

# CSP Electronics, LLC

## Early Warning, Monitoring and Alarm Systems

Most monitoring and alarm systems offered, represents a single alarm point for the alarm. This is usually done by a switch, either a pressure switch, temperature switch, fluid level switch, or an AC or DC relay for voltage switching. The problem with using a single switch point for alarm conditions is that sometimes even when new, the switch point is not set at the proper temperature or pressure. Then testing each switch for the proper set point necessary and is not easily done on the vessel. Temperature set points for example, may be adjusted by a dial setting with a screwdriver, however in some cases the dial may represent as much as a 20% error in its setting from the actual temperature switch point.

Example:

Take an engine high temperature setting of 220 degrees, and increase it by 20%, the alarm may not go off until you reach 264 degrees,  $220 + 20\%$  of 220! Needless to say, the engine is cooked before the alarm point is reached.

Additionally, even if properly set at the time of vessel delivery, the setting can change over time due to deterioration of the springs, thermals or other mechanical adjustments. Depending on how the switch is set up, it may also fail and never give an alarm condition. Some switches can be a fairly reliable device and can be tested easily. These are usually door switches or fluid level switches.

**CSP** uses temperature and pressure sensors in most cases where temperature or pressure needs to be monitored. The set point for these devices can be set in the software of the computer that is monitoring those temperatures. The sensors can also be purchased with an accuracy of 1 percent or better. So take the example instance above, if the engine temperature set point is 220 degrees, the sensor would act within +/- 1 % or 218 to 222 degrees.

In addition, **CSP** monitors pressures based on the engine or gearbox operating speed. This is due to the fact that the faster the engine or gearbox goes, the more lubrication it needs. Likewise, the slower it goes the less lubrication it needs. Therefore, a variable low pressure set point can be used to alarm at various speeds. This is programmed into the **CSP** computer to prevent false alarms at lower speeds, without creating false alarms or not being concerned with low speed loss of oil pressure.

If the **CSP** pressure or temperature sensors become unplugged or short to ground or high voltage, the screen immediately displays the fault by backlighting the sensor value in a different color than displayed during normal operation. This out of range condition is also not acknowledged by the **CSP** derate system, so that out of range sensors are ignored by the controlled derate allowing the vessel to continue to operate when a sensor has failed or become disconnected.

Level sensing switches monitored by **CSP**, are also filtered for conditions that might cause them to trip due to rocking in waves or making sharp turns. In these instances, the **CSP** system requires the switch to remain in the alarm state, for a continuous time period, typically greater than that of a wave front passage or a turn duration. This prevents false alarms from annoying the operators.

The **CSP** monitoring system also allows all of the vessel data that is being monitored, to be logged continuously at a period of once a second up to once a minute. The **CSP** system can store data for a period of time up to 30 years of continuous operation of the vessel. Also, the **CSP** system can connect to the vessels offshore email system, to send critical vessel data to shore when a fault condition occurs. This can be used by service personnel to help determine what repair parts may be needed to bring go to the vessel, when doing service work.

The **CSP** alarm system also alarms the operator by verbally articulating the alarm in English. Even though the screen backlights the alarm condition in red, there is no need to look at the screen because the system verbally articulates the alarm to you. This allows the Captain who may be doing a critical maneuver, to know what the alarm is, without taking his eye off the seas, the rig, the vessel or area that he may be maneuvering around. Each alarm is an individual alarm. There is no more hearing a beeper or bell and then having to search for the warning light, then reading the information next to it. **CSP** alarm systems tell you what is taking place, where the issues are located and right at the occurrence time.

**CSP** early warning also provided sensors for various critical equipment parameters that are not even supplied by some engine and gear suppliers. Parameters that pre warn owners and can **SAVE** your engine, gen set or gearbox, rather than you ending up with catastrophic failure, costly repair bills, extended down times, all while reducing operational cost .

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## Early Warning, Monitor and Alarms

This is a list of some of the parameters include in the CSP Early Warning, Monitor and Alarm systems:

**ENGINE PARAMETERS**, main engines, generator engines, pump engines, etc.

*Turbo pressure & temperature* – indicate proper air & fuel mixture, engine loads, proper lube, air restriction, etc.

*Engine crankcase pressure* – an indicator of severe cylinder problems, block issues, etc.

*Engines exhaust temperatures* – indicator of proper fuel and air mixture and burn rates, load conditions, etc.

*Intake manifold temperatures* – indicates proper air cooling in the after cooler that could be upset due to lack of coolant flow, or blockage of air passageways.

*Oil, Air, or Fuel restriction* – Indicates proper flow levels in the parameters critical to engine combustion and lubrication problems.

**GENERATOR PARAMETERS** –

Over and under voltage conditions

Over and under frequency conditions

**GEARBOX PARAMETERS** –

*Clutch lube oil pressures* – to verify sufficient oil pump pressure for proper gearbox lubrication

*Clutch pack applied pressures* – to verify sufficient clamping pressure to prevent burnout and warpage

*Gear oil temperatures* – validates sufficient cooling of the plates to prevent burnout and warpage

*Clutch, slip conditions* – an early indicator of a rapid overheating source for clutch plates

*Shaft speed* – used in combination to determine the level of pressure required

**FUEL CONSUMPTION PARAMETERS** –

*Fuel Pressure, Engine Speed, Torque* – Main Engines

*Power, Load, Wattage* – Generators

Fuel Burn Information provided in Continuous, Instantaneous and Snap Shot forms, with 100% Recorded Data.

### **NOTE:**

Some conditions that are monitored by **CSP** require intervention by the **CSP** system to prevent damage to the engines, and gearboxes. This intervention is called a derate condition and requires the **CSP** system to intervene in the control system in order to be applied quickly enough to protect the engine or gearbox. The system derate is a major feature difference between a **CSP** monitoring system and any conventional monitoring system. The **CSP** system also provides equipment shut down, if desired. **CSP** early warning systems know, that equipment does not just fail but rather slowing degenerates and degrades to the point of failure. **CSP** early warning systems technology lets you know months in advance of up coming and on going issues that are critical to equipment life cycles, vessel operation, equipment maintenance and operating cost.

**CSP** systems provide visual alarms, verbal alarms and controlling parameters to reduce product failure and increase life cycles.

**CSP** systems provide printable reports collected from data gathered by each system it monitors and controls. Reports can be down loaded at set intervals or when needed. The **CSP** system also has the ability to transmit all reports and condition information to shore based locations continuously.

**CSP** Electronics offers a complete line of controls, early warning systems, monitoring systems, verbal alarm systems, equipment protection systems, data reporting systems and slip control systems for DP and or similar efficient mode applications.

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