

VORTEX

Raytek Infrared Thermometers: Fast and Reliable **Auto Diagnostics**



Quick diagnosis and saving work-hours have never been easier, faster, or safer. Raytek® has a complete line of reliable and accurate thermometers designed with your specific needs in mind. Just point, shoot, and read.

Raytek Infrared Noncontact Thermometers are the professional's choice for:

- Engine Troubleshooting
- Underhood Thermal Mapping
- Climate Control
- Cooling System Diagnostics
- Tire Alignment Monitoring
- Brake System Inspection

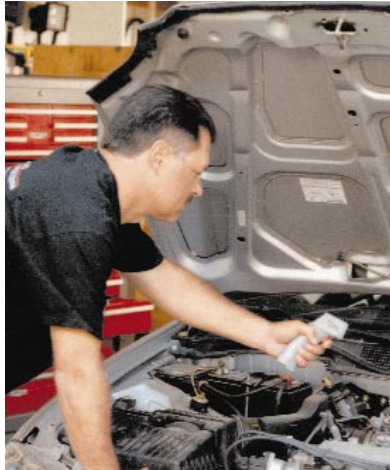
Temperature variances are leading indicators in diagnosing many problems plaguing today's more complicated vehicles. Correctly identifying and analyzing those variances can be extremely costly—especially in terms of diagnostic time and personal safety.

Raytek's portable noncontact thermometers can cut diagnostic time in half. Quick, easy-to-use, and precise, they let you measure a broad range of surface temperatures without contact, scan hot objects safely, and diagnose running engines without risking injury.

Raytek noncontact infrared (IR) thermometers are the top choice for auto technicians everywhere. These indispensable tools were expertly designed to increase productivity and performance by helping you save time and money, work smarter, quicker, and more safely.



Noncontact Thermometers—Quick and Effective Diagnostic Tools



At Home

Check heater inlet and outlet hoses.



In the Shop

Check radiator hose and thermostat housing.

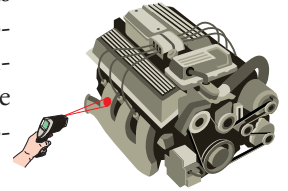
“You’d be hard pressed to find a more versatile piece of diagnostic equipment than a quality infrared thermometer. Need to check out a fan clutch or thermostat, a potential clog in a radiator, condenser or evaporator, a misfiring cylinder or a hanging brake caliper? An infrared thermometer can handle all of these chores...as long as manufacturers continue to raise the bar on these diagnostic wonders, we’ll report it. And raising the bar is exactly what the folks at Raytek did – big time!”

MOTOR Magazine

Diagnosing dozens of different systems can be tricky and time consuming. The longer it takes to diagnose one vehicle, the fewer vehicles you’ll be able to service in a workday. Raytek IR thermometers help speed the diagnostic process. Just point, shoot, and read—it’s that simple.

Engine Troubleshooting

A number of factors can cause an engine to run rough. Low compression, ignition system problems, clogged fuel injectors, or an incorrect fuel/air mixture are a few causes. Connecting diagnostic tools and engine analyzers—such as an oscilloscope or a lab-scope—is time consuming. With a portable noncontact thermometer, you can take quick temperature measurements and diagnose temperature-related problems in much less time.



Ignition System Problems

With the engine at idle, measure the exhaust manifold temperature for each cylinder and compare cylinder temperatures by pointing your thermometer at the manifold. A low temperature reading could indicate a misfiring spark plug in the cylinder. You can also diagnose diesel engines for misfiring or dead cylinders by measuring the engine block or exhaust manifold temperatures. This will identify any weak cylinders.

Fuel/Air Mixture Adjustments

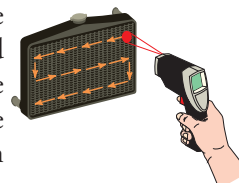
Measure the exhaust manifold, header pipes, or exhaust pipes. The exhaust temperature will be higher if the fuel mixture is too lean, or lower if the fuel injectors are clogged. This technique helps you set the optimum fuel mixture and fuel flow between cylinders.

Cooling System Diagnostics

If an engine is overheating and you can’t find any coolant leaks, a clogged radiator core, faulty thermostat, cooling fan sensor, or a worn impeller in the water pump could be at fault. By using a noncontact thermometer you can quickly and easily determine if any of these parts are the problem and need to be replaced.

Radiators

Check coolant temperature at the radiator inlet. If the fan works, scan the entire surface of the radiator for cold spots that would indicate plugged tubes. Temperature readings should decrease evenly from one side to the other on crossflow radiators, or from top to bottom on downflow radiators.



Thermometers

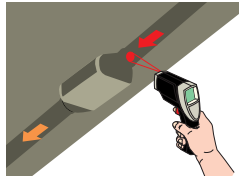
Run the engine at a fast idle to warm it up. Check the temperature of the upper radiator hose and thermostat housing. As the engine reaches an operating temperature of 180 to 220°F, there should be a sudden increase in temperature at the upper radiator hose when the thermostat opens. No temperature change indicates no coolant flow and a stuck thermostat.

Coolant Sensors

Warm-up time and operating temperature are important for vehicles equipped with computer-controlled emission systems. Measure coolant temperature sensors and manifold air temperature sensors with a noncontact thermometer, then compare the readings to the computer readings. They should be within a few degrees of each other if they are working properly.

Catalytic Converter Diagnostics

After attaining operating temperature (greater than 250°F), take temperature readings at the inlet and the outlet pipe. Outlet temperature should be higher than inlet. On 1980 and older vehicles with two-way converters, the



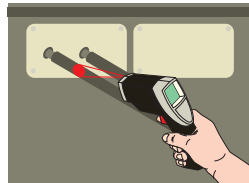
difference should be at least 100°F. On newer vehicles with three-way converters, the difference may be only 20 to 30°F. No difference in temperature indicates a defective converter or no air being received from the air pump (check air diverter valve and plumbing).

Climate Control

The heater, air conditioner, and vents control an automobile's interior climate. If any of these are malfunctioning, they can be checked quickly and easily with a noncontact thermometer.

Heaters

Allow the engine to reach normal operating temperature. Then check coolant temperature at the upper radiator hose (should be around 200°F). If lower than normal, the thermostat is stuck open. Next check heater inlet and outlet hose temperatures where they enter the firewall. Both should be hot, and the inlet hose should be about 20°F warmer than the outlet. If the outlet hose is not hot, coolant is not flowing through the heater, the heater core is plugged, or the heater control valve (if used) is not open.



Air Conditioners

Check the cooling system output by running the air conditioning system for several minutes, then measure the temperature of the air duct vents inside the vehicle. Be sure to measure the vent openings at an angle, not directly into the airflow. Compare the results to manufacturer's specifications. You



can also measure the evaporator system and condenser and compare readings to manufacturer's specifications. Low refrigerant pressure or charge may be detected by measuring the condenser and the air conditioning lines, again comparing to manufacturer's specifications.

Brake System and Tire Inspection

To diagnose brake bias and uneven braking, measure rotor or drum temperatures immediately after the vehicle has been driven in a straight line. If rotor or drum temperatures differ significantly, caliper pistons may be sticking or dragging, causing uneven braking. Check for worn brake pads or failing sealed wheel bearings by driving a short distance and measuring the bearing temperature. Temperatures significantly higher than ambient or varied temperatures between bearings indicate excessive wear.



On the Track

Check wheel bearings and brake pads.

"As a mechanic for the last 30 years, and a TV car talk host for the last three, I found your Raytek noncontact thermometers to be one of the best products I've tried out (and as a TV host I get to try them all out if they interest me). Their usage is only limited by one's imagination. No more burned hands, or guessing at replacing VERY EXPENSIVE parts, only to find out they weren't bad in the first place. No more spending hours trying to pinpoint those nasty auto problems, because the Raytek (noncontact thermometer) works so fast at weeding out bad parts versus good parts. If anyone ever uses a Raytek (noncontact thermometer) for even a few days, they'll be wondering how they got along without one in their toolbox... I know you wanted the new unit back, but everyone here at CBS is bugging the hell out of me to borrow it..."

*Scotty Kilmer
Crank It Up
CBS TV
Houston, TX*

MiniTemp™ • At Home, At Work, Anywhere

If you're looking for a basic noncontact thermometer for a variety of applications, MiniTemp is the tool for you. It's priced to fit any toolbox and is small enough to fit in your pocket. Choose between MiniTemp MT2, without laser sighting, or MiniTemp MT4 with laser sighting.

• Temp Range	-18 to 260°C (0 to 500°F)
• Response at 95%	500 mSec
• Accuracy	±2% of reading or ±2°C (±3°F) whichever is greater
• D:S	6:1
• Ambient Operating Range	0 to 65°C (32 to 150°F)



MT

Raynger® ST™ Pro & ProPlus • The Professional's Choice

The Raynger ST is the most popular noncontact thermometer in the world. It offers an ideal combination of precision and value for the technical professional. Available in four models—ST20, ST30, ST60, or ST80. Most models feature circular laser sighting and optional probe. The ST is accurate, compact, reliable, and easy to use—just what a professional needs.

• Temp Range	ST20 Pro	-32 to 400°C (-25 to 750°F)
	ST30 Pro	-32 to 545°C (-25 to 950°F)
	ST60 ProPlus	-32 to 600°C (-25 to 1100°F)
	ST80 ProPlus	-32 to 760°C (-25 to 1400°F)
• Response at 95%	500 mSec	
• Accuracy	±1% of reading or ±1°C (±2°F) whichever is greater above 23°C (73°F)	
	±2°C (±3°F) @ -18 to 23°C (0 to 73°F)	
	±2.5°C (±4°F) @ -26 to -18°C (-15 to 0°F)	
	±3°C (±5°F) @ -32 to -26°C (-25 to -15°F)	
• D:S	ST20, ST30 = 12:1, ST60 = 30:1; ST80=50:1	
• Ambient Operating Range	0 to 50°C (32 to 120°F)	
• Additional Features	ST60 & ST80 feature optional probe input and data logging capability	



ST20
ST30



ST60
ST80

Raynger® MX™ • For Those Who Demand Maximum Performance

The Raynger MX features an optically matched coaxial laser sighting system, which precisely and accurately outlines the target measurement area. With its unique combination of features and DataTemp™ software, the MX can adapt to any work environment. Choose from three models—MX2, MX4, and MX4+. Also available are the special purpose models: **MX Close Focus (MXCF)** which will measure very small targets (D:S 50:1, 6 mm target @ 30 cm, .25 in. target @ 12 in.) and **MX Subzero (MXSZ)** with extended temperature range from -50 to 500°C (-58 to 932°F).

• Temp Range	-30 to 900°C (-25 to 1600°F)
• Response at 95%	250 mSec
• Accuracy	0.5% of reading ±1°C (±2°F) whichever is greater
• D:S	60:1
• Ambient Operating Range	0 to 50°C (32 to 120°F)
• Additional Features	MX4 & MX4+ feature probe input and data logging capability



MX



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