

# SMP™ IO-2230 Distributed I/O Platform



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## Description

Eaton's SMP IO-2230 platform is the first device belonging to the new generation of substation-grade distributed I/O platforms, specially designed to meet modern industry and utility requirements.

This new evolutionary I/O platform is now fully integrated with the SMP Manager's Software and Tools and includes many new features, greatly enhancing user experience.

Eaton relies on the same expertise and high industry standards used to develop our successful SMP Gateway product line to offer a highly reliable, easy to set up and flexible I/O module, at a very competitive price.

## General features

### Hardware

- Form factor: 2U
- Individual LEDs for each I/O
- No moving part
- Two built-in Form C relays for system alarm (configurable)
- System status LEDs
- Multi-function button
- Front USB 2.0 maintenance port (Type B)
- Custom length cables available
- Protected against power supply cable inversion

### Software

- Linux®-based operating system
- Seamless integration with the SMP Gateway
- Access to SMP Manager's Tools
  - Remote management (firmware upgrade, setting changes, license update)
  - Configuration with SMP Config (also for standalone units), multi protocols/instances, configurable point mapping
  - Offline and template-driven configuration
  - Use of SMP Stats, SMP Log and SMP Trace
- Micro PLC for local programmable logic (fast and complete PLC functions)
- Ready for remote management via Enterprise Management Software (IMS)
- System alarms

### Communication and Web interface

- RS-485 serial interface
- 2 x 10/100 Mb/s Ethernet ports
- Daisy chain Ethernet capabilities
- Web interface for I/O commissioning
- Secured remote maintenance using transparent connection (SMP Gateway and IMS passthrough)

### System

- Integrated self-diagnostics
- Integrated watchdog timer
- Real-time clock (with battery backup)
- Internal clock synchronization using IRIG-B, NTP or via protocols
- Local/Remote state (logical points)
- Logs support (Security, System)

### Protocols

- DNP3 Serial or TCP/IP links and IEC61850 GOOSE
- Coming soon Protocols: Modbus®, IEC 61850
- DNP3 event queue (up to 1000 events/slave)
- Up to 5 slave instances

### Mappings

- Predefined mappings
- Configurable mappings
- Serial number, version, internal status, current time, last reset time and more are available in the protocol mapping
- Exportable DNP3 protocol device XML profile

## Cybersecurity features

- Certified under UL-2900-2-2
- Integrated Ethernet firewall
- Ability to disable any unused port (report enabled-disabled ports)
- Secure maintenance connection (TLS) via SMP Gateway Passthrough or via direct SMP Manager connection
- AES-128/256 encryption
- Secure USB maintenance port
- Secure command shell
- Account management:
  - Strong passwords
  - Single Admin account
  - User accounts and user groups
  - Detailed group permissions
- Access management (log, lockup, etc.)
- All system components digitally signed
- Settings integrity validation
- Factory reset in case of Admin password loss
- IEEE 1686-2013 compliant

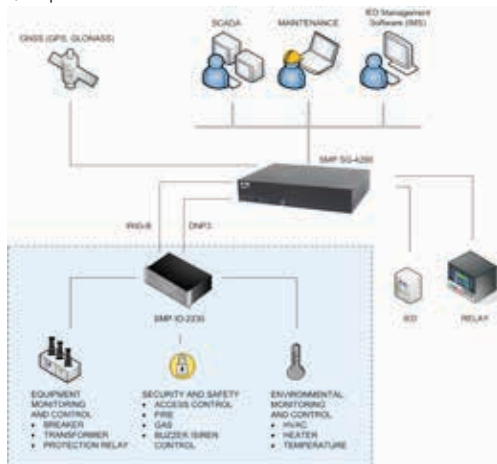
## Typical applications

The SMP IO-2230 platform deployed as a standalone unit can be connected directly to a DNP3 master station and used for asset monitoring and control with accurate IRIG-B time stamping.

Accessible by Eaton's IED Manager Suite (IMS) for configuration management and remote access and by Visual T&D for monitoring, alarm management and much more.

When deployed behind an SMP Gateway automation platform, the SMP IO-2230 platform also adds access to the SMP Gateway advanced logic and HMI's numerous functions like the status dashboard, name plate information, real-time data and the Commissioning Tool, for an enhanced device setup.

Eaton's RTU replacement solution is fully compatible with this new I/O platform.



**Figure 1. Typical application, deployed behind an SMP Gateway automation platform**

## Benefits

With its robust and scalable design, the SMP IO-2230 platform provides a flexible solution that adapts to evolving automation requirements.

### Reliability

Designed to evolve through regular software and firmware updates, ensuring a future-proof automation system.

- Independently certified as per IEC 61850-3 and IEEE1613 standards

### Easy integration

Complete support for the SMP Tools

- Easy configuration using SMP Manager's SMP Config

### Scalability

Universal power supply (wide input ac and dc voltage range), for connection flexibility

- Software configurable voltage ranges on binary inputs

### Cybersecurity

Secure remote maintenance accessible via SMP Gateway and IMS Passthrough

### Productivity

Offline configuration tools

- Web interface for I/O commissioning

## Product configuration

Flexible inputs and outputs configurations can be arranged together in rows of 16 I/O each, up to a full populated device with 64 I/O, making it adaptable to your evolving needs.

### I/O configuration groups

I/O row	I/O groups	Possible I/O configuration
4 (top)	[49,56] and [57,64]	16 BI
3	[33,40] and [41,48]	16 BO (relays)
2	[17,24] and [25,32]	16 HBO
1 (bottom)	[1,8] and [9,16]	8 BI and 8 HAI

Where:

- HAI corresponds to high isolation analog input
- HBO corresponds to fast speed and high-current interrupting binary output

## I/O features

The I/O rows must be filled starting at row 1 up to row 4 (if needed).

### Analog Inputs

- High/Low warning support
- Deadband, scaling and units
- User calibration at fixed ambient temperature

### Binary Inputs

- AC and DC inputs
- Tolerance/Intolerance filtering
- Chatter protection
- Fail safe circuit (active level in normal state)
- Binary points software polarity reversal
- Timetag at the beginning or end of the filtering (setting)
- Persisted counters (total transitions, up/down direction), with deadband, scaling and roll over detection.
- Freeze, clear, freeze and clear counters support

### Binary Outputs

- Output protection against single component failure
- Trip/close pair, latch, pulse, pulse pair support
- Persisted operation counter/operation time
- Binary points software polarity reversal
- Control queuing allows up to 10 parallel requests, sequentially processed when the same point is targeted

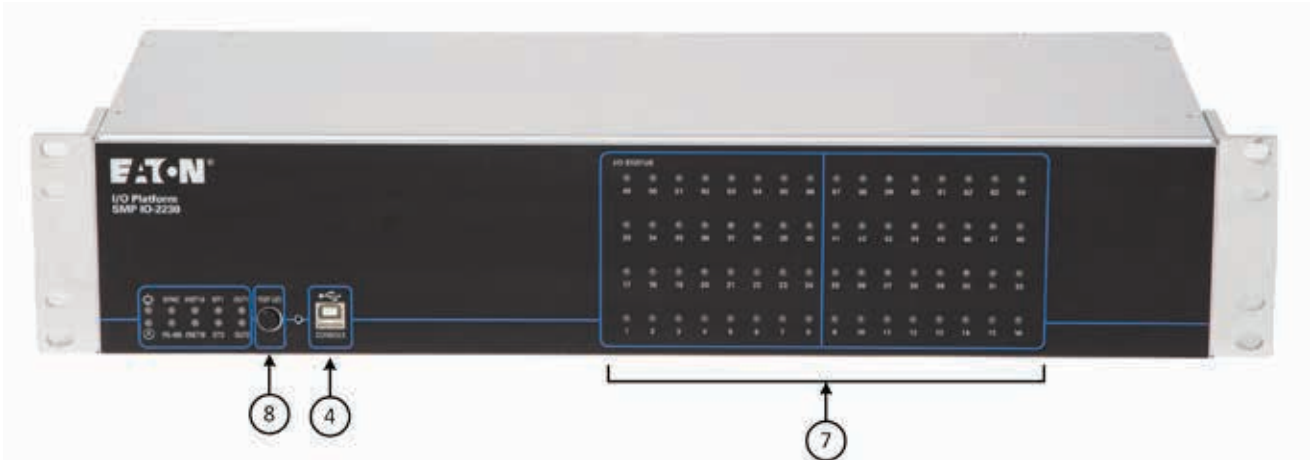


Figure 2. SMP IO-2230 platform front view

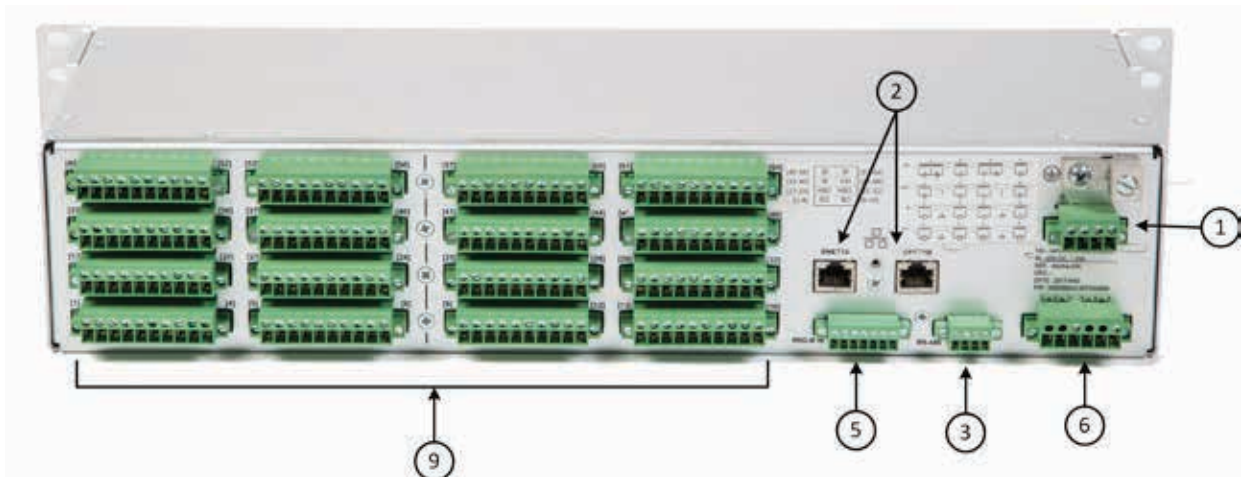


Figure 3. SMP IO-2230 platform rear view

**Base unit includes:**

- Rack unit, 2U
- Universal power supply (100-240 VAC / 24-250 VDC) (1)
- Two built-in Ethernet port switches metallic, RJ-45 connectors (rear panel) (2)
- One serial port (RS-485); COM1 (3)
- One USB port, type B (CONSOLE port) (4)
- IRIG-B demodulated input (rear panel) (5)
- Two Form C output relays, Normally Open/Normally Closed contacts (6)
- Individual LED for each I/O (7)
- Multi-function button (8)

**Options:**

- Two (2) built-in Ethernet port switches, optical with LC connectors (2, metallic shown on picture)
- Up to 64 inputs and outputs configured according to the following table (9)

I/O row	I/O groups	Possible I/O configuration
4 (top)	[49,56] and [57,64]	16 BI
3	[33,40] and [41,48]	16 BO (relays) 16 HBO
2	[17,24] and [25,32]	16 HBO
1 (bottom)	[1,8] and [9,16]	8 BI and 8 HAI

**Note:** Conformal coating is available on demand.

## SMP IO-2230 platform specifications

This section presents the complete specifications of the SMP IO-2230 platform.

**Table 1. General specifications**

<b>Dimensions SMP IO-2230 platform</b>	Rack unit: 2U 3.470 in. H x 19 in. W x 7.1 in. L 84.1 mm H x 482.6 mm W x 183.3 mm L 10 lbs (4,52 kg) max	
<b>Warranty</b>	10 - year limited	
<b>Operating temperature</b>	-40 °F to 185 °F* (-40 °C to 85 °C) Typical use	*Safety marking is based on temperature derating table
<b>Storage temperature</b>	-40 °F to 185 °F (-40 °C to 85 °C)	
<b>Humidity</b>	5% to 95%, non-condensing	
<b>Degrees of protection provided by enclosure</b>	IP30	IEC60529: 2013
<b>MTBF</b>	Real MTBF (practical): > 100 years	The MTBF value is obtained from the ratio of the number of devices in operation over the actual number of failures observed on devices of the same SMP family.
<b>Maximum altitude</b>	6761.7 feet (2000 m)	
<b>Status LED display</b>	Power (🔌) Watchdog (🐶) Clock synchronization (SYNC) Build-in serial port (RS-485) Build-in Ethernet ports (ENET1A, ENET1B) Status (ST1, ST2) Relay state (OUT1, OUT2) I/O activity/state (1-64)	
<b>Internal Battery</b>	Lifetime: > 20 years (Rechargeable lithium battery)	Not serviceable Battery autonomy > 20 days Battery charging time < 24 hr

**Table 2. Power Supply**

Universal Power Supply		
<b>Specifications</b>		
Rated supply voltage	100 – 240 VAC / 24 – 250 VDC	
Input voltage range	88 – 264 VAC / 19.2 – 287.5 VDC	
Frequency range	50 / 60 Hz	
Inrush current	40A at 28 VDC (t<1 ms) 110A at 125 VDC (t<1 ms) 160A at 120 VAC (t<1 ms)	
Power consumption	30W (max)	100 – 240 VAC, 0.6A 24 – 250 VDC, 1.25A
Dielectric	2000 Vrms Dielectric	
<b>Terminal block power</b>	4-pin	Jumper MOV are installed at the factory on power supply's terminal block connectors (pin 1-2)
Wire size	12 – 30 AWG solid wire 12 – 30 AWG stranded wire	
Wire screw max torque	4 lbf-in (0.44 N-m)	
<b>Internal fuses</b>	2 x 3.15 A TL fuses	Not serviceable Fuse on both L(+) and N(-)
<b>Ground lug</b>	External ground lug on rear panel	
Wire size	14 – 2 AWG	
<b>Protection</b>	300 VAC/385 VDC, 60J <b>Differential</b> MOV Protection  300 VAC/385 VDC, 60J <b>Common</b> MOV Protection by external jumper placed on terminal block connectors (pin 1-2)	The SMP IO-2230 platform requires the MOV protection in order to be compliant with electrical standards. The SMP IO-2230 is shipped with the MOV already installed on the power supply terminal block (pin 1-2).

**Table 3. Communication ports**

<b>2 Ethernet Ports</b>	Rear access	No LED indicators on rear panel
Metallic connectors (standard)	2 x 10/100/BASE-T/TX	RJ-45 connectors
Fiber-optic (option)	2 x 100BASE-FX, up to 2 km	LC connectors Multimode 1300 nm
<b>Serial Port</b>	1 x RS-485 terminal block connectors	
2-wire RS-485 support (multidrop)	Up to 1200m (4000 ft.) 32 devices and 115200 b/s	40 A 8.3 ms
Protection	Common mode TVS	
Wire size	16 - 28 AWG	
Wire screw maximum torque	2.2 lbf-in (0.25 N-m)	

**Table 4. Auxiliary Port**

<b>USB</b>	Type B connector (front panel)	
USB 2.0 client (CONSOLE)		

**Table 5. Time Synchronization**

<b>Demodulated IRIG-B</b>	Via terminal block (rear panel)	Isolated
Input	2V high-level detection, $V_{in}$ max up to 12 VDC, Opto-isolated IEEE 1344, C37.118, B002, B003, B004, B006, B007	Current sink at 5V IRIG-B; 5 mA Current sink at 10V IRIG-B; 11 mA Input impedance = 1000Ω ± 10%
Protection	Accuracy: ± 100 μs Differential mode TVS	40A 8.3 ms
<b>Terminal block IRIG-B</b>		
Wire size	16 - 28 AWG	
Wire screw maximum torque	2.2 lbf-in (0.25 N-m)	
<b>Real-time clock (with battery backup)</b>	Drift: ± 10 sec/day on normal operating temperature range and ± 20 sec/day outside the operating temperature range, when unit is powered off. Drift: < 3 sec/day on all temperature ranges when unit is running.	

**Table 6. Auxiliary Relays (Alarm Relays)**

<b>2 Form C relays</b>	Normally open and normally closed relays contacts (NO/NC) 1st relay is pre-configured for system health monitoring. Both relays are available for system applications and can be activated through a system data point.	8A 250 VAC / 24 VDC resistive 0.2A at 250 VDC resistive 2500 VAC dielectric 300 VAC / 385 VDC, 60J MOV Protection across contacts
<b>Terminal block Auxiliary relays</b>	6-pin connector	2 Form-C contacts
Wire size	12 – 30 AWG solid wire 12 – 30 AWG stranded wire	
Wire screw max torque	4 lbf-in (0.44 N-m)	

**Table 7. CPU**

<b>Processor Architecture</b>	ARM
<b>Operating System</b>	LINUX
<b>Processor</b>	ARM® Cortex® -A8 600 MHz, 56 MB DDR3 RAM
<b>Memory</b>	256 MB DDR3 RAM

Table 8. Binary Inputs

<b>Binary input module</b>		
<b>Voltage range selectable by software</b>	24 – 48 ( $\pm 19.2$ to $\pm 60$ ) VDC 24 – 48 ( $\pm 19.2$ to $\pm 60$ ) VAC 50/60 Hz $\pm 5$ Hz 110 – 125 VDC 100 – 120 VAC 50/60 Hz $\pm 5$ Hz  110 – 250 ( $\pm 91$ to $\pm 300$ ) VDC 100 – 240 ( $\pm 88$ to $\pm 288$ ) VAC 50/60 Hz $\pm 5$ Hz	On: $\pm 19.2$ – 60 VDC, Off: $\pm 7$ VDC On: 15 – 60 VAC, Off: 5 VAC On: $\pm 88$ – 150 VDC, Off: $\pm 18$ VDC On: 70 – 150 VAC, Off: 20 VAC  Coming soon, contact Eaton for information Coming soon, contact Eaton for information
<b>Current draw at nominal</b>	24 – 48 VDC 24 – 48 VAC 110 – 125 VDC 100 – 120 VAC	2.5 – 5.4 mA, 0.26W maximum 2.6 – 5.5 mA, 0.26W maximum 2.5 – 2.9 mA, 0.36W maximum 2.3 – 2.8 mA, 0.33W maximum
<b>Sampling rate</b>	500 $\mu$ s	
<b>Debouncer delay</b>	Software configurable up to 127 ms	No hardware filter
<b>Protection</b>	2000 Vrms dielectric 300 VAC / 385 VDC, 60J differential MOV protection	
<b>Terminal Block Binary Input</b>		
Wire size	12 – 30 AWG solid wire	
Wire screw maximum torque	4 lbf-in (0.44 N-m)	

Table 9. Binary Outputs (relays)

<b>Output relays</b>	Form C relays (all BO# odd) Form A relays (all BO# even)	
<b>Protection</b>	2000 VAC dielectric 300 VAC / 385 VDC, 60J MOV protection across contact pairs	
<b>Operating time</b>	Pickup 10 ms maximum Dropout 6 ms maximum	
<b>Electromechanical relay CSA rating</b>	8A at 24 VDC resistive 8A at 250 VAC resistive 10A at 30 VDC resistive 10A at 250 VAC resistive 0.4 A at 125 VDC resistive 0.2A at 250 VDC resistive 3A at 250 VAC $\cos\phi = 0.7$ $\frac{1}{2}$ HP at 125 VAC, $\frac{1}{3}$ HP at 125 VAC	All relay types
<b>Rated insulation voltage</b>	250Vrms	All relay types
<b>Maximum voltage</b>	400 VAC / 250 VDC	All relay types
<b>Continuous carry</b>	6A @ 70°C 4A @ 85°C	All relay types
<b>Continuous carry AC/DC UL/CSA derating</b>	5A @ < 60°C 2.5A 60°C to 70°C	
<b>Minimum load</b>	10 mA at 5VDC	All relay types
<b>Maximum load</b>	50A for 1 second	All relay types
<b>Cycling capacity (1 cycle/second) per IEC 60255-0-20:1974</b>	24 VDC / 0.8A L/R= 40 ms 48 VDC / 0.5A L/R= 40 ms 125 VDC / 0.3A L/R= 40 ms	All relay types
<b>Breaking capacity (10 000 operations) per IEC 60255-0-20:1974</b>	24 VDC / 0.8A L/R= 40 ms 48 VDC / 0.5A L/R= 40 ms 125 VDC / 0.3A L/R= 40 ms	All relay types
<b>Terminal Block Binary Output</b>		
Wire size	12 – 30 AWG solid wire	
Wire screw maximum torque	4 lbf-in (0.44 N-m)	



**Table 10. Fast Speed and High-Current Interrupting Output (HBO)**

<b>Continuous carry DC</b>	6A @ 70°C 4A @ 85°C	
<b>Continuous carry DC UL/CSA derating</b>	5A @ < 60°C 2.5A 60°C to 70°C	
<b>Thermal current rating DC</b>	50A for 1 sec	
<b>Contact protection</b>	2000 Vrms dielectric 385 VDC, 120J MOV protection across contacts	
<b>Inductive breaking DC</b> Capacity (10 000 operations) per IEC 60255-0-20:1974	24 VDC 10A L/R = 40 ms 48 VDC 10A L/R = 40 ms 125 VDC 10A L/R = 40 ms 250 VDC 10A L/R = 40 ms	
<b>Cycling capacity DC</b> 4 cycles/second followed by 2 minutes idle for thermal dissipation as per IEC 60255-0-20:1974	24 VDC 10A L/R = 40 ms 48 VDC 10A L/R = 40 ms 125 VDC 10A L/R = 40 ms 250 VDC 10A L/R = 20 ms	
<b>Pickup DC</b>	< 50 µs @ 48 – 250 VDC < 10 ms @ 24 VDC	Resistive load Fast operation is not supported at 24 VDC
<b>Droupout DC</b>	10 ms	Resistive load
<b>Rated operational voltage AC</b>	100/110/120/220/240 VAC 19.2 – 250 VAC	
<b>Rated insulation voltage AC</b>	250 VAC	
<b>Continuous carry AC</b>	6A @ 70°C 4A @ 85°C	
<b>Continuous carry AC UL/CSA derating</b>	5A @ < 60°C 2.5A @ 60°C to 70°C	
<b>Inductive breaking AC</b> Capacity (10 000 operations) as per EC 60255-0-20:1974	24 VAC 10A L/R = 40 ms 48 VAC 10A L/R = 40 ms 125 VAC 10A L/R = 40 ms 250 VAC 10A L/R = 20 ms	
<b>Terminal Block</b>  Wire size  Wire screw maximum torque	  12 – 30 AWG solid wire 12 – 30 AWG stranded wire  4 lbf-in (0.44 N-m)	
<b>Note</b>	The Normally Close contact is not suitable for Fast and High Current output. See Binary Outputs specifications.	



Table 11. Analog Inputs

<b>Input range</b>		Operation mode (voltage or current)
<b>Voltage mode</b>	± 10V	
<b>Current mode</b>	± 20 mA (4 – 20 mA transducers) ± 2 mA (0 – 1 mA transducers)	Current mode requires external resistors
<b>Input impedance</b>		
<b>Voltage mode</b>	> 100 kΩ	± 10V
<b>Current mode</b>	499Ω 5 kΩ 10 kΩ	± 20 mA ± 2 mA ± 1 mA
<b>Resolution</b>	16 Bits + sign	
<b>Accuracy</b>		
<b>Voltage mode</b>	± 0.02 % of full scale @ 25°C	Factory calibrated (25°C)
<b>Current mode</b>	± 0.15 % of full scale @ 25°C ± 0.05 % of full scale @ 25°C	With 0.1% external resistor With 0.01% external resistor No factory calibration for current mode
<b>Accuracy variation</b>	± 0.015 % /°C of full scale @ 25°C	Customer calibration possible (zero offset)
<b>Isolation</b>		
<b>Protection</b>	2000 Vrms	14 VDC MOV protection across terminals
<b>High isolation model</b>		Each input channel is totally electrically independent (galvanic isolation)
<b>Common Mode Rejection DC (CMR) @ 50/60 Hz</b>	> 90 dB	
<b>Sampling rate</b>	200 ms	
<b>Terminal Block Analog Inputs</b>		
Wire size	12 – 30 AWG solid wire	
Wire screw maximum torque	4 lbf-in (0.44 N-m)	
<b>Accessories</b>	Current mode external resistor ± 1 mA Current mode external resistor ± 2 mA Current mode external resistor ± 20 mA	See ordering information section for part number

Table 12. Accessories

<b>Jumper straps</b>	10 poles, 30A, 5.08 mm, UL-94 V0
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Table 13. Certification and standard compliancy

<b>Cybersecurity for Network-Connectable Products</b>	UL-2900-2-2	
<b>cTUVus Marking</b>	IEC 61010-1 ed3.0 (2010-06, CAN/CSA-C22.2 No. 61010-1-12 and ANSI/UL 61010-1-2012 )	
<b>RoHS</b>	2002/95/EC	
<b>REACH</b>	Regulation (EC) No 1907/2006	
<b>ISO : Equipment is designed and manufactured using ISO 9001 certified quality program</b>		ISO 9001:2008 certificate of conformance was awarded by an independent certification authority. The corresponding certificate, quality manual and quality policy are available on demand.
<b>CE Marking</b>	2006/95/EC Low Voltage Directive 2004/108/CE EMC Directive 2006/1907(EC) (REACH) 2011/65/EU (ROHS)	
<b>Substation Grade</b>	IEC 61850-3 ed2.0(2013)  IEEE Std 1613™-2009 IEEE Std 1613a™-2011 IEEE Std 1613.1™-2013 IEC 60255-1 ed1.0 (2009)	EMC : Class 2, Profile 2 Location : G, H, P Signal connections : l, f, p, h Mechanical: Class 2  Class 2 on all ports (error free), Profile 2 Zone A & B  Zone A & B

**Table 14. Substation-grade Compliancy Notes**

Compliancy element	Notes
IEC 61850-3 ed2.0	<p>The SMP IO-2230 platform is a communication device designed to achieve the highest immunity required in power stations to provide local, field and high voltage signal port connections. It can be installed in low, medium and high voltage substations, in any weather-protected unconditioned environment.</p> <p>It meets or surpasses IEC 61850-3 ed2.0. A class 2 is achieved with the Ethernet optical LC link.</p> <p>Due to the importance of selecting good cable quality, EMC test has been performed with EATON cables.</p> <p>The SMP IO-2230 platform compliance with the IEC 61850-3 standard was validated by an independent certified testing laboratory. The compliance test reports are available on demand.</p>
IEEE Std 1613™-2009 IEEE Std 1613a™-2011 IEEE Std 1613.1™-2013	<p>The SMP IO-2230 platform can be installed in Zone A&amp;B. It also meets or surpasses IEEE Std 1613 requirements as Class 2 networking device for Ethernet communications (LC fiber-optic).</p> <p>Due to the importance of selecting good cable quality, EMC test has been performed with EATON cables.</p> <p>The SMP IO-2230 platform compliance with the IEEE 1613 standard was validated by an independent certified testing laboratory. The compliance test reports are available on demand.</p>
IEC 60255-1	<p>The SMP IO-2230 platform also meets or surpasses IEC 60255-1. Per IEC 60255-26 the SMP IO-2230 platform is a command &amp; control device and is compliant to be installed in Zone A &amp; B.</p>
cTUVus	<p>The SMP IO-2230 platform is cTUVus marked. It ensures the end user that uses the SMP IO-2230 platform is safe.</p> <p>The SMP IO-2230 platform cTUVus certification was validated by an independent certified testing laboratory. The marking reports are available on demand.</p>

## Type test details

This section presents all tests that were conducted on the SMP IO-2230 platform.

**Table 15. Type Tests**

<b>Communication profile</b>	Profile 2 (IEC) Profile 3 (IEEE)	Heavy load on all communication ports with error free (Class 2).
<b>IEC 61850-3 ed2.0 (2013)</b>		
<b>Electromagnetic Compatibility (EMC)</b>		
<b>Conducted Emissions</b>	CISPR 32 (2015) FCC part 15 (2016) subpart B ICES-003 (2016)	Class A 150 kHz – 30 MHz
<b>Radiated Emissions</b>	CISPR 32 (2015) FCC part 15 (2016) subpart B ICES-003 (2016)	Class A 30 MHz – 6 GHz
<b>Harmonic Current Emission Limits</b>	EN61000-3-2 (2014)	Class A
<b>Voltage Fluctuations and Flicker Limitations</b>	EN61000-3-3 (2013)	Observation period for Pst: 10 min Observation period for Plt: 120 min
<b>Electrostatic Discharge Immunity</b>	IEC 61000-4-2 (2008)	Contact : ±6 kV Air : ±8 kV
<b>Radiated Electromagnetic Field Immunity</b>	IEC 61000-4-3 (2006) A1 (2008) A2 (2010)	Frequency sweep 80 MHz – 1 GHz : 20 V/m 1 GHz – 3 GHz : 10 V/m Spot frequencies 80 MHz, 160 MHz, 380 MHz, 450 MHz, 900 MHz, 1850 MHz, 2150 MHz: 10 V/m
<b>Electrical Fast Transient Immunity</b>	IEC 61000-4-4 (2012)	Power: ±4 kV / 5 kHz I/O ports: ±4 kV / 5 kHz Communication ports : ±4 kV / 5 kHz
<b>Surge Immunity</b>	IEC 61000-4-5 (2014)	Power: ±4 kV L-PE / ±2 kV L-L I/O ports: ±4 kV Communication Ports: ±4 kV
<b>Conducted Immunity</b>	IEC 61000-4-6 (2013)	Power : 10V I/O Ports : 10V Communication Ports : 10V
<b>Power Frequency Magnetic Field Immunity</b>	IEC 61000-4-8 (2009)	Continuous field : 100 A/m, 50 Hz & 60 Hz Short duration field : 1000 A/m, 50 Hz & 60 Hz
<b>Voltage Dips, Short Interruptions and Voltage Variation Immunity</b>	IEC 61000-4-11 (2004)	Voltage dips: 0% Un / 5 cycles 70% Un / cycle
<b>Conducted Common Mode Disturbances in the Frequency Range 0Hz-150kHz</b>	IEC 61000-4-16 (2015)	Continuous: 30 Vrms , 50 Hz & 60 Hz Short duration: 300 Vrms, 50 Hz & 60 Hz Variation 15 Hz – 150 Hz: level 4
<b>Ripple on DC Input Power Port Immunity</b>	IEC 61000-4-17 (1999) A1 (2002) A2 (2009)	% of nominal DC voltage: 15 % Test duration: 10 min
<b>Damped Oscillatory Wave Immunity</b>	IEC 61000-4-18 (2006) A1 (2010)	2.5 kV common mode 2.5 kV differential mode Oscillation Frequency = 1 MHz
<b>Voltage Dips, Short Interruptions and Voltage Variation on DC Power Port Immunity</b>	IEC 61000-4-29 (2000)	Voltage dips: 40% Un during 100 ms 70% Un during 100 ms Voltage short interruptions: 0% during 200 ms 0% during 5s
<b>Protective bonding resistance</b>	IEC 61850-3 ed2.0 (2013)	20 A < 0.1A
<b>Climatic Environment Conditions</b>		
<b>Dry heat &amp; Operational Storage</b>	IEC 60068-2-2 (2007) Test Bd, Bb	Bd 85°C, 16 hr Operational, including warm boot Bb 85°C, 16 hr Storage
<b>Cold Operational &amp; Storage</b>	IEC 60068-2-1 (2007) Test Ad, Ab	Ad -40°C, 16 hr Operational, including cold boot Ab -40°C, 16 hr Storage
<b>Damp Heat, Steady State</b>	IEC 60068-2-78 (2001) Test Cab	40°C, 93%, 10 days
<b>Damp Heat, Cyclic</b>	IEC 60068-2-30 (2005) Test Db	40°C, 2 cycles (12 hr + 12 hr) Lower temp 25°C, 97% RH Upper temp 55°C, 93% RH

Table 15. Type Tests (continued)

<b>Change of temperature</b>	IEC 60068-2-14 (2009) Test Nb	-40°F + 185°F (-40°C + 85°C) 5 cycles, 1°C/min
<b>Mechanical Environmental Conditions</b>		
<b>Sinusoidal Vibration Endurance &amp; Response</b>	IEC 60255-21-1 (1988)	Endurance 20 cycles, 2g, 10-150 Hz, 3 axes Response: 1 cycle, 1g, 10 – 150 Hz, 3 axes
<b>Shock-Bump Endurance &amp; Response</b>	IEC 60255-21-2 (1988)	Endurance 30 cycles, 11 ms, 3 impulsions, 3 axes Response: 10g, 11 ms, 3 impulsions, 3 axes
<b>Sinusoidal Vibration - Seismic</b>	IEC 60255-21-3 (1993)	Class 2, method A X = 7.5 mm (2g), Y = 3.5 mm (1g)
<b>Safety</b>		
<b>Product Safety requirements</b>	IEC 61850-3 (2013): IEC 60255-27 (2013) IEC 69529 (2013) IEC 61180-1 (1992) IEC 60664-1 (2007) IEC 60695-11-10 (2013)	The product SMP IO-2230 platform is certified cTUVus on IEC 61010-1 for the safety requirement.
<b>IEEE 1613 (2009) + AMD (2011) + IEEE 1613.1 (2013)</b>		
<b>Electromagnetic Compatibility (EMC)</b>		
<b>Electrostatic Discharge Immunity</b>	C37.90.3 (2001)	Contact : ±8 kV Air : ±15 kV
<b>Radiated Electromagnetic Field Immunity</b>	C37.90.2 (2004)	80 MHz – 1 GHz: 20 V/m 1 GHz – 3 GHz: 10 V/m  Spot frequencies: 80 MHz, 160 MHz, 450 MHz, 900 MHz 20 V/m (AM) Spot frequencies: 900 MHz 20 V/m (PM) Spot frequencies: 900 MHz, 1.6 GHz & 3.8 GHz 10 V/m (AM)  Spot frequencies: 1.732 GHz, 1.8 GHz, 2.31GHz, 2.45 GHz, 5.8 GHz 8.5 V/m (PM)
<b>SWC : Fast Transient Waveform</b>	C37.90.1 (2002)	Power: ±4 kV / 2.5 kHz I/O Ports: ±4 kV Communication Ports: ±4kV
<b>Surge Immunity</b>	EC 61000-4-5 (2014)	Power: ±4 kV L-PE / 2 kV I/O Ports: ±4 kV / 2.5 kHz Communication Ports: ±4kV / 2.5kHz
<b>Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields</b>	IEC 61000-4-6 (2013)	Power: 10 Vrms I/O Ports: 10 Vrms Communication Ports: 10 Vrms
<b>Power Frequency Magnetic Field Immunity</b>	IEC 61000-4-8 (2009)	Continuous field : 100 A/m / 50 Hz & 60 Hz Short duration field : 1000 A/m / 50 Hz & 60 Hz
<b>Damped Oscillatory Magnetic Field Immunity Test</b>	IEC 61000-4-10 (1993) A1 (2000)	Field Strength: 100 A/m Oscillation Frequency: 100 kHz & 1 MHz
<b>Conducted Common Mode Disturbances in the Frequency Range 0Hz-150kHz</b>	IEC 61000-4-16 (2015)	Continuous: 30 Vrms / 60 Hz / 50 Hz Short duration: 300 Vrms / 60 Hz / 50 Hz Variation 15 Hz-150 kHz: level 4
<b>Ripple on DC Input Power Port Immunity</b>	IEC61000-4-17 (1999) A1 (2002) A2 (2009)	% of nominal DC voltage : 15 % Test duration : 1 min
<b>SWC : Oscillatory Waveform</b>	C37.90.2 (2002)	2.5 kV common mode 2.5 kV differential mode Oscillation Frequency: 1 MHz
<b>Impulse Voltage Withstand Test</b>	IEC60255-5 (2000)	All ports: ±4 kV
<b>Dielectric Test</b>	IEC60255-5 (2000)	Universal Supply 24 - 250 VDC: 2 kVrms Enet: 1.5 kVrms IRIG-B In Demodulated: 1.5 kVrms CPU Relay: 2.0 kVrms BI (Binary Input): 2.0 kVrms HA1 (Analog Input): 2.0 kVrms HBO (Hybrid Binary Output): 2.0 kVrms BO (Binary Output): 2.0 kVrms
<b>Climatic Environment Conditions</b>		
<b>Dry heat Operational &amp; Storage</b>	IEC 60068-2-2 (2007) Test Bd, Bb	Bd 85°C, 16 hr Operational, including warm boot Bb 85°C, 16 hr Storage
<b>Cold Operational &amp; Storage</b>	IEC 60068-2-1 (2007) Test Ad, Ab	Ad -40°C, 16 hr Operational including cold boot Ab -40°C, 16 hr Storage
<b>Damp Heat, Steady state</b>	IEC 60068-2-78 (2012) Test Cab	40°C, 93 %, 10 days

Table 15. Type Tests (continued)

<b>Damp heat, cyclic</b>	IEC 60068-2-30 (2005) Test Db	40°C, 2 cycles (12 hr + 12 hr) Lower temp 25°C, 97% RH Upper temp 55°C, 93% RH
<b>Mechanical Environmental Conditions</b>		
<b>Sinusoidal Vibration Endurance &amp; Response</b>	IEC 60255-21-1 (1988)	Endurance: 20 cycles, 2g, 10 -150 Hz, 3 axes Response: 1 cycle, 1g, 10 - 150 Hz, 3 axes
<b>Shock-Bump Endurance &amp; Response</b>	IEC 60255-21-2 (1988)	Endurance: 30g, 11 ms, 3 impulses, 3 axes Response: 10g, 11 ms, 3 impulses, 3 axes
<b>Free fall</b>	IEC 60068-2-31 (2008)	1m with packaging
<b>IEC 60255-1 series</b>		
<b>Electromagnetic Compatibility (IEC 60255-26 (2013))</b>		
<b>RF radiated emission</b>	CISPR32 FCC part 15 (2016) subpart B ICES-003 (2016)	Class A 150 kHz - 30 MHz
<b>RF conducted emission</b>	CISPR32 FCC part 15 (2016) subpart B ICES-003 (2016)	Class A 30 MHz - 6 GHz
<b>Electrostatic Discharge Immunity</b>	IEC 61000-4-2 (2008)	Contact: ±6 kV Air : ±8 kV
<b>RF electromagnetic field immunity test</b>	IEC 61000-4-3 (2006) A1 (2007) A2 (2010)	80MHz-1GHz: 20 V/m 1GHz-3GHz: 10 V/m  Spot frequencies: 80MHz, 160MHz, 380MHz, 450MHz, 900MHz, 1850MHz, 2150MHz: 10V/m
<b>Electrical Fast Transient Immunity</b>	IEC 61000-4-4 (2012)	Power: ±4 kV / 5 kHz I/O Ports: ±4 kV / 5 kHz Communication Ports: ±4 kV / 5 kHz
<b>Surge Immunity</b>	IEC 61000-4-5 (2014)	Power: ±4 kV L-PE / ±2 kV L-L I/O Ports: ±4 kV Communication Ports: ±4 kV
<b>Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields</b>	IEC 61000-4-6 (2013)	Power : 10 Vrms I/O ports : 10 Vrms Communication ports : 10 Vrms
<b>Power Frequency Magnetic Field Immunity</b>	IEC 61000-4-8 (2009)	Continuous field: 100 A/m, 50 Hz & 60 Hz Short duration field : 1000 A/m, 50 Hz & 60 Hz
<b>Voltage Dips, Short Interruptions and Voltage Variation Immunity</b>	IEC 61000-4-11 (2004)	Voltage dips: 0% Un: 0.5 to 25 cycles 40% Un / 10 cycles (at 50 Hz) 40% Un / 12 cycles (at 60 Hz) 70% Un / 25 cycles (at 50 Hz) 70% Un / 30 cycles (at 60 Hz)  Short interruptions: 0% Un during 250 cycles (at 50 Hz) 0% Un during 300 cycles (at 60 Hz)
<b>Conducted Common Mode Disturbances in the Frequency Range 0Hz-150kHz</b>	IEC 61000-4-16 (2015)	Continuous: 30 Vrms, 60 Hz/50 Hz Short duration: 300 Vrms, 60 Hz/50 Hz Variation 15 Hz - 150 kHz: level 4
<b>Ripple on DC Input Power Port Immunity</b>	IEC 61000-4-17 (1999) A1 (2002) A2 (2009)	% of nominal DC voltage: 15 % Test duration: 1 min
<b>Damped Oscillatory Wave Immunity</b>	IEC 61000-4-18 (2006) A1 (2010)	2.5 kV common mode 2.5 kV differential mode Oscillation Frequency: 1 MHz
<b>Voltage Dips, Short Interruptions and Voltage Variation on DC Power Port Immunity</b>	IEC 61000-4-29 (2000)	Voltage dips: 40% Un during 200 ms 70% Un during 500 ms  Voltage interruptions : 0% during 5s
<b>Gradual shut-down/start-up for DC power supply</b>	IEC 60255-26 (2013)	≥0.8 Un to 0V to ≥0.8 Un
<b>Impulse Voltage Withstand Test</b>	IEC60255-5 (2000)	All ports: ±4 kV

**Table 15. Type Tests (continued)**

<b>Dielectric Test</b>	IEC60255-5 (2000)	Universal Supply 24 - 250 VDC: 2 kVrms Enet: 1.5 kVrms IRIG-B In Demodulated: 1.5 kVrms CPU Relay: 2.0 kVrms BI (Binary Input): 2.0 kVrms HAI (Analog Input): 2.0kVrms HBO (Hybrid Binary Output): 2.0 kVrms BO (Binary Output): 2.0 kVrms
<b>Protective Bonding Resistance</b>	IEC60255-1 (2009)	20A < 0.1A
<b>Climatic Environment Conditions</b>		
<b>Dry heat Operational &amp; Storage</b>	IEC 60068-2-2 (2007) Test Bd, Bb	Bd 85°C, 16 hr Operational, including warm boot Bb 85°C, 16 hr Storage
<b>Cold Operational &amp; Storage</b>	IEC 60068-2-1 (2007) Test Ad, Ab	Ad -40°C, 16 hr Operational, including cold boot Ab -40°C, 16 hr Storage
<b>Damp heat, steady state</b>	IEC 60068-2-78 (2001) Test Cab	40°C, 93%, 10 days
<b>Damp heat, cyclic</b>	IEC 60068-2-30 (2005) Test Db	40°C, 2 cycles (12 hr + 12 hr) Lower temp 25°C, 97% RH Upper temp 55°C, 93% RH
<b>Change of temperature</b>	IEC 60068-2-14 (2009) Test Nb	-40°F + 185°F (-40°C +85°C) 5 cycles, 1 °C/min
<b>Mechanical Environmental Conditions</b>		
<b>Sinusoidal Vibration Endurance &amp; Response</b>	IEC 60255-21-1 (1988)	Endurance: 20 cycles, 2g, 10 -150 Hz, 3 axes Response: 1 cycle, 1g, 10 - 150 Hz, 3 axes
<b>Shock-Bump Endurance &amp; Response</b>	IEC 60255-21-2 (1988)	Endurance: 30g, 11 ms, 3 impulses, 3 axes Response: 10g, 11 ms, 3 impulses, 3 axes
<b>Sinusoidal Vibration - Seismic</b>	IEC 60255-21-3 (1993)	Class 2, method A X = 7.5 mm (2g) Y = 3.5 mm (1g)
<b>Product Safety</b>		
<b>Product safety requirements</b>	IEC 60255-27 (2013)	The product SMP IO-2230 platform is certified cTUVus on IEC 61010-1 for the safety requirement.

The SMP IO-2230 platform is rugged, reliable, and tailored to our customer’s requirements. It is easy to setup and use. Eaton has decades of experience in substation-grade platforms design for grid automation systems, making our SMP IO-2230 a product line that utilities can rely on.

## Temperature derating and resistor

Due to the large number of different configurations, Eaton provides a Microsoft Excel™ calculator tool in order to enable our customers to easily calculate the total power in the device as well as the operational maximum temperature allowed, according to a specific SMP IO-2230 platform configuration.

The tool also allows to calculate and resolve the resistor value according to the current range for the analog inputs. The calculator tool can be downloaded from the web site, in the Resources page of the product.

Following are some captures taken from the tool for two typical SMP IO-2230 platform configurations. The blue fields correspond to values entered or selected by the customer and the grey fields on the right side of the table contain the calculated results.

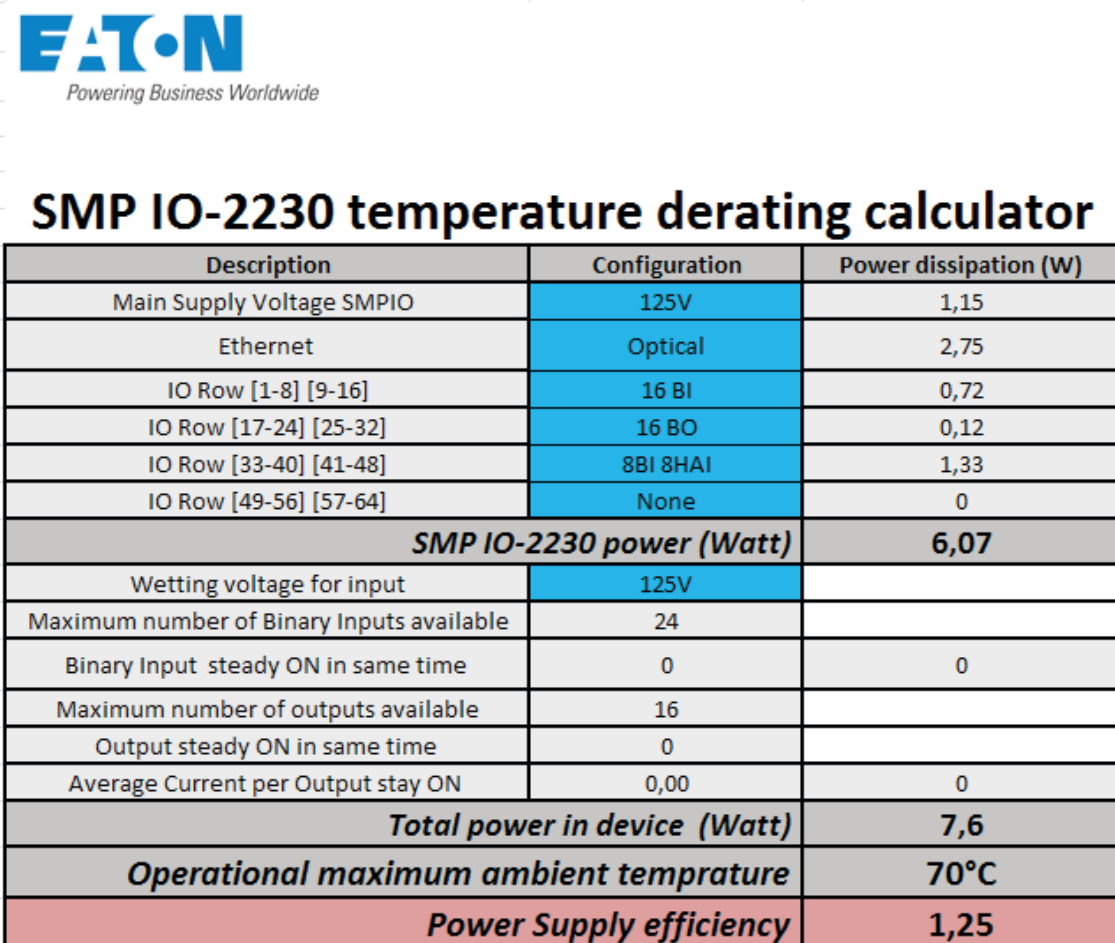
Eaton provides three calculator on the tool, they are used:

- to calculate the permitted operation temperature and the power consumption of the device
- to calculate the resistor value for a specific current range for analog inputs
- to resolve the current range according to a resistor value for analog inputs

## Temperature derating

To be compliant with the IEC 61010-1 certification, the SMP IO-2230 platform can be used within the temperature range that is function of the total power dissipated in the unit, as per the result of the table or in the Microsoft Excel™ calculator tool.

According to the standard, the SMP IO-2230 platform can support operating temperatures between -40°F and +158°F (-40°C and +70°C).



Description	Configuration	Power dissipation (W)
Main Supply Voltage SMPPIO	125V	1,15
Ethernet	Optical	2,75
IO Row [1-8] [9-16]	16 BI	0,72
IO Row [17-24] [25-32]	16 BO	0,12
IO Row [33-40] [41-48]	8BI 8HAI	1,33
IO Row [49-56] [57-64]	None	0
<b>SMP IO-2230 power (Watt)</b>		<b>6,07</b>
Wetting voltage for input	125V	
Maximum number of Binary Inputs available	24	
Binary Input steady ON in same time	0	0
Maximum number of outputs available	16	
Output steady ON in same time	0	
Average Current per Output stay ON	0,00	0
<b>Total power in device (Watt)</b>		<b>7,6</b>
<b>Operational maximum ambient temprature</b>		<b>70°C</b>
<b>Power Supply efficiency</b>		<b>1,25</b>

Figure 4. Temperature derating and power for typical application (Example 1)






## SMP IO-2230 temperature derating calculator

Description	Configuration	Power dissipation (W)
Main Supply Voltage SMPIO	48V	1,15
Ethernet	Copper	0,65
IO Row [1-8] [9-16]	16 BI	0,72
IO Row [17-24] [25-32]	16 BI	0,72
IO Row [33-40] [41-48]	16 HBO	0,12
IO Row [49-56] [57-64]	None	0
<b>SMP IO-2230 power (Watt)</b>		<b>3,36</b>
Wetting voltage for input	125V	
Maximum number of Binary Inputs available	32	
Binary Input steady ON in same time	0	0
Maximum number of outputs available	16	
Output steady ON in same time	0	
Average Current per Output stay ON	0,00	0
<b>Total power in device (Watt)</b>		<b>5,0</b>
<b>Operational maximum ambient temprature</b>		<b>70°C</b>
<b>Power Supply efficiency</b>		<b>1,5</b>

Figure 5. Temperature derating and power for typical application (Example 2)


### Analog input current range and resistance calculator



**SMP IO-2230 Analog Input  
Current range to resistor calculator**

Analog input range (± mA)	20	
Maximum resistor value allowed (Ω)		502
ADC resolution (uA)		305
<b>Power dissipated (W), single analog input</b>		<b>0,2</b>

Figure 6. Resistor calculation for a typical application (Example 1)




**SMP IO-2230 Analog Input  
Current range to resistor calculator**

Analog input range (± mA)	1	
Maximum resistor value allowed (Ω)		11031
ADC resolution (uA)		15
<b>Power dissipated (W), single analog input</b>		<b>0,01</b>

Figure 7. Resistor calculation for a typical application (Example 2)


### Analog input resistor to current range calculator



**SMP IO-2230 Analog Input  
Resistor to current range calculator**

Resistor value (Ω)	499	
Maximum analog input range (± mA)		20,13
ADC resolution (uA)		307
<b>Power dissipated (W), single analog input</b>		<b>0,2</b>

Figure 8. Current range resolution for a typical application (Example 1)



**SMP IO-2230 Analog Input  
Resistor to current range calculator**

Resistor value (Ω)	10000	
Maximum analog input range (± mA)		1,09
ADC resolution (uA)		17
<b>Power dissipated (W), single analog input</b>		<b>0,01</b>

Figure 9. Current range resolution for a typical application (Example 2)

### Dimension drawings

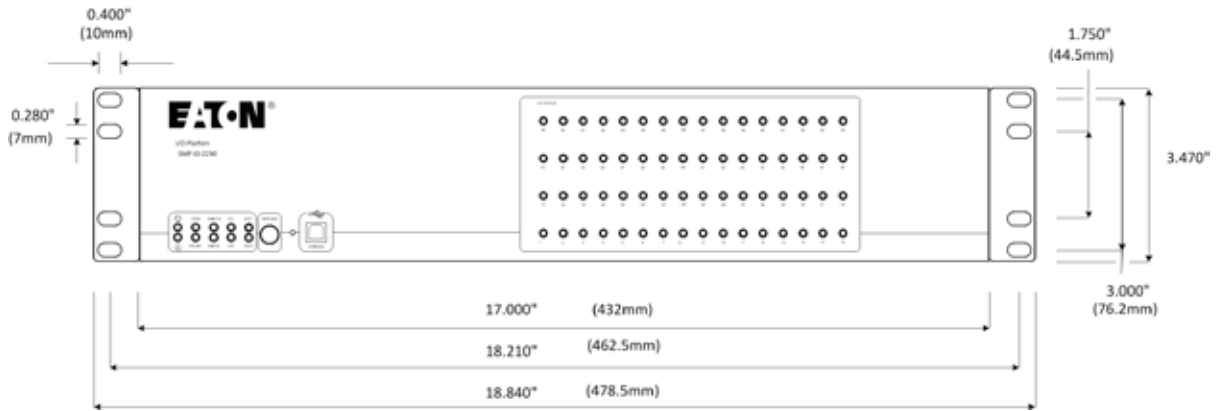


Figure 10. SMP IO-2230 platform front view

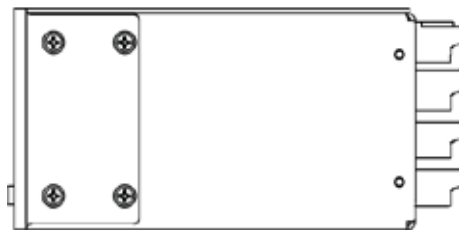


Figure 11. SMP IO-2230 platform side view

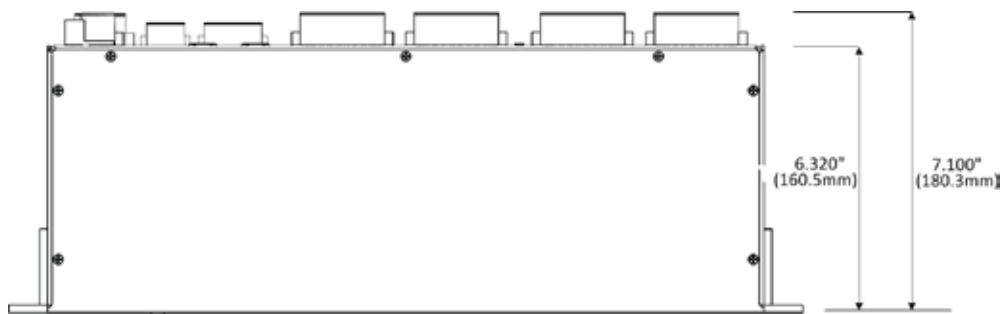


Figure 12. SMP IO-2230 platform top view

**Table 16. System Configuration Chart**

Description	SMP	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
<b>Family</b>																		
[I02] I/O Platform		I02																
<b>Format</b>																		
Rack mount 2U Base Unit		2																
<b>Model</b>																		
Basic - I/O Acquisition (Monitoring & Control)			3															
<b>Custom hardware configuration #1</b>																		
NONE				0														
<b>Custom hardware configuration #2</b>																		
NONE					0													
<b>Internal Flash Memory</b>																		
2 Gb NAND Flash						A												
<b>Ethernet</b>																		
2 Ethernet 10/100/1000 BASE-TX (basic)								C										
2 Ethernet 100 Optical, LC connectors (option)								L										
<b>Power Supply</b>																		
100-240 Vac, 24-250 Vdc									U									
<b>I/O group 1 to 16</b>																		
16 Binary Inputs										A								
16 Binary Outputs										E								
16 Binary Outputs High & Fast Current										F								
8 Binary Inputs; 8 Analog Inputs High Isolation										G								
<b>I/O group 17 to 32 (optional)</b>																		
NONE											0							
16 Binary Inputs											A							
16 Binary Outputs											E							
16 Binary Outputs High & Fast Current											F							
8 Binary Inputs; 8 Analog Inputs High Isolation											G							
<b>I/O group 33 to 48 (optional, available only if I/O 1 to 32 are populated)</b>																		
NONE												0						
16 Binary Inputs												A						
16 Binary Outputs												E						
16 Binary Outputs High & Fast Current												F						
8 Binary Inputs; 8 Analog Input High Isolation												G						
<b>I/O group 49 to 64 (optional, available only if I/O 1 to 48 are populated)</b>																		
NONE													0					
16 Binary Inputs													A					
16 Binary Outputs													E					
16 Binary Outputs High & Fast Current													F					
8 Binary Inputs ; 8 Analog Inputs High Isolation													G					
<b>Internal</b>																		
NONE														0				
<b>Internal</b>																		
NONE															0			
<b>Internal</b>																		
NONE																	0	

Table 16. System Configuration Chart (continued)

Description	SMP	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Software package</b>																	
SMP IO-2200 basic profile																	0
SMP IO-2200 61850 profile*																	A
SMP IO-2200 controller profile*																	B
SMP IO-2200 61850 & controller profile*																	C

\*: package coming soon

## Accessories & Cable options

Table 17. Accessories

Part number	Description
SMP-AICR-0001	Analog Input Current mode external Resistor option for $\pm 1$ mA, qty 1
SMP-AICR-0002	Analog Input Current mode external Resistor option for $\pm 2$ mA, qty 1
SMP-AICR-0003	Analog Input Current mode external Resistor option for $\pm 20$ mA, qty 1
SMP-JS-0001-FULL	Jumper Straps, 10 Pole, 5.08 mm, qty 1
SMP-JS-0001-CUT	Jumper Straps, 10 Pole, 5.08 mm, qty 1, Cut for SMP IO-2000 Pinout

Table 18. Cables

Part number	Description
<b>Shielded Power Cable</b>	
P-CABC-0303-00	AC Power Cable Shielded Nema 5-15-Wire * Must be used for Demo or laboratory only
P-CABC-0306-00	Power Cable Shielded Wire-Wire 1.8m
P-CABC-0318-10	Power Cable Shielded Wire-Wire 10m
P-CABC-0318-03	Power Cable Shielded Wire-Wire 3m
P-CABC-0318-01	Power Cable Shielded Wire-Wire 1m
P-CABC-0318-xx	Power Cable Shielded Wire-Wire xm
<b>USB cable</b>	
600AB0008R	Replacement USB Cable, Shielded Note: For USB Console Port
<b>Ethernet Multimode Fiber</b>	
<b>-LC-LC</b>	
P-CABC-0315-0050	Multimode Fiber OM1 62.5/125um LC-LC 50m
P-CABC-0315-0025	Multimode Fiber OM1 62.5/125um LC-LC 25m
P-CABC-0315-0010	Multimode Fiber OM1 62.5/125um LC-LC 10m
P-CABC-0315-0003	Multimode Fiber OM1 62.5/125um LC-LC 3m
P-CABC-0315-0001	Multimode Fiber OM1 62.5/125um LC-LC 1m
P-CABC-0315-xxxx	Multimode Fiber OM1 62.5/125um LC-LC xm
<b>-ST-LC</b>	
P-CABC-0316-0050	Multimode Fiber OM1 62.5/125um ST-LC 50m
P-CABC-0316-0025	Multimode Fiber OM1 62.5/125um ST-LC 25m
P-CABC-0316-0010	Multimode Fiber OM1 62.5/125um ST-LC 10m
P-CABC-0316-0003	Multimode Fiber OM1 62.5/125um ST-LC 3m
P-CABC-0316-0001	Multimode Fiber OM1 62.5/125um ST-LC 1m
P-CABC-0316-xxxx	Multimode Fiber OM1 62.5/125um ST-LC xm

**Table 18. Cables (continued)**

<b>Ethernet RJ45 Shielded Cable</b>	
P-CABC-0310-025	Copper Ethernet Cable RJ45 CAT6 25m
P-CABC-0310-010	Copper Ethernet Cable RJ45 CAT6 10m
P-CABC-0310-003	Copper Ethernet Cable RJ45 CAT6 3m
P-CABC-0310-001	Copper Ethernet Cable RJ45 CAT6 1m
P-CABC-0310-xxx	Copper Ethernet Cable RJ45 CAT6 xm
<b>DB9 Serial Shielded Cable</b>	
<b>RS-485 2-wires + IRIG-B shielded cable DB9-Wires</b>	
P-CABC-0309-0010	RS485-4wires Serial Cable DB9M-Wire 10m
P-CABC-0309-0003	RS485-4wires Serial Cable DB9M-Wire 3m
P-CABC-0309-0001	RS485-4wires Serial Cable DB9M-Wire 1m
P-CABC-0309-xxxx	RS485-4wires Serial Cable DB9M-Wire xm
<b>Time Synchronization Shielded Cable</b>	
<b>4 Twisted Pairs Shielded cable : Irig-B ; RS-485 4-Wires/2-Wires Wire-Wire</b>	
P-CABC-0320-25	4 Twisted Pairs Cable Wire-Wire 25m
P-CABC-0320-10	4 Twisted Pairs Cable Wire-Wire 10m
P-CABC-0320-03	4 Twisted Pairs Cable Wire-Wire 3m
P-CABC-0320-01	4 Twisted Pairs Cable Wire-Wire 1m
P-CABC-0320-xx	4 Twisted Pairs Cable Wire-Wire xm

Some cables can be provided with custom lengths, according to customer request. For a custom length-cable, use the required length to create your own cable code. Contact your Eaton representative to validate the maximum length for your application.

Example: a cable P-CABC-0310-xxx with 2 meters length will be P-CABC-0310-002 (always use length in meters)

Contact Eaton for other cable requirements.

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