2500 Series PLC System
Product Bulletin

2505
Vibration Sensor Interface Module

The 2505 VSIM is capable of calculating alarm levels and presenting the PLC with status bits. PLC programming downloads the appropriate setpoints and time delay values for Alert and Danger levels. Trip Multiply setpoints can also be specified per channel, and an attenuation factor if Intrinsic Safety barriers are being used. A serial port output is available for interface to a PC running special software for limited spectral monitoring.

The 2505 VSIM also has a High Speed Interface Bus on the front panel for optional connection to the 2506 Vibration System Analysis Module (VSAM). The VSAM takes the raw ADC data from each VSIM and performs an FFT which converts the time-based signal into the frequency domain. The VSAM is capable of monitoring user-specified frequency bands which can be correlated with the different sources of vibration energy. This capability is highly useful for Predictive Maintenance purposes.

Description

The vibration signal from a machine is the number one indicator of the machine's health and is a necessary component of an effective Machine Protection strategy. The 2505 Vibration Sensor Interface Module (VSIM) provides four channels of configurable connection to vibration sensors. Each vibration input can directly connect to an accelerometer, velocity probe, or proximity probe (using an external probe driver). The tachometer input can read speed from a number of sensing circuits, including a magnetic pickup on a toothed gear. Each input is buffered internally and available for connection to external analyzing equipment through front panel connectors. The VSIM calculates the RMS and true peak-to-peak value along with the speed of the overall vibration on each channel and presents these values to the controller via the I/O backplane.

Features

- Four configurable channels interface to any vibration sensor (accelerometer, velocity, or proximity) plus a tachometer input
- Buffered BNC outputs for external analysis equipment
- Overall RMS and True peak-to-peak vibration levels computed with high-speed ADC
- Alert and Danger alarm levels with PLC specified setpoints, time delays, Trip Multiply, and IS barrier attenuation factors
- DC voltage sensing circuitry for Bias Hi/Lo (accelerometers) or Gap Over/Under (proximity probes) alarming
- LED indication of configuration, probe circuit faults, Alert and Danger alarm status
- High Speed Interface Bus for optional connection to 2506 VSAM for FFT conversion and spectral monitoring/ analysis
- Hardware integration option

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Specifications

Channel options:

Accelerometer (±24V @ 5mA), velocity probe, or proximity probe (±24V bias to external probe driver circuit)

Gain (determined by probe sensitivity and expected signal levels): 1, 1.25, 2.5, 5, 10, 25

Optional hardware integration - enables accelerometer to report velocity or velocity to report displacement

High-pass filter values: 1Hz, 2Hz, 5Hz, 10Hz, 20Hz, 50Hz, 100Hz

Reporting Mode (raw mV or engineering units): RMS, computed Peak, computed P-P

Units of Measurement (English or Metric) and Scale Factor (Input and Output)

Probe Sensitivity (value specified by manufacturer); 5V peak max input spec.

Trip Multiply value: 1.5, 2.0, 2.5, 3.0

Intrinsic Safety barrier attenuation factor in percent

Alert and Danger setpoints (specified in engineering units) and Time Delays (sec x 10)
Alarms calculated on either RMS value or True peak-to-peak

Gap Over/Bias High, and Gap Under/Bias Low alarm setpoints

Gap Voltage (voltage x 100) and Gap Distance: specify the response of a proximity transducer

Tachometer channel:
Input Mode (Open Collector or Differential) and Input Signal Type (negative pulse, positive pulse, or bipolar)

Module Options (applied to all channels):

Write Protect switch: when set, allows only one download of configuration parameters per channel

f_{max} (sets low pass filter):

50kHz	6kHz	800Hz	100Hz	12Hz	1.5 Hz
25kHz	3kHz	400Hz	50Hz	6Hz	
12kHz	1500Hz	200Hz	25Hz	3Hz	

Number of Samples: correlates with f_{max} to determine Time to Sample before computing RMS value
(8192, 4096, 2048, 1024, 512, 256, 128, 64, 32, 16, 8, 4)

Number of Teeth on speed gear:
0 = report speed in Hz to PLC
1 = tach input yields one pulse per revolution (allows phase correlation by model 2506 VSAM)
2-255 = number of teeth on gear (Tach data in either Hz or RPM)

LEDs:

Module Status:
Off until Self-Diagnostics pass
Solid Green on Successful completion

Channel Status:
Off if channel not configured *or* configuration bad
Solid Green when channel configured and operation within limits
Flashing Green when Alert Setpoint AND Time Delay exceeded
Flashing Red when Danger Setpoint AND Time Delay exceeded
Solid Red if Probe Circuit Fault

Tachometer: Green in relation to speed of input signal (may flash at low speeds)

PLC reporting:

Overall RMS vibration level
Peak-to-Peak value
DC bias voltage of probe circuit
Speed (in RPM or Hz)
Probe Circuit Fault status bit
Alarm/Danger status bits (if set in module)
Module status word