EL228 Layer 2 Industrial Ethernet Switch

Sixnet Networking Series

Layer 2 Industrial Ethernet Switch

PRODUCT HIGHLIGHTS

- KEMA tested and approved for IEC 61850 and IEEE 1613
- Enterprise-class functionality and security future proofs the network
- Powerful management and monitoring simplifies deployment and provides fault isolation
- Extreme port flexibility allows for seamless field configuration and upgrade
- Up to 26 fiber optic ports offer the ultimate in noise immunity
- Universal mounting (patent pending) simplifies ordering and deployment

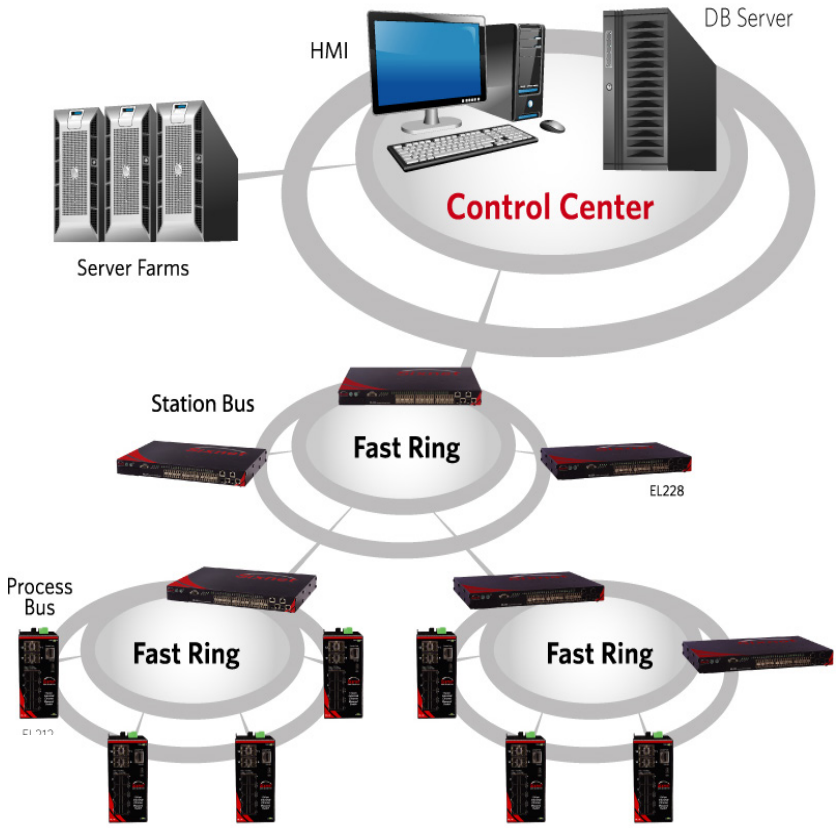
ADVANCED INDUSTRIAL RATINGS

- IEC 61850 and IEEE 1613 for utility substation automation and other power applications
- NEMA TS-2 for traffic control systems
- EN 50155 and EN 50121-4 for railway installations
- ISA 12.12 and ATEX for Zone 2 hazardous locations

The Sixnet EL228 is a 28 port (24 + 4G) managed industrial Ethernet switch designed to meet the extreme requirements of power substations, traffic control, railway and other harsh environments. It combines the high performance and security of an enterprise-class switch with rugged packaging and protected circuitry to meet the needs of the most demanding applications.

24 fast Ethernet SFP ports for fiber or copper links can be mixed and matched on the fly to provide the ultimate in port flexibility. Sixnet's universal mounting features LEDs, power/ground connections, console ports and bracket positions on both the front and back of the switch simplify ordering and deployment. By combining all of these features in one hardened package, the EL228 provides users with the lowest total cost of ownership of any industrial Ethernet switch in its class.

APPLICATION SCENARIO: POWER INDUSTRY



industrial networking

EL228 Layer 2 Industrial Ethernet Switch Specifications

FEATURES & BENEFITS

Rugged, Reliable Operation

- **Supports deployment in extreme environments**
- **Provides high reliability in the toughest applications**
  - Heavy industrial ratings for power, traffic, railway and hazloc applications
  - KEMA approved for IEC 61850 & IEEE 1613
  - Superior EMC performance and EMI immunity
  - Designed and tested from -40° to +85°C operating temperature (no fans)
  - Rugged corrosion-resistant metal enclosure
  - Sealed IP50 protects against dust, dirt and debris
  - UL/CSA, FCC and CE compliant
  - Dual-redundant AC or DC power supplies

Advanced Networking & Redundancy

- **Ensures fast recovery from faults**
- **Prioritizes handling of mission-critical data**
  - Real-Time-Ring™ for fast redundant rings
  - RSTP (Rapid Spanning Tree) provides complex redundancy
  - MSTP (Multiple Spanning Tree) per-VLAN redundancy
  - VLAN (GVRP, Q-in-Q) for convenient traffic segregation
  - LACP (Link Aggregation) increases bandwidth
  - IGMP for multicast filtering (snooping and querying)
  - QoS/CoS/DS provides real-time message prioritization
  - Jumbo frame (10K) support on Gigabit ports
  - Virtual stacking for up to 36 EL228 switches

Universal Mounting

- **Lowers overall cost of ownership**
- **Maximizes efficiency - one model does it all**
  - Universal mounting supports both front and reverse wiring
  - Status LEDs on front and back of switch for easy viewing
  - Console RS232 port on front and back of switch for local management
  - Space efficient 1U rack-mount design fits onto EIA, WECO and ETSI racks from 19" to 24"

Powerful Management & Monitoring

- **Simplifies configuration and management**
- **Provides fast and easy troubleshooting**
  - Easy configuration via Web or CLI
  - SNMPv1, v2, v3 network management
  - LLDP for universal network identification
  - sFlow for network-level monitoring
  - RMON and port mirroring for advanced diagnostics
  - Event/Error/System logging and system monitoring
  - UPnP, OAM and Banner support
  - Dual firmware upgrade system
  - Relay output contact to signal alarms

Ultimate Port Flexibility

- **Simplifies on-site configuration**
- **Reduces "fork-lift" upgrades**
  - 28 total Ethernet ports (24 + 4G)
    - 2 Gig RJ45 ports support auto 10/100/1000 Mbps
    - 2 Gig RJ45/SFP combo ports for copper or fiber links
    - 24 fast SFP ports - mix 100M fiber or 10/100 copper
  - Fiber transceivers support multimode, singlemode, bi-directional single-strand and long haul up to 120km
  - Up to 26 total noise-immune fiber optic ports

Advanced Cyber Security

- **Prevents against unauthorized access**
- **Protects from unwanted intrusion**
  - Static and dynamic port security
  - Authentication - SNMPv3, 802.1x, RADIUS, TACACS+ AAA/3.0, Web and MAC
  - Encryption - MD5, TLS, TTLS, TACACS+ AAA/3.0
  - Access Control List (ACL) per IP/MAC/VLAN/TCP/UDP
  - Secure Web (HTTPS/SSL) and Telnet (SSH)
  - Rate limiting and multicast storm protection
  - IP Source Guard, DHCP Snooping and Option 82

SPECIFICATIONS

Ethernet Performance

- 28 total Ethernet ports (24 + 4G)
- 24 SFP ports for a mix of copper or fiber
- 4 Gigabit with 2 RJ45 ports and 2 RJ45/SFP combo ports
- RJ45 ports: auto-negotiation (speed/duplex) and auto-crossover
- Non-blocking, store and forward, wire-speed

EL228 Layer 2 Industrial Ethernet Switch Specifications

- Switching capacity and forwarding rate: 12.8 Gbps/9.5 Mpps
- Jumbo frame: 10K on Gigabit ports
- Ethernet isolation: 1500 Vrms 1 minute

Switching Features

- Flow control: IEEE 802.3x (Full Duplex) and Back-Pressure (Half Duplex)
- Spanning Tree Protocol (STP per IEEE 802.1D) plus
  - IEEE 802.1w Rapid Spanning Tree Protocol (RSTP)
  - IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
  - BPDU forwarding and filtering
- Real-Time-Ring for high-speed, fault-tolerant rings
  - Link loss recovery: 50ms/hop
  - Switches in ring: <50 for best performance
  - Multiple rings are supported (4 per switch)
- Virtual Local Area Networks (VLANs)
  - 802.1Q tag-based with 256 VLANs and 4K VLAN ID
  - 802.1v protocol and port-based VLAN
  - Voice and Private VLAN
  - GVRP and Q-in-Q (double tagging)
- Link Aggregation Control Protocol (LACP per IEEE 802.3ad)
  - Static trunk (8 trunks and up to 8 ports per trunk)
  - Traffic load balancing
- Internet Group Management Protocol (IGMP)
  - IGMP v1, v2 and v3 with up to 255 multicast groups
  - IGMP snooping and querying
  - Immediate leave and leave proxy
  - Throttling and filtering
- Multicast VLAN Registration (MVR)
- IEEE 802.1ab Link layer Discovery Protocol (LLDP)
- Quality of Service (QoS) with 4 priority queues
  - Scheduling schemes: WRR and Strict priority
  - CoS per IEEE 802.1p and IP DSCP-based
  - DiffServ (DS): ingress, egress and remarking
- Rate limiting (ingress and egress)
  - 64Kbps to 100/1000 Mbps
  - Per port CoS

Security

- Enable/disable ports
- Port security (MAC-based): static and dynamic
- DHCP Snooping and Option 82
- IP Source Guard
- IEEE 802.1X Network Access Control
  - Port-based with single or multiple host mode
  - Authentication: EAP-MD5, PEAP, TLS, TTLS
  - MAC and web authentication
  - Guest VLAN and Auto VLAN assignment
- RADIUS and TACACS+ AAA
  - Authentication, Accounting and Authorization
  - 5 servers for RADIUS, 1 server for TACACS+
  - Encryption: MD5, TLS, TTLS, TACACS+ AAA/3.0
- Access Control List (ACL)
  - IP and MAC-based
  - VLAN and TCP/UDP port
- Storm Control for broadcast and multicast messages
- HTTPS/SSL for secure Web access
- SSH v1.5/2.0 for secure Telnet access
- SNMPv3 authentication and encryption
- Username and password authentication
- Management access filtering

Management & Monitoring

- IP Address assignment: Static, DHCP and BOOTP
- CLI (Command Line Interface) via console or Telnet
- Web interface (HTTP/HTTPS/SSL)
- SNMP v1, v2, v3 (Simple Network Management Protocol)
- SNMP Traps for event notification
- RMON I (Remote Monitoring): Groups 1, 2, 3 and 9
- sFlow network-wide traffi c monitoring
- Dual firmware update system
- Configuration download and upload
- Software upgrade via TFTP
- Port mirroring
- Event/Error/System log
  - Local flash
  - Remote server via system log (Syslog RFC 3164)
  - SMTP (RFC 821) email alarming
- Network Time Protocol for time synchronization
  - SNTP (RFC 2030) and NTP (RFC 1305)
- DNS (Domain Name Server) client
- Universal Plug and Play (UPnP)
- IEEE 802.3ah OAM (Operational Administration Maintenance)
- Banner commands

Power Input & Alarm Output

- Dual-redundant internal power input option
- 10-pole screw block can be positioned in front or back
- Power input options:
  +/- 24-48 VDC, (D option)(absolute min & max): +/- 18-75 VDC
  +/- 110-250 VDC or 100-240 VAC (50/60 Hz)(A option),
  (absolute min & max): +/- 90-300 VDC or 85-264 VAC
- Power consumption: 60 Watts typ. with all ports linked
- Protection: current overload and reverse polarity
- Alarm output: form -C relay (NO and NC contacts)
  - Max. voltage: 250 VAC, 30 VDC
  - Max. current: 2A @ 30 VDC or 250 VAC

Mechanical

- Universal mounting (Sixnet exclusive feature - patent pending)
  - Front or rear/reverse wiring with power in front or back
  - 1U rack mount (19" brackets included)
  - Optional 23", 24", EIA, WECO, ETSI and wall brackets available
- Ingress protection: IP50 sealed from dust and contaminants
- Heavy-gauge corrosion-resistant metal enclosure
- Dimensions (HxWxD): 1.75(1U)x17.3x12' (45x439x305mm)
- Weight (typical): 9.5 lbs (4.3 kg)

Environmental

- Operating/storage temperature: designed and tested from -40° to +85°C
  per IEC 60068-2-1/2
- Humidity: 5 to 95% RH (non-condensing) per IEC 60068-2-30
- Vibration: 20mm/s from 1 to 150 Hz per IEEE 1613 Class V.S.3
- Vibration: Amp: 3mm from 2-9 Hz, 1g from 9-200Hz, 1.5g from 200-500 Hz per IEC 61850-3
- Shock: 30g @ 11ms per IEC 61850-3, free-fall: 250mm distance

Standards & Compliance

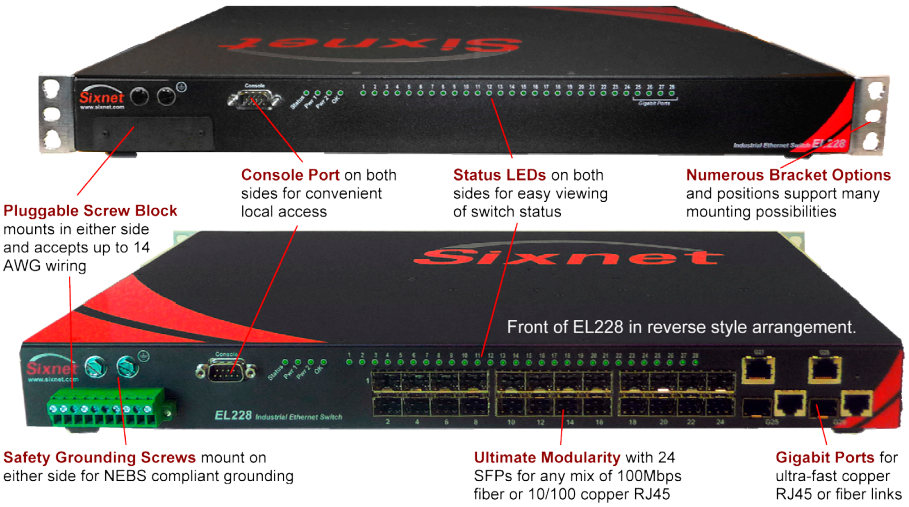
- Power Systems: IEC61850-3, IEC60870-2-1/2; IEEE1613
  - KEMA tested and approved
- Traffic Control: NEMA TS-2
  - EL228-AA-1 and EL228-A0-1
- Railway Systems: EN50155 & EN50121-4
  - EL228-AA-1 and EL228-A0-1
- Safety: UL508 / CSA C22.2 No.142 / EN61010-1 / CE
- Hazardous Locations: ISA12.12.01/CSA C22.2 No.213 (C 1, Div 2, Grps A, B, C, D)
  - EL228-AA-1 and EL228-A0-1 models, T3C@60C (Ambient)
  - EL228-DD-1 and EL228-D0-1 models, T4@60C (Ambient)
- ATEX: EL228-DD-1 and EL228-D0-1 only (Zone 2, Cat3, T4@60C)
- EMC: IEEE c37.90.1/2/3, IEC61000-6-2, IEC61000-6-4, IEC/TS61000-6-5, IEC60870-2-1, IEC61000-4 Series, FCC Part 15, EN55022/CISPR22, CE
- Dielectric and Impulse: IEC60255-5 & C37.90
- RoHS, WEEE and REACH compliant
- MTBF: >200,000 hours GB @ +40°C per MIL-HNDBK-217F2

Warranty

- 5 years on design and manufacturing defects

All specifications are subject to change. Contact Sixnet to learn more.

EL228 Layer 2 Industrial Ethernet Switch Specifications



SELECTION GUIDES

MODEL	DESCRIPTION
EL228-A0-1	with single universal VAC/VDC power input
EL228-AA-1	with dual universal VAC/VDC power supplies built in (with load share operation **)
EL228-D0-1	with single 24/48 VDC power input
EL228-DD-1	with dual 24/48 VDC power supplies built in (with load share operation **)

**See user manual for more details

ACCESSORIES MODEL	DESCRIPTION
EK1-BRCKT-19	Set (2) of 1U 19" brackets (one set included with each switch)
EK1-BRCKT-23	Set (2) of 1U 23" EIA/WECO
EK1-BRCKT-2324	Set (2) of 1U 23/24" EIA/WECO
EK1-BRCKT-ETSI	Set (2) of 1U 536 mm ETSI brackets
EK1-BRCKT-WALL	Set (2) of wall brackets

SFP TRANSCEIVERS	SPEED	MODE	NOM. MAXIMUM DISTANCE	PORT COMPATIBILITY
FCOPPER-SFP-100	10 / 100 Mbps	Cooper RJ45	100 meters	Ports 1 thru 24
FMFIBER-SFP-2K	100 Mbps	Multimode	2 kilometers	Ports 1 thru 26
FMFIBER-SFP-4K	100 Mbps	Multimode	4 kilometers	Ports 1 thru 26
FSFIBER-SFP-30K	100 Mbps	Singlemode	30 kilometers	Ports 1 thru 26
FSFIBER-SFP-60K	100 Mbps	Singlemode	60 kilometers	Ports 1 thru 26
FSFIBER-SFP-100	100 Mbps	Singlemode	100 kilometers	Ports 1 thru 26
GMFIBER-SFP-500	Gigabit	Multimode	550 meters	Ports 25 and 26
GMFIBER-SFP-2K	Gigabit	Multimode	2 kilometers	Ports 25 and 26
GSFIBER-SFP-10K	Gigabit	Singlemode	10 kilometers	Ports 25 and 26
GSFIBER-SFP-30K	Gigabit	Singlemode	30 kilometers	Ports 25 and 26
GSFIBER-SFP-50K	Gigabit	Singlemode	50 kilometers	Ports 25 and 26
GSFIBER-SFP-80K	Gigabit	Singlemode	80 kilometers	Ports 25 and 26

RED LION®