Distributed I/O Platform
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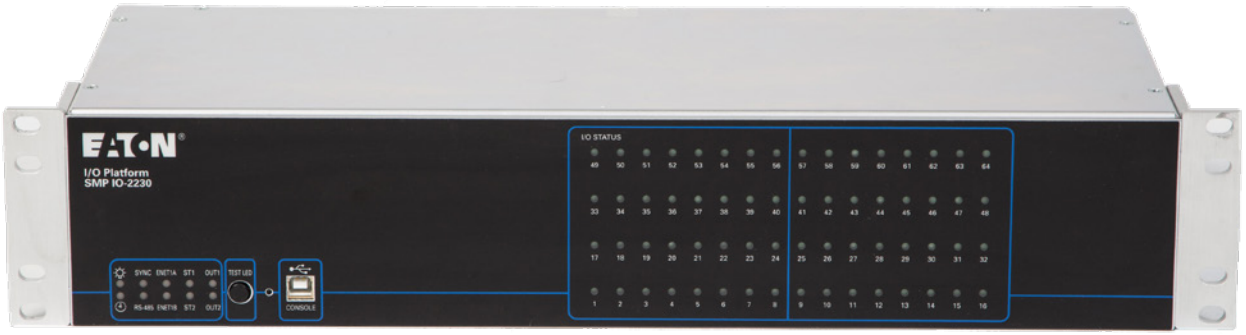
# SMP™ IO-2230 Distributed I/O Platform




## Contents



Powering Business Worldwide

## 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 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 and control (configurable)
- System status LEDs
- Multi-function button (Test LED and Local/Remote switch)
- 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 switching mechanism and state (logical points)
- Logs support (Security, System)

### Protocols

- IEC 61850 and IEC 61850 GOOSE
- DNP3
- Coming soon Protocol: Modbus®
- 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-2900-1 for firmware version 2.0
- 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.

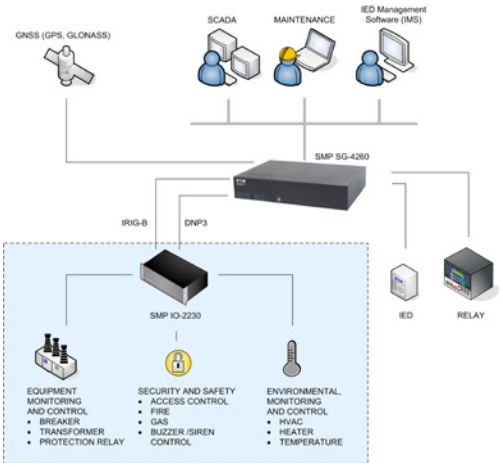



**Figure 1. Typical application, deployed behind an SMP Gateway automation platform**

## 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<br>16 BO (relays)<br>16 HBO<br>8 BI and 8 HAI |
| 3 | [33,40] and [41,48] | |
| 2 | [17,24] and [25,32] | |
| 1 (bottom) | [1,8] and [9,16] | |

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
- Pulse train command 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

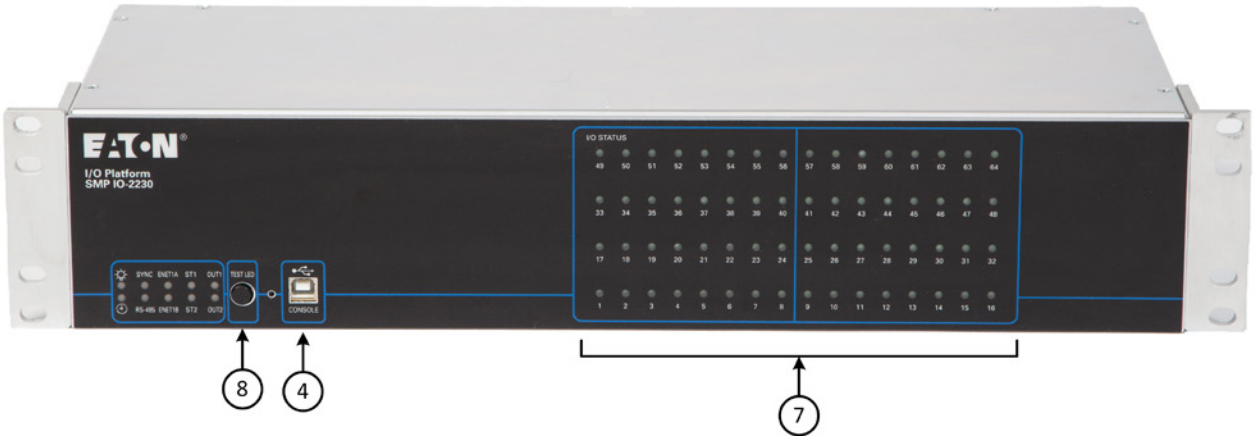



**Figure 2. SMP IO-2230 platform front view**

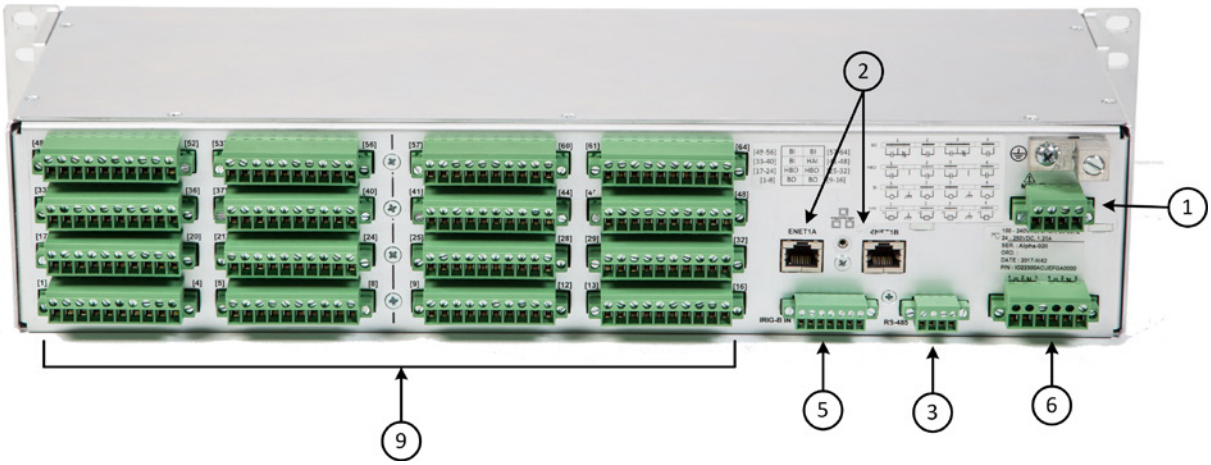



**Figure 3. SMP IO-2230 platform rear view**

## 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)**
- Test LED and Local/Remote 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<br>16 BO (relays)<br>16 HBO<br>8 BI and 8 HAI |
| 3 | [33,40] and [41,48] | |
| 2 | [17,24] and [25,32] | |
| 1 (bottom) | [1,8] and [9,16] | |

**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**

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

**Table 2. Power Supply**

| **Universal Power Supply** | | |
|---|---|---|
| **Note:** The power cable is not shipped with the device. The cable must be ordered separately or supplied by the customer. Refer to section **Accessories and Cables options** for details about the power cable. | | |
| **Specifications** | | |
| Rated supply voltage<br>Input voltage range<br>Frequency range<br>Inrush current<br><br><br>Power consumption<br><br>Dielectric | <br>100–240 Vac / 24–250 Vdc<br>88–264 Vac / 19.2–287.5 Vdc<br>50 / 60 Hz<br>40 A at 28 Vdc (t<1 ms)<br>110 A at 125 Vdc (t<1 ms)<br>160 A at 120 Vac (t<1 ms)<br>30 W (max)<br><br>2000 Vrms Dielectric | <br><br><br><br><br><br>100–240 Vac, 0.6 A<br>24–250 Vdc, 1.25 A |
| **Terminal block power**<br>Wire size<br><br><br>Wire screw max torque | 4-pin<br><br>12–30 AWG solid wire<br>12–30 AWG stranded wire<br><br>4 lbf-in (0.44 N-m) | Jumper MOV are installed at the factory on power supply's terminal block connectors (pin 1-2) |
| **Internal fuses** | 2 x 3.15 A TL fuses | Not serviceable<br>Fuse on both L(+) and N(-) |
| **Ground lug**<br>Wire size | External ground lug on rear panel<br>14–2 AWG | |
| **Protection** | 300 Vac/385 Vdc, 60 J **Differential** MOV Protection<br><br>300 Vac/385 Vdc, 60 J **Common** MOV Protection by external jumper placed on terminal block connectors (pin 1-2) | The SMP IO-2230 platform requires the MOV protection 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**

| | | |
|---|---|---|
| **2 Ethernet Ports** | 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<br>Multimode 1300 nm |
| **Serial Port** | 1 x RS-485 terminal block connectors | |
| 2-wire RS-485 support (multidrop) | Up to 1200 m (4000 ft.)<br>32 devices and 115200 b/s | |
| Wire size | 16 - 28 AWG | |
| Wire screw maximum torque | 2.2 lbf-in (0.25 N-m) | |
| **Protection** | Differential mode TVS | 40 A 8.3 ms |

**Table 4. Auxiliary Port**

| | | |
|---|---|---|
| **USB**<br>USB 2.0 client (CONSOLE) | Type B connector (front panel) | |

**Table 5. Time Synchronization**

| | | |
|---|---|---|
| **Demodulated IRIG-B** | Via terminal block (rear panel) | Isolated |
| Input | 2 V high-level detection,<br>$V_{in}$ max up to 12 Vdc, Opto-isolated<br>IEEE 1344, C37.118, B002, B003, B004, B006, B007<br>Accuracy: ± 100 µs | Current sink at 5 V IRIG-B; 5 mA<br>Current sink at 10 V IRIG-B; 11 mA<br>Input impedance = 1000 Ω ± 10% |
| **Protection** | Differential mode TVS<br>2000 Vrms dielectric | 40 A 8.3 ms |
| **Terminal block IRIG-B** | | |
| Wire size | 16 - 28 AWG | |
| Wire screw maximum torque | 2.2 lbf-in (0.25 N-m) | |
| **Real-time clock (with battery backup)** | Drift: ± 10 sec/day on normal operating temperature range and ± 20 sec/day outside the operating temperature range, when unit is powered off.<br>Drift: < 3 sec/day on all temperature ranges when unit is running. | |

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

| | | |
|---|---|---|
| **2 Form C relays** | Normally open and normally closed relays contacts (NO/NC)<br>1st relay is pre-configured for system health monitoring.<br>Both relays are available for system applications and can be activated through a system data point. | 8A 250 Vac / 24 Vdc resistive<br>0.2 A at 250 Vdc resistive<br>2000 Vrms dielectric<br>300 Vac / 385 Vdc, 60 J MOV<br>Protection across contacts |
| **Terminal block** | 6-pin connector | 2 Form-C contacts |
| Wire size | 12–30 AWG solid wire<br>12–30 AWG stranded wire | |
| Wire screw max torque | 4 lbf-in (0.44 N-m) | |

**Table 7. CPU**

| | |
|---|---|
| **Processor Architecture** | ARM |
| **Operating System** | LINUX |
| **Processor** | ARM® Cortex® -A8 600 MHz, 56 MB DDR3 RAM |
| **Memory** | 256 MB DDR3 RAM |

**Table 8. Binary Inputs**

| **Binary input module** | | |
|---|---|---|
| **Voltage range selectable by software** | 24–48 (± 19.2 to ± 60) Vdc<br>24–48 (± 19.2 to ± 60) Vac 50/60 Hz ± 5 Hz<br>110–125 Vdc<br>100–120 Vac 50/60 Hz ± 5 Hz | On: ±19.2 – 60 Vdc, Off: ±7 Vdc<br>On: 15 – 60 Vac, Off: 5 Vac<br>On: ±88 – 150 Vdc, Off: ±18 Vdc<br>On: 70 – 150 Vac, Off: 20 Vac |
| **Current draw at nominal** | 24–48 Vdc | 2.5–5.4 mA, 0.26 W maximum |
| | 24–48 Vac | 2.6–5.5 mA, 0.26 W maximum |
| | 110–125 Vdc | 2.5–2.9 mA, 0.36 W maximum |
| | 100–120 Vac | 2.3–2.8 mA, 0.33 W maximum |
| **Sampling rate** | 500 µs | |
| **Debouncer delay** | Software configurable up to 127 ms | No hardware filter |
| **Protection** | 2000 Vrms dielectric | |
| | 300 Vac / 385 Vdc, 60 J differential MOV protection | |
| **Terminal Block Binary Input**<br>Wire size<br>Wire screw maximum torque | <br>12–30 AWG solid wire<br>4 lbf-in (0.44 N-m) | |

**Table 9. Binary Outputs (relays)**

| **Output relays** | Form C relays (all BO# odd)<br>Form A relays (all BO# even) | |
|---|---|---|
| **Protection** | 2000 Vrms dielectric<br>300 Vac/ 385 Vdc, 60 J MOV protection across contact pairs | |
| **Operating time** | Pickup 10 ms<br>Dropout 6 ms maximum | |
| **Electromechanical relay CSA rating** | 8 A at 24 Vdc resistive | All relay types |
| | 8 A at 250 Vac resistive | |
| | 10 A at 30 Vdc resistive | |
| | 10 A at 250 Vac resistive | |
| | 0.4 A at 125 Vdc resistive | |
| | 0.2 A at 250 Vdc resistive | |
| | 3 A at 250 Vac cos∅= 0.7 | |
| | ½ HP at 250 Vac, 1/3 HP at 125 Vac | |
| **Rated insulation voltage** | 250 Vrms | All relay types |
| **Maximum voltage** | 400 Vac / 250 Vdc | All relay types |
| **Continious carry** | 6 A @ 70 °C<br>4 A @ 85 °C | All relay types |
| **Continous carry AC/DC UL/CSA derating** | 5 A @ < 60 °C<br>2.5 A 60 °C to 70 °C | |
| **Minimum load** | 10 mA at 5Vdc | All relay types |
| **Thermal current rating DC** | 50 A for 1 second | All relay types |
| **Cycling capacity (1 cycle/second) per IEC 60255-0-20:1974** | 24 Vdc / 0.8 A L/R= 40 ms | All relay types |
| | 48 Vdc / 0.5 A L/R= 40 ms | |
| | 125 Vdc / 0.3 A L/R= 40 ms | |
| **Breaking capacity (10 000 operations) per IEC 60255-0-20:1974** | 24 Vdc / 0.8 A L/R= 40 ms | All relay types |
| | 48 Vdc / 0.5 A L/R= 40 ms | |
| | 125 Vdc / 0.3 A L/R= 40 ms | |
| **Terminal Block Binary Output**<br>Wire size<br>Wire screw maximum torque | <br>12–30 AWG solid wire<br>4 lbf-in (0.44 N-m) | |

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

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

**Table 11. Analog Inputs**

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

**Table 12. Accessories**

| | | |
|---|---|---|
| **Jumper straps** | 10 poles, 30 A, 5.08 mm, UL-94 V0 | |

**Table 13. Certification and standard compliancy**

| | | |
|---|---|---|
| **Cybersecurity for Network-Connectable Products** | UL-2900-1 for firmware version 2.0 | |
| **cTUVus Marking** | IEC 61010-1 ed3.0 (2010-06, CAN/CSA-C22.2 No. 61010-1-12 and ANSI/UL 61010-1-2012 ) | |
| **RoHS** | 2002/95/EC | |
| **REACH** | Regulation (EC) No 1907/2006 | |
| **ISO : Equipment is designed and manufactured using ISO 9001 certified quality program** | | 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. |
| **CE Marking** | 2006/95/EC Low Voltage Directive<br>2004/108/CE EMC Directive<br>2006/1907(EC) (REACH)<br>2011/65/EU (ROHS) | |
| **Substation Grade** | IEC 61850-3 ed2.0(2013)<br><br><br><br><br>IEEE Std 1613™-2009<br>IEEE Std 1613a™-2011<br>IEEE Std 1613.1 ™-2013<br>IEC 60255-1 ed1.0 (2009) | EMC :<br>Class 2, Profile 2<br>Location : G, H, P<br>Signal connections : I, f, p, h<br>Mechanical: Class 2<br><br>Class 2 on all ports (error free), Profile 2<br>Zone A & B<br><br>Zone A & B |

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

| Compliancy element | Notes |
|---|---|
| IEC 61850-3 ed2.0 | 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.<br>It meets or surpasses IEC 61850-3 ed2.0. A class 2 is achieved with the Ethernet optical LC link.<br>Due to the importance of selecting good cable quality, EMC test has been performed with EATON cables.<br>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. |
| IEEE Std 1613™-2009<br>IEEE Std 1613a™-2011<br>IEEE Std 1613.1™-2013 | The SMP IO-2230 platform can be installed in Zone A&B. It also meets or surpasses IEEE Std 1613 requirements as Class 2 networking device for Ethernet communications (LC fiber-optic).<br>Due to the importance of selecting good cable quality, EMC test has been performed with EATON cables.<br>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. |
| IEC 60255-1 | The SMP IO-2230 platform also meets or surpasses IEC 60255-1. Per IEC 60255-26 the SMP IO-2230 platform is a command & control device and is compliant to be installed in Zone A & B. |
| cTUVus | The SMP IO-2230 platform is cTUVus marked. It ensures the end user that uses the SMP IO-2230 platform is safe.<br>The SMP IO-2230 platform cTUVus certification was validated by an independent certified testing laboratory. The marking reports are available on demand. |

## Type test details

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

**Table 15. Type Tests**

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

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

| | | |
|---|---|---|
| **Change of temperature** | IEC 60068-2-14 (2009)<br>Test Nb | -40 °F + 185 °F (-40 °C + 85 °C)<br>5 cycles, 1 °C/min |
| **Mechanical Environmental Conditions** | | |
| **Sinusoidal Vibration Endurance & Response** | IEC 60255-21-1 (1988) | Endurance 20 cycles, 2 g, 10-150 Hz, 3 axes<br>Response: 1 cycle, 1 g, 10–150 Hz, 3 axes |
| **Shock–Bump Endurance & Response** | IEC 60255-21-2 (1988) | Endurance 30 cycles, 11 ms, 3 impulsions, 3 axes<br>Response: 10 g, 11 ms, 3 impulsions, 3 axes |
| **Sinusoidal Vibration - Seismic** | IEC 60255-21-3 (1993) | Class 2, method A<br>X = 7.5 mm (2 g), Y = 3.5 mm (1 g) |
| **Safety** | | |
| **Product Safety requirements** | IEC 61850-3 (2013):<br>IEC 60255-27 (2013)<br>IEC 60529 (2013)<br>IEC 61180-1 (1992)<br>IEC 60664-1 (2007)<br>IEC 60695-11-10 (2013) | The product SMP IO-2230 platform is certified cTUVus on IEC 61010-1 for the safety requirement. |
| **IEEE 1613 (2009) + AMD (2011) + IEEE 1613.1 (2013)** | | |
| **Electromagnetic Compatibility (EMC)** | | |
| **Electrostatic Discharge Immunity** | C37.90.3 (2001) | Contact : ±8 kV<br>Air : ±15 kV |
| **Radiated Electromagnetic Field Immunity** | C37.90.2 (2004) | 80 MHz–1 GHz: 20 V/m<br>1 GHz–3 GHz: 10 V/m<br><br>Spot frequencies:<br>80 MHz, 160 MHz, 450 MHz, 900 MHz 20 V/m (AM)<br>Spot frequencies: 900 MHz 20 V/m (PM)<br>Spot frequencies:<br>900 MHz, 1.6 GHz & 3.8 GHz 10 V/m (AM)<br><br>Spot frequencies:<br>1.732 GHz, 1.8 GHz, 2.31GHz, 2.45 GHz, 5.8 GHz 8.5 V/m (PM) |
| **SWC : Fast Transient Waveform** | C37.90.1 (2002) | Power: ±4 kV / 2.5 kHz<br>I/O Ports: ±4 kV<br>Communication Ports: ±4 kV |
| **Surge Immunity** | EC 61000-4-5 (2014) | Power: ±4 kV L-PE / 2 kV<br>I/O Ports: ±4 kV / 2.5 kHz<br>Communication Ports: ±4kV / 2.5kHz |
| **Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields** | IEC 61000-4-6 (2013) | Power: 10 Vrms<br>I/O Ports: 10 Vrms<br>Communication Ports: 10 Vrms |
| **Power Frequency Magnetic Field Immunity** | IEC 61000-4-8 (2009) | Continuous field : 100 A/m / 50 Hz & 60 Hz<br>Short duration field : 1000 A/m / 50 Hz & 60 Hz |
| **Damped Oscillatory Magnetic Field Immunity Test** | IEC 61000-4-10 (1993)<br>A1 (2000) | Field Strength: 100 A/m<br>Oscillation Frequency: 100 kHz & 1 MHz |
| **Conducted Common Mode Disturbances in the Frequency Range 0Hz-150kHz** | IEC 61000-4-16 (2015) | Continuous: 30 Vrms / 60 Hz & 50 Hz<br>Short duration: 300 Vrms / 60 Hz & 50 Hz<br>Variation 15 Hz-150 kHz: level 4 |
| **Ripple on DC Input Power Port Immunity** | IEC61000-4-17 (1999)<br>A1 (2002) A2 (2009) | % of nominal DC voltage : 15 %<br>Test duration : 1 min |
| **SWC : Oscillatory Waveform** | C37.90.2 (2002) | 2.5 kV common mode<br>2.5 kV differential mode<br>Oscillation Frequency: 1 MHz |
| **Impulse Voltage Withstand Test** | IEC60255-5 (2000) | All ports: ±4 kV |
| **Dielectric Test** | IEC60255-5 (2000) | Universal Supply 24-250 Vdc: 2 kVrms<br>Enet: 1.5 kVrms<br>IRIG-B In Demodulated: 1.5 kVrms<br>Auxiliary Relays (alarm relays): 2.0 kVrms<br>BI (Binary Input): 2.0 kVrms<br>HAI (Analog Input): 2.0 kVrms<br>HBO (Hybrid Binary Output): 2.0 kVrms<br>BO (Binary Output): 2.0 kVrms |
| **Climatic Environment Conditions** | | |
| **Dry heat Operational & Storage** | IEC 60068-2-2 (2007)<br>Test Bd, Bb | Bd 85 °C, 16 h Operational, including warm boot<br>Bb 85 °C, 16 h Storage |
| **Cold Operational & Storage** | IEC 60068-2-1 (2007)<br>Test Ad, Ab | Ad -40 °C, 16 h Operational including cold boot<br>Ab -40 °C, 16 h Storage |
| **Damp Heat, Steady state** | IEC 60068-2-78 (2012)<br>Test Cab | 40 °C, 93%, 10 days |

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

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

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

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

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**SMP IO-2230 temperature derating calculator**

| Description | Configuration | Power dissipation (W) |
|---|---|---|
| Main Supply Voltage SMPIO | 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 |
| ***SMP IO-2230 power (Watt)*** | | **6,07** |
| 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 |
| ***Total power in device (Watt)*** | | **7,6** |
| ***Operational maximum ambient temprature*** | | **70°C** |
| ***Power Supply efficiency*** | | **1,25** |

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

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## 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 |
| ***SMP IO-2230 power (Watt)*** | | **3,36** |
| 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 |
| ***Total power in device (Watt)*** | | **5,0** |
| ***Operational maximum ambient temprature*** | | **70°C** |
| ***Power Supply efficiency*** | | **1,5** |

**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 |
| **Power dissipated (W), single analog input** | | 0,2 |

**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 |
| **Power dissipated (W), single analog input** | | 0,01 |

**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 |
| **Power dissipated (W), single analog input** | | 0,2 |

**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 |
| **Power dissipated (W), single analog input** | | 0,01 |

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

## Dimension drawings

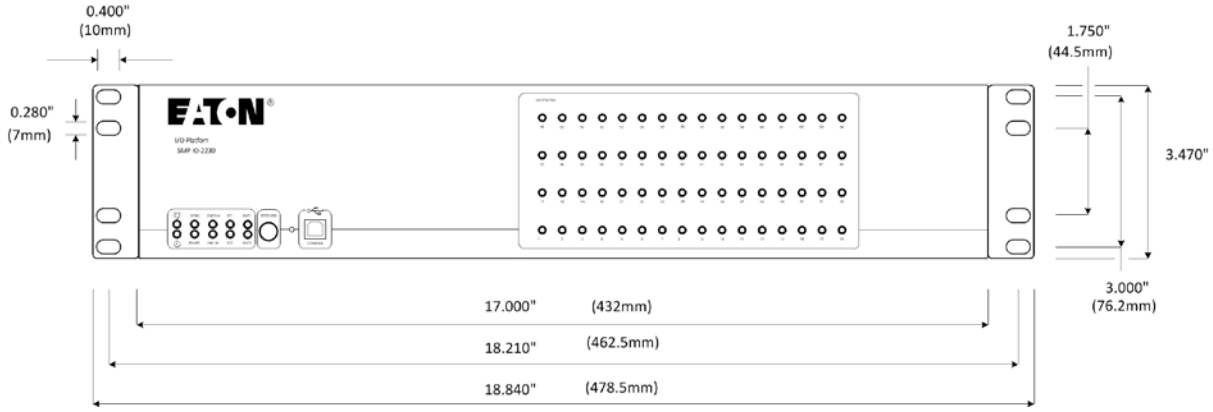


**Figure 10. SMP IO-2230 platform front view**

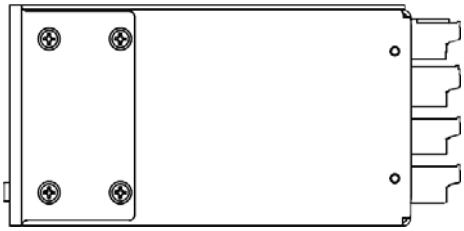

**Figure 11. SMP IO-2230 platform side view**

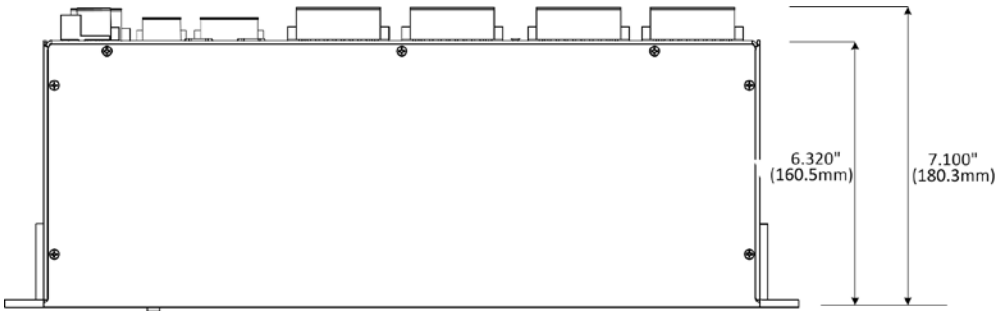


**Figure 12. SMP IO-2230 platform top view**

**Table 16. System Configuration Chart**

| Description | SMP | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Family** | | | | | | | | | | | | | | | | | |
| [IO2] I/O Platform | | IO2 | | | | | | | | | | | | | | | |
| **Format** | | | | | | | | | | | | | | | | | |
| Rack mount 2U Base Unit | | | 2 | | | | | | | | | | | | | | |
| **Model** | | | | | | | | | | | | | | | | | |
| Basic - I/O Acquisition (Monitoring & Control) | | | | 3 | | | | | | | | | | | | | |
| **Custom hardware configuration #1** | | | | | | | | | | | | | | | | | |
| NONE | | | | | 0 | | | | | | | | | | | | |
| **Custom hardware configuration #2** | | | | | | | | | | | | | | | | | |
| NONE | | | | | | 0 | | | | | | | | | | | |
| **Internal Flash Memory** | | | | | | | | | | | | | | | | | |
| 2 Gb NAND Flash | | | | | | | A | | | | | | | | | | |
| **Ethernet** | | | | | | | | | | | | | | | | | |
| 2 Ethernet 10/100/1000 BASE-TX (basic) | | | | | | | | C | | | | | | | | | |
| 2 Ethernet 100 Optical, LC connectors (option) | | | | | | | | L | | | | | | | | | |
| **Power Supply** | | | | | | | | | | | | | | | | | |
| 100-240 Vac, 24-250 Vdc | | | | | | | | | U | | | | | | | | |
| **I/O group 1 to 16** | | | | | | | | | | | | | | | | | |
| 16 Binary Inputs | | | | | | | | | | A | | | | | | | |
| 16 Binary Outputs | | | | | | | | | | E | | | | | | | |
| 16 Binary Outputs High & Fast Current | | | | | | | | | | F | | | | | | | |
| 8 Binary Inputs; 8 Analog Inputs High Isolation | | | | | | | | | | G | | | | | | | |
| **I/O group 17 to 32 (optional)** | | | | | | | | | | | | | | | | | |
| 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 | | | | | | |
| **I/O group 33 to 48 (optional, available only if I/O 1 to 32 are populated)** | | | | | | | | | | | | | | | | | |
| 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 | | | | | |
| **I/O group 49 to 64 (optional, available only if I/O 1 to 48 are populated)** | | | | | | | | | | | | | | | | | |
| 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 | | | | |
| **Internal** | | | | | | | | | | | | | | | | | |
| NONE | | | | | | | | | | | | | | 0 | | | |
| **Internal** | | | | | | | | | | | | | | | | | |
| NONE | | | | | | | | | | | | | | | 0 | | |
| **Internal** | | | | | | | | | | | | | | | | | |
| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Software package** | | | | | | | | | | | | | | | | | |
| SMP IO-2200 basic profile<br>• DNP3 Server<br>• IEC 61850 GOOSE (publisher/ subscriber)<br>• Basic SoftPLC capabilities | | | | | | | | | | | | | | | | | 0 |
| SMP IO-2200 61850 profile<br>• DNP3 Server<br>• IEC 61850 Server<br>• IEC 61850 GOOSE (publisher/ subscriber)<br>• Basic SoftPLC capabilities | | | | | | | | | | | | | | | | | A |

## Accessories & Cable options

**Table 17. Accessories**

| Part number | Description |
|---|---|
| SMP-AICR-0001 | Analog Input Current mode external Resistor option for ±1 mA, qty 1 |
| SMP-AICR-0002 | Analog Input Current mode external Resistor option for ±2 mA, qty 1 |
| SMP-AICR-0003 | Analog Input Current mode external Resistor option for ±20 mA, qty 1 |
| SMP-JS-0001-FULL | Jumper Straps, 10 Pole, 5.08 mm, qty 1 (covers 4 inputs) |
| 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 |
|---|---|
| **Shielded Power Cable** | |
| P-CABC-0303-00 | AC Power Cable Shielded Nema 5-15-Wire<br>* Must be used for Demo or laboratory only |
| P-CABC-0306-00 | Power Cable Shielded Wire-Wire 1.8 m |
| P-CABC-0318-10 | Power Cable Shielded Wire-Wire 10 m |
| P-CABC-0318-03 | Power Cable Shielded Wire-Wire 3 m |
| P-CABC-0318-01 | Power Cable Shielded Wire-Wire 1 m |
| P-CABC-0318-xx | Power Cable Shielded Wire-Wire x m |
| **USB cable** | |
| 600AB0008R | Replacement USB Cable, Shielded<br>Note: For USB Console Port |
| **Ethernet Multimode Fiber** | |
| **-LC-LC** | |
| P-CABC-0315-0050 | Multimode Fiber OM1 62.5/125um LC-LC 50 m |
| P-CABC-0315-0025 | Multimode Fiber OM1 62.5/125um LC-LC 25 m |
| P-CABC-0315-0010 | Multimode Fiber OM1 62.5/125um LC-LC 10 m |
| P-CABC-0315-0003 | Multimode Fiber OM1 62.5/125um LC-LC 3 m |
| P-CABC-0315-0001 | Multimode Fiber OM1 62.5/125um LC-LC 1 m |
| P-CABC-0315-xxxx | Multimode Fiber OM1 62.5/125um LC-LC x m |

**Table 18. Cables (continued)**

| -ST-LC | |
|---|---|
| P-CABC-0316-0050 | Multimode Fiber OM1 62.5/125um ST-LC 50 m |
| P-CABC-0316-0025 | Multimode Fiber OM1 62.5/125um ST-LC 25 m |
| P-CABC-0316-0010 | Multimode Fiber OM1 62.5/125um ST-LC 10 m |
| P-CABC-0316-0003 | Multimode Fiber OM1 62.5/125um ST-LC 3 m |
| P-CABC-0316-0001 | Multimode Fiber OM1 62.5/125um ST-LC 1 m |
| P-CABC-0316-xxxx | Multimode Fiber OM1 62.5/125um ST-LC x m |
| **Ethernet RJ45 Shielded Cable** | |
| P-CABC-0310-025 | Copper Ethernet Cable RJ45 CAT6 25 m |
| P-CABC-0310-010 | Copper Ethernet Cable RJ45 CAT6 10 m |
| P-CABC-0310-003 | Copper Ethernet Cable RJ45 CAT6 3 m |
| P-CABC-0310-001 | Copper Ethernet Cable RJ45 CAT6 1 m |
| P-CABC-0310-xxx | Copper Ethernet Cable RJ45 CAT6 x m |
| **DB9 Serial Shielded Cable** | |
| **RS-485 2-wires + IRIG-B shielded cable DB9-Wires** | |
| P-CABC-0309-0010 | RS485-2wires Serial Cable DB9M-Wire 10 m |
| P-CABC-0309-0003 | RS485-2wires Serial Cable DB9M-Wire 3 m |
| P-CABC-0309-0001 | RS485-2wires Serial Cable DB9M-Wire 1 m |
| P-CABC-0309-xxxx | RS485-2wires Serial Cable DB9M-Wire x m |
| **Time Synchronization Shielded Cable** | |
| **4 Twisted Pairs Shielded cable : Irig-B ; RS-485 4-Wires/2-Wires Wire-Wire** | |
| P-CABC-0320-25 | 4 Twisted Pairs Cable Wire-Wire 25 m |
| P-CABC-0320-10 | 4 Twisted Pairs Cable Wire-Wire 10 m |
| P-CABC-0320-03 | 4 Twisted Pairs Cable Wire-Wire 3 m |
| P-CABC-0320-01 | 4 Twisted Pairs Cable Wire-Wire 1 m |
| P-CABC-0320-xx | 4 Twisted Pairs Cable Wire-Wire x m |

Some cables can be provided with custom lenghts, 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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