

# Processor Card Specifications

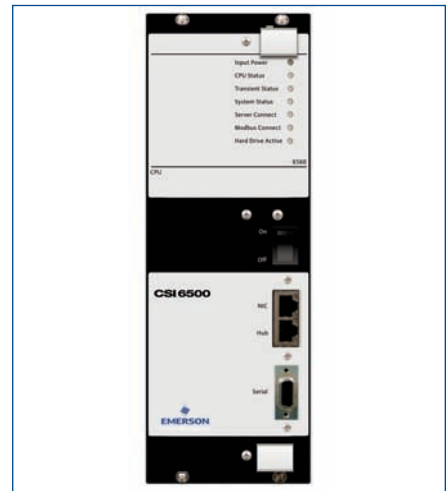
## PN A6560, A6560-T

The machinery health processor is the heart of the CSI 6500 Machinery Health Monitor providing field-based, predictive intelligence.

The A6560 provides (1) real-time overall vibration, (2) configurable machinery health monitoring and (3) with the A6560-T, an optional onboard transient processor designed for turbomachinery. The A6560-T includes all of the functionality of the A6560, and also includes the transient option.

While the real-time overall vibration monitor provides a quick check of all rotating machines, the predictive machinery health processor is performing deeper analysis, two channels at a time to help diagnose deteriorating machine conditions. Waveform, spectrum and analysis parameters are computed in the field. Event-based adaptive monitoring also adjusting in the field provides the tailored monitoring for your machines and changing process conditions. Results are sent from the field to the control system or to AMS Suite: Machinery Health Manager software for analysis and storage.

- A6560 includes a real-time overall vibration processor
- A6560 includes configurable, event based, adaptive machinery health processor
- A6560-T includes same functionality as A6560, and also includes transient monitoring for turbomachinery.
- Order tracking
- Optional PeakVue®
- Optional Modbus TCP/Ethernet output
- Local system health check and status LEDs
- Onboard memory stores machinery health data upon network loss
- Each A6560 supports up to two A6510 modules
- Install one A6560 module per chassis when API 670 protection modules are installed.
- Install up to two A6560 modules per chassis when API 670 protection modules are not installed.



A6560

**Technical Data for Process Module**

<b>General</b>	
Memory Capacity	32 MB SDRAM, 32 MB Flash
Network Communications	10/100 BaseT Ethernet NIC and HUB, front and rear RJ45 jacks
HUB	May be used for daisy chain-type network architecture
Local Communications	HUB for laptop or local display and RS-232 serial port
Onboard Test Generator	All sensor channels, tachometer channels, AC, DC amplitude and phase
CSI 6500 Rack Health Relay	One relay will change states based loss of power or rack reboot, SPDT 24VDC @ 0.5A DC dry contact

<b>Overall Vibration Monitor</b>	
Sensor Channel Scan	12 ch rms, DC (or peak-to-peak) per 400 msec
Overall Vibration Scan	Peak-to-peak available with transient option
DC Scan Rate	Simultaneously scanned with overall vibration scan (includes DC Gap, temperature, and accelerometer bias)
Overall Level and DC Accuracy	1% at input channel range full span at 1kHz
Overall Level and DC Resolution	16 bits
Data Acquisition Event Bases	Relay input, RPM, DC, AC or software controlled

<b>Production State Monitor</b>	
Data Collection	Event based, adaptive
Data Collection Interval	Event based and/or time based
Data Storage Interval	Exception based and/or time based
ADC Resolution	24 bit, 2-channel simultaneous
Dynamic Range	100 dB, all ranges
Spectral Resolution	100 to 6400 lines
Analysis Bandwidth Fmax	10 Hz to 40 kHz, discrete steps
Spectral Scan Rate	1 second per two channels, 400 lines, 400 Hz, 1 avg. (depends on analysis configuration)
Amplitude Accuracy	5% 0.2Hz - 0.5Hz, 2% 0.5Hz - 25kHz, 4% 25kHz - 40kHz
Frequency Accuracy	0.01%, crystal based
THD	-90 dB, all ranges
1x Phase Accuracy	4 degrees 1Hz - 1kHz (not calibrated below 1Hz), 5 degrees > 1kHz
Analysis and Trend Types	Total energy, energy in a range, non-sync energy in a range, sync energy in a range, sync peak, sync phase, true peak, HFD, waveform peak to peak, RPM, gap, orbit, configurable with user defined parameter names

Analysis Setup	Multiple analysis types per machine and per sensor
Averaging	Normal, PeakVue®, order tracking, synchronous time averaging
Units	English, Metric, Hz, CPM, order
Scaling	Linear, log, dB
Windows	Hanning, uniform

## Process Card Specifications PN A6560-T

The transient option of the machinery health monitor has three parallel processors. The overall vibration monitor and the machinery health monitor of the A6560 is available standard in the A6560-T, but the A6560-T also includes transient monitoring for turbomachinery.

The transient processor monitors in real-time and records a continuous time waveform simultaneously on all 24 channels.

Over 100 hours of continuous time waveform on all channels is simultaneously buffered, can be permanently stored, auto extracted, viewed live, or replayed.

- 100+ hours of buffered continuous waveform data collection on all channels simultaneously—no snapshots
- Manual or automatic permanent storage of buffered data
- Live viewing of 11 analysis plots simultaneously
- Replay saved data as if the machine was running live
- Option for external network attached storage (NAS drive) support of buffered data
- Simultaneous data acquisition on up to 48 channels for rear termination chassis

---

### Buffering

For each channel a non-stop, continuous time waveform recording is occurring and is being buffered for over 100 hours by the monitor. The user can demand a slice of the waveform by selecting a time period, or quick scan the data searching for the anomaly to extract.

---

### Storage

The user can extract waveform data from the buffer in the field monitor, or the monitor may be pre-programmed to automatically archive 1 hour slices of data based on events. Events such as high vibration, change of machine speed, a triggering input or output relay may be programmed to trigger an auto-archive that will permanently store data to a network hard drive.

---

### Live viewing

The transient processor enables the user to connect using AMS Machinery Manager directly to the field monitor and view 11 plots in real-time—orbital, shaft centerline, cascade, waterfall, Bode, Nyquist, waveform, spectrum, overall vibration, DC position and speed. On the spot, the user can filter the orbital, change resolution, select 1 sensor or an entire machine train to view.

---

### Replay

If you missed the event in live mode, a replay session can be commanded. To the user, the replay looks as if the data is being replayed into a monitoring system from a data recorder. That is, the same 11 plots can be displayed as if being viewed live all over again.

---

**A6560-T Specifications**

**(includes all A6560 Specifications plus the following:)**

Number of Channels	The A6510-T supports up to two 12 channel A6510-T modules
AC Channel Accuracy	5% 0.2Hz - 0.5Hz, 2% 0.5Hz - 2kHz
Frequency Range	DC to 2kHz with transient monitor, peak-to-peak rectification configurable
ADC Resolution	16 bits
Spectral Resolution	200 lines - 51200 lines
Dynamic Range	>80 dB
Number of Tach Channels Supported	4
Data Recorder	100+ hours at 1Gb / hour / 24 channels
Communication	10 \100base-T Ethernet HUB and NIC 100 BaseT required for transient

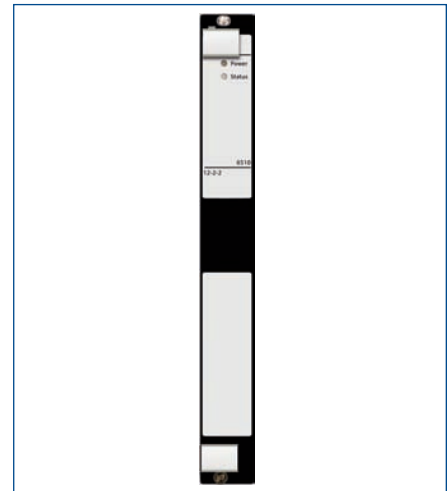
# Sensor Input Module Specifications

## PN A6510, A6560-T

The signal input modules connect the field instrumentation to the machinery health processor.

Each signal input module, A6510, can input up to 12 vibration signal inputs, 2 tachometer inputs and has 2 relay inputs for event-based vibration monitoring control and/or outputs for alarm annunciation.

Up to two A6510 signal input modules can be associated with an A6560 machinery health processor. The A6560 and A6560-T processors work in conjunction with the signal input modules, the A6510 and A6510-T, respectively.



A6510

### Technical Data

#### A6510 Specifications

Sensor Input Types	Dynamic displacement probe, accelerometer, velocity probe, AC input custom definable (Flux, dynamic pressure sensor, dynamic basis weight input, etc.), DC input custom definable (temperature or other process input), 4-20 mA signal.
Number of Sensor Inputs	16 inputs per A6510 monitor (12 sensors, 2 tachometers and 2 digital I/O), 2 monitors per A6560 processor, racks linked by Ethernet
Analysis Bandwidth	DC to 40 kHz and DC to 2Khz with transient option
AC Coupling Corner Frequency	0.5 Hz
RMS Channel Accuracy	1% at full span 30Hz - 40kHz, 2.5% at full span 20Hz, 5% at full span 10Hz, uncalibrated below 10Hz
Analog Integration	1 per channel (acceleration to velocity or velocity to displacement)
Analog Integrator Accuracy	2% (frequency and amplified)
AC Input Range	0.5 Vpk, ±1.0 Vpk, ±5 Vpk, ±10 Vpk (software configurable)
AC Input Range	±24Vdc, ±24 vdc
Maximum AC + DC Input Range	±24V
Powered Sensor Types	ICP accelerometer and velocity probes by each sensor channel, and displacement probes by fused -24 VDC power supply on each channel

Sensor Power	4 mA (nominal) constant current with 22 v compliance per channel
Powered Ch Input Impedance	500 K $\Omega$ (single ended)
Non Powered Ch Input Impedance	1 M $\Omega$ (differential)
Non Powered Sensor Types	Displacement, AC or DC process
RMS to DC Converter	1 per channel, 1 Hz to 40 kHz
Mux Card Analog Outputs	ChX, ChY, RMS, DC/Process (Peak-to-peak with transient option)

**Tachometer Channel Specifications**

Number of Tachometer Channels	2 inputs per A6510 monitor
Tachometer Frequency Inputs	0.1 Hz to 2 kHz (6 RPM to 120,000 RPM)
Tachometer Frequency Accuracy	0.1%
Tachometer Resolution	0.002 Hz @ 60 Hz (0.1RPM)
Tachometer Types	Eddy current displacement probe, TTL, passive magnetic
Tachometer	Input and trigger pulse range $\pm 0.5$ v to $\pm 24$ v, $\pm 25$ v CM
Pulse Characteristics	1 pulse per revolution, 500 $\mu$ s/min. pulse width, tach divider on card
Modes	Volt compare, automatic adaptive, divide by N
Input Impedance	1 M $\Omega$ (differential)

## Relay Channel Specifications

Number of Channels	2 input or output relay channels per A6510.  Pre-ordering input/output relays not required. Selection between input and output relay are dip switch settable.  Relays are auto resetting, that is, not latching.  Relays designed for enunciation, notification and event based monitoring. The A6740 relay card is designed for use in auto machinery shutdown circuits.
Input Impedance	1 MΩ (differential)
Relay Types	SPDT 24VDC at 0.5 A DC dry contact
Auto Resetting	0 to 10s programmable time delay for 2 sensor voting logic
Response Time	50 μsec to 50 msec
Digital input high voltage / current	5 VDC - 24 VDC / 10mA at 24 VDC
Digital Input Low Voltage	<3 VDC

**Emerson Process Management**  
**Asset Optimization Division**  
835 Innovation Drive  
Knoxville, Tennessee 37932  
T (865) 675-2400  
F (865) 218-1401

©2012, Emerson Process Management.

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

Emerson Process Management, PlantWeb, AMS, PeakVue, and Machinery Health are marks of one of the Emerson Process management family of companies. The Emerson logo is a trademark and service mark of Emerson Electric Co. All other marks are the property of their respective owners.