

iES28GF-L2

**Intelligent 28 Port Configurable Gigabit Ethernet Switch
IEC 61850, IEEE 1613, EN50155, KEMA Certified Ed 2**

Product Overview



iES28GF-L2 is a highly redundant and scalable Layer 2 with Basic Routing functionality intelligent 28 port configurable Gigabit Ethernet switch with 4 fixed modules. It is designed to withstand the harshest environments of transmission and distribution substations and rolling stock applications. The switch is IEC 61850 Ed.2, IEEE 1613, and EN 50155 certified.

The iES28GF-L2 provides redundancy support through functions such as STP/RSTP/MSTP assuring protection of all mission critical network applications. The iES28GF-L2 can be managed via the Web UI, iManage Software Suite, Telnet, and Console (CLI) / SSH v2.

The switch provides advanced DOS/DDOS auto prevention. The compliance with IEEE 1588 PTPv2 provides precision time synchronization.

The iES28GF-L2 is made of IP-40 galvanized steel and has a wide operating temperature range from -40°C to +85°C, which is suitable for the harshest of environments without use of fans.



Tel: +1 905-670-0004
Toll Free : +1 844-520-0588
Technical Support: +1 844-475-8324
Email: info@is5com.com
www.is5com.com





Features

Table 1. Features

Feature	
Supports:	<ul style="list-style-type: none">• STP / RSTP / MSTP• LLDP (Link Layer Discovery Protocol)• Modbus TCP• VLAN Priority—supports priority-tagged frames to be received by specific IEDs• HTTPS / SSH v2• SNTP for synchronizing the switch’s clock• PTP clock synchronization
IGMP v2 / v3 (IGMP Snooping)	
SNMP v1 / v2c /v3 & RMON	
ACL, AAA (RADIUS), and NAS 802.1x (User Authentication)	
9.6K Bytes Jumbo Frame	
Multiple alarm notification methods	
Configurable by Web browser, Telnet, Console(CLI), iManage software running on Windows 10, NT/2000/XP/2003/VISTA/7	
Rack and panel mounting	



Product Specifications

Table 2. Technical Specification

Description	Specification
Slot 1 - (Ports 1-8)	2 or 4 X 10Base-FL Ports, 8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 2 - (Ports 9-16)	2 or 4 X 10Base-FL Ports, 8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 3 - (Ports 17-24)	2 or 4 X 10Base-FL Ports, 8 X 10/100/1000Base-T(X) RJ45 Ports, 8 X 100/1000Base-X SFP Ports, 2 or 4 X 100FX Ports, 2 or 4 X 1000LX/SX Ports
Slot 4 - (Ports 25-28)	2 or 4 X 1000Base-X SFP Ports, 2 or 4 X 1000LX/SX Ports
Fixed Module Slot 1-3 (Ports 1-16) Note***: If this fixed module is selected, select Module for Slot 4 only from the above (future release)	<u>16 ports module</u> 16 X 100Base-FX Ports, 16 X 1000SX/LX Ports
Fixed Module Slot 2-4 (Ports 9-28) Note***: If this fixed module is selected, select Module for Slot 1 only from the above (future release)	<u>16 ports module</u> 16 X 100Base-FX Ports, 16 X 1000SX/LX Ports
RS-232 Serial Console Port	RS-232 in RJ45 connector with console cable: 115200 bps, 8, N, 1
Warning / Monitoring System	Relay output for fault event alarming 2 alarm warning methods for system events supported: <ul style="list-style-type: none"> • SYSLOG with server / client structure; recording and viewing events in the System Event Log • SMTP for notification via email Event selection per port
Alarm	Relay output to carry capacity of 1 A at 24 VDC
Technology	
MAC Table	8K
Priority Queues	8
Processing	Store-and-Forward
Switch Properties	Switching latency: 7 μ s Switch capacity: 56 Gbps Max. Number of Available VLANs: 4096 IGMP multicast groups: 32 for each VLAN Port rate limiting: User Defined
Jumbo frame	9.6 K



Description	Specification
Security Features	<ul style="list-style-type: none"> • STP/RSTP/MSTP • Device Binding and Remote Control security • Access Control List (ACL) for every port • Authentication, Authorization and Accounting (AAA) • RADIUS Authentication management • Port based network access control (NAS) 802.1x • QoS for achieving efficient bandwidth utilization • Private VLAN with Port Isolation Configuration • VLAN (802.1 Q) for segregation and securing network traffic • SNMPv3 authentication and privacy encryption • HTTPS / SSH v2 enhanced network security • Web and CLI authentication and authorization
Software Features	<ul style="list-style-type: none"> • Web or CLI based Management (Console or Telnet / SSH v2) • DHCP Server / Relay • VLAN (802.1Q) for segregating and securing network traffic • Supports SNMPv1/v2/v3 • Traffic Prioritization—Storm Control and Quality of Service (QoS) including DSCP-Based QoS Ingress Port Classification • Multicast traffic—IGMP Snooping (IGMP v1/v2 / v3) and unregistered IPMCv4 Flooding • Warnings (Syslog and SMTP) and Fault Alarm (power failure) • Monitoring and Diagnostics—MAC Table and Port Statistics (ports monitoring including for SFP ports, system information, issuing PING packets for troubleshooting IP connectivity issues) • SNTP for synchronizing of clocks over network • Supports PTP Client (Precision Time Protocol) clock synchronization • Basic Routing <ul style="list-style-type: none"> ○ Static Routing ○ RIPv2 ○ VRRP
Network Redundancy	<ul style="list-style-type: none"> • STP/RSTP/RSTP (IEEE 802.1 D /W) • MSTP (RSTP/ STP compatible) • Fast Recovery and Dual Port Recovery
Physical Characteristics	
Enclosure	IP-40 Galvanized Steel
Dimensions (W x D x H)	479.3 (W) x 360 (D) x 44.3 (H) mm (18.87 x 14.17 x 1.74 inches)
Weight (g)	6600 g
Power	
Input Power	Redundant Power Supplies: Dual Input 9-36VDC, Dual Input 36-75VDC, or Dual Input 110-370VDC or 90-264VAC
Power Consumption (Typ.)	46 Watts max.
Overload Current Protection	Present



Table 3. Compliance Specifications

Type	Standards
Electromagnetic Emissions	FCC Part 15, CISPR (EN 55022) class A, EN 50155 (EN 50121-3-2, EN 55011, EN 50121-4)
Electromagnetic Immunity	EN 61000-4-2 (ESD), EN 61000-4-3 (RS), EN 61000-4-4 (EFT), EN61000-4-5 (Surge), EN 61000-4-6 (CS), EN 61000-4-8, EN61000-4-11
Industry Standards	KEMA Certified Ed 2 (TIC 1030-14) IEC 61850-3 (2013); IEEE 1613
Industry Standards	IEC 61850 Ed. 2
Safety Standards	EN 60950-1
Operating Environment	-40°C to +85°C (-40° to 185°F) (no fans) EN 60068-2-21
Storage Environment	-40°C to +85°C (-40° to 185°F) EN 60068-2-14
Operating Humidity	5% to 95% Non-condensing E60068-2-30
Shock	IEC 60068-2-27
Free Fall	IEC 60068-2-32
Vibration	IEC 60068-2-6
Warranty	5 years

Table 4. Standards and Management

Description	Specification
IEEE Standards	IEEE 802.3 for 10Base-T IEEE 802.3u for 100Base-TX and 100Base-FX IEEE 802.3ab for 1000Base-T IEEE 802.z for 1000Base-X IEEE 802.3x for Flow control IEEE 802.3ad for LACP (Link Aggregation Control Protocol) IEEE 802.1D - 1998 Spanning Tree Protocol (STP) IEEE 802.1D – 2004 /w Rapid Spanning Tree Protocol (RSTP) IEEE 802.1Q – 2014 Bridged Networks IEEE 802.1-2010 Port Based Network Access Control IEEE 802.1AB – 2016 Station and Media Access Connectivity discovery (LLDP) IEEE 802.1AX Link Aggregation

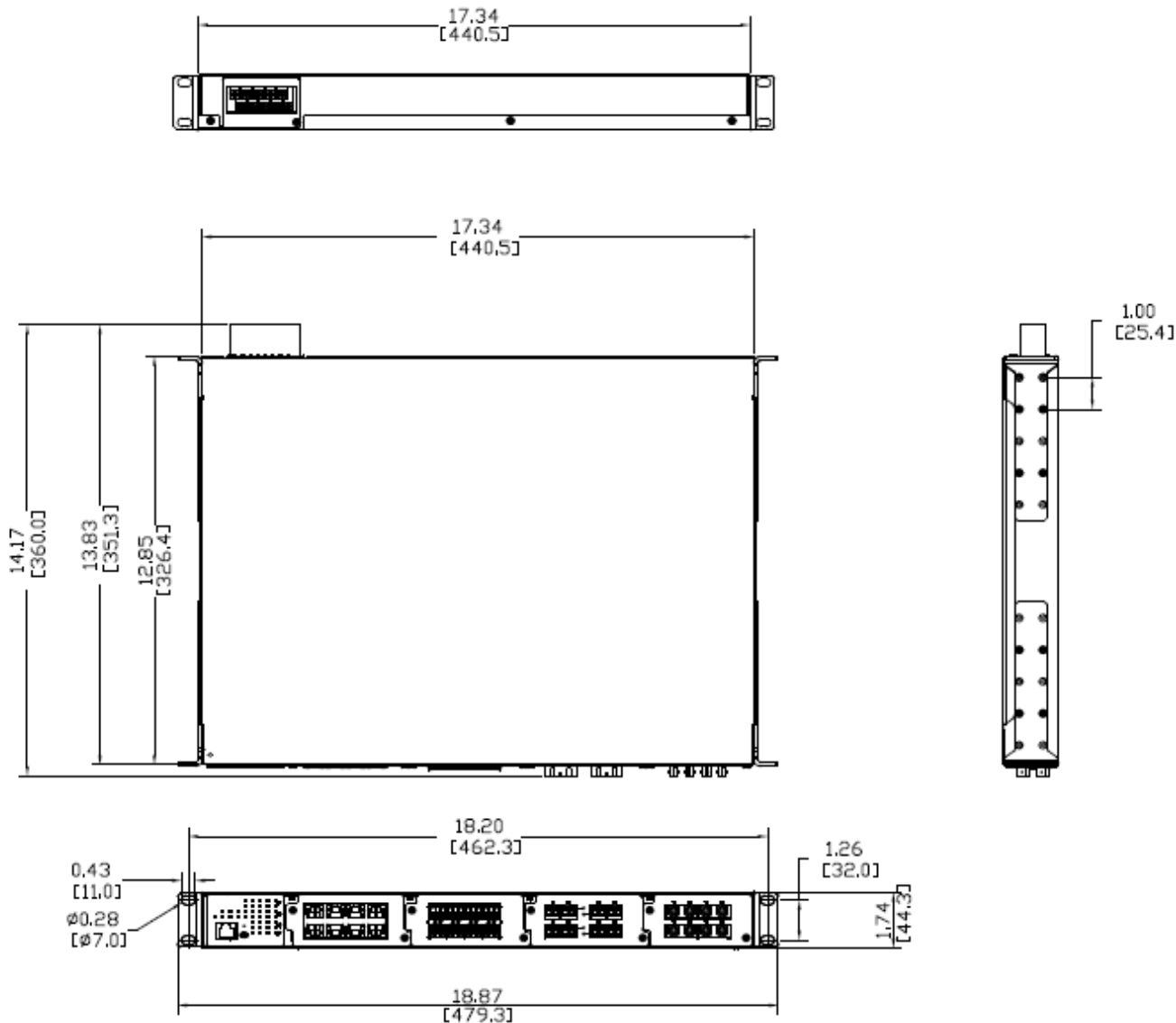


Description	Specification		
RFC Compliance	<ul style="list-style-type: none">• RFC 768: UDP• RFC 783: TFTP• RFC 791: IPv4• RFC 792: ICMP• RFC 793: TCP• RFC 854: Telnet• RFC 959: FTP• RFC 1157: SNMPv1	<ul style="list-style-type: none">• RFC 1901,1902-1907 SNMPv2• RFC 2273-2275: SNMPv3• RFC 2571: SNMP Management• RFC 1166: IP Addresses• RFC 1643: Ethernet Interface MIB• RFC 1757: RMON• RFC 2068: HTTP• RFC 2990 QoS	<ul style="list-style-type: none">• RFC 2131, 2132: DHCP• RFC 2236: IGMP v2• RFC 3376: IGMP v3• RFC 2474: DiffServ Precedence• RFC 3046: DHCP Relay Agent Information Option• RFC 3580: 802.1x RADIUS• RFC 4250-4252 SSH Protocol



Dimensions

All dimensions are shown in inches.





Ordering Information

Base	Power supply 1	Power supply 2	Mount	Power terminals	Slot 1 (Ports 1-8) *	Slot 2 (Ports 9-16)	Slot 3 (Ports 17-24)	Slot 4 (Ports 25-28)**	Conformal Coating	Description
iES28GF-L2	LV	HV	R	R	8GRJ45	8GRJ45	8GSFP	4GSFP	C1	
iES28GF-L2										Layer 2 Switch core assembly and packaging
	XX	XX								None
	LV	LV								Input 9-36VDC
	MV	MV								Input 36-75VDC
	HV	HV								Input 110-370VDC or 90-264VAC
			R							Rack Mounting
			P							Panel Mounting
			N							No Mounting hardware
				F						Power Terminals in the Front with Ethernet Ports/Display Rear opposite Ethernet Ports
				R						Power Terminals in the Rear opposite Ethernet Ports/Display Front with Ethernet Ports
									C1	Conformal Coating

iS5Com #	Slots 1-3 Description
XX	None
8GRJ45	8 X 10/100/1000Base-T(X) RJ45
2MMSTFL	2 X 10Base-FL Multimode ST
4MMSTFL	4 X 10Base-FL Multimode ST
8GSFP	8 X 100/1000Base-X SFP
2MMSC2	2 X 100FX Multimode SC, 2km, 1310nm
4MMSC2	4 X 100FX Multimode SC, 2km, 1310nm
2MMST2	2 X 100FX Multimode ST, 2km, 1310nm
4MMST2	4 X 100FX Multimode ST, 2km, 1310nm
2SMSC15	2 X 100FX Singlemode SC, 15km, 1310nm
4SMSC15	4 X 100FX Singlemode SC, 15km, 1310nm
2SMST15	2 X 100FX Singlemode ST, 15km, 1310nm
4SMST15	4 X 100FX Singlemode ST, 15km, 1310nm
2SMSC40	2 X 100FX Singlemode SC, 40km, 1310nm
4SMSC40	4 X 100FX Singlemode SC, 40km, 1310nm
2SMST40	2 X 100FX Singlemode ST, 40km, 1310nm
4SMST40	4 X 100FX Singlemode ST, 40km, 1310nm
2SMSC60	2 X 100FX Singlemode SC, 60km, 1310nm
4SMSC60	4 X 100FX Singlemode SC, 60km, 1310nm
2SMST60	2 X 100FX Singlemode ST, 60km, 1310nm
4SMST60	4 X 100FX Singlemode ST, 60km, 1310nm
2SMSC80	2 X 100FX Singlemode SC, 80km, 1550nm
4SMSC80	4 X 100FX Singlemode SC, 80km, 1550nm

iS5Com #	Slot 4 Description
XX	None
2GSFP	2 X 1000Base-X SFP
4GSFP	4 X 1000Base-X SFP
2GMMSC	2 X 1000SX Multimode SC, 550m, 850nm
4GMMSC	4 X 1000SX Multimode SC, 550m, 850nm
2GMMST	2 X 1000SX Multimode ST, 550m, 850nm
4GMMST	4 X 1000SX Multimode ST, 550m, 850nm
2GSMSC10	2 X 1000LX Singlemode SC, 10km, 1310nm
4GSMSC10	4 X 1000LX Singlemode SC, 10km, 1310nm
2GSMST10	2 X 1000LX Singlemode ST, 10km, 1310nm
4GSMST10	4 X 1000LX Singlemode ST, 10km, 1310nm
2GSMSC40	2 X 1000LX Singlemode SC, 40km, 1310nm
4GSMSC40	4 X 1000LX Singlemode SC, 40km, 1310nm
2GSMST40	2 X 1000LX Singlemode ST, 40km, 1310nm
4GSMST40	4 X 1000LX Singlemode ST, 40km, 1310nm
2GSMSC70	2 X 1000LX Singlemode SC, 70km, 1550nm
4GSMSC70	4 X 1000LX Singlemode SC, 70km, 1550nm
2GSMST70	2 X 1000LX Singlemode ST, 70km, 1550nm
4GSMST70	4 X 1000LX Singlemode ST, 70km, 1550nm
16MMSC2	16 X 100FX Multimode SC, 2km, 1310nm
16MMST2	16 X 100FX Multimode ST, 2km, 1310nm
16SMSC15	16 X 100FX Singlemode SC, 15km, 1310nm
16SMST15	16 X 100FX Singlemode ST, 15km, 1310nm



iS5Com #	Slots 1-3 Description
2SMST80	2 X 100FX Singlemode ST, 80km, 1550nm
4SMST80	4 X 100FX Singlemode ST, 80km, 1550nm
2SMSC100	2 X 100FX Singlemode SC, 100km, 1550nm
4SMSC100	4 X 100FX Singlemode SC, 100km, 1550nm
2SMST100	2 X 100FX Singlemode ST, 100km, 1550nm
4SMST100	4 X 100FX Singlemode ST, 100km, 1550nm
2GMMSC	2 X 1000SX Multimode SC, 550m, 850nm
4GMMSC	4 X 1000SX Multimode SC, 550m, 850nm
2GMMST	2 X 1000SX Multimode ST, 550m, 850nm
4GMMST	4 X 1000SX Multimode ST, 550m, 850nm
2GSMSC10	2 X 1000LX Singlemode SC, 10km, 1310nm
4GSMSC10	4 X 1000LX Singlemode SC, 10km, 1310nm
2GSMST10	2 X 1000LX Singlemode ST, 10km, 1310nm
4GSMST10	4 X 1000LX Singlemode ST, 10km, 1310nm
2GSMSC40	2 X 1000LX Singlemode SC, 40km, 1310nm
4GSMSC40	4 X 1000LX Singlemode SC, 40km, 1310nm
2GSMST40	2 X 1000LX Singlemode ST, 40km, 1310nm
4GSMST40	4 X 1000LX Singlemode ST, 40km, 1310nm
2GSMSC70	2 X 1000LX Singlemode SC, 70km, 1550nm
4GSMSC70	4 X 1000LX Singlemode SC, 70km, 1550nm
2GSMST70	2 X 1000LX Singlemode ST, 70km, 1550nm
4GSMST70	4 X 1000LX Singlemode ST, 70km, 1550nm
16MMSC2	16 X 100FX Multimode SC, 2km, 1310nm
16MMST2	16 X 100FX Multimode ST, 2km, 1310nm
16SMSC15	16 X 100FX Singlemode SC, 15km, 1310nm
16SMST15	16 X 100FX Singlemode ST, 15km, 1310nm
16SMSC40	16 X 100FX Singlemode SC, 40km, 1310nm
16SMST40	16 X 100FX Singlemode ST, 40km, 1310nm
16SMSC60	16 X 100FX Singlemode SC, 60km, 1310nm
16SMST60	16 X 100FX Singlemode ST, 60km, 1310nm
16SMSC80	16 X 100FX Singlemode SC, 80km, 1550nm
16SMST80	16 X 100FX Singlemode ST, 80km, 1550nm
16SMSC100	16 X 100FX Singlemode SC, 100km, 1550nm
16SMST100	16 X 100FX Singlemode ST, 100km, 1550nm
16GMMSC	16 X 1000SX Multimode SC, 550m, 850nm
16GMMST	16 X 1000SX Multimode ST, 550m, 850nm
16GSMSC10	16 X 1000LX Singlemode SC, 10km, 1310nm
16GSMST10	16 X 1000LX Singlemode ST, 10km, 1310nm
16GSMSC40	16 X 1000LX Singlemode SC, 40km, 1310nm
16GSMST40	16 X 1000LX Singlemode ST, 40km, 1310nm
16GSMSC70	16 X 1000LX Singlemode SC, 70km, 1550nm
16GSMST70	16 X 1000LX Singlemode ST, 70km, 1550nm

*If a 16 port module is selected in Slot 1, Slots 2&3 are unavailable

***If a 16 port module is selected in Slot 4, Slots 2&3 are unavailable

iS5Com #	Slot 4 Description
16SMSC40	16 X 100FX Singlemode SC, 40km, 1310nm
16SMST40	16 X 100FX Singlemode ST, 40km, 1310nm
16SMSC60	16 X 100FX Singlemode SC, 60km, 1310nm
16SMST60	16 X 100FX Singlemode ST, 60km, 1310nm
16SMSC80	16 X 100FX Singlemode SC, 80km, 1550nm
16SMST80	16 X 100FX Singlemode ST, 80km, 1550nm
16SMSC100	16 X 100FX Singlemode SC, 100km, 1550nm
16SMST100	16 X 100FX Singlemode ST, 100km, 1550nm
16GMMSC	16 X 1000SX Multimode SC, 550m, 850nm
16GMMST	16 X 1000SX Multimode ST, 550m, 850nm
16GSMSC10	16 X 1000LX Singlemode SC, 10km, 1310nm
16GSMST10	16 X 1000LX Singlemode ST, 10km, 1310nm
16GSMSC40	16 X 1000LX Singlemode SC, 40km, 1310nm
16GSMST40	16 X 1000LX Singlemode ST, 40km, 1310nm
16GSMSC70	16 X 1000LX Singlemode SC, 70km, 1550nm
16GSMST70	16 X 1000LX Singlemode ST, 70km, 1550nm



Example of Order

iES28GF-L2-LV-HV-RR-8GRJ45-8GRJ45-8GSFP-4GSFP-C1

Description:

28 Port Ethernet Gigabit Switch, (Power Supply 1) Input 9-36VDC, (Power Supply 2) Input 110-370VDC or 90-264VAC, Rack Mounting/Power Terminals in the Rear opposite Ethernet Ports/Display Front with Ethernet Ports, (Slot 1 (Ports 1-8)) 8 X 10/100/1000Base-T(X) RJ45, (Slot 2 (Ports 9-16)) 8 X 10/100/1000Base-T(X) RJ45, (Slot 3 (Ports 17-24))8 X 100/1000Base-X SFP (Blank no SFP transceivers), (Slot 4 (Ports 25-28)) 4 X 1000Base-X SFP (Blank no SFP transceivers, C1- added for conformal coating

NOTE: When selecting 2GSFP, 4GSFP, or 8GSFP (Blank no optical transceivers**) **SFPs are to be ordered separately.



Authorization

Name & Title		Signature	Date
Prepared	Zornitza Doneva		
Reviewed	Jonathan Azarcon		
Approved	Boris Tseitin		

Document History

Revision	Date	Notes
1	July 2017	Initial Draft
1A	Aug 2017	ZD: new template implemented
1B	Jan 3, 2018	Removed the MRP reference
1C	Jan 4, 2018	After Boris' review, removed the references to Layer 3 routing, MVRP, Voice VLAN, GVRP support, and DHCP Snooping. Changed "Device Linking" to "Device Binding". Added: SSH, in redundancy: iChain, Fast recovery, and Dual Port Recovery, RSTP, HTTP / HTTPS; Changed "Radius Centralized password management" to "Authentication by RADIUS". All references to TACACS support removed.
1D	Feb 6, 2018	Added to the Raptor type template and 26GF approved by Boris template. Added 61850-2 certified. Removed all references to iRing. Changed the HV of 130 VDC to 110 VDC and added the changes in the tables and note section (as per Configurator 1.05).
1E	Feb 8, 2018	Deleted Rapid Ring Discovery, IPv6, etc. Added Basic routing. After Boris' review added uniform approach for all 9000 series for Security and Software features, Network redundancy, features, etc.
1F	Feb 12, 2018	Deleted the Combos from the fixed modules (as per Ryan and Steve). Deleted all references to ST/SC connectors in the spec. Changed 100Base-FX to 100FX, and 1000Base-SX/LX to 1000LX/SX. Spelled SMV.
2	Feb 23, 2018	Signed and ready for release
2A	Aug 3, 2018	Added KEMA certification to Page 1 and Page 5.
3	Aug 3, 2018	Signed and ready for release
3A	Oct 1, 2018	SSH specified as ver 2 as resolution to Bug 2159 . On page 2, moved Modbus TCP to third line, and HTTPS / SSH v2 to 5 th line. After Fuat's review, "for protection and control applications such as Sampled Measured Values (SMV) in the IEC 61850 process bus" removed from page 1. Oct 16 - Missing dimension of 18.87" added as per MK.
4	Oct 2, 2018	Document is released.

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