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Protection Cards for AMS 6500 Classic Systems

A6740-10 16-Channel Output Relay Module

A6740-12 16-Channel Output Relay Module

A6125 Case Piezoelectric Vibration Monitor

A6120 Case Seismic Vibration Monitor

A6824-R ModBus And Rack Interface, 4TE

A6824 ModBus And Rack Interface, 6TE

A6620 Process Input Monitor

A6140 Shaft Absolute Vibration Monitor

A6220 Shaft Eccentricity Monitor

A6110 Shaft Relative Vibration Monitor

A6312 Speed and Key Monitor

A6312-8 Speed and Key Monitor

A6630 Temperature Monitor

A6210 Thrust Position, Differential Expansion, and Rod Position Monitor

A6410 Valve and Case Expansion Monitor

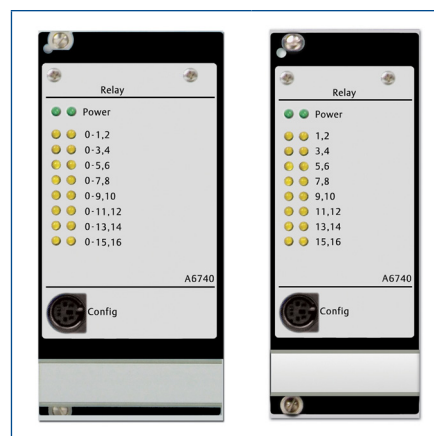
16-Channel Output Relay Module Specifications

The 16-Channel Output Relay Module is designed for high reliability for the plant's most critical rotating machinery. This 2-slot monitor is used together with the AMS 6500 to build a complete API 670 machinery protection monitor. Applications include steam, gas, compressors and hydro turbo machinery.

Any channel clear, alert or alarm signal can be selected as input to the 16-Channel Output Relay Module. Use Boolean logic, apply time delay, and select an output relay to complete the configuration. Easy-to-use software provides graphical logic displays that guide the user pictorially through configuration.

The AMS 6500 Machinery Health Monitor 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.

Data Output	
Relays	Redundant relay configurable Mechanical relays per API 670 specification Control voltage: 13-32 VDC Contact load: 48 V, 1 A Normally open or Normally closed, selectable Normally energized, or Normally non-energized, selectable Single pole, double throw (SPDT)
Logic	Redundant relay configurable Off, AND, OR, 2 out of 3, AND AND OR Up to 30 logic expressions definable per 6740 module
Inputs	60 inputs of type: ■ Channel clear (slot number), channel 1 and 2 ■ Alert (slot number), channel 1 and 2 ■ Danger (slot number), channel 1 and 2
Outputs	Relay 1 - 16
Time Delay	0 - 30 seconds
Handle	Easily remove card and provide plate for module identification



A6740

A6740-10

- 3U size, 2-slot plug-in module decreases cabinet space requirements in half from traditional 6U size cards
- API 670 compliant, hot swappable module
- 60 inputs, 30 logical expressions, 16 relay outputs
- 6740 is a 12TE wide module for IMR6000 series rack
- 6740-10 is the 10TE wide module for the IMR6500 series rack

Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 20, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Temperature for Storage and Transport	-40° - 70°C (-40° - 158°F)
Relative Humidity	5 - 95%, non-condensing
Vibration	■ IEC 68-2, part 6 ■ 0.15 mm, 10 - 55HZ ■ 19.6 mm/s², 55 - 150 Hz
Shock	■ IEC 68-2, part 29 ■ 98 m/s² (9.98 g's peak) ■ 16 msec
EMC Resistance	EN50081-1 / EN50082-2
Power Consumption	Max. 6 W
Configuration	Password protected

6740 Relay Module Dimensions:

PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)

Width: 60mm (2.362in) (12 TE)

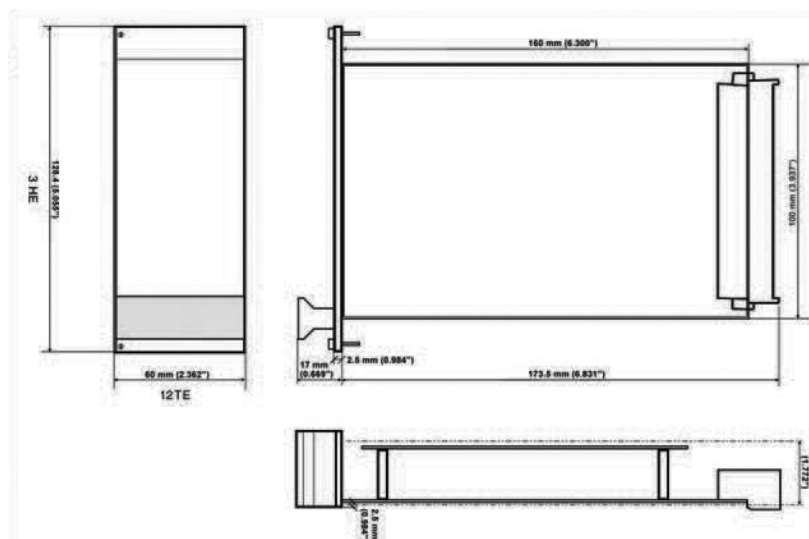
Height: 128.4mm (5.055in) (3 HE)

Length: 160mm (6.300in)

Net Weight: app 320g (0.705lbs)

Gross Weight: app 450g (0.992lbs)

Packing Volume: app 2.5dm³ (0.08ft³)



6740-10 Relay Module Dimensions:

PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)

Width: 54.46 mm (1.99 in) (10 TE)

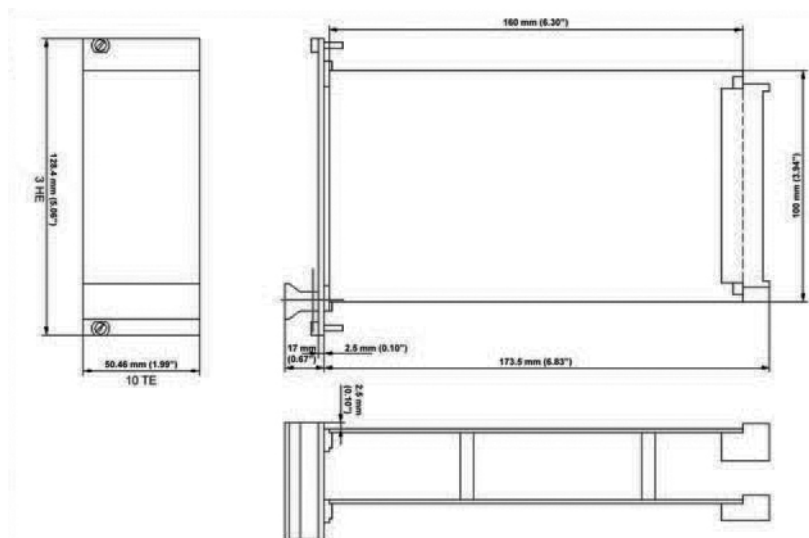
Height: 128.4mm (5.055in) (3 HE)

Length: 160mm (6.300in)

Net Weight: app 320g (0.705lbs)

Gross Weight: app 450g (0.992lbs)

Packing Volume: app 2.5dm³ (0.08ft³)



Ordering Information

Model Number	Product Description
A6740	16-Channel Output Relay Module, 12 TE wide module for use in IMR 6000/10, IMR 6000/20 and IMR 6000/30
A6740-10	16-Channel Output Relay Module, 10 TE wide relay module for use with AMS 6500 systems

CSI A6125 Case Piezoelectric Vibration Monitor for CSI 6500 Machinery Health Monitor

The Case Piezoelectric Vibration Monitor is designed for high reliability for your plant's most critical rotating machinery monitoring case vibration from accelerometer sensors. This 1-slot monitor is used together with other CSI 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 Case Piezoelectric Vibration Monitor is to accurately monitor case vibration and reliably protect machinery by comparing vibration parameters against alarm setpoints, driving alarms and relays.

Case piezoelectric vibration sensors, sometimes called case absolute (not to be confused with shaft absolute), are accelerometers, or velometers, with the output in acceleration or velocity. The case vibration monitor provides vibration monitoring for the bearing case in g's acceleration or velocity, mm/sec (in/sec). Since the sensor is mounted on the case, the resultant vibration of the case can be influenced by many different sources including rotor movement, foundation and case stiffness, blade vibration, adjacent machines, etc.

When replacing field sensors, many seismic sensors are being replaced with piezoelectric-type. The 6125 monitor is designed for the newer piezoelectric style sensors.

Case measurements are common in nuclear power applications. Case measurements with piezoelectric sensors are also common for rolling element bearing machines and gearboxes. Emerson recommends the piezoelectric sensor and piezoelectric sensor monitor for use when updating both field sensors and monitors.

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



A6125

- 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
- Remote selectable limit multiply and trip bypass
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor and cable
- Use with piezoelectric accelerometers and velometer sensors

Transducer Inputs	
Number of Inputs	Two, independent, differential inputs
Type of Inputs	Piezoelectric (accelerometer or velometer)
Input Resistance	>100 kΩ
Input Voltage Range	-5 to +15 VDC
Signal Input Voltage Range	6125/00, 311 - 9500 mV peak to peak
Signal Input Voltage Range	6125/10 16 - 450 mV peak to peak (special high temperature sensor)

Input Frequency Range (Accelerometer)	■ High: 30 - 8000 Hz ■ Med: 10 - 2000 Hz ■ Low: 6 - 1000 Hz
Input Frequency Range (Velometer)	■ High: 10 - 2000 Hz ■ Med: 6 - 1500 Hz ■ Low: 2 - 250 Hz
Sensor Supply	Accelerometer, constant current, 2 - 8mA, 30 VDC
Configurable Parameters	■ Measuring range ■ RMS or zero to peak ■ Sensitivity ■ Alert and Danger ■ Filter frequency ranges
Sensor Power Supply	■ Separate buffered sensor supply ■ Galvanically separated from all system voltages and system supply voltage ■ Open and short circuit proof
Front Panel Outputs	
Green LED's	Two LED's, indicates channel OK separately for each channel
Red LED's	Four LED's, indicates alert and danger separately for each channel
Front Panel Buffered Outputs	■ Two, identical to transducer sensor inputs, ± 12 V, >100 kΩ load, freq. range 0.1 - 0.075 Hz - 10 kHz -3 dB $\pm 20\%$
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 ■ Independent dual-channel
Accelerometer Sensor (either RMS or 0 to Peak)	■ 30 - 8 kHz, g's ■ 10 - 2 kHz, g's or velocity ■ 6 - 1 kHz, g's or velocity
Velocity Sensor (either RMS or 0 to Peak)	■ 10 - 2.0 kHz, velocity or displacement ■ 6 - 1.5 kHz velocity or displacement ■ 2 - 250 Hz velocity or displacement
Analysis Parameters	■ ½x, 1 - 10x and phase angle of same ■ Available via ModBus TCP/IP output
CSI 4500 Interface	■ 4 channel connector designed for CSI 4500 plug & play
Rear Outputs Available	
Mode Current Outputs	0/4-20 mA output for each channel proportional to main value ■ For example, RMS or 0 to peak ■ Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	±1% of full scale
Settling Time	Configurable, 0 -10 seconds
Mode Voltage Outputs	0 - 10 VDC output proportional to main value for each channel ■ For example, S zero to peak or peak to peak ■ Open/short circuit proof
Rear Buffered Outputs	0 - 10 VDC output proportional to main value for each channel ■ For example, S zero to peak or peak to peak ■ Open/short circuit proof
Frequency Range	0.075 Hz - 13 kHz -3 dB ±20%
Permissible Load	>100 kΩ

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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input

Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6125 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)

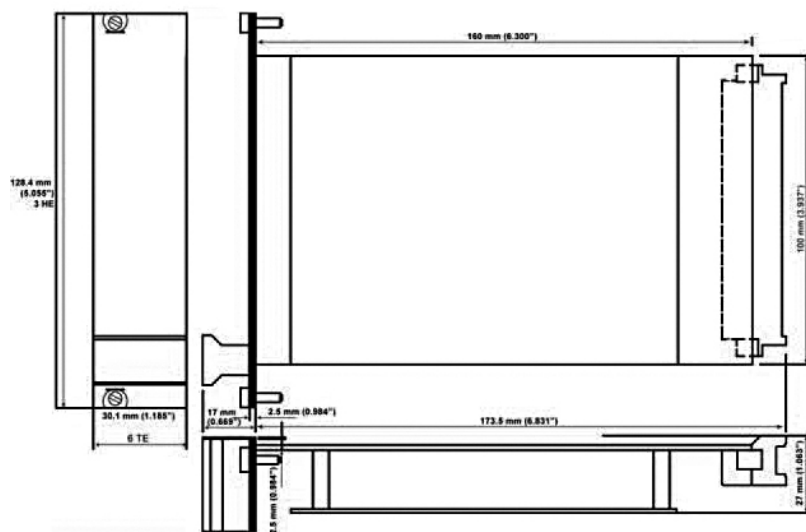
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6125	Dual-channel Case Piezoelectric Vibration Monitor

CSI A6120 Case Seismic Vibration Monitor for CSI 6500 Machinery Health Monitor

The Case Seismic Vibration Monitor, for use with electromechanical seismic transducers, is designed for high reliability for the plant's most critical rotating machinery. This 1-slot monitor is used together with other CSI 6500 monitors to build a complete API 670 machinery protection monitor. Applications include steam, gas, compressors and hydro turbomachinery. Case measurements are common in nuclear power applications.

The main functionality of the Case Seismic Vibration Monitor is to accurately monitor case seismic vibration and reliably protect machinery by comparing vibration parameters against alarm setpoints, driving alarms and relays.

Case seismic vibration sensors, sometimes called case absolute (not to be confused with shaft absolute), are electro-dynamic, internal spring and magnet, velocity output type sensors. The case seismic vibration monitor provides overall vibration monitoring for the bearing case in velocity, mm/sec (in/sec).

Since the sensor is mounted on the case, the resultant vibration of the case could be influenced by many different sources including rotor movement, foundation and case stiffness, blade vibration, adjacent machines, etc.

When replacing field sensors, many sensors are being updated with piezoelectric-type sensors that provide internal integration from acceleration to velocity. The piezoelectric-type sensor is a newer style electronic sensor, instead of an older electromechanical sensor. The Case Seismic Vibration Monitor is backward-compatible to the electro-mechanical sensors installed in the field.

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



A6120

- 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
- Remote selectable limit multiply and trip bypass
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Use with electro-dynamic (electro-mechanical) sensor 9266, 9267, or 9268

Transducer Inputs	
Number of Inputs	Two, independent channels
Type of Inputs	Electro-dynamic (electro-mechanical), differential
Emerson Sensor Inputs	Part number: 9266, 9267, or 9268
Isolation	Galvanically separated from power supply
Input Resistance	>100 kΩ
Input Voltage Range	-5 - +15 VDC
Input Frequency Range	■ Lower cutoff 1 or 5 Hz ■ Upper cutoff 50 - 2000 Hz adjustable

Measuring Range	
Range	■ Continuously adjustable with the configuration software ■ Vrms (metric) = 5 - 100mm/s (± 25 to $\pm 500 \mu\text{m}$) ■ Vrms (English) = 0.197 in/sec to 3.937 in/sec (± 0.984 mils to ± 19.685 mils)
Frequency Range	10 - 1000 Hz (VDI 2056, DIN 4566, ISO 3945)
Selectable Frequency Range	■ 5 - 50 Hz, 10 - 50 Hz, 50 - 1000 Hz, or 50 - 1600 Hz
Lifting Coil Current	0 - 8 mA configurable in steps of 40 μA
Lifting Coil Current Accuracy	■ $\pm 0.5\%$ of full scale range, $\pm 0.5\%$ of configured value
Max Permissible Load	3.4 k Ω at 2 mA
Min Dynamic Input Voltage	311 mV peak to peak
Max Dynamic Input Voltage	9500 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
Front Panel Outputs	
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, identical to transducer sensor inputs ■ $\pm 10 \text{ V}$, >100 kΩ load, freq. range 0.1Hz - 5kHz (-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 ■ Independent dual-channel ■ Vrms (VDI 2056) ■ Zero to peak ■ Peak to peak (DIN 45666 and ISO 3945)
Analysis Parameters	■ ½x, 1 - 10x and phase angle of same ■ Available via ModBus TCP/IP output
Rear Outputs Available	
Mode Current Outputs	0/4-20 mA output for each channel proportional to main value ■ For example, RMS or 0 to peak ■ Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	±1% of full scale
Settling Time	Configurable, 0 - 10 seconds
Mode Voltage Outputs	0 - 10 VDC output proportional to main value for each channel ■ For example, 5 zero to peak or peak to peak ■ Open/short circuit proof
Rear Buffered Outputs	■ Raw buffered output signal, 0 - 12 V peak to peak ■ Open/short circuit proof
Frequency Range	0.1Hz - 15 kHz (-3 dB)
Permissible Load	>10 kΩ
CSI 4500 Interface	4 channel connector designed for CSI 4500 plug & play

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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input

Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6120 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)

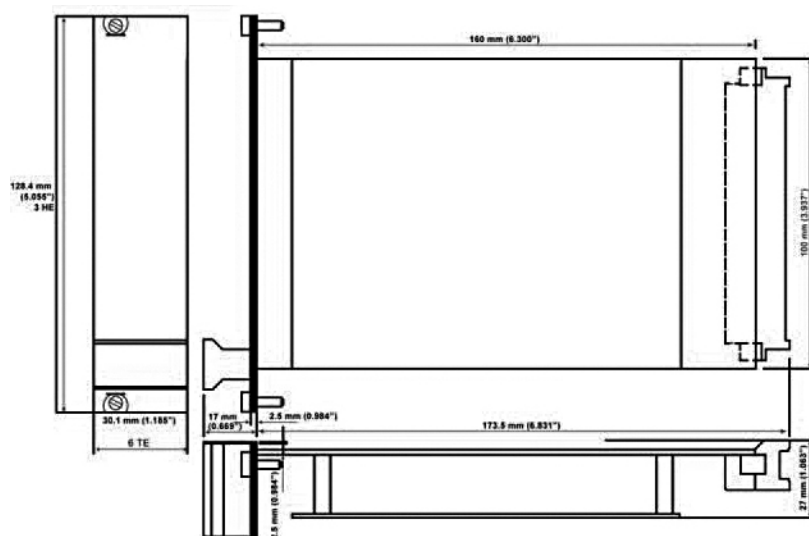
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6120	Case Seismic Electro-dynamic Vibration Monitor

ModBus and Rack Interface Specifications

The ModBus and Rack Interface Module is designed for high reliability for the plant's most critical rotating machinery. It reads parameters from all AMS 6500 modules and outputs these parameters via ModBus TCP/IP and/or ModBus RTU (serial). 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.

Operators are provided machinery health parameters in the control environment for seamless integration. The module powers local graphical displays at the protection rack for machine and instrumentation readout. Either ModBus TCP/IP or ModBus RTU can be configured, or for redundant paths, can be used simultaneously.

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.

Data Output	
ModBus RTU (Serial)	19.2 kbaud Data bits: 8 Parity: Even Stop bit: 1
Default Address	IP address: 192.168.255.1 Subnet mask: 255.255.255.0
ModBus Ethernet	RJ 45 socket, 10BaseT
Green LED	Power supply OK
Handle	Easily remove card and provide plate for module and sensor identification
Example Data Types	Speed, vibration (1/2x, 1x, etc.), gap value, alarm state, channel OK, phase



A6824

A6824-R

- 3U size, 1-slot plug-in module decreases cabinet space requirements in half from traditional 6U size cards
- API 670 compliant, hot swappable module
- Password protected user configuration
- Self-checking facilities include monitoring hardware, power input, and hardware temperature
- A6824 module can serve multiple 19" racks
- A6824 is a 6TE wide module, no redundant option, for use in the IMR6000 series, 19" rack
- A6824R is a 4TE wide module, redundancy optional, for use in the IMR6500 series, 19" rack

Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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. 5 W

A6824 Dimensions:

PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)

Width: 30mm (1.181in) (6 TE)

Height: 128.4mm (5.055in) (3 HE)

Length: 160mm (6.300in)

Net Weight: app 320g (0.705lbs)

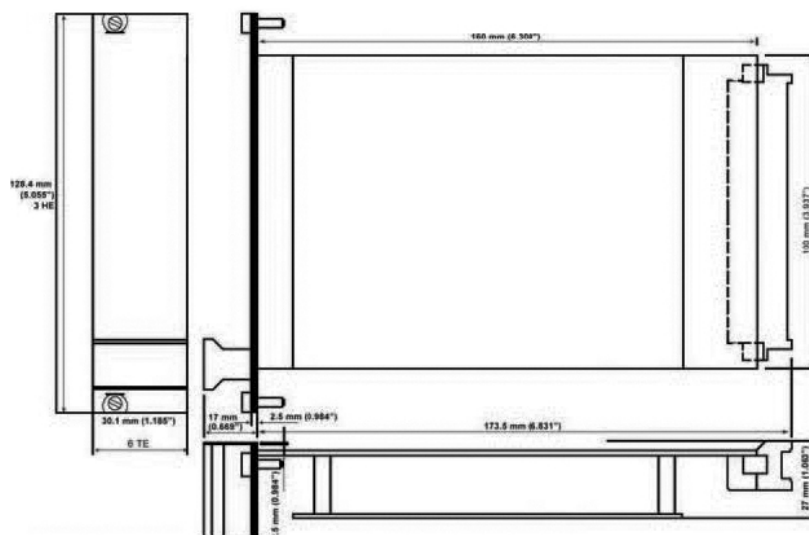
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



A6824-R Dimensions:

PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)

Width: 19.98mm (0.79in) (4 TE)

Height: 128.4mm (5.055in) (3 HE)

Length: 160mm (6.300in)

Net Weight: app 320g (0.705lbs)

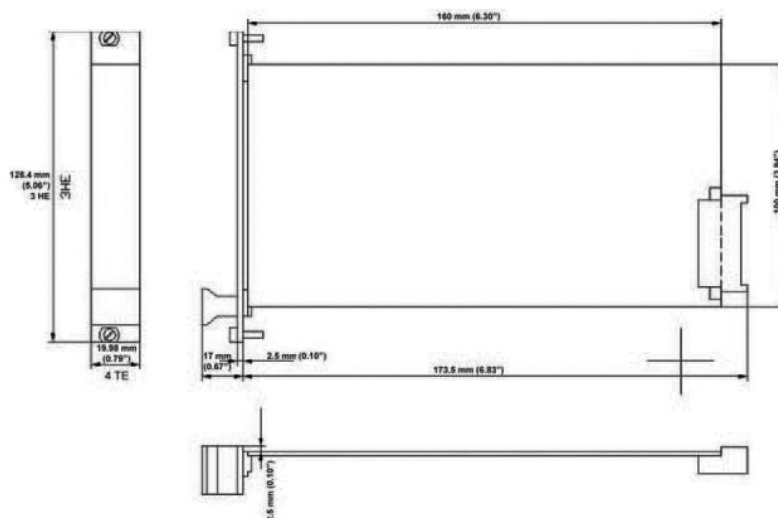
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6824	ModBus and Rack Interface Module for use with IMR 6000/10, IMR 6000/20 and IMR 6000/30
A6824-R	ModBus and Rack Interface Module with redundancy mode for use with AMS 6500 systems

CSI A6620 Process Input Monitor for CSI 6500 Machinery Health Monitor

The Process Input Monitor is designed for high reliability for the plant's most critical rotating machinery monitoring process inputs such as temperature, pressure, load, etc. This 1-slot monitor is used together with other CSI 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 Process Input Monitor is to accurately monitor process parameters and reliably protect machinery by comparing parameters against alarm setpoints, driving alarms and relays.

Process inputs can be ± 1 V; ± 10 V or 0/4-20 mA. The CSI 6500 Machinery Health Monitor is an integral part of PlantWeb® and AMS Suite.

PlantWeb provides operations integrated machinery health combined with the Ovation® and DeltaV™ process control system. AMS Suite provides maintenance personnel advanced predictive and performance diagnostic tools to confidently and accurately determine machine malfunctions early.

Transducer Inputs	
Number of Inputs	Four, independent
Type of Inputs	- Voltage or current ± 1 V or ± 10 V 0/4-20 mA
Analog Outputs	4 current outputs, 0/4-20 mA - Galvanically separated, 500 Ω
Accuracy	- Temperature error: < 0.25% per 10k - Linearity error at 20°C < 1%
Alarm Outputs	Channel OK, alert and danger for each input



A6620

- Four-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
- Remote selectable limit multiply and trip bypass
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor and cable
- For use in the IMR600020 chassis

Front Panel Outputs	
Green LED's	Four LED's, indicates channel OK separately for each channel
Red LED's	Eight LED's, indicates alert and danger separately for each channel
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
Configurable Parameters	■ Measuring range ■ Engineering units ■ Alert and Danger ■ Available via ModBus TCP/IP output
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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
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

A6620 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)

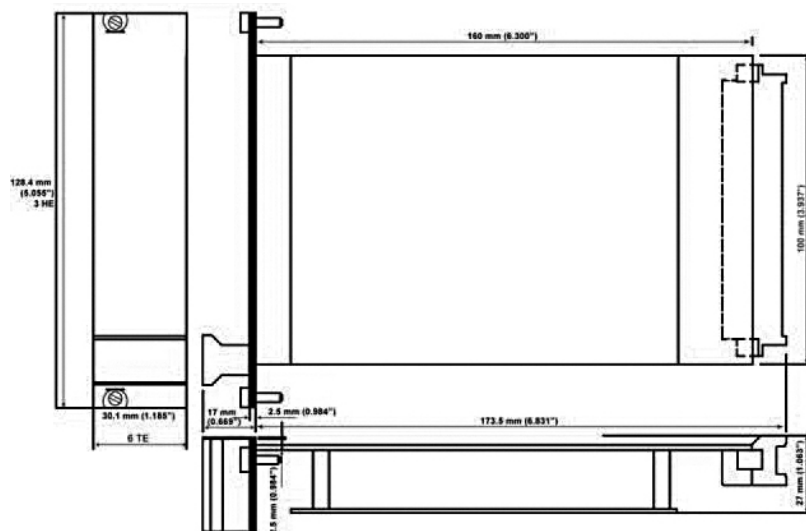
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6620	Four-channel Process Input Monitor (for use in the IMR 6000/20 chassis)

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.

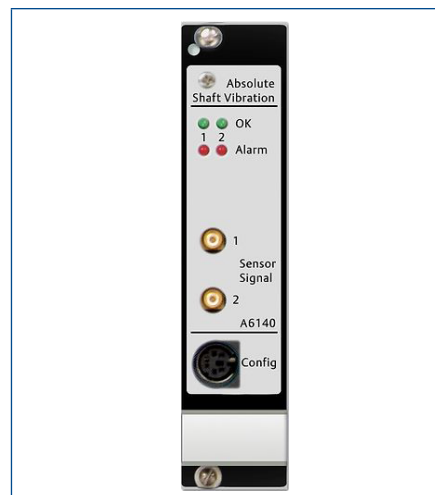
The shaft absolute transducer system consists of a relative displacement sensor and a case-mounted vibration sensor located in the same external housing. The displacement sensor is a non-contact sensor measuring shaft position and movement relative to the case, and the case-mounted vibration sensor measures 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 k Ω
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 k Ω
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, $\pm$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	■ $\frac{1}{2}x$, 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 outputs are identical combined for Smax (combined mode) ■ For example, both outputs are independent for Y and X (independent mode) Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	$\pm 1\%$ 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 outputs are identical combined for absolute shaft vibration Smax (combined mode) ■ For example, both outputs are independent for shaft vibration (channel 1) and bearing vibration (channel 2)
Permissible Load	>10 k Ω
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	0.1 Hz - 5 kHz (-3 dB)
Permissible Load	>10 k Ω
Accuracy	$\pm 1\%$ of range
Permissible Load	>10 k Ω
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 - 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 - 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)

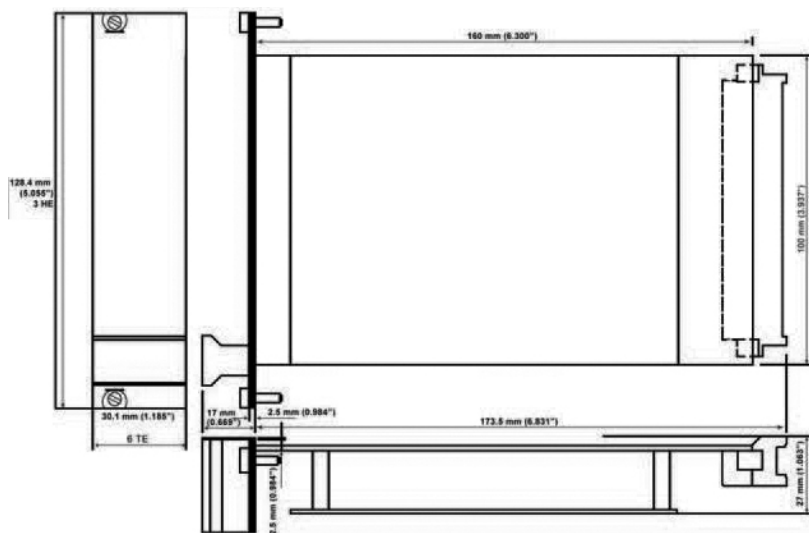
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

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

A6220 Shaft Eccentricity Vibration Monitor for AMS 6500 Machinery Health Monitor

The Shaft Eccentricity 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 turbomachinery.

The main functionality of the Shaft Eccentricity Monitor is to accurately monitor shaft eccentricity and reliably protect machinery by comparing vibration parameters against alarm setpoints, driving alarms and relays.

Shaft eccentricity monitoring consists of a displacement sensor either mounted through the bearing case or mounted internally on the bearing housing with an eccentricity collar near the thrust bearing as the target. The displacement sensor is a non-contact sensor measuring shaft movement proportional to shaft bowing or bent shaft, below 600 rpm.

Shaft eccentricity monitoring is an important measurement on large sleeve bearing machines for predictive and protection monitoring.

The AMS 6500 Machinery Health Monitor 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
Type of Inputs	Eddy current, differential
Emerson Sensor Inputs	Part number: 6422, 6423, 6424, 6425
Isolation	Galvanically separated from power supply
Input Resistance	>100 kΩ
Input Voltage Range	-1 to 23 VDC
Input Frequency Range	0.017 - 70 Hz (102 - 4200 rpm)



A6220

- 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
- Remote selectable limit multiply and trip bypass
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor and cable
- Use with displacement sensor 6422, 6423, 6424 and 6425, driver CON XXX and key monitoring module

Measuring Range	
Range	Continuously adjustable with the configuration software
Smallest Range	0 - 400 mV peak
Largest Range	0 - 8000 mVpeak
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
Front Panel Outputs	
Green LED's	Two LED's, indicates channel OK separately for each channel
Red LED's	Four LED's, indicates alert and danger separately for each channel
Front Panel Buffered Outputs	Two, identical to transducer sensor inputs -1 to - 24 V, >100 k Ω load, freq. range 0 - 16 kHz (-3db)
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 (60 second settling time) Peak to peak ■ Min/max measurement ■ Continuous gap measurement
Configurable Parameters	■ Measuring range ■ Engineering units ■ Sensor sensitivity

Rear Outputs Available	
Current Mode Outputs	■ 0/4-20 mA output for each channel proportional to main value ■ Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	$\pm 1\%$ of full scale
Settling Time	Configurable, 0 - 10 seconds
Voltage Mode Outputs	■ 0 - 10 VDC output proportional to main value for each channel ■ Open/short circuit proof
Permissible Load	>10 k Ω
Rear Buffered Outputs	Raw buffered output signal, AC and DC Open/short circuit proof
Frequency Range	0 Hz - 16 kHz (-3 dB)
Permissible Load	>10 k Ω
DC Voltage Outputs	■ 0 - 10 VDC output proportional to the shaft position (gap) ■ Open/short circuit proof
Accuracy	$\pm 1\%$ of range
Permissible Load	>10 k Ω
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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input
Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6220 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)

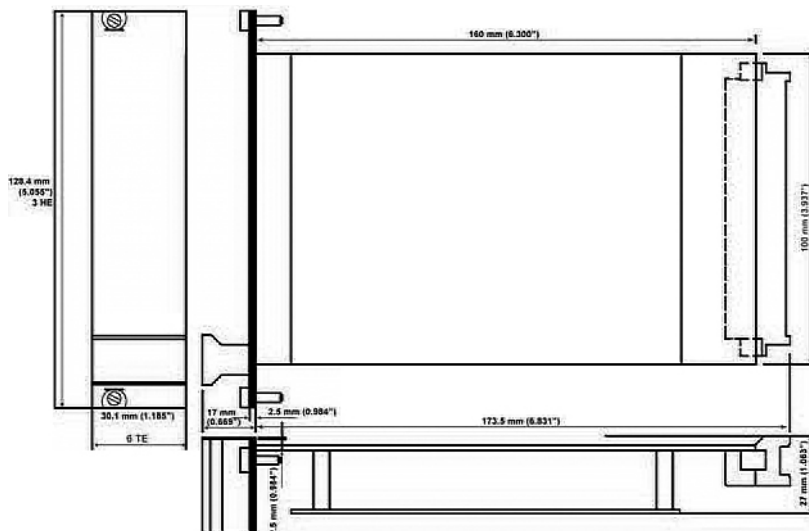
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6220	Dual-channel Eccentricity Vibration Monitor

A6110 Shaft Relative Vibration Monitor for AMS 6500 Machinery Health Monitor

The Shaft Relative Vibration Monitor is designed for extremely 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 Relative Vibration monitoring module is to accurately monitor shaft relative vibration and reliably protect machinery by comparing vibration parameters against alarm setpoints, driving alarms and relays.

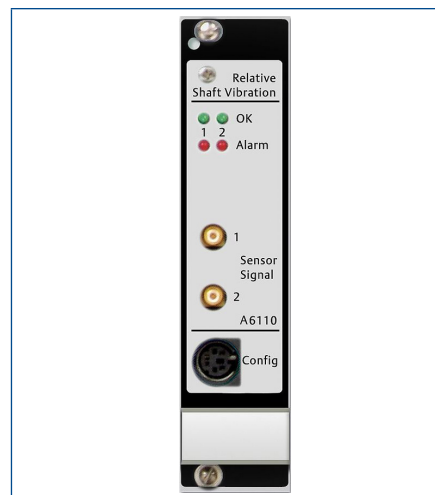
Shaft relative vibration monitoring consists of a displacement sensor either mounted through the bearing case, or mounted internally on the bearing housing, with the rotating shaft being the target.

The displacement sensor is a non-contact sensor measuring shaft position and movement. Since the displacement sensor is mounted to the bearing, the monitored parameter is said to be shaft relative vibration, that is, shaft vibration relative to the bearing case.

Shaft relative vibration is an important measurement on all sleeve bearing machines for predictive and protection monitoring. Shaft relative vibration should be selected when the machine case is massive as compared with the rotor, and the bearing case is not expected to vibrate between zero and production-state machine speeds. Shaft absolute is sometimes selected when the bearing case and rotor mass are more closely equal, where it is more likely that the bearing case will vibrate and impact shaft relative readings.

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, differential
Emerson Sensor Inputs	Part number: 6422, 6423, 6424, 6425
Isolation	Galvanically separated from power supply
Input Resistance	>100 kΩ
Input Voltage Range	0 to -22 VDC
Input Frequency Range	■ Lower cutoff 1 or 5 Hz ■ Upper cutoff 50 - 2000 Hz adjustable



A6110

- 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
- Remote selectable limit multiply and trip bypass
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor, and cable
- Use with displacement sensors PR6422, PR6423, PR6424, PR6425, and driver CON 011/91, 021/91, 041/91

Measuring Range	
Range	Continuously adjustable with the configuration software
Smallest Range	0 - 400 mV
Largest Range	0 - 8000 mV
Sensor Power Supply	■ 0 - 8000 mV ■ Separate buffered sensor supply ■ Galvanically separated from all system voltages and system supply voltages ■ Open and short circuit proof
Nominal Voltage	-26.7 V
Available Current	Nominal 20 mA, maximum 35 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, identical to transducer sensor inputs ■ ± 10 V, >100 kΩ load, freq. range 0.1 - 5 ■ kHz (-3 dB) 0 - 16 kHz-3 dB $\pm 20\%$
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 ■ Smax (combined) (DIN 45670A) ■ Smax peak to peak (combined) (DIN 45670B, VDI 2059) ■ Smax 0 to peak (combined) (VDI 2059) ■ True S peak to peak Y. X (independent) ■ (API 670)
Analysis Parameters	■ $\frac{1}{2}x$, 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 outputs are identical combined for Smax (combined mode) ● For example, both outputs are independent for Y and X (independent mode) ■ Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	$\pm 1\%$ 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 outputs are identical combined for Smax (combined mode) ● For example, both outputs are independent for Y and X (independent mode) ■ Open/short circuit proof
Permissible Load	>10 k Ω
Rear Buffered Outputs	■ Raw buffered output signal, AC and DC ■ Open/short circuit proof
Frequency Range	0.1 - 16 kHz (-3 dB) 0 - 16 kHz -3 dB $\pm 20\%$
Permissible Load	>10 k Ω
DC Voltage Outputs	■ 0 - 10 VDC output proportional to the shaft position (gap) ■ Open/short circuit proof
Accuracy	$\pm 1\%$ of range
Permissible Load	>10 k Ω

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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input

Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6110 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)

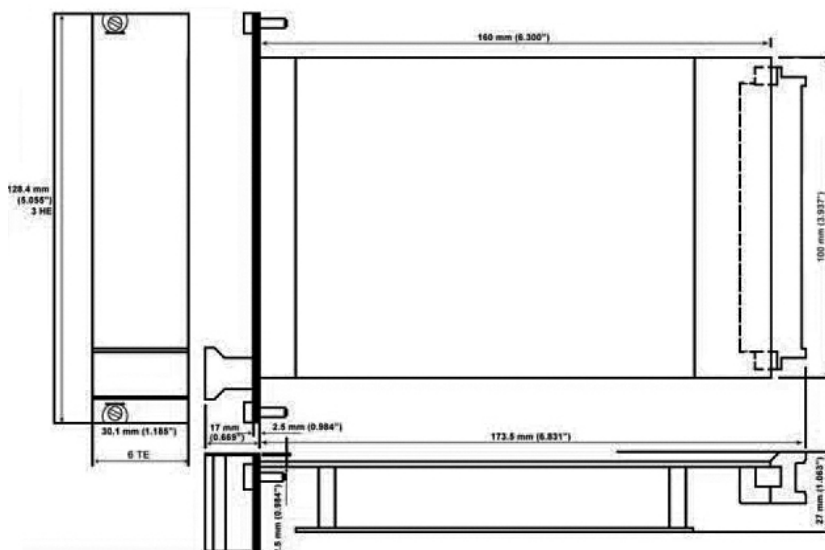
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6110	Dual-channel Shaft Relative Vibration Monitor

Speed and Key Monitor Specifications

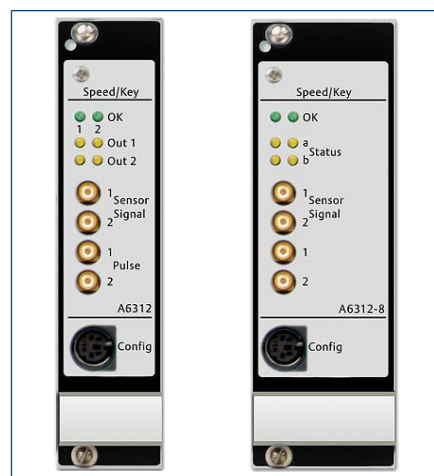
The Speed and Key Monitor is designed for high reliability for the plant's most critical rotating machinery monitoring speed, phase, zero speed and direction of rotation. This 1-slot monitor is used together with the AMS 6500 monitors to build a complete API 670 machinery protection monitor. Applications include steam, gas, compressors and hydro turbo machinery.

The Speed and Key Monitor can be configured for redundant mode where automatic switchover from primary to backup tach is possible. Sensor gap voltage and pulse counting/comparison are monitored to trigger switchover. When the Speed and Key Monitor is operating in redundant mode, the main and failover key or speed displacement sensor must be installed in the same axial plane to ensure phase continuity upon failover.

Speed measurements consist of a displacement sensor mounted internally to the machine with the target being a toothed wheel, a keyway or gear rotating on the shaft. The purpose of the speed measurement is to alarm on zero speed, monitor for reverse rotation and provide a speed measurement to track process conditions for advanced analysis. Key, or phase measurements, also consist of a displacement transducer but must have a once per revolution target, not a toothed wheel or gear for a target. The phase measurement is a critical parameter when looking for machine health changes.

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
Type of Inputs	Eddy current, differential
Emerson Sensor Inputs	Part number: 6422, 6423, 6424, 6425
Isolation	Galvanically separated from power supply
Input Resistance	>100 kΩ
Input Voltage Range	0 to ±27.3 VDC
Input Frequency Range	0 - 20,000 Hz, 65,535 RPM



A6312

A6312-8

- Two-channel 3U size plug-in modules decrease cabinet space requirements in half from traditional four-channel 6U size cards
- API 670 compliant, hot swappable module
- Remote selectable limit multiply and trip bypass
- Rear buffered proportional outputs, 0/4-20 mA output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor and cable
- Use with displacement sensor 6422, 6423, 6424 and 6425 and driver CON 011/91, 021/91, 041/91
- 6TE wide module used in AMS 6000 19" rack mount chassis
- 8TE wide module used with AMS 6500 19" rack mount chassis

Measuring Range	
Range	Continuously adjustable with the configuration software
Smallest Range	2 V
Largest Range	0 - 30 V
Sensor Power Supply	Separate buffered sensor supply Galvanically separated from all system voltages and system supply voltage Open and short circuit proof
Nominal Voltage	-26.75 VDC
Available Current	Nominal 20 mA, maximum 35 mA
Front Panel Outputs	
Green LED's	Two LED's, indicates channel OK separately for each channel
Yellow LED's	Four LED's, indicates alert and danger separately for each channel
Front Panel Buffered Outputs	Two, ± 10 V, signal input level reduced by factor 0.15, >100 k Ω load, frequency range 0 Hz - 16 kHz (-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
Speed Measurements with Each Channel	Forward and reverse rotation with trigger wheel (1 - 255 trigger marks), max. freq. 20 kHz
Pulse Width Time Window	5 - 10 msec
Key Pulse Detection with Each Channel	- One key mark on the shaft - Possible with multiple key marks, but phase will change with each start-up
Zero Speed Monitor with Each Channel	- Detects zero speed of trigger wheel with 1 - 255 trigger marks - Measures time between two pulses in a configurable range of 1 - 1700 seconds, forward or reverse direction
Both Channels in Combined Use	- Detects direction of rotation of two trigger marks of which one is phase shifted - Detects a difference between the speed of two trigger wheels, difference adjustable in number of RPM

Rear Outputs Available	
Current Mode Outputs	■ 0/4-20 mA output for each channel proportional to main value ■ Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	$\pm 1\%$ of full scale
Settling Time	Configurable, 0 - 10 seconds
Pulse Outputs	0 Hz - 20 kHz output for each channel Open/short circuit proof
Permissible Load	>10 k Ω
TTL Pulse Output	■ 0 Hz - 20 kHz output signal for each channel, 0 - 20 kHz ■ Open/short circuit proof
Permissible Load	>10 k Ω
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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input
Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6312 Relay Module Dimensions:

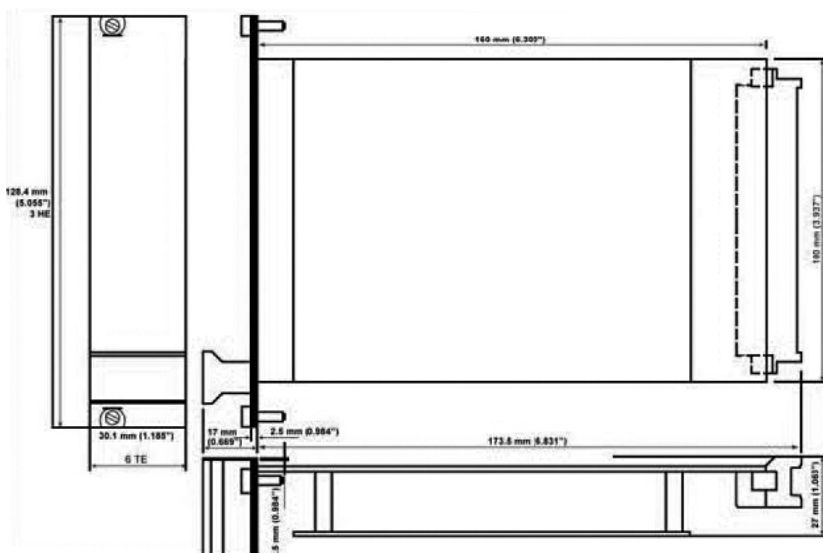
PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)

Width: 30mm (1.181in) (6 TE)
Height: 128.4mm (5.055in) (3 HE)
Length: 160mm (6.300in)
Net Weight: app 320g (0.705lbs)
Gross Weight: app 450g (0.992lbs)
includes standard packing
Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



A6312-8 Relay Module Dimensions:

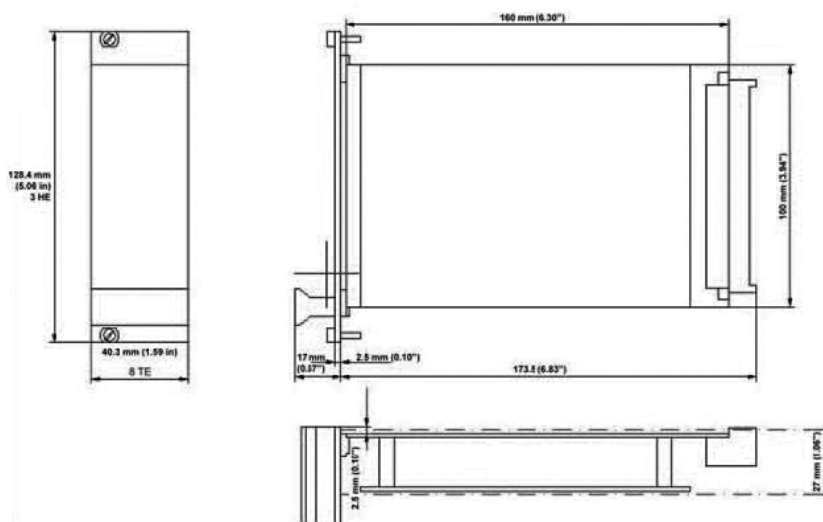
PCB/EURO card format according to
DIN 41494, 100 x 160mm (3.937 x 6.300in)

Width: 40.3mm (1.59in) (8 TE)
Height: 128.4mm (5.055in) (3 HE)
Length: 160mm (6.300in)
Net Weight: app 320g (0.705lbs)
Gross Weight: app 450g (0.992lbs)
includes standard packing
Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6312	Dual-channel Speed and Key Monitor for use in IMR 6000/10 and IMR 6000/30
A6312-8	Dual-channel Speed and Key Monitor for use with AMS 6500 systems

A6630 Temperature Monitor for AMS 6500 Machinery Health Monitor

The A6630 Temperature Monitor is designed for extremely high reliability for the plant's most critical rotating machinery. This 1-slot multi-channel 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 turbomachinery.

The main function of the Temperature Monitor is to input RTD and thermocouple temperature sensors and confidently protect machinery by comparing temperature levels against alarm setpoints as well as driving alarms and relays. Temperature monitoring along with vibration and position measurements provides better fault confirmation, which leads to increased availability and safety.

Machinery protection applications include radial and thrust bearing metal temperature. Important process temperature values include generator, rotor, and stator winding temperature, oil supply temperature, steam temperature, and ambient temperature.

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



A6630

- Component of the AMS 6500 machine monitoring system
- Applicable for thermocouple and RTD (resistance temperature detector) temperature sensors
- No additional sensor transmitter required
- Access to individual card via front RS232 port for configuration and visualization of monitored information
- Readout of all measured data via the serial interfaces
- Extended self-checking facilities for electronic circuits and sensors
- Hot-swappable, monitor may be changed during operation
- Measurements according to API 670 requirements

Technical Data	
Sensor Input	The following sensor types are supported: Thermocouples: ■ Type E –270...1000°C ■ Type J –210...1200°C ■ Type K –270...1372°C ■ Type T –270...400°C ■ Signal voltage range: ±500mV RTDs: ■ PT100 ($\alpha=0,00385$)–200...850°C ■ PT100 ($\alpha=0,00392$)–200...660°C ■ Ni100 ($\alpha=0,00549$)–60...180°C ■ Ni120 ($\alpha=0,00672$)–80...260°C ■ Cu10 ($\alpha=0,00427$)–200...260°C ■ Range of measurable resistors: 0...1000kΩ These inputs are galvanically isolated from the rest of the monitor circuits.

Sensor Supply	Each channel is equipped with an integrated sensor power supply. Thermocouples: ■ Bias voltage for isolated thermocouples RTDs: ■ Constant current supply: 250µA ...1mA ■ Voltage: 4V
Power Supply	■ Redundant supply via two supply inputs (decoupled diodes). At least one supply input is required for the supply of the module. ■ Supply voltage: 24 (18...31.2) VDC according to IEC 654-2; class DC4 ■ Power consumption: max. 8 W
Control Inputs	Two logic binary inputs are available for all channels for two of the following features: ■ Reset max measured temperature ■ Reset latching relays ■ Limit Blocking ■ Control inputs designed as 24V logic (active Low inputs) ■ Low: 0...3V; High: 13...48V ■ Input resistance: $\geq 30 \text{ k}\Omega$
Current Outputs	■ Nominal range: 0/4...20 mA or 20...4/0 mA open and short circuit proof ■ Permissible load: $\leq 500 \Omega$ ■ Resolution: 16 bit
Optocoupler Outputs	■ Six collector / emitter outputs ■ $U_{ce} = 48 \text{ VDC}$ ■ $I_{ce} = 100 \text{ mA}$
Mechanical Construction	■ Circuit board: European standard size according to DIN 41494 ■ 100 x 160 mm / 3.94 x 6.30 in ■ Connector: DIN 41612, type F 48 M ■ Module width: 6 HP 30 mm / $\approx 1.18 \text{ in}$ ■ Module height: 3 RU 128,4 mm / $\approx 5.06 \text{ in}$ ■ Length: 160 mm / $\approx 6.30 \text{ in}$ ■ Net weight: approx. 320 g / 11.29 oz ■ Gross weight: approx. 450 g / 15.87 oz

Measuring Modes

- The measuring modes can be set by means of the configuration software.
- Each channel can be configured individually via the configuration software.
- The configuration can be changed at any time during operation. When changed, the measuring operation of the module will be stopped for approximately 15 seconds.

Function and Design

Two modes of operation are user selectable:

- Subtype “RTD Mode” is used for temperature module inputs of type Resistance Temperature Device.
 - Subtype “TC” is used for temperature module inputs of type Thermocouple (TC).
- For each temperature module with thermocouple inputs, an RTD must be used for cold junction compensation (CJC).

Programmable Measuring Parameters

- Measuring range.
- Measurement type.
- Sensor types.
- Alarm function and limits.
- Current outputs can be freely assigned to the input channels.
- Digital outputs can be freely assigned to the input channels.
- Digital outputs are configurable for use as normally open or normally closed.
- Channel identification: freely selectable by means of a point ID and a description.

Limit Supervision

- Six digital outputs with separately adjustable limit values are available.
- The alarm output functions can be blocked by means of the channel clear/circuit fault function or by an external binary input.
- After downloading the configuration parameters, the alarm function will be locked for the duration of the settling time of approximately 15 seconds.
- Adjustable range of the limit values: 0...100 % of the measuring range.
- Resolution and reproducibility: 1 % of the measuring range.
- Delay time: 0...25.5 seconds, selectable.
- Switching characteristic: with increasing signal levels.
- Switching hysteresis: only effective during decreasing signal values.

Module and Sensor Supervision

The internal module supervision includes the following functions:

- Sensor signal within a preset.
- OK range.
- Wiring between sensor and module (open and short circuit detection).
- System supply voltages within preset limits.
- Configuration and parameter settings.
- Internal temperature of module.
- System watchdog.

While changing from a sensor malfunction into the OK-status and after switching on the module, all functions are locked for a settling time of 15 seconds.

The “Channel clear” is visualized on the front of the module by means of a green LED. This LED switches off during a “channel fault”. During a delay time or during settling time, this LED flashes.

Detailed information about reasons for a “channel fault” indication can be seen through the module configuration software.

Operating Elements at the Module Front

- 2 green LEDs indicate channel clear and power OK.
- 6 yellow LEDs indicate the logical conditions of the binary outputs.
- 1 mini-DIN diode type socket, RS-232 connector for configuration cable.

System Design

The following table provides an overview of the number of input channels and current outputs that are possible with the various chassis options.

	RTD ¹ Input Channels Per Module	Thermocouple ² Input Channels Per Module	4-20mA out Per Module
Slots 9 - 12	3	5	3
	RTD ¹ Input Channels Per Module	Thermocouple ² Input Channels Per Module	4-20mA out Per Module
All slots	4	6	4

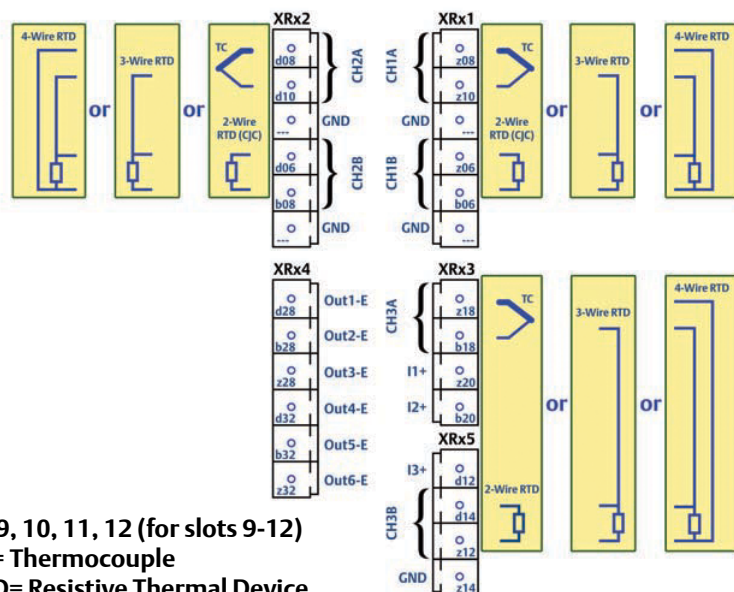
¹RTDs are the API 670 standard.

²Thermocouples are used in API 670 when specified.

More combinations are possible, for example, mixing RTD's and TC on same module.

The following are wiring diagrams for all possible sensor termination options:

A6630 temperature module installed in AMS 6500 in slots 9-12 in RTD mode



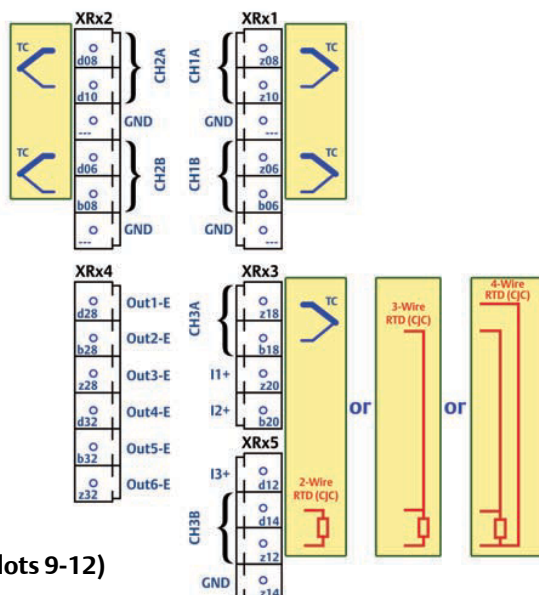
x= 9, 10, 11, 12 (for slots 9-12)

TC= Thermocouple

RTD= Resistive Thermal Device

Note: If a TC is used in any possible channel, an RTD is required for CJC.

A6630 temperature module installed in AMS 6500 in slots 9-12 in TC mode

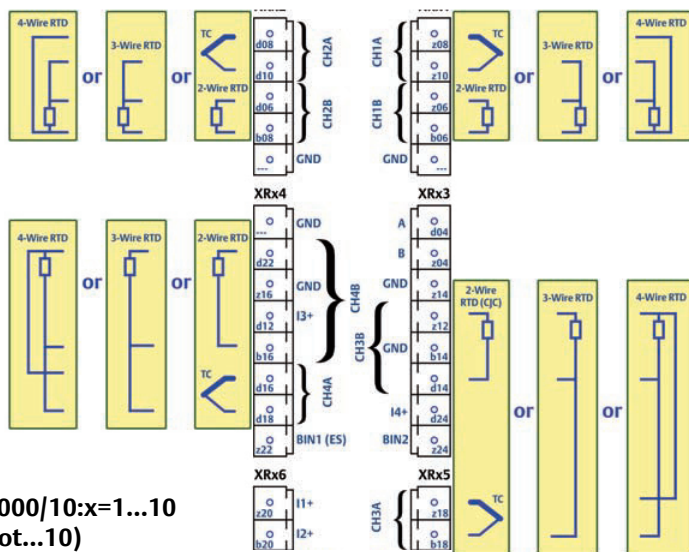


x= 9, 10, 11, 12 (for slots 9-12)

TC= Thermocouple

RTD= Resistive Thermal Device

Note: Required CJC.

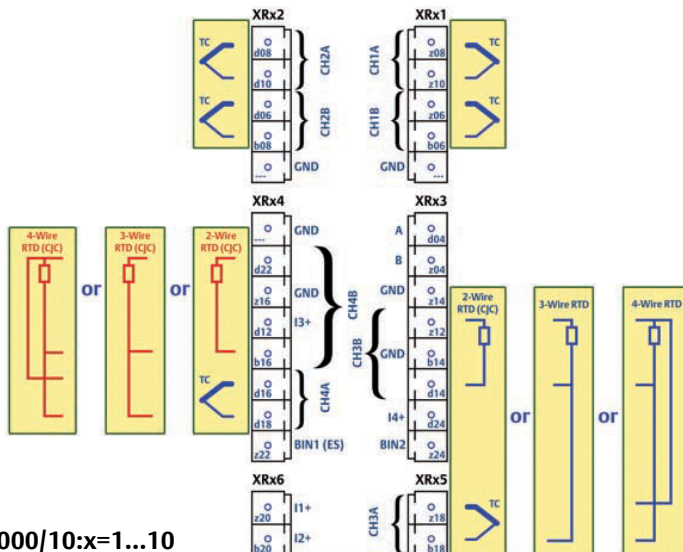
A6630 temperature module installed in AMS 6500 in slots 9-12 in RTD mode


IMR 6000/10:x=1...10
(for slot...10)

TC= Thermocouple

RTD= Resistive Thermal Device

Note: If a TC is used in any possible channel, an RTD is required for CJC.

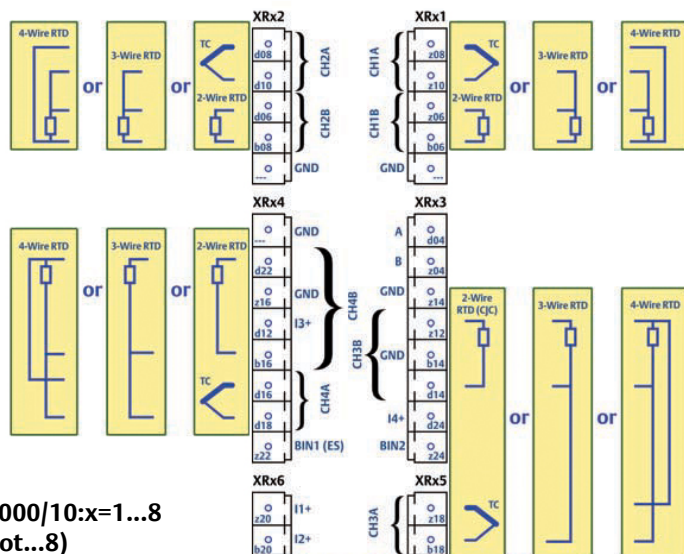
A6630 temperature module installed in IMR 6000/10 in slots 1-10 in TC mode


IMR 6000/10:x=1...10
(for slot...10)

TC= Thermocouple

RTD= Resistive Thermal Device

Note: Required for CJC.

A6630 temperature module installed in IMR 6000/30 in slots 1-8 in RTD mode


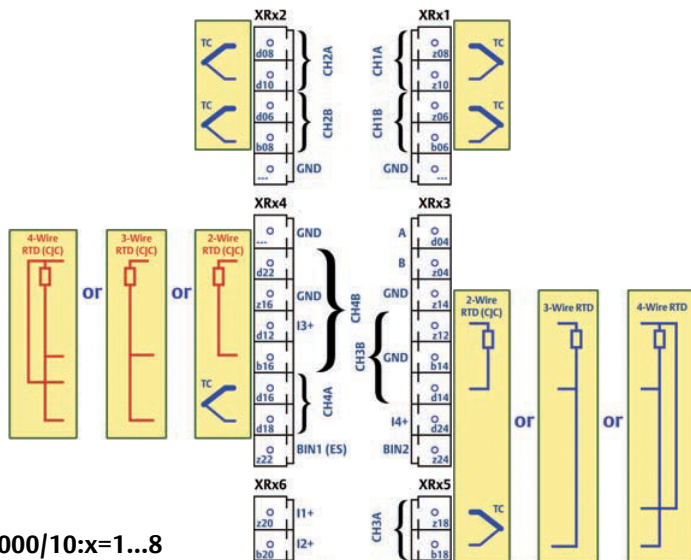
IMR 6000/10:x=1...8

(for slot...8)

TC= Thermocouple

RTD= Resistive Thermal Device

Note: If a TC is used in any possible channel, an RTD is required for CJC.

A6630 temperature module installed in IMR 6000/30 in slots 1-8 in TC mode


IMR 6000/10:x=1...8

(for slot...8)

TC= Thermocouple

RTD= Resistive Thermal Device

Note: Required for CJC.

Environmental Conditions

- Protection class:
module: IP00 according to DIN 40050
front plate: IP21 according to DIN 40050
- Climate conditions:
according to DIN 40040, class KTF operating temperature range:
0...+65°C / +32...+149°F
- Temperature range for storage and transport: -30...+85°C / -22...185°F
- Permissible relative humidity: 5...95%, non-condensing
- Permissible vibration: according to EN-IEC 60068-2-6
- Permissible shock: according to EN-IEC 60068-2-27
- EMC: according to EN-IEC 61326-1

Configuration PC Requirements

The temperature monitor can be configured using the supplied interface cable connected to the temperature monitor front panel serial interface. The computer used to configure the temperature monitor should meet the following minimal requirements:

- Processor: Pentium III or higher
- Required space on fixed disk: minimum 300MB available hard disk space
- Operating system: Windows XP or up to current Microsoft operating system
- Drive: CD-ROM
- Interfaces: a RS232 9-pin D serial connection such as COM1

Order Numbers

A6630

Temperature Monitor

9100-00001

Accessories:

Configuration software for AMS 6500 monitors

9510-00027

Warning note:

*Installation and commissioning of the monitor may only be made by trained staff.
The manufacturer is not liable for damages which were caused by improper use or by operation errors of unauthorized persons.*

A6210 Thrust Position, Differential Expansion, and Rod Position Monitor for AMS 6500 Machinery Health Monitor

The A6210 monitor operates in 3 distinct modes: thrust position, differential expansion, or rod position.

The Thrust Position mode accurately monitors thrust position and reliably provides machinery protection by comparing the measured axial shaft position against alarm set-points – driving alarms and relay outputs.

Shaft thrust monitoring is one of the most critical measurements on turbomachinery. Sudden and small axial movements should be detected in 40 msec or less to minimize or avoid rotor to case contact. Redundant sensors and voting logic are recommended. Thrust bearing temperature measurement is highly recommended as a complement to thrust position monitoring.

Shaft thrust monitoring consists of one to three displacement sensors mounted in the axial direction parallel to the shaft at the shaft-end or thrust collar. The displacement sensor is a non-contact sensor that measures shaft position.

For extremely critical safety applications, the A6250 monitor provides triple-redundant thrust protection built on the SIL 3-rated overspeed system platform.

The A6210 monitor can also be configured for differential expansion measurements. As both the case and rotor grow due to changes in thermal conditions at turbine start-up, differential expansion delivers a measure of the relative difference between mounted displacement sensors on the case and the sensor target on the shaft. If the case and shaft grow at approximately the same rate, then the differential expansion remains close to the desired value of zero. The differential expansion measurement mode supports tandem/complementary or cone/ramp modes.

Finally, the A6210 monitor can be configured for average rod drop mode – used to monitor rider band wear in reciprocating compressors. Over time, rider bands wear in horizontal reciprocating compressors due to the force of gravity acting on the horizontally-oriented piston in the compressor cylinder. If the rider band wears beyond spec, the piston can contact the cylinder wall and cause incremental machine damage and possible failure.

By mounting at least one displacement probe to measure the piston rod position, you will receive notification when the piston drops – an indication of rider band wear. You can then set shutdown protection thresholds for automatic trip. The average rod drop parameter can be factored to represent the actual rider band wear, or with no factor applied, rod drop will represent the actual movement of the piston rod.

The AMS 6500 includes easy integration to the DeltaV and Ovation process automation systems, including preconfigured DeltaV Graphic Dynamos and Ovation Graphic Macros to speed operator graphic development. AMS software provides maintenance personnel advanced predictive and performance diagnostic tools to confidently and accurately determine machine malfunctions early.



A6210

- Two-channel, 3U size, 1-slot plug-in module decreases cabinet space requirements in half from traditional four-channel 6U size cards
- API 670 and API 618 compliant hot swappable module
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Self-checking facilities include monitoring hardware, power input, hardware temperature, simplifies and cable
- Built-in software linearization easing sensor adjustment after installation
- Use with displacement sensor 6422, 6423, 6424 and 6425 and driver CON xxx

Transducer Inputs	
Number of Inputs	Two, independent
Type of Inputs	Eddy current, differential
Emerson Sensor Inputs	Part number: 6422, 6423, 6424, 6425
Isolation	Galvanically separated from power supply
Input Resistance	>100 k Ω
Input Voltage Range	0 to -22 VDC
Measuring Frequency Range	0 - 8 Hz (10 Hz, -3 dB)
Measuring Range	
Range	■ Continuously adjustable with the configuration software. ■ Also includes measuring range invert
Sensor Power Supply	■ Separate buffered sensor supply Galvanically separated from all system voltages and system supply voltage ■ Open and short circuit proof
Nominal Supply Voltage	-26.7 VDC
Available Current	Nominal 20 mA, maximum 35 mA
Front Panel Outputs	
Green LED's	Two LED's, indicates channel OK separately for each channel
Red LED's	Four LED's, indicates alert and danger separately for each channel
Front Panel Buffered Outputs	Two, identical to transducer sensor inputs -1 to -24 V, >100 k Ω load
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 ■ Axial shaft movement ■ Axial shaft position ■ Measures cone, ramp and collar differential expansion ■ Measures radial shaft position and bend ■ Measures tandem configurations ■ Measures conical disc with temperature compensation or radial displacement compensation ■ Measures average rod position
Configurable Parameters	■ Measuring range ■ Engineering units ■ Sensitivity ■ Alert and Danger
Rear Outputs Available	
Current Mode Outputs	0/4-20 mA output for each channel proportional to main value ■ For example, both outputs are identical for combined mode Tandem/Cone and assigned to the relevant channel for the modes Dual Channel or Min/Max ■ For example, Open/short circuit proof
Permissible Load	<500 Ω
Accuracy	$\pm 1\%$ of full scale
Settling Time	Configurable, 0 - 10 seconds
Rear Buffered Outputs	0 - 10 VDC output proportional to main value for each channel Open/short circuit proof
Frequency Range	>10 k Ω
Permissible Load	Raw buffered output signal, AC and DC Open/short circuit proof
DC Voltage Outputs	■ 0 - 10 VDC output proportional to the shaft position (gap) ■ Open/short circuit proof
Accuracy	$\pm 1\%$ of range
Permissible Load	>10 k Ω

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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input

Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6210 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)

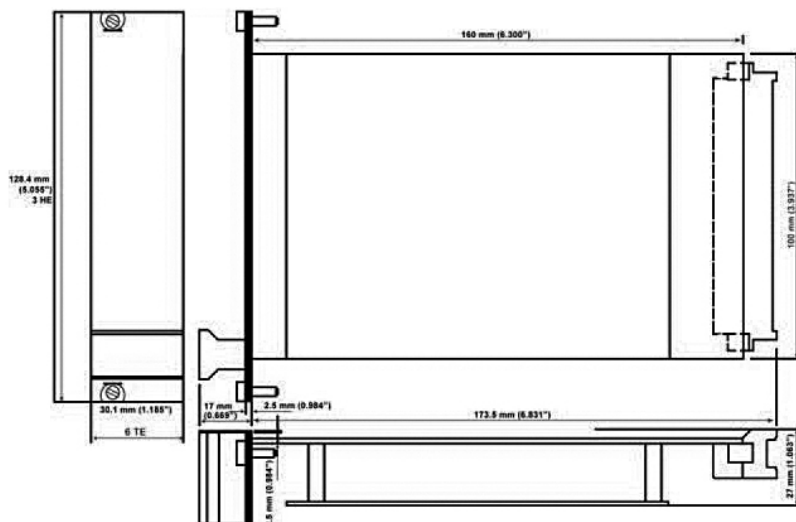
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6210	Dual-channel Thrust, Differential Expansion, and Rod Drop Monitor

A6410 Valve and Case Expansion Monitor for AMS 6500 Machinery Health Monitor

The Valve and Case Expansion 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 turbomachinery.

The main functionality of the Valve and Case Expansion Monitor is to accurately monitor valve position and case expansion and reliably protect machinery by comparing parameters against alarm setpoints, driving alarms and relays.

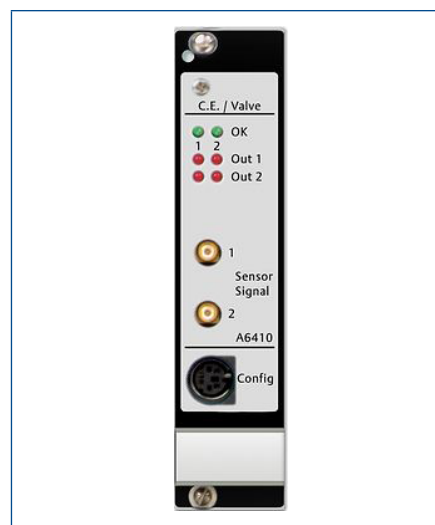
Valve position is a measurement of the main steam inlet valve stem position normally displayed in percent open. The valve position measurement provides the operator with an indication of the current load on the turbine.

Case expansion monitoring usually consists of two inductive displacement sensor (or LVDT's) mounted in the axial direction, parallel to the shaft, and on each side of the turbine case. Unlike the eddy current sensor which is a non-contact sensor, the inductive sensor is a contact sensor.

Case expansion monitoring is important at start-up, so both sides of the turbine case can be monitored for proper expansion rates. Because the turbine is allowed to slide on rails as it expands, if both sides are not free to expand, the turbine "crabs" (the case bends), leading to the rotor colliding with the case.

Channel 1 can measure static values, such as case expansion, and can also be used for dynamic quantities, such as displacement, angles, forces, torsions or other physical quantities measured by inductive transducers. Channel 2 is left for static measurements and relative displacements (relative to channel 1).

The AMS 6500 Machinery Health Monitor 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.



A6410

- 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
- Password protected user configuration
- Self-checking facilities include monitoring hardware, power input, hardware temperature, sensor and cable
- Front and rear buffered and proportional outputs, 0/4-20 mA output, 0 - 10 V output
- Use with inductive displacement sensor 9350

Transducer Inputs	
Number of Inputs	Two, independent, differential inputs
Type of Inputs	Inductive, half bridge or full bridge and differential transformers
Emerson Sensor Inputs	Part number: PR 9350/xx and K20315/xx
Isolation	Galvanically separated from power supply
Input Impedance	200 kΩ
Input Voltage Range	3.6 VDC (protected against over voltage)
Measuring Frequency Range	0 - 100 Hz (-3 dB)

Measuring Range	
Range	Continuously adjustable with configuration software. One or both outputs may be inverted
Carrier Frequency	4.75 kHz
Sensor Power Supply	Separate buffered sensor supply Galvanically separated from all system voltages and system supply voltage. Open and short circuit proof.
Nominal Supply Voltage	4 V rms
Permissible Load	120-600 Ω
Front Panel Outputs	
Green LED's	Two LED's, indicates channel OK separately for each channel.
Red LED's	Four LED's, indicates alert and danger separately for each channel.
Front Panel Buffered Outputs	Two, identical to transducer sensor inputs ± 12 V, >100 k Ω load.
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 for dual-channel measurement, expansion measurement.
Configurable Parameters	■ Measuring range ■ Engineering units ■ Sensitivity ■ Alert and Danger

Rear Outputs Available	
Current Mode Outputs	0/4-20 mA output for each channel proportional to main value Open/short circuit proof.
Permissible Load	<500 Ω
Accuracy	$\pm 1\%$ of full scale
Settling Time	Configurable, 0 - 10 seconds
Rear Buffered Outputs	Raw buffered output signal, 0 - 12 V peak to peak Open/short circuit proof
Frequency Range	0 - 100 Hz (-3 dB)
Permissible Load	>100 k Ω
DC Voltage Outputs	0 - 10 VDC output proportional to main value Open/short circuit proof
Accuracy	$\pm 1\%$ of range
Permissible Load	>10 k Ω
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 - 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 - 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	Remote, relay input, 1.00-4.99 factor
Trip Bypass	Remote, relay input
Environmental, General	
Module	IP 00, DIN 40050
Front Plate	IP 21, DIN 40050
Climate	DIN 40040 class KTF
Operating Temperature	0° - 65°C (32° - 149°F)
Storage Temperature	-30° - 85°C (-22° - 185°F)
Relative Humidity	5 - 95%, non-condensing
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

A6410 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)

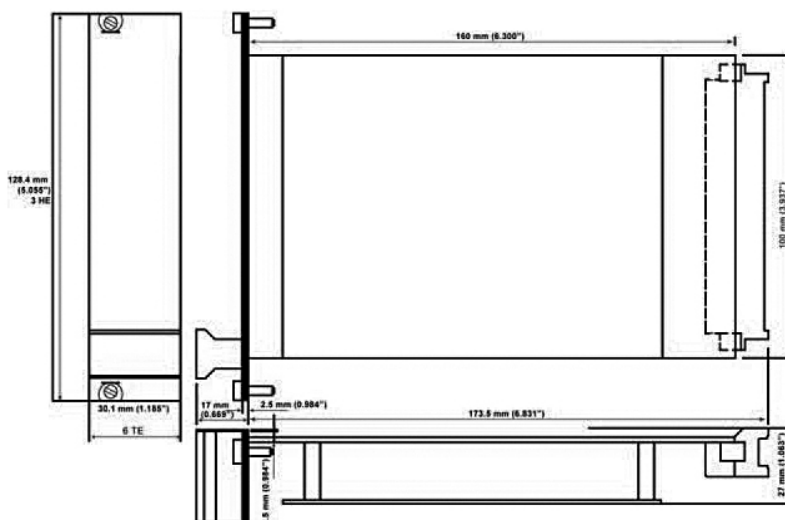
Gross Weight: app 450g (0.992lbs)
includes standard packing

Packing Volume: app 2.5dm³ (0.08ft³)

Space

Requirements: 1 slot

14 modules fit into each 19" rack



Ordering Information

Model Number	Product Description
A6410	Dual-channel Valve and Case Expansion Monitor

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