

# SIC-A



## Redundancy Protocols Gateway (PRP/HSR)

### Multi-protocol conversor function

### Redbox function



- SIC-A provides any-to-any protocol conversion that permit the integration of equipment with proprietary and legacy protocols in a modern infrastructure with the most recent protocols and redundant topologies.
- SIC-A can work as a multi-protocol conversor, as an unmanaged Redbox or as a redundant protocol gateway.
- SIC-A can manage upto 3000 data points of the most common protocols (Modbus, IEC 60870, DLMS, DNP3,...) or upto 800 data points of advanced protocols as IEC 61850.
- The device provides with HSR (High-availability Seamless Redundancy) is one of the chosen redundancy protocols for the substation automation as per the IEC 61850 standard. This redundancy is the evolution of the existing Parallel Redundancy Protocol (PRP).
- It is especially suited for applications that demand high availability and very short switch over time because it provides zero recovery time in case of the failure of any component. A good example of application may be the protection of automatized electrical substations or the control of synchronized drives, for instance.

## Technical specifications

Main specifications	
Management	Easy Connect Configuration utility
System Protocols	TCP/IP, UDP/IP, SMTP, POP, HTTP, FTP, SNMP, ICMP, DHCP, BOOTP, Telnet, DNS, ARP, PPPoE, DDNS
Device Security	NERC/CIP Compliant, SSHv2
Communication Security	SSL based VPN tunnel using Blowfish/AES/3DES
Logic Programming	AND/OR/NOT/Bit SHIFT/Split/Index support for digital and analog data, Delay operations
Network Management	SNMP Agent
Protocol Support	IEC 60870-5-101/103/104, DNP3 serial/TCP, Modbus RTU/ASCII/TCP, IEC 62056-DLMS, IEC 61850, IEC 61400
Supported Data Point	IEC 61850: 800
	DNP3, IEC 60870, Modbus and other proprietary protocols: 3000
Devices Supported	20 (10 over serial RS-485 recommended)
Serial interfaces	1 or 2 RS-485 - Terminals and/or 1 or 2 RS-232- DB9 *
Ethernet interfaces	1 RJ45 or 1 LC SFP 100Base-FX 1300nm *
HSR/PRP interfaces**	2 RJ45 or 2 LC SFP 100Base-FX 1300nm *
Time Synchronization	NTC/SNTP/MEA, Protocol Specific (IEC 104,/DNP3, etc.) RTC on-board
Redundancy**	Unmanaged. Compliant implementation of both PRP (IEC 62439-3-4) and HSR (IEC 62439-3-5)

\* Model dependent

\*\* Redundant functionality and redundant ports will be disabled if SIC-A2 model is selected

Item	Unit	Value
Purpose of device	-	Protocol Gateway – Redbox – Protocol Redundant Gateway
Assembly (mounting) type	-	Mounted on standard 35 mm DIN bar and Wall mounting
Protection degree	-	IP20
Operating temperature range	°C	-40 to +85
Consumption	W	6 maximum
Auxiliary Power	Vdc/Vac	24*-110 / 48-230 ±20%
Weight	Kg	1
Diameter of adapters on terminals	mm2	0.5-2.5

## Selection & Ordering data SIC-A

SIC-A	Redundancy Protocols Gateway (PRP/HSR)									
										<b>FUNCTION</b>
										Redbox
										Protocol Gateway
										Redundant Protocol Gateway
										<b>POWER SUPPLY</b>
										24*-110 / 48-230 Vdc-Vac ±20%
										<b>ETHERNET PORT</b>
										RJ45
										RJ45 + SFP LC Connector
										<b>REDUNDANCY PORT</b>
										RJ45
										RJ45 + SFP LC Connector
										<b>SERIAL PORTS</b>
										RS232 (DB9) + RS-485 (Terminal)
										<b>REDUNDANCY TYPE</b>
										None
										HSR
										PRP
										<b>MASTER / CLIENT PROTOCOL</b>
										None
										Modbus RTU
										IEC 60870-5-103
										DNP3.0 Serial
										IEC 60870-5-101
										DLMS/COSEM
										IEC 61850
										IEC 60870-5-104
										2 Protocols
										<b>SLAVE/SERVER PROTOCOL</b>
										None
										IEC 61850
										DNP3.0 TCP/IP
										IEC 60870-5-104
										MODBUS TCP/IP
										IEC 60870-5-101
										2 Protocols
										<b>ADAPTATION</b>
										-

\* SIC-A Gateway using optical fiber will require a minimum voltage supply of 48 Vdc for its correct working.

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# SIC-E

Industrial Managed Gigabit Switch  
8 or 12-Port IEC61850-3 Certified



## Main characteristics

- The SIC-E Series is a highly reliable Gigabit Managed Ethernet Switch. Its IEC61850-3 compliance allows it to be core part in the IEC 61850 network in power substations and control centers.
- The IEEE1588 Precision Time Protocol capabilities allow the deployment of SIC-E Series in networks with stringent time Synchronization requirements. It can act as hw-assisted End-to-End transparent clock providing nanosecond-accurate correction-field packet-update and as a sw-assisted boundary clock.
- The device equips up to 8 10/100/1000BASE-T(X) RJ-45 ports and up to 4 1000BASE-X SFP ports. With its high performance, it provides network redundancy self-recovery mechanisms is less than 20ms on full load that enables the user to build a reliable network through a redundant ring topology. ERPS/STP/MSTP/RSTP/ /MRP (Client) and many other compatible rings are supported. With a Multifunctional web dashboard, its offers intelligent features such as Quality of service (QoS), Virtual LAN (VLAN), IGMP, IGMP Snooping, Port mirroring and security.
- The SIC-E is designed to be used in core power utilities. It provides dual redundant power inputs with Reverse Polarity Protection and two sets of relay that allow the user build up a stand-alone fault alarm system. Its wide operating temperature of -40 to 85°C and DIN-Rail mounting capacities make it suitable to be used in remote substations where harsh environment and reliability is an issue.

## Selection & Ordering data SIC-E

SIC-E	8 or 12-Port Industrial Managed Gigabit Switch	
0 1		<b>FUNCTION</b> 6 X 10/100/1000 BASE-T(X) ports and 2 x 1000 BASE-X SFP ports 8 X 10/100/1000 BASE-T(X) ports and 4 x 1000 BASE-X SFP ports
	0 1 2	<b>POWER SUPPLY</b> Dual 24-57 VDC input Dual 100-370 VDC input Dual 88-264 VAC input

Example of ordering code:

SIC-E	0	2	SIC-E 0 2
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## Technical specifications

Switch Properties	
Priority Queues	8
VLAN Table	4096
MAC-Based VLAN	512
VLAN ID Range	VID 1 to 4094
Trunk Group	4
Static IGMP Groups	128
Dynamic IGMP Groups	256
MAC Table Size	16K
Packet Buffer Size	1.5 MB
Jumbo Frame	9216 Byte
Ethernet	
Standards	IEEE 802.3 for 10BASE-T IEEE 802.3u for 100BASE-T(X) IEEE 802.3ab for 1000BASE-T IEEE 802.3z for 1000BASE-X IEEE 802.3x for Flow Control/ Back pressure control IEEE 802.1d-2004 for Spanning Tree Protocol IEEE 802.1w for Rapid Spanning Tree Protocol IEEE 802.1s for Multiple Spanning Tree Protocol IEEE 802.1q for VLAN Tagging IEEE 802.1p for Class of Service IEEE 8021x for Authentication
Protocols	IPv4, IPv6, IGMPv1/v2/v3, IGMP Snooping, GARP, GMRP, GVRP, SNMPv1/v2c/v3, SNMP Inform, ICMP, Telnet, SSH, DHCP Server/Relay/Client, DHCP Option 66/67/82, BootP, RARP, TFTP, NTP Server/Client, SNTP, SMTP, SMTP (Gmail), RMON, HTTP, HTTPS, Syslog, MRP (Client), LLDP, IEEE 1588 PTP V1/V2, IEEE 1588 Hardware-Assisted End-to-End Transparent Clock and Software-assisted Boundary Clock, MRP (Client), 802.1x, EAP, RADIUS, TACACS+, Mirror port, QoS, ACL, Serial Console, U-Ring, STP, RSTP, MSTP, Redundancy Compatible Ring
Automation Profiles	Profinet CC-B compatible, Ethernet/IP ready, Modbus/TCP status registers
SNMP MIB	MIB II, IF-MIB, SNMPv2 MIB, BRIDGE-MIB, RMON MIB Group 1,2,3,9, RFC 1157, RFC 1213, RFC 1215, RFC 1493, RFC 1643, RFC 1757, RFC 2011, RFC 2012, RFC 2013, RFC 2233, RFC 2571, RFC 2742, RFC 2819, RFC 2863, RFC 3411, RFC 3412, RFC 3413, RFC 3414, RFC 3415
Power	
Input Voltage	24-57 VDC 100~240 VAC for SICEx2 series 110~370 VDC for SICEx1 Series
Input Current (System)	0.63A @ 24 VDC 0.16A @ 100 VAC for SICEx2 series 0.12A @ 110 VDC for SICEx1 series
Connector	5-Pin 5.08mm Lockable Terminal Block
Reverse Polarity Protection	Yes

# SIC-R



Time-aware Redbox Switch  
In compliance with IEC 61850-3



### Main characteristics

- Intelligent device that integrates advanced field-proven technology for non-packet-loss redundant Ethernet, sub-microsecond synchronization and cybersecurity.
- Able to merge the whole LAN with redundant networks, to interconnect PRP and HSR networks and to extend HSR rings via QuadBox operation.
- In compliance with IEC 61850-3 / IEEE 1613.
- Ports number can be adapted to customer needs.
- Completely secure and reliable infrastructure.

### Selection & Ordering data SIC-R

SIC-R	Time-aware Redbox Switch
	<b>FUNCTION</b>
0	1x 10/100/1000Base-TX Ethernet copper port (Console/Service/Security) + 4x SFP Cages for 10/100/1000Base-TX Ethernet copper or 100Base-FX/1000Base-X fiber
1	1x 10/100/1000Base-TX Ethernet copper port (Console/Service/Security) + 6x 10/100/1000Base-TX Ethernet copper port
2	1x 10/100/1000Base-TX Ethernet copper port (Console/Service/Security) + 6x 10/100/1000Base-TX Ethernet copper port + 2x SFP Cages for 10/100/1000Base-TX Ethernet copper or 100Base-FX/1000Base-X fiber

Example of ordering code:

SIC-R	0	SIC-R 0
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## Technical specifications

Communication Interfaces	
Features	<ul style="list-style-type: none"> <li>• Multiple PTP Tri-speed Ethernet ports</li> <li>• Zero-Packet-Loss redundancy modes: <ul style="list-style-type: none"> <li>» IEC 62439-3 v3 Clause 5 "High-availability Seamless Redundancy (HSR)" Modes: H, N, T, U, X, HSR-SAN, PRP-HSR, HSR-HSR</li> <li>» EC 62439-3 v3 Clause 4 "Parallel Redundancy Protocol (PRP)" Modes: Duplicate discard, duplicate accept, transparent reception, PRP-HSR</li> </ul> </li> <li>• Optional modes: <ul style="list-style-type: none"> <li>» IEC 62439-2 Clause 5 "Media Redundancy Protocol (MRP)"</li> <li>» "Device Level Ring (DLR)" for Ethernet IP</li> <li>» RSTP IEEE802.1w</li> </ul> </li> <li>• VLAN support and Ethernet type based or IEEE 802.1P Traffic prioritization</li> <li>• Cut-through and Store&amp;Forward switching capability</li> </ul>
Synchronization	
Features	<ul style="list-style-type: none"> <li>• IEEE 1588-2008 PTPv2. Optional IRIGb Master/Slave bridge</li> <li>• Modes: Transparent Clock, Ordinary Clock, Boundary Clock</li> <li>• Profiles: Default, Power, IEC 61850-9-3,AS</li> <li>• IEEE 1588 Stateless Transparent Clock P2P mode to support</li> <li>• IEEE 1588 PRP/HSR redundant networks merging</li> </ul>
Other interfaces (not available in all models)	
Features	<ul style="list-style-type: none"> <li>• 1x RS485 port</li> <li>• 2 x USB type A ports</li> <li>• 1x HDMI output</li> <li>• 1x Alarm output (potential-free relay 250VACmax.)</li> <li>• 1x Pulse-Per-Second (PPS) SMA output</li> </ul>
Processing performance	
Features	<ul style="list-style-type: none"> <li>• Xilinx Zynq FPGA with embedded dual-core ARM9 processor</li> <li>• 1GB DDR3 RAM Memory</li> <li>• Linux Operating System</li> </ul>
Security	
Features	<ul style="list-style-type: none"> <li>• Optional support for IEC 62351-6 wire-speed cryptography</li> <li>• Security infrastructure for IEC 62351-9 Key Exchange facilities</li> <li>• AES 256, HMAC and RSA hardware engines for software and firmware encryption, authentication and signature</li> <li>• Secure boot</li> <li>• System Level audited security (OS &amp; Applications)</li> <li>• Integrated anti-tampering, accelerometers and power consumption measurement sensors to mitigate advanced security attacks</li> <li>• Ethernet port isolated from switching infrastructure to implement security oriented services (NAT, Firewall, VPN, etc.)</li> <li>• IEEE 802.1X access control for port based and MAC based authentication, MAC Port binding and authentication for login security</li> <li>• Optional internal mirroring port with deep packet inspection capability</li> <li>• Optional integrated SIEM agent for IDS and Syslogv5 TLS support for distributed SIEMs approach</li> </ul>
Rugged devices	
Features	<ul style="list-style-type: none"> <li>• IEC 61850-3 / IEEE 1613</li> <li>• Fanless design and full metal enclosure</li> <li>• Redundant Power Supply: 6VDC to 36 VDC</li> <li>• Optional PS: 48VDC / 125VDC</li> <li>• Operating temperature: -40°C to +70°C</li> <li>• Storage temperature: -40°C to +85°C</li> <li>• Optional mounting: DIN rail</li> </ul>
Configuration and management	
Features	<ul style="list-style-type: none"> <li>• SNMPv3, SSH</li> <li>• Web-based HTML5-GUI access/configuration</li> <li>• Accessible through HTTP(S)</li> <li>• Configuration profiles and Firmware updates</li> <li>• Real-time network monitoring</li> </ul>

# SIC-G



**Industrial PoE Unmanaged Gigabit Ethernet Switch**  
**EN50155 / EN50121-4 Certified**



## Main characteristics

- The SIC-G is 7 Port PoE Unmanaged Gigabit Ethernet Switches designed to work in mission critical environments such as mining and heavy industry.
- It equips up to five 10/100/1000BASE-T(X) RJ-45 ports and up to two 100/1000 BASE-F(X) and 1000 BASE-X SFP ports.
- With its high performance and non-blocking switching capacity, the SIC-G Series is able to fulfill the increasing demand in industrial networking.
- Its PoE capability of 30W per port up to four ports simplifies the wiring in complex fields, where every cable is an added cost.
- The equipped terminal block provide dual redundant power inputs with Reverse Polarity Protection and relay output which allows field engineers to build up a fault alarm system.
- Its IP30 housing protection, wide operating temperature of -40 to 70°C and DIN-Rail mounting capacities are liable to do most industrial filed applications.
- The SIC-G Series is fully EN50155-certified to ensure reliable performance under a wide range of power supply conditions, and it complies with essential sections of EN50121-4 for ground equipment.

## Selection & Ordering data SIC-G

SIC-G	Industrial Unmanaged Gigabit Switch
	<b>PORTS</b>
<b>1</b>	2 SFP + 5 RJ45 (Non-PoE)
<b>2</b>	2 SFP + 1 RJ45 (Non-PoE) + 4 RJ45 (PoE)

Example of ordering code:

<b>SIC-G</b>	<b>1</b>	<i>SIC-G 1</i>
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## Technical specifications

	SIC-G1	SIC-G2
Switch Properties		
Processing Scheme	Store-and-Forward	
MAC Address Table	8096	
Jumbo Frame	10K Bytes	
Packet Buffer	1 Mbits	
Ethernet		
Compliance	IEEE 802.3 for 10BASE-T IEEE 802.3u for 100BASE-T(X) and 100BASE-FX(X) IEEE 802.3ab for 1000BASE-T IEEE 802.3z for 1000BASE-X IEEE 802.1Q for VLAN Tagging IEEE 802.1p for Class of Service IEEE 802.3x Flow Control IEEE 802.3af / 802.3at for Power-over-Ethernet IEEE 802.3az for Energy Efficient Ethernet	
Flow Control	Back pressure and pause frame-based flow control schemes	
LLDP	Forwarding	
Transmission Rate	10/100/1000 Mbps (the second SFP port is 1000 Mbps only)	
Auto MDI/MDI-X	Yes	
Power		
Input Voltage	12-52 VDC*	
Input Current (System)	0.6A @ 12 VDC	
Max. Power Consumption (System)	7.2 W	
Input Current (with PoE)	---	2.6A @ 51 V
Max. Power Consumption (with PoE)	---	130 W
Relay Output	24 V / 0.5A	
Connector	Terminal Block	
Led		
Indicators	PWR1, PWR2, Alarm, RJ45 Act/Link, SFP Link, PoE	
Physical Characteristics		
Housing	IP30 protection according to EN 60529	
Material	Aluminum	
Dimension (W x H x D)	45.3 x 89.6 x 110 mm	
Weight	350g	
Installation	DIN-rail or wall-mount (optional)	

\*802.3af PoE output starts from 43 VDC input and 802.3at output starts from 51 VDC input.