

K100RS Temp Gage Replacement

By [Bob Carter](#)

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Here are my notes on my search for an after market temperature gage to replace the failed OEM unit on my '89 K100RS. (I couldn't bring myself to pay dealer prices for a commodity item.) I've received several inquires on this topic since it was posted and have tried to address those questions in this revision.

Background and Technical Information

I purchased a VDO Vision temp gage #11-310105 (250 degree F) and a package of 1/4 inch female spade connectors at my local performance auto center. Great face-to-face service, warehouse stock, next day delivery AND returnable if I didn't fry it! The bill came to just under \$40.

The OEM and this VDO unit are 2 and 1/16 inches in diameter (52 mm -- Note over the winter I measured the mounting holes in my brother's R100/7 S fairing and they are also this size). I chose the Vision series because of its integrated mounting hardware -- a spin on mounting cup. This eliminated any worries about matching it up with the OEM mounting cup. I also noted in a recent trip to my local NAPA dealer that some of the other models of the VDO gages (other than Vision series which has this spin on mounting cup) may be an exact match to the BMW and fit into the OEM mounting hardware.

For those interested, a good picture of this gage can be found at either of the following manufacturer's web sites:

[VDO North America](#)
[VehicleControls.com](#)

You'll also find technical information on this manufacturer's other gages and sending units.

The temperature sending unit is a thermistor -- meaning that the resistance changes as temperature changes. For those who want to know more about how this works to indicate temperature, the below link has some basic thermistor characteristics and circuit information:

[temperatures.com](#)

As engine temperature changes the current/voltage signal to the gage also changes -- making the temp gage nothing more than a somewhat calibrated amp/volt meter.

Troubleshooting

There are two, independent cooling system temperature sending units - one for the gage and the second for the engine management system. Plus, there is an oil pressure sending unit.

The gage sending unit is located in the lower body of the water/oil pump housing. The combined water/oil pump is located on the front of the engine block. If you pull the lower fairing and take a close look at the housing, you'll find two sending units. The upper, aft sending unit is for oil pressure. The lower, forward sending unit is for water temperature to the gage. The water temp sending unit takes the place of the cooling system drain plug.

The engine management temperature sending unit is on top of the engine block, left side, just inboard and forward of the intake manifolds. This sending unit is mounted in the cooling system pipe. This temperature sending unit provides an input to the fan relay under the tank. If the radiator fan is coming on and cycling normally when the engine reaches normal operating temperatures, then this sending unit and its relay are working properly.

If your gage is not working properly, then you could have any or all of three potential problems: 1) a bad sending unit, 2) a faulty gage or 3) faulty wiring leading to the gage.

You can pull the gage from the dash (but leave it connected into the wiring harness), and starting with a cold engine, measure the voltage delivered to the gage. Use a voltmeter to measure the voltage, the voltage should slowly increase as the engine warms up. This will confirm a faulty gage. Below you'll find the wiring scheme as found on my '89 K100RS, which I assume is pretty standard. The gage reading "zero" is a normal failure mode -- no amount of input signal to it is going to get it moving. Mine exhibited intermittent functioning for a few weeks before total failure -- I could ride down the road and tap the gage and it would function for a moments, before falling back to zero.

Having just rebuilt my water/oil pump, I can say with certainty that on an '89 K100RS, the sending unit fills the normal drain plug hole at the bottom of the water pump casing -- it would not be difficult to pull the sending unit and replace with a matching VDO unit, if you needed to. If you suspect the sending unit, one way to test it would be to pull it from the water pump casing (at the front of the engine), connect it to a ohm meter and place in hot water, observing its response. But before you do this, check the connections and the wiring.

Gage Replacement

I pulled the OEM unit from the fairing and with my trusty old VTVM found the 4-wire connector was set up as follows: Color Function gray/black lamp hot lead + 12 volts black sending unit signal brown ground green/black gage power +12 volts

I clipped the wires at the OEM gage and crimped on the female spade connectors (this preserved the OEM connector in case a follow on owner ever wanted to reinstall an OEM gage). The VDO gage is a five lead unit -- two ground connections -- one for both the lamp and gage, so I twisted in an extra piece of wire before I crimped connector on the brown ground lead, and hooked this jumper to the ground lead of the lamp.

The VDO gage comes with green and red lamp covers. I pulled the lamp and fitted it with the green cover to match the rest of the instrumentation.

I hooked up the VDO gage to the leads as per the instructions with that came with the unit -- they were pretty clear and straight forward, then clipped the harness into the bike and tested it. Worked fine. Fan cycled normally and came on at an indicated temperature of about 200 F, which is about right if I recall correctly.

The VDO unit comes with its own spin on mounting unit. I installed the VDO gage into the fairing mounting hole. It was a perfect fit. Both the OEM and this VDO unit are 2 and 1/16 inches in diameter (52 mm).

I installed the O-ring under the gage that was used with the OEM, but not sure if I'll leave it there. The O-ring is showing its age, and I'm not sure it really does anything. Any thoughts on this?

Please note, I did not replace the any of the sending units. The coolant temp gage OEM sending unit was not touched.

The lighting of the VDO gage is excellent and appears better than the OEM fuel gage on the left side of the fairing.

Bob Carter
1989 K100RS ABS