Welcome

Transmisión y Distribución de Energía cumpliendo IEC 61850-3

Antonio Gordillo IMA Septiembre - Diciembre 2020

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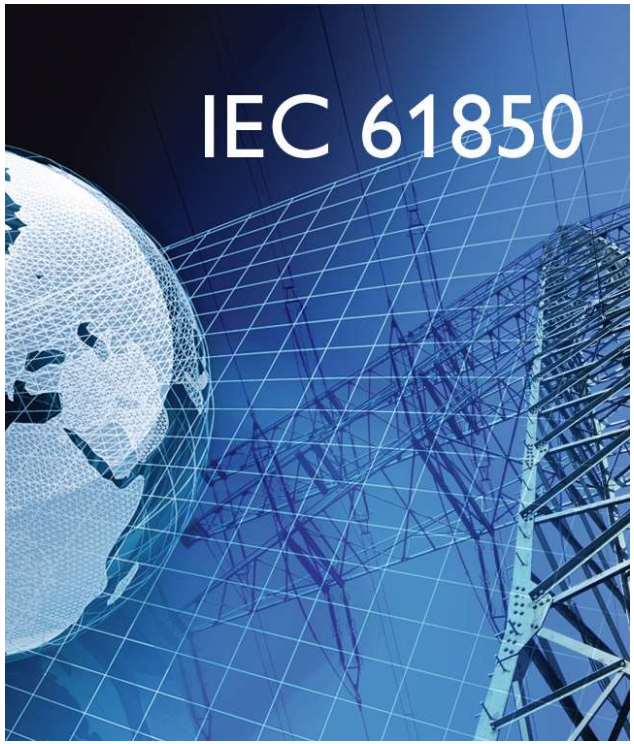
INSPIRING INNOVATIONS

Webinars

Agenda

- Overview
- Network Infraestructure
- PRP Redundancy
- Splices Box FO
- Axioline F for IEC 61850-3
- More infrastructure products



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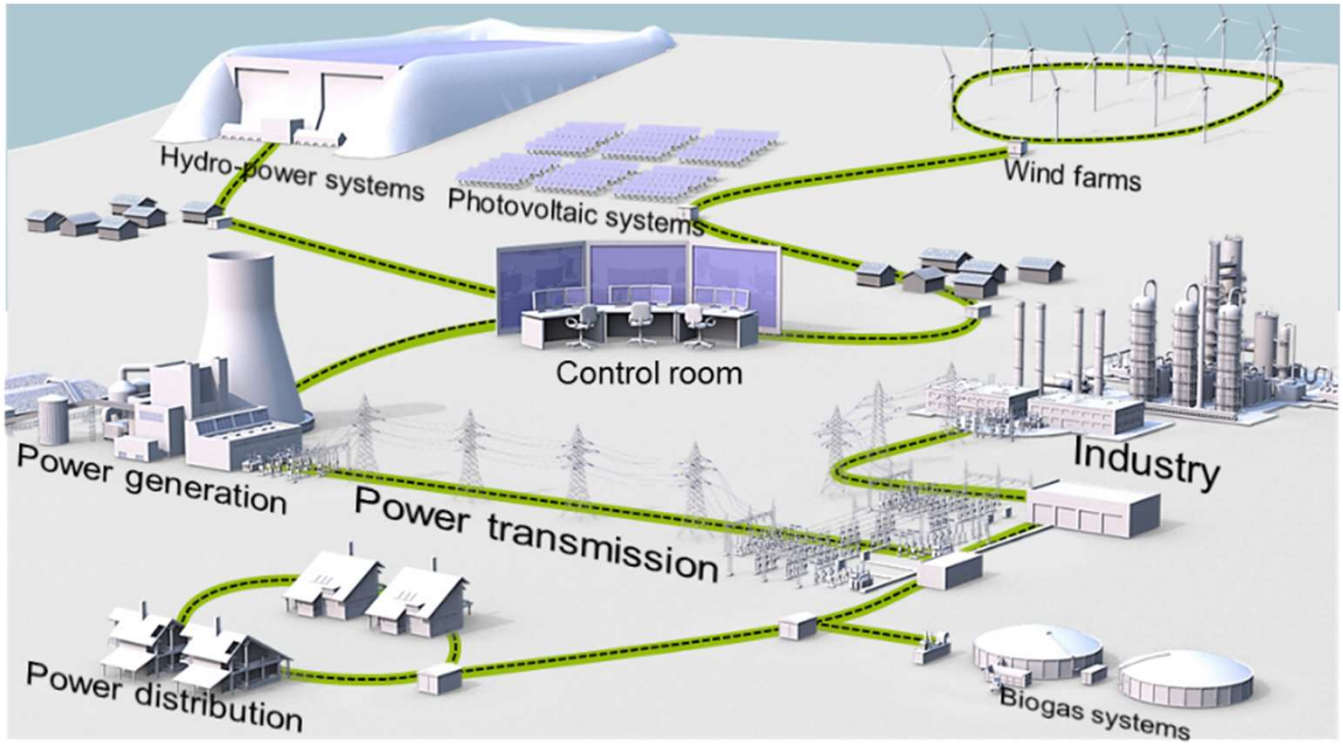
Overview IEC 61850 communication

Network technology for energy systems … Smart Grid



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Products and solutions fo the digital substations

Phoenix Contact

Video Overview Electrical Substations

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Energy

Overview Transmision and Distribution

- New infraestructura based on IEC 61850 is necessary for Smart Grid and new requirements of Energy Market for connecting all parts with modern Generation, Transmision, Distribution and New consumer models for integrity and capacity of electrical Network

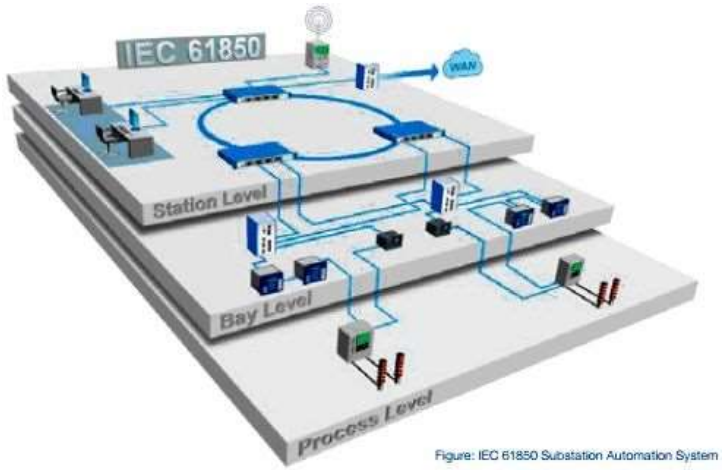

Figure: IEC 61850 Substation Automation System

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Products for IEC 61850

Network infrastructure for energy systems

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Products for IEC 61850

Overview network technology

- Comprehensive product range for DIN rail and 19” racks
- Extremely robust and EMC-proof design
- Extremely fast recovery time in case of redundancy
- Comprehensive security functions
- Professional services

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Products for IEC 61850

Robust Ethernet infrastructure

- Robust
  - Extended temperature range
  - Resistant against impact, shock and vibration
- Reliable
  - Resistant against electrostatic discharges (ESD), fast transient bursts, surges and magnetic fields
- Available
  - Continuous operation without interruptions, even in the event of voltage fluctuations

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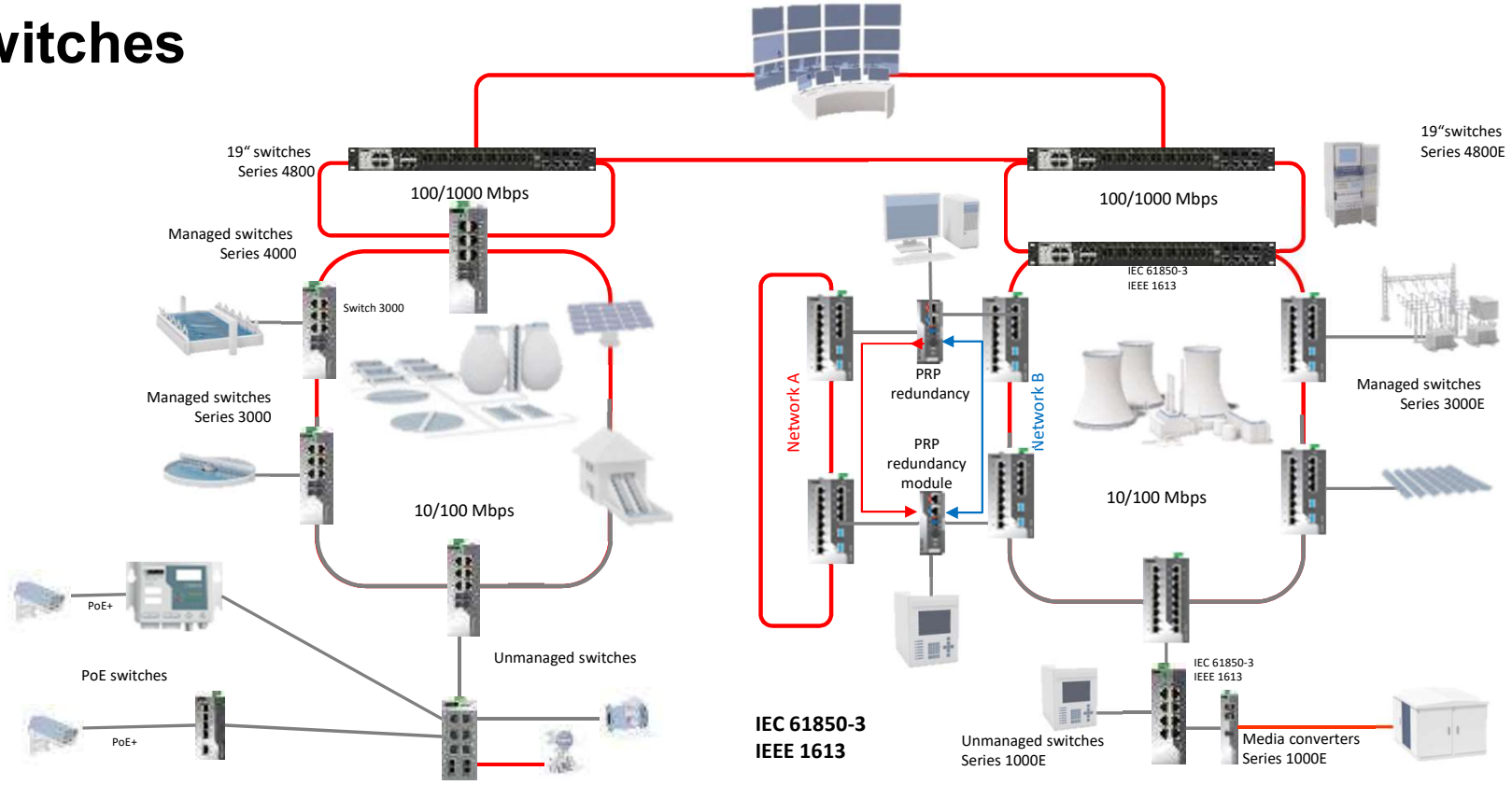
Infrastructure networks

Switches



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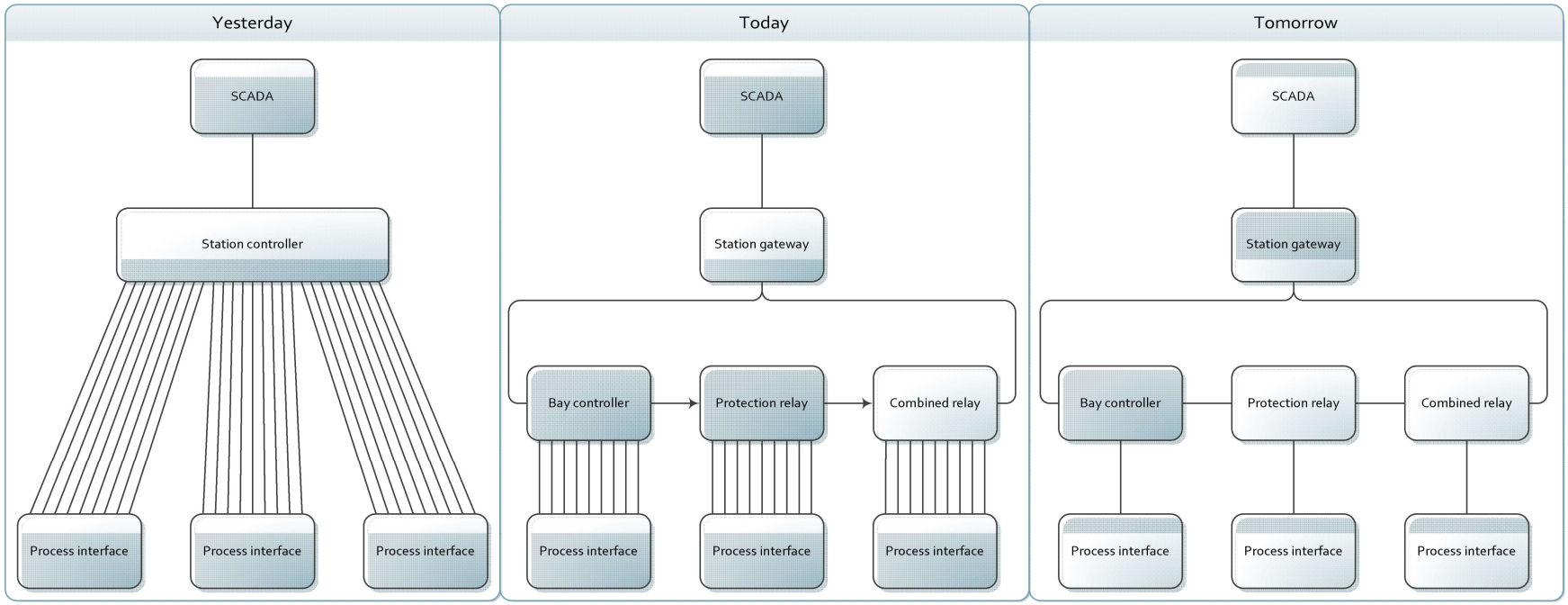
Envolution of substation automation systems



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Control cabinets or switchgear

Switches and media converters

- Fiber optic media converters for interference-free transmission over large distances
- Unmanaged switches as port multipliers
- Managed switches for high-performance and stable network infrastructure
- SFP modules for flexible fiber optic networks

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Conformance according IEC 61850 / IEEE1613

Portfolio network technology

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Conformance according IEC 61850 / IEEE1613

Ethernet infrastructure

PRP redundancy modules

1000E

MC 2000E

4800E

3000E

Modular power supply

The ideal device for each application

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Switches for 19” racks

19” switches with 8 RJ45 ports and 4 Gigabit combo ports and per version:

16 RJ45 ports

16 SC multi mode ports

16 LC single mode ports

16 LC multi mode ports

16 SC single mode ports

16 **ST** single mode ports

Exchangeable wide range power supply:
48 V DC or 110/220 V AC/DC

16 **ST** multi mode ports

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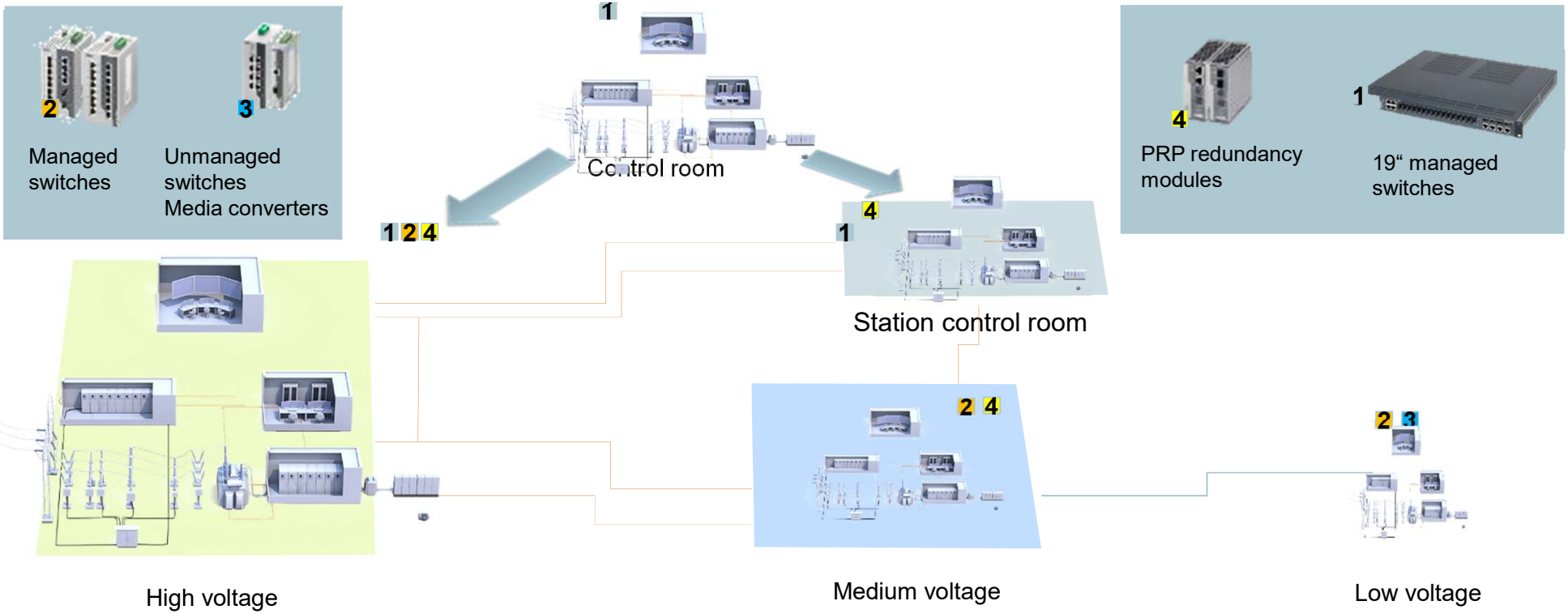
Products for IEC 61850

Network infrastructure



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Pluggable FO connection

- No splicing is necessary
- Front release without special tool
- Space-saving module insert with high packing density
- Plug and play
- Can be easily extended, thanks to the modular design

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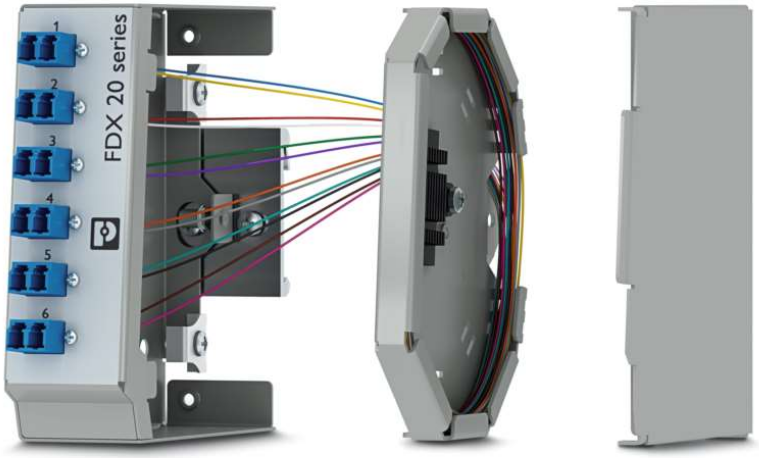
FO connection

Compact fiber optic splice boxes for DIN rails



- Continuously reliable data connections thanks to extensively tested components
- Up to twelve front ports and compact dimensions for more space in the control cabinet
- Reduced installation time due to pre-assembled, ready-to-splice design

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Compact fiber optic splice boxes for DIN rails

Product range

6x LC-Duplex

6x ST-Duplex

6x SC-Duplex

12x LC-Duplex

6x LSH (E2000®)-Duplex

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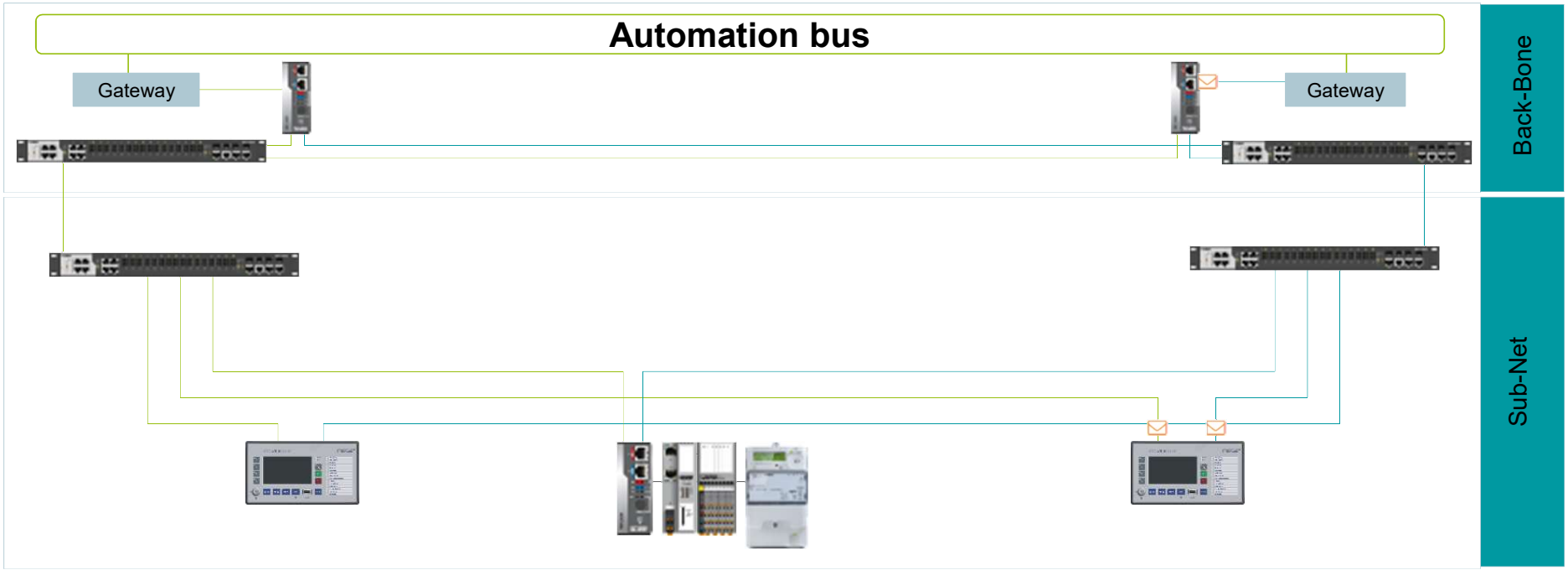
PRP (Parallel Redundancy Protocol)

No packet loss in critical situations



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PRP (Parallel Redundancy Protocol)

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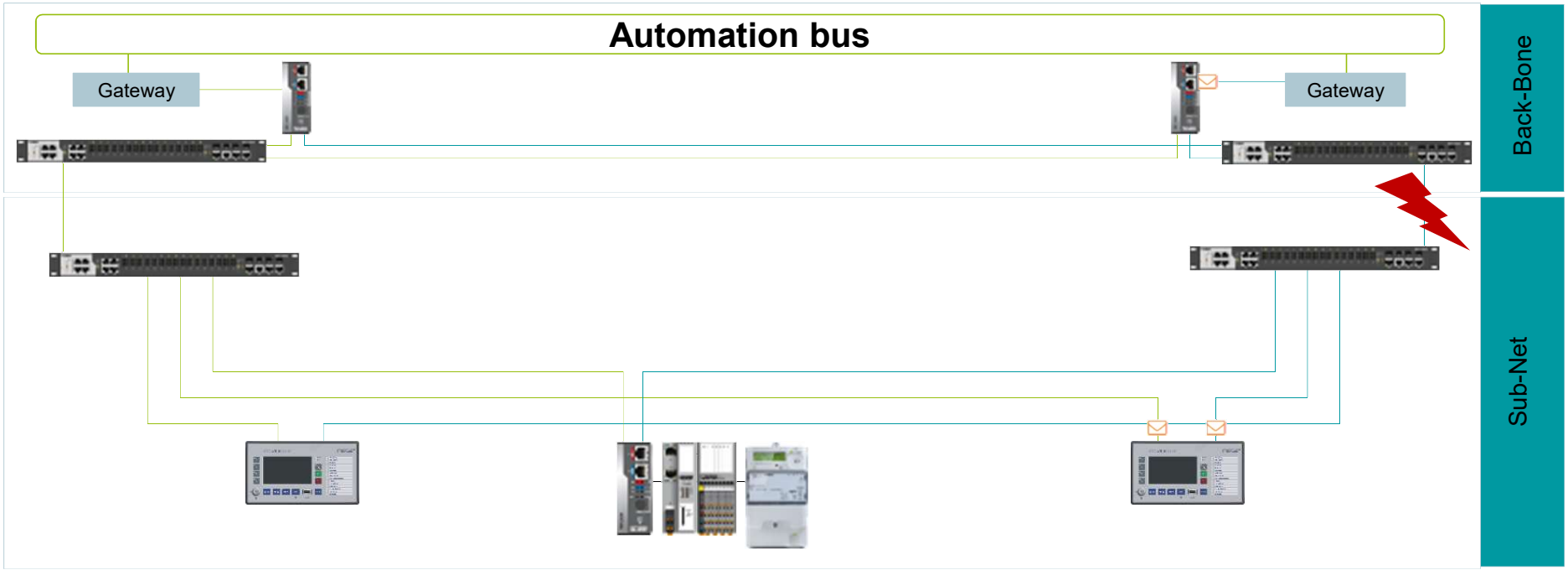

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PRP (Parallel Redundancy Protocol)

Parallel network redundancy modules

- Integration of devices in two parallel networks for maximum availability
- No recovery time for continuous operation in case of failure (0 ms)
- No packet loss in the event of network failure or malfunction of network components

For highest network availability without packet loss

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Infraestructure IEC 61850-3

PRP Parallel Redundancy Protocol

Redundancy

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Redundancy in IEC 61850 Networks

Standard in IEC 61850

PRP

Parallel redundancy protocol

Highest Availability

Proprietary Redundancy

Standard in IEC 61850

RSTP

Rapid spanning tree protocol

Standard Technology

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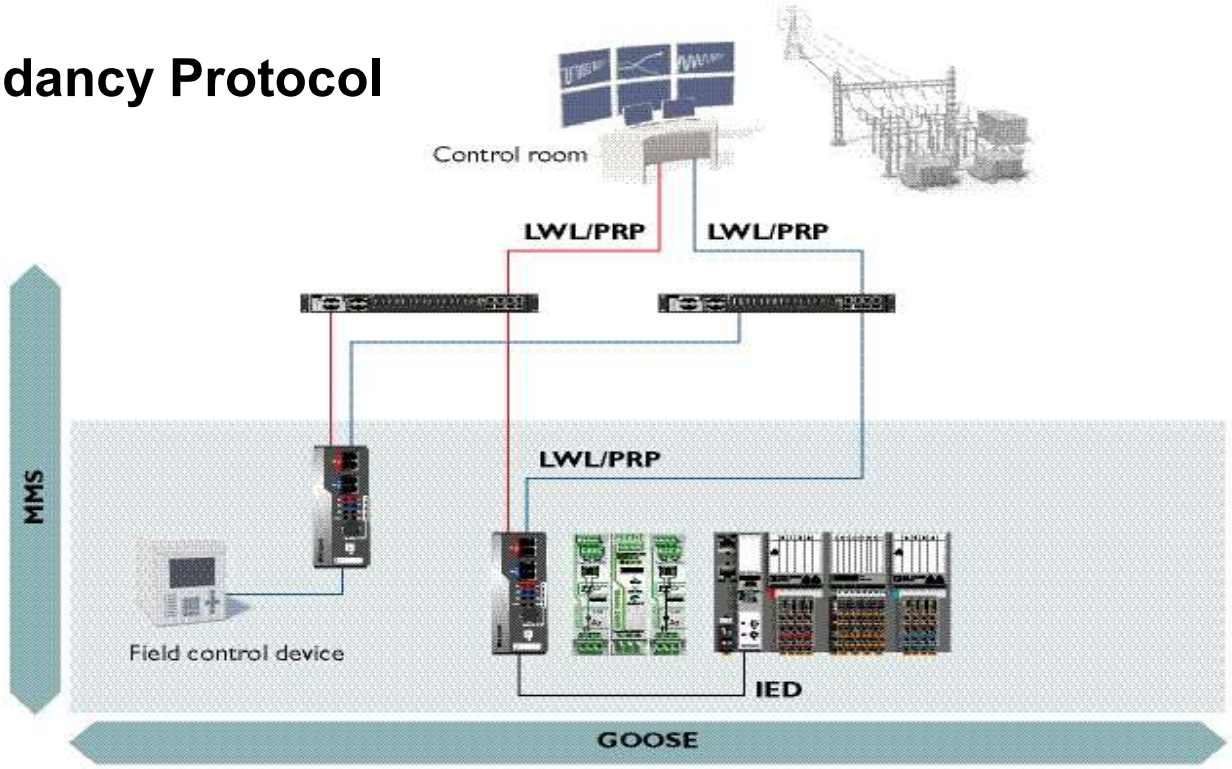
Redundancy in IEC 61850

PRP Paralell Redundancy Protocol



PRP: Parallel Redundancy Protocol
GOOSE: Generic Object Ortiented Substation Events
MMS: Manufacturing Messaging Specification
IED: Intelligent Electric Device

Axioline F for IEC 61850

IEC 61850: Communication networks and systems for power utility automation

- Power plants
- Transmission grid
- Distribution grid
- Transforming stations
- Switchgear
- …

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Axioline F for IEC 61850

Bus coupler – AXL F BK SAS

- 2 Ethernet Ports RJ45
- IEC 61850 server communication:
  - MMS
  - GOOSE
- Integrated Web-Server
- Easy engineering due to parameterization
- Flexible I/O-Mapping
- IEC 61850 SCL files

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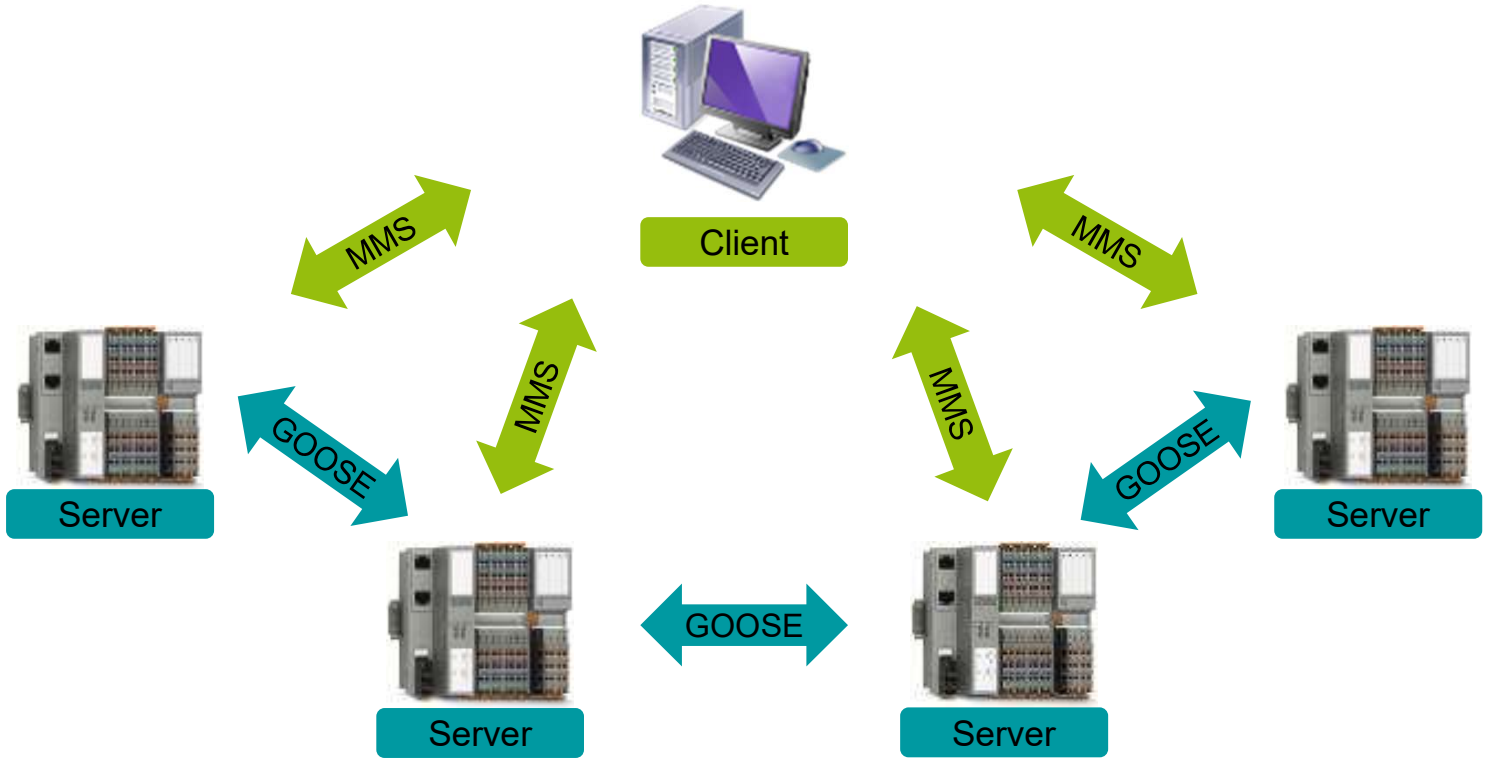
Axioline F for IEC 61850

Communication – MMS and GOOSE



GOOSE Generic Object Oriented Substation Events
MMS Manufacturing Messaging Especification

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Axioline F for IEC 61850

Interoperability

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Axioline F for IEC 61850

Interoperability

IEC 61850 Certificate Level A[1]

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No. 74106066-OPE/INC 14-3323

Issued to:
Phoenix Contact GmbH & Co. KG
Flachsmarktstraße 8
32825 Blomberg
Germany

For the server product:
AXL F BK SAS with I/O modules:
DO16/3 2F, DI16/4 2F, DI16/1 1H,
DO16/1 1H, DI8/2 110/220 DC 1F,
DOR4/2 AC/220DC 1F, AI8 1F, AO8 1F,
RTD4 1H, UTH4 1H.
Monitoring module
Firmware version 1.10
Hardware version 03 (21062013)

Issued by: KEMA DNV

The server product has not been shown to be non-conforming to:

IEC 61850 First Edition Parts 6, 7-1, 7-2, 7-3, 7-4 and 8-1

Communication networks and systems in substations

The conformance test has been performed according to IEC 61850-10, the UCA International Users Group Device Test Procedures version 2.3 with TPCL[2] version 1.7, the product's protocol, model and technical issue implementation conformance statements: Protocol Implementation Conformance Statement (PICS) for the IEC 61850 interface in AXL F BK SAS with FW version 1.10, Model Implementation Conformance Statement (MICS) for the IEC 61850 interface in AXL F BK SAS with FW version 1.10 and TISSUES Implementation Conformance Statement (TICS) for the IEC 61850 interface in AXL F BK SAS with FW version 1.10 and the extra information for testing: Protocol Implementation eXtra Information for Testing (PIXIT) for the IEC 61850 interface in AXL F BK SAS with FW version 1.10.

The following IEC 61850 conformance blocks have been tested with a positive result (number of relevant and executed test cases / total number of test cases):

1	Basic Exchange (21/24)	12a	Direct Control (3/12)
2	Data Sets (3/6)	13	Time Synchronization (4/5)
5	Unbuffered Reporting (15/19)		
6	Buffered Reporting (18/21)		

This certificate includes a summary of the test results as carried out at Phoenix Contact in Germany with UniCA 61850 Client simulator 4.28.04 with test suite 3.28.00 and UniCA 61850 Analyzer 5.28.03. This document has been issued for information purposes only, and the original paper copy of the DNV KEMA report No. 74106066-OPE/INC 14-3324 will prevail.

The test has been carried out on one single specimen of the product as referred above and submitted to DNV KEMA by Phoenix Contact. The manufacturer's production process has not been assessed. This attestation does not imply that DNV KEMA has approved any product other than the specimen tested.

Arnham, November 12, 2014

M. Adriaensen
Director Intelligent Networks & Communication

R. Schimmel
Certification Manager

[1] Level A - Independent test lab with certified ISO 9001 Quality System
[2] TPCL - Test procedures change list

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Axioline F for IEC 61850

Digital Input Modul – AXL F DI8/2 110/220DC 1F

- 8 channels
- Wide range
- Nominal voltages from110V DC to 220V DC
- IEC 61850-3
- Surge Voltage 5 kV

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Axioline F for IEC 61850

Digital Input Modul – AXL F DI8/2 48/60DC 1F

- 8 channels
- Wide range
- Nominal voltages from 48V DC to 60V DC
- IEC 61850-3
- Surge Voltage 5 kV

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Axioline F for IEC 61850

Digital Input Modul – AXL F DI8/2 24DC 1F

- 8 channels
- Nominal voltage 24V DC
- IEC 61850-3
- Surge Voltage 5 kV

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Axioline F for IEC 61850

Digital Output Modul – AXL F DOR4/2 AC/220DC 1F

- 4 digital Outputs
- Relay contacts, normally open
- Potential-free
- Nominal voltage up to 220V DC / 230V AC
- IEC 61850-3
- Surge voltage 5 kV

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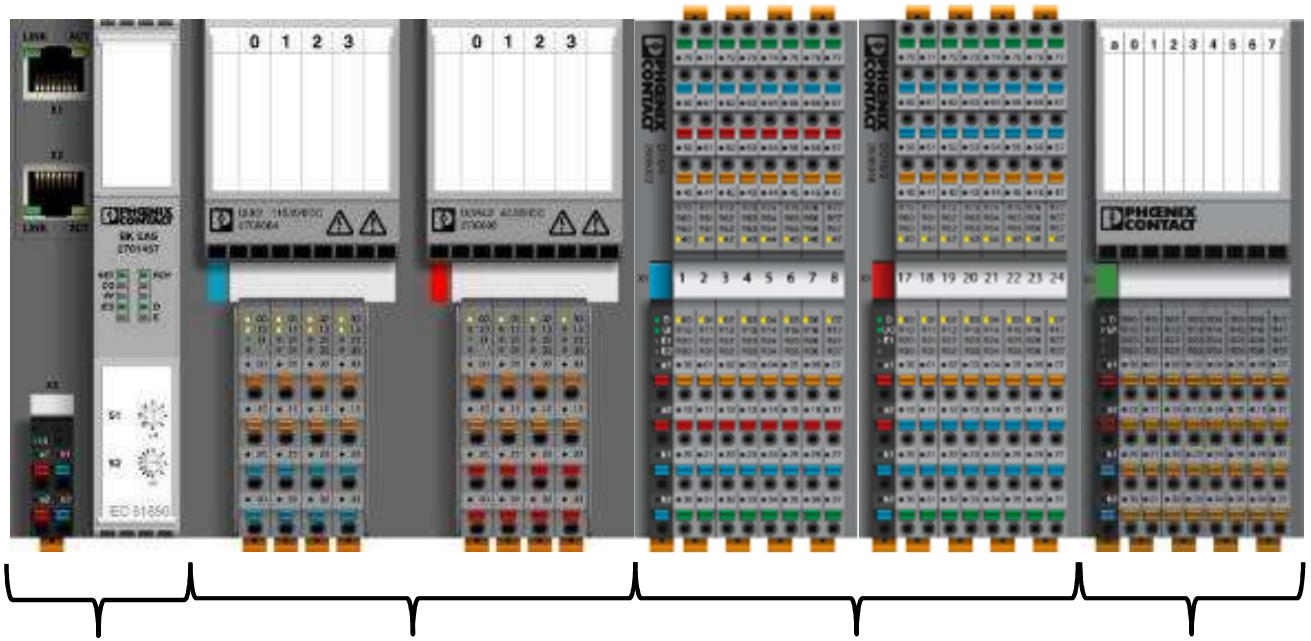
Axioline F for IEC 61850

Every network, every environment

IEC 61850

PROFIBUS

PROFINET



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QUINT POWER – Advantages at a glance

Strongest output
Static boost, dynamic boost and SFB Technology

Most robust input
Mains buffering

High level of electrical immunity

Most comprehensive signaling
Analog signal, digital signal, relay contact, optical bargraph

Preventive function monitoring indicates critical operating states before errors occur

Can be ordered preconfigured
Minimum order quantity is only 1

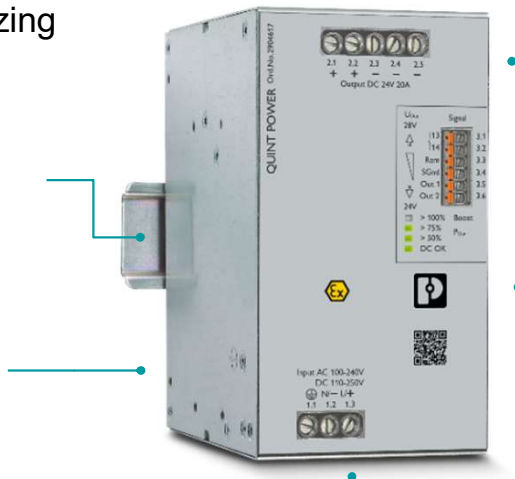
Power supplies

QUINT POWER – Plus version

Integrated decoupling-MOSFET
1+1- and n+1- redundancy for maximizing system availability

Double OVP
Switches the output off in the event of an error

SIL 3 certification
Maximizing operational safety



Protective coating
Protection against dust, corrosive gases and 100 % humidity

ATEX +IECEx approval
For use in potentially explosive areas of zone 2

Wide temperature range
-40°C to +75°C

IEC 61850-3
Tested according EMC requirements

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IEC 61850 full package

- Unmanaged switches
- Managed switches
- Media converters
- PRP redundancy modules
- 19" marshalling panels

- IEC 61850 bus coupler
- Low voltage I/O modules
- Standard I/O modules
- EMC tests power supply

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Products for IEC 61850

Visualization

- Full SCADA (Supervisory Control And Data Acquisition) function with visualization, trend representation, and alarm management
- Data logging, trend display, and recipe management
- Scripts can be created in VBA and IL
- Multilingual software and projects

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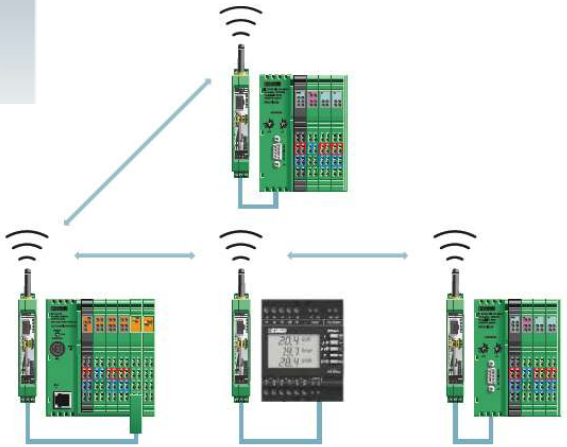
Intelligent Ethernet extender system

- Flexibility and location independence
- Saving of time: easy, fast start-up through the plug-and play implementation in complex IP networks
- Saving of costs: instead of IP devices, unmanaged Ethernet extenders can be implemented in complex IP networks
- High failure reliability through preventive maintenance
- Saving of costs: a separate surge protection is no more required
- Unambiguous, easy diagnostics on site through a plaintext display on the device (status indication of the surge protection PT-IQ and path diagnostics)

Simple signal distribution



- Quick and easy startup
- Easy point-to-point or network connections (star, mesh)
- Can be extended with up to 32 I/O modules per station via DIN rail connectors (hot-swap capability)
- I/O-to-I/O, I/O-to-serial, serial-to-serial
- Trusted Wireless 2.0 technology
- Adjustable data rates for the wireless interface (16 … 500 kbps)
- 128-bit data encryption (AES)

Measurement and monitoring

- Energy measurement in just three steps, thanks to an intuitive installation wizard
- Direct connection of commercially available Rogowski coils saves wiring and configuration effort
- Easy to maintain, thanks to smart web server and display functions
- Operating elements and interfaces can be disabled to ensure data security

Measuring currents and voltages

- Easily retrofit current measuring technology with the PACT RCP set without having to remove system parts
- Transform alternating currents up to 4,000 A using a single universal PACT RCP measuring system
- For permanent use in outdoor settings: Rogowski coil with UV protection for housings and cables
- Fast, reliable and tool-free installation: plug-in current transformers with Push-in Technology

Robust signaling of errors and operating states

- Modular and highly reliable relay design
- Suitable for harsh ambient conditions
- Easy installation and operation
- Long term mechanical display

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Highly compact control and switching

Relay module,
16 mm wide

Relay module,
6.2 mm wide

Relay module,
31 mm wide

Relay module,
40 mm wide

- For all auxillary voltage levels the same system
- Unidirectional usage
- Feasable for control rooms with $24V_{DC}$, $48V_{DC}$, or $60V_{DC}$ and field applications with $110V_{DC}$, $125V_{DC}$ or $220V_{DC}$
- Easy handling, thanks to state-of-the-art wiring and potential distribution concept
- Easily extended to create a time relay via a pluggable function module
- Complete product range covering all standard relay applications
- Available as a complete module or modular system

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Force-guided contacts for safety related processes

- Modular and highly reliable relay design
- Suitable for harsh ambient conditions
- Easy installation and operation

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Easy and fast potential distribution

- Saves up to 80% of assembly time compared to terminal block system
- Saves up to 50 % of installation space
- Flexible + solid combination
- Simple electrical extension
- Link to CLIPLINE complete
- New adhesive technology provides unforeknown mounting opportunities
- New flange system offers comfortable installation

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Monitoring and remote control of applications

SMARTRTU AXC SG

VMM Power transmission and distribution | Marvin Leitmann

smartRTU – Fast commissioning and simple parameterization

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Smart RTU

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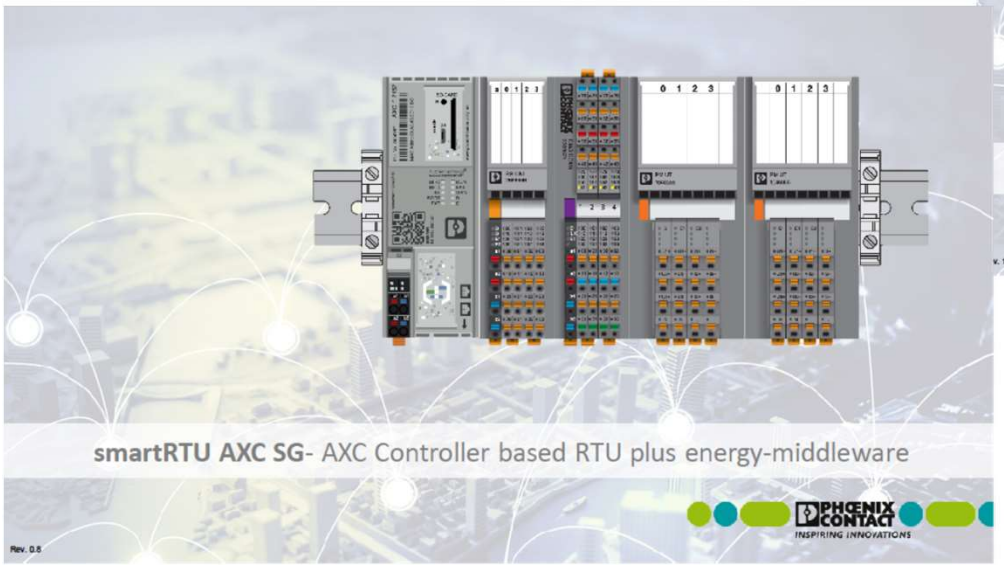
Already in 2020…

- Web based engineered RTU
- Annunciator



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Signaling

Annunciators

VMM Power transmission and distribution | Marvin Leitmann

infobox - Product presentation: Everything at a glance

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Infobox products

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Annunciators

'MM Power transmission and distribution | Marvin Leitmann

nfobox - Fast commissioning and simple parameterization

Infobox technical

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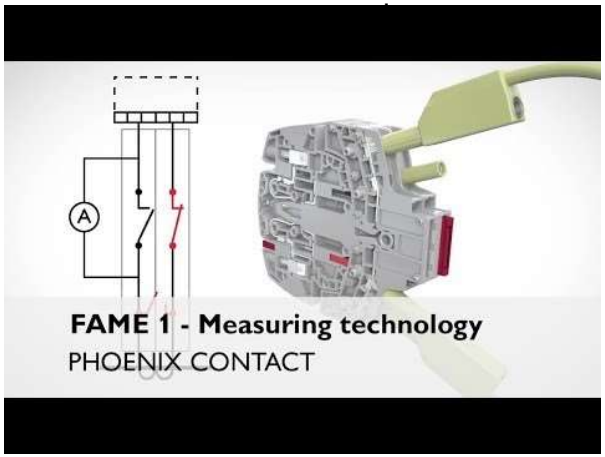
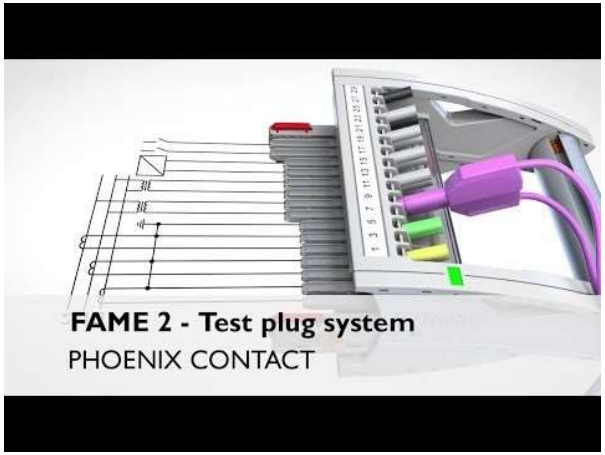
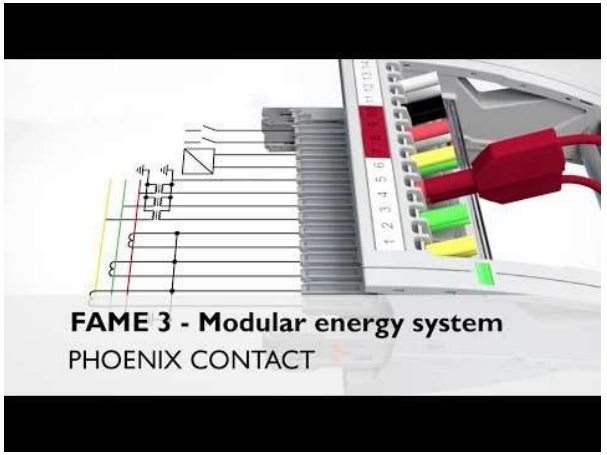
Products of Energy Sector

FAME

El sistema de prueba Fame 2 de Phoenix Contact, que ha sido galardonado con el Red Dot Award 2014, es idóneo para todas las tareas de medición y prueba en el ámbito de la tecnología de protección de red. Se pueden ejecutar de forma sencilla y segura y en un solo proceso de prueba complejas conmutaciones en instalaciones de conmutación de alta y media tensión. A esto contribuye la empuñadura giratoria patentada.



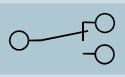
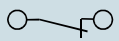
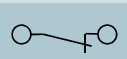
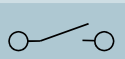
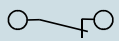
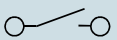
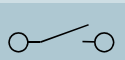
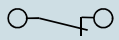
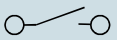
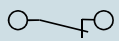
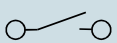


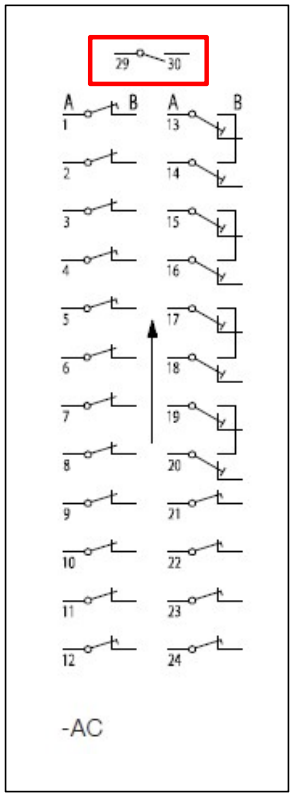


Con la clavija de prueba se puede ejecutar la secuencia de conmutación de cada una de las funciones, separadas temporalmente de forma segura, a través de tres láminas de contacto de distintas longitudes en una sola manipulación de conmutación. Especialmente característico es el cortocircuito del transformador automático y adelantado, que aporta una gran seguridad a la medición. Todas las tareas de conmutación para la medición del transformador de corriente y de tensión se pueden realizar de forma sencilla mediante los accesorios del sistema de bornes para carril Clipline complete. Los estados de conmutación, en especial de las barras cortocircuitadoras tan importantes para la seguridad, son claramente reconocibles. Los cables de prueba se conectan de forma sencilla y segura con clavijas de prueba estándar de seguridad de 4 mm.

FAME-AUX as a part of the FAME test socket

Comming 2020…

Article	Technology		Assembly	Main Slice	AUX Slice
FAME 1		UT	Panel mounted		
		PT	Panel mounted		
FAME 2		UT	Panel mounted		
		UT	Rail mounted		
		PT	Panel mounted		
		PT	Rail mounted		
FAME 3		RSC	Panel mounted		
		RSC	SL Panel mounted		
		BT	19“ Rack mounted		



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Data connector

Comming 2020…

FO data connector of the M17 MPO Series
High Performance Data Connector

New 2020

Webcode: #1623

Preconfigured 19“ splice boxes
For all common FO interfaces

New 2020

Webcode: #2348

Duplex patch cable for indoor use
Great variety for FO cabling

New 2020

Webcode: #2342

Connectors for energy storage systems
Connect battery poles safely

New 2020

Webcode: #2346

Pluggable energy distributors of the PRC series
Supply devices safely and quickly

New 2020

Webcode: #2060

Angled circular connectors of the PRC series
Flexible connection in the field

New 2020

Webcode: #2056

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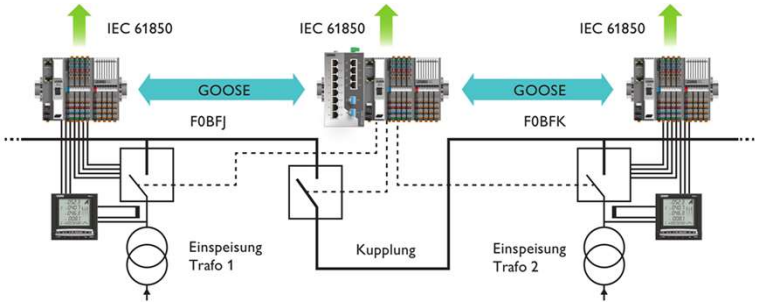
Products, Systems, Solutions

Power Plant



IEC 61850 Power Stations

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Thank you

Thank you

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