

# SENTINEL® ENGINE PROTECTION SYSTEMS



There is no way to predict when or where engine problems will occur. Hoses break, seals crack, and connections fail in the most unlikely places and at the most inopportune times. But, with an engine protection system on the job, diesels are shut down before minor problems can cause major damage.

Mechanical shutdown systems protect diesel engines against a wide range of abnormal conditions, including low oil pressure, loss of coolant, and overheating of the oil and coolant systems.

It's easy to translate these problems into dollars and cents. Replacement costs run between \$15,000 and \$20,000 and the cost of downtime is escalating. Disrupted schedules and customer dissatisfaction are also real costs in a major mechanical breakdown. An engine protection system is simply an inexpensive form of insurance that pays for itself the first time you need it.

## PROTECTS STATIONARY AND MOBILE ENGINES

While engine protection systems are a valuable asset in managing fleet operations, they are especially important in protecting unattended engines. "Irrigation is a round-the-calendar job out here in the San Joaquin Valley," says Bob McClure. "There are 8,760 hours in a year," he continues, "and some of our stationary engines log from 2,000 to 6,000 hours, running 24 hours a day for long stretches. You can bet that every diesel that goes out of here has got an engine protection system on it."

McClure Equipment, Inc. specializes in the sale, service and rental of diesel engines for irrigation. They handle Deutz air-cooled 5 to 600 horsepower engines and Volvo Penta liquid-cooled 100 to 500 horsepower engines.

McClure Equipment is both a Sentinel Engine Protection System dealer and an end-user. In addition to sales and service, McClure has a rental fleet of 170 irrigation engines ranging from 5 to 400 horsepower. "Whether we sell or rent an engine for stationary work, all our customers specify an engine protection system. Water is absolutely vital in this business," says McClure, "and farmers count on our engines to work hard and reliably." Even with regularly scheduled maintenance programs, water pumps can fail, oil pump shafts break, hoses burst, and engines overheat. When there's trouble, Sentinel Systems shut the engine down.

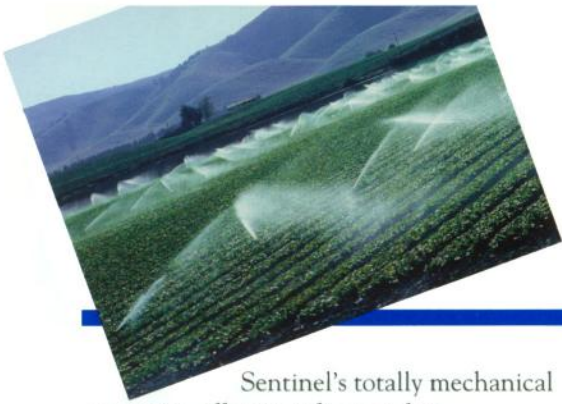
"The reason we like the Sentinel System," says McClure, "is that it doesn't need any electrical current to keep it energized."

## RELIABLE MECHANICAL DESIGN

The Sentinel System's reliability and low maintenance is derived from its mechanical design and sealed construction. The mechanical operation of the system is doubly important to McClure because many of his engines are also used in the nearby oil fields.

An engine-saving management tool for stationary installations and fleet operations.





Sentinel's totally mechanical operation offers significant safety advantages when engines operate in oil fields, underground construction, marine environments, mines, or any volatile, explosion-prone areas. The system uses no electrical circuits that could malfunction because of moisture, corrosion, severed wiring, blown fuses or severe vibration.

### TROUBLE-FREE SYSTEM

Mechanics find the Sentinel System easy to install and virtually trouble-free. It is made up of only three basic mechanical parts — the Master Control, the Heat Sensor, and the Coolant Pressure Valve.



The Master Control fits in the main fuel supply line. In normal operation, the oil pressure from the engine keeps the piston in the raised position, allowing fuel to flow to the engine. The Heat Sensor guards against engine damage due to high coolant temperatures. The Coolant Pressure Valve protects the engine against major failures in the cooling system such as hose breaks, low coolant supply, water pump failure, and loose belts.

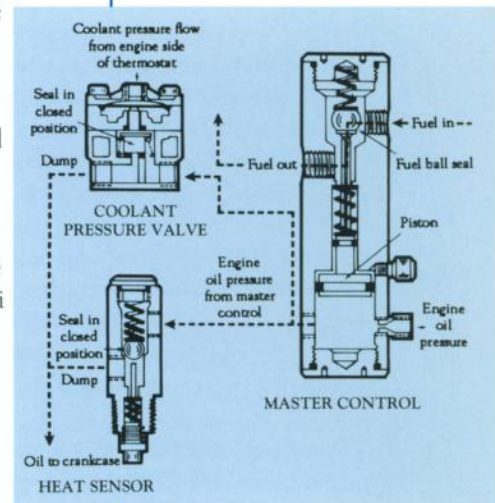
The Sentinel System's highly reliable sensors measure low oil pressure, loss of coolant, and high temperatures in the engine. An abnormality in any of these areas causes the piston to drop, completely

shutting off the fuel supply on a stationary engine. When McClure's mechanics install Sentinel on air-cooled engines, they place sensors to measure crankcase oil temperature and air fan belt tension. Again, any abnormalities trigger the Master Control and the engine shuts down.

In most cases, Sentinel will last as long as the equipment on which it is installed. The system has few moving parts and no direct metal wear. Racor uses the highest quality aluminum, brass, and stainless steel alloy and precision-machines the parts to 1/1,000 of an inch tolerance for a perfect fit. Inside, special Viton-quad rings on the main piston of the Master Control reflect more Racor quality. Each of these rings provides a double seal between the fuel section and the oil section of the system, assuring that fuel and oil cannot mix within the control itself.

### FITS ANY ENGINE

The Sentinel System is effective on almost any diesel because it can be customized to match the specific operating characteristics of each engine. The unique piston design in the Master Control utilizes the engine fuel pressure to assist in closing the fuel valve. This allows the Master Control to be closed at a higher working oil pressure than its original low idle setting. For example, a Master Control installed on a Detroit Diesel engine would have a primary oil pressure setting of five psi for idle conditions. However, this engine, when running at governed speed under load, produces approximately 70 to 80 psi fuel pressure. Under these conditions, the Sentinel Master Control will close the fuel supply to the engine when diminishing oil pressure reaches 15 psi, not the 5 psi primary setting.



The Sentinel System's totally mechanical operation offers significant safety advantages when engines operate in oil fields, underground construction, marine environments, mines, or any volatile, explosion-prone areas.

Likewise, a Cummins engine would have a 10 psi primary oil pressure setting installed on the pressure side of the PT fuel pump. This engine, when running at governed speed under load, will produce 150 psi fuel pressure. In this instance, the Sentinel Master Control would close the fuel supply at 33 psi, not the 10 psi primary setting for idle conditions.

Temperature and pressure shut-off points can be specified within wide limits, and various options allow Sentinel Systems to be tailored to individual specifications. Settings can be ordered factory-set or made on the job by a shop mechanic. Normally on suction side applications, the Master Control is installed between the fuel filter and the injection pump, as close to the pump as practical. On unit injection engines, it can be installed between the final filter and the heads. On Cummins engines, the control should be installed on the pressure side of the pump.

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### SHUTDOWN OPTIONS

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For unattended engines in agriculture, construction, mining, and oil drilling, the basic full shutdown is generally specified. A manual override allows engine start-up and emergency operation.

On vehicular applications — trucks, bulldozers, loaders, workboats, for example — either full engine shutdown or reduced horsepower torque can be specified. A visible and audible shutdown warning device signals the driver of an imminent shutdown condition. Another model automatically de-torques an engine to a pre-selected reduced horsepower torque capability. In either case, the driver has complete control, including power steering and power brakes, until he can make a voluntary shutdown.

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### OVER-THE-ROAD APPLICATION

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This control is what first attracted Jack Frost, president of Jack Frost Trucking in El Paso, Texas, to the Sentinel Engine Protection System. "This device gives the owner control over his trucks no matter where they are. If the truck runs out of oil or overheats anywhere in the country, the Sentinel puts that truck on the side of the road until a trained mechanic can look at it."

Frost's company hauls refrigerated produce throughout the western United States with a fleet of 15 trucks powered by Cummins 400 diesel engines. With this fragile cargo, Frost doesn't take any chances with breakdowns. One major problem convinced Frost of the Sentinel System's performance benefits.

"We had a new truck with less than 10,000 miles on it," said Frost. "The truck blew an oil seal in the turbocharger, the oil went into the exhaust section of the turbocharger and right out the stack. The driver didn't notice the problem and continued to drive until there was no oil in the pan — and wiped out the engine. It cost about \$10,000 to fix it."



In his search to find a device that would stop the truck when it got too hot or lost oil pressure, Frost learned about the Sentinel System from his local Cummins dealer. "Now when we buy a truck," says Frost, "it doesn't leave the yard until a Sentinel is installed on it. Sentinel always works — and it completely protects an engine for just several hundred dollars."

In Frost's experience, Sentinel System's provide a continuous, vital daily service. "It's rare if there is a single truck out there that doesn't shut down for one reason or another during the course of a year. When an engine overheats pulling up a long grade or is overworked under tailwind conditions, Sentinel will shut it down." All of Frost's trucks have the Sentinel System set up to meet California's standards for limited stop. Although engine power is reduced, the engine will run at idle with enough power to pull the truck to the side of the road safely.



Fleet owners like Sentinel product safety features that prohibit operators from tampering with, bypassing, or shutting down the system. When trouble occurs, owners want the assurance that the engine will be shutdown before the problem causes expensive engine repair. "Recently, Frost concluded, "we forgot to put anti-freeze in one of our trucks. The driver got in to a below freezing temperature zone and the water started freezing in the radiator. While the driver didn't notice it, the Heat Sensor sensed the water was getting too hot and stopped the engine."

Sentinel System is good business. The protection, savings of time and money, and improved customer relations are valuable assets in today's well-managed diesel operations.

"Sentinel sensed the water was getting too hot and stopped the engine. Saving that repair bill was like putting \$10,000 in the bank."

*Jack Frost  
Jack Frost Trucking, Inc.*



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