

# SMART SIGNAL CONDITIONER WITH CYBERSECURITY LOCK TO PREVENT TAMPERING – IDEAL FOR NUCLEAR POWER PLANTS



## Features Embedded within ASG's S2A LVDT Signal Conditioning Module

Alliance Sensors Group developed its model S2A DIN-rail-mounted LVDT Signal Conditioning Module specifically for use in steam-powered electric generating plants to operate LVDT linear position sensors that provide feedback for monitoring and controlling the positions of the steam turbine's various valves. Because Alliance Sensors Group's model S2A signal conditioner module is a microprocessor-based electronics product, power plant operators are naturally concerned about potential vulnerabilities to any type of cyberattack. It is of paramount concern at nuclear power plants that all control electronics and hardware be resilient to potential cyberattacks and attempts at malware introduction. For this reason, S2A modules are equipped with significant cybersecurity features.

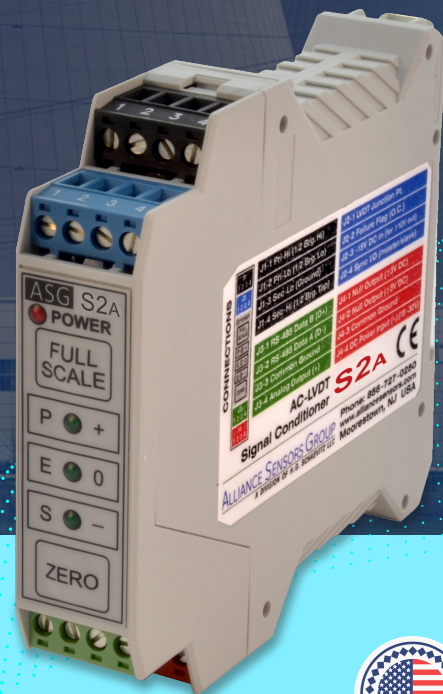
Foremost of these is the fact that there is no physical or electronic connection to the Internet. While there is an RS-485 digital communications port built into an S2A LVDT module for diagnostic purposes, it has absolutely no access to the operating firmware of the module, so the module cannot be subverted by any attempts to access its operating system. As such, it is protected at the highest level from a cyberattack. Nevertheless, the S2A module does permit certain operational parameters to be adjusted by ASCII digital commands transmitted over this RS-485 bus.

To prevent tampering with the operational parameters that were input when the module was installed, the S2A offers a lock-out feature that prohibits tampering with the module's setup and can notify the control room operator of any attempt to tamper with the module. This lock-out feature can be initiated over the RS-485 bus with the appropriate command, or it can be physically set at the module by using the lock-out process noted below. In either case, the module cannot be unlocked over the RS-485 bus. It can only be unlocked and reset by an authorized party who has been instructed in the specific unlocking process that must be applied to the module itself. Therefore this person must be someone who has already been cleared by plant security and who is physically present inside the facility at the module's actual location.

This lock-out approach to cybersecurity puts the emphasis on the facility security systems and personnel. Most power generation facilities already have substantial security safeguards in place, so this approach to cybersecurity is unlikely to place any extra burden on the power plant's security systems or personnel.

## Applying the Lock-out Code to an S2A Signal Conditioning Module

One way the lock feature of an S2A can be applied is by invoking the **Lock** command over the module's RS-485 port, using the syntax shown in the S2A manual. There is no bus-wide ASCII Lock command, so each S2A module must be locked separately. The other method of applying the **lock** feature is done at each module itself by depressing and holding down the **ZERO** pushbutton on the S2A's front panel and simultaneously depressing the **FULL SCALE** pushbutton three times in a row for at least 0.25 seconds each time. When the lock takes effect, the red **POWER** LED will flash once, indicating that the lock has been engaged. When an S2A is locked, it will still respond to informational data request commands such as **Config, Analog, Ver**, etc., but will react to transformational commands or actions such as **Recal, Set, Reset, Cirall**, etc., as tampering. If anyone tries to tamper with a locked module, the green front panel LEDs will flash continuously, a tamper alert will be sent to the failure warning switch, and tamper code 8192 will be output onto the RS-485 bus. Note that to correct any errors or faults that have been detected by an S2A module's internal diagnostics or exhibited by the module, the lock-out must be unlocked.



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Contact our technical support team for application-specific recommendations on LVDT Signal Conditioners.