PG5901 Series

Industrial Protocol Gateway

FEATURE HIGHLIGHTS

- Dual 10/100 Mbps Ethernet port, PoE PD
- 1-port RS-232/422/485, baud rate up to 921.6 Kbps
- IP30 Metal housing with Aluminum heat sink
- Strong EMC protection, works in environments from -40 to 85°C
- 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)
- Optional Full-License version for simultaneous transformation of multiple protocols.
- User friendly configuration with a Java-Based Windows utility
- Embedded IPsec, PPTP and OpenVPN for enhanced security
- Redundancy through embedded RSTP Protocol

PRODUCT DESCRIPTION

The PG5901 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 user 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.

An additional highlight of ATOP protocol gateways is the ability to enable multiple protocols simultaneously. In contrast to conventional gateways, which require predefinition of a single master and slave protocol each, the Full-License model allows users to transform multiple incoming protocols in our protocol base to others compatible with the output side, achieving powerful protocol conversion functions, flexible operations, and easier maintenance.

+ 886-3-5508137
+ 886-3-5508131
info@atop.com.tw
www.atoponline.com

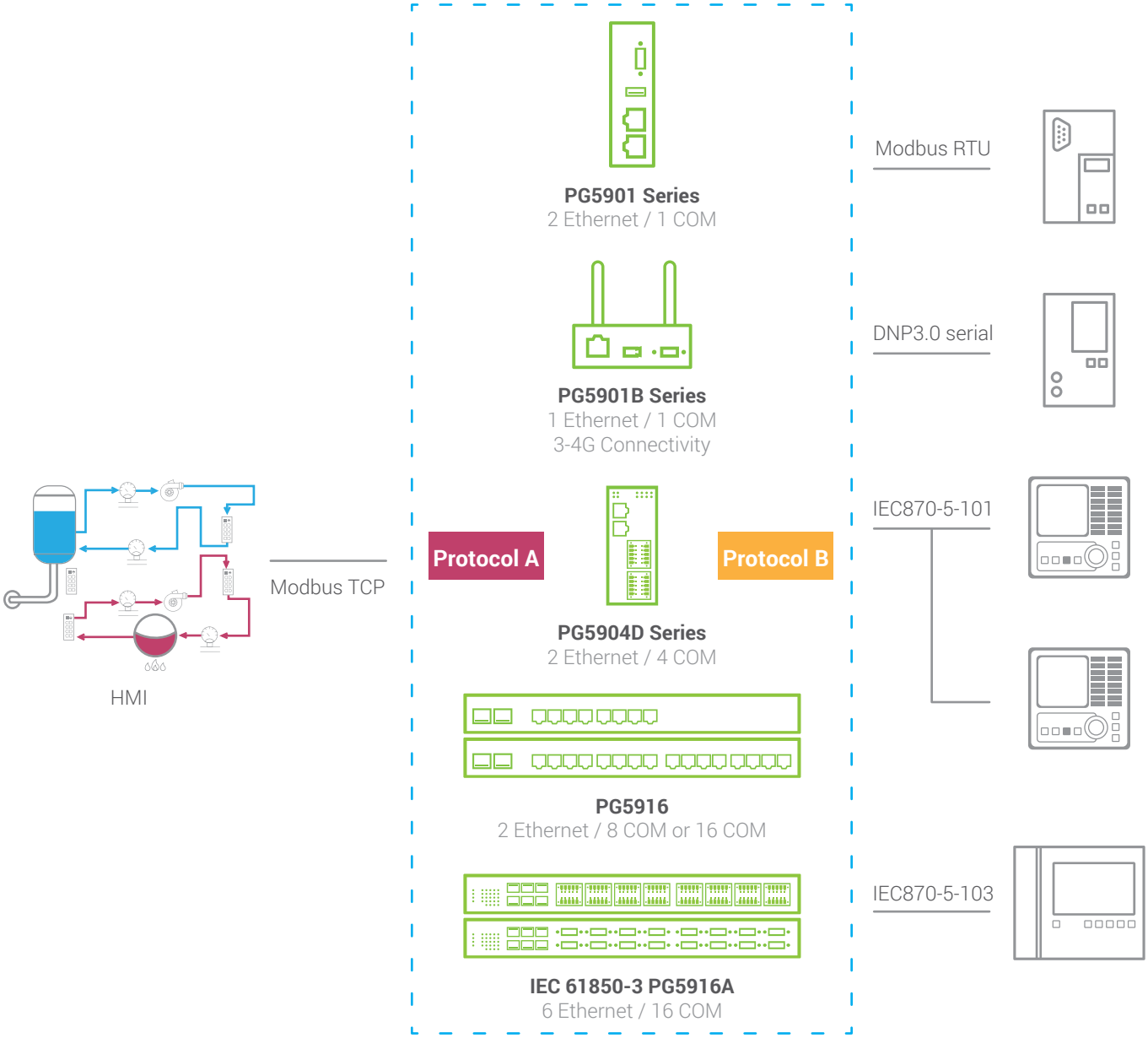
APPLICATION

Features

The protocol gateway's embedded protocol stacks allow

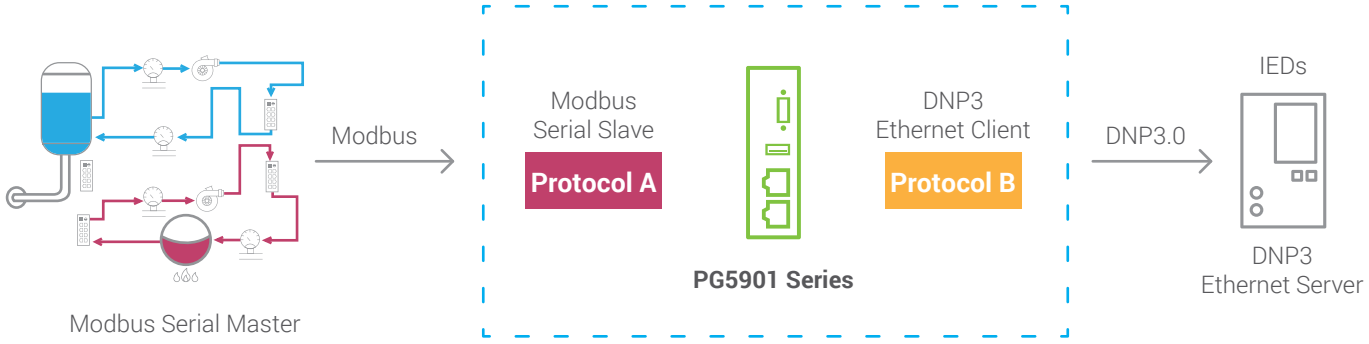
- Seamless conversion
- Exception/error Management
- Unsolicited event management for the protocols requiring them (such as DNP3)
- High performance
- Low cost

General Architecture



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

Example



The example shows how to Easily connect a Modbus Serial HMI, through Atop's Protocol Gateway to a DNP3.0 Ethernet Server 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 gate way is connected to. In this example, the SKU shown is "MBSS-DNEC" (Modbus Serial Slave to DNP3.0 Ethernet Client)

PROTOCOL AVAILABILITY

Protocol Availability Matrix for Conventional PG5901 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
Ethernet Client	IEC 61850	n/a	DNES-50EC	MBES-50EC	04ES-50EC	DNSS-50EC	MBSS-50EC	01SS-50EC
	DNP3	50ES-DNEC	n/a	MBES-DNEC	04ES-DNEC	DNSS-DNEC	MBSS-DNEC	01SS-DNEC
	Modbus TCP	50ES-MBEC	DNES-MBEC	n/a	04ES-MBEC	DNSS-MBEC	n/a	01SS-MBEC
	IEC 60870-5-104	50ES-04EC	DNES-04EC	MBES-04EC	n/a	DNSS-04EC	MBSS-04EC	01SS-04EC
Serial Master	DNP3	50ES-DNSM	DNES-DNSM	MBES-DNSM	04ES-DNSM	n/a	n/a	n/a
	Modbus RTU/ASCII	50ES-MBSM	DNES-MBSM	n/a	04ES-MBSM	n/a	n/a	n/a
	IEC 60870-5-101	50ES-01SM	DNES-01SM	MBES-01SM	04ES-01SM	n/a	n/a	n/a
	IEC 60870-5-103	50ES-03SM	DNES-03SM	MBES-03SM	04ES-03SM	n/a	n/a	n/a

Full-License PG5901 Series

Users can run single or multiple protocol(s) in both Protocol A and Protocol B sides.

PROTOCOL SPECIFICATION

IEC61850 Server/ Client	
Supported Functions	• Generic access to the data (Read, Write) • 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.
Supported Control Type of commands	• Generic access to the data (Read, Write) • 8 Logical Devices per Port • GOOSE (Generic Object Oriented Substation Event)
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

DNP3 Server/ Client/ Master/ Slave	
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 Functions	• Time Synchronization generic access to the data(Read, Write) • Commands with or without preselection (Select, Operate, Direct Operate) • Transmission of time-tagged events • Self-address
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

Modbus Server/ Client/ 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

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 Exception Codes	1: illegal function 2: illegal data address 3: illegal data value 4: server device failure 6: server device busy

IEC 60870-5-101 Master	
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 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 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

IEC 60870-5-103 Master	
General Specifications	• Protocol implementation with configurable parameters conforms to the IEC 60870-5-103:1997 • Every serial port supports only one IED • Process Information in Monitor and Control Direction • Unbalanced Modes
Supported Functions	• Station Initialization, Supports reset FCB and CU • General Interrogation • Clock Synchronization • Command Transmission • Test Mode • Blocking of Monitor Direction
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>

IEC 60870-5-104 Server/ Client	
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 • 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 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

SPECIFICATION

Network Interface	
Ethernet Port	2x RJ-45
LAN Mode	Dual Subnets or RSTP Redundancy
Compliance	IEEE 802.3 10BASE-T IEEE 802.3u 100BASE-TX
Serial Interface	
Connector	5-Pin 5.08mm Terminal Block or D-Sub9 connector
Port	1
Mode	RS-232/422/485, software selectable
Baud Rate	1,200~921,600 bps
Parity	None, Odd, Even
Data Bits	7, 8
Stop Bits	1, 2
USB Interface	
Speed	USB 2.0
Connector	USB A Type *1
Power Characteristics	
Connector	3-Pin 5.08mm Lockable Terminal Block
Input Voltage	9-48 VDC, 24VAC, 48 VDC (supplied by PoE, PoE models only),
Power Consumption	0.65A @ 9VDC
Power Redundancy	No
Reverse Polarity Protection	Yes

Mechanicals	
Housing	IP30 protection, metal housing
Dimensions(W x H x D)	32mm x 110mm x 90mm
Installation	DIN-Rail or Wall-Mount (optional kit)
Reset Button	Yes
Weight	400g
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 or IPsec VPN (peer-to-peer or peer-to-side), with a maximum VPN throughput of 37.9Mbps(*), and PPTP

REGULATORY APPROVALS

Safety	EN60950-1:2006; EN62368-1			
EMC	FCC Part 15, Subpart B, Class A EN 55032, EN 61000-3-2, EN 61000-3-3, EN 55024, EN 61000-6-2, EN 61000-6-4			
Test	**Item**		**Value**	**Level**
IEC 61000-4-2	ESD	Contact Discharge Air Discharge	±4KV ±8KV	2 3
IEC 61000-4-3	RS	80-1000MHz 1.4~2.0GHz 2.0~2.7GHz	10 V/m 3 V/m 1 V/m	3 2 1
IEC 61000-4-4	EFT	AC Power Port DC Power Port Signal Port	±2.0KV ±2.0KV ±2.0KV	3 3 3
IEC 61000-4-5	Surge	AC Power Port AC Power Port DC Power Port DC Power Port Signal Port	Line-to Line±1.0KV Line-to Earth±2.0KV Line-to Line±1.0KV Line-to Earth±2.0KV Line-to Earth±2.0KV	3 3 3 3 3
IEC 61000-4-6	CS	0.15-80MHz	10 Vrms	3
IEC 61000-4-8	PFMF	Enclosure	30 A/m	4
IEC 61000-4-11	DIP	AC Power Port	30% Reduction (Voltage Dips), 25/30 Cycle 60% Reduction (Voltage Dips) : 10/12 Cycle 100% Reduction (Voltage Dips) : 1 Cycle >95% Reduction(Voltage Dips), 0.5 period 100% Reduction (Voltage Interruption) : 250/300 Cycle	-
Shock	IEC 60068-2-27			
Drop	IEC 60068-2-32			
Vibration	IEC 60068-2-64			
RoHS	Yes			
REACH	Yes			
MTBF	21.16 years (MIL-HDBK-217F-based prediction)			
Warranty	5 years			

ORDERING INFORMATION

Hardware			
Model Name	**LAN ports**	**Serial ports**	**Additional features**
PG5901-DB	2x RJ45	1x RS-232/485/422 (D-Sub 9)	-
PG5901-TB	2x RJ45	1x RS-232/485/422 (5-pin TB)	-
PG5901-PoE-DB	2x RJ45	1x RS-232/485/422 (D-Sub 9)	PoE PD (802.3af)
PG5901-PoE-TB	2x RJ45	1x RS-232/485/422 (5-pin TB)	PoE PD (802.3af)

Optional Accessories		
Model Name	**Part Number**	**Description**
UN315-1212(US-Y) LV6	50500151120003G	Y-Type (5.08 mm) power adaptor,100-240VAC,1.25A@12VDC out,US plug,LV6
UNE315-1212(EU-Y)LV6	50500151120013G	Y-Type (5.08 mm) power adaptor,100-240VAC,1.25A@12VDC out,EU plug,LV6
ADP-DB9(F)-TB5	59906231G	Female DB9 to Female 3.81mm TB5 Converter
WMK-315-Black	70100000000050G	Black Aluminum Wall Mount Kit

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

DNES-MBEC	DNP3 Ethernet Server to Modbus Ethernet Client
DNES-MBSM	DNP3 Ethernet Server to Modbus Serial Master
DNSS-04EC	DNP3 Serial Slave to IEC 60870-5-104 Ethernet Client
DNSS-50EC	DNP3 Serial Slave to IEC 61850 Ethernet Client
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-03SM	Modbus Ethernet Server to IEC 60870-5-103 Serial Master
MBES-04EC	Modbus Ethernet Server to IEC 60870-5-104 Ethernet Client
MBES-50EC	Modbus Ethernet Server to IEC 61850 Ethernet Client
MBES-DNEC	Modbus Ethernet Server to DNP3 Ethernet Client
MBES-DNSM	Modbus Ethernet Server to DNP3 Serial Master
MBSS-04EC	Modbus Serial Slave to IEC 60870-5-104 Ethernet Client
MBSS-50EC	Modbus Serial Slave to IEC 61850 Client
MBSS-DNEC	Modbus Serial Slave to DNP3 Ethernet Client
FL	Allows a model to run single or multiple protocol(s) in both front-end to SCADA and back-end to IED sides