



## **Installation and Operating Instructions**

**Tachometer  
CAN Central Instrument**

**Easy Link  
Satellite Gauge**

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# Safety instructions

This product was developed, manufactured and tested in accordance with the basic safety requirements of EU Directives and the latest technological standards.

Changing or tampering with a VDO product can affect safety. Therefore, the product may not be changed or tampered with.



## On the installation manual

- This manual is subject to German copyright law. It may not be duplicated, edited, distributed or used in any way that violates copyright laws without the explicit consent of the manufacturer. This manual may only be copied for private, non-commercial use.
- Read this manual thoroughly before starting the installation. Keep the manual in a safe place. If you pass the device on to third parties, include the manual.
- Failure to follow the instructions in this manual can result in injury or damage to the device or vehicle.
- We are not liable for damage resulting from failure to follow the instructions in this manual.

## On the notes used

- Important notes are labeled accordingly. Always read these notes to avoid accidents and damage to the device:



### **WARNING:**

Warns you about hazards to your health and indicates possible risk of injury.



### **NOTE:**

Highlights tips and information for you.

## On specific target groups

- To avoid damage to property or the environment, installers must have a basic knowledge of electrical and mechanical systems for the automotive/shipbuilding industry.

### **On intended use**

- This device is intended for use in vehicles and machines on land as well as in recreational ships (including non-classified commercial ships). Any other use is considered improper use and is prohibited. Improper use of the product can result in personal injury or damage to property or the environment.

### **The following is prohibited:**

- Do not operate the device in the vicinity of explosive or flammable materials. This could cause a fire or explosion.

### **On power supply**

- Ensure the proper cable cross section. For sensor lines, use cables at least 0.5 mm<sup>2</sup>, for power supply lines see detailed information in the installation instruction.
- Smaller cable cross section can result in higher current density. This can cause the relevant section of cable to heat up.
- When laying electrical cables, use existing cable ducts and wiring harnesses. However, do not run cables parallel to ignition cables or cables that lead to large consumers of power.
- Secure the cables with cable ties or adhesive tape. Do not run cables over moving parts. Do not attach cables to the steering column.
- Ensure that cables are not subjected to tensile forces, compressive forces or shearing forces.
- When running cables through holes, use rubber sleeves or similar protectors to prevent damage to cables.
- Only use wire strippers to remove insulation from cables. Set up the stripper so that stranded wires are not damaged or cut off.
- New cable connections must be soft-soldered, or standard crimping terminals must be used.
- Only use crimpers to connect crimping terminals. Observe the safety instructions of the crimper manufacturer.
- Insulate stranded wires to eliminate the risk of short circuits.
- Caution: Faulty connections or damaged cables can result in short circuits.
- Short circuits in the on-board power supply can cause cable fires, battery explosions and damage to other electronic systems. Therefore, insulate all connections in the power supply using weldable butt connectors and ensure adequate insulation.
- Take special care to ensure correct ground connections.
- Incorrect connections can result in short circuits. Always connect cables in accordance with the electrical circuit diagram.
- When operating the device with power units, make sure that the power unit is stabilized and meets the following standards: DIN EN 61000- Section 6-1 to 6-4.

## **On installation**

- The product should be installed by an expert who specializes in the installation of the product. If you install the product yourself, wear appropriate work clothes. Do not wear loose clothing that can become caught in moving parts. If you have long hair, wear a hair net.
- Before installation, read the vehicle documentation to learn about the type of vehicle and any special features that may be relevant.
- Look at blueprints to find out where the fuel lines, hydraulic lines, compressed air and electrical lines are located. Make note of any modifications to the vehicle that you might need to consider during installation.
- Ensure that the engine cannot accidentally start during installation.
- When removing or installing seats, covers, etc., make sure not to damage any lines or disconnect any plugs.
- Make a note of all data stored in other installed devices with volatile electronic memories.

## **Pay attention to the following during installation:**

- During installation, ensure that the components of the product do not affect or impair vehicle functions and do not become damaged themselves.
- Install only undamaged parts in a vehicle.
- During installation, ensure that the product does not impair visibility and is not positioned in the head impact zone of the driver or passenger.
- When working on on-board electronics, do not wear metallic or conductive jewelry such as necklaces, bracelets, rings, etc.
- If you have to work on a running engine, take special precautions. Always wear appropriate work clothes due to risk of injury from crushing and burns.
- Before starting work, disconnect the negative terminal of the battery to avoid short circuits. If the vehicle has additional batteries, the negative terminals of these batteries may also need to be disconnected.
- Short circuits can cause cable fires, battery explosions and damage to other electronic systems. Remember that when you disconnect the battery, all volatile electronic memories will lose their entries and must be reprogrammed.
- Before working on the engine compartment of a gas-powered ship engine, run the engine compartment fan for at least five minutes.
- Note the paths of lines and wiring harnesses to avoid damaging them when drilling or sawing.
- Do not install the product near the mechanical and electrical systems for the airbag.
- Do not drill holes or make openings in stabilizing struts or side bars.
- Before working under the vehicle, secure it in accordance with the manufacturer's instructions.
- When choosing an installation location, make sure there is enough space behind the holes or opening.

- Drill small openings first, then enlarge them with a cone cutter, hole saw, jigsaw or file, if necessary. Deburr sharp edges. Always observe the safety instructions of the tool manufacturer.
- If it is necessary to work without interrupting the power supply, always use an insulated tool.
- To measure voltage and current in the vehicle, machine or ship, always use multimeters or diode test lamps specially designed for this purpose. Using conventional test lamps can damage control units or other electronic systems.
- Ensure that the electrical outputs of the display unit and the cables connected to it are protected against direct contact and damage. This means that the cables used must have sufficient insulation or voltage stability and the contact points must be protected against contact.
- Also take appropriate measures to ensure that the electrically conductive parts of the connected loads are protected against direct contact. Use of bare metal cable and contacts is not permitted.

### **After installation**

- Connect the grounding cable to the negative terminal of the battery.
- If necessary, enter data in the volatile electronic memory.
- Check all the functions of the newly installed device.

### **If the device is defective**

- Never operate a defective device.
- Give defective devices to your VDO dealer for testing.

### **Maintenance and cleaning**

- The device does not contain any parts or components that require maintenance.
- Use only pure water for cleaning components. Observe the IP codes when cleaning (IEC 60529).

### **Storage and transportation**

- Do not subject the device to temperatures defined in the corresponding data sheet of the product.

### **Disposal**

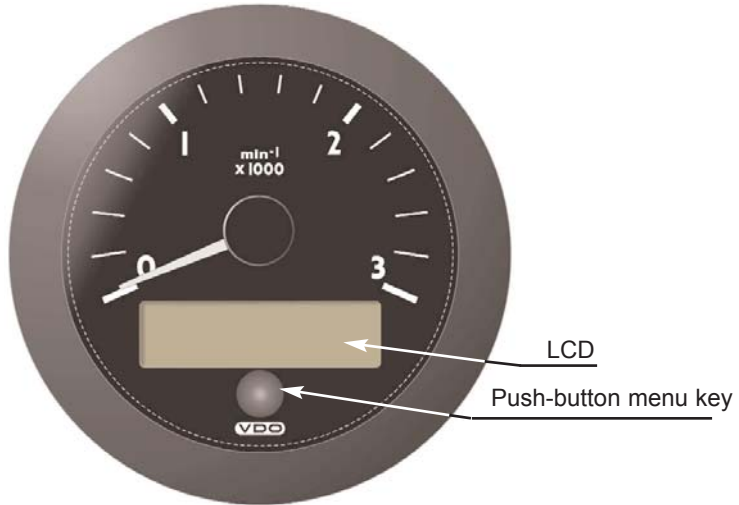


- Do not dispose of the device as household waste. Take the device to a recycling center for electrical and electrotechnical equipment.



# 1. Ocean Link Tachometer

## Basic Information



The VDO Ocean Link tachometer is a multifunctional instrument for indicating engine data, and is intended for use in navigation of sports ships. The tachometer shows the actual engine speed in operation, on the analogue scale. Further values and operating aids appear in the LCD.

The instrument has a push-button menu key on the front side, with which all the functions can be selected. Handling of the instrument is thus easy and uncomplicated. The instrument is connected to the engine electronics through a CAN bus, and receives the engine data. In addition, the display unit is provided with a bus output for transmitting data to Easy Link Satellite gauges. A maximum of Easy Link Satellite gauges can be connected.

The instrument is also provided with 2 sensor inputs for analogue VDO sensors.

## **2. Components**

The supply schedule includes the following:

- display unit
- a set of parts for fixing the display unit
- assembly and operating instructions

### **2.1 Accessories**

(not included in the supply schedule):

- Ocean Link front bezels in various colours
- Easy Link satellite gauges



# 3. Functions of the Tachometer

## Displays:

- Engine speed (indicated by means of a pointer)
- Engine hours (indicated in LCD)
- Engine oil pressure (indicated in LCD)
- Transmission oil pressure (indicated in LCD)
- Transmission oil temperature (indicated in LCD)
- Cooling water temperature (indicated in LCD)
- Engine oil temperature (indicated in LCD)
- Battery voltage (indicated in LCD)
- Instantaneous fuel consumption (indicated in LCD)
- % load (indicated in LCD)
- Intake air temperature (indicated in LCD)
- Charge air temperature (indicated in LCD)
- Exhaust gas temperature (indicated in LCD)
- Fuel level (indicated in LCD)
- Water level (indicated in LCD)
- Exhaust gas temperature before turbine (indicated in LCD)
- Vehicle speed (Easy Link satellite gauge)

## Setting possibilities:

- Selection of illumination intensity in 8 steps
- Selection of display unit in metric or English units
- Selection of CAN baud rate
- Selection of sensor types for the analogue inputs
- Selection of the number of charge air pressure inputs
- Illumination - internal / external
- Selection of display modes
- Activation of the simulation mode

# 4. Displays and Setting Possibilities

## 4.1 Basic Settings

The basic settings necessary for perfect operation can be selected in the settings menu. These are obtained by pressing and holding the push-button key while switching on the power supply of the display.

- Display units:** Selection of display unit (see p. 8)
- Baud rate:** Selection of baud rate (see p. 8)
- Config inputs:** Setting the inputs (see p. 9)
- Screens on / off:** Selection of displays (see p. 11)
- Simulator mode:** Activation of simulation mode (see p. 11)
- Exit setup:** Ending the setting menu (see p. 11)

In order to change a value (e.g. from No to Yes), press the push-button key briefly. In order not to change a value, keep the push-button key pressed until the set value flashes once. Then release the push-button key immediately. Through this the displayed setting is taken over. If the push-button key is not pressed, the displayed setting is automatically taken over after 10 seconds.

### 4.1.1 Selection of the display units

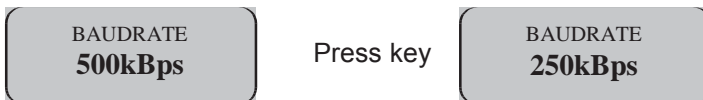
The values for temperatures and pressures can be displayed alternatively in the units °C/bar (METRIC) or °F/psi (ENGLISH). Selection of the units is carried out as follows:



In the example shown the unit is changed from METRIC to ENGLISH.

### 4.1.2 Selection of the baud rate

The rate at which values are transmitted on the CAN bus can be set to 250 kB/s (250 kBps) or alternatively to 500 kB/s (500 kBps). Selection of the baud rate is carried out as follows:



### 4.1.3 Setting the inputs

(config inputs)

In this menu the following settings are possible:

<i>Fuel tank signal:</i>	Selection of fuel quantity signal (see p. 9)
<i>4-20 mA input:</i>	Selection of function of 4-20 mA transmitter (see p. 10)
<i>Change boost amount:</i>	Setting number of exhaust gas temperature measured values (see p. 10)
<i>External illumination:</i>	Setting of illumination (see p. 10)

### 4.1.4 Selection of fuel tank signal

Select here from which signal source the fuel tank signal is transmitted:

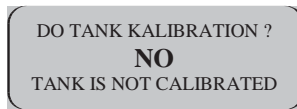
<i>Off:</i>	No display of fuel quantity
<i>CAN:</i>	Fuel tank signal from CAN bus
<i>Lever:</i>	Fuel tank signal from lever type sensor
<i>Pipe:</i>	Fuel tank signal from dip type sensor

When using a dip type sensor, calibration must be carried out. This is always carried out with the tank empty. For this the procedure is as follows:

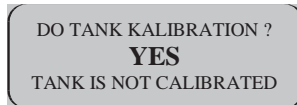
Example:



Keep key pressed



Press key



Keep key pressed



Ensure that the tank is empty

MEASURED RES: VAL: 85  
**NO**  
SAVE VALUE FOR CAL. ?

MEASURED RES: VAL: 85  
**YES**  
SAVE VALUE FOR CAL. ?

Keep key pressed

**TANK  
CALIBRATED**

#### 4.1.5 Selection of the function of the 4-20 mA sensor

Select here which function the 4-20 mA water level sensor has.

*Off:* No display of water level  
*FRESH WATER:* Display of fresh water level  
*WASTE TANK:* Display of waste water tank level

#### 4.1.6 Setting number of exhaust gas temperature measured values

(change boost amount)

Select here whether one or two measured values are to be displayed for the exhaust gas temperature before the turbine.

1: One exhaust gas temperature measured value  
2: Two exhaust gas temperature measured values  
(V-type engines)

#### 4.1.7 Setting the illumination

(external illumination)

Select here whether illumination of the tachometer and the connected satellite gauges are to be connected internally or externally.

*EXTERNAL:* The illumination is switched on and off through an input of the 14-pole plug. Dimming of the illumination is thus not possible.  
*INTERNAL:* The illumination is regulated in the normal operating mode by pressing and holding the push-button key in 8 steps.

#### **4.1.8 Selection of the displays**

(screens on / off)

Select here which measured values are to be displayed in the normal operating mode.

**YES:** Here all measured values, with their ISO symbol, are displayed. By selecting NO the measured value can be removed from the normal operating mode.

If the measured value is to be displayed again, select YES when the ISO symbol of the measured value is displayed.

**NO:** No changes in the setting are made.

#### **4.1.9 Activation of the simulation mode**

(simulator mode)

Select here whether the simulation mode is to be switched on.

**YES:** The simulation mode is switched on. The display now generates random values for all measuring channels and displays these. The measured values are also transmitted to the bus instruments.

**NO:** The simulation mode is switched off.

Please note that the simulation mode still remains active after switching off and switching on again, if it has not been switched off by selecting NO.

#### **4.1.10 Ending the settings**

(exit setup)

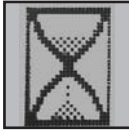
Select here whether the settings are to be exited.

**YES:** The settings are exited, the display restarts in the normal operating mode.

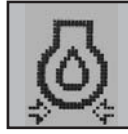
**NO:** The settings are restarted.

# 5. Main Functions

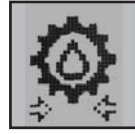
The main functions of the VDO Ocean Link tachometer can be called by pressing the push-button key. Each time the key is pressed, the next measured value is displayed.



Engine hours



Engine oil pressure



Transmission oil pressure



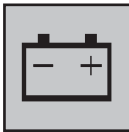
Transmission oil temperature



Cooling water temperature



Engine oil temperature



Battery voltage



Instantaneous fuel consumption



% load



Intake air temperature



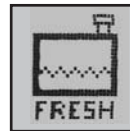
Charge air pressure



Exhaust gas temperature



Fuel level  
(depending on the setting)



Water level  
(depending on the setting)



Exhaust gas temperature before turbine 1 (depending on the setting)



Exhaust gas temperature before turbine 2 (depending on the setting)

If you keep the push-button key pressed for 4 seconds, the roll bar for the illumination setting appears. By repeated pressing of the key you can change the illumination of the tachometer and the connected satellite gauges in 8 steps. The display jumps back to the normal operating mode 8 seconds after the last key press. The illumination setting is retained even after switching off the power supply and switching on again.

Please note that setting of the illumination is possible only if external illumination is set to INTERNAL in the settings menu.

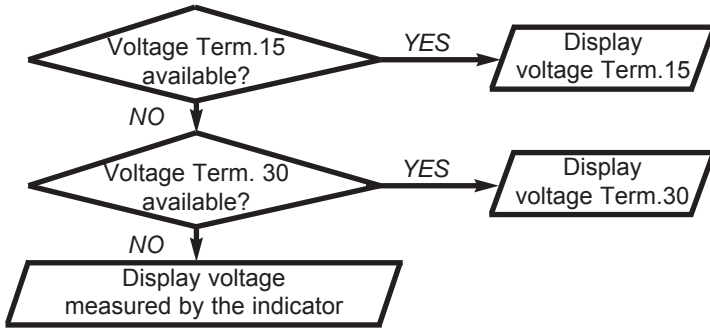
## 6. The CAN Interface

The VDO Ocean Link tachometer receives data from a CAN 2.0 B interface. Data in the SAE J1939 format are transmitted on this interface. The parameter group numbers (PGN) of the data which the display receives are given in the table below. More detailed information is given in the respective sections of the SAE J1939 standard. This standard can be found under <http://www.sae.org>

List of measured values SAE J1939/71 Oct. 1998

<i>Measured value:</i>	<i>Section no.:</i>	<i>PGN:</i>
% load	5.2.1.7	61443
Exhaust gas temperature 1 (before turbine)	5.2.5.207	65176
Exhaust gas temperature 2 (before turbine)	5.2.5.207	65176
Exhaust gas temperature	5.2.5.8	65270
Intake air temperature	5.2.5.4	65270
Engine hours	5.2.5.61	65253
Engine speed	5.2.1.9	61444
Vehicle speed	5.2.1.12	65265
Fuel consumption (ltr/hr)	5.2.5.63	65266
Fuel level	5.2.5.71	65276
Cooling water temperature – engine	5.2.5.5	65262
Charge air pressure	5.2.5.36	65270
Oil pressure – transmission	5.2.5.24	65272
Oil pressure – engine	5.2.5.28	65263
Oil temperature – transmission	5.2.5.17	65272
Oil temperature – engine	5.2.5.15	65262
Battery voltage	5.2.5.75	65271

**Display of battery voltage:**

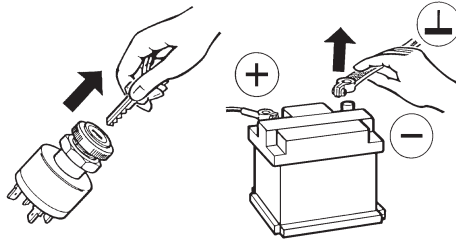


List of parameter groups used SAE J1939/71 Oct. 1998

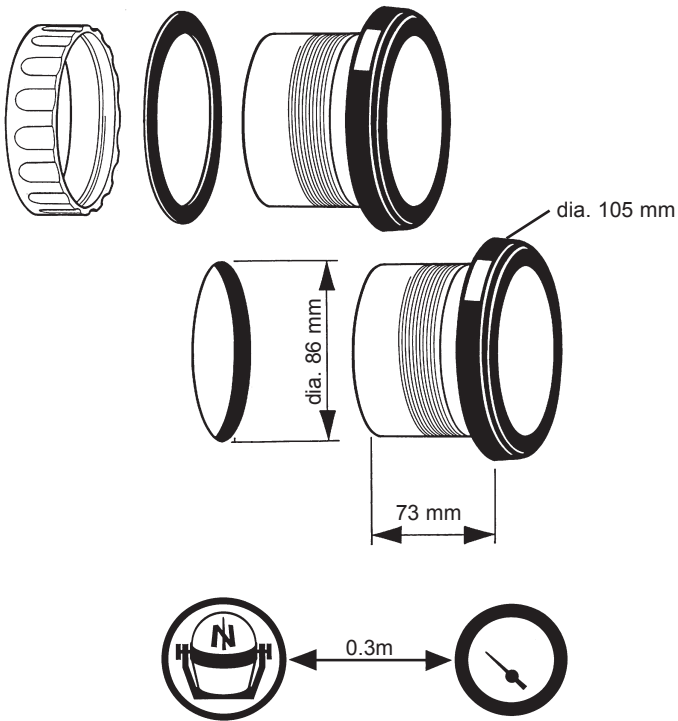
<i>Designation:</i>	<i>Section no.</i>	<i>PGN:</i>
ELECTRONIC ENGINE CONTROLLER #2	5.3.6	61443
ELECTRONIC ENGINE CONTROLLER #1	5.3.7	61444
ENGINE HOURS; REVOLUTIONS	5.3.19	65253
ENGINE TEMPERATURE	5.3.28	65262
ENGINE FLUID LEVEL/PRESSURE	5.3.29	65263
CRUISE CONTROL/VEHICLE SPEED	5.3.31	65265
FUEL ECONOMY	5.3.32	65266
INLET/EXHAUST CONDITIONS	5.3.36	65270
VEHICLE ELECTRICAL POWER	5.3.37	65271
TRANSMISSION FLUIDS	5.3.38	65272
DASH DISPLAY	5.3.42	65276
TURBOCHARGER INFORMATION #4	5.3.97	65176

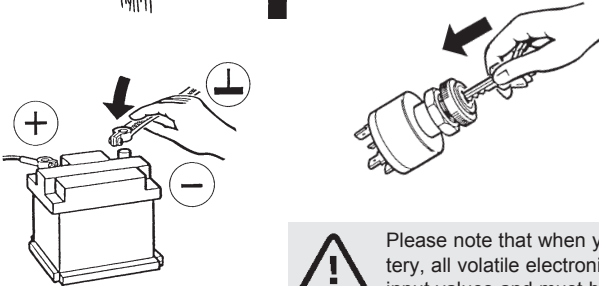
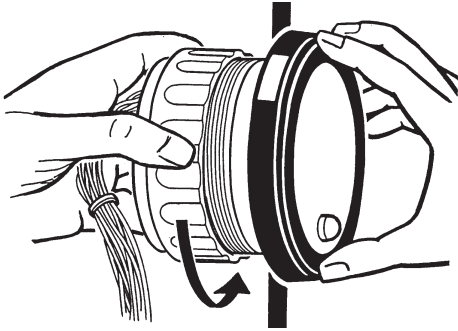
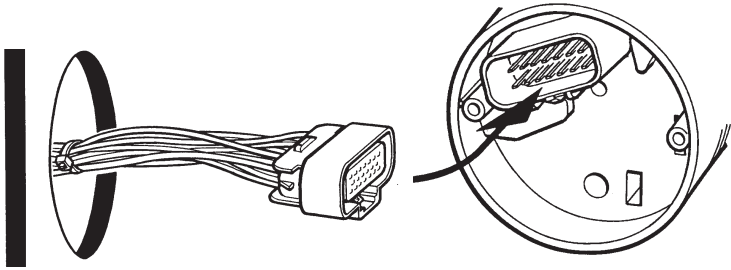
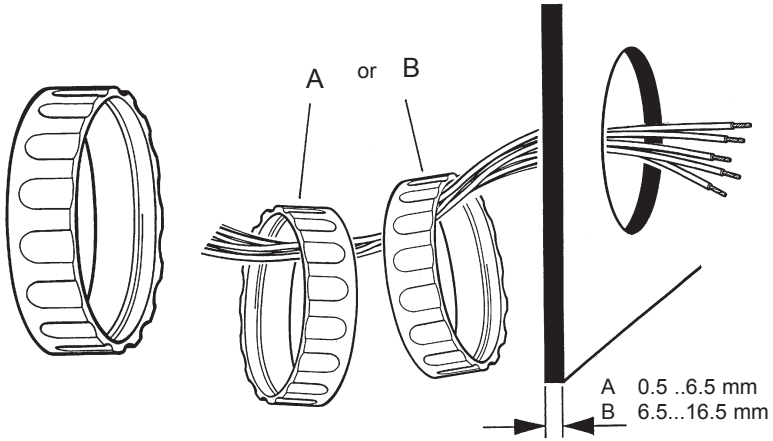



# 7. Installation of the Tachometer



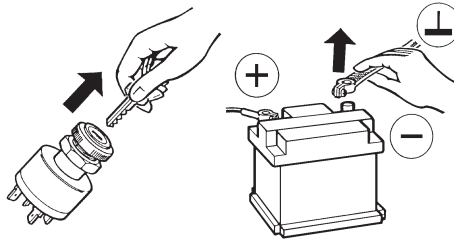
Before beginning, disconnect the negative terminal on the battery, otherwise you risk a short circuit.. If the vehicle is supplied by auxiliary batteries, you must also disconnect the negative on these batteries! Short circuits can cause fires, battery explosions and damages to other electronic systems. Please note that when you disconnect the battery, all volatile electronic memories lose their input values and must be reprogrammed.



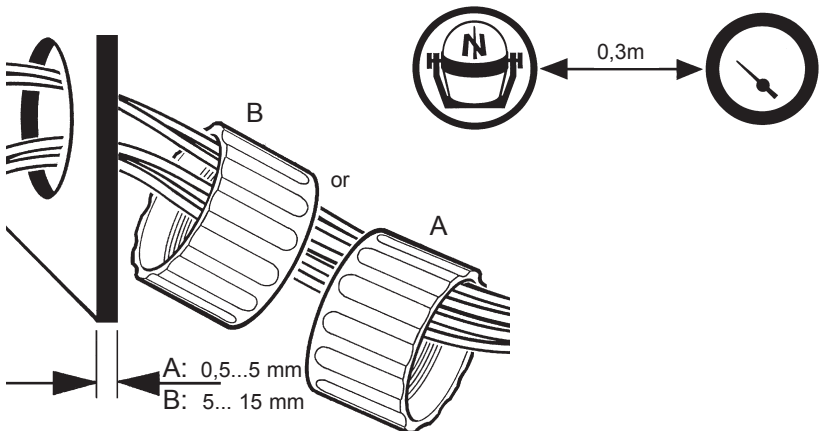
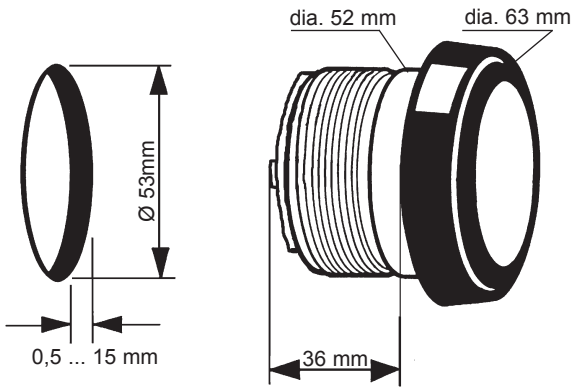


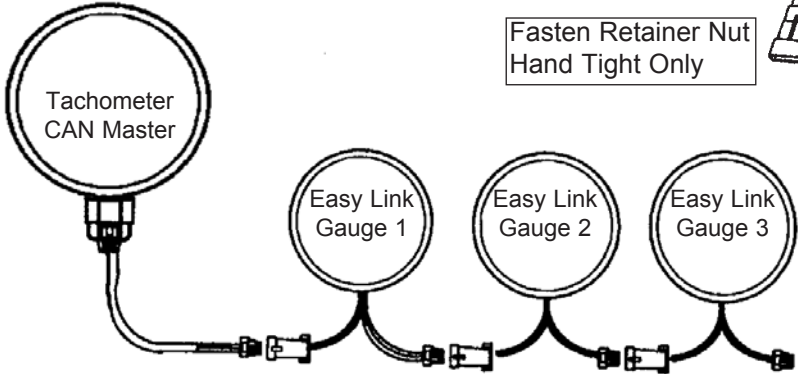
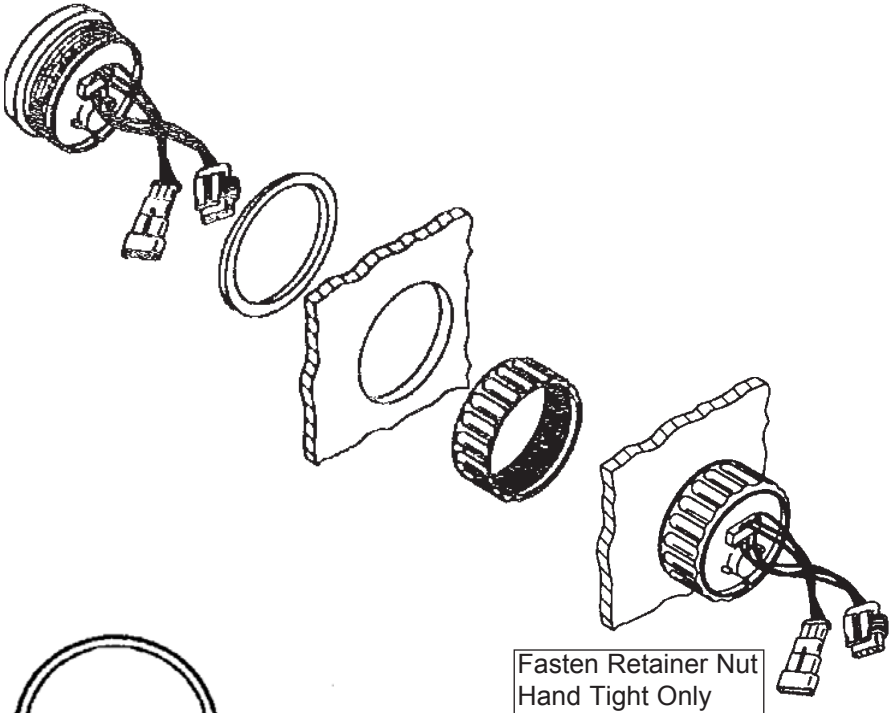
 Please note that when you disconnect the battery, all volatile electronic memories lose their input values and must be reprogrammed.

## 8. Installation of the Satellite Gauge

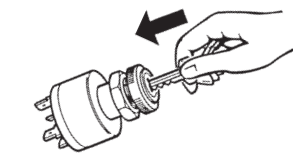
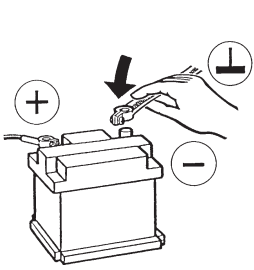


Before beginning, disconnect the negative terminal on the battery, otherwise you risk a short circuit.. If the vehicle is supplied by auxiliary batteries, you must also disconnect the negative on these batteries! Short circuits can cause fires, battery explosions and damages to other electronic systems. Please note that when you disconnect the battery, all volatile electronic memories lose their input values and must be reprogrammed.



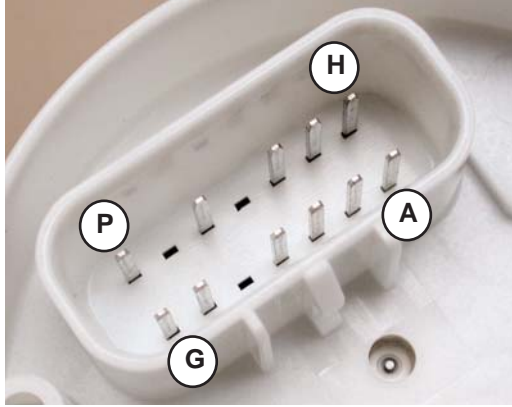


.....max. 20 Gauges  
max. 20 m Cable Length



**!** Please note that when you disconnect the battery, all volatile electronic memories lose their input values and must be reprogrammed.

## 9. Electrical Installation (pin assignment)



<b>Pin:</b>	<b>Assignment:</b>	<b>Color</b>
A	Satellite Bus Power	red/white
B	Analogue input 4-20 mA	blue/white
C	Analogue input 0-200 Ohm	grey/white
D	Satellite Bus Ground / Signal Ground	black/grey
E	not connected	purple
F	Term. 31 (GND)	black
G	Term. 30 (Battery power)	red
H	Satellite Bus	yellow
J	CAN high	green
K	CAN low	blue
L	not connected	brown
M	Term. 58 (illumination)	grey
N	not connected	pink
P	Term. 15 (ignition) Data	orange/brown

## 10. Cable Lengths

Permissible cable lengths for the Easy Link satellite bus are 20 metres. The total number of Easy Link satellite gauges displays which are connected to the Easy Link bus must not exceed 20.

# 11. Technical Data

<b>Power supply:</b>	<b>10 to 30 VDC</b>
Current consumption:	approx. 120 mA without illumination
	approx. 140 mA with illumination
Illumination:	red, dimmable, amber display
Operating temperature:	- 20 to + 70°C
Type of protection:	DIN 40050 –IP 65 front side
EMV:	CE according to EMV 83/336/EEC
Data input:	CAN 2.0 B; SAE J1939
	analogue 4-20 mA
	analogue 0-200 Ohm
Data output:	VDO Easy Link satellite bus
Dimensions:	85 mm built-in diameter
	73 mm built-in depth (including cable)
Connection:	Delphi plug, GT 150 sealed

**Subject to technical alterations**

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