AS-360 System Datasheet

Advanced API-670 Machinery Protection with Real-Time Analysis

The AS-360 combines Alta Solutions' renowned signal analysis capabilities and machinery protection experience into a modern API-670 compliant solution. Designed around our commitment to reliability, flexibility and efficiency, the system can accommodate any sensor type into any channel.

With two separate analog-to-digital signal paths, machine protection and analysis data acquisition functions are provided within the AS-360 system. To view and record diagnostic data during a start-up or shut-down, you no longer need to connect special data acquisition equipment to the machinery protection system.

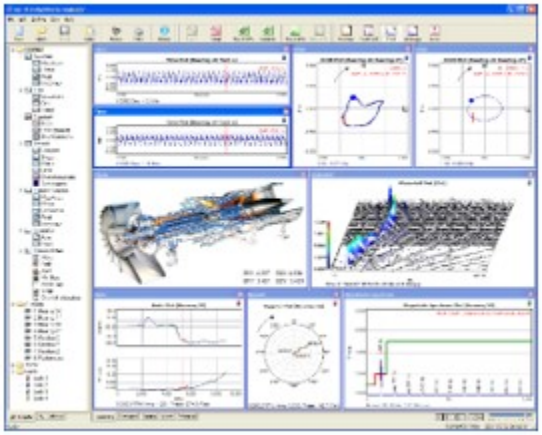
Just connect one Ethernet cable to your laptop or PC, running Alta analysis software, to view or record real time gapless data for subsequent playback and analysis. Fully independent A to D signal paths allow access to real time dynamic signals without affecting the machinery protection system functions.

Installation and maintenance has been simplified. Using a more traditional front-monitor and rear-wiring form factor, modules can be hot swapped without having to remove and reconnect wiring. Upgrading from existing systems is simplified since modules can be spaced to align with the existing systems' terminal blocks. R&R existing MPS systems quickly and easily or reconfigure for future expansion.

Alta Solutions

ADVANCED VIBRATION PROTECTION

The AS-360 is designed to meet or exceed MPS guidelines within 5TH Edition API 670. Each AS-360/50 module provides four channels of protection circuitry, 24-bit A-to-D converters, and distributed relay outputs to provide a fully redundant and fault tolerant protection system. The AS-360 MPS is designed for protection monitoring of critical machines or multiple BOP machines.

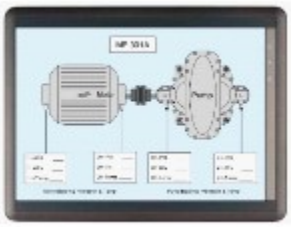


BUILT-IN ADVANCED ANALYSIS CAPABILITIES

Each 4 channel AS-360/50 module contains independent parallel 24-bit A to D circuits which acquires advanced condition monitoring and analysis data. The AS-360 eliminates phase lag, amplitude loss, or signal degradation between the analog sensor input and the machinery diagnostics data.

STATE OF THE ART HARDWARE

The AS-360 design methodology uses the latest chip technology to optimize system reliability, efficiency, and product lifespan.



LEVERAGE OFF-THE-SHELF CONNECTIVITY

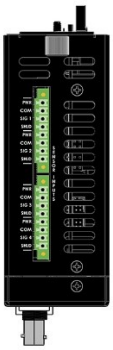
The AS-360 utilizes Ethernet connectivity to connect to computers using standard Ethernet cables and protocols. No proprietary interface cards, no unusual or special cables to support. The system interfaces with a wide range of third-party HMIs and remote displays which increases your display choices while reducing cost.

LEVERAGE OFF-THE-SHELF POWER SUPPLIES

The AS-360 operates on +24Vdc which allows the use of off-the-shelf power supplies, existing control system power, which reduces overall system and long-term maintenance costs.

DESIGNED TO SUPPORT CURRENT AND FUTURE INTERFACES

The AS-360 communications are designed around the latest programmable network processors to support today's control and historian interfaces including Modbus TCP. Firmware upgrades will allow native communications with other interfaces and historians.



LEVERAGING TRADITIONAL INDUSTRIAL CONNECTORS

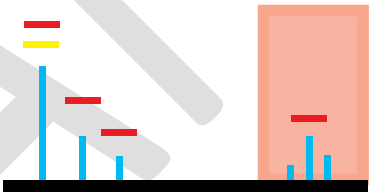
Each module uses common terminal plugs which match traditional systems. This reduces time to replace older instrumentation while improving field wire gauge compatibility. Front panel BNC connectors provide access to buffered output signals for maintenance or analysis. No need for special and easy to forget or lose adapters.

TRANSDUCER POWER

Each AS-360/50 provides + or -24Vdc 3 wire transducer power, or +24Vdc 2 wire Integrated Electronic Piezoelectric (IEPE) sensor power. No additional hardware is needed to support industry standard sensors.

SENSOR SUPPORT

The AS-360 is designed to support all machinery protection type sensors from any manufacturer that produces a voltage signal between -24 and +24 volts.



INTELLIGENT ALARMING AND SHUTDOWN

Flexible and easy logic configuration and a shared relay bus are available to any of the four relays on every dynamic signal card allow for an unprecedented level of speed, reliability and redundancy not previously available without costly additional hardware.

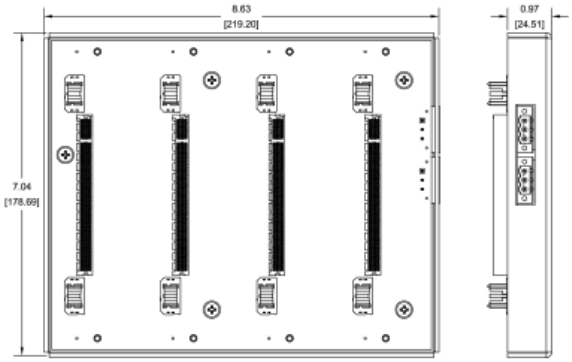
DIAGNOSES BLOCKS (VOTING LOGIC)

Ease of configuration is increased by making diagnosis blocks available to more effectively and easily reuse common arrays in complex voting logic.

BACKPLANE SPECIFICATIONS

FOUR SLOT BACKPLANE

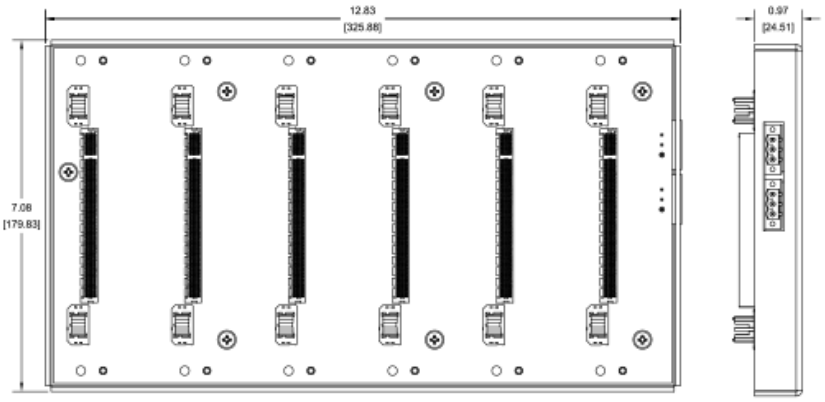
Backplane	4 Slots
360/30 Modules Supported	1
360/50 or 360/70 Modules Supported	3
Dimensions	8.63” x 7.04” x 0.97”



4 MODULES BACKPLANE
SUPPORT PLATE

SIX SLOT BACKPLANE

Backplane	6 Slots
360/30 Modules Supported	1
360/50 or 360/70 Modules Supported	5
Dimensions	12.83” x 7.04” x 0.97”

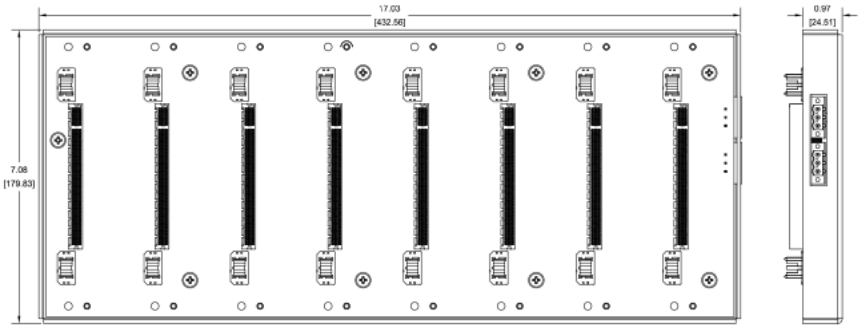


6 MODULES BACKPLANE
SUPPORT PLATE

BACKPLANE SPECIFICATIONS

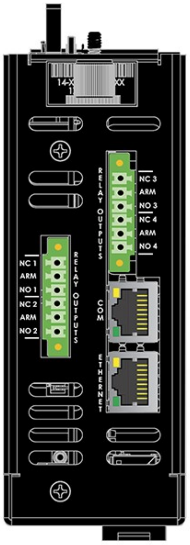
EIGHT SLOT BACKPLANE

Backplane	8 Slots
360/30 Modules Supported	1
360/50 or 360/70Modules Supported	7
Dimensions	17.03” x 7.04” x 0.97”

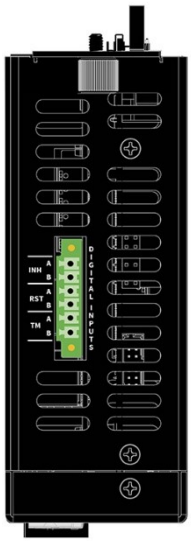


8 MODULES BACKPLANE
SUPPORT PLATE

FRONT VIEW



TOP VIEW



BOTTOM VIEW

The 360/30 seamlessly integrates critical functions including programming, health status monitoring, dynamic data streaming, and communications. This multifunction module simplifies the system configuration while reducing costs via a minimized spares inventory.

The 360/30 System Monitor provides the following features:

- Module and system health monitoring
- LED indicators for both module health and system power status
- System fault logging with output relay
- System configuration security key-lock
- Ethernet based system programming and real-time analysis ports
- System reset push-button
- Ethernet TCP/IP based communication ports for HMI's or Historians

POWER INPUT(S)

Voltage Range	+20Vdc to +30Vdc (Nominal: +24Vdc)
Connector	Electrical • +24Vdc: Power Supply Positive Input • COM: Power Supply Input Return • SHLD: Earth Ground Connection Mechanical • Maximum Gauge: 10AWG Stranded • Plug pin Pitch: 7.62mm • Connection Type: Screw Clamp

DIGITAL INPUTS

Function	Remote systems interface for discrete digital control • Inhibit: Alarm inhibit during programming changes • Reset: Latched alarm reset • Trip Multiply: Alarm trip level multiply for startup and shutdown
Connector	One 6-tap removable terminal block Electrical All input pairs are isolated and biased internally • Inhibit: Contact Closure Sensing • Reset Alarm Latch: Contact Closure Sensing • Trip Multiple: Contact Closure Sensing Mechanical • Maximum Gauge: 16AWG Stranded • Plug pin Pitch: 3.81mm • Connection Type: Screw Clamp
Activation	<1kOhm (shorted)
De-activation	>10kOhm (open)
Isolation	Common mode (2500Vpeak)

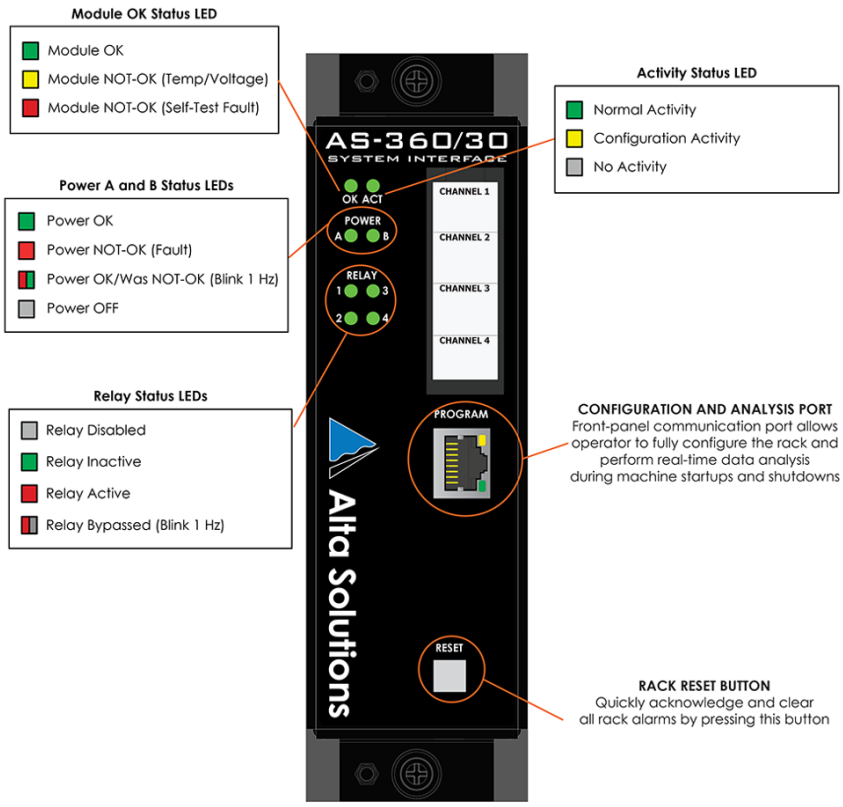
RELAY OUTPUTS

Number of Relays	4
Function	Alarm Fault Output or Rack-Wide System Fault
Connector (electrical)	Removable Terminal Block (2 channels outputs per Terminal Block) • NO: Normally Open Contact, in De-Energized state Relay Open Contacts • COM: Relay Common Pole • NC: Normally Closed Contact, in De-Energized state Relay Closed Contacts
Connector (mechanical)	Removable Terminal Block • Maximum Gauge: 10AWG Stranded • Plug pin Pitch: 7.62mm • Connection Type: Screw Clamp
Relay Type	1 Form C, SPDT
Contact Rating	6A @ 28Vdc or 300Vac
Max Switched Power	180 W or 1800VA
Max Switched Current	6A
Max Switched Voltage	150Vdc or 300VAC
Relay Normal State	Normal-Energize or Normal-De-Energize Through Configuration Software

COMMUNICATION

FUNCTIONS	Serial Connectivity to external intelligent systems Streaming real-time data for analysis
INTERFACE	Three Ethernet ports • COM A • COM B • REAL-TIME Electrical • Ethernet TX/RX • LED indicators for LINK (GREEN SOLID) and ACTIVITY (YELLOW BLINK) Mechanical • RJ45/Shielded • CAT5E or better cable

AS-360/30 – SYSTEM MONITOR MODULE



FRONT PANEL LEDS

LED Indicators	Module OK, Module Activity, Power Status. 3-Color LED (Green / Yellow / Red) for Easy At-A-Glance Status Indication.	
Module OK Status LED	MODULE OK	Internal Voltage < 5% error Internal Temperature > -20C(-4F) AND < 65C(149F)
	MODULE NOT OK	Internal Voltage > 5% ERROR Internal Temperature < -20C(-4F) OR > 65C(149F)
	MODULE NOT OK	Self-Test Fault
Module Activity Status LED	NORMAL ACTIVITY	Module is communicating with software
	CONFIG ACTIVITY	Module is receiving configuration from software
	NO ACTIVITY	Module is not communicating
Power Status LED	POWER OK	Input Voltage > +20Vdc AND < +30Vdc
	POWER NOT OK	Input Voltage < +20Vdc OR > +30Vdc
	POWER OK	Power has recovered from fault condition

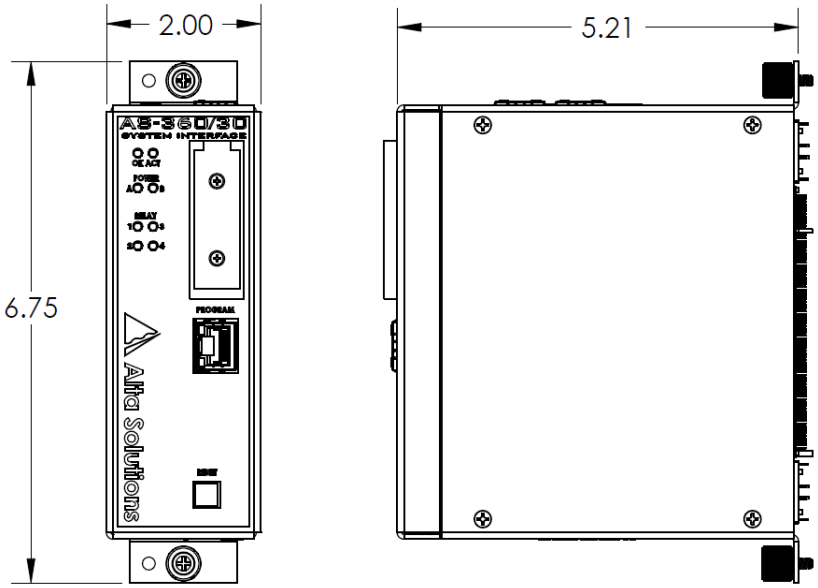
FRONT PANEL

AS-360/30 – SYSTEM MONITOR MODULE

Configuration Lockout	Two position barrel keylock receptacle limits configuration programming access to authorized personnel only	
	LOCK	Configuration access from software disabled
	CONFIG	Configuration access from software enabled via password
Program Port	1GBbit Ethernet port operating Alta Solutions proprietary protocol for: System Programming and Monitoring Streaming real-time data for analysis	
	LINK	Network PHY carrier detected
	ACT	Network communication is valid
	Shielded RJ45 receptacle for use with CAT5E or better cable	
System Reset	Local reset/acknowledge of system alarm condition(s) and relay latching Spring loaded return momentary pushbutton	
	PUSH	50msec de-bounced transition initiates system reset
	RELEASE	No response

EXTENDED CONNECTIVITY

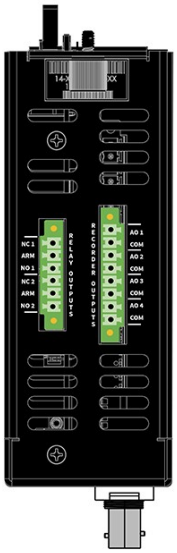
Communication Interface	Three separate serial interfaces with 360/30 operating three Ethernet ports Two ports operating with 100Mbit TCP/IP Ethernet protocol for: Intelligent communications with Control Systems, Historians, or HMIs One port operating with 100Mbit Alta proprietary Ethernet protocol for: Streaming real-time data for analysis	
	LINK	Network PHY carrier detected
	ACT	Network communication is valid
	Shielded RJ45 receptacle for use with CAT5E or better cable	



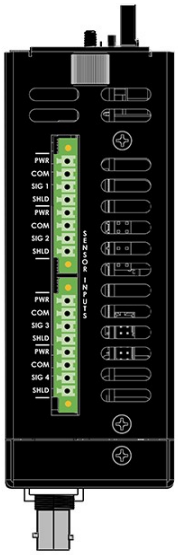
PHYSICAL SPECIFICATIONS

Dimensions	6.75” x 5.21” x 2.00” (H x D x W)
Weight	0.9 lbs (408 grams)
Slot Spacing	1 slot

FRONT VIEW



TOP VIEW



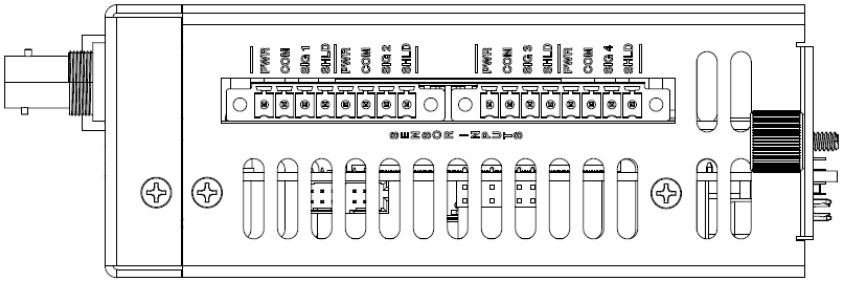
BOTTOM VIEW

The 360/50 Machinery Protection module combines the features found in a traditional protection card with the advanced analysis of portable systems.

By utilizing 21st century processing power, the 360/50 can support a wide range of channel configurations (including many forms of vibration, axial position, differential expansion, speed) typically requiring specialized separate modules. This approach reduces the overall system cost in both material and logistics by limiting the system spares requirement.

The 360/50 implements the following features:

- Real-time protection of four dynamic inputs
- Separate real-time analysis circuitry
- Support for a wide range of sensor types
- Advanced Boolean logic to cross module logic
- 4-20mA outputs to connect to existing control systems or HMIs
- Standard buffered BNC outputs



DYNAMIC INPUTS (ANALOG/SPEED)

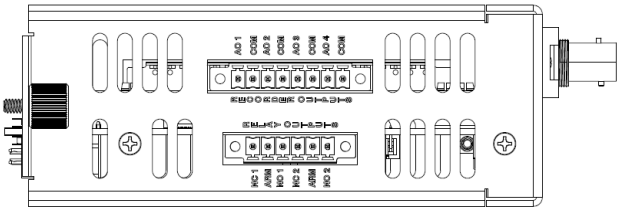
Number of Channels	4	
Connector (electrical)	Removable Terminal Block (2 Channels per Terminal Block) • PWR: Sensor Power, User configurable for + or – 24Vdc @ 14mA max • COM: Common for Dynamic Signal Input and Sensor Power • SIG: Signal Input, User configurable IEPE, 3.3mA +/-.3mA @+24Vdc • SHLD: Field Wiring Shield (referenced to chassis ground)	
Connector (mechanical)	Removable Terminal Block • Maximum Gauge: 16AWG Stranded • Plug pin Pitch: 3.81mm • Connection Type: Screw Clamp	
Performance	**ANALOG**	
	A/D Resolution:	24 bits
	Sampling:	Simultaneous for all Analog Inputs
	Dynamic Range:	110dB (typical)
	Signal-to-Noise Ratio:	110dB (typical)
	Voltage Range:	+/-24V
	Impedance:	>100kΩ
	Frequency Range:	DC to 20kHz
	Amplitude Error:	< 1%
	Phase Accuracy:	+/- 1° between channels
	SPEED/PHASEMARKER	
	Minimum Pulse Width:	1 microsecond
	Speed Range:	1 to 1,000,000 RPM
	RPM Error (24 – 60,000):	<0.01%
	RPM Error (60,000 to 1,000,000):	<0.13%
	Pulses Per Revolution:	0.01 to 10,000
	Trigger Threshold:	-20V to +20V
	Trigger Type:	Notch or Projection
	Hysteresis:	0.2V or 1V

MEASUREMENT SPECIFICATIONS

Measurement Type	Radial Vibration Axial Position Acceleration Velocity Eccentricity Differential Expansion Single Differential Expansion Complementary Differential Expansion Ramp Single Differential Expansion Ramp Dual Speed Reverse Rotation
Measurement Scaling	Maximum, Minimum, Clamp Value

ALARM SETTINGS

Alarm Types	Danger Alert
Alarming Signals	Dynamic Inputs Speed / Phase Inputs
Boolean Logic	Normal-AND, True-AND, OR, NOT, 2oo3
Threshold Types	Upper Lower In-Range Out-Of-Range
Latch Types	Latching and Non-Latching
Alarm Delay Time	0 to 600 Seconds
Trip Multiply Factor	1 to 10

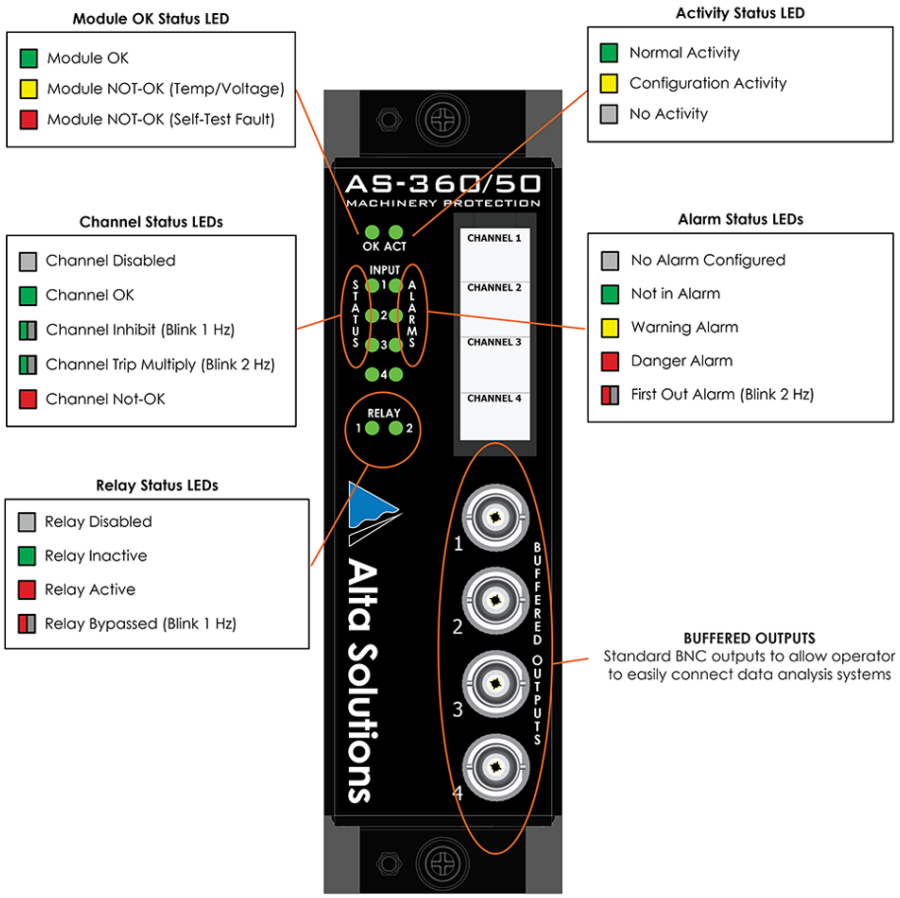


RELAY OUTPUTS

Function	Alarm Fault Output
Connector (electrical)	Removable Terminal Block (2 channels outputs per Terminal Block) • NO: Normally Open Contact, in De-Energized state Relay Open Contacts • COM: Relay Common Pole • NC: Normally Closed Contact, in De-Energized state Relay Closed Contacts
Connector (mechanical)	Removable Terminal Block • Maximum Gauge: 10AWG Stranded • Plug pin Pitch: 7.62mm • Connection Type: Screw Clamp
Relay Type	1 Form C, SPDT
Contact Rating	6A @ 28Vdc or 300Vac
Max Switched Power	180 W or 1800VA
Max Switched Current	6A
Max Switched Voltage	150Vdc or 300VAC
Relay Normal State	Normal-Energize or Normal-De-Energize Through Configuration Software

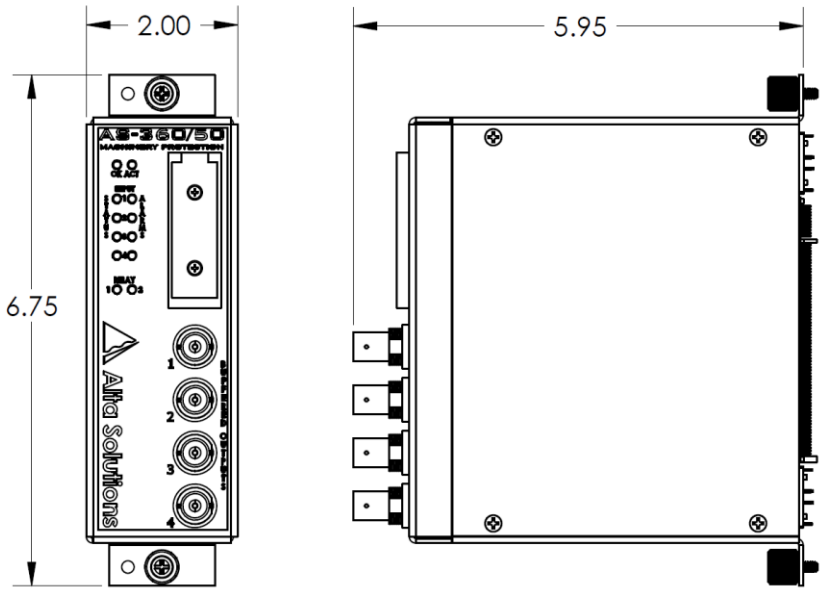
RECORDER (4-20mA) OUTPUTS

Number of Outputs	4
Function	4-20mA Representation of Any On-Card Measurement Value
Performance	Resolution: 10µA Update Rate: Typical 10msec (Process Loading Dependent) Loop Supply Voltage: +24Vdc Supplied Internally Loop Resistance (external max load): 800Ω Maximum 2mA Channel Not Ok Configurable
Connector (electrical)	Removable Terminal Block (4 loop pairs per Block) • AO: 4-20mA (Provides Loop Power) • COM: 4-20mA Loop Return (Non-Isolated shared common)
Connector (mechanical)	Removable Terminal Block • Maximum Gauge: 10 AWG Stranded • Plug pin Pitch: 7.62 mm • Connection Type: Screw Clamp



FRONT PANEL

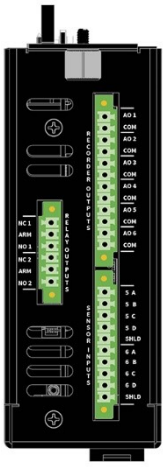
LED Indicators	Module OK, Module Activity, Channel Status, Alarm Status, Relay Status. 3-Color LED (Green / Yellow / Red) for Easy At-A-Glance Status Indication.
Channel Status	Indicates Channel Condition Including Channel OK / Was Not-OK /Not-OK, Trip Multiply, Alarm Inhibit, etc.
Alarm Status	Shows Highest Alarm Currently Active, Indicates Unacknowledged Highest Alarm, Uses Green for Below-Alarm, Yellow for Alert / Alarm 1, Red for Danger / Alarm 2.
Relay Status	Indicates Relay Activity Showing Green When Configured and Inactive, or Red When Active. Unlit when a relay is disabled or unconfigured.



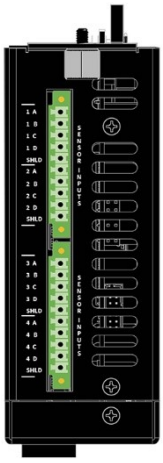
PHYSICAL SPECIFICATIONS

Dimensions	6.75” x 5.95” x 2.00” (H x D x W)
Weight	0.9 lbs (408 grams)
Slot Spacing	1 slot

FRONT VIEW



TOP VIEW



BOTTOM VIEW

The 360/70 module processes six temperature sensor inputs, including Resistance Temperature Detector (RTD), and Thermocouple (TC). Flexibility is inherent in the design with the ability to configure any input channel for any type of supported temperature sensor. By utilizing modern digitizing circuitry, the 360/70 offers laboratory level accuracy in an industrial package.

The 360/70 implements the following features:

- 2-wire, 3-wire, and 4-wire RTD support
- Type J, K, E, and T Thermocouple
- +/-1°C accuracy
- Automatic Burn Out, Short-circuit and fault detection
- Front-panel multi-colored LEDs indicating sensor status or faults

AS-360/70 TEMPERATURE MONITOR MODULE

CHANNEL SPECIFICATIONS

Number of Channels	6
Sensor Types	Thermocouple, RTD
Connector Type	Terminal Strip
Terminal Specifications	Three removable 10-Pin terminal plugs, two channels per terminal plug Screw-Clamp, 16AWG max, 3.81mm Pitch Plug pinout • Plug #1 - 1A, 1B, 1C, 1D, SHLD, 2A, 2B, 2C, 2D, SHLD • Plug #2 - 3A, 3B, 3C, 3D, SHLD, 4A, 4B, 4C, 4D, SHLD • Plug #3 - 5A, 5B, 5C, 5D, SHLD, 6A, 6B, 6C, 6D, SHLD
Units	°C or °F
Accuracy	+/- 1°C

INPUT SENSOR SPECIFICATIONS

RTD	
Types	PT10 (Platinum 10 Ohm) PT50 (Platinum 50 Ohm) PT100 (Platinum 100 Ohm) PT200 (Platinum 200 Ohm) PT500 (Platinum 500 Ohm)
Wiring	2, 3, and 4 wire
Alpha Coefficient	0.003911 (American) 0.003850 (European) 0.003916 (Japanese) 0.003926 (ITS-90)
THERMOCOUPLE	
Types	J, K, E, T, B

MEASUREMENT SPECIFICATIONS

Measurement Type	Direct Composite (Group Average) Differential (Direct – Group Average)
Measurement Scaling	Maximum, Minimum, Clamp Value

ALARM SETTINGS

Alarm Types	Danger, Alert
Boolean Logic	AND, OR, NOT
Threshold Types	Upper, Lower, In-Range, Out-Of-Range
Latch Types	Latching and Non-Latching
Alarm Delay Time	0 to 600 Seconds

RECORDER (4-20mA) OUTPUTS

Connector Type	One removable 12-Pin terminal plug, six channels per terminal plug Screw-Clamp, 16AWG max, 3.81mm Pitch Plug pinout: • AO1, COM, AO2, COM, AO3, COM, AO4, COM, AO5, COM, AO6, COM • AOX = 4-20mA Loop Source • COM = 4-20mA Loop Return 2 mA Channel Not Ok Configurable
Output Value	Any On-Card Measurement Value
Type	Non-Isolated Output, All Outputs Share Common
Resolution	10 uA
Update Rate	Typical 10 msec (Process Loading Dependent)
Loop Supply Voltage	+24 Vdc Supplied Internally
Loop Resistance	800 Ohm Maximum (external load)

FRONT PANEL

LED Indicators	Module OK, Module Activity, Channel Status, Alarm Status. 3-Color LED (Green / Yellow / Red) For Easy At-A-Glance Status Indication.
Channel Status	Indicates Channel Condition Including Channel OK / Was Not-OK /Not-OK, Trip Multiply, Alarm Inhibit, etc.
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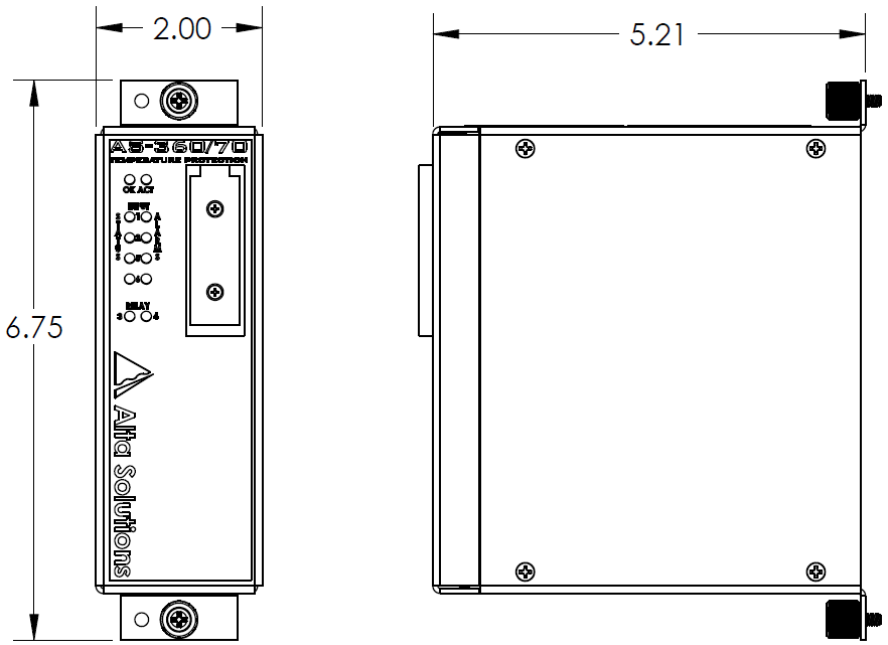

PHYSICAL SPECIFICATIONS

Dimensions	6.75” x 5.21” x 2.00” (H x D x W)
Weight	0.9 lbs (408 grams)
Slot Spacing	1 slot

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