General Specifications

Model S2MMM843
I/O Module (for N-IO)

ProSafe-RS

GS 32P06K30-01EN

■ GENERAL

This General Specifications (GS) provides the hardware specifications of I/O module (for N-IO) that can be mounted on the Base Plate for N-IO I/O (S2BN1D, S2BN4D and S2BN5D).

■ STANDARD SPECIFICATIONS

● Analog Digital I/O Module

Analog Digital I/O Module (S2MMM843) has an analog I/O function and digital I/O function for each channel. The analog input function, analog output function, digital input function and digital output function can be switched by configuring the setting for each channel in the software. A pair of these modules can be mounted in a dual-redundant configuration.

Common Specifications

Item		Specifications	
Model		S2MMM843	
Number of channels		16 (isolated) (*3)	
Maximum current consumption	System power supply	600 mA (24 V DC) (*4)	
	Field power supply	11 A (24 V DC) (*5)	
Field power supply input voltage range		24 V -10 %/+20 %	
Withstanding voltage (*1) (*2)		Between input/output and system	: 1500 V AC for 1 minute : 42 V DC, continuous
Weight		Approx. 0.64 kg	

Note: A Zener barrier is not allowed to be connected with this module.
Use an isolation barrier when the module is used in intrinsic safety explosion protection instrumentation.

*1: When utilizing the DO function, a field power supply is required. These voltages show the case using the field power supply floating. When the field power supply is grounded, the system (functional) ground is connected to the field ground, which is not isolated. For the higher noise immunity, floating the field power supply is recommended.
*2: When the withstanding voltage of the field power supply between the output and the ground is lower than the value shown in the table above, these voltages are adopted as the withstanding voltage of the field power supply.
*3: The setting of analog input function, analog output function, digital input function and digital output function is possible for each channel. Analog output function can be set up to eight channels.
*4: This is the current consumption when all channels are set to the analog input (2-wire) used with the maximum rated current
*5: This is the current capacity required when all channels are set to the digital output function and the connected load is maximized. Use an appropriate capacity of external power supply in accordance with load characteristics. If an inrush current is assumed to generate due to load, use a power supply with a sufficient capacity in consideration of such a current.

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Analog Input Function (Current Input) Specifications

Item		Specifications
Rated input range		4 to 20 mA
Allowable input range		0 to 24 mA
Input impedance	Power ON	250 Ω
	Power OFF/ Dual-redundant standby side	500 kΩ or more
Rated Accuracy (Power supply voltage = 24 V) (*1)		±16 μA (±0.1 % of full-scale) (0.05 mA to 23 mA) ±32 μA (± 0.2 % of full-scale) (<0.05 mA) ±16 μA/10°C (±0.1 %/10°C)
Transmitter power supply (2-wire)		15.0 V or more (20 mA) 24.0 V or less (0 mA)
2/4-wire setting		Individual setting for each channel
Current limitation (2-wire type)		80 mA or lower
Data update frequency		40 ms
HART communication function (*1)		Support for HART protocol Rev. 7.3
Transmitter power supply ON/OFF function (*2)		Available in 2-wire setting with S2BN1D

*1: When mixing analog input (AI) signal and digital output (DO) signal in the same multi-core cable, take the following influence from DO pulse diagnostics or ON/OFF operation into consideration.
· The accuracy for Analog input function may be worse by several tens of μA depending on the type, length of a cable and DO load current.
· A delay may occur in updating the HART event.

*2: This function enables to reset the alarm state of Fire and Gas devices by turning off the transmitter power supplied from this module in 2-wire setting.

Analog Output Function (Current Output) Specifications

Item	Specifications
Rated output range (maximum guaranteed accuracy range)	4 to 20 mA
Allowable load resistance	230 to 600 Ω
Output open-circuit detection	0.65 mA or less
Output short-circuit detection	60 to 600 Ω (Configurable)
Accuracy (Power supply voltage = 24 V)	± 48 μA (± 0.3 % of full-scale) ± 16 μA / 10°C (± 0.1 % / 10°C)
Current limitation	23 mA or lower
Data update period	40 ms
HART communication (*1)	Support for HART protocol Rev. 7.3

Note: Analog output function can be available up to eight channels with any channel.
*1: When mixing analog output (AO) signal and digital output (DO) signal in the same multi-core cable, a delay may occur in updating the HART event depending on the DO pulse diagnostics or ON/OFF operation. For details, refer to "ProSafe-RS Installation Guidance" (TI 32P01J10-01EN).

Digital Input Function Specifications

Item	Specifications
Function	ON/OFF status input
Input format	Dry contact input
External resistance when input ON	1 kΩ or less (6 mA continuous)
External resistance when input OFF	10 kΩ or more (2.4 mA or less)
Input current	6 mA ± 20 %
Contact rating	30 V DC or more 10 mA or more
Current limitation	7.2 mA or lower
Data update period	10 ms
Input response time	30 ms to 40 ms

If field wiring diagnostic functions of digital input function are used, the following diagnostic elements should be installed for individual channels in the vicinity of the field equipment:

• SCB100 (for defective open circuit detection while accepting off signals) (*1)
• SCB110 (for defective short-circuit detection while accepting on signals) (*2)

*1:   Input signals are normally off while in normal operation.
*2:   Input signals are normally on while in normal operation.

When the input signals are normally off while in normal operation, connect the SCB100 in parallel with the contact output of the field equipment as given below.
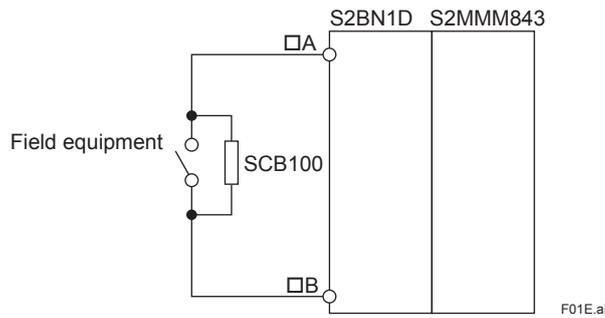
When the input signals are normally on while in normal operation, connect the SCB110 in series with the contact output of the field equipment (take care about the polarity taking note of the polarity).
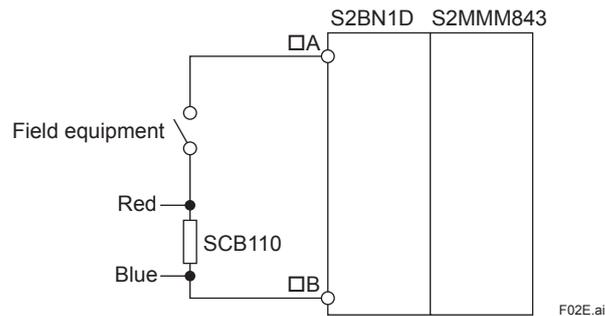
When checking for both defective short and open circuits, connect the SCB100 and SCB110 in parallel and series with the contact outputs of the field equipment respectively, as given below.


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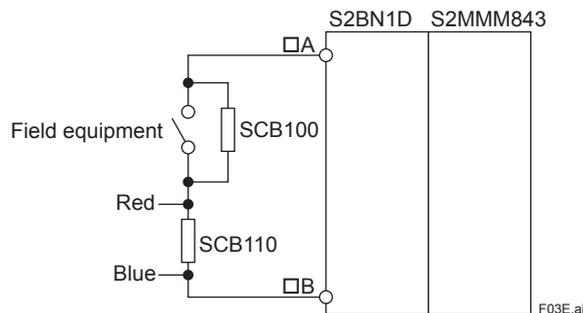
Digital Output Function Specifications

The maximum load current per channel is 0.66 A. A load current device with more than 0.66 A can be connected by using parallel connection with adjacent channels.

・The 2-channel parallel connection allows a maximum load current of 1.3 A.
・The 3-channel parallel connection allows a maximum load current of 2.0 A.

To use parallel connection, connect the base plate terminals on the external terminal board. The following figure shows an example of parallel connection.
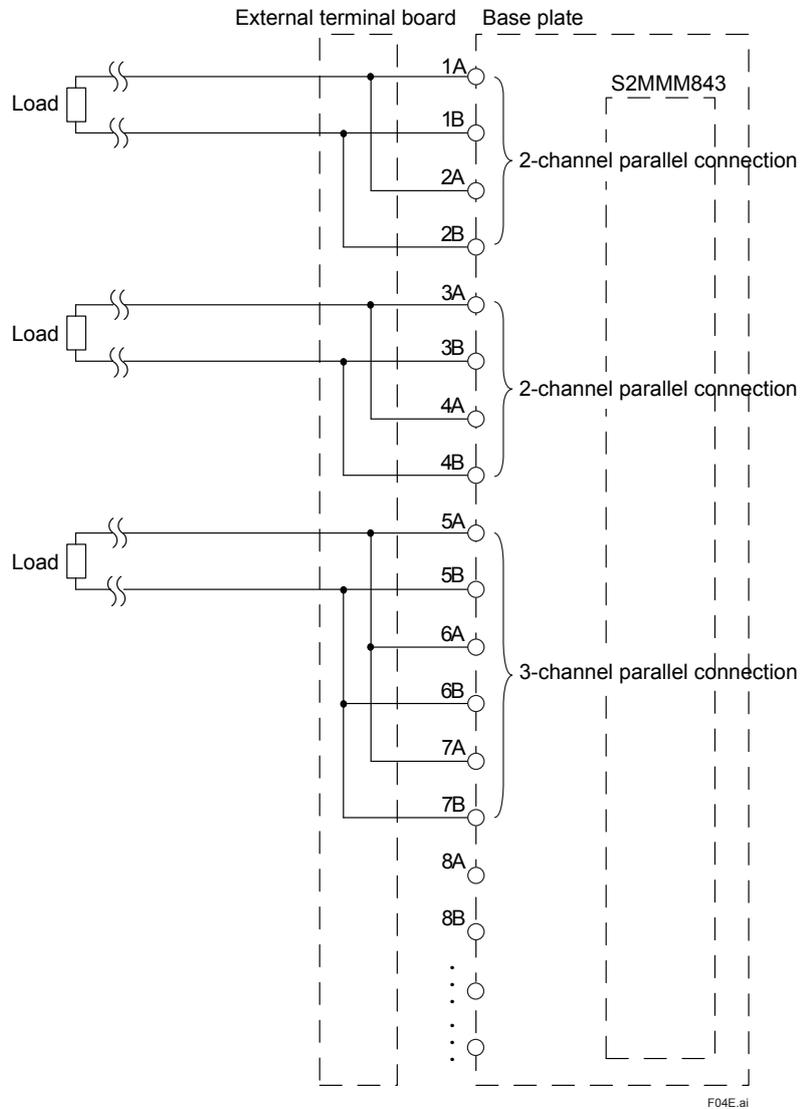

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Item	Specifications		
	1-channel single connection	2-channel parallel connection	3-channel parallel connection
Function	ON/OFF status output (*1)		
Output format	Current source		
Output voltage	24 V DC		
Output voltage drop	1 V or less		
Leak current at output off	0.3 mA or less		
Minimum load current	10 mA	200 mA	200 mA
Maximum load current	0.66 A (*2)	1.3 A (*2)	2.0 A (*2)
Load resistance range	36 Ω to 2.4 k Ω (*3)	18 Ω to 120 Ω (*3)	12 Ω to 120 Ω (*3)
Maximum lamp load (*4)	0.33 A	0.65 A	1 A
Current limitation	3 A or lower	6 A or lower	9 A or lower
Data update period	10 ms		
Output response time	20 ms to 30 ms		
Pulse diagnosis	Pulse Interval: about 0.5 s Pulse width: about 200 μs		

*1:   When the application logic is designed to continuously change the output state to ON and OFF alternately, at least one of the following conditions must be met.
         - every ON state must be kept 500ms or longer
         - every OFF state must be kept 2,000ms or longer
*2:   The total load current of all channels is limited as shown below according to the derating specifications due to the ambient temperature of modules.
         -40 to 40 °C: Max. 10.56 A (0.66 A/16-channel)
         40 to 50 °C: Max.9.71 A (0.66 A/14-channel)
         50 to 60 °C: Max.8.85 A (0.66 A/13-channel)
         60 to 70 °C: Max.8 A (0.66 A/12-channel)
*3:   Resistance value of the load for both ON and OFF state, including the field wiring resistance.
*4:   This is the maximum rated load current in the case of a filament lamp. The inrush current of a filament lamp is acceptable up to 10 times of this value.

■ HART COMMUNICATION

Analog I/O module with HART communication on ProSafe-RS allows Plant Resource Manager (PRM) to manage the HART communication devices connected to input and output modules on SCS. Also, the analog output module allows PRM client to conduct Partial Stroke Test (PST) on HART-supported valve positioner equipped with the PST function. The HART7 device event notification makes possible the immediate detection of a device failure.

The HART communication functions on ProSafe-RS are interference-free and have no impact on the safety functions on SCS.
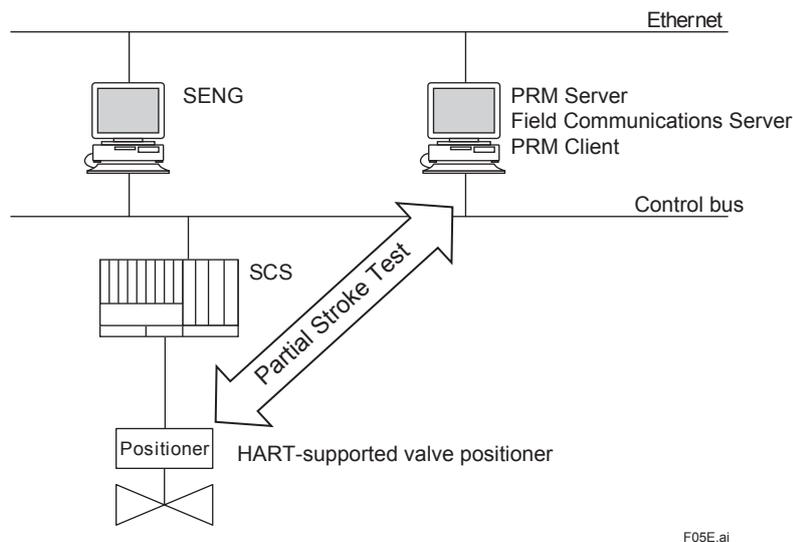
Figure Example of the HART Communication Function System Configuration

● **I/O Modules for HART Communication Function (for N-IO)**

The following table shows analog I/O modules for HART communication function (for N-IO) available to ProSafe-RS.

Model	Module	Number of channels compatible with the HART communication function
S2MMM843	Analog digital I/O module (current input, current output)	Max. 16-channel (max. 8-channel for analog output)

One HART device is connectable for each channel. Each channel is equipped with a power supply function to the HART device.

Each channel has an independent HART modem. It makes possible to communicate concurrently with multiple HART devices .

● **HART Communication Specifications**

Table   HART Communication Specifications

Function	Description
Communication mode	Serial half duplex, start-stop synchronization, 1 start/ 8 bit/ odd parity/ 1 stop
Applicable standard	HART Protocol Revision 7.3 (*1)
Transmission speed	1200 bps ± 1%
Modulation technique	Binary phase-continuous FSK 1: 1200 Hz ± 1 %, 0: 2200 Hz ±1%
Response time	Max. 28 characters (256.7 ms)
No response timer	33 characters (305 ms) for primary 41 characters (380 ms) for secondary
Bus monitor	8 characters (75 ms)
Response window	20 ms

*1:   The HART 5, 6, and 7 devices can be connected but applying the HART protocol Revision 7.3 function.

■ EXTERNAL DIMENSIONS

● S2MMM843 Analog Digital I/O Module

Unit: mm

191.7

97

32

16

196

206.4

5.2
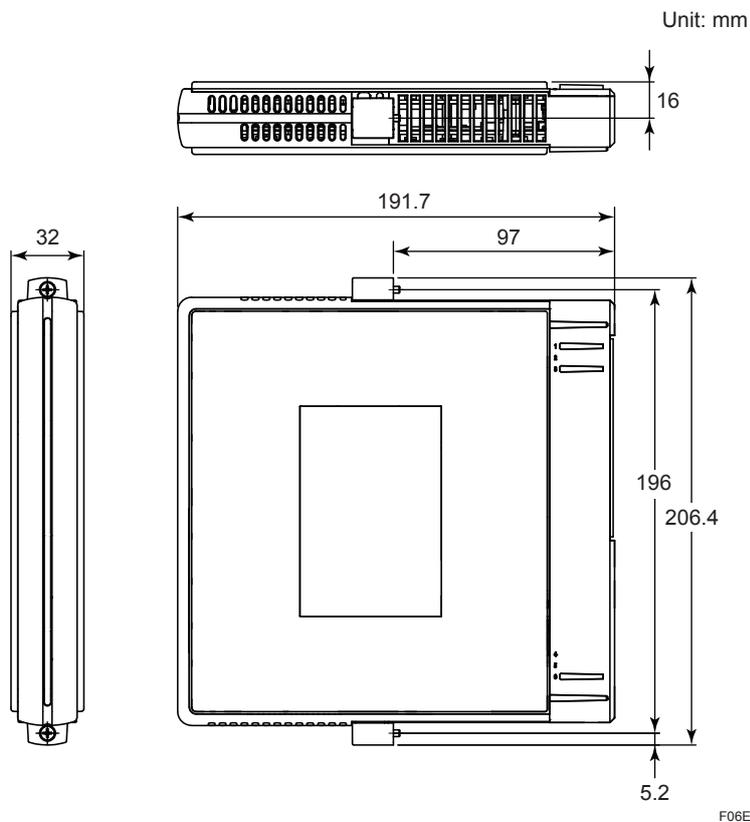
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Nominal Tolerances :
When the reference dimension is over 0.5 mm and equal or less than 120 mm, its nominal tolerance is ± 0.8 mm, while its combination of nominal tolerance is ± 1.5 mm.
When the reference dimension is over 120 mm, its nominal tolerance is in accordance with JEM 1459.

■ MODEL AND SUFFIX CODES

			Description
Model	S2MMM843		Analog Digital I/O Module (16-channel, module Isolated)
Suffix Codes	-S		Analog I/O function Standard type
	S		Digital I/O function Standard type
	1		Always 1
	0		With no explosion protection
	1		With explosion protection
	3		With ISA Standard G3 and wide range temperature (-40 to 70 °C)
		0	Always 0

■ SOFTWARE

S2MMM843 is supported by R4.01 or later.

■ CONFORMITY STANDARDS

Refer to "ProSafe-RS Standards Compliant Models" (GS 32P01B60-01EN).

■ ORDERING INFORMATION

Specify the model and suffix code(s).

For selecting the right products for explosion protection, please refer to TI 32S01J30-01E without fail.

■ TRADEMARKS

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