Instrument Kit Installation and Wiring Instructions

VDO

1-800-265-1818

USE IS RESTRICTED TO 12 VOLT NEGATIVE GROUND ELECTRICAL SYSTEMS.

Parts List

Item	Description	Quantity
1.	Programmable Speedometer (3 1/8" or 3 3/8" diameter)	1
2.	Voltmeter (2 1/16" diameter	1
3.	Fuel Gauge (2 1/16" diameter)	1
4.	Pressure Gauge (2 1/16" diameter)	1
5.	Temperature Gauge (2 1/16" diameter)	1
6.	Pressure Sender (1/8" – 27 NPT)	1
7.	Temperature Sender (3/8" – 18 NPT)	1
8.	Fuel Level Sender & Float Arm	1
9	3/8"-18 NPT to 1/2"-14 NPT adapter	1
10.	Speed Sensor, Hall Effect	1
11.	Spin-Lok Mounting Clamp for gauges and speedometer	5
12.	Instrument Kit Installation Instruction	1
13.	Speedometer Programmable Installation Instructions	1

Additional Material That May Be Required For Installation:

16 Gauge standard insulated wire
Insulated female 1/4" spade terminals
Gauge connectors for 2 1/16" gauge
(one per gauge P/N: 240-025)
Speedometer connector (P/N: 240-053)
Fuel Sender Bolt on Installation Kit (P/N: 226-451)
Stud Mounting Kit, Speedometer (P/N: 600-401)
Stud Mounting Kits 2 1/16" gauges (P/N: 600-402)

CAUTION: Read these instructions thoroughly before making installation. Do not deviate from assembly or wiring instructions. Always disconnect battery ground before making any electrical connections.

General Information:

These kits come with VDO's Spin-Lok™ Mounting Clamps for easy installation. Optional VDO mounting brackets are available from your VDO dealer, should you require them. Note that the programmable speedometer included in this kit has a special set of installation and operation instructions. These instructions must be followed carefully to insure proper performance of the speedometer.

Gauge Installation:

1. Select mounting locations for all gauges which provide good visibility for the driver. Lay out center points for each instrument on the panel.

2. Using a hole saw cut mounting holes in panel. All small gauges require a 2 1/16" (52mm) hole for mounting. Speedometers are 3 3/8" (85mm) or 3 1/8" (80mm) depending upon which kit you purchased.

If in doubt measure the back of the instrument prior to cutting any Holes.

3. Hand tighten the gauges using the spin-Lok™ mounting clamps until the gauge can be no longer rotated in the panel. (Note) If the gauge can not be tightened fully, remove and reverse spin-lok™ clamp and re-install.

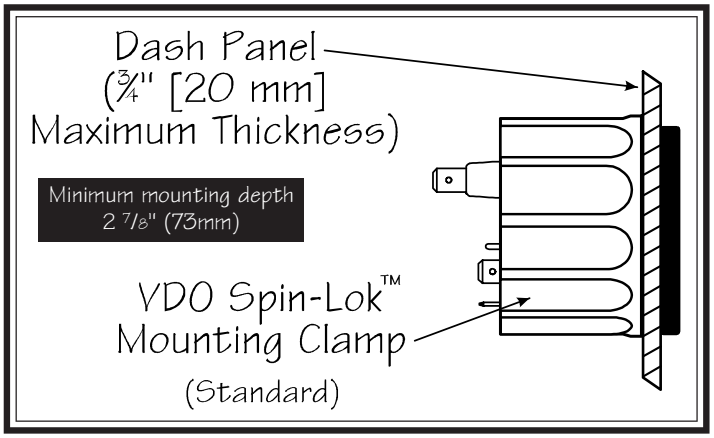


Diagram A
Proper mounting using VDO's Spin-Lok™ Mounting Clamp

Speedometer Installation:

PLEASE REFER TO THE SEPARATE PROGRAMMABLE SPEEDOMETER INSTALLATION AND OPERATING INSTRUCTIONS FOR PROPER MOUNTING AND OPERATION OF THE SPEEDOMETER. *SEE PAGE 3 FOR INSTRUCTIONS ON INSTALLING SPEED SENSORS.*

Part #0 515 010 396 Rev. 03/09

Fuel Level Sender Installation:

The fuel sender in this kit has a resistance rating of 10 ohms when the tank is empty and 180 ohms when full. The unit can be adjusted to read accurately in tanks from 6-23" in tank depth. For sender adjustment refer to **Table 1 and Diagram C**.

I. This fuel sender is designed to mount on all fuel tanks with a standard SAE five-hole flange configuration. If your tank does not have this configuration it may be necessary to purchase our optional flange kits referred to on the front page of these instructions.

II. Measure the tank depth of your fuel tank. Locate this dimension in **Column A of Table 1**. Reading across to **Column B** you will find the dimension from the mounting flange to the float pivot. You will need to adjust the fuel sender. If this dimension is 15-1/2" or greater, proceed to **Section A** for adjustment details. If less than 15-1/2", proceed to **Section B** for adjustment details.

Section A: (Tank depths less than 15-1/4")

1. Loosen the two screws marked 'd' in **Diagram D**. Adjust the plastic housing up or down until the proper dimension from **Table 1** is obtained. Re-tighten screws until secure.

Section B: (Tank depths less than 15-1/4")

1. Remove nut 'a' and washer 'b' to wire lead.
2. Remove two screws marked 'd' and discard.
3. On reverse side of sender locate two screws in plastic housing marked 'e'.
4. Slide plastic housig off of bracket 'f' and discard.
5. Install plastic housing by sliding on to bracket 'g' and reinstalling screws loosely.
6. Slide housing up or down until proper dimension from **Table 1** is reached, then tighten screws.
7. Wrap excessive lead wire around bracket 'g' and re-install with nut and washer.

Float Installation:

1. Loosen pivot screw 'h' removing short metal rod show in **Diagram D**
2. Install float rod to proper dimension found in **Table 1**, **Column C** and tighten pivot screw.

Note: Make sure the float is installed as shown **Fig. 4** If installed backwards, the fuel gauge will indicate "full" when the tank is empty, and "empty" when the tank is full.

3. Leaving 1" of float rod exposed on left of float pivot cut off excess float rod.

CAUTION: To avoid damage to the threads, do not overtighten hardware.

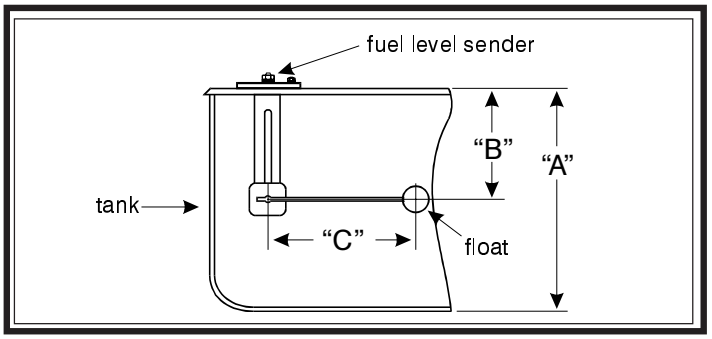
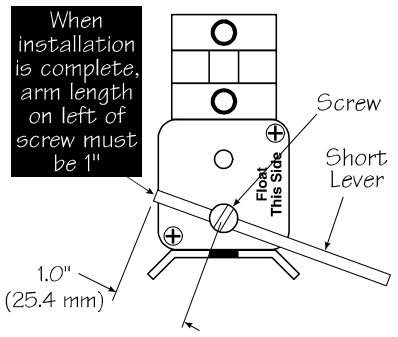


Diagram C
Measurements Needed To Make Proper Adjustments

!! IMPORTANT !!

As received, the unit will have a short lever arm installed. Loosen the screw and remove the short lever arm, and replace it with the long float arm and plastic float ball assembly. **When the installation is finished, the arm length to the left (short side) of the screw must be 1".**



CAUTION: When attaching the float arm to the sender body, make sure the float ball is to the right side as you face the unit, as shown in Diagram D. If you attach the float arm to the left of the sender body, or backwards, the fuel gauge will read "FULL" when the tank is actually empty!

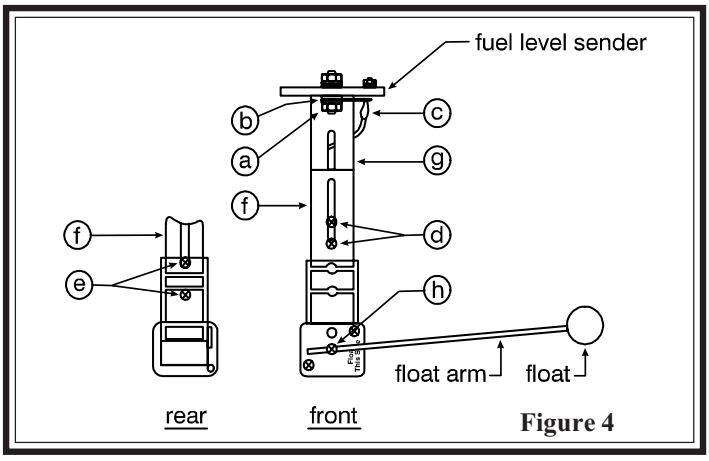


Figure 4

Diagram D
Parts of the Fuel Level Sender Unit to be Adjusted

Note: In some installations if it is necessary to have the float pointed in the opposite direction. to accomplish this do not reposition the float. You must remove the two screws marked 'd'. Slide plastic housing off of bracket, rotate and reinstall to the proper dimension.

TABLE 1 (dimensions in inches)

A	B	C	A	B	C	A	B	C
6.0	3.00	3.5	12.0	6.00	7.8	18.0	9.00	12.0
6.5	3.25	3.8	12.5	6.25	8.1	18.5	9.25	12.3
7.0	3.50	4.2	13.0	6.50	8.5	19.0	9.50	12.6
7.5	3.75	4.5	13.5	6.75	8.9	19.5	9.75	12.9
8.0	4.00	4.9	14.0	7.00	9.3	20.0	10.00	13.4
8.5	4.25	5.3	14.5	7.25	9.6	20.5	10.25	13.8
9.0	4.50	5.6	15.0	7.50	10.0	21.0	10.50	14.2
9.5	4.75	6.0	15.5	7.75	10.4	21.5	10.75	14.6
10.0	5.00	6.4	16.0	8.00	10.7	22.0	11.00	15.0
10.5	5.25	6.7	16.5	8.25	11.0	22.5	11.25	15.4
11.0	5.50	7.1	17.0	8.50	11.4	23.0	11.50	15.7
11.5	5.75	7.4	17.5	8.75	11.8			

CAUTION: Before drilling any holes into the tank, place the sender assembly on top of the tank to judge the proper hole placement—one that will allow the float arm clearance inside the tank.

SAFETY PRECAUTION: When making modifications to fuel tanks, it is essential that the tank be removed from the vehicle, and that it is empty, clean and dry. After drilling, make sure all chips and other foreign matter have been removed from the tank. Clean the tank thoroughly.

If no holes exist in the fuel tank (see CAUTION, above):

1. Carefully mark an area to be cut open so you can insert the sender. The key to this step is to position the float as close as possible to the center of the tank. This provides the most stable and accurate reading when the fuel splashes back and forth. Make sure you have allowed enough clearance for the float arm before you cut the hole. Remember, you only get one chance to do it right!
2. Cut a 1.697" (43 mm) hole in the top of the tank.
3. With the gasket in place below the flange, carefully feed the float arm and sender body into the 1.697" (43 mm) hole in the tank. Make certain the float arm has free motion within the tank. Using the sender flange as a template, locate the positions of the five mounting holes. Depending on the thickness of the tank, either self-tapping screws or #8-32 machine screws may be used, drilling and tapping accordingly. If threaded holes already exist, check the thread size and use the appropriate hardware.
4. Insert the fuel sender assembly into the tank and apply gas-proof sealant. Align the holes and thread in the ½" mounting screws through the holes in the sender flange and tank. Check to make sure that all screws are secure. AVOID OVERTIGHTENING! When you have done this, the installation of the fuel level sender unit is complete.

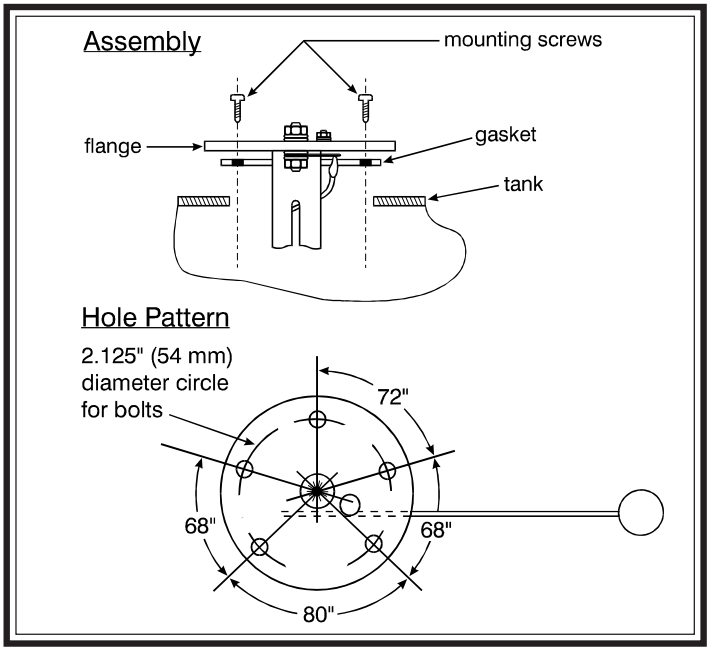


Diagram E
Fuel Sender Assembly and Hole Pattern Dimensions

Temperature and Pressure Sender Installation:

Check the OEM engine manual for the correct location for these senders. Temperature senders are most accurate when installed in an "aftermarket" intake manifold. Installing the sender into the cylinder head can cause high readings due to exhaust manifold heat.

NOTE: This kit contains a 3/8" – 18 NPT temperature sender, and a 3/8" – 18 NPT to ½" – 14 NPT adapter should you need it.

CAUTION: Do not use tee, angle or reducing adapters for temperature senders, as the tip may not be immersed in the water flow. Do not use teflon tape on sender threads. It will interfere with the electrical ground. Senders have self-sealing, tapered pipe threads.

Speed Sensor Installation:

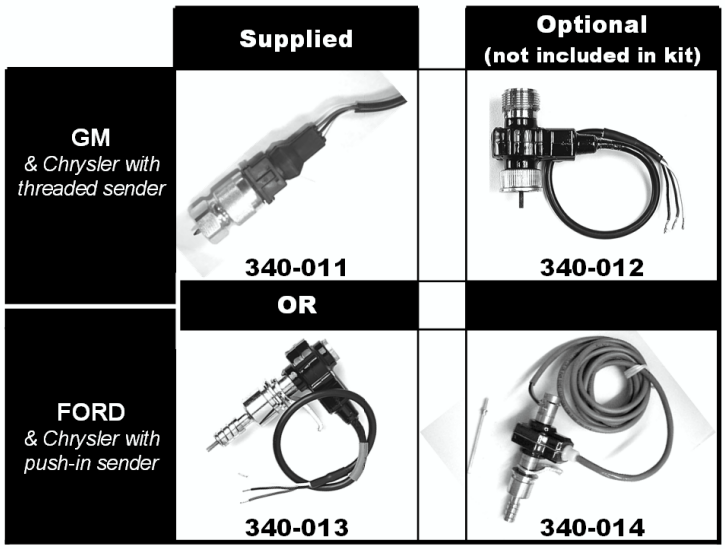
The speed sender included for use with the programmable speedometer in this VDO Instrument Kit is a standard, closed Hall-effect sender. It is a closed sender with a 16 pulse-per-revolution signal in a three-wire configuration.

1. If you are replacing an existing speedometer: Remove the cable that went to the old speedometer.
2. Install the new sender in the place where the old cable was bolted onto the transmission.

or, in a new installation:

1. Bolt the sender onto the transmission at the location specified by the OEM for speedometer cable installation.
2. Run the length of wire to the new speedometer.
3. Cut it to length, and attach it to the new speedometer according to the instructions in the separate, enclosed speedometer installation and operation instructions.

NOTE: All three wires MUST be connected directly to the speedometer. See separate speedometer instruction sheet for wiring information.



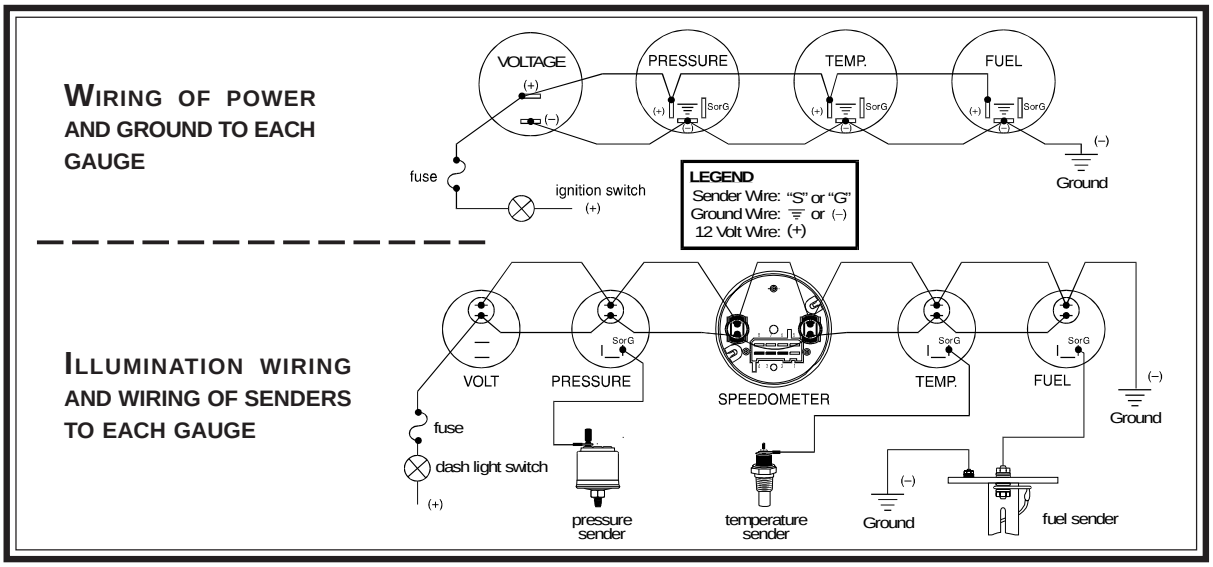


Diagram G
Wiring Diagram

Electrical Wiring:

Refer to the wiring diagram, Diagram G. Wire gauges in series from a positive (+) accessory to a source which is not already overloaded with fans, air conditioning, and such. The ground (–) wire is also run in series, including the light socket ground. The final ground run, using 14-gauge wire, should be connected to a good ground such as the engine block ground strap or directly to the negative battery post.

NOTE: See the separate Speedometer Installation and Operation Instructions for information on wiring the speedometer.

System Testing:

When installation and wiring have been completed, the following tests should be performed to ensure that all systems are functioning properly:

I. Turn on the dash light switch to see if all gauges light up properly. If not, check your wiring, the ground, and all bulbs. Reconnect or replace as necessary.

II. Turn on the ignition key. Gauges should read:

Pressure: Needle to "0"
Fuel: Needle to amount of fuel in the tank
Temperature: Needle to the temperature of the engine water

a) With the key on, pull the sender wire off of the sender:

Fuel and pressure gauges: needle to the right-hand position
Temperature gauge: needle to the left-hand position

b) With the key on, ground the sender wire to the engine block:

Fuel and Pressure Gauges: needle to the left-hand position
Temperature Gauge: needle to the right-hand position

NOTE: All VDO electrical gauge pointers will peg full left-hand position when the key is off.

III. Senders can be tested with an ohmmeter that measures from 10Ω to 2000Ω. Connect the positive (+) lead from the tester to the sender terminal, and the negative (–) lead to a good ground. The following readings should occur if the sender is operating properly:

Temperature sender—	engine cold:	700Ω
	engine approximately 180°:	68Ω
Pressure sender—	engine off:	10Ω
	engine running 40 psi:	105Ω
	engine running 60 psi:	152Ω

IV. Voltmeter:

	Volts:
Key on, engine off:	12
Engine running, no accessories or lights:	13.7 – 14.3
Engine running with accessories, lights:	13.0 – 14.0

NOTE: These readings are approximate, depending on the regulator system and engine speed. Lower readings indicate a bad battery, regulator, or alternator; or incorrect wiring.

V. With VDO fuel tank senders (Part #226 001), an empty tank will read 10Ω. As fuel is added, the resistance reading will rise until the tank is full, when it will read 180Ω.

NOTE: If you already have a fuel level sender in your tank, check the resistance readings. If they do not match the readings above, VDO manufactures a number of fuel gauges which should match your sender. ***REMEMBER:*** The ohm range of the sender and the gauge ***MUST MATCH***!