A6140 Shaft Absolute Vibration Monitor for AMS 6500 Machinery Health Monitor

The Shaft Absolute Vibration Monitor is designed for high reliability for the plant's most critical rotating machinery.

This 1-slot monitor is used together with other AMS 6500 monitors to build a complete API 670 machinery protection monitor. Applications include steam, gas, compressors and hydro turbo machinery. The main functionality of the Shaft Absolute Vibration monitoring module is to accurately monitor shaft absolute vibration and reliably protect machinery by comparing vibration parameters against alarm setpoints, driving alarms and relays.

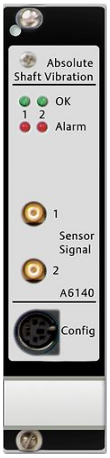
The shaft absolute transducer system consists of a relative displacement sensor and a case-mounted vibration sensor located in the same external housing. The displacement sensor is a non-contact sensor measuring shaft position and movement relative to the case, and the case-mounted vibration sensor measures case absolute relative to free space.

The two sensors are phase compensated for the different units and mathematically subtracted to get absolute displacement of the shaft relative to free space.

Shaft absolute vibration is an important measurement on all sleeve bearing machines for predictive and protection monitoring. Shaft absolute vibration should be selected when the bearing case and the rotor mass are closely matched, as the bearing case may have significant movement during machine operation.

The AMS 6500 is an integral part of PlantWeb® and AMS software. PlantWeb provides operations integrated machinery health combined with the Ovation® and DeltaV™ process control system. AMS software provides maintenance personnel advanced predictive and performance diagnostic tools to confidently and accurately determine machine malfunctions early.

Transducer Inputs	
Number of inputs	Two, independent or combined monitoring modes
Type of inputs	Eddy current, seismic or piezoelectric, differential
Emerson sensor inputs	■ Channel 1 part numbers: 6422, 6423, 6424, 6425 ■ Channel 2 part number: 6125
Isolation	Galvanically separated from power supply



A6140

- Two-channel, 3U size, 1-slot plug in module decreases cabinet space requirements in half from traditional four-channel 6U size cards
- API 670 compliant, hot swappable module
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0-10V output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor and cable
- For connecting one displacement sensor and one seismic, or piezoelectric sensor, so that the combined output is shaft absolute relative to free space
- Use with displacement sensor 6422, 6423, 6424 and 6425 and driver CON 011/91, 021/91, 041/91 and case-mounted piezo electric velocity sensor

Channel 1 Displacement Sensor	
Input resistance	>100 kΩ
Input voltage range	-1 to -23 VDC
Input frequency range	■ Lower cutoff 1 or 5 Hz ■ Upper cutoff 50-2000 Hz, adjustable
Smallest range	0-400 mV peak to peak
Largest range	0-2000 mV peak to peak
Sensor power supply	■ Separate buffered sensor supply Galvanically separated from all system voltages and system supply voltage ■ Open and short circuit proof
Nominal voltage	-26.7 VDC
Available current	Nominal 20 mA, maximum 35 mA
Channel 2 Case Vibration Sensor	
Input resistance	>100 kΩ
Input voltage range	-5 to +15 VDC
Signal input voltage range	311-9500 mV peak to peak
Input frequency range	■ Lower cutoff 5 or 10 Hz ■ Upper cutoff 50-1000 or 1600 Hz adjustable
Sensor supply for accelerometer	Constant current, 0-8mA, 30 VDC
Sensor power supply for accelerometer	■ Separate buffered sensor supply ■ Galvanically separated from all system voltages and system supply voltage ■ Open and short circuit proof
Permissible load for accelerometer	■ > 3.4 kΩ at 8 mA ■ > 13.6 kΩ at 2 mA

Front Panel Outputs	
Green LED's	Two LED's, indicates channel OK separately for each channel
Red LED's	Two LED's, indicates alert and danger separately for each channel
Front panel buffered outputs	Two: ■ Channel 1, -1 to -24 V, >100 kΩ load, freq. range 0-16 kHz (-3 dB) ■ Channel 2, ±10 V, 0.1-5000 Hz (-3 dB)
Mini DIN configuration socket	■ Module interface connection for configuration and parameter and status monitoring ■ RS-232
Handle	Easily remove card and provide plate for module and sensor identification
Analysis	
Measurement modes	■ Hot configurable ■ Zero to peak ■ Peak to peak ■ Independent dual-channel or combined dual-channel modes
Configurable parameters	■ Measuring range ■ RMS, zero to peak or peak to peak ■ Sensitivity ■ Alert and Danger ■ Filter frequency ranges
Analysis parameters	■ ½x, 1-10x and phase angle of same ■ Available via ModBus TCP/IP output

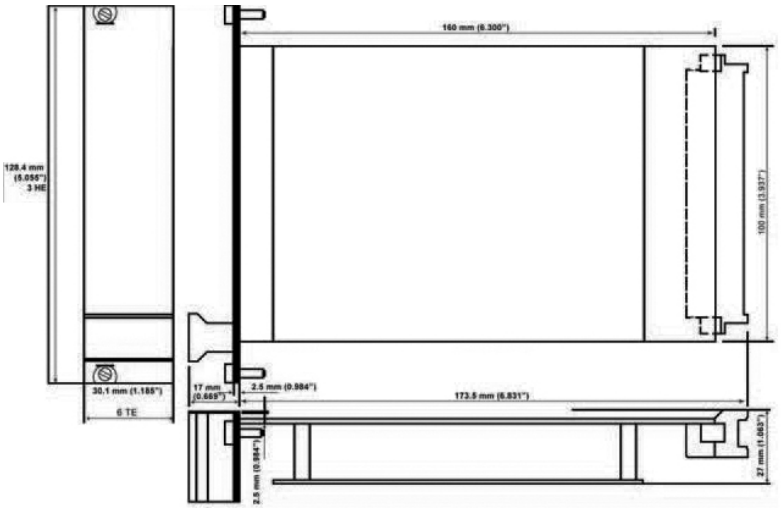
Rear Outputs Available	
Current mode outputs	0/4-20 mA output for each channel proportional to main value ■ For example, both ouputs are identical combined for Smax (combined mode) ■ For example, both ouputs are independent for Y and X (independent mode) Open/short circuit proof
Permissible load	<500 Ω
Accuracy	±1% of full scale
Settling time	Configurable, 0-10 seconds
Voltage mode outputs	0-10 VDC output proportional to main value for each channel ■ For example, both ouputs are identical combined for absolute shaft vibration Smax (combined mode) ■ For example, both ouputs are independent for shaft vibration (channel 1) and bearing vibration (channel 2)
Permissible load	>10 kΩ
Rear Buffered Outputs	Raw buffered signal, AC and DC Open/short circuit proof
Frequency range channel 1	0 Hz-16 kHz (-3 dB)
Frequency range channel 2	0.1Hz-5 kHz (-3 dB)
Permissible load	■ >10 kΩ
Accuracy	±1% of range
Permissible load	>10 kΩ
Channel 1 only	■ Voltage output proportional to the DC part of the signal (gap voltage) ■ 0-10 VDC ■ Open/short circuit proof ■ 10 kΩ load resistance

Alarm Setpoints Alarm time delays	
Alert	■ Selectable normally open, normally closed 0-5 second delay per channel 0-36 second delay with A6740 relay card ■ Selectable to be blocked on channel not OK ■ Adjustable range 5-100% of full scale value ■ Resolution 1% of full scale value ■ Alarm hysteresis on decreasing signal value, 0 to 20% of full scale value
Danger	■ Selectable normally open, normally closed 0-5 second delay per channel 0-36 second delay with A6740 relay card ■ Selectable to be blocked on channel not OK ■ Adjustable range 5-100% of full scale value ■ Resolution 1% of full scale value ■ Alarm hysteresis on decreasing signal value, 0 to 20% of full scale value
OK	Self checking (normally closed): ■ Power supply, sensor, cable, module checking, overload, internal temperature, system watchdog Green LED: ■ Off when not OK ■ During delay time, LED flashes ■ Reason for not OK can be read from communication bus
Limit multiply	Environmental, General
Trip bypass	Remote, relay input

Environmental, General	
Front plate	IP 00, DIN 40050
Climate	IP 21, DIN 40050
Operating Temperature	DIN 40040 class KTF
Storage Temperature	0˚-65˚ C (32˚-149˚ F)
Relative humidity	-30˚-85˚ C (-22˚-185˚ F)
Vibration	■ IEC 68-2, part 6 ■ 0.15 mm, 10-55 Hz ■ 19.6 mm/s2, 55-150 Hz
Shock	■ IEC 68-2, part 29 ■ 98 m/s2 peak, 16 ms
EMC resistance	EN50081-1 / EN50082-2
Power consumption	Max. 6 W, 250 mA at 24 VDC
Configuration	Password protected

A6140 Dimensions:

PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)
Width: 30.0mm (1.181in) (6 TE)
Height: 128.4mm (5.055in) (3 HE)
Length: 160.0mm (6.300in)
Net Weight: app 320g (0.705lbs)
Gross Weight: app 450g (0.992lbs)
includes standard packing
Packing Volume: app 2.5dm^3 (0.08ft^3)
Space requirements: 1 slot
14 modules fit into each 19” rack



Ordering Information

Model Number	Product Description
A6140	Dual-channel Shaft Absolute Vibration Monitor

Emerson
Reliability Solutions
12001 Technology Drive
Eden Prairie, MN 55344 USA
+1 952 828 3633

www.emerson.com/ams

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