Siemens VDO®

Speedometer Installation and Operation Instructions
for Programmable Speedometers with LCD Display

INSTRUCTIONS FOR THE INSTALLATION AND OPERATION OF THE PROGRAMMABLE SPEEDOMETER ARE CONTAINED HEREIN. USE IS RESTRICTED TO 12-VOLT OR 24-VOLT NEGATIVE GROUND ELECTRICAL SYSTEMS.

CAUTION!!!

These instructions contain information about gauges of different sizes. *You must determine the size of your gauge before cutting any holes!*

Tools and Materials Needed For Installation:

Hole saw or jigsaw (may not be needed)
¼" spade terminals
Miscellaneous electrical connectors
Philips and/or flathead screwdriver
Pliers and/or wrenches
Crimping tool and/or soldering iron
  (may not be needed)

Parts List

Item	Description	Quantity
1.	Speedometer	1
2.	Lamp Socket (Push in, wedge-type)	2
3.	Light Bulb (12-volt / G.E. #158 or equivalent)	2
4.	VDO Spin-Lok™ Mounting Clamp	1
5.	Installation/Operation Instructions	1

General Information

The VDO Programmable Speedometers featured in this installation manual are available in three diameters: 3⅛" (80 mm); 3⅜" (85 mm), and 4" (100 mm). The speedometers are also available with different dial faces: (MPH, Km/h or MPH–Km/h).

Incorporated into each speedometer is the latest VDO microprocessor technology for measuring speed and distance. These versatile instruments can be used in Original Equipment Manufacturer applications as well as in aftermarket installations.

VDO Programmable Speedometers can be used with *inductive*, *hall-effect, reed* and on manual transmissions, with *OEM sensors.* Use with electronic transmissions requires the speedometer be hooked up to the electronic transmission control box. Intermittent shifting may occur when connecting directly to OEM sensors *in electronic transmissions.*

These instructions describe the installation, wiring, calibration and operation of all VDO Programmable Speedometers with LCD display.

CAUTION; Read these instructions thoroughly before installing the speedometer. Do not deviate from assembly or wiring instructions. Always disconnect the battery ground before making any electrical connections. If in doubt, please contact your dealer or VDO North America at **(800)265-1818**.
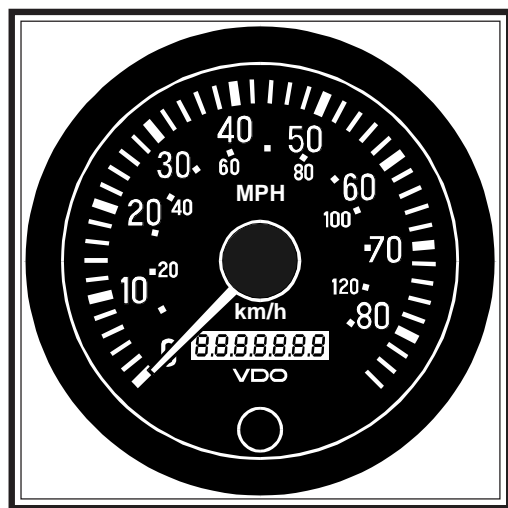
Sensor Installation

The speed sensor necessary to provide the signal to your new VDO Speedometer is not included. This sensor is available from your auto parts dealer. (Part numbers for VDO Hall Effect Sensors are: 340 011; 340 012; 340 013; and 340 014. The VDO Generator Sensor is Part # 340 001. VDO's Inductive Sensor is Part # 340 020 or 340 021.)

I. Mounting the Speedometer

1. Refer to Diagram B for dimensions. The 3⅛" (80 mm) speedometer requires a hole diameter of 3⅛" (80mm); the 3⅜" (85 mm) speedometer requires a hole diameter of about 3⅜" (85 mm); and the 4" (100 mm) speedometer requires a hole diameter of about 4" (100 mm). If you are mounting the speedometer into an existing panel, remember that the panel cannot be more than ¾" (20 mm) thick. Minimum mounting depth is 3⁹⁄₁₆" (91mm).

2. Careful measuring is a must for proper mounting of your speedometer. An improperly placed hole would be a costly mistake, so measure everything twice. *REMEMBER: THERE ARE NO SECOND CHANCES ONCE YOU HAVE MADE YOUR HOLE! MEASURE TWICE... CUT ONCE!*

3. Cut the hole. If you do not have a hole saw the exact size needed, use the closest **SMALLER** size, and carefully widen the hole with a half-round file or other similar device.

4. Place the speedometer in the opening and secure it with the supplied VDO Spin-Lok clamp as shown in Diagram C. You may also mount the speedometer with a VDO mounting bracket and nuts [*optional – must be purchased separately; they are available from your VDO dealer*].

II. Wiring the Speedometer

1. Prepare insulated ¼" spade terminals for use with the speedometer. Make sure all wires are long enough to reach the necessary positive and negative terminals and any wires from the sensor.

2. Connect the wire from pin #4 to a switched +12 volt or +24 volt source. A switched +12 or 24 volt wire can be found coming from the ignition switch. Follow this wire to a junction, and attach the wire from the speedometer. Refer to Diagram D for the proper wiring of the speedometer.

3. Attach the wire from pin #3 to a ground (negative) source. One such source can always be found where the battery is attached to the metal frame of the vehicle. Use an appropriate electrical connector to ground this wire.

4a. If you are using a hall effect speed sensor, attach the three hall effect sensor wires to the speedometer head as follows:

a) **RED** to Terminal #2;
b) **BLACK** to be piggy-backed to Terminal #3 and on to a suitable ground;
c) the **OFF-WHITE** wire to a butt-splice with two wires coming out of the butt-splice going to Terminals #6 and #8.

4b. If you are using an inductive speed sensor, connect one terminal to pin #7. Connect the other terminal to pin #8.

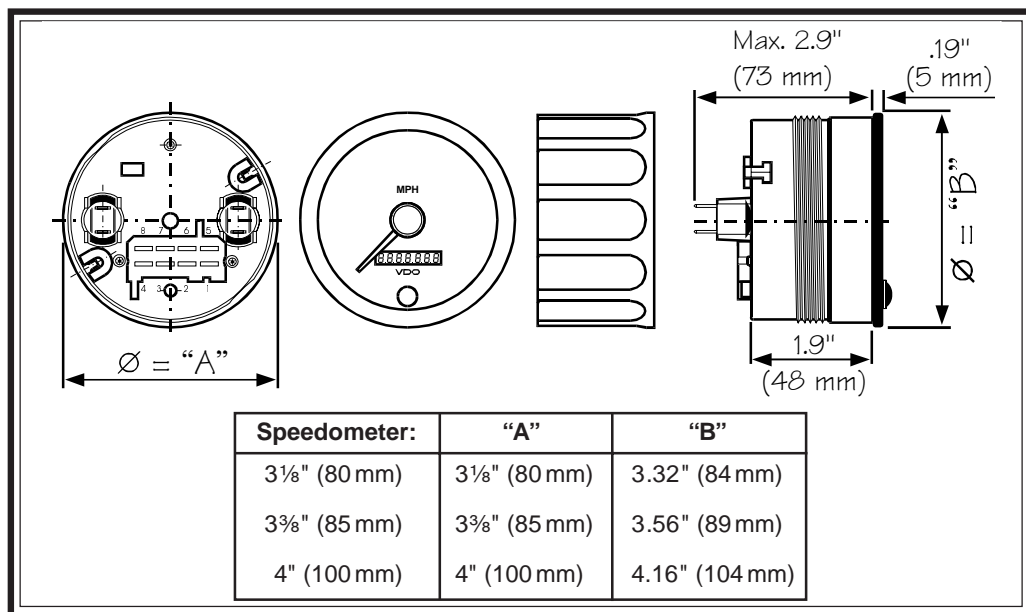4c. If you are using an electronic transmission, connect its speed signal wire to pin #8.

Diagram A
All *VDO Programmable Speedometers with LCD Display*
feature auto-calibration

Max. 2.9" (73 mm)
.19" (5 mm)
1.9" (48 mm)
∅ = "A"

Speedometer:	"A"	"B"
3⅛" (80 mm)	3⅛" (80 mm)	3.32" (84 mm)
3⅜" (85 mm)	3⅜" (85 mm)	3.56" (89 mm)
4" (100 mm)	4" (100 mm)	4.16" (104 mm)

Diagram B
VDO Programmable Speedometer Dimensional Drawings

❶

Ignition

Light
Switch

Fuse
Block

Butt Splice

8 7 6 5

Pin #4

Pin #3

4 3 2 1

Battery

Off-White Wire
to Pins
#6 & #8

Black Sensor
Wire to Pin #3

Back of Speedometer

Hall-Effect
Sensor

Red Sensor Wire to Pin #2

---

❷

Ignition

Light
Switch

Fuse
Block

8 7 6 5

Pin #4

Pin #3

4 3 2 1

Battery

Inductive
Sender

Pin #7

Pin #8

Back of Speedometer

---

❸

Ignition

Light
Switch

Fuse
Block

8 7 6 5

Pin #4

Pin #3

4 3 2 1

Battery

Electronic
Control Box

Pin #8

Back of Speedometer

Signal Wire from
Electronic Transmission Box

Diagram D
Proper wiring of the speedometer with: ❶ Hall-Effect sensors; ❷ Inductive sensors; or ❸ Electronic transmissions
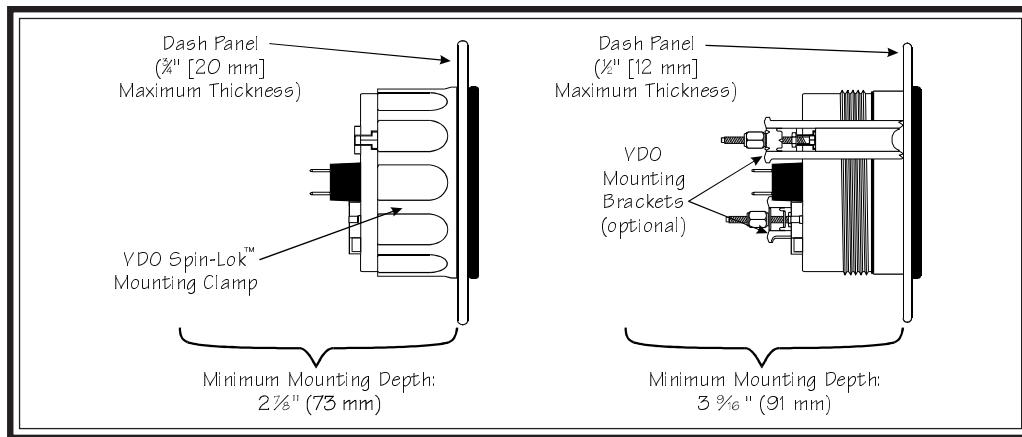
Diagram C
Proper mounting of the VDO Speedometer

❸

5. For wiring of the lights, see Diagram D.

6. Reconnect the battery and turn on the ignition to make sure the speedometer is working. When you turn on the ignition, the speedometer will do an automatic self-test. During this self-test, the pointer moves over the whole scale range, and the LCD display shows the word "tESt". After the test is completed, the display will reveal either the trip distance or the total distance, depending on which one was selected when the ignition was turned off. Since this is the first time power has been applied to the instrument, the reading will be |0.0|, or |t 0.0|. If everything is working properly, the installation is complete. If it isn't, re-check your wiring.
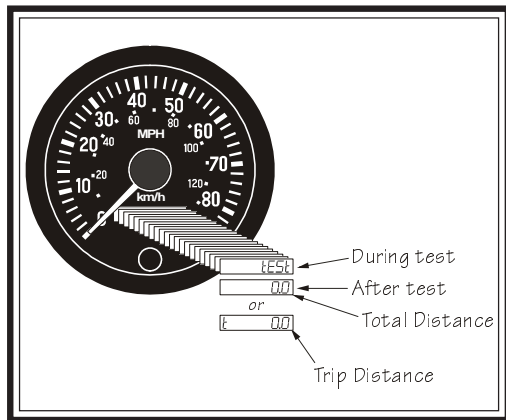

Diagram E
The LCD on the speedometer will show this display during, then after the self-test.

III. Calibrating the Speedometer

Calibration of the *VDO Speedometer with LCD Display* is a relatively simple procedure, and can be accomplished in any of three ways:

- Automatic calibration when driving on a road with the exact distance of 1 mile clearly defined; or on a dynomometer...
- By the input of the known pulse-per-mile (kilometer) for the vehicle and sensor being used with the speedometer...
- Using a reference point for adjustment or fine tuning.

You gain access to the calibration functions by pressing the button on the front of the speedometer and holding it in while you turn on the ignition. As you continue to hold in the button, the display will change...scrolling through the three calibration methods and stopping on each one for about two seconds.
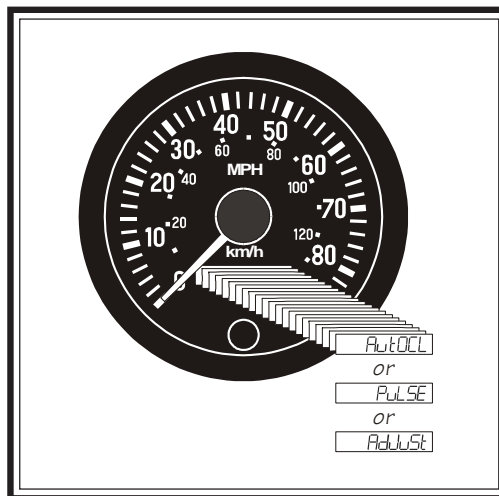

Diagram F
Calibration modes as displayed on the Speedometer's LCD

The display lists the auto-calibrate mode as AutOCL; the pulse-per-mile mode as PuLSE; and the reference/fine-tune mode as AdJuSt. When you see the method you wish to use, let go of the button and that function will be enabled. See Diagram F.

1. Autocalibration (AutOCL)

The auto-calibration function can be used successfully only on: ❶ A road with the distance of one mile accurately designated or ❷ A dynomometer.

To use the autocalibrate mode:

1. Press the button on the front of the speedometer, hold it in, and start the engine. Release the button when the display reads, "AutOCL."

2. After three seconds, the word "buttOn" will show on the display. When you are ready to begin your calibration run, press the button again. The display will now begin flashing the word "StArt."

3. Drive the reference distance of one mile (or 1 kilometer). *NOTE: As you drive this distance, the speedometer needle will not register or move. This is a normal occurrence during the autocalibration process.*

4. When you have gone *exactly* one mile, press the button again. If the electronic impulse rate detected by the speedometer's microprocessor is within the calibration range limits of 500 to 399,999, the rate will be shown on the LCD display. For example, your reading might be "P16000 ≙ Calibration Range 16000). Such a display indicates that the impulse rate detected during the reference mile you drove exactly matches the microprocessor's programmed rate for 1 mile. That means the speedometer is now perfectly calibrated to provide the most accurate display possible of both speed and distance. The speedometer finishes its autocalibration by moving the pointer through a full sweep, then back down to zero.

However, if the speedometer detects any kind of error during your run, the LCD will display the following message: "F 0.0". This means no useable impulse was detected. In this case, simply turn off the ignition, and start the process again.

> **REMEMBER:** During the auto-calibration run, the pointer on the speedometer will not operate.
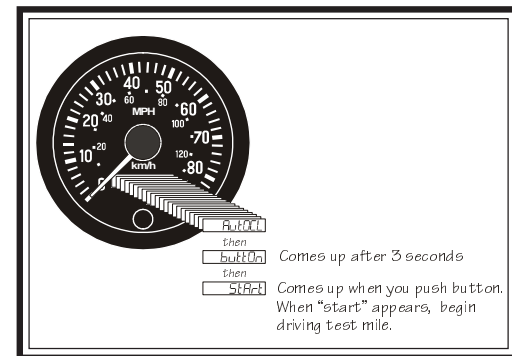

Diagram G
LCD Sequences as they appear during Automatic Calibration

2. Manual Calibration with a known value (PuLSE)

If you know the exact calibration value for the vehicle and type of sensor you are using (pulse-per-mile or pulse-per-kilometer), you may use that value to manually calibrate the speedometer.

To calibrate your VDO Speedometer manually:

1. Press and hold in the button on the front of the speedometer as you turn on the ignition. Hold in the button until the word "PuLSE" is displayed on the LCD readout.
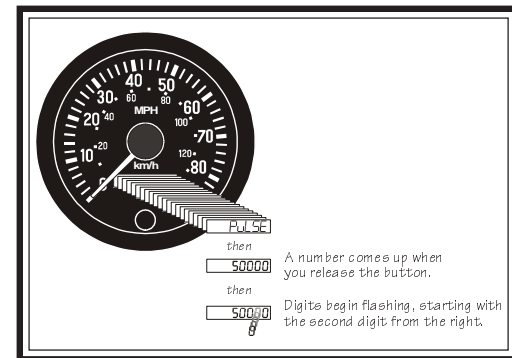

Diagram H
LCD Sequences as they appear during Manual Calibration

2. As soon as you see the word "PuLSE," release the button. After a few seconds, the display will start flashing a series of numbers (factory default setting) that you can change to represent the correct calibration impulse value. For example, a number like 50000 will show on the display, with each digit flashing in turn, except for the last digit on the right, which is fixed: first, the second **0** from the right; then the third **0** from the right; then, the next **0**; and finally, the **5**.

3. As each number flashes, press the button to change it until the correct digit appears (that is, the number you wish to input).

For example, let's say the number that represents the correct calibration value for your vehicle and sensor is "43850." When you begin the manual calibration process, the LCD displays a default value. Each digit, except the one farthest to the right, will flash, in turn, from right to left. Wait until the second digit from the right starts to flash again. When it does, press the button to start cycling through the numbers available for this digit. When the number "5" appears, release the button.

At this point, the number "5" is set, and the digit to its immediate left begins to flash — the middle digit. Press the button again, and hold it until the number "8" appears. Release the button. Now, the second digit from the left begins to flash. Again, hold in the button until the number "3" appears. When it does, all but the left-lmost digit are set. Repeat the process to set the "4" and the value in our example is set. The value "43850" should be displayed on the LCD readout.

4. When you are satisfied you have properly entered the correct calibration value — when that value is displayed on the LCD readout — take your finger off the button and wait. After a few seconds, the value you have entered will be downloaded into the speedometer's microprocessor, and the speedometer will revert back to normal operating mode. At this point, the manual calibration process is complete.

In the future, you can use this method to update the calibration value stored in the computer should it ever become necessary. This function also allows you to manually adjust the calibration value after you perform the automatic calibration process.

3. Manual Calibration (Fine Tuning) (*Adjust*)

You can fine-tune the calibration of the speedometer's analog display (the pointer showing miles-per-hour or kilometers-per-hour) by using speed test equipment and the " *Adjust* " function on the LCD readout. The pointer can be repositioned anywhere within the calibration range of the speedometer.
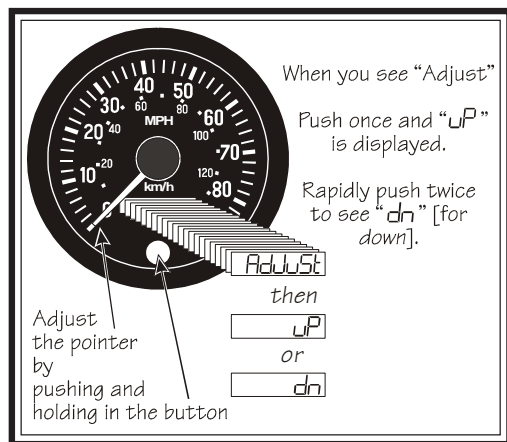
Diagram I
Calibration of the analog (pointer) display on the speedometer

To manually calibrate the pointer on the analog display (with the car on a dyno at the specified speed):

1. Press and hold in the button on the speedometer as you turn on the ignition and start the engine. Hold in the button until the word " *Adjust* " shows up. When it does, release the button.

2. Press the button once, and the word " *uP* " will be displayed on the LCD readout. Press it twice, in rapid succession, and
" *dn* " [for *down*] will be displayed.

3. When either " *uP* " or " *dn* " is showing, press the button again, and hold it in. If you hold the button in for just a short time, the pointer will move slowly either upwards or downwards, depending on which mode you selected. This allows for a very accurate adjustment of the pointer. Holding the button in for a longer period of time makes the pointer move faster.

4. When you have repositioned the pointer where you want it, release the button and wait. If no further adjustments are made within one minute, the speedometer will revert back to the normal operating mode.

NOTE: If you move the pointer past the upper limit of the calibration range, the LCD display will flash and you will only be able to adjust the pointer downward. If you move the pointer past the lower limit of the calibration range, the LCD display will also flash, and you will only be able to adjust the pointer upward.

IV. Operating the Speedometer

When the speedometer is in the normal operating mode, the LCD readout acts as an odometer, allowing you to display either total miles driven, or trip distance. Total mileage is counted up to 999,999.9 miles. Trip distance is counted up to 99,999.9 miles.

To display either Total Mileage or Trip Distance:

Press the button. If the *Total Mileage* had been showing on the LCD readout, it will change to *Trip Distance* when you push the button. If the *Trip Distance* had been showing, the display will change to reveal *Total Mileage*.
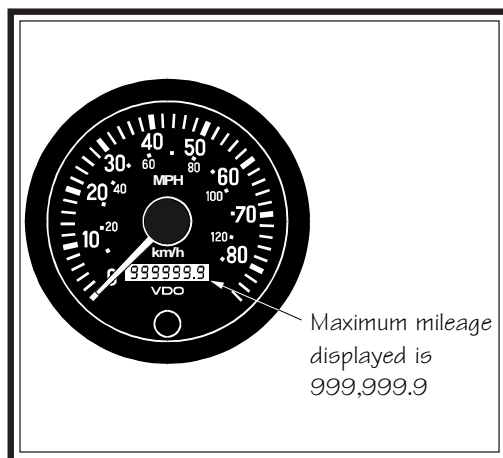
Diagram J
The LCD display showing Total Mileage

To reset the odometer Trip Distance display to zero:

Push and hold in the button for about two seconds. The odometer will reset to **0.0** miles. Be aware that pushing and holding in the button will reset *Trip Distance* to zero regardless of which display is currently showing on the LCD readout — *Trip Distance* or *Total Mileage*.
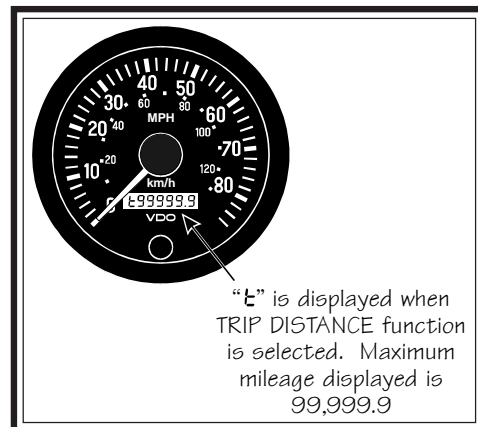
Diagram K
The LCD display showing Trip Distance

TECHNICAL DATA

Operating voltage:	10.8 – 32 Volts
Operating current:	< 100 mA (< 600 mA with light)
Operating temperature:	−4° F to 158° F (-20° C to 70° C)
Protection:	IP65 (Front) Ozone and UV resistant housing
Dimensions—	
Depth:	3.6" (91 mm)
Diameter:	3⅛" (80 mm) 3⅜" (85 mm) 4" (100 mm)
Illumination:	Backlit / Frontlit dial and display
Calibration range:	500 to 399,999 pulses per mile or kilometer