

Instrument Kit Installation and Wiring Instructions

For Cockpit, Cockpit Royal, Series 1, Heritage Gold, Contour and Millennium Series

Siemens VDO

Allentown, Pennsylvania USA

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
14.	Wire Harness (Millennium Kit ONLY)	1

Additional Material That Maybe Required

For Installation:

16 Gauge stanard insulated wire (P/N: 240-023)
Insulated female 1/4" spade terminals
Gauge connectors for 2 1/16" gauge
(one per gauge P/N: 240-026)
Speedometer connector (P/N: 240-053)
Fuel Sender Bolt on Installation Kit (P/N: 226-451)
Fuel Sender Weld on Installation Kit (P/N: 226-901)
Stud Mounting Kits 2 1/16" gauges (P/N: 600-402)
Stud Mounting Kit, Speedometer (P/N: 600-401)
Fuel Sender Ford application: 1935-1956 (P/N: 226-902)

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. If in doubt, please contact your dealer or VDO Instruments at 1-800-265-1818.

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. Speedometer are 3 3/8" (85mm) or 3 1/8" (80mm) depending upon which kit you purchased.

If in dout measure the back of the instrument priop to cutting any Holes.

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

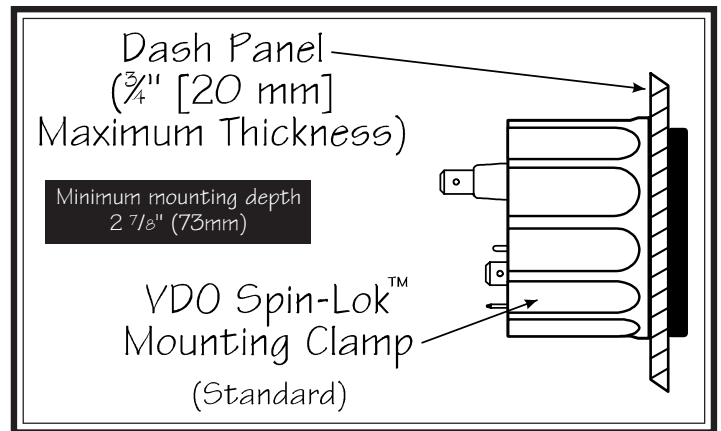


Diagram A

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.

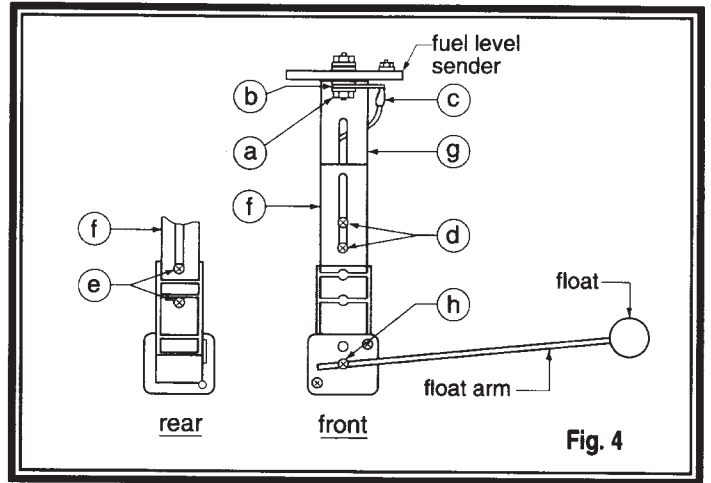
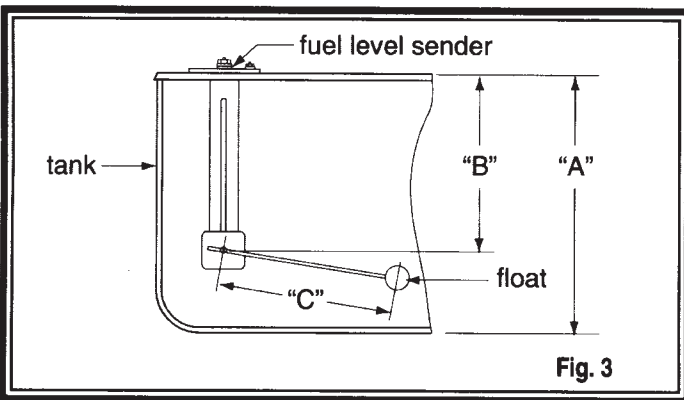
Fuel Level Sender Installation

The Fuel Level Sender in this kit is designed to work with the VDO fuel gauge enclosed and 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" to 23" deep. For sender adjustment, refer to Table 1 and Fig. 3.

I. Measure depth of the fuel tank. Locate this dimension in Column "A" of table. Column "B" then shows the length from the underside of the sender flange to the center of the float pivot. Column "C" shows the distance from the center of the float pivot to the center of the float ball. For example, a tank 12" deep would need a measurement of 6" from the flange to the pivot, and 7.8" from the pivot to the float.

II. For tank depths up to 15-1/2" it will be necessary to eliminate a part of the assembly. (See Fig. 4) Proceed as follows:

1. Remove nut "a", washer "b", and ring terminal "c" from the underside of the mounting flange.
2. Remove two screws "d" and discard.
3. Remove two screws "e" from the plastic housing and reserve for later use.
4. Carefully remove bracket "f" from the plastic housing and discard. Replace with bracket "g" in the housing and loosely re-install two screws "e" into housing.



CAUTION: When installing the float arm into the sender body, make sure the float ball is to the right side when you face the unit, as shown in Fig. 4. If installed to the left, the fuel gauge will read "full" when the tank is empty.

5. Slide housing up or down until the proper dimension from Table 1 is reached, then tighten screws securely.
6. Replace ring terminal and hardware.

CAUTION: Do not overtighten hardware to avoid damage to the threads.

III. For tank depths of 16" to 23", no disassembly of the sender bracket is necessary.

1. Remove ring terminal as instructed in Section II, above.
2. Loosen two screws "d" and adjust the plastic housing up or down until the proper dimension from Table 1 is obtained, then retighten screws securely.
3. Re-install ring terminal and hardware, and tighten all hardware securely, avoiding overtightening.

IV. To install the float assembly, loosen screw "h", remove the short piece of rod, and discard. Insert the float rod until the proper length "c" from Table 1 is met, then tighten the screw securely. Carefully cut off any excess rod with a bolt cutter or similar tool, taking care not to damage the assembly.

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

VDO North America recommends that the fuel sender and the fuel gauge be wired together and checked for compatibility prior to installing fuel sender into tank.

V. Refer to Fig. 5 for installation of the fuel sender assembly into the tank. The sender flange is designed to fit a standard SAE hole pattern.

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.

TABLE I (dimensions in inches)

A	B	C	A	B	C	A	B	C
6.0	3.0	3.5	12.0	6.0	7.8	18.0	9.0	12.0
6.5	3.25	3.8	12.5	6.25	8.1	18.5	9.25	12.3
7.0	3.5	4.2	13.0	6.5	8.5	19.0	9.5	12.6
7.5	3.75	4.5	13.5	6.75	8.9	19.5	9.75	12.9
8.0	4.0	4.9	14.0	7.0	9.3	20.0	10.0	13.4
8.5	4.25	5.3	14.5	7.25	9.6	20.5	10.25	13.8
9.0	4.5	5.6	15.0	7.5	10.0	21.0	10.5	14.2
9.5	4.75	6.0	15.5	7.75	10.4	21.5	10.75	14.6
10.0	5.0	6.4	16.0	8.0	10.7	22.0	11.0	15.0
10.5	5.25	6.7	16.5	8.25	11.0	22.5	11.25	15.4
11.0	5.5	7.1	17.0	8.5	11.4	23.0	11.5	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 sloshes 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 1/2" 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.

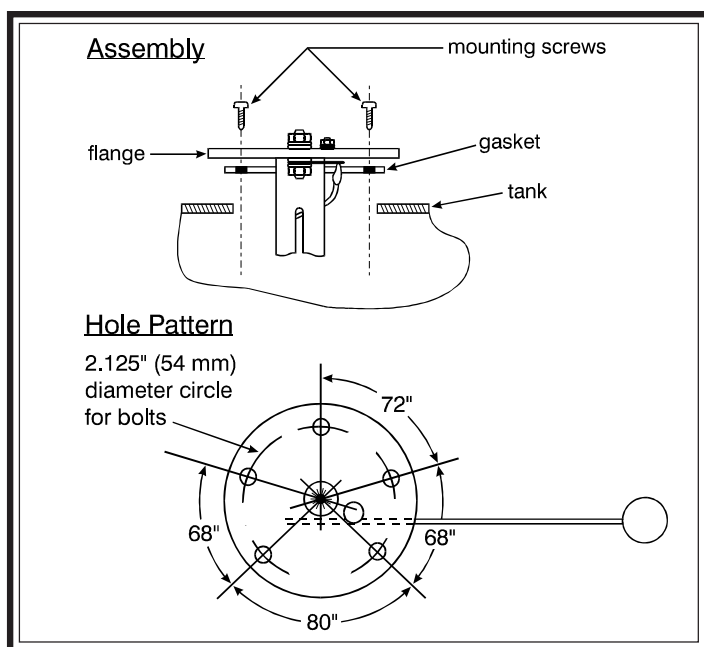


Diagram E

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 1/2" – 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 7/8" – 18 NPT fittings for GM and many other transmissions. It sends a 16 pulse-per-revolution signal in a three-wire configuration.

(A standard, through Hall-effect sender for use with cruise control is available from your VDO dealer (Part Number 340-012). Other senders which can be used with the programmable sender include Ford [through or closed] Hall-effect senders or almost any inductive sender.)

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 eight foot 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.

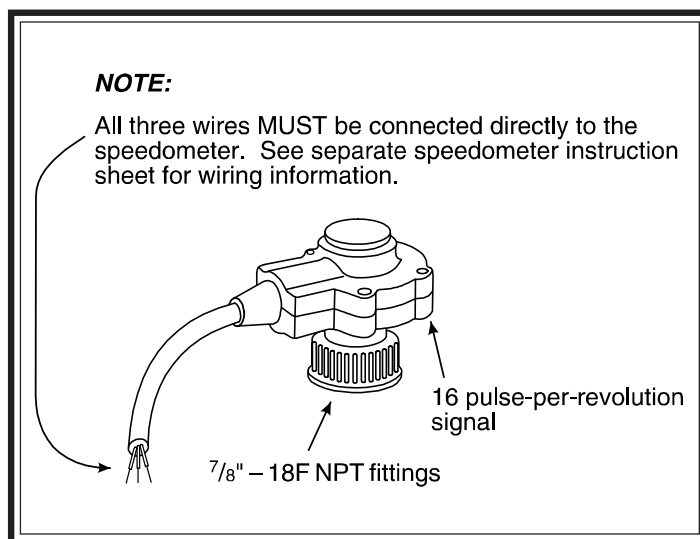


Diagram F

Standard, closed, 3-wire Hall-effect sender included in kit

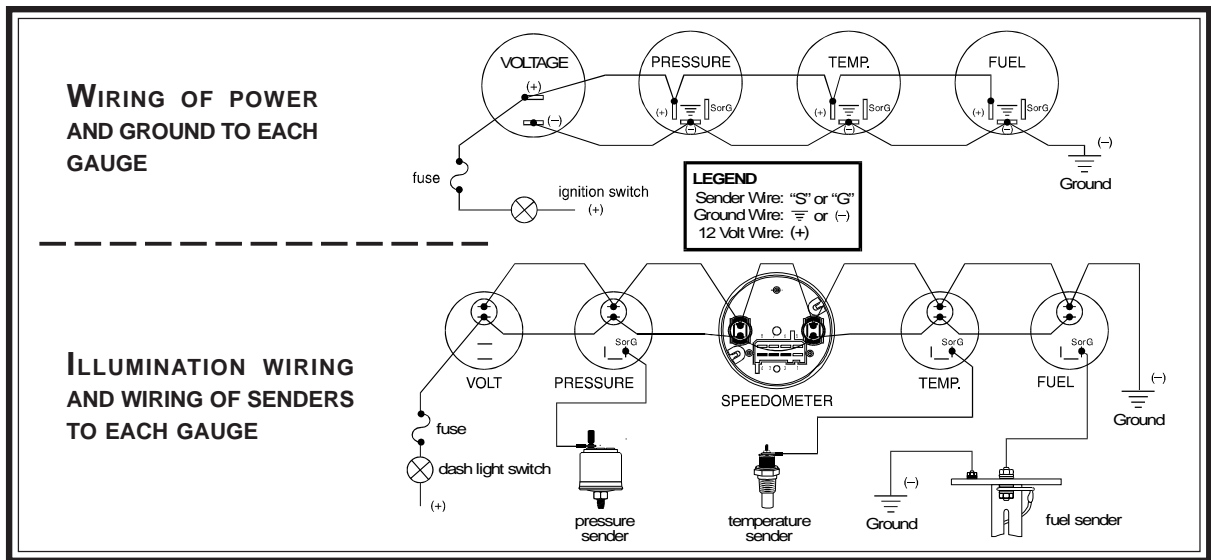


Diagram G
Wiring Diagram

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 has 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. 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!**

Siemens VDO Automotive Limited Warranty

Siemens VDO Automotive warrants all merchandise against defects in factory workmanship and materials for a period of 24 months after purchase. This warranty applies to the first retail purchaser and covers only those products exposed to normal use or service. Provisions of this warranty shall not apply to a VDO product used for a purpose for which it is not designed, or which has been altered in any way that would be detrimental to the performance or life of the product, or misapplication, misuse, negligence or accident. On any part or product found to be defective after examination by Siemens VDO Automotive,

Siemens VDO Automotive will only repair or replace the merchandise through the original dealer or on direct basis. Siemens VDO Automotive assumes no responsibility for diagnosis, removal and/or installation labor, loss of vehicle use, loss of time, inconvenience or any other consequential expenses. The warranties herein are in lieu of any other expressed or implied warranties, including any implied warranty of merchantability or fitness, and any other obligation on the part of Siemens VDO Automotive, or selling dealer.

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