Industrial Protocol Gateway

PG5908/PG5916 Series

Feature Highlights

- ✓ Dual 10/100Mbps Ethernet ports, Embedded IPsec VPN for enhanced security
- ✓ Remotely monitor, manage, and control industrial field devices
- ✓ Relay out indicator for Network link-status
- ✓ LCM display with 4-key touch pad for configuration
- ✓ Same hardware platform for different protocol conversion (Modbus TCP/RTU/ASCII, DNP3.0 TCP or serial, IEC 60870-5-101, IEC 60870-5-103, IEC 60870-5-104, IEC 61850)
- ✓ User friendly configuration with a Java-Based Windows utility

Product Description

The PG5908/16 Series is a highly reliable and fault tolerant Industrial Protocol Gateway. Its powerful architecture provides seamless conversion between the different protocols Ethernet or Serial based. The serial devices 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. It allows configuring target platforms, set device properties and protocol data point mapping. To do so, a project file representing the system should be created. This will include devices and the protocol applications running on them. 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.

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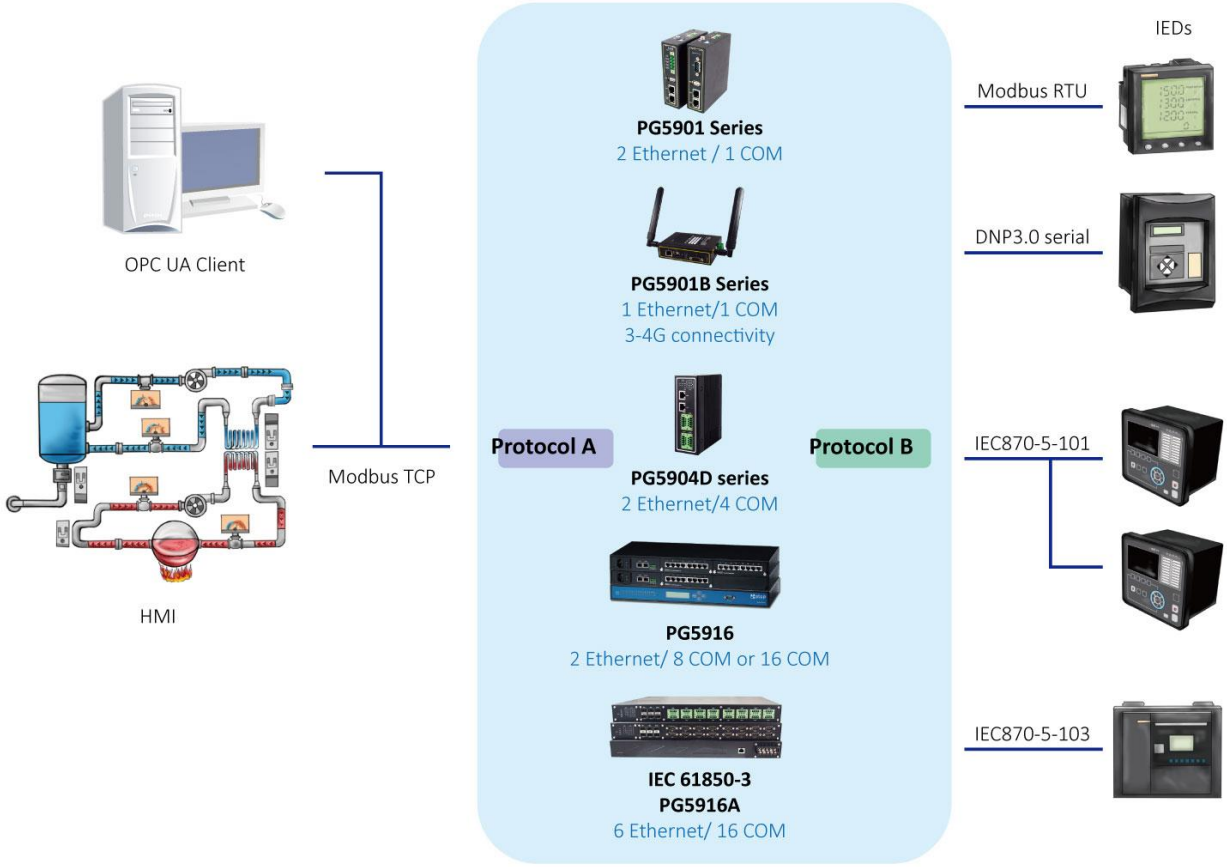
Application

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 Serial HMI, through Atop's Protocol Gateway to a DNP3.0 Ethernet slave IED. The host HMI has the role of a Modbus Serial Master 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 Serial Slave, 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 "MBSS-DNEC" (Modbus Serial Slave to DNP3.0 Ethernet Client)

Protocol Availability Matrix for PG5908/PG5916 Series

Protocol B		Protocol A							
		Ethernet Server				Serial Slave			
		IEC 61850	DNP3	Modbus TCP	IEC 60870-5-104	DNP3	Modbus RTU/ASCII	IEC 60870-5-101	IEC 60870-5-103
Ethernet Client	IEC 61850	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	DNP3	n/a	n/a	n/a	n/a	DNSS-DNEC	MBSS-DNEC	n/a	n/a
	Modbus TCP	n/a	n/a	n/a	n/a	DNSS-MBEC	n/a	n/a	n/a
	IEC 60870-5-104	n/a	n/a	n/a	n/a	n/a	MBSS-04EC	n/a	n/a
Serial Master	DNP3	50ES-DNSM	DNES-DNSM	MBES-DNSM	04ES-DNSM	DNSS-DNSM	MBSS-DNSM	01SS-DNSM	03SS-DNSM
	Modbus RTU/ASCII	50ES-MBSM	DNES-MBSM	n/a	04ES-MBSM	DNSS-MBSM	n/a	01SS-MBSM	03SS-MBSM
	IEC 60870-5-101	50ES-01SM	DNES-01SM	MBES-01SM	04ES-01SM	DNSS-01SM	MBSS-01SM	n/a	03SS-01SM
	IEC 60870-5-103	50ES-03SM	DNES-03SM	MBES-03SM	04ES-03SM	DNSS-03SM	MBSS-03SM	01SS-03SM	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/ Master/ Slave		IEC 60870-5-101 Master/ Slave	
General Specifications	• Support Modbus RTU and ASCII in Serial mode • 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	• Protocol implementation with configurable parameters conforms to the IEC 60870-5-101 edition 2 specification • Process Information in Monitor and Control Direction • Balanced and Unbalanced Modes • CP24Time2a or CP56Time2a timestamp for monitor direction report
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 • Cyclic Data and Spontaneous Transmission (Slave 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 up to 1000 pts: Single Point, Double Point, Step Position, Bit String, Measured with Normalized Value, Measured with Scaled Value, Measured Short Floating Point Value, Integrated Totals • Control Points: Each supports up to 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, Bit string

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IEC 60870-5-103 Master/ Slave		IEC 60870-5-104 Server/ Client	
General Specifications	• Protocol implementation with configurable parameters conforms to the IEC 60870-5-103:1997 • Master supports connecting up to 16 IEDs • Process Information in Monitor and Control Direction • Unbalanced Modes	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 Functions	• Station Initialization, Supports reset FCB and CU • General Interrogation • Clock Synchronization • Command Transmission • Test Mode • Blocking of Monitor Direction	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 Information	• Monitor direction: * Status indications in monitor direction: from <16> to <30> * Supervision indications in monitor direction: <32>, <33>, from <35> to< 39>, <46>, <47> * Earth fault indications in monitor direction: from <48> to <52> * Fault indications in monitor direction: from <64> to <93> * Auto-reclosure indications in monitor direction: from <128> to <130> * Measurands in monitor direction: from <144> to <148> • Control direction: General commands in control direction: from <16> to <19>, from <23> to <26>	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	2 x RJ-45
LAN Mode	Dual Subnets or LAN Redundancy
Compliance	IEEE 802.3 10BASE-T IEEE 802.3u 100BASE-T(X)
Serial Interface	
Connector	RJ-45
Port	8 or 16
Mode	RS-232/422/485, software selectable
Baud Rate	1,200~921,600 bps
Parity	None, Odd, Even, Space, Mark
Data Bits	5,6,7,8
Stop Bits	1,2
Flow Control	None, Xon/Xoff, RTS/CTS (RS-232 only)
Power Characteristics	
Connector	IEC 60320-1 C14 AC Power Inlet (AC models) 5.08mm 3-pin Lockable Terminal Block (DC models)
Input Voltage	24-48 VDC for DC models 100-240 VAC for AC models
Power Consumption	0.54A @ 24 VDC 0.21A @ 100 VAC
Power Redundancy	No
Reverse Polarity Protection	Yes (DC Input only)
Mechanicals	
Housing	IP30 protection, metal housing
Dimensions(W x H x D)	436 mm x 43.5 mm x 200 mm
Installation	19” Rack Mount
Reset Button	Yes
Weight	3.2kg (16 ports) / 3.0 kg (8 ports)
Environmental Limits	
Operating Temperature	-20°C ~ 70°C (-4°F ~ 158°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, SNMP v1/v2c/v3, Syslog, IPsec VPN peer-to-peer and peer-to-side, with a maximum VPN throughput of 37.9Mbps(*)

* testing conditions may affect the VPN throughput

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Regulatory Approvals

Safety	EN 60950-1/IEC60950-1 LVD			
EMC	FCC Part 15, Subpart B, Class B EN 55022, Class B EN 61000-3-2 EN 61000-3-3 EN 55024			
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 ±2.0KV	4 4 3
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	1A/m	3
IEC 61000-4-11	DIP	AC Power Port	-	-
Shock	IEC60068-2-27			
Drop	ISTA Test Procedure 2A			
Vibration	IEC60068-2-64			
RoHS	Yes			
MTBF	TBD			
Warranty	5 years			

Ordering Information

Hardware

PG5916-N-DC	Ind. 16-Port Protocol Gateway, RS-232/422/485 Software Selectable, DC TB3
PG5916-N-US	Ind. 16-Port Protocol Gateway, RS-232/422/485 Software Selectable, AC Inlet, US Plug
PG5916-N-EU	Ind. 16-Port Protocol Gateway, RS-232/422/485 Software Selectable, AC Inlet, EU Plug
PG5908-N-DC	Ind. 8-Port Protocol Gateway,RS-232/422/485 Software Selectable, DC TB3
PG5908-N-US	Ind. 8 Port Protocol Gateway, RS-232/422/485 Software Selectable, AC Inlet, US Plug
PG5908-N-EU	Ind. 8 Port Protocol Gateway, RS-232/422/485 Software Selectable, AC Inlet, EU Plug

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Optional Accessories		
Model Name	**Part Number**	**Description**
SDR-75-24	50500752240001G	75W/3.2A DIN-Rail 24VDC power supply 88~264VAC / 124-370VDC input
Power Adapter-AD17-24C (US-Y)	50500151240002G	Y-Type power adaptor,100-240VAC input, 0.6A @ 24VDC output, US plug
Power Adapter-AD17-24D (EU-Y)	50500151240012G	Y-Type power adaptor,100-240VAC input, 0.6A @ 24VDC output, EU plug
GDC-120	59906861G	120mm copper woven grounding cable
ADP-DB9(F)-TB5	59906231G	Female DB9 to Female 3.81mm TB5 Converter
CBL-RJ45(8P)-DB9(M)-90	50891781G	RJ45 to DB9 Male Cable, 90cm
CBL-RJ45(8P)-DB9(M)-200	50891951G	RJ45 to DB9 Male Cable, 200cm
CBL-RJ45(8P)-DB9(F)-90	50891791G	RJ45 to DB9 Female Cable, 90cm
CBL-RJ45(8P)-DB9(F)-90-C	50891971G	RJ45 to DB9 Female Cross Over Cable, 90cm
CBL-RJ45(8P)-DB9(F)-200-C	50891961G	RJ45 to DB9 Female Cross Over Cable, 200cm
RMK-718-Black	70100000000040G	Rack Mount Mounting-Kit, Black
Power Cable (US)	50801041G	6 feet Power Cable, US
Power Cable (EU)	50801051G	6 feet Power Cable, EU
Fuse	59907561G	250V, 2A, 20mm (length) * 5mm (diameter)

Protocols	
04ES-01SM	IEC 60870-5-104 Ethernet Server to IEC 60870-5-101 Serial Master
04ES-DNSM	IEC 60870-5-104 Ethernet Server to DNP3 Serial Master
04ES-MBSM	IEC 60870-5-104 Ethernet Server to Modbus Serial Master
DNES-01SM	DNP3 Ethernet Server to IEC 60870-5-101 Serial Master
DNES-DNSM	DNP3 Ethernet Server to DNP3 Serial Master
DNES-MBSM	DNP3 Ethernet Server to Modbus Serial Master
DNSS-DNEC	DNP3 Serial Slave to DNP3 Ethernet Client
DNSS-MBEC	DNP3 Serial Slave to Modbus Ethernet Client
MBES-01SM	Modbus Ethernet Server to IEC 60870-5-101 Serial Master
MBES-DNSM	Modbus Ethernet Server to DNP3 Serial Master
MBSS-04EC	Modbus Serial Slave to IEC 60870-5-104 Ethernet Client
MBSS-DNEC	Modbus Serial Slave to DNP3 Ethernet Client
01SS-DNSM	IEC 60870-5-101 Serial Slave to DNP3 Serial Master
01SS-MBSM	IEC 60870-5-101 Serial Slave to Modbus Serial Master
DNSS-01SM	DNP3 Serial Slave to IEC 60870-5-101 Serial Master
DNSS-DNSM	DNP3 Serial Slave to DNP3 Serial Master
DNSS-MBSM	DNP3 Serial Slave to Modbus Serial Master
MBSS-01SM	Modbus Serial Slave to IEC 60870-5-101 Serial Master
MBSS-DNSM	Modbus Serial Slave to DNP3 Serial Master
04ES-03SM	IEC 60870-5-104 Ethernet Server to IEC 60870-5-103 Serial Master
50ES-01SM	IEC 61850 Ethernet Server to IEC 60870-5-101 Serial Master
50ES-03SM	IEC 61850 Ethernet Server to IEC 60870-5-103 Serial Master
50ES-DNSM	IEC 61850 Ethernet Server to DNP3 Serial Master

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50ES-MBSM	IEC 61850 Ethernet Server to Modbus Serial Master
DNES-03SM	DNP3 Ethernet Server to IEC 60870-5-103 Serial Master
MBES-03SM	Modbus Ethernet Server to IEC 60870-5-103 Serial Master
01SS-03SM	IEC 60870-5-101 Serial Slave to IEC 60870-5-103 Serial Master
03SS-01SM	IEC 60870-5-103 Serial Slave to IEC 60870-5-101 Serial Master
03SS-DNSM	IEC 60870-5-103 Serial Slave to DNP3 Serial Master
03SS-MBSM	IEC 60870-5-103 Serial Slave to Modbus Serial Master
DNSS-03SM	DNP3 Serial Slave to IEC 60870-5-103 Serial Master
MBSS-03SM	Modbus Serial Slave to IEC 60870-5-103 Serial Master

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