MARCH 2019

EPDS – Digital Solutions offering & Automation

ABB EPDS Digital Solution Centers + PG3401 Products offering
## ABB Distribution Automation

**Portfolio**

<table>
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<th>Basic Range</th>
<th>Mid Range</th>
<th>Hi-end Range</th>
<th>Grid Automation</th>
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<td>605 series</td>
<td>611 series</td>
<td>615 series</td>
<td>RER/REC 615 series</td>
</tr>
<tr>
<td>61 series</td>
<td>615 series</td>
<td>620 series</td>
<td>RER 620 series</td>
</tr>
</tbody>
</table>

**Relion Range**

**Basic Range**
- 605 series
- 611 series

**Mid Range**
- 615 series
- 620 series

**Hi-end Range**
- 630 series
- 640 series

**Grid Automation**
- RER/REC 615 series
- RER 620 series

**600 family**

### Station products
- SSC600
- COM600
- RIO600
- Arctic

### SW
- PCM600
  - ZEE600 (ABB Zenon + Envisage)

### Other solutions and legacy
- PCM600
  - ZEE600 (ABB Zenon + Envisage)
- FT's & cables
- DSC
- 500 series
  - REA, EM, SACO
Distribution Automation
Global footprint

- Digital solution centers
  - Ratingen, Germany
  - Dalmine, Italy
  - Vaasa, Finland
  - Vadodara, India
  - Singapore, Singapore
  - Lake Mary, USA
  - San Paulo, Brazil
  - Istanbul, Turkey (2019)
  - Dubai, UAE (2019)

- Regional Product Marketing Managers
- Factories
- Regional Product Specialists (technical support)
- Local DA sales units
Coordinated market approach

- Internal channel
  - Switchgear
  - Modular system & NSPP
  - CPP/Outdoor products
  - Service
  - ABB system integrator (ABB SI)

- External channel
  - Direct sales
  - OEM/Panel builder
  - EPC/system integrators
  - Technical distributors

Distribution Automation Digital Solution Centers

Business model
**Distribution Automation Solution**

KPI’s example: solutions for Food and Beverage

1. **Improve energy efficiency**
   Power Management System (PMS) for secured power supply to critical loads in the to reduce unplanned downtime for important production areas and to reduce power consumption by planned downtime.

2. **Easy maintenance**
   Monitoring system for fast event recognizing allows operators, maintenance staff and production supervisors to prevent or fix effectively downtime issues as they happen, instead of weeks later.

3. **Power Quality, Protection and Utility connection**
   Relion protection and control relays for several application reduce complexity. Long term cost reduction (TCO) for trainings and maintenance by reduce variety of relays.

4. **Power Management**
   Monitoring and effective power and energy management environment from medium and low voltage – ensure service continuity and reliability of the network.

5. **People/plant safety**
   A fast and selective arc fault mitigation for air-insulated LV & MV switchgear and Relion protection and control relays and sensor technology protect staff and plant facilities for many years.

6. **Increase OEE**
   Various application for automatically transferring supply to a healthy incoming feeder to increase manufacturing time that is truly productive which includes three main factors: availability, performance, quality.
Distribution Automation Solution

Power network for Industries / Applications

Medium Voltage Substation
- Transformer protection
- Incomer line protection
- ARC protection
- Local control
- Measurement

Low Voltage Substation
- Earth fault protection
- Motor protection
- Transfer system
- ARC protection
- Local control
- Measurement

Energy and Power management
- MV&LV Substation remote control
- Transformer/ Tap changer control
- Process control
- Monitoring
- Analyzing
- Logic control

Utility

Water treatment
Capacitor Banks
Wastewater
Product lines
Air condition
Packaging line
Doors
Air condition

Solar

Generator
Digital Solution Centers

Digital Solution Centers offering - Detailed

Note: majority of Distribution Automation Solutions and Success stories do combine different solutions, based on customer need's and KPI’s
EPDS Distribution Automation Portfolio
ABB Distribution Automation
Relion Basic Range

Current-based protection relays

*REF601*
Feeder protection relay with breaker control
- 51, 50, 51N, 50N, 68, 49

*REM601*
Motor protection relay with/without breaker control

Current-based + self-supplied or dual supply

*REJ603 V 1.5*
Self-powered feeder protection relay with special CTs
- 51, 50, 51N, 50N, 68, 49

*REJ603 V 3.0*
Self-powered feeder protection relay with conventional CTs + front port comm.
- 51, 50, 51N, 50N, 68, 49

Basic Current and Voltage

*611 series*
Protection relay with breaker control, current and voltage functions (up to 4I+4U + 8Bi)
- +IEC61850 Ed.1+2
- +PRP/HSR comm
- 50/51/49/67/67N/46/59G/68...

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March 19, 2019
Relion® 615 series
Compact solution for utility distribution and industrial applications

ABB's Relion product family includes the 615 protection and control series of relays, characterized by compactness and withdrawable plug-in unit design.

The 615 series relays fully support the IEC 61850 standard for communication and interoperability of substation automation devices, including fast GOOSE messaging and IEC 61850-9-2 LE. The 615 series support both the parallel redundancy protocol (PRP) and the high-availability seamless redundancy (HSR) protocol, together with the DNP3, IEC 60870-5-103 and Modbus® protocols.

The 615 series include:
- RED615 Line differential protection and control
- REF615 Feeder protection and control
- RET615 Transformer protection and control
- REV615 Voltage protection and control
- REM615 Motor protection and control
- REV615 Capacitor bank protection and control
- REG615 Generator and interconnection protection

abb.com/relion
ABB Distribution Automation
Relion 620 series

- Protects 2 breakers / 1 earthing switch / 4 disconnectors (full duplex)
- Max 32 BI / 18 BO
- 3 high-speed outputs (option)
- Configurable push-buttons
- Large mimic HMI
- Disturbance recorded (100 recordings) / 1024 events traceability

Analog input module (CT/VT variant):
- 4 analog voltage inputs
- 1 voltage input dedicated for syncro-check (U_SYN)
- 4 binary inputs
- Selectable binary input thresholds (17 – 186 V DC)

Sensor input module (sensor variant):
- 3 combi-sensor inputs
- Support for other sensor types using external adapters
- 1 residual current (1/5 A) input, core balance CT
ABB Distribution Automation
Relion REX640 – HMI Carousel
Relion® REX640
All-in-one protection for any power distribution application

Protection and control relay – REX640

- New high end protection and control relay
- Powerful all-in-one protection and control for power distribution and generation
- Integration of functions usually performed by separate hardware
- Modular, flexible design of both hardware and software elements
- Easy modification and upgrading for hardware and software at any point in time
- Specifically designed to support ABB digital switchgear

Newest member of the Relion® protection and control family.
Relion® REX640
Application coverage / positioning

Newest member of the Relion® protection and control family

Hardware capabilities and flexibility

Application coverage
# Application coverage - overview

Relion® Protection and Control REX640

<table>
<thead>
<tr>
<th>Base functionality*</th>
<th>Power transformer protection</th>
<th>Machine protection</th>
<th>Interconnection protection</th>
<th>Shunt capacitor protection</th>
<th>Busbar protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Overcurrent protection</td>
<td>- Protection for two and three winding power transformers</td>
<td>- Protection of synchronous and asynchronous machines</td>
<td>- Protection of interconnection points of distributed generation units</td>
<td>- Protection of single Y, double Y and H-bridge connected capacitor banks</td>
<td>- High imp. based BB protection</td>
</tr>
<tr>
<td>- Earth-fault protection</td>
<td>- Voltage protection</td>
<td>- Frequency protection</td>
<td>- Restricted earth-fault</td>
<td>- Protection of harmonic filter circuits</td>
<td>- Selective phase-dedicated double BB protection, including check zone – enabled with one device</td>
</tr>
<tr>
<td>- Restricted earth-fault</td>
<td>- Load shedding</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Feeder / line protection**

- Extensive earth-fault protection
- Fault locator
- Line distance protection
- Line differential protection

**On-load tap changer control**

- Control of parallel running power transformers
- Flexible master unit selection via the local HMI

**Generator auto-synchronizer**

- Auto-, semi-auto and manual generator synchronization
- The local HMI enables a fully visualized process

**Network auto-synchronizer**

- Synchronized closing of non-generator CB by actively adjusting selected generators
- The local HMI enables a fully visualized process

**Petersen coil control**

- Automatic control of Petersen coil
- Control of additional fixed parallel coil
- Control of parallel resistor

**Arc protection**

- Four lens or loop sensors supported in any combination
- Both sensor types are supervised
 SSC600
How does SSC600 embrace "centralized protection and control"?

Everything in one device

- Protection and control centralized in one device in the substation
- Measurements and IO values provided via IEC61850 from bay level
- Access to control, monitoring and protection via a centralized single human-machine interface (HMI)
- Flexibility in customization with optional application packages in one single device
SSC600
Suggested application examples

Redundant centralized protection and control

- Solution built with merging units used in every feeder
- Redundancy based on
  - SSC600 hot-hot protection standby and hot control standby
  - Communication based on IEC 61850 PRP (process and station bus)
  - Time synchronization with IEEE1588v2 GPS master and backup time master from merging unit or secondary GPS master
- Used where only centralized functionality is required.
  (usually on new installations)
- A single IEC 61850 network for process and station bus
- System visualization via SSC600 with WebHMI
- Substation gateway doubles up as HMI
- Substation HMI doubling up as gateway for local and remote control
ABB Distribution Automation
FIONA smart cabinets with RTU’s

FIONA

- Smart cabinet for conventional CT’s, VT’s, combisensors, based on RTU’s portfolio
- Alternative to RIO600/REC615 based smart cabinets
- To fit with customers «RTU-based» specifications
- Manufactured and assembled by PG3401 team in Germany
- Includes communication, batteries, chargers
Protection and control IED manager PCM600

Main customer benefits

One Configuration tool

One configurator tool for all ABB’s protection and control IEDs, provides versatile functionalities for the entire lifecycle of ABB’s protection and control IED applications.

The graphical application configuration that enables state of the art configuration and monitoring of the complete IED application.

Informative graphical support of protection parameter settings

- 670 series
- 650 series
- REX640
- 630 series
- 620 series
- 615 series
- 611 series
- 610 series
- 605 series

Further supported products: (for parameter setting, disturbance handling and monitoring functions(*))

- REF542+
- REx541/543/545
- REX521
- SPACOM

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Link to ABB SA Software Library: https://www143.abb.com/SoftwareLibrary
EPDS Digital Solution Centers Offering
**ABB Distribution Automation**

Sensors technology for secondary switchgears

**MV sensors**

- No specific engineering (1 sensor type fits all)
- Higher safety (no explosion risk)
- Higher safety for maintenance operators (only mV signals)
- Reliable values (no saturation)
- Shorter deliveries times
- Less spares (less different types)
- Energy efficiency (no losses)
- Reliable (no electronic/communication conversion)

### Parameters for Application

<table>
<thead>
<tr>
<th>Parameters for Application</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated primary current of application</td>
<td>A</td>
<td>up to 630</td>
</tr>
<tr>
<td>Rated primary voltage of application</td>
<td>kV</td>
<td>up to 24</td>
</tr>
</tbody>
</table>

### Sensor Parameters

<table>
<thead>
<tr>
<th>Parameters for Application</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated primary voltage, ( U_{in} )</td>
<td>kV</td>
<td>22/( \sqrt{3} )</td>
</tr>
<tr>
<td>Highest voltage for equipment, ( U_e )</td>
<td>kV</td>
<td>24</td>
</tr>
<tr>
<td>Rated power frequency withstand voltage</td>
<td>kV</td>
<td>50</td>
</tr>
<tr>
<td>Rated lighting impulse withstand voltage</td>
<td>kV</td>
<td>125</td>
</tr>
<tr>
<td>Rated primary current, ( I_{p} )</td>
<td>A</td>
<td>80</td>
</tr>
<tr>
<td>Rated continuous thermal current, ( I_{ct} )</td>
<td>A</td>
<td>630</td>
</tr>
<tr>
<td>Rated transformation ratio, ( K_a ) for current measurement</td>
<td>-</td>
<td>80 A / 150 mV at 50 Hz / 180 mV at 60 Hz</td>
</tr>
<tr>
<td>Rated transformation ratio, ( K_u ) for voltage measurement</td>
<td>-</td>
<td>10 000 : 1</td>
</tr>
</tbody>
</table>

**Current accuracy class**

- 0.5/5P100

**Voltage accuracy class**

- 0.5/3P

**Length of cable for sensor**

- m 2.2

**Length of cable for capacitive divider**

- m 0.45
### ABB Distribution Automation

Sensors technology for primary switchgears

**MV sensors**

- No specific engineering (1 sensor type fits all)
- Higher safety (no explosion risk)
- Higher safety for maintenance operators (only mV signals)
- Reliable values (no saturation)
- Shorter deliveries times
- Less spares (less different types)
- Energy efficiency (no losses)
- Reliable (no electronic/communication conversion)

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<thead>
<tr>
<th>Parameters for Application</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated primary current of application</td>
<td>A</td>
<td>up to 2500</td>
</tr>
<tr>
<td>Rated primary voltage of application</td>
<td>kV</td>
<td>6/3 up to 24/3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sensor Parameters</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated primary voltage, $U_{pm}$</td>
<td>kV</td>
<td>11/3; 15/3; 22/3</td>
</tr>
<tr>
<td>Highest voltage for equipment, $U_{hm}$</td>
<td>kV</td>
<td>12; 17.5; 24</td>
</tr>
<tr>
<td>Rated power frequency withstand voltage</td>
<td>kV</td>
<td>28 (42); 38; 50</td>
</tr>
<tr>
<td>Rated lighting impulse withstand voltage</td>
<td>kV</td>
<td>75; 95; 125</td>
</tr>
<tr>
<td>Rated primary current, $I_{pm}$</td>
<td>A</td>
<td>80</td>
</tr>
<tr>
<td>Rated continuous thermal current, $I_{ct}$</td>
<td>A</td>
<td>1250</td>
</tr>
<tr>
<td>Rated transformation ratio, $K_{va}$</td>
<td>A</td>
<td>80 A /</td>
</tr>
<tr>
<td>for current measurement</td>
<td>-</td>
<td>150 mV at 50 Hz</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>180 mV at 60 Hz</td>
</tr>
<tr>
<td>Rated transformation ratio, $K_{vb}$</td>
<td>-</td>
<td>10 000 : 1</td>
</tr>
<tr>
<td>for voltage measurement</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Current accuracy class</td>
<td>-</td>
<td>0.5/5P630</td>
</tr>
<tr>
<td>Voltage accuracy class</td>
<td>-</td>
<td>0.5/3P</td>
</tr>
<tr>
<td>Length of cable</td>
<td>m</td>
<td>5.0; 6.5; 7.5</td>
</tr>
</tbody>
</table>
Almost no analog wiring in the switchgear – increases reliability
Protection and control with 90% less wiring

- With sensors less human interaction is required, which leads to decreased risk of malfunction
- One relay is able to handle several applications via software configuration
  - Minimized need for spares
  - Operators need to learn only one type of relay
- GOOSE (Generic Object Oriented Substation Event) communication between Relion protection and control relays
  - Reduced cabling result in less installation and commissioning time
  - Fast data transfer between substation relays improve selectivity and reliability of a power network
  - Reduced engineering and material cost for complex feeder automation schemes
- Redundant Ethernet communication increase reliability
Distribution Automation Solution
Protection and control cabinets

Solution

- Pre-configured protection and control cabinets
- Pre-configured station automation cabinets for substation HMI and gateway system and solutions for critical power application
- Can integrate protection relays, COM600 or any other industrial computer running ABB Zenon/MicroScada or 800xA
- On request, can integrate HMI, keyboard, mouse
- Fitting customers requirements for industrial and infrastructure LV and MV applications
Relion® REX640
Auto synchronizer for generator CB

Protection and control with 90% less wiring

- Each REX640 controls its own generator. If the generator CBs are the only ones to be synchronized we have no limit, otherwise up to 8 generators in a single system is supported.
- REX640 relays within the scheme communicate with each other using GOOSE signals over ETHERNET and no external logic is needed.
- REX640 HMI contains dedicated page for user interaction with the autosynchronizer. Auto, semi-auto and manual modes are available.
- Control of the autosynchronizer can be carried out via communication interface (MMS or Modbus) by the DCS or SCADA systems.
ABB Distribution Automation applications

Smart RMU: Safeplus 12/24kV + REC615 2.0

- A REC615 is combination of small RTU functionalities and REF615 protection relay.
- Direct communication IEC 60780-5-104 to SCADA through FO/Ethernet or through a GPRS/LTE gateway
- Compatibility with current/voltage sensors or conventional instrument transformers.
- Permits the protection for a breaker and control 2 load switches (more if combined with RIO600), with FDIR and SYNC features.

Integrated in RMU

In separate control box (top/side)

Available as loose components for OEM's/PB's

Single Line Diagram - Concept
Ensuring safety of personnel and electrification assets
Fast acting and coordinated arc protection

Example: MV and LV arc protection using UFES and REA101

Customer needs
- Required at all voltage levels to ensure personnel and equipment safety
- To ensure improved system availability
- To ensure safeguard of investment in the substation

Solution: Dedicated or combined solutions based on arc clearance time requirement
- Variant 1 (UFES-QRU + REA 101/TVOC) < 4 ms
- Variant 2 (REA 101 + Relion) ~ 55-80 ms
- Variant 3 (SSC600 + SMU615) ~ 60-80 ms
- Variant 4 (TVOC2+ Emax2 with Ekip 2) <70ms - LV
Protection and control solution enabling features

REX640 arc protection features

Arc protection

REX640 offers:

- 4pcs of optical Arc flash sensor inputs
- Free mixture of loop and lens sensors
- Sensor types that are **all supervised**
- Free allocation of sensor types and trip signals that enable cost efficient and selective protection schemes
- GOOSE signaling and high speed static outputs that will further enhance the scheme performance
Distribution Automation Solution

Power Management system keep main processes running and reducing energy cost

Example for low end solution

- Power management system and / or Distributed Control SCADA
- Using Protection and control relay within Switchgear

Customer Needs

- Secures continued power supply to the most important loads and prevents power blackouts/outages
- Seamless integration in medium-voltage switchgear
- Avoid costly production outage and environmental damage
- Stand-alone (one-box) load-shedding concept within IEC61850 network
- Adaptation to customer requirements
- Fast return of investment

Solution: Power management cPMS

- In case of disturbance, switching off non-critical loads and securing power to critical loads
- Different application from low end up to high end compact power management system (cPMS) which could include:
  - Generator-, Circuit breaker-, Motor-, Transformer and Power control and
  - Manual und automatic synchronization and monitoring
  - Guided engineering by wizard functionility
Low end vs. fast transfer solution

- Synchronized automatic transfer system using protection relays from Relion® product family
  - Automatic transfer solution for both LV and MV applications (non critical)
  - Switchover time down to 200 - 300 ms and mitigate total downtime
- High speed bus transfer for critical applications
  - Ensuring process continuity and quality of energy supply
  - Protection of facilities, environment and workers
  - Reduce stress of components
  - Optional VM1-T fast operating circuit breaker and special initiation device for transfer within 30ms

ATS based on Relion series

High speed bus transfer (HSTS)
Distribution Automation Solution
Grid Automation: Loop Control LC1000 for ring application

**Optimized ring application**

**Existing**

**Optimized**

**Customer needs**

- Fast isolating a fault and reconfiguration to reduce downtime cost
- Reliable protection of primary equipment such as cable, overhead lines and transformers
- Flexibility and easily extension to minimize installation time
- Various protocols for easy connecting equipment to existing control system
- Safe operation

**Solution: loop control for open or close ring**

- Fast automatic fault detection, isolation and ring re-configuration (FDIR) in less then 1 sec
- Centralized or de-centralized application based on GOOSE (Generic Object Oriented Substation Event) messaging
- Relion relays plus circuit breaker in each RMU increase the reliability of the primary equipment
- Integrated Relion relays and sensor technology for safe local operation
Distribution Automation Solution
Remote IO’s RIO600

Customer needs

- Modular additional IO’s inputs, with analog-sensors and binary values
- Fault Passage Indication (FPI)
- Current and voltage ranges: 4A-8kA and 480V-48kV
- Power measurements: P, Q, S and cos ϕ
- The typical accuracy of line voltages, currents and active power is < 0.5% and for other power measurements <1%
- Active/reactive energy counters
- Capability to detect the directional and non-directional overcurrent and earth faults
- Detection of the harmonic disturbances (TDD, TDH) up to the 8th harmonics

Solution: RIO600

- RIO600 modular DIN rail construction
- Communication module with IEC61850 GOOSE and Modbus TCP
- WebHMI based, same configuration tool as Relays (PCM600)
- Hardware designed and tested according to IEC standards
**Communication solution**

- Data transfer wireless or hardwired to control center
- From serial to IP protocol conversion
- Wireless transfer of I/Os: e.g. alarms to control center via VPN-tunnel
- Various range of communication products
- Cloud based application

**Customer needs**

- Dynamic addressable IP addresses with the ARM600 VPN concentrator, gateway
- Public wireless Arctic devices asset management software Arctic Patrol
- Access far reaching and widely ramified and unconnected areas
- Fast and easy installation without the need of construction work
- Temporary/flexible construction for special application
- Secured communication to prevent cyber attacks (Regular software update)
Distribution Automation Solution
Communications: Arctic Patrol SW → Benefits of asset management

- Arctic Patrol is an asset management application for remotely managing the installed and connected Arctic 600 series gateways. Patrol includes comprehensive condition monitoring, communication network statistics and remote firmware updating.
  - Arctic Patrol allows individual or mass updates of all connected Arctic 600 series gateway firmware
  - Allows the operator to get a better understanding of the status of the communication network
  - Automatic back-up of connected Arctic 600 series gateway configurations
  - Provides statistical information about cellular network performance
  - Allows access to all connected Arctic gateway user interfaces
  - Integrated in both ARM600 M2M Gateway variants and is accessed via the ARM600 web user interface
  - Supports also management of ABB RIO600 devices when connected through ARC600
Distribution Automation Solution
Remote access and reliable data transfer

Example substation application

Customer needs

- Combined substation HMI, gateway and process controller for medium sized application
- Gateway functionality between the substation devices and external higher-level systems such as Network Control Center (NCC) using IEC 60870-5, DNP3, modbus or OPC-based protocols.
- Solution based on COM600 optimized for communication based on IEC61850

Solution: Gateway and Substation Monitoring

- Substation monitoring system (alarm, events, control) or alternative gateway system for visible safe operation
- Fast analyzing of events and disturbances to prevent unplanned outages
- Connection of equipment different manufactures
- Alternative hardwired data transfer to reduce installation time
- Reliable and monitored communication network
- Industrial PC for usage in special environmental conditions
Distribution Automation Solution
Fault location, restoration and public wireless communication

Flexible concept for MV and LV
- Reduce varieties of spare parts (cost reduction of spare part handling)
- Reduce training effort and cost

Time optimized operation
- Automatic fault location of earth fault and overcurrent
- Safe and fast isolation of the fault via remote controllable load break switches
- Fast automatic restoration of the net to improve SAIFI and SAIDI

Voltage, current and Power measurement
- Documentation of power supply and quality
- Monitoring of utilities equipment and early detection of an overload increase power quality
- Reduce energy consumption using sensor technology

Observe of the low voltage band (active voltage regulation)
## Distribution Automation Solution

Protection and control cabinets

### Solution

<table>
<thead>
<tr>
<th>Application</th>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhead line networks</td>
<td>Control Cabinet for 1 – 3 outdoor switch disconnectors</td>
<td>GA02</td>
</tr>
<tr>
<td></td>
<td>Control Cabinet for switch disconnector</td>
<td>GA03</td>
</tr>
<tr>
<td></td>
<td>- Voltage and current measurements included</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control Cabinet for recloser</td>
<td>GA04</td>
</tr>
<tr>
<td></td>
<td>- Measurements and protection included</td>
<td></td>
</tr>
<tr>
<td>Cable Networks</td>
<td>Control Cabinet for RMU with control of to 3 LBS's</td>
<td>GAI2</td>
</tr>
<tr>
<td></td>
<td>Control Cabinet for RMU with control of to 3 LBS's</td>
<td>GAI3</td>
</tr>
<tr>
<td></td>
<td>- Voltage and current measurements included</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control Cabinet for RMU with control up to 9 bays</td>
<td>GAI4</td>
</tr>
<tr>
<td></td>
<td>- Control of 1 CB and 8 LBS included</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Measurements and protection included</td>
<td></td>
</tr>
</tbody>
</table>
Service and Upgrades with Distribution Automation

Life cycle services: Relay replacement

**Flexible concept for MV and LV**
- Plug and play solutions for all major relays in the market
- Type tested and certified Pre-cable Matching Units

**Time optimized replacement**
- No need to prepare new drawings
- Existing cables can be reused at the same connection point
- Retrofit relays can be configured with same logics and settings than legacy products

**Future proof**
- Available with new communication protocols and IEC61850 Ed1 and Ed2
- Including PRP/HSR redundant communication
- Permits future schemes with Sampled Values and Centralized protection devices
Distribution Automation Solution
ABB Ability™ Power Management/ Remote Monitoring and Control

Full plant integration

- Reduce volatility of energy cost into millions of dollars gained in increased production or saved in reduced operating costs.
- Operate efficiently and safely and to facilitate maintenance
- Improved cost management
- Integration of all electrical equipment from different suppliers with different design specifications and functionalities

Customer needs

Solution: Electrical management systems

PLC-based Electrical Control System (ECS) which includes the functionalities of gateway, SCADA and Power Management System (PMS) to control in the event of unstable power supply from grid or disruption of power supply in plant that may lead to blackouts and costly, unplanned shutdowns

- Electrical equipment ranging from high to medium and low voltage requires real-time data acquisition on the status of various electrical equipment and plant electrical networks
- Aligned retrofit of Switchgear and Electrical management System (EMS) increase availability of the power network
High performance and easily maintainable primary assets
Asset analytics aiding predictive maintenance (1/4)

Example 1: MV asset management

Customer needs

- Maintain substation assets (transformers, switchgear, circuit breakers, motors etc.) proactively using condition monitoring and predictive maintenance.
- Ensure longevity of service, reduce or eliminate outages.
- Run operations with minimal equipment inventory
- Avoid unscheduled downtime: predict faults before they happen
- Optimize maintenance: condition-based maintenance
- Minimize repairing time and maximize plant efficiency

Solution: Temperature and PD monitoring

- Monitoring temperature rise and partial discharge in MV switchgear line up.
- Cost effective solution
- Diagnostic unit that can integrate with sensors, protection relays, smart equipment, gateways based on IEC 61850, Modbus etc.
- Solution with local WebHMI, wireless interface to hand-held devices.
High performance and easily maintainable primary assets
Asset analytics aiding predictive maintenance (2/4)

Example 2: LV asset management

Customer needs
- Maintain substation assets (transformers, switchgear, circuit breaker, motors, etc.) proactively using on-site condition with integrated analytics for predictive maintenance.
- Ensure longevity of service, reduce or eliminate outages.
- Run operations with minimum equipment inventory.
- Avoid unscheduled downtime: predict faults before they happen.
- Optimize maintenance condition based.
- Minimize repairing time and maximize plant efficiency.

Solution
- Temperature Monitoring Solution (TMS) for ACB cable termination, busbar shipping splits and power module contacts.
- Fully integrated on-site condition monitoring solution and cloud connectivity.
- Connectivity to Process Control systems by various (*) fieldbus protocols.
- Connectivity to SCADA systems.

(*) Fieldbus options: Modbus TCP, RTU / Profinet / Profibus DP
High performance and easily maintainable primary assets
Asset analytics aiding predictive maintenance (3/4)

Features and Functions

• Low voltage switchgear 'black box' data collector; fully embedded solution
• No programming required
• Web based full graphical user interface, password protected
• Online log for alarm, trip and status information with Knowledge Base for detailed fault analysis
• Switchgear overview and single line diagram for diagnosis purpose
• Condition and Energy consumption report to optimize the assets
• Thermal view based on TMS sensor and load data
• Integrated analytics for predictive maintenance
• Connectivity to cloud solution MyRemoteCare
High performance and easily maintainable primary assets
Asset analytics aiding predictive maintenance (4/4) – MNS Digital LV switchgear

**Scalable, modular, flexible**
- One system platform for whole LV switchgear portfolio and any kind of application
- Flexible integration to DCS and plant maintenance systems by standarized industrial protocols
- Open platform for any sensor and device integration
- Integrated temperature monitoring solution – where needed
- Scalable based on customer needs but with capability for future extensions
- Easy access to any data - where needed
- Future-proof by adding new functions without changing equipment physically and use of industrial IIoT standard technology

**Condition Monitoring**
- Integrated on-premise condition monitoring system
- System configuration without programming
- Seamless fault finding support by detailed indication and inbuilt knowledge base to reduce unplanned downtime to a minimum
- Switchgear thermal condition at one click – the integrated thermal view
- Energy reporting – just a click ahead – to identify energy saving potentials and anomalies
- Fault tracing by historic data analytics
- Option for remote diagnosis by ABB Service experts for improved maintenance and fault finding support - keeps plants productive at a maximum

**Data analytics**
- On-premise data analytics – integrated part of condition monitoring system
- Integrated algoritms to minimize plant down time by providing early warnings of critical situations
- Predictive maintenance support – maintenance when needed – to minimize production losses
- Asset health supervision by data analytics of critical parameters

**Cloud integration**
- Integrated connectivity to ABB Ability cloud solution MyRemoteCare
- One common platform for MV and LV switchgear for data analytics and asset health supervision
- Fleet management support for distributed production
- Customer support through remote diagnostics by ABB Service
- Centralized remote monitoring option of plant electrification assets by ABB Service or customer global service organization to reduce overall maintenance costs.
- Monitoring of un-manned production facilities for fastest failure analytics and maintenance planning.
### ABB Ability™ Electrical Distribution Control System

**Sub & Final distribution**

#### Features & Benefit

- Cloud based solutions
- Information available on portable devices
- No local IT infrastructure required
- Scalable solution
- Features improvement by ABB Market place, no supplier involvement required
- Easy implementation on brownfield for all the devices with Modbus communication
- Integration of third party devices
- Main target applications: infrastructures, buildings, shopping mall

#### Target Applications

- Infrastructures
- Building
- Shopping mall

#### Integration:

<table>
<thead>
<tr>
<th>Sub distribution</th>
<th>Final distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metering (M2M)</td>
<td>MCCB (Tmax XT)</td>
</tr>
<tr>
<td>ATS (TureOne)</td>
<td>MCCB (Sx 200)</td>
</tr>
<tr>
<td>ACB (Emax2)</td>
<td>Gateway (CMS700)</td>
</tr>
<tr>
<td>MCCB (Tmax XT)</td>
<td>EQ Meter (A43-A44)</td>
</tr>
<tr>
<td>Switches (Slimline XR)</td>
<td>Third parties</td>
</tr>
</tbody>
</table>
ABB Ability™ Electrical Distribution Control System

In energy distribution systems
COM600S 5.0
Process Visualization (1/4)

**WebHMI**

- Web browser-based user interface
- Pre-installed and maintenance-free WebHMI software
- Easy and secure remote access of WebHMI using encrypted communication
- Multiple users can access the WebHMI using a standard internet browser (IE 10 or later, Firefox 45.0 or later or Chrome 54.0 or later)
- Local or remote access
COM600S 5.0
Process Visualization (2/4)

WebHMI

- Single Line Diagram (SLD)
  - Substation and bay level views
  - Additional custom views in addition to Master view => improved flexibility
  - Bigger SLD configurations can be managed
  - Single, double busbar arrangements
  - User configurable 4-mode dynamic busbar coloring based on the busbar status
- Object control (opening and closing of circuit breakers, disconnectors, etc.)
  - Identification
  - Select-before-execute
  - Interlocking
  - Reservation
- Alarms/Events management
Visualization of measurements (current, voltage, power etc.)

Parameter Setting Tool (PST) for displaying and setting the ABB relays' parameters over:
- IEC 61850
- SPABus
- Modbus

System supervision, including relays, communication buses and links

Access and user management for secure authorized access to the relays

Language switching

Used for Data Historian, GOOSE Analyzer, reports and disturbance record management
WebHMI

- Direct links to the related documentation
  - Web pages (Web Server -> relay WebHMI)
  - Manuals
  - Drawings
  - Other documents
  - Information available on substation, voltage, bay and conducting equipment levels
- Summary table for overview of selected online data from single or multiple bays
Network disturbance analysis

**DR Handling**

- Disturbance recorder (DR) upload from the relays
- Import of DRs from the relays using IEC 61850 file transfer or the FTP protocol
- DR handler to display all uploaded disturbance recorder files
- Wavewin DR Viewer to display and analyze DR data
- DR summary feature:
  - Shows all IEDs with DRs
  - Displays latest records and number of records
Based on cpmPlus 5.0 History manager, used across products from divisions in ABB
- Designed and optimized for extensive history recording and process information management
- Used for accurate process performance monitoring based on process and equipment calculations with real-time and history values
- Historian’s buffer is pre-programmed for 6 months’ duration:
  • Limit reached with ~ 2500 signals and updated every 5 seconds
- Used for handling DR data for running substation analytics AND trends
- Cross referencing completed using gateway tool
COM600S 5.0
GOOSE Analyzer

‘Soft-wire’ monitoring

- For monitoring and analyzing GOOSE signals between relays on the IEC 61850 substation bus
- Enables the graphical representation of GOOSE signal flow from publishers to subscribers
- Supports commissioning, operation maintenance and upgrade phases
- Enables real-time diagnosis through detailed events
- Presents data values and the status of the communication between the relays
- Real time events in general event list and their querying is supported
COM600S 5.0
Logic Processor (1/2)

Substation application execution

– IEC 61131-3 based logic engine (Codesys) enables the implementation of substation level automation tasks
– All five PLC languages specified by the IEC 61131-3 standard
– Applications programmed using logic editor
– Information flow between logic engine and COM600 core components handled using Codesys OPC server
– Shortest data transfer cycle between process signals and logic variables is 50 ms.
– Default task interval for logic program is 200ms. Max. response time ~ 300 ms.
– Offline and online features for engineering and diagnostics
– Modeled as an ‘internal IED’ in SAB600
Substation application execution

- Results or actions of the application’s logic can be sent back to relays or to upper level systems.
- Can be used when relays do not have logic capabilities.
- Some examples of substation level logic*:
  • Automated busbar transfer
  • Interlocking schemes
  • Special alarm generation
  • Sequence control (*documentation available)

* To be developed by user: No pre-defined libraries available
ABB Zenon Electrification Edition (ZEE600)

Why ABB Zenon Electrification Edition?

- Create EP platform for Low and Medium-Voltage electrical control systems
- Get access to an existing strong core system, recognized worldwide
- Efficient and fast engineering wizards and tools, for competitive industrial and infrastructure applications
- Focus on developing specific libraries based on ABB Electrification portfolio, with templates for faster engineering
- Enable a long term partnership and development program with Integrators channels
Digital Solution Center
ABB Zenon for electrification solution

Data center application

The Home Page displays a PDC house as background image. This image may be changed to actual project specific PDC image.

The header is common to all pages and displays:
- Page name
- Current user login data
- Time and date

The footer is also common to all pages:
- Acts as a menu for page transition
- Certain buttons/functions will be grayed out for users without authorization.
Data center application

Specific switchgear one line opened from footer page link
Device Icons and lines are dynamic
Green for un-powered
Red for Powered.
Truck icons indicate Racked In, Test and Racked Out positions

Sequence of operation (SOO)
- Predefined software PLC programming for switching function
Data center application

Control commands require confirmation

Control only possible if the following conditions are met.

- User authority is sufficient
  - No interlocks are active
  - Device in Local mode
  - Truck position is correct
  - Another user has not placed a software lock out
- All active interlocks are displayed for information

Historical trend window allows online configuration of pens, logging cycles, storage duration and many other options
Digital Solution Center
ABB Zenon for electrification solution

Data center application
Standard reporting function with customization
- Alarm list
- Event list
- Load profiles
Digital Solution Center
ABB Zenon for electrification solution

Energy Management System
Centralized power monitoring and control
Energy tracking
Load shedding
Load profile
Automatic reports
Power consumption optimization
Digital Solution Center

ABB Zenon for electrification solution

Examples for oil and gas application
Digital Solution Center
ABB Zenon for electrification solution

Examples for utilities application
Digital Solution Center
New Digital Solutions page

One site for all Digital Solutions

Innovatively designed to help in solving challenging customer requirements and delivering high performance, cost-effectiveness and efficiency.

ABB’s reliable and high performance medium voltage products facilitate creation of unique customer solutions towards smarter power distribution in industries, sensitive infrastructure and utilities. These type of solutions are enabled through distributed functions across multiple interconnected digital-enabled products and in doing so, their individual features are fully exploited to derive maximum benefit. Besides, new installations, these solutions also offer the possibilities to introduce latest substations, digital-edge technologies into existing installations.

Scope
- Facilitate creation of unique customer solutions towards smarter power distribution in industries, sensitive infrastructure and utilities

Product benefits
- High expertise, competence and commitment in understanding and solving customer challenges
- Safeguarding customer investment by avoiding expensive and dedicated high-end equipment
- Providing high returns to customer's substation protection and control infrastructure

Our offering
- Bus transfer solutions
- Substation safety solutions
- Relay retrofit
- Grid automation
- Substation or plant-wide solutions
- Power management

EPDS Digital Solution Centers
Envisage SCADA
Energy Management Solution
ABB envisage software solution

- A scalable and open software solution to drive energy cost reduction
- A tool to centralize, prioritize and broadcast actionable data to increase uptime and extend the life of equipment
Envisage Overview
Facility Monitoring

- Provides a bird’s-eye view of the entire network
- Intuitive navigation
- Tabular displays for all devices
- Prioritized alarm annunciation
- Precise sequence of events recording
- Advanced security and safety functions
Envisage Overview

Facility Monitoring

• Turns a desktop computer or mobile device into a virtual window for tracking and analyzing a facility’s power

• Logs and trends data from any smart energy device

• Highlights unusual activity with real-time and historical alarm viewers
- When clicking a lineup of Switchgear from the System Overview screen, a mimic bus screen (elevation) can be shown.
Envisage Overview

Facility Monitoring

- Interactive icons on the Overview Screen reveal a multi-tabbed detail screen
- Each screen is customizable and can combine tables, annunciators and other graphics
Envisage Overview

Trending

- A powerful trending tool allows you to drag and drop parameters that are of most interest for graphing.
DATA CENTER EXAMPLE
OFFICE/SCHOOL EXAMPLE

MCC-AHU, 480V, 800A

Panel 1A, 277/480V, 400A (Harrison Hall)

Floor 1E
A: 57.6
kW: 42.4
Floor 1W
A: 54.1
kW: 39.4

Floor 2E
A: 42.9
kW: 31.8
Floor 2W
A: 41.6
kW: 29.9

Floor 3E
A: 51.6
kW: 39.2
Floor 3W
A: 52.8
kW: 39.5

Floor 4E
A: 27.5
kW: 20.3
Floor 4W
A: 35.5
kW: 19.6

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Envisage Overview

MCC One-line Screen – Drive Icon

- An example of a drive detail screen focused on communications
### Envisage Overview

**MCC One-line Screen – Drive Icon**

- Another example of a drive detail screen - Alarms

<table>
<thead>
<tr>
<th>Extruder S1 Drive</th>
<th>ACS880-S1-SPD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Legend:</strong></td>
<td></td>
</tr>
<tr>
<td>= Inactive Alarm</td>
<td>= Active Alarm</td>
</tr>
<tr>
<td>= Active Warning</td>
<td></td>
</tr>
</tbody>
</table>

- **Alarms**
  - Overcurrent
  - DC Link Difference
  - STO Hardware Failure
  - Earth Leakage
  - Output Phase Loss
  - Safe Torque Off
  - Short Circuit
  - Autophasing
  - PU Logic Error
  - IGBT Overload
  - IGBT Overtemperature
  - Rating ID Mismatch
  - Input Phase Loss
  - Cooling
  - PU Communication
  - Charge Relay Lost
  - Excess Temperature
  - Power Unit Loss
  - Cross Connection
  - Excess Temp Difference
  - PU Communication Internal
  - DC Link Overvoltage
  - IGBT Temperature
  - Measurement Circuit ADC
  - DC Link Undervoltage
  - External Temperature
  - PU Board Powerfall
  - Standby Timeout
  - Fan
  - Measurement Circuit DFF
  - Stack Overflow
  - Motor Stall
  - PU Communication Config
  - Internal File Load
  - Brake Resistor
  - Charging Feedback
  - Internal Record Load
  - BR Excess Temperature
  - Unknown Power Unit Fault
  - Application Loading
  - BC Short Circuit
  - Internal SW Error
  - User Set Fault
  - Overspeed
  - FBA A Mapping File
  - Kernel Overload
  - Encoder 1
  - Task Overload
Envisage Overview

Facility Monitoring

- An example Transformer Overview screen that can provide real-time information including:
  - Oil temperatures
  - Winding hot spots
  - Tap changer status
  - Oil gasses
  - Bushing health
  - Volts & Amps
  - Overload capacity

- Red/Yellow indicators for quick scanning

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Envisage Overview
Open Architecture

• We hear our customers say the less software, the better so we responded by staying very network flexible from the enterprise to the edge devices

• This allows you to source best-in-class devices with one software package

• And throw a wide net to most any type of smart asset such as:
  • Medium Voltage Distribution
  • Low Voltage Distribution
  • Special (ex. Transformers)
  • Other including W.A.G.E.S.
Communications such as:

MODBUS OVER ETHERNET
MODBUS RTU
PROFINET
PROFIBUS
IEC61850
BACNET
DNP3
LONWORKS
>300 more available
Envisage Overview
Asset Management

- Customers asking for an asset data concentrator
- Wizards to easily load data
- Use the virtual window on your PC screen or mobile device to its fullest extent
- Don’t stop at power distribution – add motors, chillers, AHUs, and more
- ABB can offer power system studies, one-line updates and maintenance services as needed
Envisage Overview

Increase Uptime with Power Analytics

- Capture disturbances such as total harmonic distortion, individual harmonic distortion and sub-cycle transients.

- Event logs of triggered high-speed electrical disturbances displayed in a prioritized list, automatically recorded in envisage database.

- Waveform recorder overlays multiple devices to isolate & understand the exact nature of a problem.

- Complete, accurate system-wide depiction of real-time harmonic data leads to identifying sources of “dirty power”.
Envisage Overview

Reduce spend with Digital Predictive Maintenance

- Harness the power of connected devices, such as this EMAX 2 low voltage breaker
- Such data is rarely reviewed without a monitoring system such as envisage
- Online maintenance data and a strategic maintenance dashboard allows the facility to plan maintenance spend based on equipment condition and criticality
- Inventory parts can be ordered on-demand helping minimize inventory
Envisage Overview

Digital Predictive Maintenance

- Moving from reactive maintenance (aka “Run-Break”) to preventative maintenance (time-based) typically saves 10-20% of maintenance spend.

- Moving further to digital predictive maintenance:
  - Maintenance spend reduced by 50%
  - Unexpected failures reduced by 55%
  - MTBF increased by 30%

Source: ARC Advisory Group 2014
Envisage Overview

Digital Predictive Maintenance

- Breaker Aging/MECHANICAL – Customized predictive analytics in the software
- Breaker Wear/ELECTRICAL (contacts) Predictive analytics in the breaker
- Custom adjustment for the Production Criticality
- Custom adjustment for Harmonic Heating
- Breakers are color coded based on customized predictive maintenance modeling

Environmental Adjustment

<table>
<thead>
<tr>
<th>Envirionmental Factor</th>
<th>Rating Scale 1-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Hydrogen Sulphide H₂S</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Sulphur Dioxide SO₂</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Chlorine Cl₂</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Nitrogen Oxide NO₂</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Ammonia NH₃</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Oil Mist</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Dust</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

Aggregate Adjustment % 12.7

Environmental Factors

- Ambient °F 90.4
- RH % 86.2
- Vibration mil 0.0
- THD-amps % 9.2

Criticality Adjustment

<table>
<thead>
<tr>
<th>Criticality Level</th>
<th>Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>1.2X Wear</td>
</tr>
<tr>
<td>MED</td>
<td>1.0X Wear</td>
</tr>
<tr>
<td>HIGH</td>
<td>0.8X Wear</td>
</tr>
</tbody>
</table>

Breaker Aging & Wear

- ≤ 30% Elec or Mech Wear
- 31-49% Elec or Mech Wear
- ≥ 50% Elec or Mech Wear

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Envisage Overview
Reduce energy spend with Energy Tracker

• An essential tool for managing energy usage and identifying areas for cost savings.

• Create virtual meters that aggregate real meters in a specified area

• Use for energy benchmarking to compare similar departments or factories

• The next steps are to analyze why peaks are set at certain times and/or why two similar departments are different after normalizing the data for production
**Envisage Overview**

Reduce energy spend with Energy Reporting

- Energy Tracker aggregates energy data to create individual energy reports and bills for a variety of groupings
- By posting cost reports in each department, it helps drive energy cost accountability
- Within a holistic energy management plan with cost-out team leaders, this report provides a tool to reduce energy spend
Envisage Overview

Reduce energy spend through Visibility to focus on energy conservation initiatives

• Create dashboards with envisage for:
  • Comparison of energy cost amongst departments
  • Comparison of energy cost amongst comparable equipment
  • Energy consumption ranking of key equipment

• Create setpoints to generate alarms when equipment exceeds its historical consumption average

• Within a holistic energy management plan with cost-out team leaders, this report provides a tool to reduce energy spend
Envisage Overview

Reduce energy spend with Billing Verification

- Create a Shadow Bill to compare to the utility’s monthly bill
- Outside billing auditors charge a fee plus up to 50% of the savings they identify from billing errors
- Most common sources are clerical errors and faulty utility meters
- The Shadow Bill can help uncover:
  - Wrongs rates applied
  - Incorrect meter readings
  - Duplicate line items
  - Sales taxes to exempt accounts
  - Net metering rates misapplied
EPDS Digital Solution Centers

References (public)
ABB Digital Technologies for the future distribution grid

Case: Ziziola Primary Substation

Customer challenge

- Common platform to fully digitalize the new and the existing substation for the new era
- Full IEC61850 Ed2 solution to be interoperable with the new DMS system providing a wide amount of data from the network
- Flexible software-defined logics
- Advanced monitoring for condition-based maintenance

ABB solution

- Relion relays with IEC61850 Ed2 support
- Full-redundant communication infrastructure based on HSR and PRP using ABB AFS family switches
- IEC61850-9-2 support ready to use
- Synchronization with IEEE1588 protocol and GALILEO GNSS
- Retrofit solution based on RIO600+Relion to easy upgrade existing switchgears
- Pilot with ABB Ability™ SWICOM

Customer benefits

- Flexible system
- Common platform for the new and the retrofit solutions
- Future-proof technologies and architecture
- Flexible full digitalized solution with communication-based logics
- Lots of data to feed the DMS

Contractor/End user: UNARETI SpA
Year of delivery: 2017
Country: ITALY
Segment: UTILITY
Products delivered: Control Relay Panel & UniGear with Relion 615/620 series
Key success factors: Customer consultancy, cooperation, cutting-edge technologies
SUE3000 substations safety and power maintenance
Case: Refinery PCK Schwedt, Germany

**Customer challenge**
- Environmental protection and safety
- Regularly investing in the latest environmental and safety technologies to protect its staff and production facilities for many years.
- Function reliably twenty-four hours a day,
- Protected from voltage dips or the worst case of a complete interruption to electrical power supply.
- High Speed Transfer Devices of type SUE 3000.
- In case of fault, the SUE system can, depending on the network configuration and the defined preselection, automatically switch over to back-up feeder or couple busbars of two units.
- Apart from automatic transferring in fault conditions, each SUE can also be activated manually for planned switching operations.

**ABB solution**
- Protect its staff and production facilities for many years
- On power failure, SUE ensures continuing supply to the PCK machinery, providing for optimum plant availability
- Function reliably twenty-four hours a day
- Be protected from voltage dips or the worst case of a complete interruption to electrical power supply

**Customer benefits**
- Environmental protection and safety
- Regularly investing in the latest environmental and safety technologies to protect its staff and production facilities for many years.
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Contractor/End user: PCK Schwedt
Country: Germany
Segment: Oil & Gas industry
Products delivered: SUE3000 High Speed Transfer Device including Control cabinet
Key success factors: Continued power supply for critical application processes
SUE 3000 to increase reliability of BP oil refinery
Case: BP Kwinana Refinery, Australia

**Customer challenge**
- BP Kwinana Refinery searched for a new solution that responds to different safety and operational requirements.
- The old concept of low-voltage switchgear operated with ‘open’ bus-tie was used to limit the risks of arc faults and to avoid losing the entire substation or injuring personnel. But this provision reduced the reliability of the switchgear, making them susceptible to upstream tripping causing that section of the bus to fail.
- Reduce arc fault occurrence and enable a bus transfer in the event of failure of any single incoming feeder due to an upstream fault or feeder trip.

**ABB solution**
- Using the bus transfer with SUE 3000 at the substations ensures availability respectively by automatically transferring supply to a healthy incoming feeder.
- Reduced downtime, maintenance and repair cost
- Fast installation and commissioning of Bus Transfer Scheme
- Complete engineering, designing and fabricated supply
- Seamless integration in existing substation
- Inspection and factory acceptance testing

**Customer benefits**

---

**Contractor/End user:** BP Refinery Kwinana  
**Year of delivery:** 2017
**Country:** Australia  
**Segment:** Oil & Gas industry  
**Products delivered:** SUE3000 High Speed Transfer Device including Control cabinet, LV Circuit breaker (EMAX 2 ACB), Feeder protection relays (PR122)

**Key success factors:** Continued power supply and downtime prevention
cPMS630 and COM600S for reliable and secure power supply

Case: Sugar & Ethanol production Junqueiropolis, Sao Paulo

Customer challenge

- Ensure continuous uptime of the plant’s main process and avoid costly production downtime.
- Optimize the use of electricity in the plant and improve the control of the contracted power demand to avoid penalties from the utility.
- Needed to monitor energy costs at different areas of the plant to improve cost management.

ABB solution

- Authentic IEC 61850 load-shedding solution, by integrating Relion® protection relays, the load-shedding controller PML630 and the Substation Management Unit COM600S
- Data sharing and supervision using IEC 61850 protocol
- Data Historian in the COM600S unit allows to determine the load profile of the feeders, which makes energy cost management easier.
- Fast return on investment in ~7 months. Through leveling of the power consumption, the plant no longer exceeds the contracted amount
- Secured continued power supply to the most important loads.
- Improved internal energy cost management with the forecasting possibilities
- Safety remote and easy access to the disturbance recordings and editing parameters

Customer benefits

Contractor/End user: Glencane Bioenergia S/A
Year of delivery: 2015
Country: Brazil
Segment: Food and beverage industry; production of ethanol, sugar and electricity cogeneration
Products delivered: Load-shedding controller PML630, Substation Management Unit COM600S, Relion® protection and control relays from the 615 and 670 series
Key success factors: effective energy cost management and secure power supply
cPMS630 secure continued power supply in the plant
Case: Spices and flavor production Ajinomoto Group, Thailand

Customer challenge

- To ensure uninterrupted power to the plant, a new cogeneration plant was needed.
- To ensure continuous uptime of the plant’s main process and avoid costly production downtime a load-shedding solution was sought.
- Modification of changes also in existing MicroSCADA system

ABB solution

- To secure continued power supply to critical loads in the plant, ABB’s solution was a compact power management system (cPMS).
- Prevent disturbance-related blackouts and power outages in the plant and achieve extensive load-shedding functionality by load-shedding controller PML630.
- Engineering services to make the needed modifications in the existing MicroSCADA Pro system.
- Secured process up time to high priority process loads and fast and accurate load-shedding
- Reduced downtime, maintenance and repair cost
- Fast installation and commissioning using IEC 61850 communications standard
- Seamless integration of protection and control, station automation and power management functionality in medium-voltage switchgear

Customer benefits

Contractor/End user: Ajinomoto Group
Year of delivery: 2015
Country: Thailand
Segment: Food and beverage industry
Products delivered: Air-insulated switchgear UniGear ZS1. Loadshedding controller PML630. Relion® 615 series protection and control relays, Remote I/O Unit RIO600, MicroSCADA Pro control system
Key success factors: Continuous uptime of the plant’s main process
Tools & Contacts
Online/Offline PG3401 Configurator

PST for ABB internal users: https://fivaa-s-te00145.fi.abb.com/PST/#/

PST for internal and external users. Registration is required. Some features may not be available in this version for external users: https://abbtm.fi.abb.com/PST/#/

Steps:
1) Get registered online
2) Once registered, you can sign in
3) Import your pricelist to setup price visibility
4) Update product data/price data
5) Reload the page
6) Select a product and configure to get the price. You can copy-paste the specs.
# EPDS Distribution Automation

## Global Contacts

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Distribution Solutions Control and Protection products
Wide portfolio at the tip of your fingers

Resources

Segment & Channels Linecards
Matching our solutions to your needs
  - Global coverage, fulfilling local needs
  - Maximize potential with bundling opportunities

ABB Connect App
Your personal, digital assistant
  - Electrification Products mobile application
  - Browse by industry, solution or product family

Landscape flyers
ABB offering, at a glance
  - Indoor Products & Instrument Transformers and Sensors
  - Outdoor Products
  - Distribution Automation

new.abb.com/medium-voltage
First level access to ABB offering
  - Access to literature and use cases
  - Contact information for your country
  - Latest news, papers and releases

Making it easier for our partners to have ABB as one stop shop for safe, reliable and innovative technology