TO: Moore Industries Representatives
FROM: Tom Watson
Manager, Corporate Marketing

New Product Release

– 2016 – 2016 – 2016 – 2016 – 2016 – 2016 – 2016 – 2016 –

Announcing the
SPA²IS Programmable Limit Alarm Trips with Intrinsically-Safe Field Connections

Our Alarm Trip family just keeps getting better: **Introducing the SPA²IS!** A multifunctional alarm trip with many of the same features as the SPA² with one big difference: ***Intrinsically-Safe Field Connections!*** Now, customers can connect sensors or transmitters located in Class I Div 1/Zone 0/1 hazardous areas ***directly*** to the SPA²IS. Read this release kit for all the details.

What's included in this kit:

New materials with the details about the new SPA²IS Programmable Limit Alarm Trips with Intrinsically-safe Field Connections for Current/Voltage, RTDs and Thermocouples:

- **SPA²IS Data Sheet**
- **Press Release**
- **Product Photo**
- **AIS White Paper**
- **Talking Points**
- **FAQ**
- **Price List**

Visit the new Product Page in the Download Center
www.miinet.com/spa2is
Visit the Rep Portal for the release materials
http://reps.miinet.com

- Literature Order Form -

TO: Rep Rapid Response Department FAX: (818) 891-2816
(or E-mail us at: info@miinet.com)

Name: _____

Company: _____ Office: _____

SPA²IS Data Sheets: 25 50 75 Other _____ **AIS White Paper:** 25 50 Other _____

MOORE INDUSTRIES WORLDWIDE

SPA²IS

Programmable Limit Alarm Trips with Intrinsically-Safe Field Connections

January 2016

Description

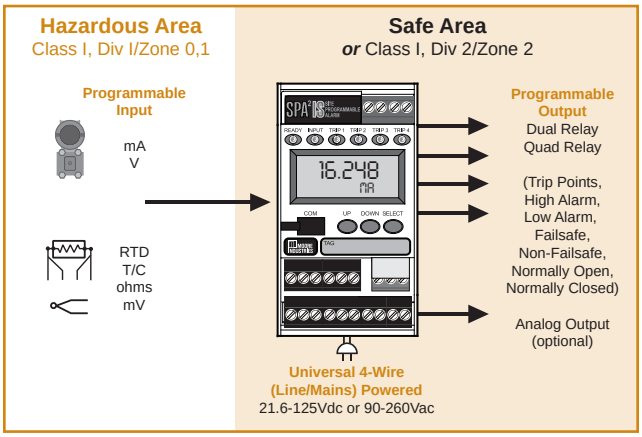
The universal SPA²IS Programmable Limit Alarm Trips provide on/off control, warn of unwanted process conditions, alarm on rate-of-change and provide emergency shutdown. Very versatile, they accept signal inputs from transmitters and temperature sensors that are located in hazardous areas where the method of protection implemented by the plant or facility is Intrinsic Safety (Figure 1). Normally such installations would require the additional use of an intrinsically-safe barrier. The SPA²IS, however, includes intrinsically-safe field connections which provide the necessary protection typically afforded by a galvanically isolated intrinsically-safe barrier. The SPA²IS accepts a wide array of inputs:

- **Current and Voltage Signals**
- **23 RTD Types**
- **9 Thermocouple Types**
- **Resistance and Potentiometer Devices**
- **Direct Millivolt Sources**

Dual and Quad Alarm Trip Outputs

The 4-wire (line/mains-powered) SPA²IS provides two or four independent and individually-configurable alarm relay outputs when a monitored process variable falls outside of user-set high and/or low limits. This is typically used to activate a warning light, annunciator, bell, pump, motor or shutdown system.

Figure 1. *Available SPA²IS models deliver versatile and programmable input and output choices.*



Certifications

FM APPROVED · CE · Ex · IECEx

The SPA²IS *features a metal, RFI resistant housing with display that snaps onto standard DIN-style rails.*

Features

- **Intrinsically-Safe Field Connections.** Apply inputs from temperature sensors or transmitters located in hazardous areas without the need of a costly intrinsically-safe barrier. Plus power an intrinsically-safe loop using the 2-wire transmitter excitation in the current/voltage input model.
- **Universal plant standard.** With programmable input/output parameters, and "Universal" DC or AC power input, there's no need to stock dozens of different alarm trips.
- **20-bit input resolution.** Delivers industry-best digital accuracy for both sensor (RTD and thermocouple) and analog (current/voltage) inputs.
- **Site- and PC-Programmable.** Featuring security password protection, the SPA²IS offers the choice of using front panel pushbuttons or our FREE Windows®-based Intelligent PC Configuration Software for fast and simple set up.
- **Large 5-digit process and status readout.** A display shows menu prompts during pushbutton configuration and, when the SPA²IS is in operation, shows the process variable, the output or toggles between the two in selectable engineering units.
- **Combined alarm trip and transmitter.** The analog output (-AO) option reduces costs and installation time when both alarm and transmitter functions are needed at the same location.
- **Long-term stability.** Provides up to 5 years between scheduled calibrations.
- **Isolated and RFI/EMI protection.** Delivers superior protection against the effects of ground loops and plant noise.

225-710-08A

SPA²IS

Programmable Limit Alarm Trips with
Intrinsically-Safe Field Connections

SPA²IS Associated Apparatus

An IS system installation requires a barrier or associated apparatus interface between the field device and the control room equipment (Figure 2). Its function is to limit the energy to the hazardous area such that, even under a fault condition, there cannot be enough electrical or thermal energy released by the device to ignite an explosive atmosphere.

Zener Diode barriers are simple passive devices comprised of zener diodes, resistors and fuses that serve to limit the voltage, current, and power available to the hazardous area device. A common downside of using this approach is that the required earth ground has low noise rejection capability. This electrical interference can introduce stray and unwanted electrical noise components into the measurement circuit creating potentially significant measurement errors.

Isolated barriers are active devices that incorporate galvanic isolation thus eliminating the requirement for an earth ground. These barriers require auxiliary operating power and cost more than passive zener barriers.

The disadvantage of these separate IS barriers is the installation and maintenance costs. Many of these costs can be drastically reduced if an associated apparatus like the SPA²IS is used. Since the associated apparatus includes the barrier in the receiving device there is no need for the additional cost of the barrier, cabinet space, a high integrity clean ground connection, separate power supply or custom vendor backplane.

Associated apparatus incorporate a barrier into the safe area (Class I Div 2/Zone 2 or Unclassified) mounted receiving device or the control room equipment. The Moore Industries SPA²IS is an example of such a device that provides an isolating barrier within the alarm trip (Figure 3 and 4). This dramatically reduces the cost of purchase, installation and maintenance versus more traditional approaches that require a separate zener or isolating barrier.

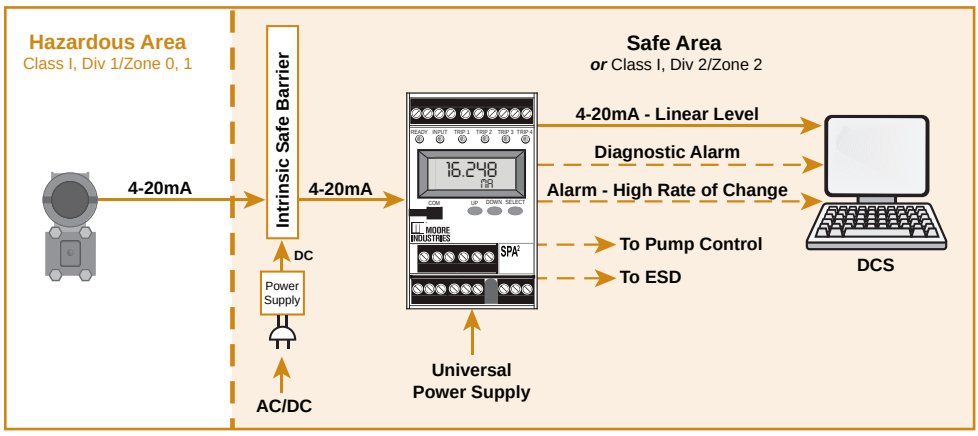


Figure 2. *An intrinsically-safe system utilizing isolated barriers.*

Because the SPA²IS offers the dual role of transmitter/isolated barrier combination in one package this provides significant cost savings by reducing the number of components, power supply requirements, cabinet space, wiring terminations, installation labor and stocking requirements. Furthermore, these savings are ongoing with reduced spares inventory, maintenance-related downtime and consequent process restart issues.

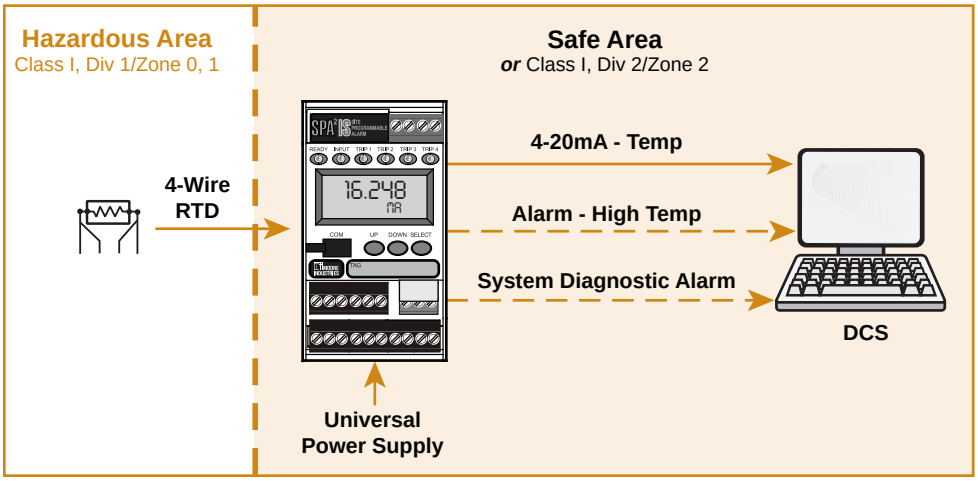


Figure 3. *A Moore Industries SPA²IS associated apparatus incorporating IS barrier, temperature transmitter, temperature alarm and diagnostic alarming functions in a single device.*

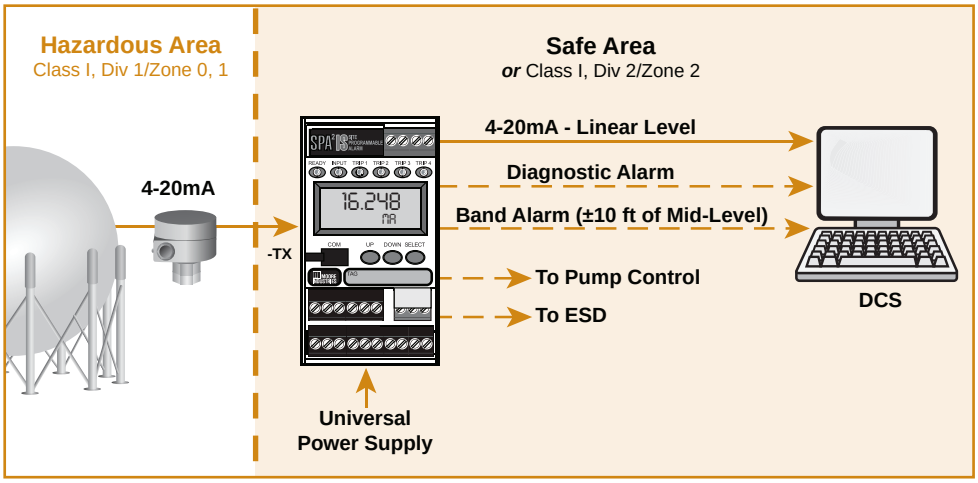


Figure 4. *A Moore Industries SPA²IS Associated Apparatus incorporating an IS barrier, spherical tank linearization measurement function, local pump control, Hi-Hi ESD, local indication, self-diagnostics, and quad relay outputs for control and alarming.*

See the white paper: **"*Associated Apparatus: The Safe and Most Affordable IS Solution*"** for a more detailed overview of Associated IS Apparatus.

SPA²IS

Programmable Limit Alarm Trips with
Intrinsically-Safe Field Connections

Site- and PC-Programmable

Operating parameters configure quickly and easily using front panel pushbuttons or our Intelligent PC Configuration Software. Programmable functions include:

- Security password protection on/off and password
- Input type and measurement range (zero and full scale values)
- Input and output trimming
- Multiple alarm options including high or low trip, out of band, rate of change, stuck input and fault alarm
- Failsafe or non-failsafe, and normally open or normally closed alarm relays
- Alarm deadband (0-100%) and alarm time delay
- T/C reference junction compensation (on/off)
- Display parameters (scale, engineering units, and set number of digits after the decimal point)
- Differential or averaging of RTD inputs
- Standard and custom linearization curves (up to 128 points)*
- Analog output range**
- On input failure, upscale or downscale drive, fail to last value or fail to selected value**
- Analog signal output damping (0-30 seconds)**

*Programmable via the PC Configuration Software only.

**Models with Analog Output (-AO) option.

Powers a 2-Wire Transmitter

The SPA²IS (HLPRG: current/voltage input model) comes standard with 2-wire transmitter excitation that provides 24Vdc to power the loop. This saves the cost of specifying and installing an additional instrument power supply to power a 2-wire transmitter on the input loop.

Figure 5. *The SPA²IS provides transmitter excitation to power a 2-wire transmitter.*

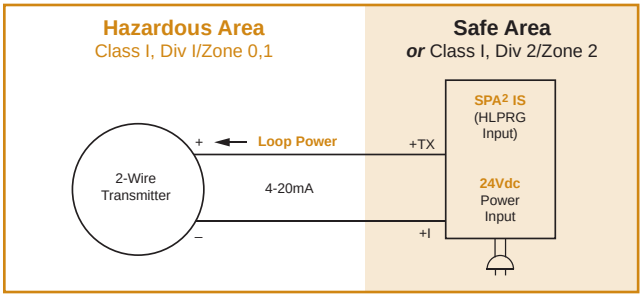
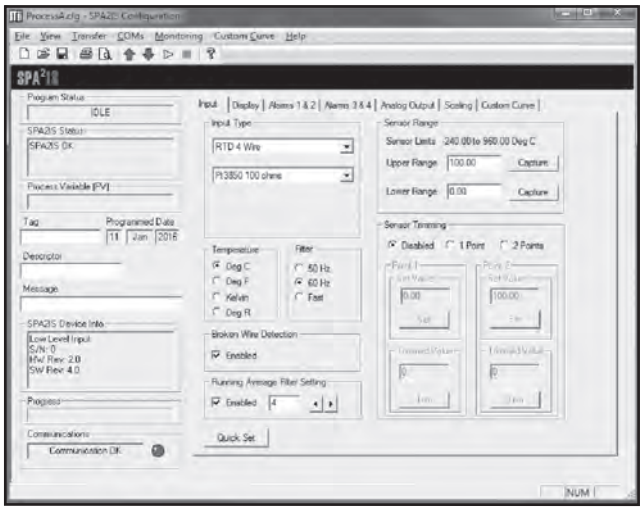


Figure 6. *In addition to pushbutton configuration, the SPA²IS programs quickly from a single software window.*



Versatile Alarm Options

Each individually-configurable SPA²IS alarm trip relay programs via the PC software as a:

Band Alarm—Combines the High and the Low Trip Alarms into one. It can be used to warn of a process that has left its normal operating conditions.

Stuck Alarm—Monitors the input with respect to time and trips when that input hasn't changed by a user-selected rate (Delta) over a user selected time period (Delta Time).

High or Low Limit Process Alarm—Monitor a temperature, pressure, level, flow, position or status variable, and use to warn of unwanted process conditions (Figure 4), provide emergency shutdown or provide on/off control (Figure 5).

Rate-of-Change Alarm—Monitor an input for a change in value with respect to time (Figure 6). The alarm trips when the input rate-of-change exceeds a user-selected rate (Delta) over a user selected time period (Delta Time).

Input Fault Alarm—Setting one of the alarm's relays to trip on input or self-diagnostic failure (without affecting the other relay being used to monitor the process) is typically implemented to warn of a failure, such as a broken sensor, without tripping more critical process alarms or shutting down the process.

Out of Range Alarm—Monitor your process variable (PV). If the value strays past user-set limits, the SPA²IS will go into an alarm state indicating that the PV has gone out of the allowed range.

Self-Diagnostic Alarm—The SPA²IS checks its own operation and configuration upon start up, and then continuously monitors its status during operation. One of the SPA²IS relays can be configured to trip if it senses that it is not operating properly.

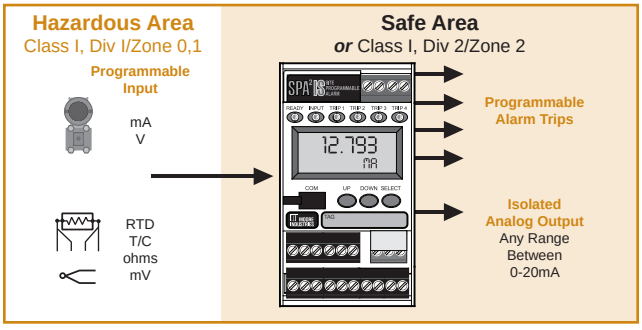
Quick Ranging Calibration

Using the front panel pushbuttons or the PC Configuration Software (instead of potentiometers which can drift), precise zero and span settings can be made in seconds. Just select the zero and span values, and the push of a button locks the values into the alarm trip's memory.

Combination Alarm and Isolated Transmitter

When ordered with the Analog Output (-AO) option, the SPA²IS provides a proportional and isolated analog retransmission of the input signal that can be sent to remote monitoring/control devices like a DCS, PLC, PC, indicator or data recorder (Figure 7). All analog parameters can be selected using the SPA²IS push buttons or the Intelligent PC Configuration Software. Upon input failure, the analog output can be user-set for upscale or downscale drive or fail to last value.

Figure 10. *When ordered with the Analog Output (-AO) option, the SPA²IS is a combination alarm trip and signal transmitter.*



Continuous Self-Diagnostics

Incorporating advanced self-diagnostics, the SPA²IS checks its own operation and configuration upon start up and then continuously monitors its status during operation. If it senses that it is not operating properly, it displays an error message on its display indicating what condition has occurred. In addition, one or more of the alarm trip outputs can be set as a fault alarm which will trip when an unwanted diagnostic condition occurs.

Figure 7. *High and/or low limit alarms, with a selectable deadband to reduce false alarms, can be used to warn of unwanted process conditions or to provide emergency shutdown.*

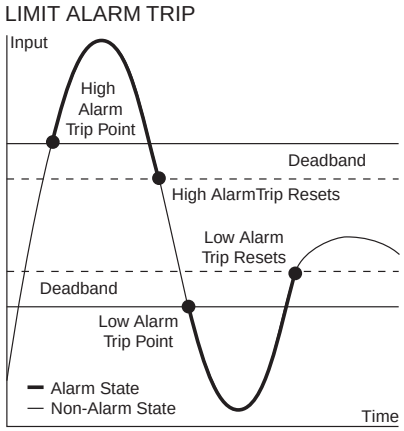


Figure 8. *The SPA²IS can be used as a simple on/off controller such as those required in level applications (pump/valve control) when filling or emptying a container or tank.*

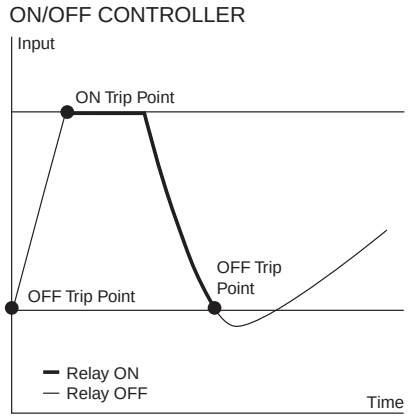
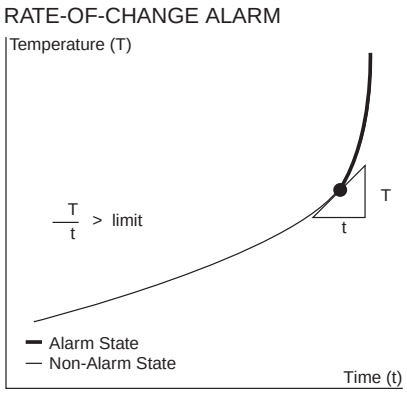


Figure 9. *The SPA²IS can be set to trip when the input rate-of-change exceeds a user-selected rate (Delta) over a user-selected time period (Delta Time).*



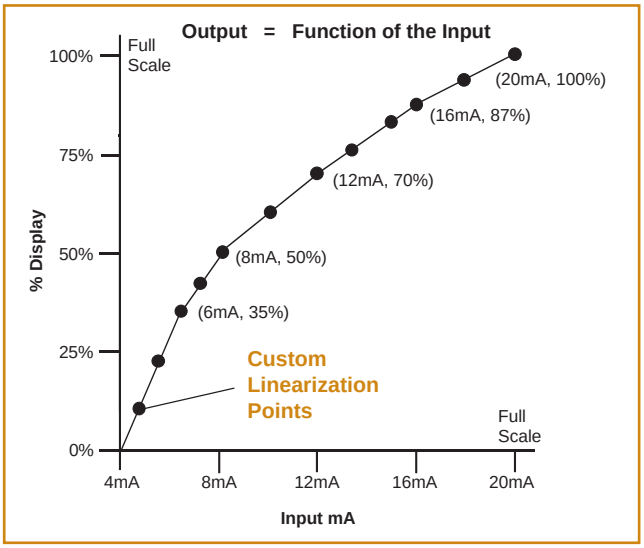
SPA²IS

Programmable Limit Alarm Trips with
Intrinsically-Safe Field Connections

Custom 128-Point Linearization Curves

The ability to plot a custom linearization curve is beneficial when non-linear input signals must be converted to linear output representations (Figure 11). Typical applications include monitoring a non-linear transducer, the level of odd-shaped tanks and flow meter linearization.

Figure 11. *Using the Intelligent PC Configuration Software, up to 128 custom linearization points can be selected and saved in the SPA²IS's memory to compensate for non-linear input signals.*



Total Sensor Diagnostics for RTD Inputs

Our SPA²IS Programmable Limit Alarm Trip (TPRG input model) performs continuous sensor diagnostics (Figure 13). This industry-first and patented Moore Industries feature saves you time and money by letting you know when a problem occurs, and its type and location. If the RTD input breaks, the user can decide whether or not to trip one or more alarms to indicate trouble. A plain-English error message on the display, as well as on the PC Configuration Software, indicates exactly which RTD wire has broken. Specific error messages eliminate the work of removing the sensor or checking all lead wires to diagnose a problem. If equipped with the Analog Output (-AO) option, the user has the option of driving the analog output either upscale or downscale on sensor failure.

Trim to Specific Curve Segments

The SPA²IS can be trimmed with two data points within the selected zero and span measurement range (Figure 12). This allows a complete process range to be monitored while placing measurement emphasis on a critical segment of the range. This provides incredible precision over a limited portion of the span while measuring the remainder of the span with outstanding accuracy.

Figure 12. *The SPA²IS can be set to measure the segment most critical to the process.*

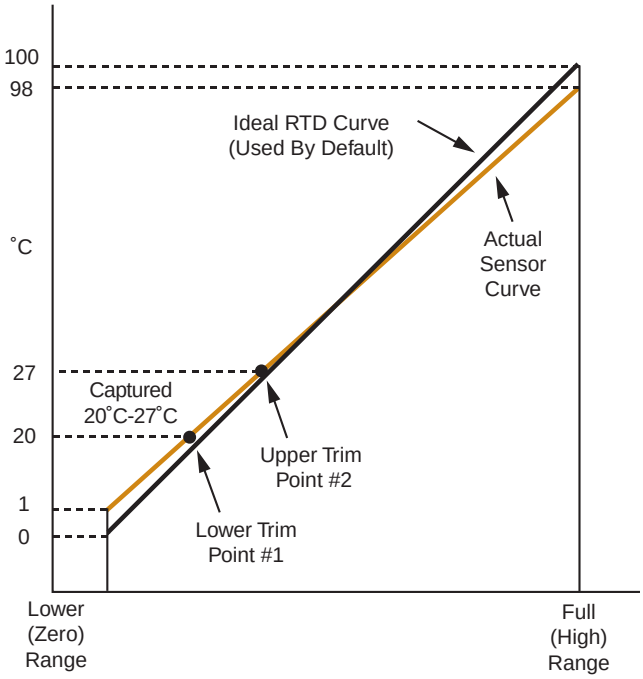
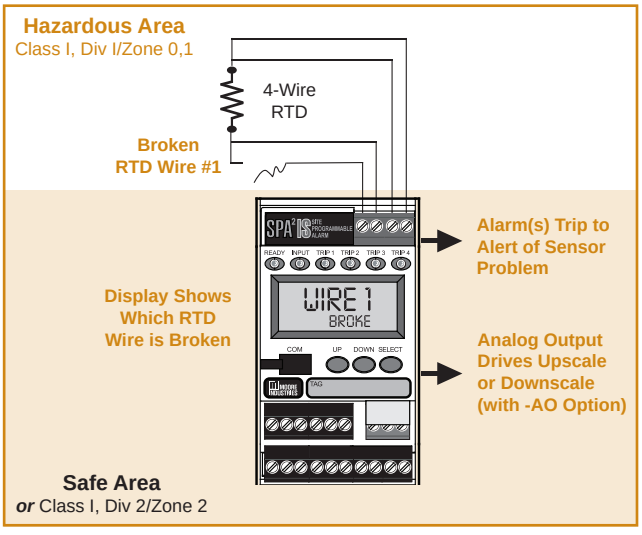


Figure 13. *Patented "Total Sensor Diagnostics" saves troubleshooting time by identifying which sensor wire has broken.*



Specifications (HLPRG: mA and V Input Model)

Performance

Input Range: Current Input 0-50mA (1mA minimum span); Voltage Input 0-11V (250mV minimum)
Input Accuracy and Alarm Trip Repeatability: Current inputs, ±2 microamps (0.01% of 20mA span); Voltage inputs, ±1mV (0.01% of max. span)
Stability: Refer to Table 1
Dead Band: 11.5V or 50mA, maximum in Linear Mode; equivalent of maximum input range in user-set engineering units in Scaling/Custom Mode
Response Time: 256msec typical (Defined as the time from step change on input to alarm state change when alarm is set to trip mid-point)
Alarm Trip Delay: Programmable from 0-120 seconds
Power Supply Effect: ±0.002% of span for a 1% change in line voltage (AC or DC)
Isolation: 500Vrms between case, input, output (units with -AO option) and power, continuous.
Dielectric Strength: Will withstand 1560Vrms for 2 seconds between Input, Output and Power; 500Vrms for 2 seconds between Case to I/O or Mains
Power Supply: Universal 21.6-125Vdc or 90-260Vac;
Power Consumption: 3.5W typical, 5.5W maximum
Input Impedance: Current inputs, 20 ohms; Voltage inputs, 1 Mohm
Input Over-Range Protection: Voltage inputs, ±30Vdc; Current inputs, ±100mA

Performance (continued)

TX Power Supply: Open Circuit Voltage/Short-Circuit Current: 25.2V/42.5mA, Available Voltage: 17V at 23.6mA ±10%@24mA (regulated)
Relay Outputs: Single-pole/double-throw (SPDT), 1 form C, rated 5A@250Vac, 50/60Hz or 24Vdc, non-inductive

Performance with Analog Output (-AO Option)

WITH ANALOG OUTPUT
Output Accuracy: ±0.01% of maximum span (±2 microamps)
Response Time: 256msec maximum (128msec typical) for the output to change from 10% to 90% of its scale for an input step change of 0 to 100%
Ripple (up to 120Hz): Current output, 10mVp-p when measured across a 250 ohm resistor
Output Limiting:

Output	Failure Limits
0-20mA	0, 23.6mA
4-20mA	3.6, 23.6mA
X-20mA	(90% of X), 23.6mA
0<X<4	

Load Capability: Source mode (internal power supply), 0-1000 ohms
Load Effect (current outputs): ±0.01% of span from 0 to 1000 ohms

Ambient Conditions

Operating Range: -40°C to +85°C (-40°F to +185°F)
Storage Range: -40°C to +85°C (-40°F to +185°F)

Ambient Conditions (continued)

Ambient Temperature Effect: 2 microamps/°C ±0.009% of max. span/ °C
Relative Humidity: 5-95%, non-condensing
RFI/EMI Protection: 80% AM at 1Khz 20V/m @ 20-1000Mhz per IEC61000-4-3.
Noise Rejection: Common Mode, 100dB@50/60Hz Normal Mode, Current Input, 70dB typical@50mAp-p@ 50/60Hz; Voltage Input, 70dB typical@1Vp-p@ 50/60Hz

Adjustments

Front panel pushbuttons parameter configurations; Internal jumper and menu password protect parameter settings

Indicators

LCD: 2x5 14-segment characters, backlit, alphanumeric readout accurate to the nearest digit.
Range: -99999 to 99999; Decimal point can be user-set
LED Type: INPUT LED: Dual color LED indicates input failure
READY LED: Green LED indicates unit is operating properly
ALARM 1, 2, 3 and 4 LED: Dual color LED per relay indicates alarm status
Display Accuracy: ±1 digit; when scaling the display (or in Custom Mode), high input-to-display span ratios decrease display accuracy

Weight

544 g to 601 g (19.2 oz to 21.2 oz)

Table 1. *Long-Term Stability*

Stability (% of Maximum Span)	Input-to-Output (Years)			Input-to-Relay (Years)		
	1	3	5	1	3	5
Current Inputs	0.081	0.14	0.18	0.047	0.081	0.105
Voltage Inputs	0.093	0.16	0.21	0.066	0.114	0.147

SPA²IS

Programmable Limit Alarm Trips with
Intrinsically-Safe Field Connections

Specifications (TPRG: RTD, T/C, Ohm, mV and Potentiometer Input Model)

Performance

Input Accuracy and Alarm Trip Repeatability: Refer to Table 2
Reference Junction Compensation Accuracy (T/C inputs only): ±0.45°C
Stability: Refer to Table 3
Dead Band: User set within selected input range; fully scalable and set in user-selected engineering units
Input to Output Response Time: 256msec typical (Defined as the time from step change on input to alarm state change when alarm is set to trip mid-point)
Alarm Trip Delay: Programmable from 0-120 seconds
Power Supply Effect: ±0.002% of span for a 1% change in line voltage (AC or DC)
Isolation: 500Vrms between case, input, output (units with -AO option) and power, continuous.
Dielectric Strength: Will withstand 1560Vrms for 2 seconds between Input, Output and Power; 500Vrms for 2 seconds between Case to I/O or Mains
Power Supply: Universal 21.6-125Vdc or 90-260Vac
Power Consumption: 3W typical, 5W maximum
Input Over-Range Protection: ±5Vdc
Input Impedance: T/C inputs, 40 Mohms, nominal

Performance (continued)

Excitation Current: (RTD and Ohms) 250 microamps, ±10%
Relay Outputs: Single-pole/double-throw (SPDT), 1 form C, rated 5A@250Vac, 50/60Hz or 24Vdc, non-inductive

Performance with Analog Output (-AO Option)

WITH ANALOG OUTPUT

Output Accuracy: ±0.01% of maximum span (±2 microamps);
Response Time: 256msec maximum (128msec typical) for the output to change from 10% to 90% of its scale for an input step change of 0 to 100%
Ripple (up to 120Hz): Current output, 10mVp-p when measured across a 250ohm resistor
Output Limiting:

Output	Failure Limits
0-20mA	0, 23.6mA
4-20mA	3.6, 23.6mA
X-20mA 0<X<4	(90% of X), 23.6mA

Load Capability: Source mode (internal power supply), 0-1000 ohms
Load Effect (current outputs): ±0.01% of span from 0 to 1000 ohms resistance

Ambient Conditions

Operating Range: -40°C to +85°C (-40°F to +185°F)
Storage Range: -40°C to +85°C (-40°F to +185°F)

Ambient Conditions (continued)

Ambient Temperature Effect: Refer to Table 4
Effect of Ambient Temperature on Reference Junction Compensation (T/C inputs only): ±0.005% per °C change of ambient temperature
Relative Humidity: 5-95%, non-condensing
RFI/EMI Protection: 80% AM at 1Khz 20V/m @ 20-1000Mhz per IEC61000-4-3
Noise Rejection: Common Mode, 100dB@50/60Hz Normal Mode, refer to Table 5

Adjustments

Front panel pushbuttons parameter configurations; Internal jumper and menu password protect parameter settings

Indicators

LCD: 2x5 14-segment characters, backlit, alphanumeric readout accurate to the nearest digit.
Range: -99999 to 99999; Decimal point can be user-set
LED Type: INPUT LED: Dual color LED indicates input failure
READY LED: Green LED indicates unit is operating properly
ALARM 1, 2, 3 and 4 LED: Dual color LED per relay indicates alarm status
Display Accuracy: ±1 digit; when scaling the display (or in custom mode), high input-to-display span ratios decrease display accuracy

Weight

544 g to 601 g (19.2 oz to 21.2 oz)

Table 3. *Long-Term Stability*

Stability (% of Maximum Span)	Input-to-Output (Years)			Input-to-Relay (Years)		
	1	3	5	1	3	5
RTD, Ohm & Pot Inputs	0.09	0.16	0.21	0.047	0.081	0.104
T/C & mV Inputs	0.08	0.14	0.18	0.008	0.014	0.019

Table 2. *Accuracy with RTD, Thermocouple, Ohms, and Millivolt Inputs (Models with TPRG Input)*

Input	Type	α	Ohms	Conformance Range	Minimum Span	Input Accuracy/ Repeatability	Maximum Range
RTD (2-, 3-, 4-Wire) **Dual** (2-Wire, One 2-Wire and One 3-Wire)	**Platinum**	0.003850	100	-200 to 850°C (-328 to 1562°F)	10°C (18°F)	±0.1°C (±0.18°F)	-240 to 960°C (-400 to 1760°F)
			200				
			300				
			400				
			500				
			1000				
			Dual 500				
			Dual 1000				
		0.003902	100	-100 to 650°C (-148 to 1202°F)			-150 to 720°C (-238 to 1328°F)
			200				
			400				
			500				
			1000				
			Dual 500				
			Dual 1000				
		0.003916	100	-200 to 510°C (-328 to 950°F)			-240 to 580°C (-400 to 1076°F)
	Nickel	0.00672	120	-80 to 320°C (-112 to 608°F)			-100 to 360°C (-148 to 680°F)
	Copper	0.00427	9.035	-50 to 250°C (-58 to 482°F)		±0.85°C (±1.53°F)	-65 to 280°C (-85 to 536°F)
Ohms	**Direct Resistance**	n/a	0-4000	0-4000 ohms	10 ohms	±0.4 ohms	0-4095 ohms
			Dual 0-4000 ohms				
	Potentiometer		4000 maximum	0-100%	10%	±0.1%	0-100%
T/C	**J**	n/a	n/a	-180 to 760°C (-292 to 1400°F)	35°C (63°F)	±0.25°C (±0.45°F)	-210 to 770°C (-346 to 1418°F)
	K	n/a	n/a	-150 to 1370°C (-238 to 2498°F)	40°C (72°F)	±0.3°C (±0.54°F)	-270 to 1390°C (-454 to 2534°F)
	E	n/a	n/a	-170 to 1000°C (-274 to 1832°F)	35°C (63°F)	±0.2°C (±0.36°F)	-270 to 1013°C (-454 to 1855.4°F)
	T	n/a	n/a	-170 to 400°C (-274 to 752°F)	35°C (63°F)	±0.25°C (±0.45°F)	-270 to 407°C (-454 to 764.6°F)
	R	n/a	n/a	0 to 1760°C (32 to 3200°F)	50°C (90°F)	±0.55°C (±0.99°F)	-50 to 1786°C (-58 to 3246.8°F)
	S	n/a	n/a	0 to 1760°C (32 to 3200°F)	50°C (90°F)	±0.55°C (±0.99°F)	-50 to 1786°C (-58 to 3246.8°F)
	B	n/a	n/a	400 to 1820°C (752 to 3308°F)	75°C (135°F)	±0.75°C (±1.35°F)	200 to 1836°C (392 to 3336.8°F)
	N	n/a	n/a	-130 to 1300°C (-202 to 2372°F)	45°C (81°F)	±0.4°C (±0.72°F)	-270 to 1316°C (-454 to 2400.8°F)
	C	n/a	n/a	0 to 2300°C (32 to 4172°F)	100°C (180°F)	±0.8°C (±1.44°F)	0 to 2338°C (32 to 4240.4°F)
mV	**DC**	n/a	n/a	n/a	4mV	±30 microvolts	-50 to 1000mV

SPA²IS

Programmable Limit Alarm Trips with
Intrinsically-Safe Field Connections

Ordering Information

Unit	Input	Output	Power	Options	Housing
SPA²IS Programmable Limit Alarm Trip with Associated IS Inputs for Current/Voltage, RTDs and Thermocouples	**HLPRG** Programs to accept: Current: Any range between 0-50mA including: 0-20mA 4-20mA 10-50mA Voltage: Any range between 0-10Vdc including: 0-5Vdc 1-5Vdc 0-10Vdc **TPRG** Programs to accept (see Table 2 for details): RTD: 2-, 3- and 4-wire; platinum, copper, and nickel Thermocouple: J, K, E, T, R, S, B, N, C Ohms: 0-4000ohms (Potentiometer, 4000ohms maximum) Millivolts: –50 to +1000mV	**2PRG** Dual Relays (Relays are single-pole/double-throw (SPDT, 1 form C, rated 5A@250Vac, 50/60Hz or 24Vdc, non-inductive) **4PRG** Quad Relays (Relays are single-pole/double-throw (SPDT), 1 form C, rated 5A@250Vac, 50/60Hz or 24Vdc, non-inductive) Each relay individually configures for: High or Low Trip Normally Open or Normally Closed Failsafe or Non-Failsafe	**U** Universal accepts any power input range of 21.6-125Vdc or 90-260Vac	**-AO** Analog output (isolated and linearized) scalable for any range between 0-20mA into 1000 ohms (see "Specifications" for additional information) **-FMEDA** Unit comes with Failure Modes, Effects and Diagnostic Analysis (FMEDA) data for evaluating the instrument for suitability of use in a safety-related application	**DIN** DIN-style housing mounts on 35mm (EN50022) Top Hat DIN-rails **FLB** Flange mount bracket for wall mounting

When ordering, specify: Unit / Input / Output / Power / Options [Housing]
Model number example: SPA2IS / TPRG / 2PRG / U / - AO [DIN]

Table 4. *Ambient Temperature Effect*

	Accuracy per 1°C (1.8°F) Change in Ambient
RTD*	0.0035°C
Millivolt	0.5 microvolts + 0.005% of reading
Ohm	0.002 ohms +0.005% of reading
Thermocouple	
	Accuracy per 1°C (1.8°F) Change in Ambient
J	0.00016°C + 0.005% of reading
K	0.0002°C + 0.005% of reading
E	0.00026°C + 0.005% of reading
T	0.0001°C + 0.005% of reading
R, S	0.00075°C + 0.005% of reading
B	0.0038°C + 0.005% of reading
N	0.003°C + 0.005% of reading
C	0.00043°C + 0.005% of reading
mV	0.5 microvolts + 0.005% of reading

*Accuracy of Ni672 is 0.002°C

Table 5. *Normal Mode Rejection Ratio*

Sensor Type		Max. p-p Voltage Injection for 100dB at 50/60Hz
T/C: J, K, N, C, E		150mV
T/C: T, R, S, B		80mV
Pt RTD: 100, 200, 300 ohms		250mV
Pt RTD: 400, 500, 1000 ohms		1V
Ni: 120 ohms		500mV
Cu: 9.03 ohms		100mV
Resistance	**mV**	
1-4 kohms	250-1000	1V
0.25-1 kohms	62.5-250	250mV
0.125-0.25 kohms	31.25-62.5	100mV

Figure 14. *Installation Dimensions*

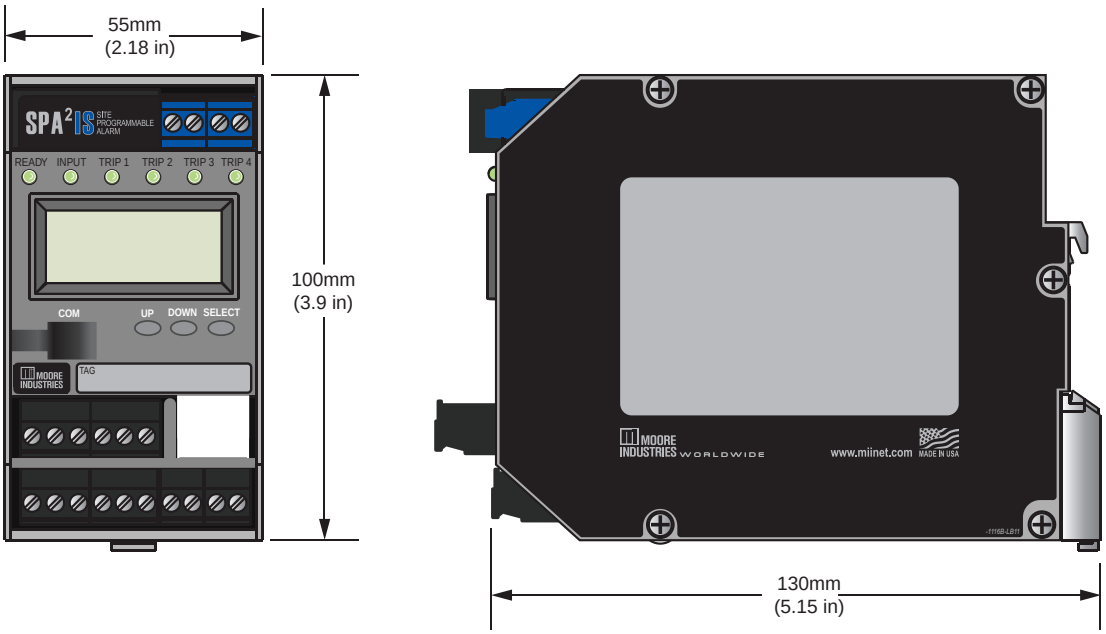
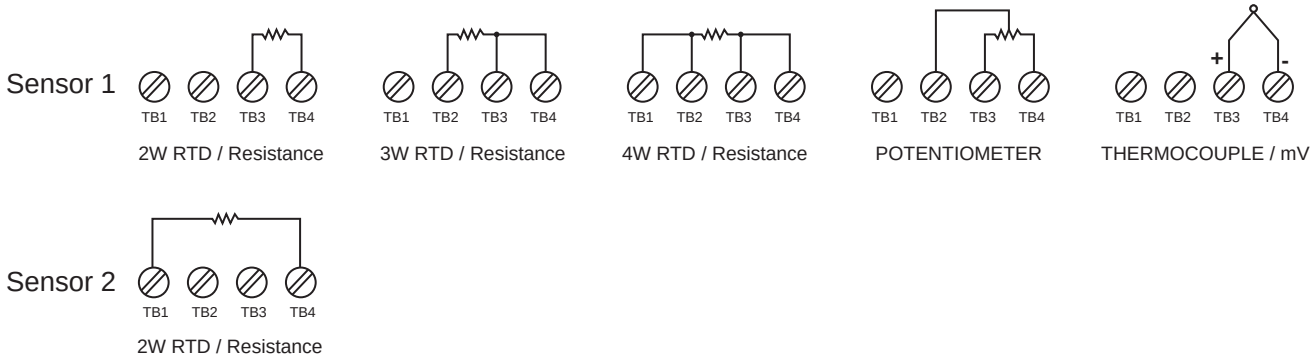


Figure 15. *Temperature Sensor Hook-Up Guide (Models with TPRG Input)*



Note: When using 2 input sensors, sensor 1 is limited to 2-wire and/or 3-wire RTD/resistance. 4-wire sensors cannot be used.

Table 6. *Terminal Designations*

	Top Terminals (Left to Right)			
Terminal Number	1	2	3	4
TPRG Input	1	2	3	4
HLPRG Input	TX	+I	COM	+V

	Center Terminals (Left to Right)								
Terminal Number	5	6	7	8	9	10	11	12	13
Center	NC3	CM3	NO3	NC4	CM4	NO4	AC/DC	AC/DC	GND

	Bottom Terminals (Left to Right)									
Terminal Number	14	15	16	17	18	19	20	21	22	23
Bottom	NC1	CM1	NO1	NC2	CM2	NO2	MR	MR	+Io	-Io

NOTES:
1. Terminal blocks can accommodate 14-22 AWG solid wiring, tighten to four inch-pounds (maximum).
2. ±Io labeling is present only when the unit is equipped with the Analog Output (-AO) option.

KEY:

AC/DC = Universal Power
CM = Relay Common
GND = Ground (case)
+I = Current Input
Io = Current Output
MR = Manual Reset
NO = Normally Open
NC = Normally Closed
SPDT = Single-Pole/Double-Throw
TX = 2-Wire Transmitter Power
+V = Voltage Input

Accessories

Each SPA²IS order comes with one copy of our Intelligent PC Configuration Software. Use the chart below to order additional parts.

Part Number **225-75D05-02**	**Intelligent PC Configuration Software** (One copy provided free with each order)
Part Number **803-053-26**	**Non-Isolated Serial Communication**
Part Number **804-030-26**	**Fuse Protected, Non-Isolated USB Communication Cable**

Certifications

Factory Mutual – FM Approvals – US/Canada (cFMus):

Associated Intrinsically-Safe
Class I, II, III, Division 1, Groups A-G
[Class I, Zone 0], AEx [ia] IIC, Ex [ia] IIC

Non-Incendive
Class I, Division 2, Groups A, B, C & D

Non-Sparking
Class I, Zone 2, AEx nA [ia] IIC, Ex nA [ia] IIC

ATEX Directive 94/9/EC (FM Approvals):
Associated Intrinsically-Safe & Type "n"
Ⓔx II (1) G [Ex ia Ga] IIC
Ⓔx II 3 (1) G Ex nA [ia Ga] IIC T4 Gc

IECEx (FM Approvals):
Associated Intrinsically-Safe & Type "n"
[Ex ia Ga] IIC
Ex nA [ia Ga] IIC T4 Gc

Temperature Code:
T4 @ 85°C Maximum Operating Ambient

CE Conformant:
EMC Directive 2004/108/EC - EN 61326
LVD Directive 2006/95/EC - EN 61010

MOORE INDUSTRIES
United States • info@miinet.com
Tel: (818) 894-7111 • FAX: (818) 891-2816
Australia • sales@mooreind.com.au
Tel: (02) 8536-7200 • FAX: (02) 9525-7296
Belgium • info@mooreind.be
Tel: 03/448.10.18 • FAX: 03/440.17.97
The Netherlands • sales@mooreind.nl
Tel: (0)344-617971 • FAX: (0)344-615920
China • sales@mooreind.sh.cn
Tel: 86-21-62491499 • FAX: 86-21-62490635
United Kingdom • sales@mooreind.com
Tel: 01293 514488 • FAX: 01293 536852

MOORE INDUSTRIES
WORLDWIDE *Demand Moore Reliability*

Moore Industries-International, Inc.

16650 Schoenborn Street
North Hills, CA 91343-6196

Telephone (818) 894-7111
FAX (818) 891-2816
E-mail: info@miinet.com

Editorial Contact:
Tom Watson, (818) 894-7111
twatson@miinet.com

For Immediate Release

Moore Industries Releases SPA²IS with Intrinsically-Safe (IS) Field Connections that Reduces Installation and Maintenance Costs

NORTH HILLS, Calif.—Feb. 2, 2016—Moore Industries announces the new SPA²IS programmable alarm trips with built-in intrinsically-safe (IS) field connections. Now customers in the chemical, petrochemical, oil & gas extraction & refining and pharmaceutical industries that monitor, control, and measure signals in hazardous areas have an alarm solution that significantly reduces wiring, installation and maintenance costs. The SPA²IS is a combination alarm trip and temperature transmitter solution that includes built-in intrinsically-safe field connections for current/voltage, resistance temperature detectors (RTDs), and thermocouple.

The IS approach as a method of hazardous area protection with monitoring and measurement instruments is increasing globally. Many industrial sites that have previously implemented explosion-proof or flameproof protection are now utilizing a hybrid approach of both protection methods in their hazardous areas. Constructing or retrofitting IS solutions within these plants can be costly and instrumentation often requires the additional purchase of a separate zener or isolating barrier and power supply.

For facilities that employ intrinsic safety measures the SPA²IS is a cost effective and complete alarm solution that includes intrinsically-safe field connections, which provides the necessary protection typically afforded by a galvanically isolated intrinsically safe barrier. In addition, the SPA²IS cuts wiring and maintenance costs by enabling users to eliminate additional barriers and power supplies, which reduces space requirements and heat dissipation or cooling considerations in barrier marshalling cabinets.

The SPA²IS is powered by a universal AC/DC power supply and provides on/off control, warns of unwanted process conditions, alarms on rate of change, and assists with or performs emergency shutdowns. Very versatile, it accepts a wide variety of signal inputs from transmitters and temperature sensors and provides dual and quad independent and individually-configurable alarm relay outputs when a monitored process variable falls outside of user-set high and/or low limits.

Key features of the SPA²IS include:

- **Intrinsically-Safe field connections -** Apply inputs from temperature sensors or transmitters located in hazardous areas without the need for a costly intrinsically-safe barrier.
- **Universal plant standard -** With programmable input/output parameters and universal DC or AC power input, there's no need to stock dozens of different alarm trips.
- **20-bit input resolution -** Delivers industry-best digital accuracy for both sensor (RTD and thermocouple) and analog (current/voltage) inputs.

- more -

- **Site- and PC-programmable -** A choice of using front panel pushbuttons or Moore Industries' Windows-based intelligent PC configuration software for fast and simple setup.
- **Large 5-digit process and status readout -** A large display shows menu prompts during pushbutton configuration and, when the SPA^{2}IS is in operation, shows the process variable, the output, or toggles between the two in selectable engineering units.
- **Combined alarm trip and transmitter -** The analog output (-AO) option reduces costs and installation time when both alarm and transmitter functions are needed at the same location.

For more information visit www.miinet.com/spa2is

About Moore Industries-International, Inc.:

Based in North Hills, CA, Moore Industries is a world leader in the design and manufacture of rail, panel and field instruments for industrial process control and monitoring, system integration and factory automation. The company has direct sales offices in the United States and additional strategic worldwide locations in Australia, Belgium, the Netherlands, the People's Republic of China and the United Kingdom. The company serves a variety of industries such as chemical and petrochemical; power generation and transmission; petroleum extraction, refining and transport; pulp and paper; food and beverage; mining and metal refining; pharmaceuticals and biotechnology; industrial machinery and equipment; water and wastewater; and environmental and pollution monitoring.

For more information on Moore Industries, visit www.miinet.com.

# # #

MOORE INDUSTRIES WORLDWIDE

SPA²IS Programmable Limit Alarm Trips with Intrinsically-Safe Field Connections for Current/Voltage, RTDs and Thermocouples

www.miinet.com

MOORE INDUSTRIES WORLDWIDE

T.S. Todd, Director of Engineering
Moore Industries-International, Inc.

Associated Apparatus: The Safe and Most Affordable IS Solution

Overview

Significant savings, both initial installation and ongoing maintenance costs, for your intrinsically safe (IS) facility or project can be achieved by selecting associated apparatus as the IS barrier in your system.

Preventing explosions and fires in hazardous areas caused by process measurement and control instrumentation has historically followed either the path of containing the explosion within the device enclosure or preventing the device from having enough energy to cause a spark or thermal ignition. In North America the predominant choice has been to use explosion-proof equipment while the rest of the world typically employs energy limiting Intrinsic Safety devices.

Although there has been some resistance to change from the familiar explosion-proof approach in North America, engineers have recognized the cost savings and advantages of an IS design, leading to wider acceptance of IS. Additionally, globalization of many corporate structures often leads to standardization of plant designs that are the best economic fit on a global basis and these designs frequently require use of IS technology.

This whitepaper provides a brief introduction to intrinsic safety, the different components in an intrinsically-safe system and the two different types of barriers. Additionally this paper outlines why selecting an associated apparatus as the IS barrier provides the most economic and effective use of IS technology. The techniques outlined in this paper are most applicable to the industrial process control sector including such industries as oil and gas production, oil refining, petrochemical, chemical, pharmaceuticals, food & beverage, and pulp & paper.

The Concept of Intrinsic Safety

Instead of using explosion-proof techniques to contain a possible explosion, the IS approach limits the electrical and thermal energy that could reach any device in the hazardous area. This ensures that the energy level remains below threshold levels that would ignite an explosive atmosphere. The vast majority of field instrumentation devices, such as transmitters and solenoid valves, typically operate on 24Vdc or less with low current signal levels which are well within typical IS system limits.

There are a number of approval agencies that certify IS devices including FM, CSA International, SIRA, LCIE, Testsafe and many others who offer North American, ATEX and IEC Ex based certifications for gas, dust and fiber hazardous environments. These certifications are accepted by OSHA in the US and other agencies throughout the world.

An IS system includes the field devices, the barriers and/or the associated IS devices, and the interconnecting cable. *(Figure 1)*

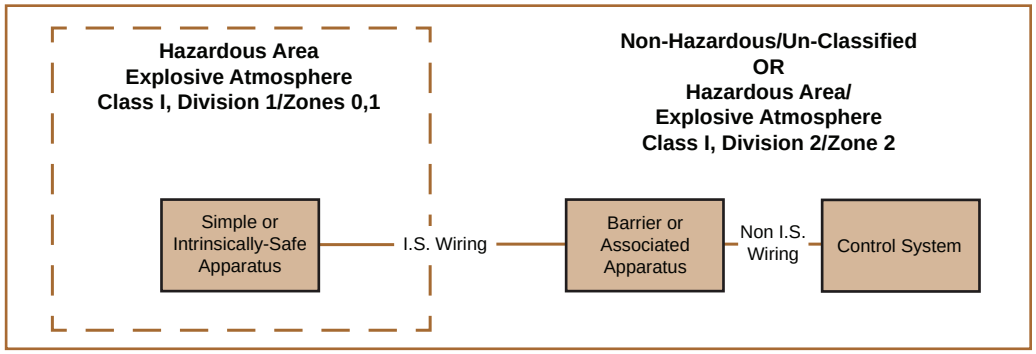


Figure 1. *Components of a typical intrinsically-safe system.*

Field Device IS Classifications

Simple Apparatus include devices such as RTDs, T/Cs, switches, LEDs, potentiometers and switches. They are electrical components which do not generate or store more than 1.5V, 100mA and 25mW or a passive component which does not dissipate more than 1.3W. Simple devices can be freely used without any agency certifications but do require an assessment for their maximum surface temperature and assigned a temperature classification (referred to as a T code).

Intrinsically-Safe Apparatus are devices that can store electrical energy such as transmitters, I/P converters and solenoid valves. They may also be connected to simple apparatus in the hazardous field location. These devices must be certified as intrinsically safe apparatus and classified based on allowable hazardous locations, gas group and T code. Entity parameters for the device must also be provided and include the maximum voltage, current and power limits as well as the internal capacitance and inductance parameters of the device. These parameters are used in conjunction with the connecting cable parameters to calculate the maximum allowable cable lengths, loop voltage and current values for the system.

Barrier or Associated Apparatus

An IS system installation requires a barrier or associated apparatus interface between the field device and the control room equipment. Its function is to limit the energy to the hazardous area such that, even under a fault condition, there cannot be enough electrical or thermal energy released by the device to ignite an explosive atmosphere. They are designed for connection to simple or IS apparatus, and must be certified. There are two types of barriers that are most commonly used and a hybrid method where the barrier is integrated into the receiving device.

Zener Diode Barriers are simple passive devices comprised of Zener diodes, resistors and fuses that serve to limit the voltage, current, and power available to the hazardous area device. The design requires the use of a dedicated IS earth ground connection maintained at less than 1Ω and allows no grounding connections at the field devices. A common downside of using this approach is that the required earth ground has low noise rejection capability. This electrical interference can introduce stray and unwanted electrical noise components into the measurement circuit creating potentially significant measurement errors.

Isolated Barriers are active devices that incorporate galvanic isolation thus eliminating the requirement for an earth ground and the restriction for grounding of field devices. They also provide a higher voltage to the field and devices. These barriers require operating power and are application specific with different models required for different applications (RTD, T/C, 4-20mA etc.)

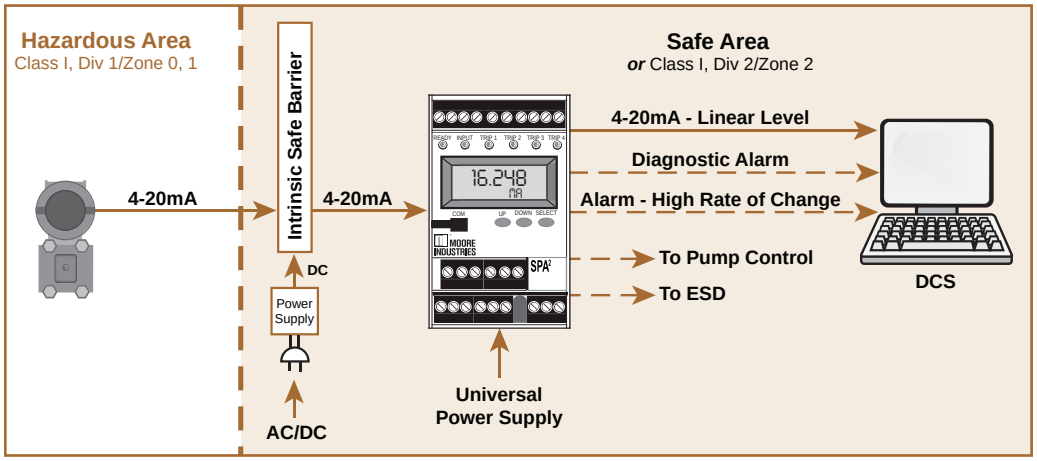


Figure 2. *A system using a safe area device with an external barrier and power supply.*

Associated Apparatus incorporate a barrier into the safe area mounted receiving device or the control room equipment. The Moore Industries SPA²IS is an example of such a device that provides an isolating barrier within the alarm trip. This dramatically reduces the cost of purchase, installation and maintenance versus more traditional approaches that require a separate zener or isolating barrier. *(Figures 3 and 4)*

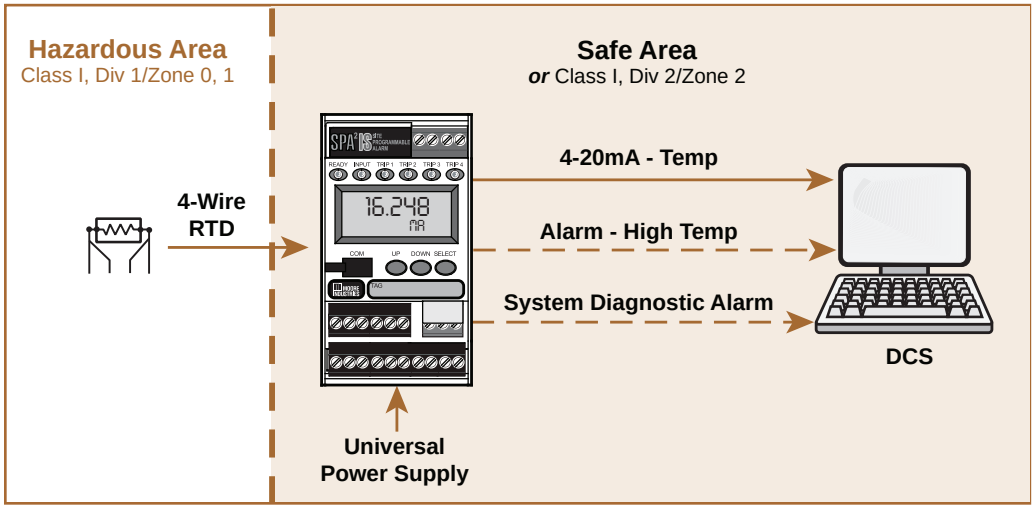
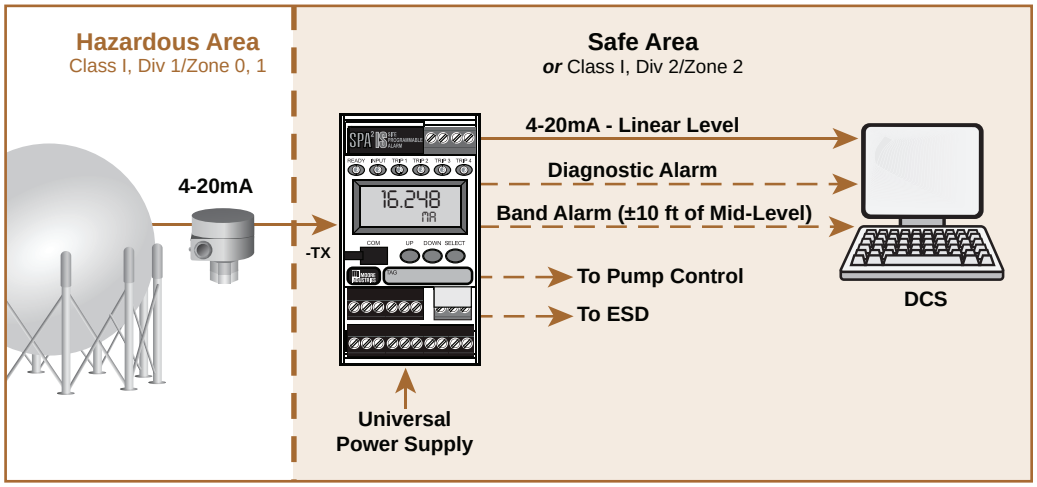


Figure 3. *A Moore Industries SPA²IS associated apparatus incorporating the isolating barrier, temperature transmitter, temperature alarm and diagnostic alarming functions in a single device.*

Figure 3. *A Moore Industries SPA²IS associated apparatus incorporating a spherical tank linearization measurement function, local pump control, Hi-Hi ESD, local indication, self diagnostics, and quad relay outputs for control and alarming.*



Design Considerations

As discussed, the premise of an Intrinsically-Safe system is that there is no component or combination of components that can release enough electrical or thermal energy to ignite an explosion in the hazardous area either under normal or fault conditions. In order to accomplish this goal the energy storage and release characteristics of all components must be defined and incorporated into the system design.

While this may sound like a daunting task, it is relatively simple in practice. The manufacturer of each component must provide a certification document (or data sheet) that lists the definitive voltage, current, power, inductive and capacitive values appropriate to the application. These are called ***entity parameters***. As an example, the capacitance of the field mounted transmitter and its output cable must not exceed the allowable value specified by the associated device (barrier) in the safe area. This is a simple A + B ≤ C calculation for the capacitance (C) and the inductance (L) of the transmitter and the cable. And further, the output voltage of the barrier must be less than the maximum allowed by the transmitter and similarly the output current of the barrier must be less than that allowed by the transmitter.

The combined values of capacitance and inductance for a typical transmitter and 400 meters of cable are far less than the maximum allowable by a typical barrier or associated IS device. The voltage, current and power specification of a typical associated IS device (barrier) is limited by vendor design to acceptable numbers for the intended application. For a transmitter barrier for example, the maximum voltage is typically less than 30Vdc, and the maximum current is less than 100mA.

Figure 5. *Design constraints associated with Entity Parameters.*

NOTE: A simple apparatus has no entity parameters and only the cable parameters need to be considered to determine maximum cable length for intrinsically-safe installation.

[1] Symbols shown are the IEC and ISA markings. ISA markings are shown 2nd if they differ from IEC.

Intrinsically-Safe Apparatus (maximum)	Barrier or Associated Apparatus (maximum)	Design Constraints
Input Voltage (U_i or V_{max})[1]	Output Voltage (U_o or V_{oc})	Maximum Output Voltage must be less than or equal to Maximum Input Voltage ($U_o \le U_i$)[1]
Input Current (I_i or I_{max})	Output Current (I_o or I_{sc})	Maximum Output Current must be less than or equal to Maximum Input Current ($I_o \le I_i$)
Input Power (P_i)	Output Power (P_o or P_t)	Maximum Output Power must be less than or equal to Maximum Input Power ($P_o \le P_i$)
Internal Capacitance (C_i)	Allowed Capacitance (C_o or C_a)	The Total Capacitance of the connecting cable plus the device must be less than or equal to the Allowed Capacitance ($C_o \ge C_i + C_{cable}$)
Internal Inductance (L_i)	Allowed Inductance (L_o or L_a)	The Total Inductance of the connecting cable plus the device must be less than or equal to the Allowed Inductance ($L_o \ge L_i + L_{cable}$)
OR		
Internal Inductance to Resistance Ratio (L_i/R_i)	External Inductance to Resistance Ratio (L_o/R_o or L_a/R_a)	Inductance to Resistance Ratio can be used as an alternative to the Allowed Inductance ie. The cable length restrictions due to cable inductance can be ignored if the following conditions are met: $L_o/R_o \ge L_i/R_i$ AND $L_o/R_o \ge L_{cable}/R_{cable}$)

To certify the installation, a system assessment document is created based on the entity parameters of each component and a verification performed to ensure that all values of the system are within the allowable limits.

Installation and Maintenance Considerations

One advantage of IS installations is that, due to the low power, ordinary instrument cables can be used for IS circuits. Maintenance and calibration of field equipment can also be carried out while the plant is in operation and the circuit is “live” in the hazardous area.

A key design decision which can have a significant effect on the IS system installation and maintenance costs is the choice of barriers. While zener barriers are less expensive than active isolated barriers they require a separate, clean, high integrity ground which has high maintenance costs and potential for electrical noise issues. An isolated barrier is often the better choice but cost, maintenance and cabinet space of barrier power supplies needs to be included. This may also involve redundant systems, since power supplies usually have the highest failure rate and can significantly reduce system reliability. This further adds to required cabinet space and heat dissipation or cooling considerations in your barrier marshalling cabinets. Often the additional cost of the isolated barriers and power supplies are more than the field mount instruments themselves.

An often overlooked consideration is the use of associated apparatus. These offer the dual role of transmitter/isolated barrier combination in one package which can provide significant cost savings by reducing the number of components, power supply requirements, cabinet space, wiring terminations, installation labor and stocking requirements. Cost savings are ongoing with reduced spares inventory, maintenance-related downtime and consequent process restart issues.

Conclusion

Intrinsically safe systems are becoming more prevalent in the process control industry and offer some advantages over explosion proof systems when used for field instrumentation. Since the energy is limited, general purpose wiring methods can be used (no rigid conduit, pouring of seals or special housings are needed). Also equipment can be replaced and maintained without having to un-power loops or shutdown the process.

However, a disadvantage is the installation and maintenance costs of the required IS barriers. Many, but of course not all, of these costs can be drastically reduced if an associated apparatus like the SPA^{2}IS is used. Since the associated apparatus includes the barrier in the receiving device there is no need for the additional cost of the barrier, cabinet space, a high integrity clean ground connection, separate power supply or custom vendor backplane.

The associated apparatus provides an integral solution that is the most affordable and safe IS solution available.

Relevant Standards and Further Reading

- SPA²IS Datasheet
- NEC 2014 National Electrical Code ANSI/NFPA 70 Articles 500-505
- ANSI/ISA-RP12.06.01-2003 Recommended Practice for Wiring Methods for Hazardous (Classified) Locations Instrumentation Part 1: Intrinsic Safety
- ANSI/ISA 60079-11 (12.02.01)-2009 Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety “i”
- IEC 60079-10-1 Ed 2.0 2015 Explosive Atmospheres – Part 10-1: Classification of Areas – Explosive Gas Atmospheres
- IEC 60079-11 Ed 6.0 2011-07 Explosive Atmospheres – Part 11: Equipment Protection by Intrinsic Safety “i”
- FM 3610 2010 Intrinsically-Safe Equipment-Hazardous Locations

T.S. Todd *is Director of Engineering at Moore Industries. She has a BSEE from Brunel University and more than 25 years of systems engineering experience in industrial, communications and aerospace applications.*

MOORE INDUSTRIES WORLDWIDE

Moore Industries-International, Inc.

16650 Schoenborn Street
North Hills, CA 91343-6196

Telephone (818) 894-7111
FAX (818) 891-2816
E-mail: info@miinet.com
www.miinet.com

Talking Points for the SPA^{2}IS Programmable Limit Alarm Trips with Intrinsically-Safe Field Connections for Current/Voltage, RTDs and Thermocouples

- **The SPA^{2}IS is the product that should be introduced to your existing SPA^2 customers and those who buy Intrinsically-Safe (IS) barriers for Intrinsically-Safe areas.**

  Since it includes intrinsically-safe field connections that provide the necessary protection typically afforded by a galvanically isolated intrinsically-safe barrier, a separate intrinsically-safe barrier is not needed.

- **The SPA^{2}IS was designed for applications where your customer needs alarm trip functionality from transmitters or temperature sensors in hazardous locations and IS is their preferred method of protection**.

  The SPA^{2}IS (4-Wire) works the same as other typical 4-20mA line-powered programmable limit alarm trips, providing two or four independent and individually-configurable alarm relay outputs when a monitored process variable falls outside of user-set high and/or low limits.

  SPA^{2}IS offers the dual role of transmitter/isolated barrier combination in one package which can provide significant cost savings by reducing the number of components, power supply requirements, cabinet space, wiring terminations, installation labor and stocking requirements. Cost savings are ongoing with reduced spares inventory, maintenance-related downtime and consequent process restart issues.

- **No separate zener barrier or isolated barrier required**

  The disadvantage of separate barriers is the installation and maintenance costs of the required IS barriers. Many of these costs can be drastically reduced when the SPA^{2}IS associated apparatus is used.

- ## Cost:

  The SPA^{2}IS saves overall cost where an alarm solution is required with signals coming from hazardous locations

  Since the associated apparatus includes the barrier in the receiving device there is no need for the additional cost of the barrier, cabinet space, a high integrity clean ground connection, separate power supply or custom vendor backplane.

MOORE INDUSTRIES WORLDWIDE

Moore Industries-International, Inc.

16650 Schoenborn Street, North Hills, CA 91343-6196
Telephone (818) 894-7111 • FAX (818) 891-2816
E-mail: info@miinet.com • www.miinet.com

FAQ: SPA²IS Programmable Limit Alarm Trips with Intrinsically-Safe Field Connections for Current/Voltage, RTDs and Thermocouples

Frequently Asked Questions

Q: *What is the SPA²IS?*

A: The SPA²IS (4-Wire) is a multifunctional alarm trip with many of the same features as the SPA², with one very unique difference: Intrinsically-Safe Field Connections. This will allow customers to hook up sensors or transmitters located in Class I Div 1/Zone 0/1 hazardous areas directly to the SPA²IS.

WHY IS THIS GOOD?
Since it includes intrinsically-safe field connections that provide the necessary protection typically afforded by a galvanically isolated intrinsically-safe barrier, a separate intrinsically-safe barrier is not needed.

Q: Does the SPA²IS replace the SPA²?
A: No, not directly. Only when a customer needs an alarm trip that connects to a sensor or transmitter located in a Class I Div 1/Zone 0/1 area and the method of protection is intrinsic safety. Normally the customer would require a separate intrinsically-safe barrier but the *SPA²IS has this required barrier built into its front end.*

Q: Why are we calling this product the SPA²IS?
A: The name "SPA²" is retained because the majority of the features and characteristics of the SPA² are included in this new model. "IS" is added to identify it as the Associated **I**ntrinsically-**S**afe version.

Q: Who Should I sell the SPA²IS to?
A: You can sell the ***SPA²IS*** to engineers and technicians at any plant or facility that uses intrinsic safety as a method of protection for their hazardous areas. Industries include chemical, petrochemical, oil & gas extraction & refining and pharmaceutical industries that monitor, control and measure signals in hazardous areas. These customers would more than likely already be users of our SPA, SPA², STA, CPA, ECA, and even DCA products. Check with your Moore Industries Manager to get a list of these users.

Q: Is there a cost difference between the SPA² and SPA²IS?
A: Yes. The SPA²IS costs about 10% more than the SPA².

Q: What titles would these customers have?
A: Process Engineer, I&C Engineer, I&C Tech, or Safety Engineer.

Q: What safety information would customers need when implementing the SPA²IS?
A: The SPA²IS is an Associated IS apparatus which is certified in USA and Canada (cFMus), European Union (ATEX) and Internationally (IECEx). It can be located in a non-classified or Class I Div 2/Zone 2 area with the

MOORE INDUSTRIES WORLDWIDE

Moore Industries-International, Inc.

16650 Schoenborn Street, North Hills, CA 91343-6196
Telephone (818) 894-7111 • FAX (818) 891-2816
E-mail: info@miinet.com • www.miinet.com

input terminals connected to sensors or transmitters in Class I Div 1/Zone 0/1 hazardous areas where Intrinsic Safety is the preferred method of protection. Installation guidelines and IS Entity parameters will need to be reviewed by the technician before installing the device. All of these parameters can be found in the SPA^{2}IS installation manual.

Q: What are the key features of the SPA^{2}IS that buyers will be most interested in?

A: Intrinsically-Safe Field Connections; combination alarm trip and temperature transmitter with the TPRG version, universal AC or DC power, on/off control, warns of unwanted process conditions, rate of change alarms, band alarm, stuck input alarm; and ability to perform emergency shutdowns.

Q: What certifications will they have at release?

A: The SPA^{2}IS will have Class 1 Div 2/Zone 2 approval for mounting in hazardous areas. Additionally it will have IS approvals as an Associated IS Apparatus. See the Data Sheet for certification details.

Q: What competitors does the SPA^{2}IS have?

A: Competitors include Pepperl+Fuchs, MTL, Stahl, GM International, and PR electronics. Most of these products ***do not*** include several SPA^{2}IS features such as quad relay capability, -TX transmitter excitation, auxiliary analog output, front-panel configuration, redundant sensor inputs, broken wire detection, ability hold the last measurement, universal power, band alarm, stuck input alarm or rate-of-change alarming.

Q: What are the main differences between the SPA^{2}IS and the SPA^2?

A: The biggest difference is that the SPA^{2}IS is approved as an Associated IS Apparatus that has an IS barrier built into the front end. The SPA^{2}IS has the same alarming capability as the SPA^2 with three additional alarming capabilities: Band Alarm (both window and mid-point), Stuck Input Alarm (alarm if PV does not change X EGUs over a delta time period), and additional Rate of Change alarm capabilities for a rising PV, falling PV or either direction. The SPA^{2}IS does have a limitation on the analog output as it can only be a sourcing or active current output. No voltage or sync/passive current outputs allowed.

Q: Will there be a PC Program provided by Moore Industries?

A: Yes. The SPA^{2}IS Intelligent PC Configuration Software is provided free with each order, P/N 750-75E05-01. It is available for download from our website on the SPA^{2}IS product page available through the Interface Solution Download Center. It will also be available on a CD for those customers who are unable to download programs from a website.

Q: What cable do I need to use, and can I use the existing MII cables?

A: You can use the Moore Industries serial or USB cables. Below is a list of the programming cables that can be used with the SPA^{2}IS:

- **P/N 803-053-26** – Non-Isolated Serial Communication Cable
- **P/N 804-030-26** – Fuse Protected, Non-Isolated USB Communication Cable

Q: What models are available?

A: The SPA^{2}IS is available with HLPRG or TPRG Inputs and 2PRG Dual Relays or 4PRG Quad Relays. An auxiliary analog output can be ordered as an option (sourcing only). All models come in a DIN-Rail Mount housing.

MOORE INDUSTRIES WORLDWIDE

Moore Industries-International, Inc.

16650 Schoenborn Street, North Hills, CA 91343-6196
Telephone (818) 894-7111 • FAX (818) 891-2816
E-mail: info@miinet.com • www.miinet.com

Q: What is Associated IS?

A: An IS system installation requires a barrier or associated apparatus interface between the simple apparatus or field device located in a Class I Div 1/Zone 0/1 hazardous area and the control room equipment. Its function is to limit the energy to the hazardous area such that, even under a fault condition, there cannot be enough electrical or thermal energy released by the simple apparatus or device to ignite an explosive atmosphere. There are IS system designs and installation criteria for simple apparatus (RTD, T/C, Switches), for IS apparatus (Field transmitters like the TRY), and for hybrid devices referred to as Associated Apparatus (SPA^{2}IS) wherein the barrier and the receiving device are integral. They all must pass a certification process. For more details, see the white paper: "Associated Apparatus: The Safe and Most Affordable IS Solution"

Q: Does an Associated IS device have an advantage over barriers?

A: Yes. An associated IS device eliminates the need to purchase and install a separate Zener or isolating barrier, significantly reducing wiring, installation and maintenance costs.