Industrial Protocol Gateway

PG5900A Series

Feature Highlights

- ✓ Compliant with IEC 61850-3 and IEEE 1613 Power Substation Standards
- ✓ Isolated redundant power inputs with 24-48 VDC ,100-240 VAC, 100-370 VDC
- ✓ Extreme EMC protection according to IEC61850-3. Works in environments from -40 to 85°C
- ✓ Same hardware platform for different protocol conversion (Modbus TCP, DNP3.0 over Ethernet, IEC 60870-5-104, IEC 61850)
- ✓ User friendly configuration with a Java-Based Windows utility
- ✓ Embedded PPTP, IPsec and OpenVPN client/server for enhanced security
- ✓ Network Redundancy through RSTP

Product Description

The PG5900A Series is a highly reliable and fault tolerant Industrial Protocol Gateway. Its powerful architecture provides seamless conversion between the different Ethernet-based protocols. The IEDs communicating on different protocols could be integrated into the system and extend its reach over the gateway's redundant Ethernet. This device is designed to work in most demanding industries such as power substations, power generation, oil and gas, farming and manufacturing.

The configuration carried out through a use friendly, Java- Based Windows Utility called eNode Designer, that allows configuring target platforms, set device properties and protocol data mapping. The configuration is completely dependent on the "eNode Module" which represents that device or application – but may include things such as changing the communication port settings and defining where data point information enters and leaves the eNode Designer system.

PG59XX Series embeds an additional layer of security, allowing the devices to be deployed in topologies that request data to flow through the Internet and preventing sensitive control and monitoring data to be readable from malicious activities. IPsec VPN encryption, configurable in both peer-to-peer and peer-to-side modes will make sure the data passing is encrypted through a strong 128, 192 or 256-bit AES encryption. OpenVPN-based applications can take advantage of Client/Server support on our device.

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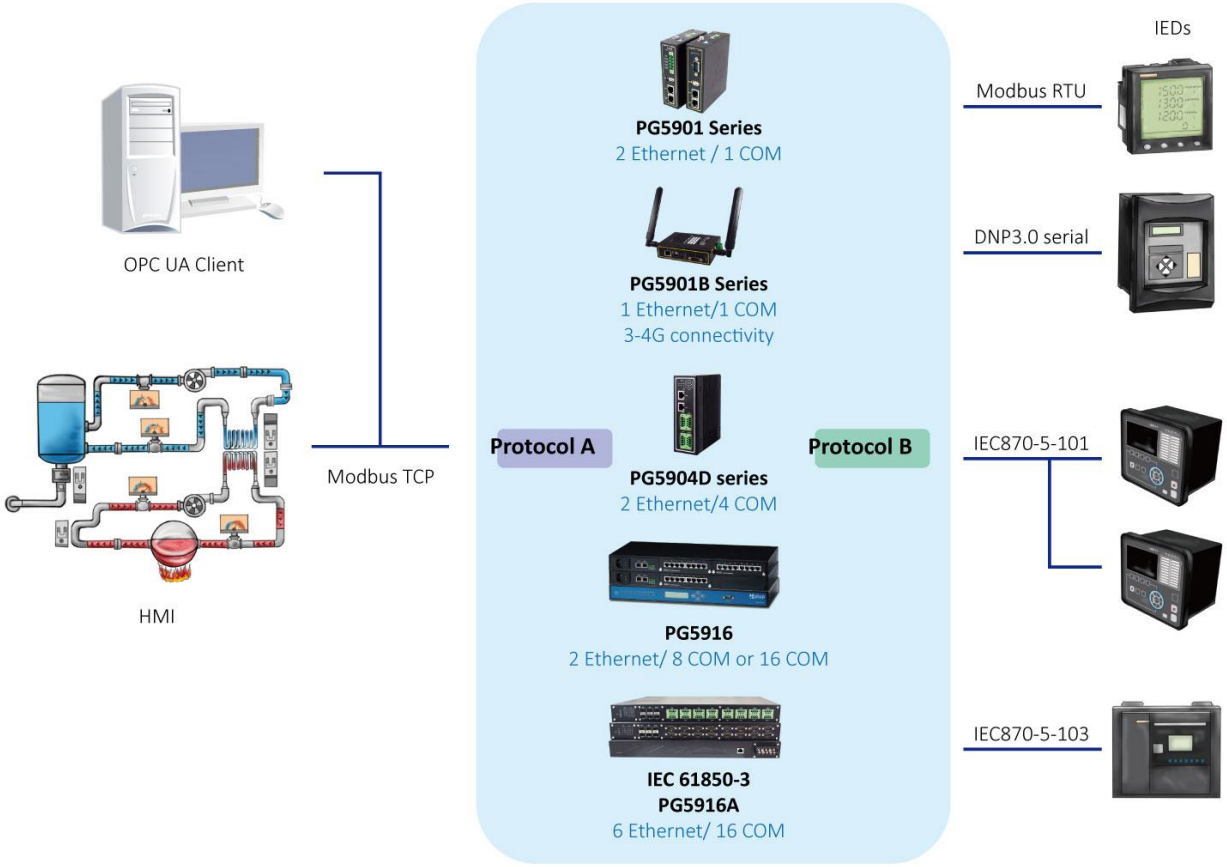
Application

Features

The protocol gateway's embedded protocol stacks allow

- Seamless conversion
- Exception/error Management
- Unsolicited event management for the protocols requiring them (such as DNP3)
- High performance
- Low cost

General Architecture



* Protocol A and Protocol B - Please refer to Protocol Availability Matrix and order information

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Example

The example shows how to Easily connect a Modbus Ethernet HMI, through Atop's Protocol Gateway to a DNP3.0 Ethernet Slave IED. The host HMI has the role of a Modbus Ethernet Client while the end-device to be accessed is a DNP3.0 Ethernet Server.

Atop's protocol Gateway acts towards the HMI seamlessly as a Modbus Ethernet Client, answering the poll commands or the write commands required by the Host by its virtual Modbus ID. Meanwhile, it acts as a DNP3.0 Ethernet Client with regard to the end-device whose DNP3.0 address is mapped to the virtual Modbus ID that the HMI is accessing.

Be careful! – all gateway functions listed in the datasheet refer to the "Gateway" role, and not which "host" or "slave" the gateway is connected to. In this example, the SKU shown is "MBES-DNEC" (Modbus Ethernet Server to DNP3.0 Ethernet Client)

Protocol Availability Matrix for PG5900A Series

Protocol B		Protocol A			
		Ethernet Server			
		IEC 61850	DNP3	Modbus TCP	IEC 60870-5-104
Ethernet Client	IEC 61850	n/a	DNES-50EC	MBES-50EC	04ES-50EC
	DNP3	50ES-DNEC	n/a	n/a	n/a
	Modbus TCP	50ES-MBEC	n/a	n/a	n/a
	IEC 60870-5-104	50ES-04EC	n/a	n/a	n/a

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Protocol Specifications

IEC61850 Server/ Client		DNP3 Server/ Client/ Master/ Slave	
Supported Functions	• Generic access to the data (Read, Write) • Clock Synchronization • 8 Logical Devices per Port • GOOSE (Generic Object Oriented Substation Event) – a GOOSE message will be generated by the gateway automatically upon event(*) • (*)Being other protocols not Real-Time, there is no guarantee that GOOSE message is generated within 1 ms from the event itelf.	General Specifications	• Serial Mode or Ethernet with TCP or UDP Mode • Server side supports serving up to 5 client in TCP Mode • Client side in a single RS-485 port, supports connecting up to 16 IEDs • Client side supports connecting up to 16 IEDs • Maximum Fragment size 2048 octets • Protocol implementation with configurable parameters conforms to IEEE Std 1815-2012 level 2
Supported Control Type of commands	• Direct-with-Normal-Security Select Before Operate (SBO)-with-Normal-Security • Direct-with-Enhanced Security Select Before Operate (SBO)-with-Enhanced-Security	Supported Functions	• Time Synchronization generic access to the data(Read, Write) • Commands with or without preselection (Select, Operate, Direct Operate) • Transmission of time-tagged events • Counter management (Immediate Freeze, Freeze and Clear) • Self-address
Implemented Protocol Subsets	• IEC 61850-6 (Substation Configuration Language Description: SCL) • IEC 61850-7-1 (Principles and Models) • IEC 61850-7-2 (Abstract Communication Service • Interface: ACSI • IEC 61850-7-3 (Common Data Classes: CDC) • IEC 61850-7-4 (Logical Nodes and data Object Classes) • IEC 61850-8-1 (Mapping to Manufacturing Message Specification: MMS) • Edition 1 & Edition 2 are both Supported	Supported DNP3 Object Library	• Binary Inputs up to 8000 pts • Binary Outputs up to 2000 pts • Double Inputs up to 4000 pts • Analog Inputs up to 250 pts • Analog Outputs up to 250 pts • Counters up to 250 pts

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Modbus Server/ Client		IEC 60870-5-104 Server/ Client	
General Specifications	• Support Modbus in TCP mode • For Modbus Client in TCP mode, support connecting up to 64 Modbus servers • For Modbus Server in TCP mode, support serving up to 64 Modbus clients • Support maximum number of data points in read direction: 8000 pts • Support maximum number of commands in write direction: 4000 pts	General Specifications	• Server side supports serving up to 5 client • Client side supports connecting up to 10 IEDs • Protocol implementation with configurable parameters conforms to the IEC 60870-5-104 specification edition 2 • Process Information in Monitor and Control Direction • CP56Time2a timestamp for Control Commands
Supported Function Codes	1: Read Coils 2: Read Discrete Inputs 3: Read Holding Registers 4: Read Input Registers 5: Write Single Coil 6: Write Single Register 15: Write Multiple Coils 16: Write Multiple Registers 43/14: Read Device Identification (server side only)	Supported Functions	• Station Initialization • Interrogation • Read Procedure (Server side only) • Cyclic Data and Spontaneous Transmission (Server side only) • Clock Synchronization • Transmission of Integrated Totals • Direct and SBO command
Supported Exception Codes	1: illegal function 2: illegal data address 3: illegal data value 4: server device failure 6: server device busy	Supported Data Types	• Monitors Points: Each supports maximum 1000 pts: Single Point, Double Point, Step Position, Bit String, Measured with Normalized Value, Measured with Scaled Value, Measured Short Floating Points Value, Integrated Totals. • Control Points: Each supports maximum 500 pts: Single Command, Double Command, Regulating Step Command, Set Point Command with Normalized Value, Set Point Command with Scaled Value, Set Point Command Short Floating Point, Bitstring. • Event Logging (Server Side only) Universal Event Buffer up to 20,000 Events

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Hardware Specifications	
Network Interface	
Ethernet Port	6 x RJ-45 or 6 x SFP slot
LAN Mode	Dual Subnets or RSTP Redundancy
Compliance	IEEE 802.3 10BASE-T IEEE 802.3u 100BASE-T(X) and 100BASE-FX
Power Characteristics	
Connector	10-Pin Terminal Block
Input Voltage	24-48 VDC 100-240 VAC/ 100-370 VDC for HV Series
Power Consumption	0.73A @ 24 VDC 0.35A @ 100 VAC 0.2A @ 100 VDC
Power Redundancy	Yes (Two Modules)
Reverse Polarity Protection	Yes
Mechanicals	
Housing	IP30 protection, metal housing
Dimensions(W x H x D)	440.6mm x 44mm x 309mm
Installation	19” Rack Mount
Reset Button	Yes
Weight	4kg
Environmental Limits	
Operating Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
Storage Temperature	-40°C ~ 85°C (-40°F ~ 185°F)
Ambient Relative Humidity	5 ~ 95% RH, (non-condensing)
Software	
Protocols	IPv4, ARP, ICMP, TCP, UDP, DHCP Client, DNS Client, Telnet, HTTP, HTTPS, SMTP/TLS, SNMP v1/v2c/v3, Syslog, 802.1D-2004 RSTP, OpenVPN Client/Server, IPsec VPN peer-to-peer and peer-to-side, maximum VPN throughput of 37.9Mbps(*), and PPTP

* testing conditions may affect the VPN throughput

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Regulatory Approvals				
Safety	EN 61010-2-201			
EMC	FCC Part 15, Subpart B, Class B EN 55032, Class B EN 61000-6-2, Class B EN 61000-3-2 EN 61000-3-3 EN 55024 EN 61000-6-4 IEC 61850-3 / IEEE 1613			
Test	**Item**		**Value**	**Level**
IEC 61000-4-2	ESD	Contact Discharge Air Discharge	±8KV ±15KV	4 4
IEC 61000-4-3	RS	Enclosure	10 V/m	3
IEC 61000-4-4	EFT	AC Power Port DC Power Port Signal Port	±4.0KV ±4.0KV ±4.0KV	4 4 4
IEC 61000-4-5	Surge	AC Power Port AC Power Port DC Power Port DC Power Port Signal Port	Line-to Line±2.0KV Line-to Earth±4.0KV Line-to Line±1.0KV Line-to Earth±2.0KV Line-to Line±2.0KV	4 4 3 3 4
IEC 61000-4-6	CS	AC Power Port DC Power Port Signal Port	10 Vrms 10 Vrms 10 Vrms	3 3 3
IEC 61000-4-8	PFMF	Enclosure	100A/m	5
IEC 61000-4-10	Damped Oscillatory Magnetic Field	Enclosure	100A/m	5
IEC 61000-4-11	DIP	AC Power Port	-	-
IEC 61000-4-12	Damped Oscillatory	AC Power Port Signal Port	2.5 KV common, 1 KV differential 2.5 KV common, 1 KV differential	3 3
Shock	MIL-STD-810F Method 516.5			
Drop	MIL-STD-810F Method 516.5			
Vibration	MIL-STD-810F Method 514.5 C-1 & C-2			
RoHS	Yes			
MTBF	TBD			
Warranty	5 years			

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Ordering Information

Hardware

PG5900A-6SFP	Industrial Protocol Gateway,10/100BASE-T(X) SFP slot, 24-48 VDC
PG5900A-6SFP-HV	Industrial Protocol Gateway,10/100BASE-T(X) SFP slot, 100-240VAC/ 100-370VDC
PG5900A	Industrial Protocol Gateway,10/100BASE-T(X) RJ45, 24-48 VDC
PG5900A-HV	Industrial Protocol Gateway,10/100BASE-T(X) RJ45, 100-240VAC/ 100-370VDC

Optional Accessories

Model Name	Part Number	Description
SDR-75-24	50500752240001G	75W/3.2A DIN-Rail 24VDC power supply with universal 88-264VAC / 124-370VDC input
GDC-120	59906861G	120mm copper woven grounding cable
ADP-DB9(F)TB5	59906231G	Female DB9 to Female 3.81mm TB5 Converter
LM38-A3S-TI-N	50708051G	SFP Transceiver, 155Mbps, 1310nmLED, Multi-mode, 2km, 3.3V, -40~85C
LS38-A3S-TI-N	50709431G	SFP Transceiver, 155Mbps, 1310nmFP, Single-mode, 30km, 3.3V, -40~85C

Protocols

04ES-50EC	IEC 60870-5-104 Ethernet Server to IEC 61850 Ethernet Client
50ES-04EC	IEC 61850 Ethernet Server to IEC 60870-5-104 Ethernet Client
50ES-DNEC	IEC 61850 Ethernet Server to DNP3 Ethernet Client
50ES-MBEC	IEC 61850 Ethernet Server to Modbus Ethernet Client
DNES-50EC	DNP3 Ethernet Server to IEC 61850 Ethernet Client
MBES-50EC	Modbus Ethernet Server to IEC 61850 Ethernet Client

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