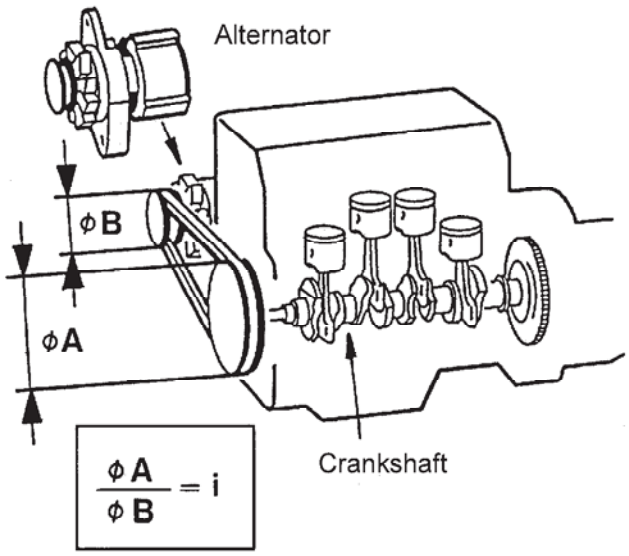
Make the fine adjustment with the potentiometer (see page 5 - 13).

5. Electronic Tachometer (dia 52 mm)

5.6 Setting

Diesel engine setting

The following formula can be used to calculate an unknown pulse ratio, which is then set as described on page 5 - 11.



Example:
dia. A = 280 mm
dia. B = 132 mm

$i = \frac{280}{132} = 2.12$

i x 6 = the pulse ratio

pulses per revolution
number of alternator pole pairs
2.12 x 6 = 12.72
= 13 pulses per revolution

Set the coding switches to 'off, off, off' first if the number of alternator pole pairs is not known. Make the fine adjustment with the potentiometer.
Select a different coding switches position and the potentiometer if the indication cannot be matched to the reference instrument indication.

Calculate the pulse ratio as follows if the frequency (Hz) is known, and not the pulse ratio:

Example 1733 Hz:

$\frac{\text{Hz x 60 sec.}}{\text{full scale speed}}$ = pulses/revolution

$\frac{1733 \times 60}{8000} = 12.99 = 13$ pulses/revolution

Formula for frequency (Hz):

Example:

$\frac{\text{pulses/revolution x full scale speed}}{\text{60 sec.}} = \text{Hz}$

$\frac{13 \times 8000}{60} = 1733$ Hz

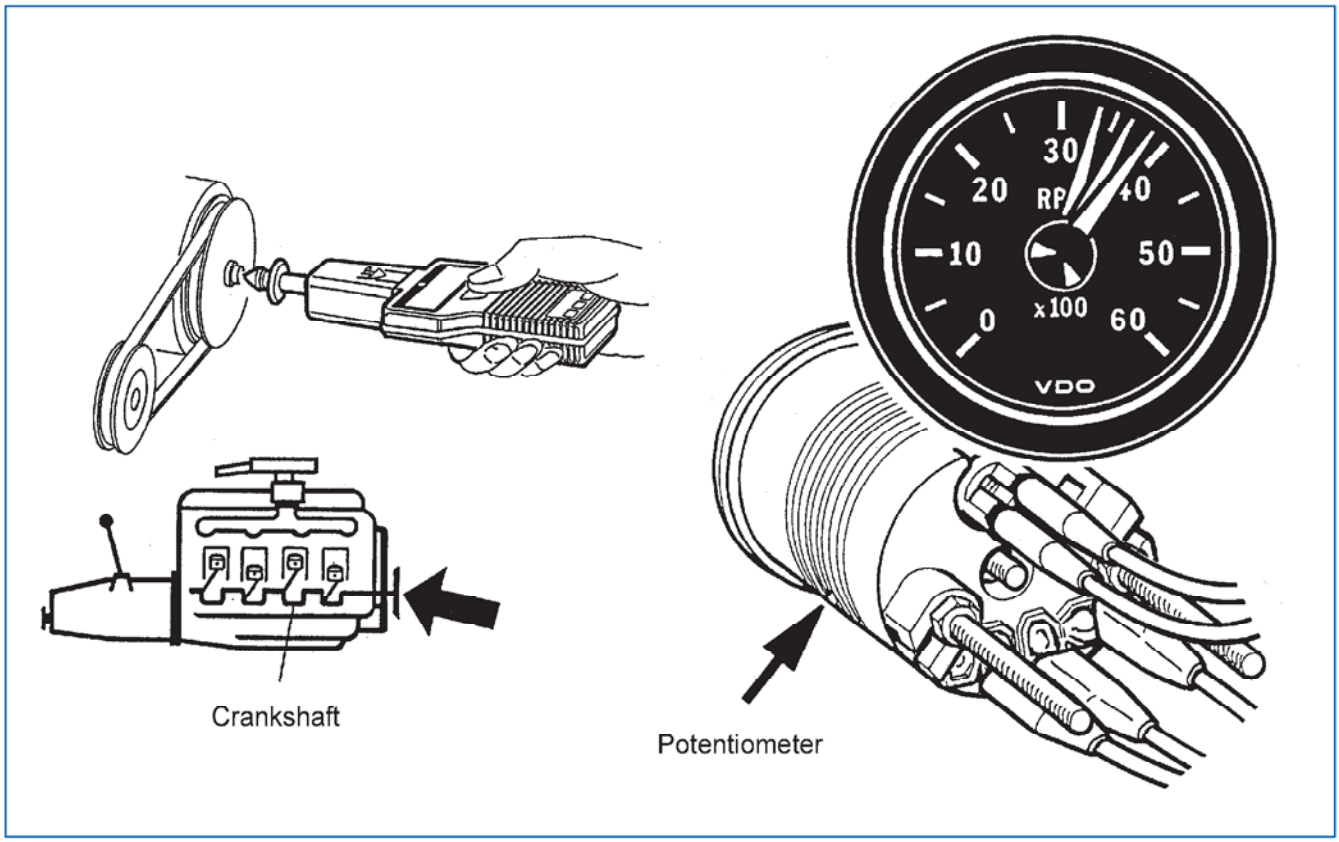
5. Electronic Tachometer (dia 52 mm)

5.6 Setting

Diesel engine setting

Fine adjustment with potentiometer

The fine adjustment using the potentiometer is only possible between 30% and 100% of the indicating range. Use a reference tachometer (hand-held tachometer) to compare the engine speed indications.
The adjustment must be made by two people, one of them adjusting the instrument, the other one using the hand-held tachometer.
Measure the engine speed at the crankshaft stub of the engine with the hand-held tachometer.
Be very careful! Do not wear loose clothing!



Adjust potentiometer with an insulated screwdriver to speed indication matches the indication of the hand-held tachometer.

5. Electronic Tachometer (dia 52 mm)

5.7 Testing Instructions

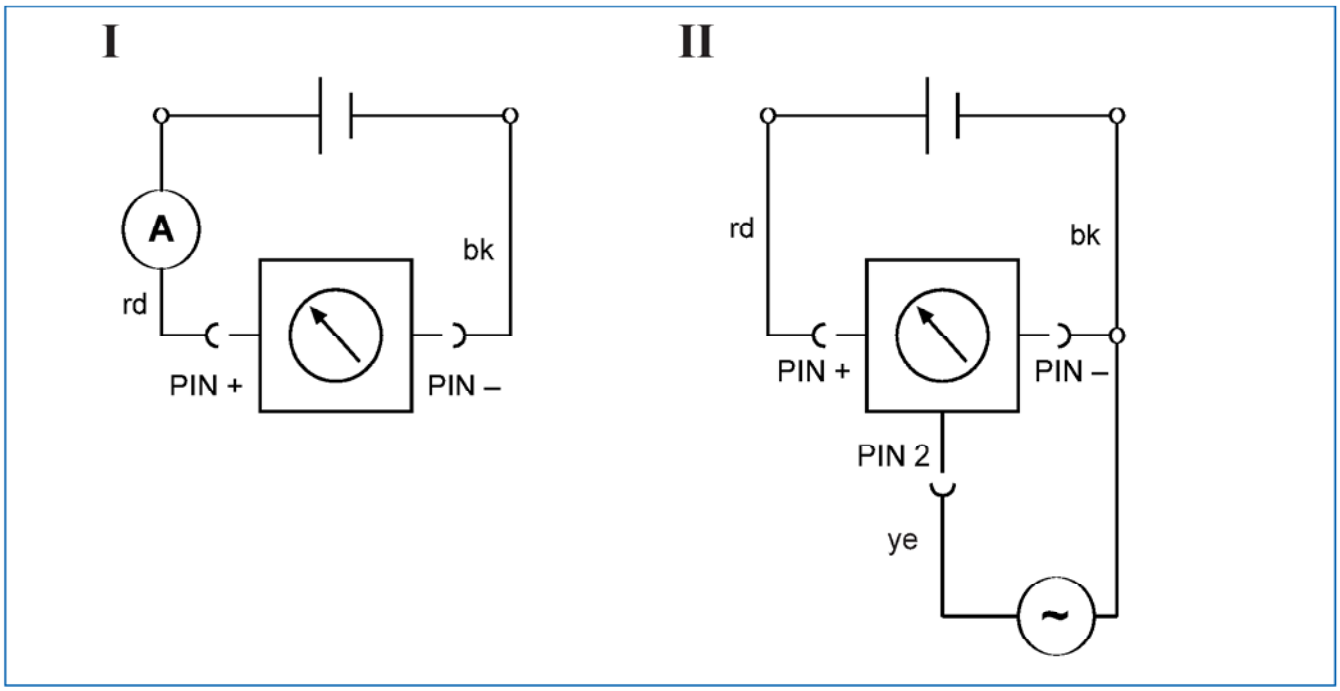
Test accessories

1x Power supply
1x Test cable No. 3 } contained in test cables kit
1x Measuring cable } X12.019/101/001
1x Frequency generator
1x Ammeter

Pin allocation

Pin + + 12V
Pin – Ground
Pin 2 Sensor signal input

Test circuit diagram



5. Electronic Tachometer (dia 52 mm)

5.7 Testing Instructions

Test method description

Basic setting: 12 V instruments ➠ 14 V ± 0.2 V

Set coding switches (at instrument back) to: 1-on, 2-off, 3-off .

Current consumption measurement

Connect the instrument per test circuit diagram I with test cable No. 3.

Value range: 12 V instruments ➠ I = 69 ± 10 mA

Pointer position check

a) Zero position check

Connect the instrument per test circuit diagram I with test cable No. 3.

Switch operating voltage on and check pointer deviation. The allowed deviation is ± 2 angular degrees.

b) Full range position check

Connect the instrument per test circuit diagram II with test cable No. 3.

Connect a square wave signal with a frequency corresponding to full range to pin 2. The amplitude shall be at least 10 V.

Engine speed range	Frequency	Tolerance
6000 RPM	200 Hz	± 150 RPM
8000 RPM	267 Hz	± 200 RPM

5. Electronic Tachometer (dia 52 mm)

5.8 Instruments Survey

VDO cockpit vision (Backlight) dia. 52 mm — Part No. 333 015 . . .

Dial		Special feature	Part No.
Range	Imprint		
0 ... 6000 min^{-1}	RPM x 100	12 V	**009 K**
0 ... 8000 min^{-1}	RPM x 100	12 V	**010 K**

VDO cockpit international (Floodlight) dia. 52 mm — Part No. 333 035 . . .

Dial		Special feature	Part No.
Range	Imprint		
0 ... 6000 min^{-1}	RPM x 100	12 V	**017 C** **017 G**
0 ... 8000 min^{-1}	RPM x 100	12 V	**018 G**
0 ... 4000 min^{-1}	RPM x 100	12 V	**029 C** **029 G**

5. Electronic Tachometer (dia 52 mm)

5.9 Installation Instructions

999 165 005: VDO cockpit vision
999 165 011: VDO cockpit international

See file 'Installation Instructions'. ▼

▼ will follow