

EXTERNAL

  
MARCH 2019

# **EPDS – Digital Solutions offering & Automation**

ABB EPDS Digital Solution Centers + PG3401 Products offering



# ABB Distribution Automation

## Portfolio

### Relion Range

#### Basic Range

605 series



611 series



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



### Other solutions and legacy

#### SW

PCM600  
ZEE600  
(ABB Zenon  
+Envisage)

#### Tools

FT's &  
cables



#### Solutions

DSC



#### Legacy

500 series  
REA, EM, SACO



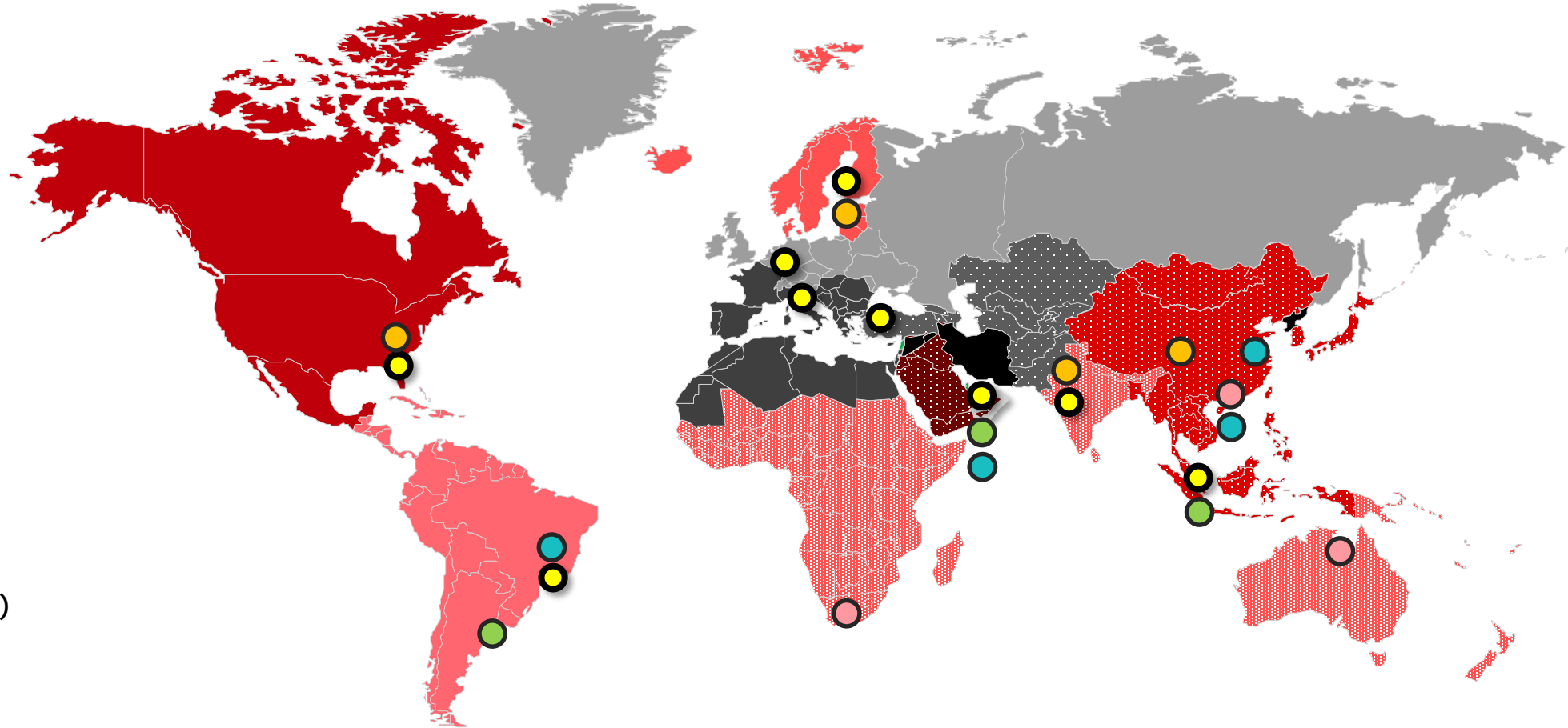
# Distribution Automation

## 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
- Regional Product Specialists (technical support)
- Local DA sales units
- Factories

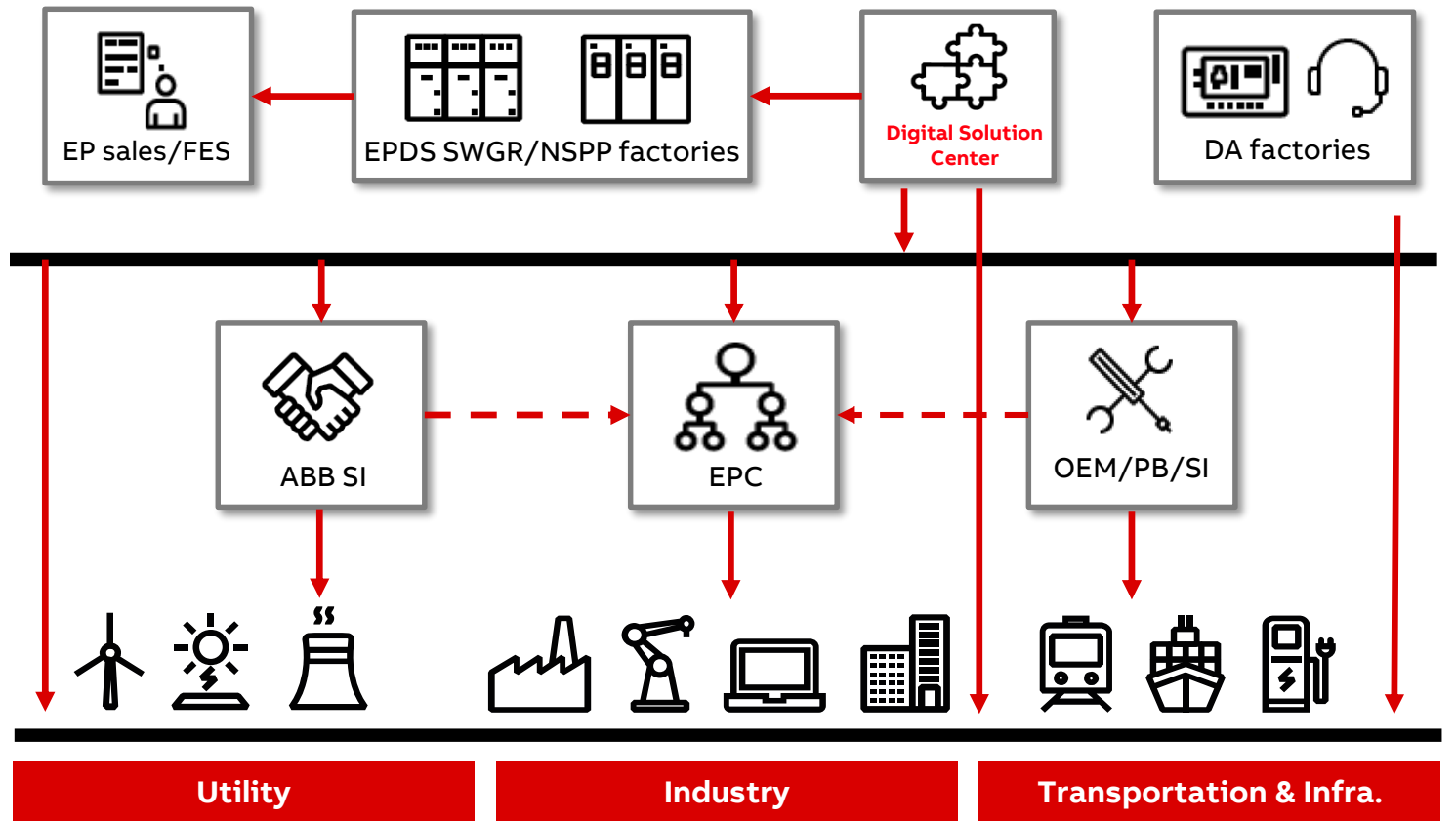


# Distribution Automation Digital Solution Centers

## Business model

### Coordinated market approach

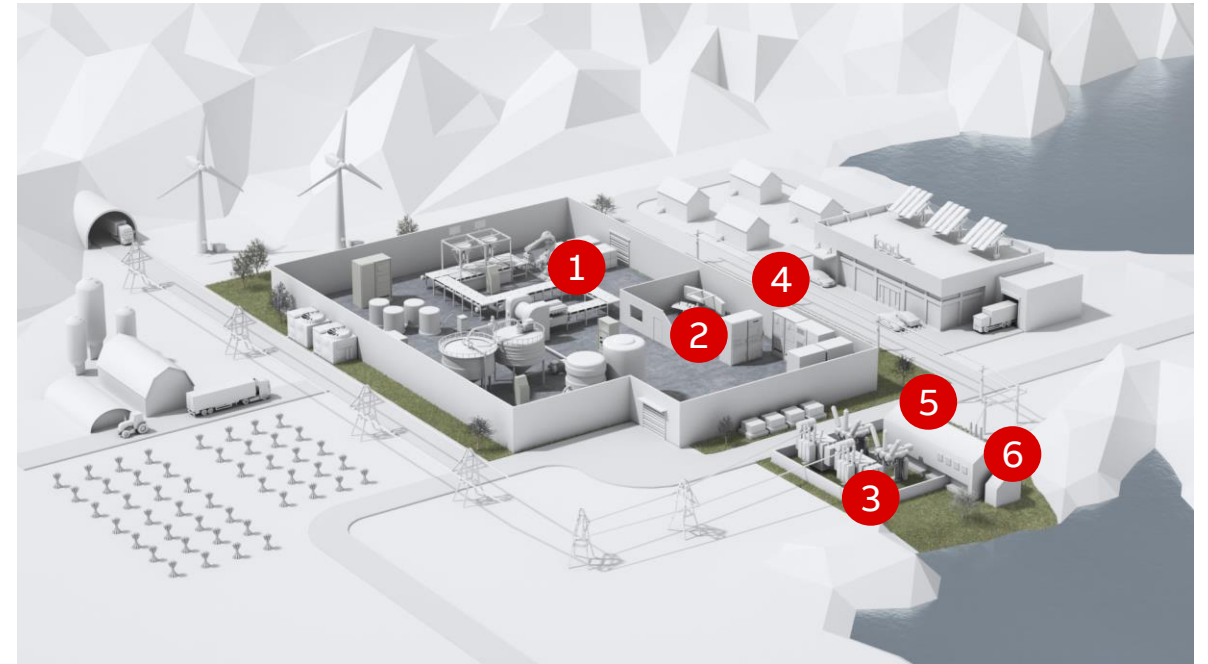
- Internal channel
  - Switchgear
  - Modular system & NSPP
  - CPP/Outdoor products
  - Service
  - ABB system integrator (ABB SI)
- External channel
  - Direct sales
  - OEM/Panel builder
  - EPC/system integrators
  - Technical distributors



# Distribution Automation Solution

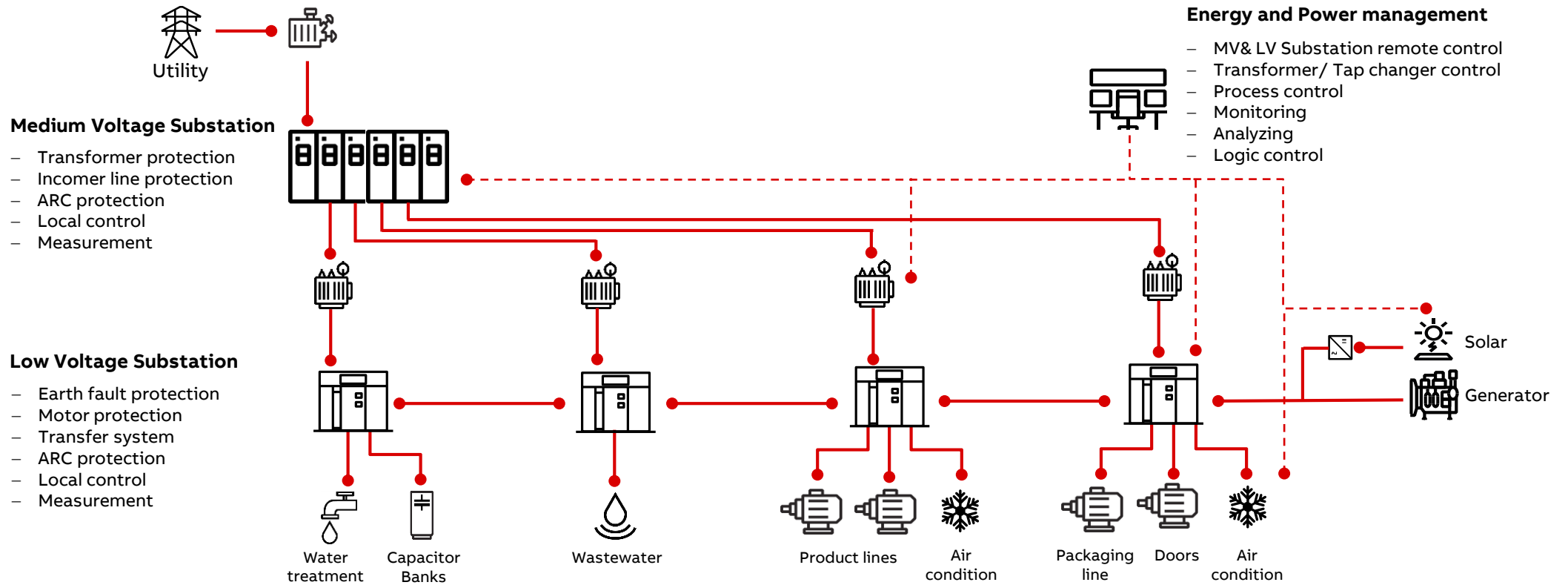
## KPI's example: solutions for Food and Beverage

- 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

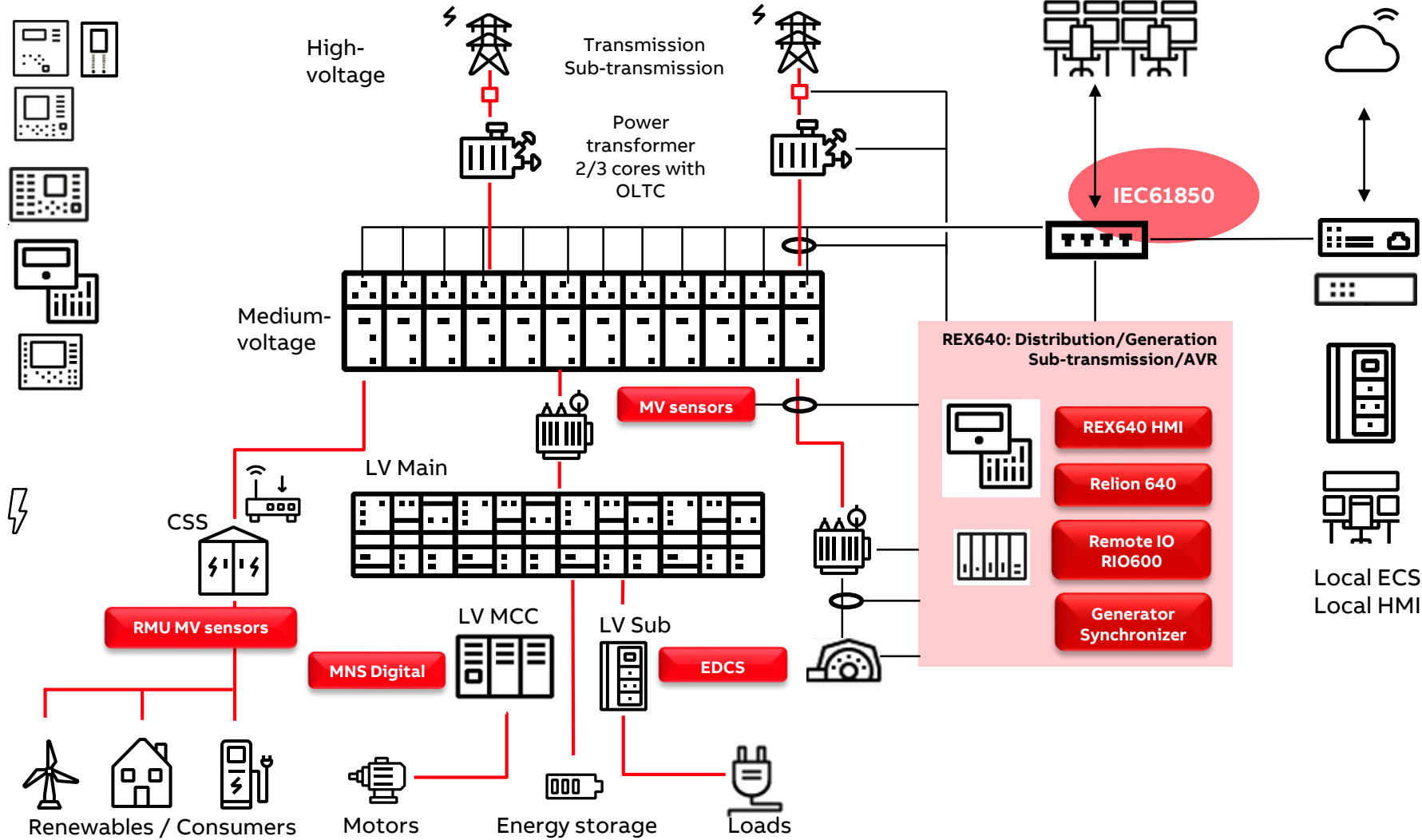
## Power network for Industries / Applications



# ABB Electrification Digital Solutions

- Protection & control devices**
- Relion 605 series
  - Relion 615 series
  - Relion 620/630
  - Relion 640
  - PML630 Load-shedding controller
  - SSC600

- Distribution automation solutions**
- Arc Flash protection
  - Relay retrofit
  - Fiona w/RTU
  - Smart Control
  - Directional fault location+restoration
  - Communication Public Wireless



- Condition monitoring**
- ABB Ability Condition monitoring

- Local HMI + Tools**
- Engineering IEC61850
  - SSC600 Centralized Protection
  - P&C cabinets
  - PCM600



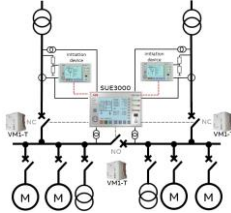

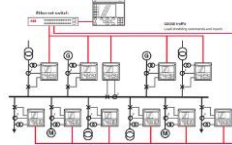
- Electrical Control System**
- ABB Ability COM600
  - ABB Zenon ZEE600
  - ABB Envisage (US)

- Applications**
- compact PMS
  - ATS - Fast transfer switch
  - Loop Control

Cloud-Enabled  
ABB Ability Edge Technologies

# Digital Solution Centers

## Digital Solution Centers offering - Detailed

Performances								
	Engineering Services and IEC61850 logics/templates	REA arc detector + UFES - extinguishing time of < 4 ms	SUE3000 with fast breakers VM1-T < 10 ms	Full PMS systems including 800xA/Zenon up to 6 generators	Full PMS systems including 800xA/Zenon up to 6 generators			
	Trainings, Certifications and support	REA arc detector + breaker trip - extinguishing time of < 60 ms	Arctic GPRS/LTE devices with configuration + M2M server gateway system	SUE3000 and conventional breakers < 100 ms	FDIR solutions, Zone concept and LC1000 (Loop control)	Pre-configured automation cabinets for HMI/Gateway applications	COM600 with ABB Zenon Energy Edition	+ Generator synchronisation, Transformer control, Load-sharing, Power control
Pre-configured matching units and RRP + customized solutions	Arc detection in Relion series + trip breaker - extinguishing time of < 65 ms	Arctic GPRS/LTE devices with configuration	Transfer switch with IEC61850, Goose < 500 ms	Grid automation boxes packages, FIONA	Pre-configured protection panels and cabinets	COM600 with COM600 software	Supervision, control and Load shedding cPMS	
	Services	Arc fault protection	Communication	Transfer switch	Grid Automation	Control and Relay cabinet	ECS Electrical Control System	PMS Power Management System

Note: majority of Distribution Automation Solutions and Success stories do combine different solutions, based on customer need's and KPI's





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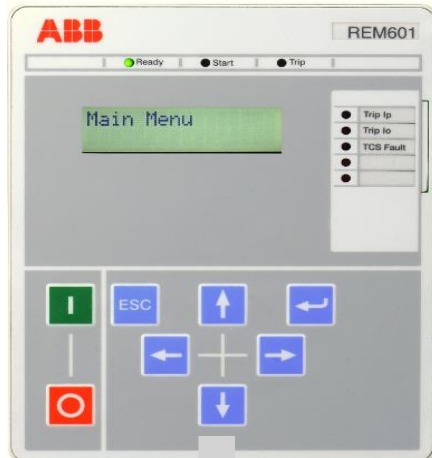
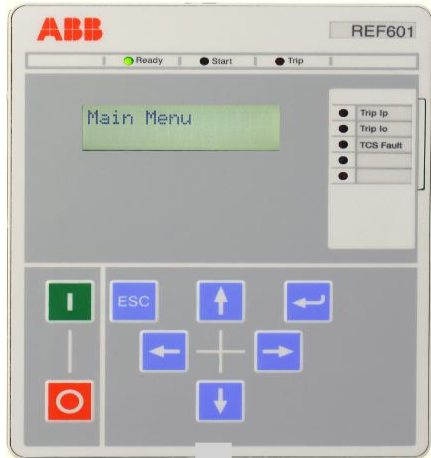
# **EPDS Distribution Automation Portfolio**



# ABB Distribution Automation

## Relion Basic Range

### Current-based protection relays



### Current-based + self-supplied or dual supply



### Basic Current and Voltage



**REF601**  
Feeder protection relay with breaker control

51, 50, 51N, 50N, 68, 49

**REM601**  
Motor protection relay with/without breaker control

50, 51, 51N, 50N, 49M, 46PD, 46, 46R, 51LRS, 14/48/66/37/50BF/94/86, 52CB

**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

**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...

# Relion® 615 series

## Compact solution for utility distribution and industrial applications

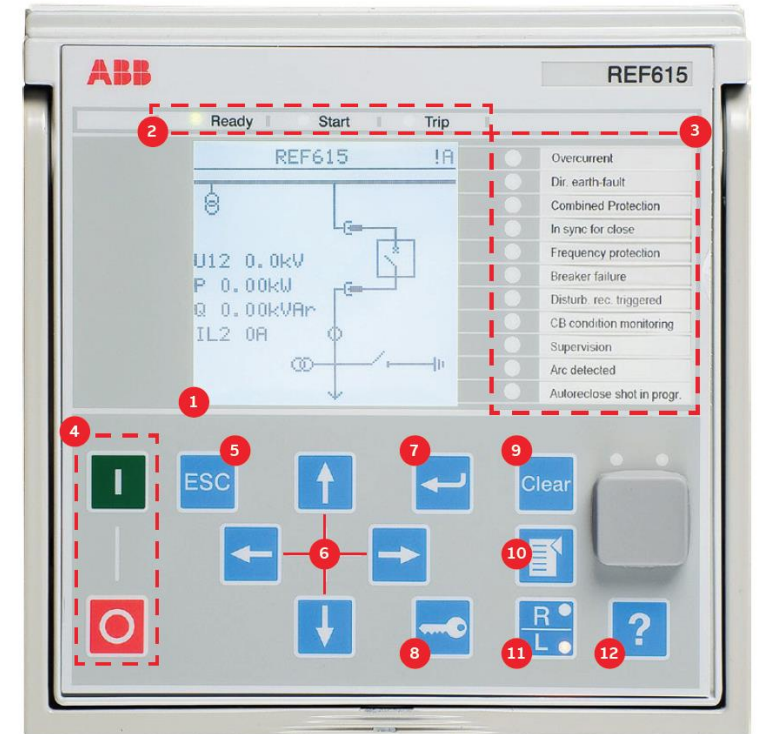
ABB's Relion product family includes the 615 protection and control series of relays, characterized by compactness and withdrawable plug-in unit design.

The 615 series relays fully supports 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.

[abb.com/relion](http://abb.com/relion)

The 615 series include:

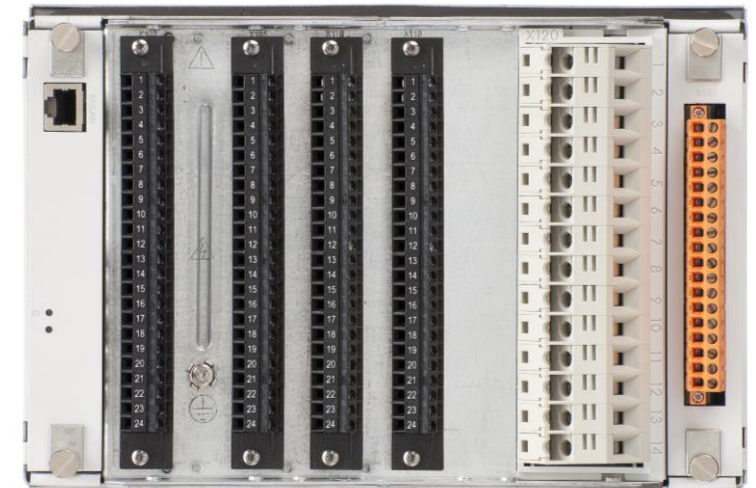
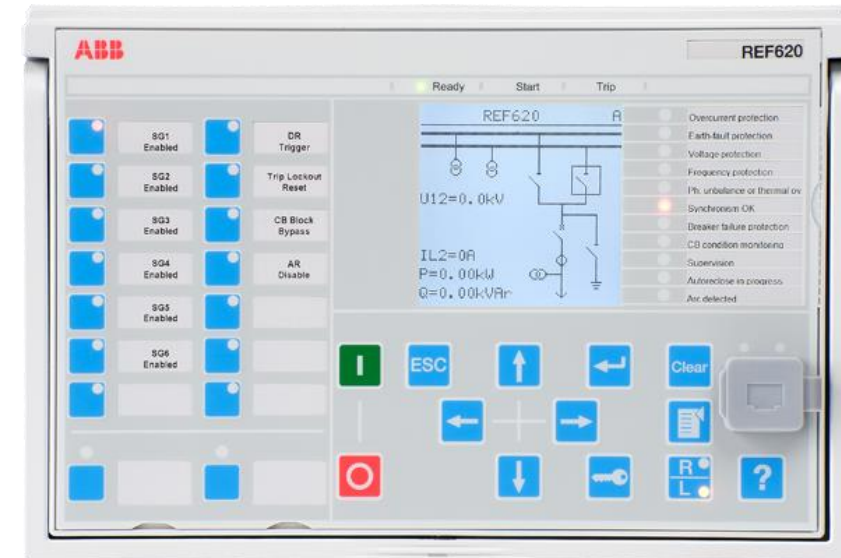
- RED615 Line differential protection and control
- REF615 Feeder protection and control
- RET615 Transformer protection and control
- REU615 Voltage protection and control
- REM615 Motor protection and control
- REV615 Capacitor bank protection and control
- REG615 Generator and interconnection protection



# 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 synchro-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

The image displays a carousel of HMI screens for the ABB REX640 distribution automation system. The screens are as follows:

- Parameterization:** Shows settings for Group 1, including Start value (0.10 xIn), Start value Mult (1.0), and IEC Def. Time (40 ms).
- TAP-CHANGER AND PETERSEN COIL CONTROL:** Displays a schematic diagram of a transformer with tap-changer and Petersen coil.
- Measurements:** Shows real-time data for 41.00 Hz, 0.0 kVA, 23.2 kVAr, and 35.4 kW. It also lists instrument values for L\_INST\_A, L\_INST\_B, L\_INST\_C, I1\_INST, I2\_INST, and I0\_INST.
- Harmonics Distribution:** A bar chart showing voltage harmonics. Text indicates: Sliding interval 3 seconds, Fundamental 15.1%, THD 0.0%, and DC 30.7%.
- Line Differential Protection Current Phasors:** Two phasor diagrams labeled 'Local' and 'Remote', both at 90°. It lists CT Ratio Corrected and phase angles for L\_AMPL\_LOC\_A/B/C and L\_AMPL\_REM\_A/B/C.
- Overview:** Shows 'GENERATOR BREAKER SYNCHRONIZATION' with a schematic and a 'Remote measurements' section for GEN 1. It features three gauges: 35.4 kW (P\_INST), 23 kVAr (Q\_INST), and 2310 A (I\_INST\_B).
- Control Panel:** A grid of buttons for 'Send Events', 'Secondary Injection', 'Protection Measurement Direction', 'Coil Controller Commissioning', 'View GOOSE Sending', 'View GOOSE Receiving', 'View SMV Sending', and 'View SMV Receiving'. It also includes 'Test mode activation' (Local) and 'Internal fault test' (Test off).
- Fault Recorder:** A table showing fault data:
 

Fault loop React	0.00	ohm
Active group	1	
Shot pointer	6	
Max diff current IL1	0.000	pu
Max diff current IL2	0.000	pu
Max diff current IL3	0.000	pu
Diff current IL1	0.000	pu

# Relion® REX640

All-in-one protection for any power distribution application

## Protection and control relay – REX640

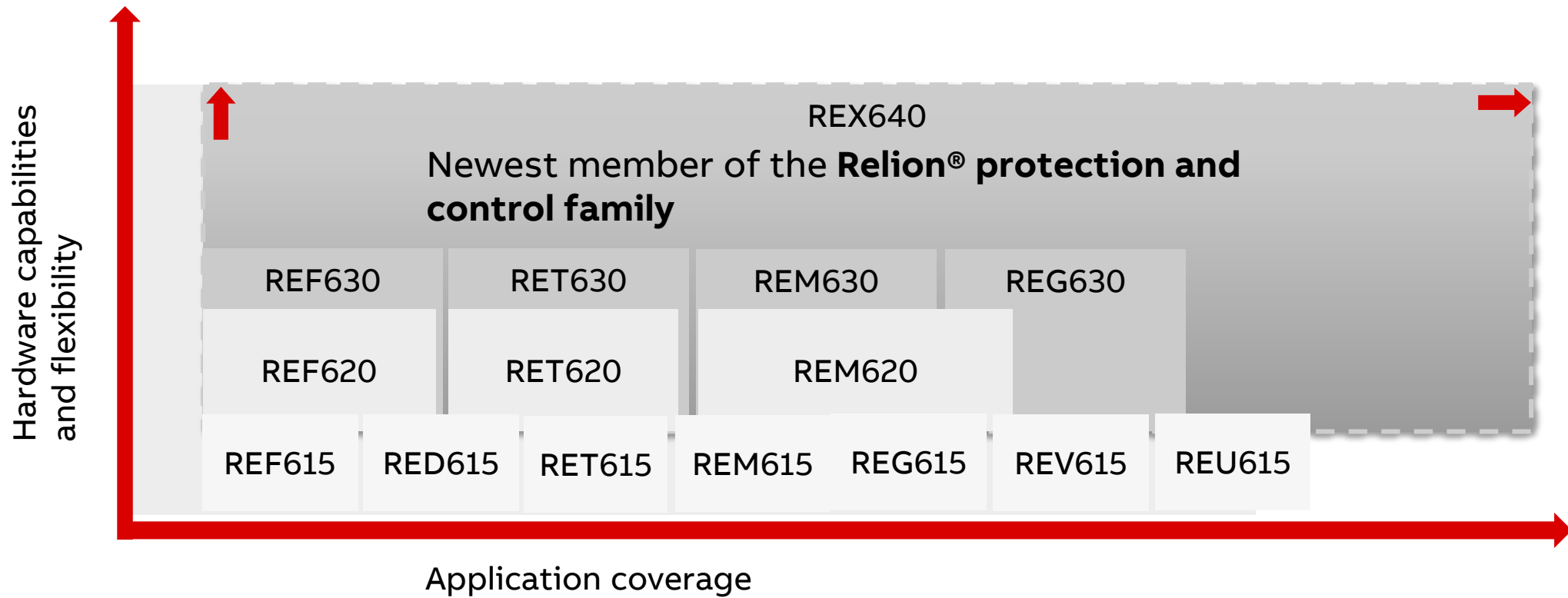
- New high end protection and control relay
- Powerful all-in-one protection and control for power distribution and generation
- Integration of functions usually performed by separate hardware
- Modular , flexible design of both hardware and software elements
- Easy modification and upgrading for hardware 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



# Application coverage - overview

## Relion® Protection and Control REX640

Base functionality*	Power transformer protection	Machine protection	Interconnection protection	Shunt capacitor protection	Busbar protection
<ul style="list-style-type: none"><li>- Overcurrent protection</li><li>- Earth-fault protection</li><li>- Restricted earth-fault</li><li>- Voltage protection</li><li>- Frequency protection</li><li>- Load shedding</li></ul>	<ul style="list-style-type: none"><li>- Protection for two and three winding power transformers</li></ul>	<ul style="list-style-type: none"><li>- Protection of synchronous and asynchronous machines</li></ul>	<ul style="list-style-type: none"><li>- Protection of interconnection points of distributed generation units</li></ul>	<ul style="list-style-type: none"><li>- Protection of single Y, double Y and H-bridge connected capacitor banks</li><li>- Protection of harmonic filter circuits</li></ul>	<ul style="list-style-type: none"><li>- High imp. based BB protection</li><li>- Selective phase-dedicated double BB protection, including check zone – enabled with one device</li></ul>
Feeder / line protection	On-load tap changer control	Generator auto-synchronizer	Network auto-synchronizer	Petersen coil control	Arc protection
<ul style="list-style-type: none"><li>- Extensive earth-fault protection</li><li>- Fault locator</li><li>- Line distance protection</li><li>- Line differential protection</li></ul>	<ul style="list-style-type: none"><li>- Control of parallel running power transformers</li><li>- Flexible master unit selection via the local HMI</li></ul>	<ul style="list-style-type: none"><li>- Auto-, semi-auto and manual generator synchronization</li><li>- The local HMI enables a fully visualized process</li></ul>	<ul style="list-style-type: none"><li>- Synchronized closing of non-generator CB by actively adjusting selected generators</li><li>- The local HMI enables a fully visualized process</li></ul>	<ul style="list-style-type: none"><li>- Automatic control of Petersen coil</li><li>- Control of additional fixed parallel coil</li><li>- Control of parallel resistor</li></ul>	<ul style="list-style-type: none"><li>- Four lens or loop sensors supported in any combination</li><li>- Both sensor types are supervised</li></ul>

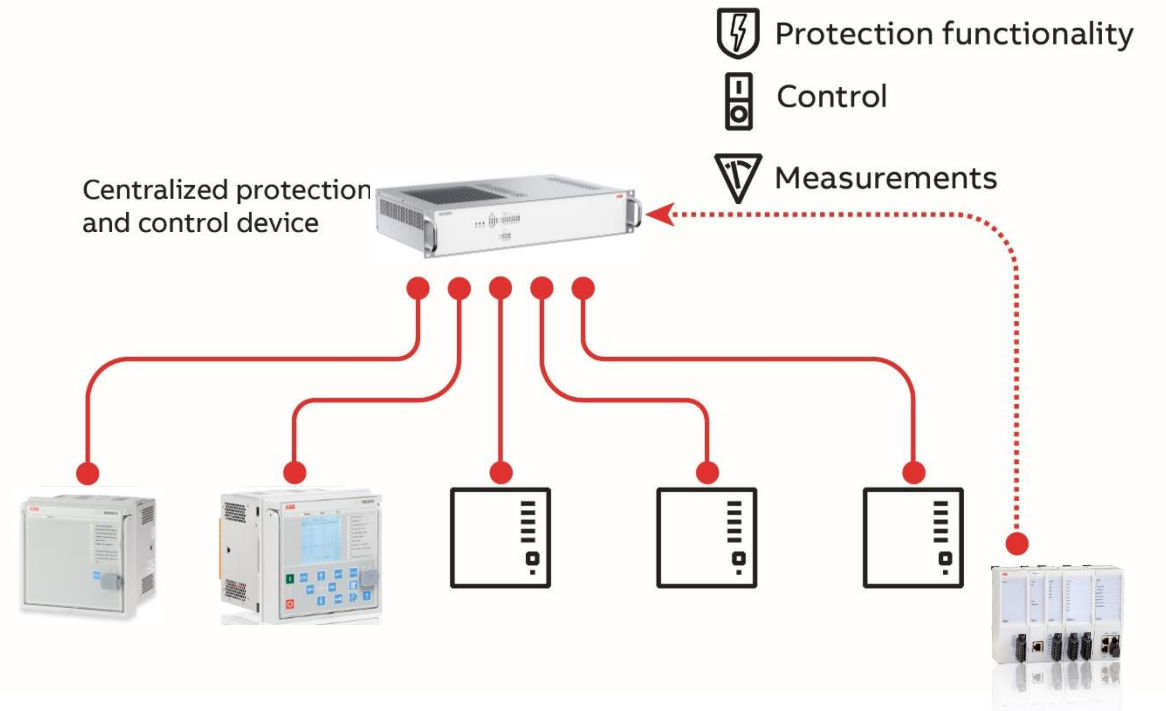
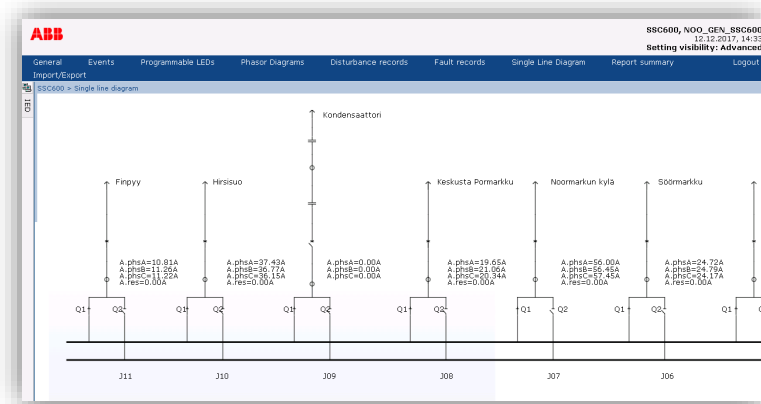


# SSC600

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

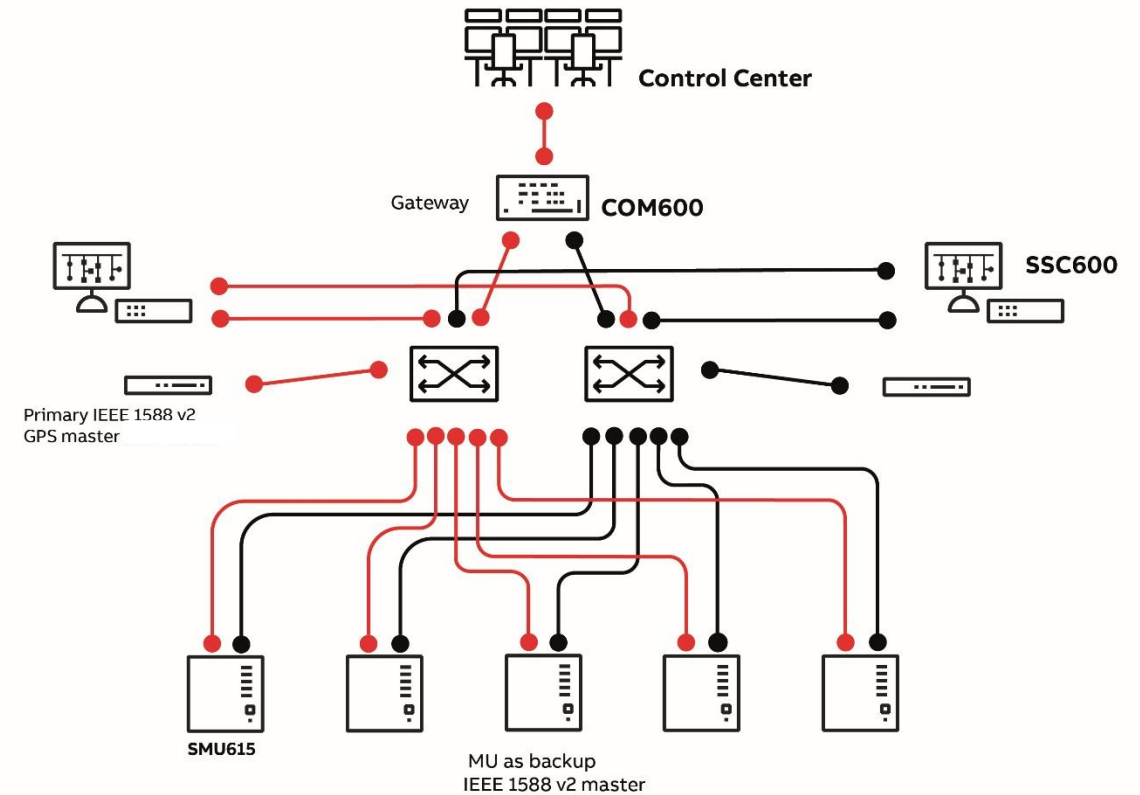


# SSC600

## 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*.

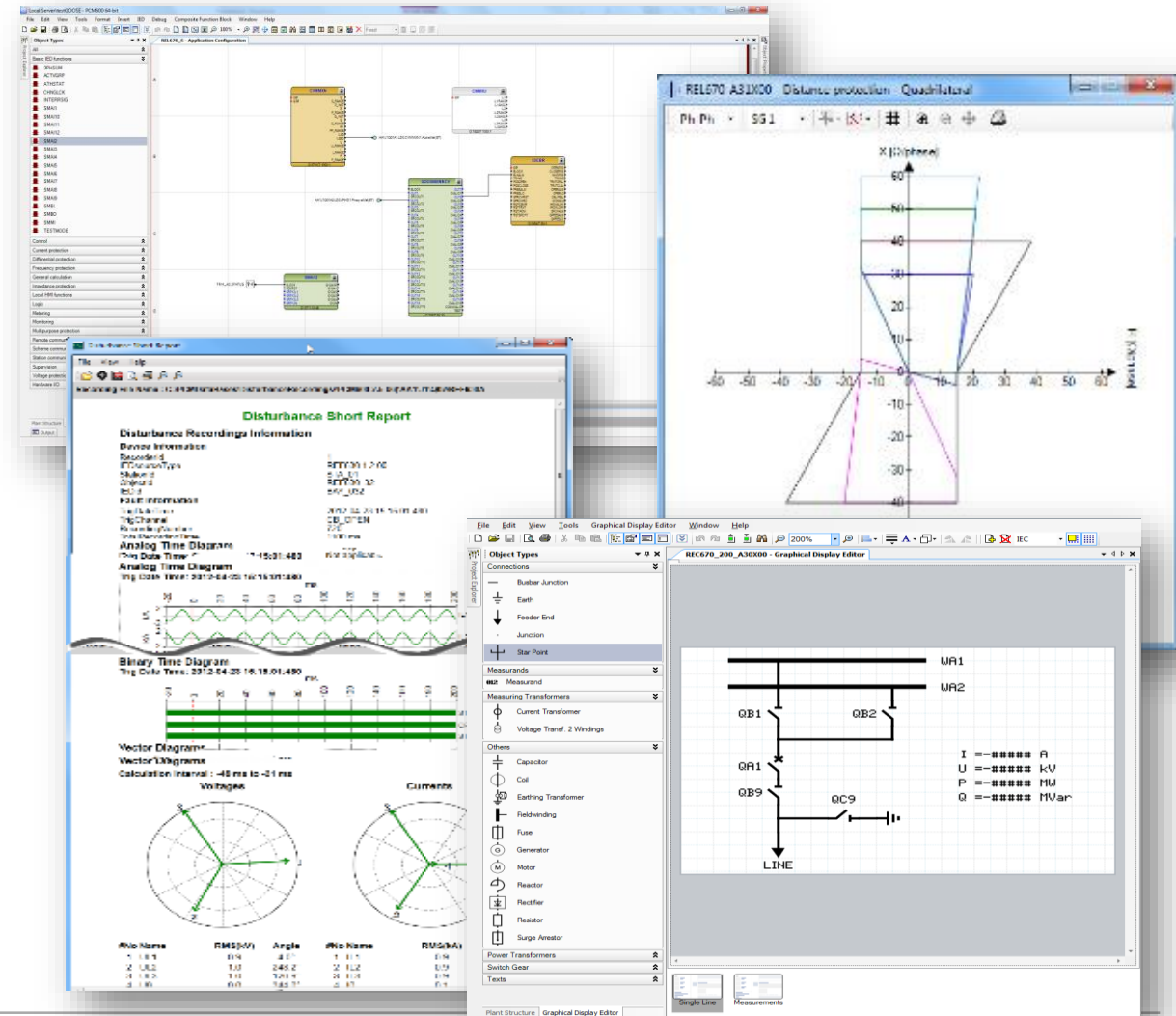
The graphical application configuration that enables state of the art *configuration* and *monitoring* of the complete IED application  
Informative *graphical support* of protection *parameter settings*

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

- REB500
- RBX615
- RIO600
- PML630
- GMS600
- PWC600
- SAM600
- SSC600

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

- REF542+
- REX541/543/545
- REX521
- SPACOM





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**EPDS Digital Solution Centers  
Offering**



# ABB Distribution Automation

## Sensors technology for secondary switchgears

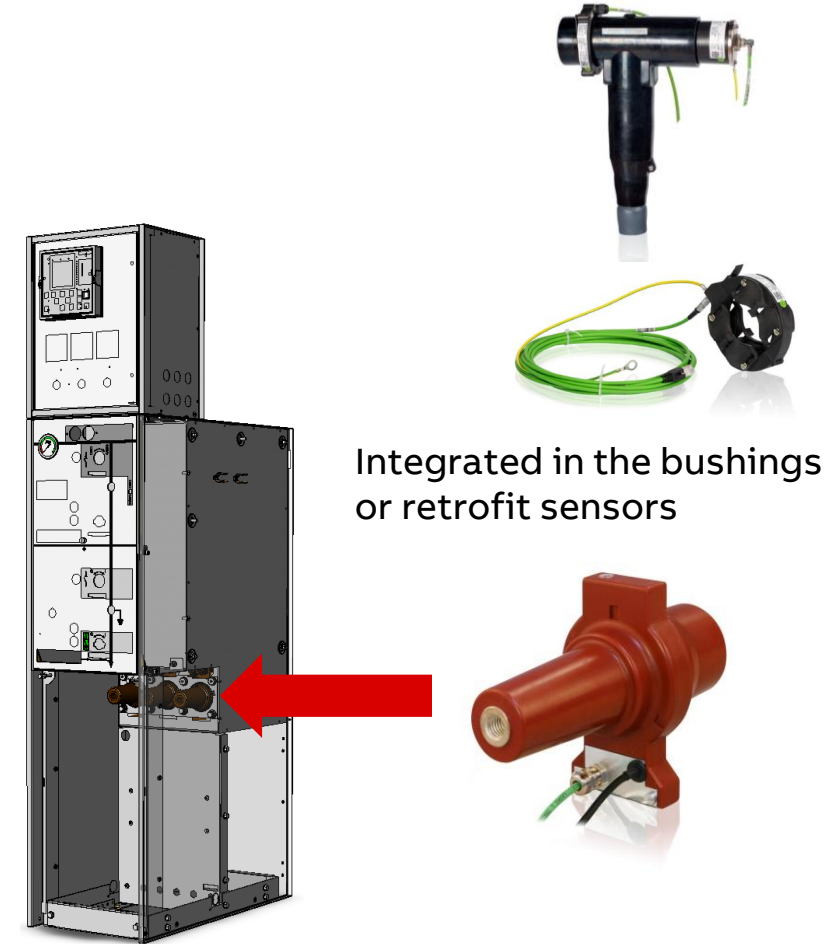
### MV sensors

- 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	Unit	Value
Rated primary current of application	A	up to 630
Rated primary voltage of application	kV	up to 24

Sensor Parameters	Unit	Value
Rated primary voltage, $U_{pn}$	kV	$22/\sqrt{3}$
Highest voltage for equipment, $U_m$	kV	24
Rated power frequency withstand voltage	kV	50
Rated lightning impulse withstand voltage	kV	125
Rated primary current, $I_{pr}$	A	80
Rated continuous thermal current, $I_{cth}$	A	630
Rated transformation ratio, $K_{ra}$ for current measurement	-	80 A / 150 mV at 50 Hz 180 mV at 60 Hz
Rated transformation ratio, $K_n$ for voltage measurement	-	10 000 : 1
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

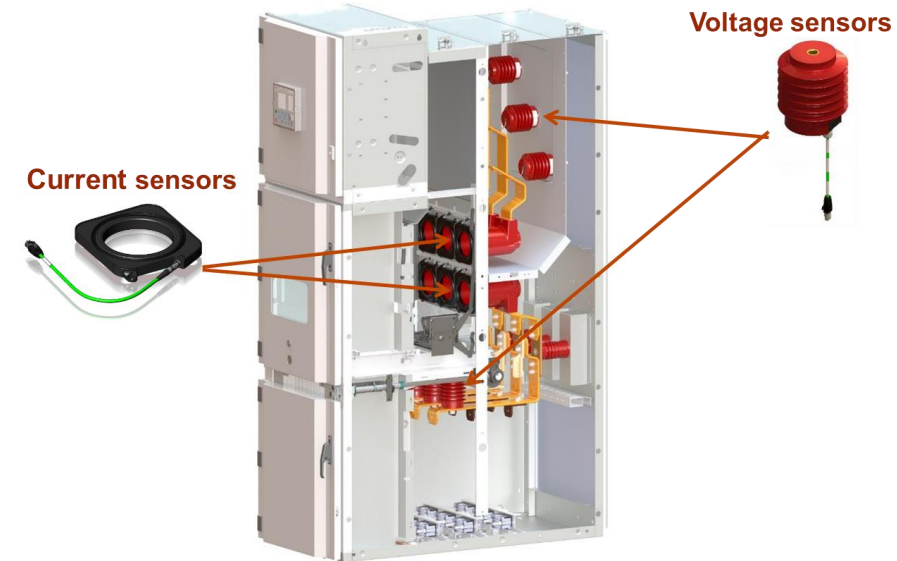
- No specific engineering (1 sensor type fits all)
- Higher safety (no explosion risk)
- Higher safety for maintenance operators (only mV signals)
- Reliable values (no saturation)
- Shorter deliveries times
- Less spares (less different types)
- Energy efficiency (no losses)
- Reliable (no electronic/communication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

Parameters for Application	Unit	Value
Rated primary current of application	A	up to 2500
Rated primary voltage of application	kV	6/√3 up to 24/√3

Sensor Parameters	Unit	Value
Rated primary voltage, $U_{pn}$	kV	11/√3; 15/√3; 22/√3
Highest voltage for equipment, $U_m$	kV	12; 17.5; 24
Rated power frequency withstand voltage	kV	28 (42); 38; 50
Rated lightning impulse withstand voltage	kV	75; 95; 125
Rated primary current, $I_{pf}$	A	80
Rated continuous thermal current, $I_{cth}$	A	1250
Rated transformation ratio, $K_{ra}$ for current measurement	-	80 A / 150 mV at 50 Hz 180 mV at 60 Hz
Rated transformation ratio, $K_n$ for voltage measurement	-	10 000 : 1
Current accuracy class	-	0.5/5P630
Voltage accuracy class	-	0.5/3P
Length of cable	m	5.0; 6.5; 7.5



Voltage/current sensors or combined sensors for AIS switchgears



# Digital Switchgears offering Concept + testing/commissioning

**Current sensor**



**GIS**



**AIS**

**Voltage sensor**



**GIS**



**AIS**

**FT-14D Digital (ANSI) - option**



IED must have LEA (Low Energy Analog) inputs compatible with the Rogowski coil and RVD sensors.

**Adapter**



**Test Switch for Sensors  
(Essailec/FT Digital)**



**Test set**

**Protection Relay**



**RIO600  
Remote I/O**



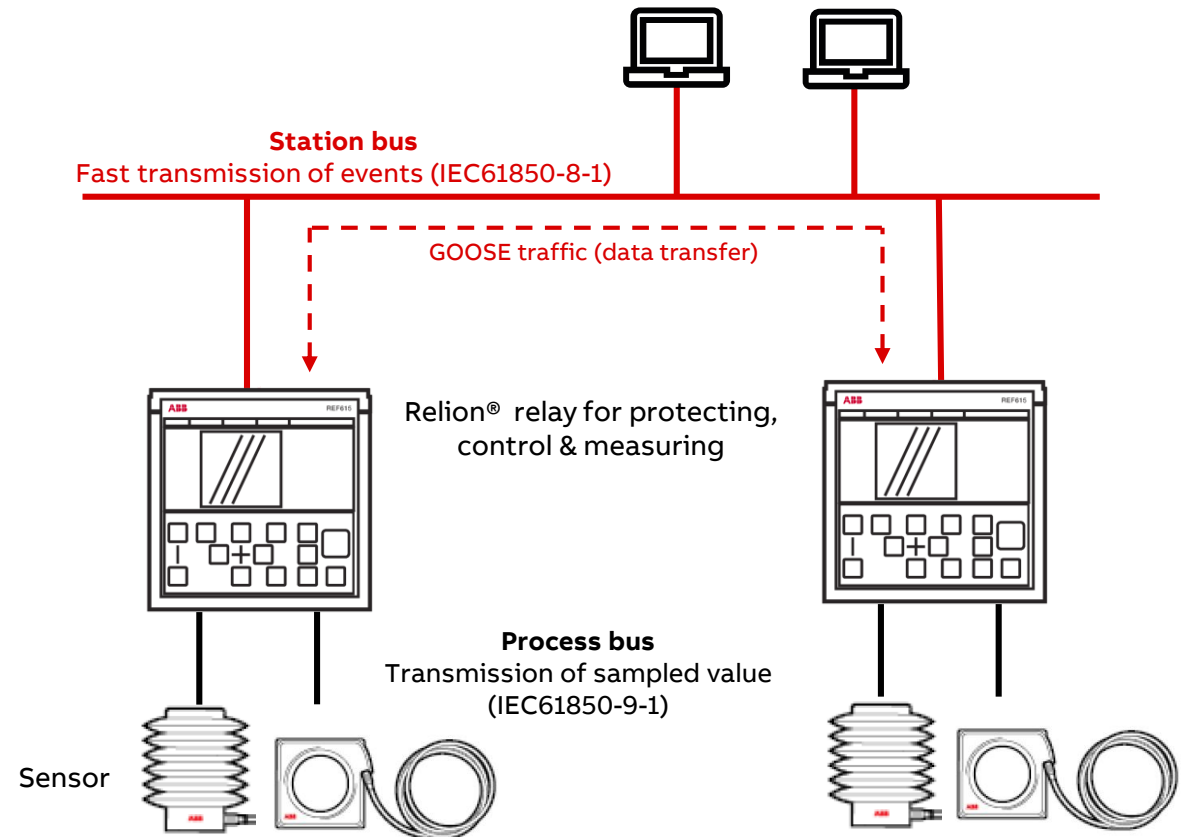


# Distribution Automation Solution

## Smart protection solution

### 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



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# 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

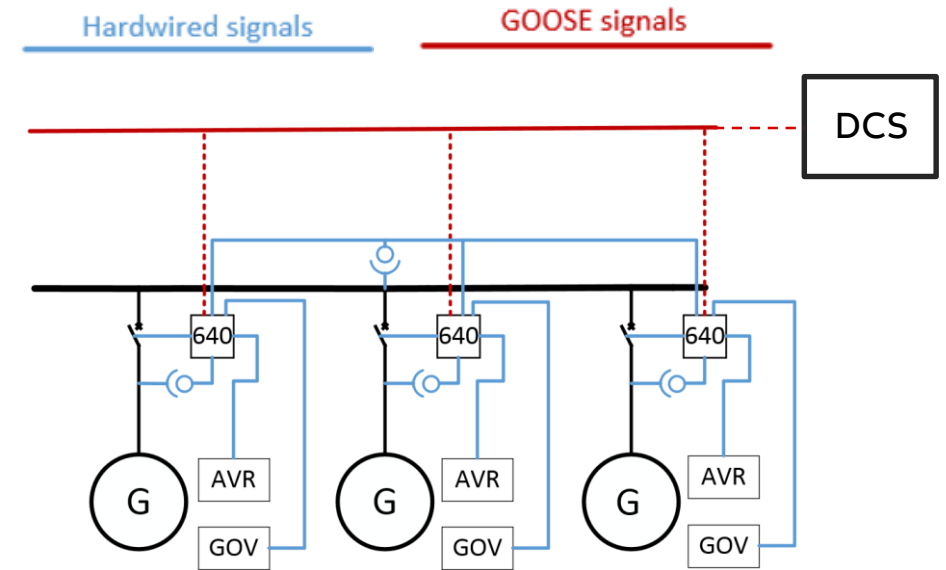


# Relion® REX640

## 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.



The screenshot shows the REX640 HMI interface with the following data and controls:

Bus Voltage: 11.56 kV	49.85 Hz :Bus Frequency
Generator Voltage: 11.64 kV	49.95 Hz :Generator Frequency
dU: 0.08 kV	0.20 % :Slip
	-1.43 :Phase difference

Controls include:

- Voltage: Raise (up arrow), Lower (down arrow)
- Frequency: Raise (up arrow), Lower (down arrow)
- Q0.2: A green button with a lightning bolt symbol.
- Cancel: A grey button.

A central circular gauge shows a green needle pointing to a green area, indicating the current status of the system.

# ABB Distribution Automation applications

Smart RMU: Safepplus 12/24kV + REC615 2.0



## Integrated in RMU

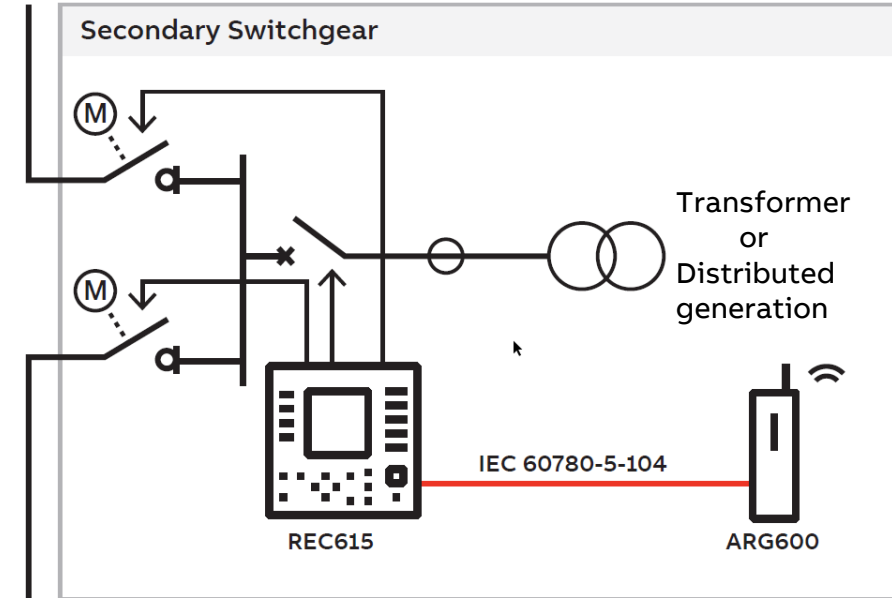


## In separate control box (top/side)

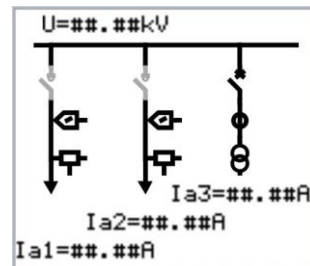


Available as loose components for OEM's/PB's

## Single Line Diagram - Concept



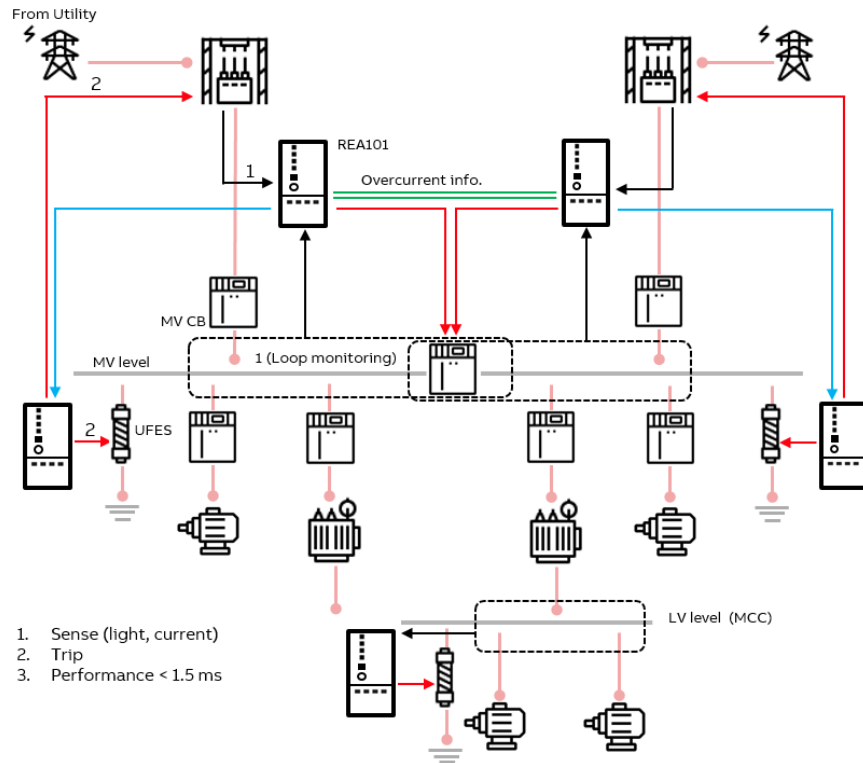
- A REC615 is combination of small RTU functionalities and REF615 protection relay.
- Direct communication IEC 60780-5-104 to SCADA through FO/Ethernet or through a GPRS/LTE gateway
- Compatibility with current/voltage sensors or conventional instrument transformers.
- Permits the protection for a breaker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



# Ensuring safety of personnel and electrification assets

## Fast acting and coordinated arc protection

### Example: MV and LV arc protection using UFES and REA101

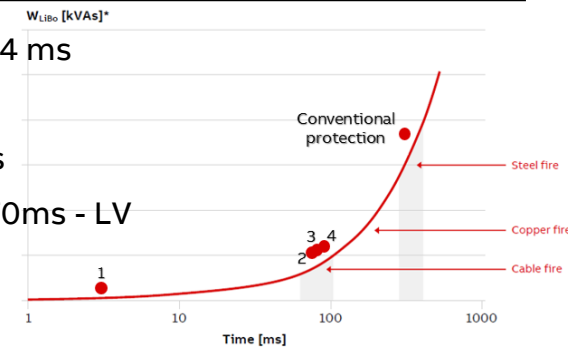


### Customer needs

- 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



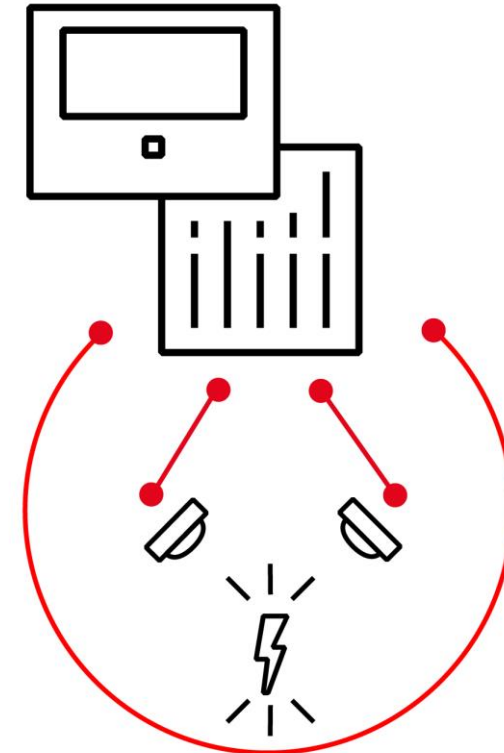
# Protection and control solution enabling features

## REX640 arc protection features

### Arc protection

REX640 offers:

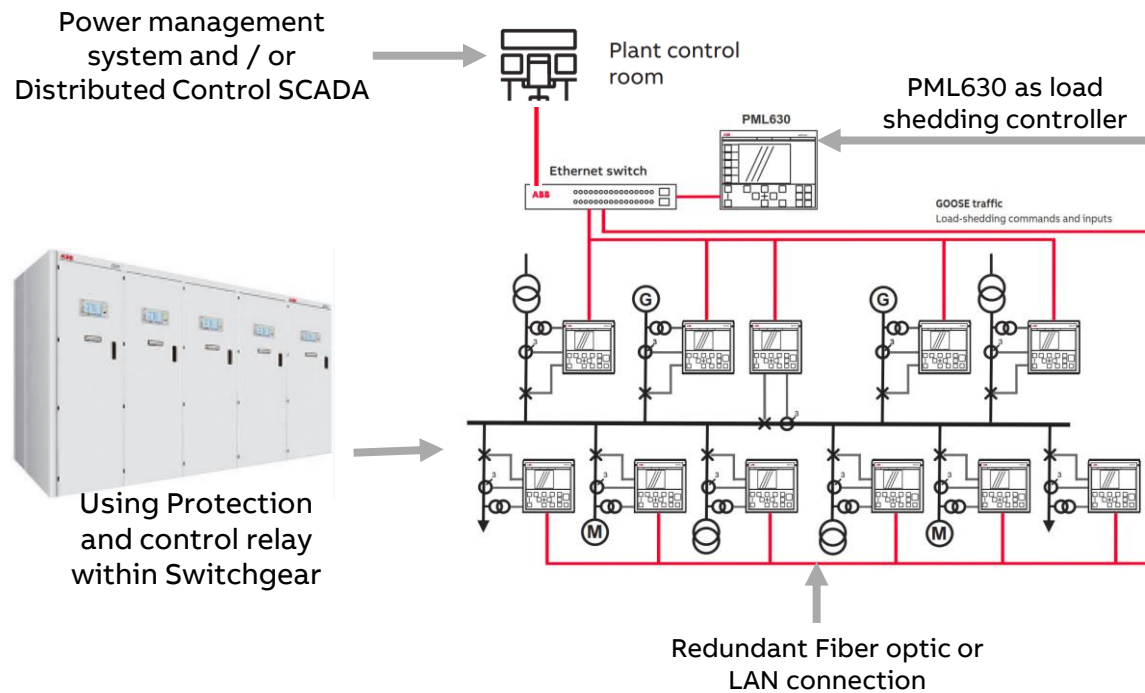
- **4pcs of optical Arc flash sensor inputs**
- Free mixture of loop and lens sensors
- Sensor types that are **all supervised**
- Free allocation of sensor types and trip signals that enable cost efficient and selective protection schemes
- GOOSE signaling and high speed static outputs that will further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



# Distribution Automation Solution

Power Management system keep main processes running and reducing energy cost

## Example for low end solution



## 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 functoriality

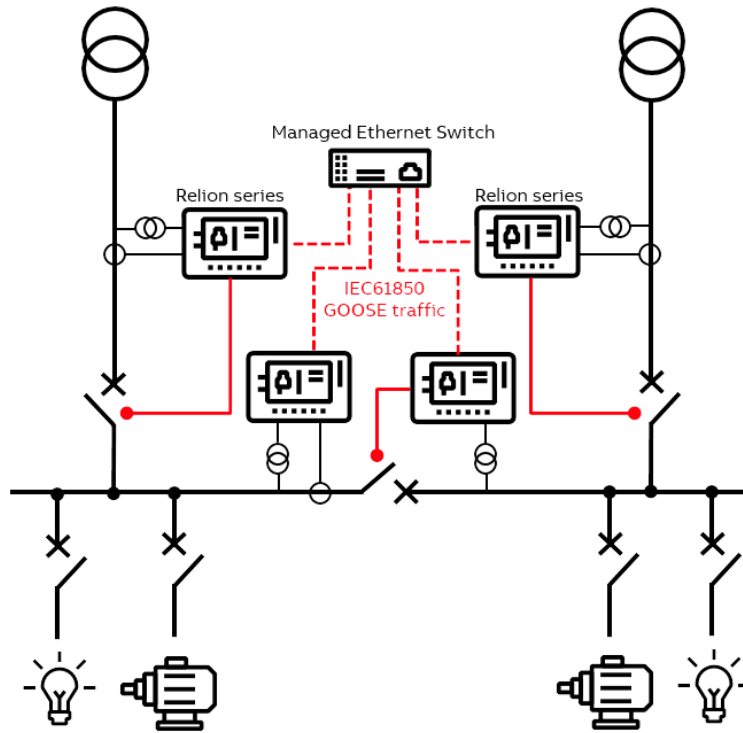
# Distribution Automation Solution

## Automatic transfer systems

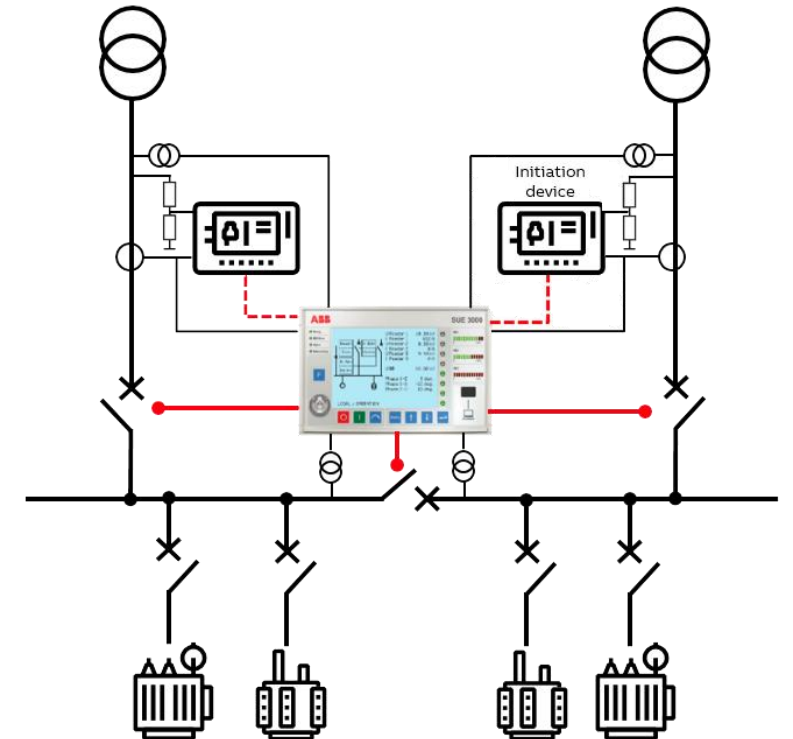
### Low end vs. fast transfer solution

- 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)

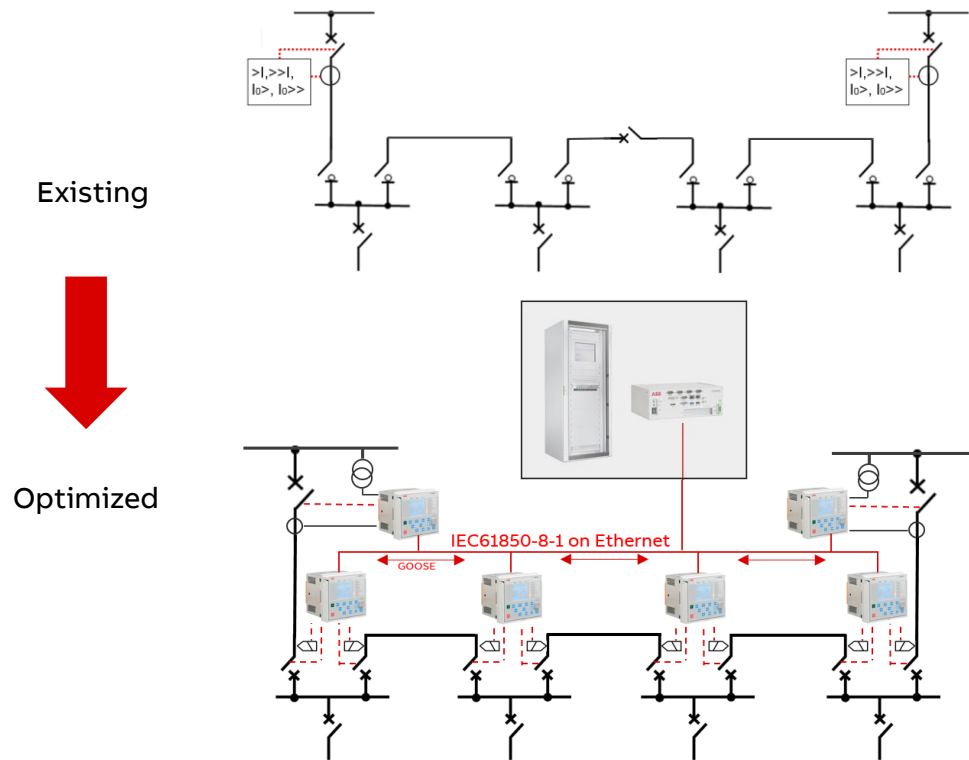




# Distribution Automation Solution

## Grid Automation: Loop Control LC1000 for ring application

### Optimized ring application



### 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 than 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



MV combisensors  
input module

### 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  $\cos \varphi$
- 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

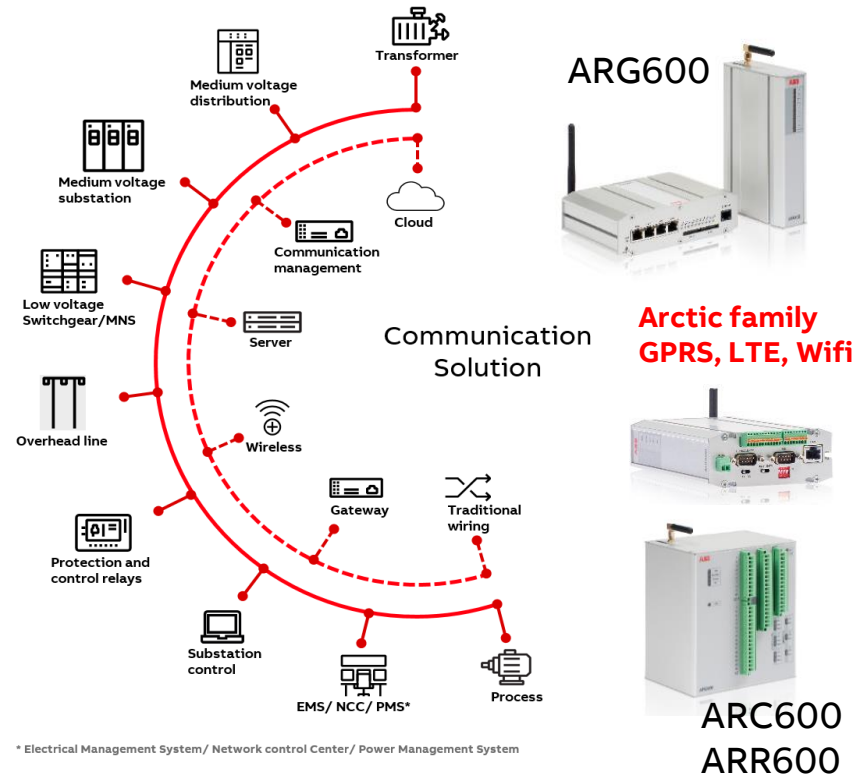
### Solution: RIO600

- 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

# Distribution Automation Solution

Secured communication from substation to control center

## Communication solution



## Customer needs

- 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

## Communication Solution

- 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)

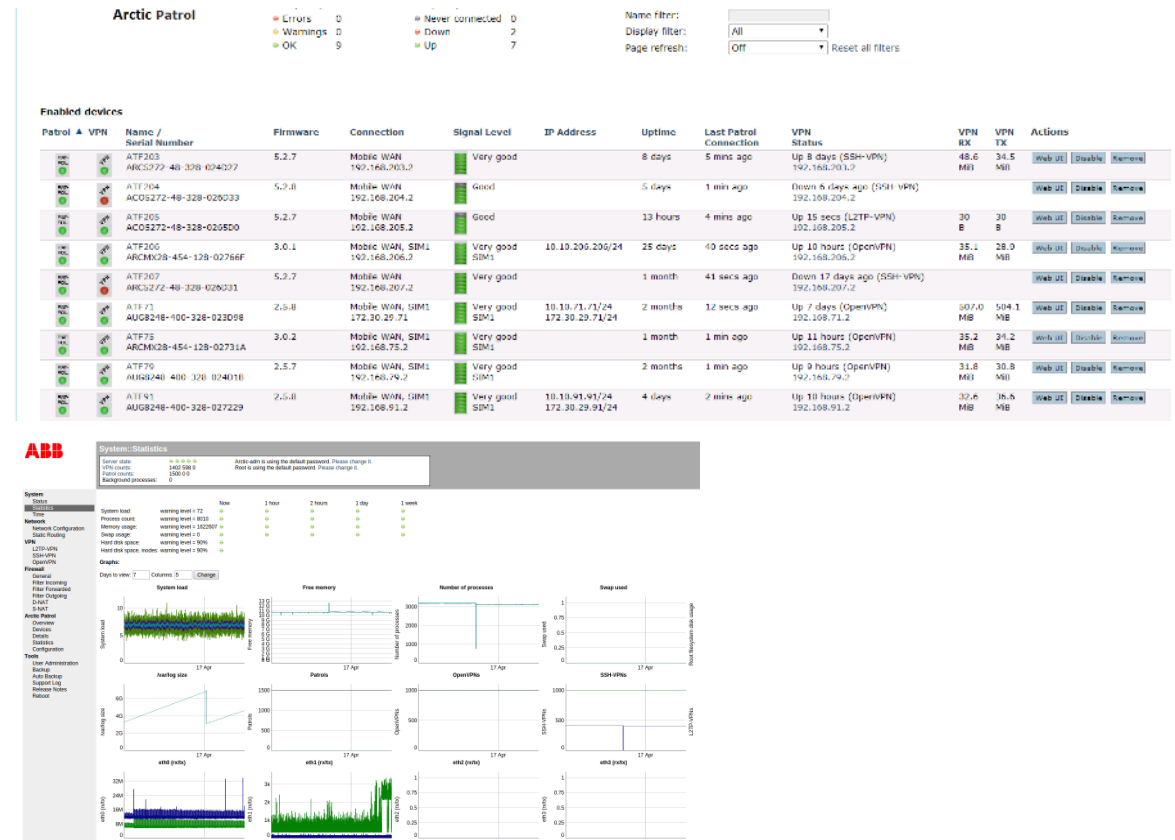


ARM600

# Distribution Automation Solution

## Communications: Arctic Patrol SW → Benefits of asset management

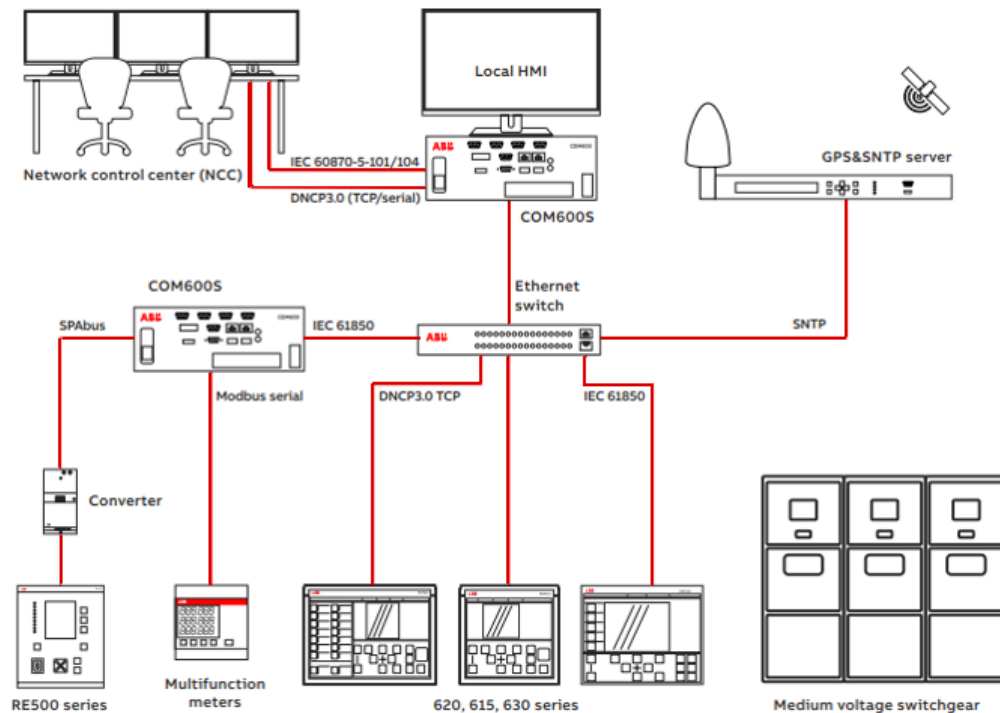
- Arctic Patrol is an asset management application for remotely managing the installed and connected Arctic 600 series gateways. Patrol includes comprehensive condition monitoring, communication network statistics and remote firmware updating.
- Arctic Patrol allows individual or mass updates of all 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

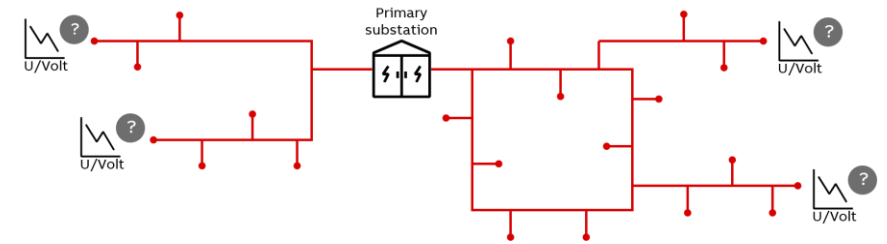
## Time optimized operation

- 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 und 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)



Ring main unit



Sensors



Relay



FIONA

# Distribution Automation Solution

## Protection and control cabinets

### Solution

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



# 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

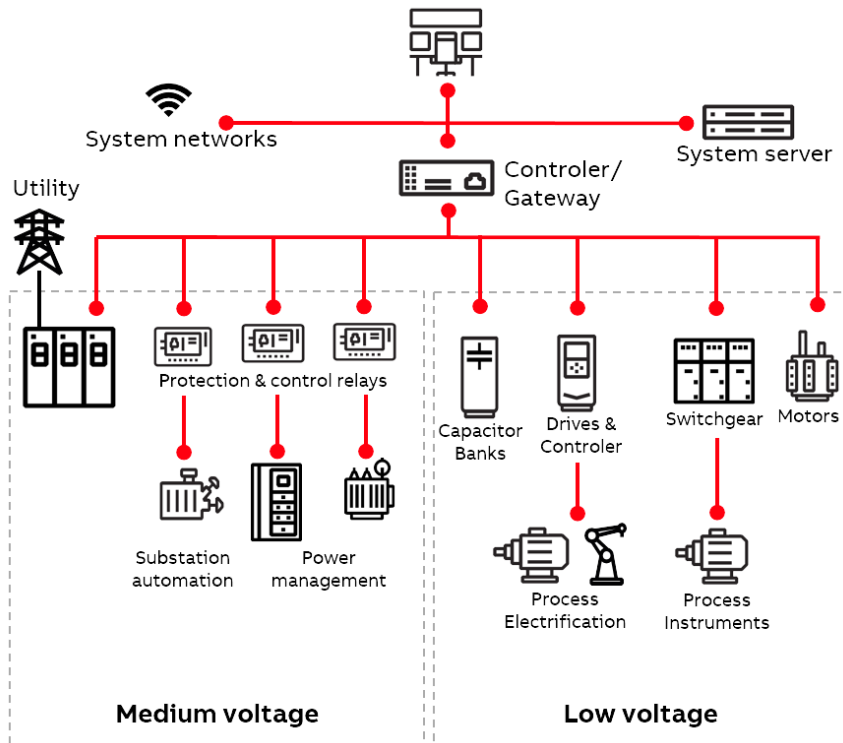




# Distribution Automation Solution

ABB Ability™ Power Management/ Remote Monitoring and Control

## Full plant integration



## Customer needs

- 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

## Solution: Electrical management systems

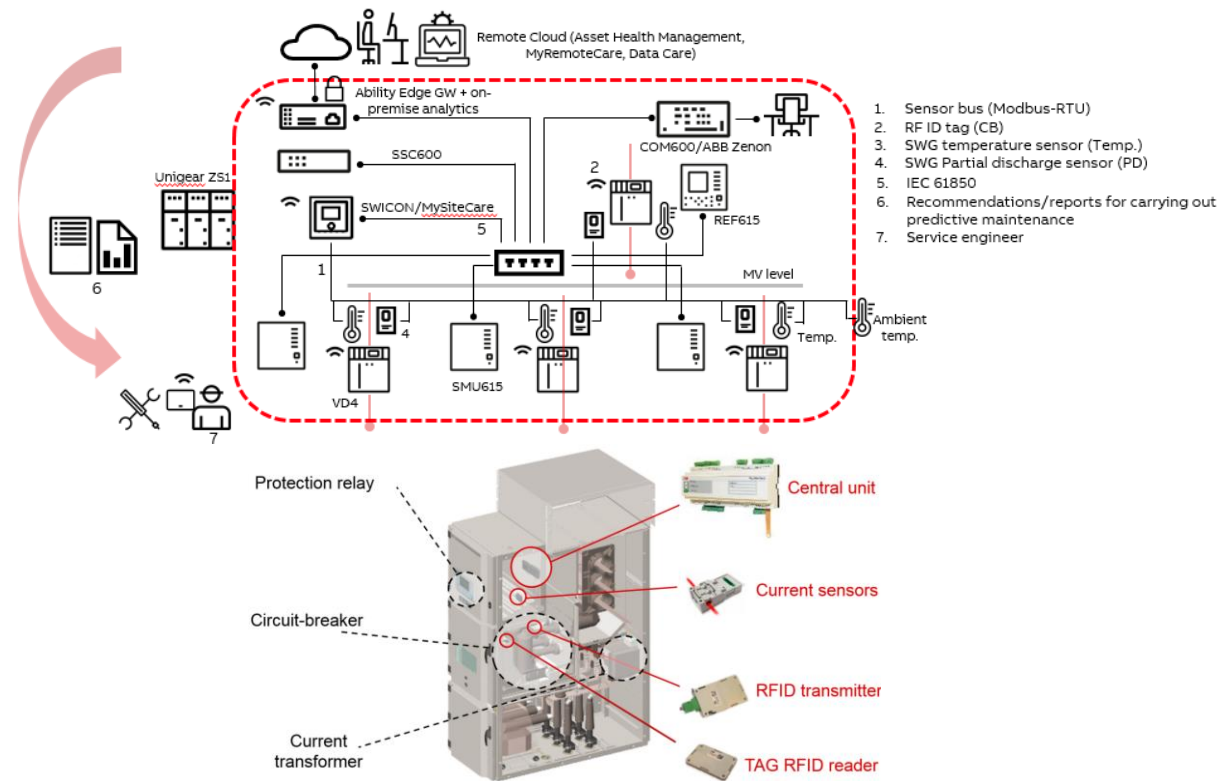
PLC-based Electrical Control System (ECS) which includes the functionalities of gateway, SCADA and Power Management System (PMS) to control in the event of unstable power supply from grid or disruption of power supply in plant that may lead to blackouts and costly, unplanned shutdowns

- 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

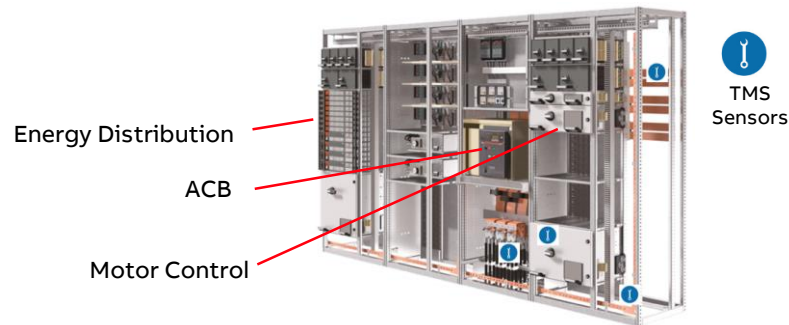
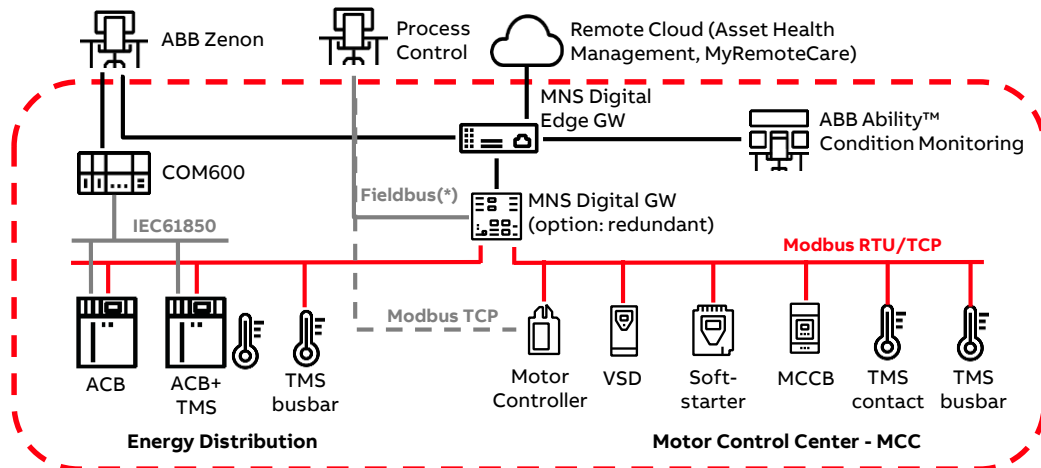
### Solution: Temperature and PD monitoring

- 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.

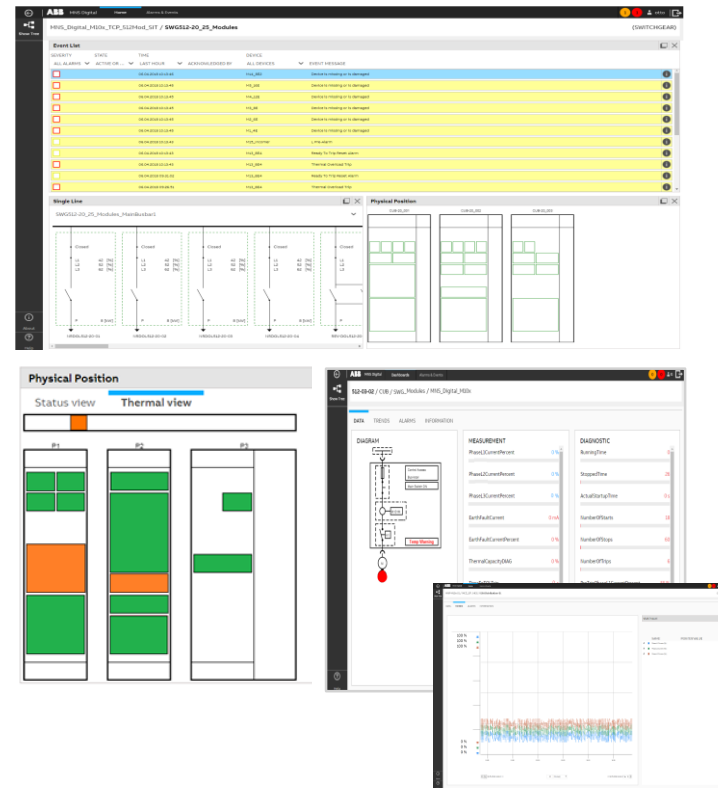
# High performance and easily maintainable primary assets

## 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

### Dashboards



### Reports

#### Condition report

**Executive Summary of Report Content**

Number of substations	1
Number of cabinets	1
Total number of reported equipment	14

**Equipment with Failure**

Device Name	Device Name 2	Cabinet	Level	Priority	Count
Actuator	Actuator	CL000001	27	2	4
CFBreak	CFBreak	CL000001	27	2	4
DCU	DCU	CL000001	27	2	4
Feeder	Feeder	CL000001	27	2	4
FeederRelFuse	FeederRelFuse	CL000001	24	1	2
RelFuse	RelFuse	CL000001	24	2	4
RCU DCU	RCU DCU	CL000001	24	2	4
RCU REVDCU	RCU REVDCU	CL000001	24	2	4
Rel-Dist	Rel-Dist	CL000001	24	1	2
REV DCU1	REV DCU1	CL000001	24	2	4
RelayProtectionModule	RelayProtectionModule	CL000001	16	2	4
Switchgear	Switchgear	CL000001	21	2	4
Wan-Dist	Wan-Dist	CL000001	19	2	4
Transposition	Transposition	CL000001	21	2	4

**Equipment with Out of Specification**

Device Name	Device Name 2	Cabinet	Level	Priority	Count
Actuator	Actuator	CL000001	27	4	4
Feeder	Feeder	CL000001	27	4	4
FeederRelFuse	FeederRelFuse	CL000001	24	2	4
RelFuse	RelFuse	CL000001	24	2	4
RCU DCU	RCU DCU	CL000001	24	2	4
RCU REVDCU	RCU REVDCU	CL000001	24	2	4
Rel-Dist	Rel-Dist	CL000001	24	2	4
RelayProtectionModule	RelayProtectionModule	CL000001	16	2	4
Switchgear	Switchgear	CL000001	21	2	4
Wan-Dist	Wan-Dist	CL000001	19	2	4
Transposition	Transposition	CL000001	21	2	4

**Equipment with Maintenance required**

Device Name	Device Name 2	Cabinet	Level	Priority	Count
Feeder	Feeder	CL000001	27	4	4
RCU DCU	RCU DCU	CL000001	24	2	4
RelayProtectionModule	RelayProtectionModule	CL000001	16	2	4

ABB

# 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 standardized 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 algorithms 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

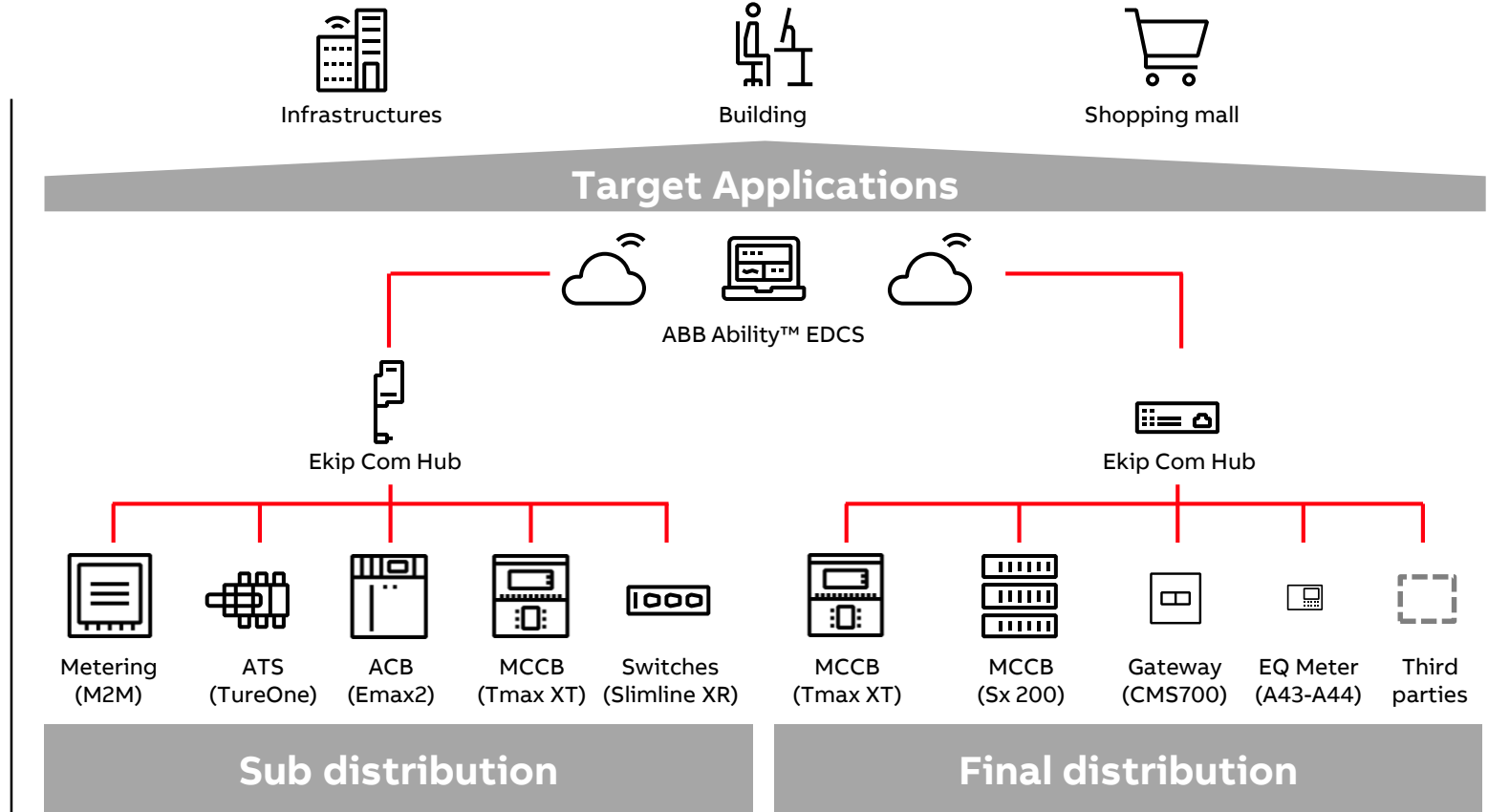
- Integrated connectivity to ABB Ability cloud solution MyRemoteCare
- One common platform for MV and LV switchgear for data analytics and asset health supervision
- Fleet management support for distributed production
- Customer support through remote diagnostics by ABB Service
- Centralized remote monitoring 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

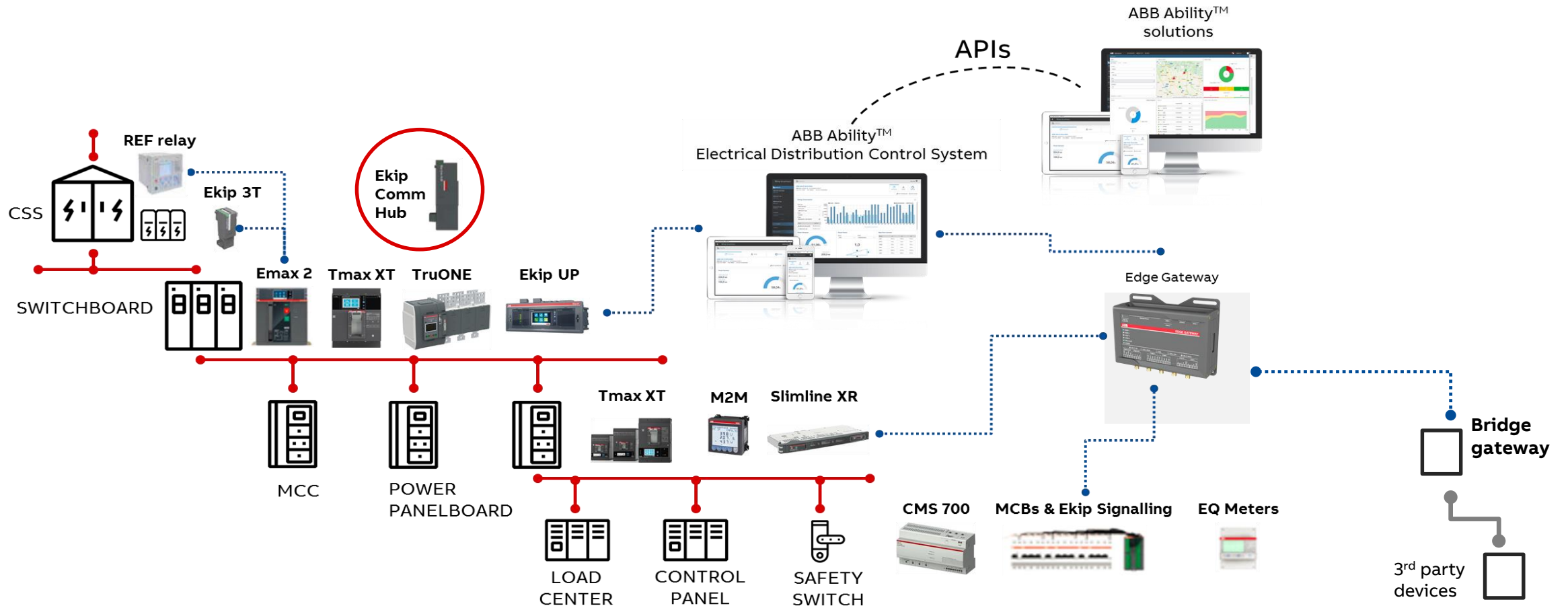
### Features & Benefit

- 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



# ABB Ability™ Electrical Distribution Control System

In energy distribution systems





# EPDS COM600

[← BACK](#)



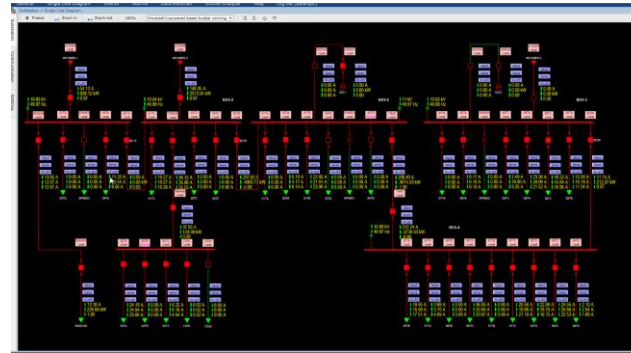


# COM600S 5.0

## 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

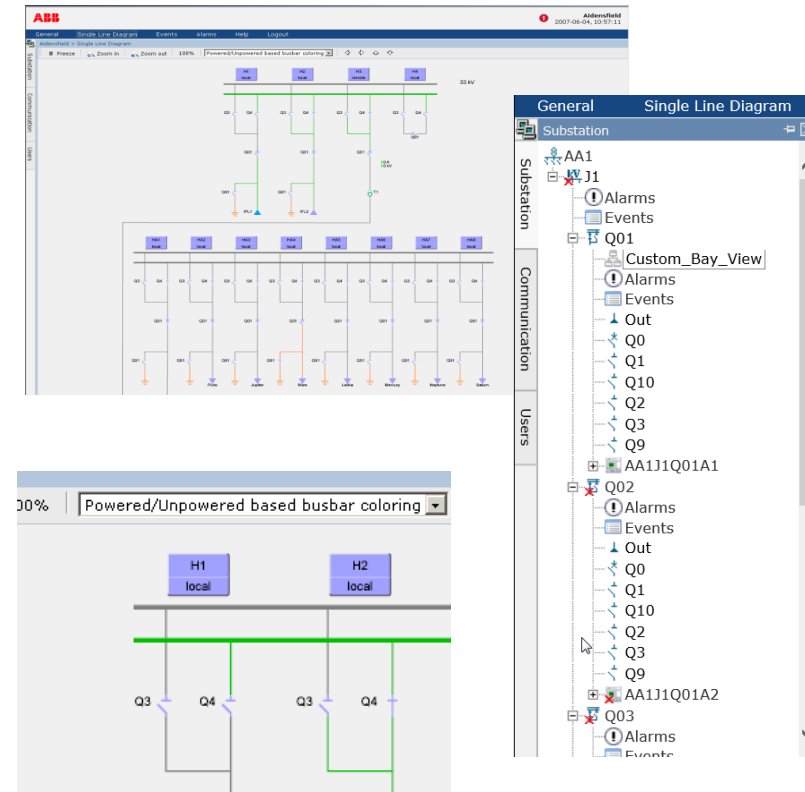


# COM600S 5.0

## 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

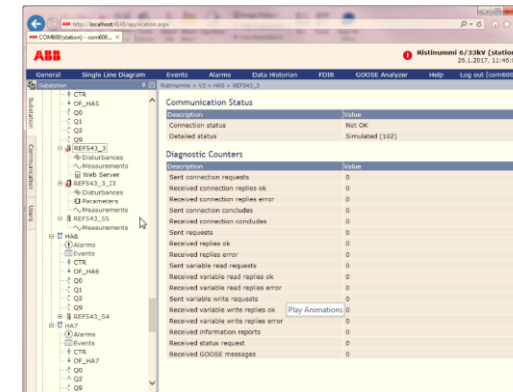
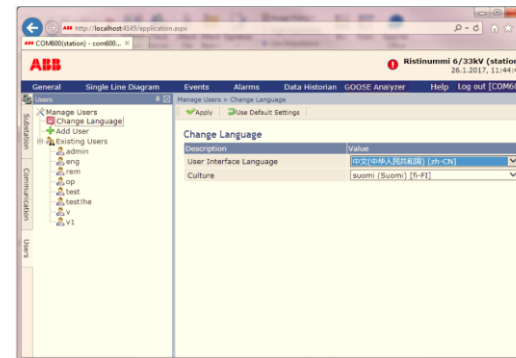


# COM600S 5.0

## Process Visualization (3/4)

### WebHMI

- 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

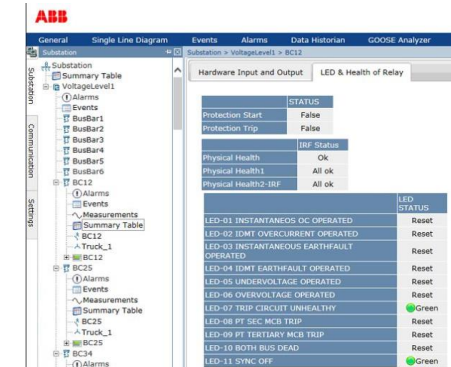
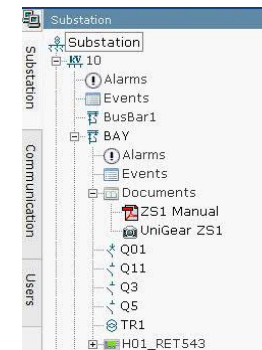
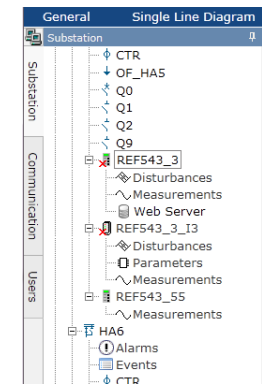


# COM600S 5.0

## Process Visualization (4/4)

### 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

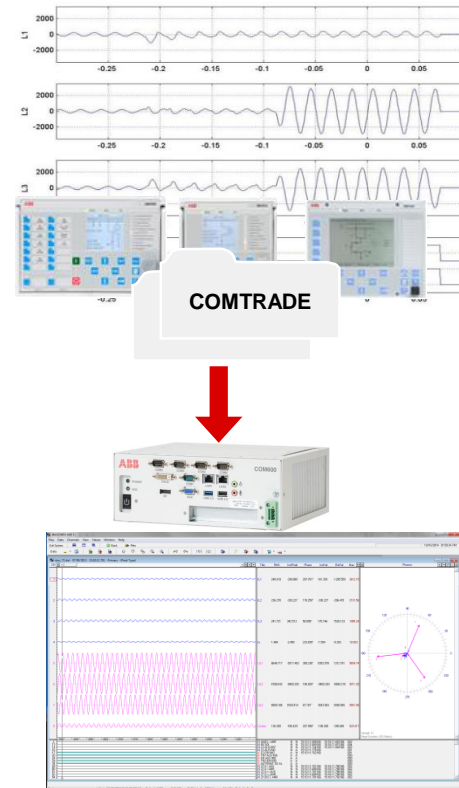


# COM600S 5.0

## 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



The screenshot shows the 'Disturbance Recordings' table in the Wavewin DR Viewer. The table lists various recording events with columns for Name, Description, Date, Time, and Action.

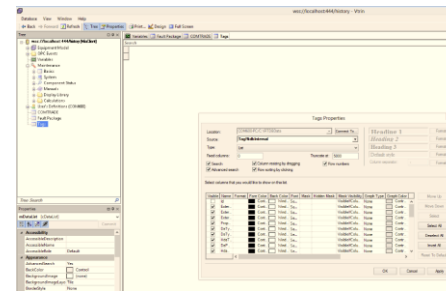
Name	Description	Date	Time	Action
DR101 (01)	DR_2015_07_17_14_31_03_778_Acc.csv	17.8.2015	17:22:03	View
DR102 (01)	DR_2015_07_24_13_24_14_998_Acc.csv	19.7.2015	18:24:14	View
DR103 (01)	DR_2015_07_24_13_40_21_778_Acc.csv	19.7.2015	18:40:21	View
DR104 (01)	DR_2015_07_24_13_13_103_103_Acc.csv	27.7.2015	14:21:04	View
DR105 (01)	DR_2015_07_24_15_06_09_918_Acc.csv	24.7.2015	18:06:09	View
DR106 (01)	DR_2015_07_24_15_06_26_998_Acc.csv	24.7.2015	18:06:26	View
DR107 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR108 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR109 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR110 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR111 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR112 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR113 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR114 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR115 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR116 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR117 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR118 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR119 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View
DR120 (01)	DR_2015_07_24_15_06_30_918_Acc.csv	24.7.2015	18:06:30	View

# COM600S 5.0

## Data Historian

### Historical data management

- 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



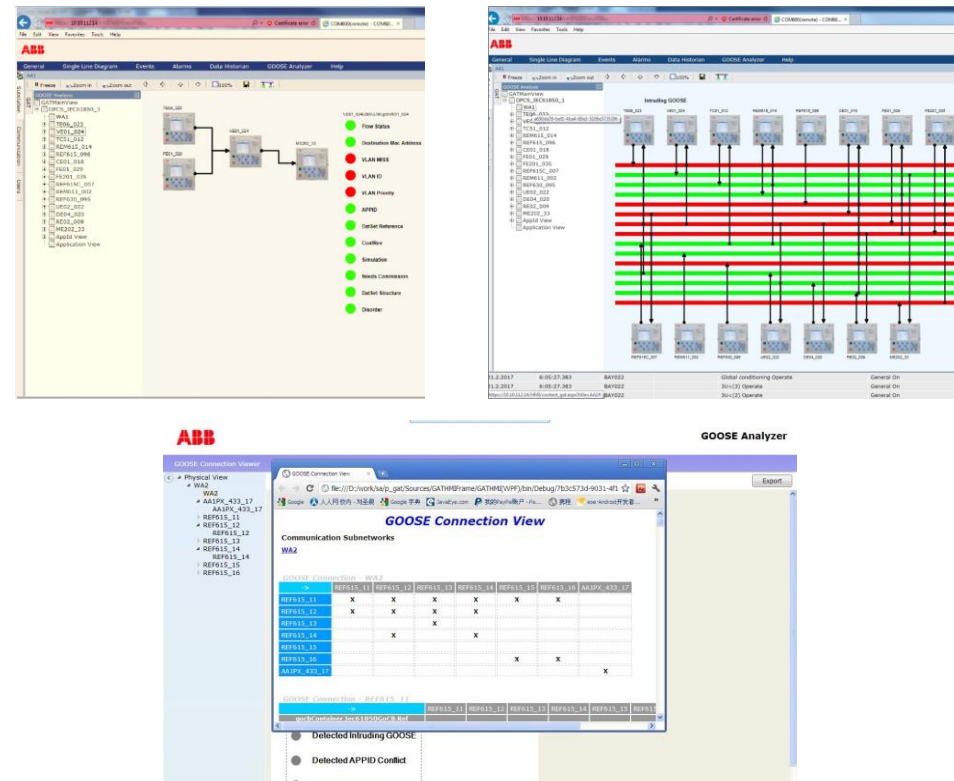
Selected	Signal	Name	Cycle	Minimum Value	Maximum Value	Description	Process Path	Unit	History Levels	Equipment Path
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.Mod	AAU1021A1.LDD.CM600U1.Mod	5000	0	3	Controllable Integer Status	WAT-AAU1021A1.LDD.CM600U1.Mod/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.Beh	AAU1021A1.LDD.CM600U1.Beh	5000	0	3	Integer Status	WAT-AAU1021A1.LDD.CM600U1.Beh/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.Health	AAU1021A1.LDD.CM600U1.Health	5000	0	3	Integer Status	WAT-AAU1021A1.LDD.CM600U1.Health/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.NamPh	AAU1021A1.LDD.CM600U1.NamPh	5000	0	3	Logical Node Name Plate	WAT-AAU1021A1.LDD.CM600U1.NamPh/cVal		AVG	AAU1021A1
<input checked="" type="checkbox"/>	AAU1021A1.LDD.CM600U1.AlphaA	AAU1021A1.LDD.CM600U1.AlphaA	5000	0	40	W Y E	WAT-AAU1021A1.LDD.CM600U1.AlphaA/cVal/mag		AVG	AAU1021A1
<input checked="" type="checkbox"/>	AAU1021A1.LDD.CM600U1.AlphaB	AAU1021A1.LDD.CM600U1.AlphaB	5000	0	40	W Y E	WAT-AAU1021A1.LDD.CM600U1.AlphaB/cVal/mag		AVG	AAU1021A1
<input checked="" type="checkbox"/>	AAU1021A1.LDD.CM600U1.AlphaC	AAU1021A1.LDD.CM600U1.AlphaC	5000	0	40	W Y E	WAT-AAU1021A1.LDD.CM600U1.AlphaC/cVal/mag		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.Aves	AAU1021A1.LDD.CM600U1.Aves	5000	0	20000	W Y E	WAT-AAU1021A1.LDD.CM600U1.Aves/cVal/mag		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.Avel	AAU1021A1.LDD.CM600U1.Avel	5000	0	20000	W Y E	WAT-AAU1021A1.LDD.CM600U1.Avel/cVal/mag		AVG	AAU1021A1
<input checked="" type="checkbox"/>	AAU1021A1.LDD.CM600U1.Aveset	AAU1021A1.LDD.CM600U1.Aveset	5000	0	20000	W Y E	WAT-AAU1021A1.LDD.CM600U1.Aveset/cVal/mag		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.AvesetMod	AAU1021A1.LDD.CM600U1.AvesetMod	5000	0	3	Integer status setting	WAT-AAU1021A1.LDD.CM600U1.AvesetMod/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.NamPh	AAU1021A1.LDD.CM600U1.NamPh	5000	0	3	Integer status setting	WAT-AAU1021A1.LDD.CM600U1.NamPh/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.HAen	AAU1021A1.LDD.CM600U1.HAen	5000	0	3	Single Point Status	WAT-AAU1021A1.LDD.CM600U1.HAen/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.HWen	AAU1021A1.LDD.CM600U1.HWen	5000	0	3	Single Point Status	WAT-AAU1021A1.LDD.CM600U1.HWen/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.LaWen	AAU1021A1.LDD.CM600U1.LaWen	5000	0	3	Single Point Status	WAT-AAU1021A1.LDD.CM600U1.LaWen/cVal		AVG	AAU1021A1
<input type="checkbox"/>	AAU1021A1.LDD.CM600U1.LaAen	AAU1021A1.LDD.CM600U1.LaAen	5000	0	3	Single Point Status	WAT-AAU1021A1.LDD.CM600U1.LaAen/cVal		AVG	AAU1021A1

# 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

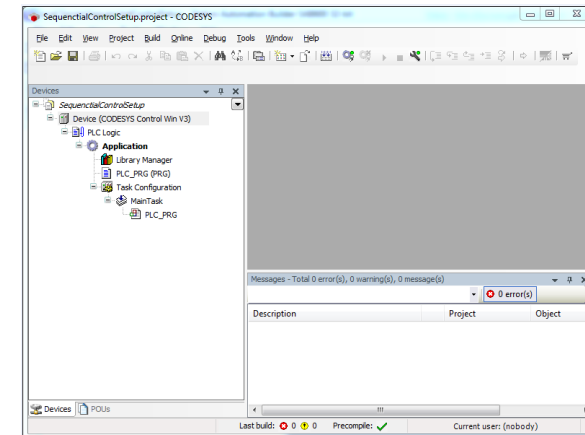
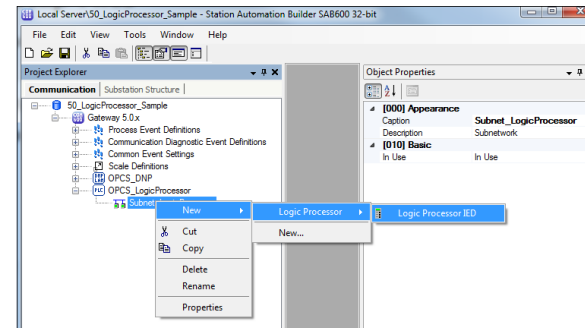


# COM600S 5.0

## 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



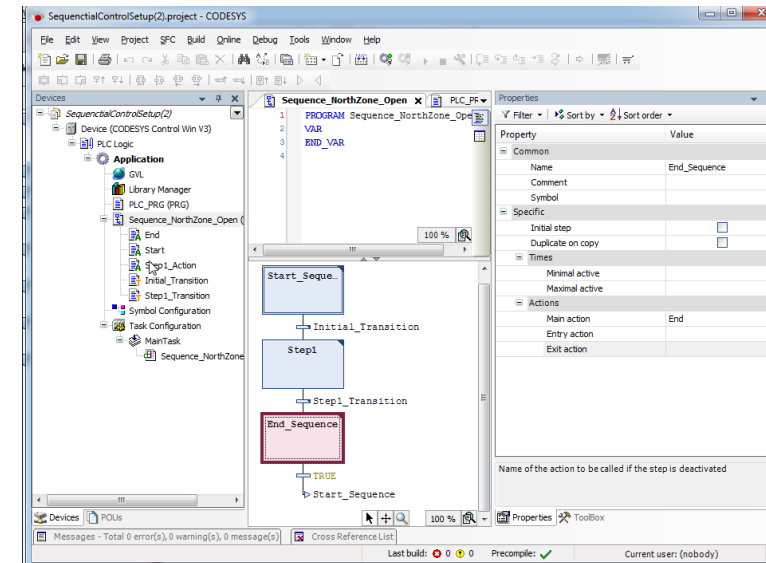


# COM600S 5.0

## Logic Processor (2/2)

### 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



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# EPDS ABB Zenon Electrification Edition

[← BACK](#)



# 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

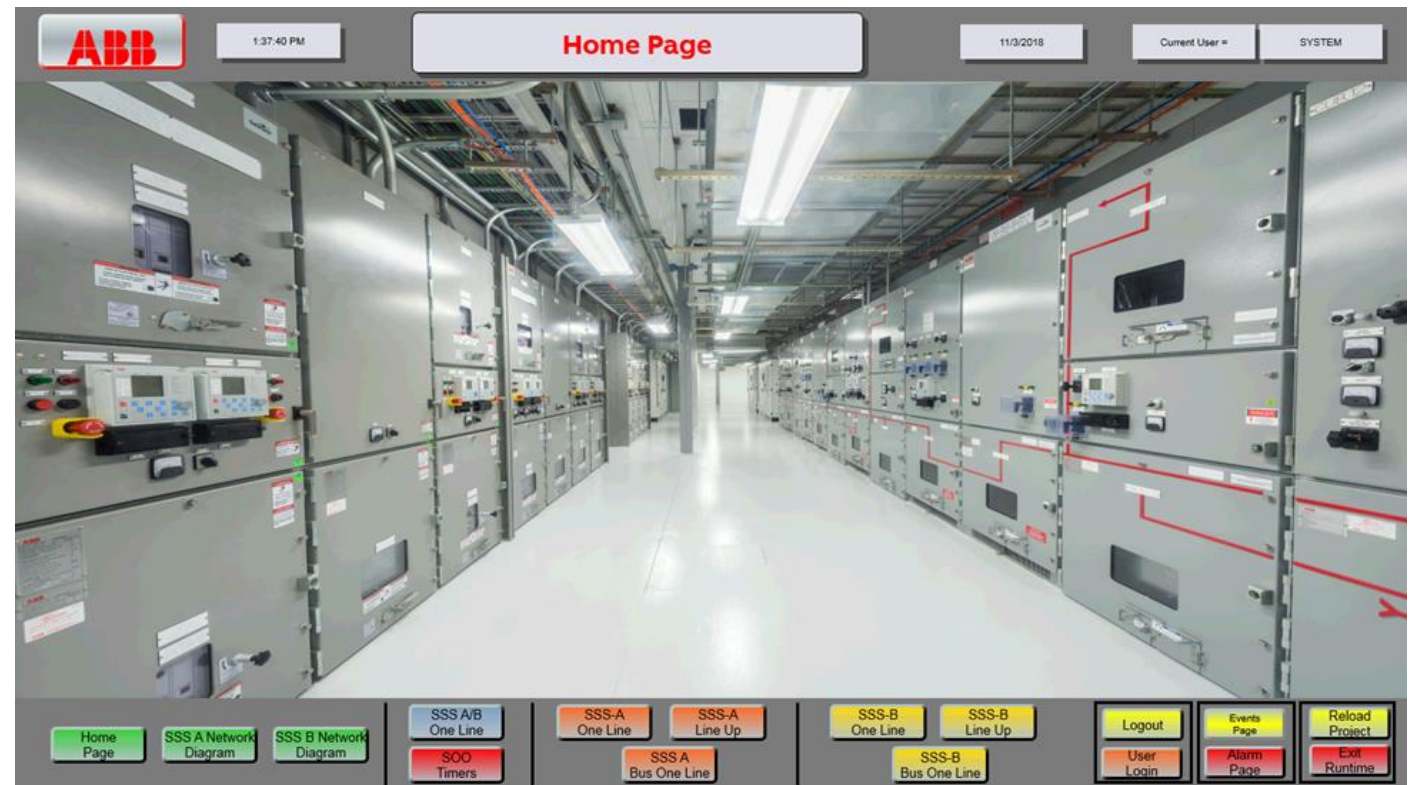
The Home Page displays a PDC house as background image. This image may be changed to actual project specific PDC image

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



# Digital Solution Center

ABB Zenon for electrification solution

## Data center application

Specific switchgear one line opened from footer page link

Device Icons and lines are dynamic

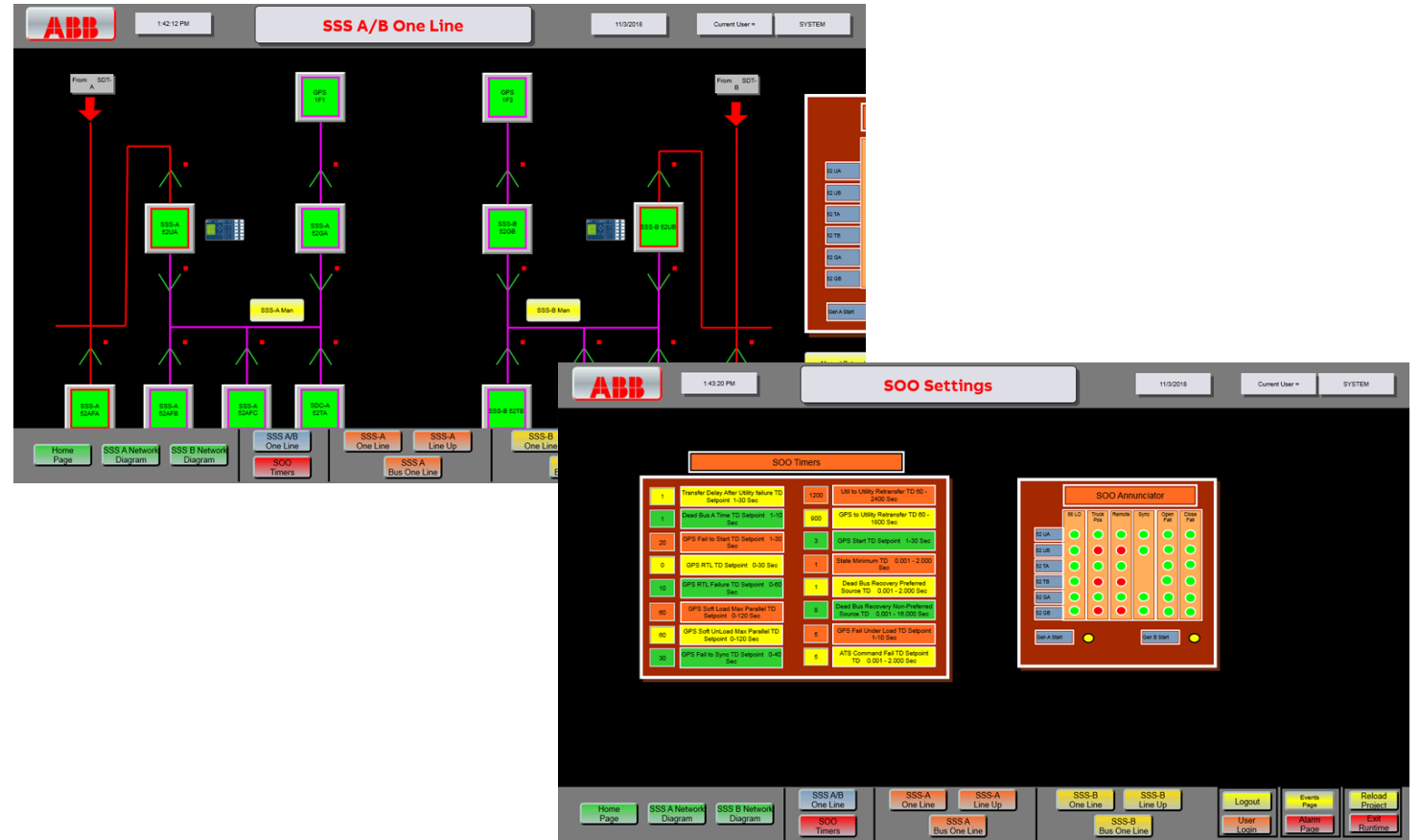
Green for un-powered

Red for Powered.

Truck icons indicate Racked In ,Test and Racked Out positions

## Sequence of operation (SOO)

- Predefined software PLC programming for switching function



# Digital Solution Center

## ABB Zenon for electrification solution

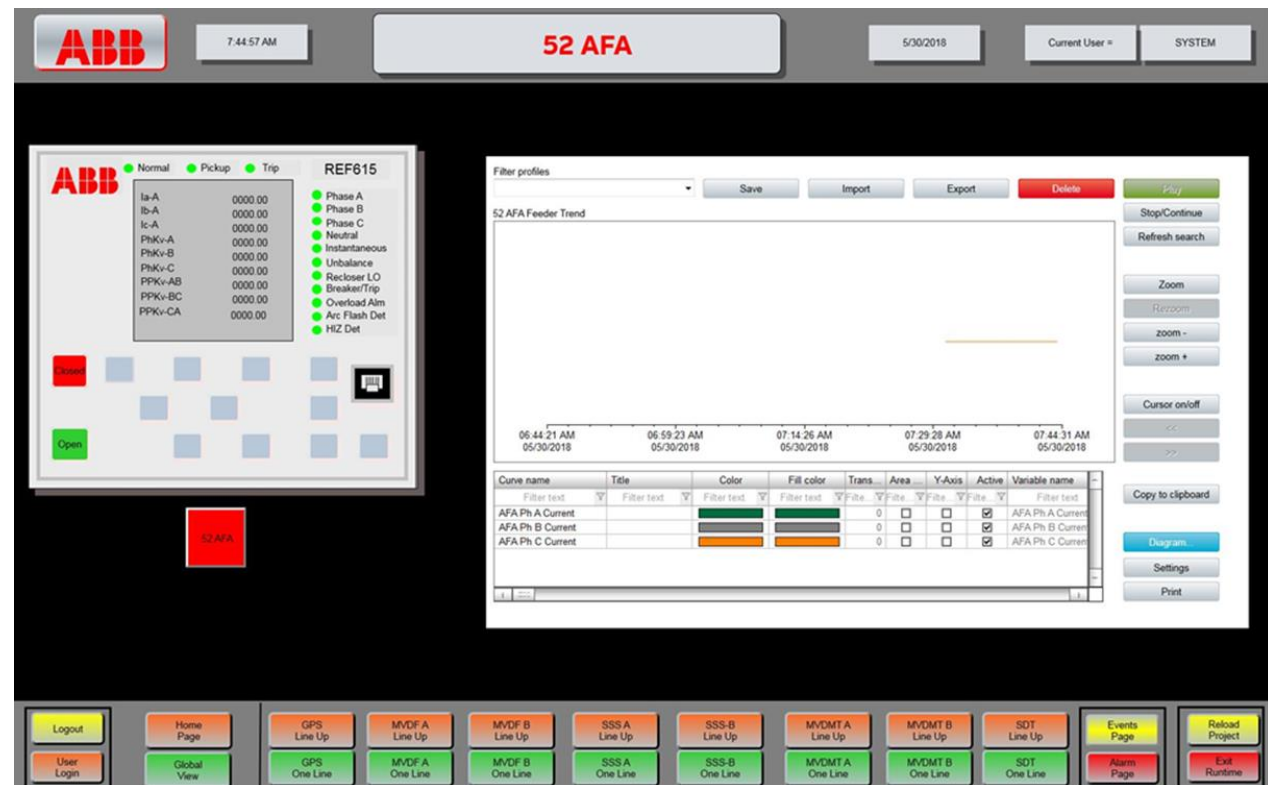
### Data center application

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

The screenshot displays two overlapping windows from the ABB Zenon interface. The top window is titled 'Events' and shows a table of system events. The bottom window is titled 'Alarm' and shows a table of active alarms with various control buttons on the right side.

**Events Window:**

Time received	Text	Identification	Value	Mea...	User - full name	Computer name	Comm...
11/3/2018 1:15:16 PM	System was started				SYSTEM	US-L-7004431.A...	
11/3/2018 1:15:18 PM	Sources A + B Selected		1				

**Alarm Window:**

Alar...	Time received	Time cleared	Time acknowledged	Identification	Value	User - full name	Computer name
---------	---------------	--------------	-------------------	----------------	-------	------------------	---------------

**Alarm Function Buttons:**

- Stop
- Total: 0
- Not acknowledged: 0
- Acknowledge
- Acknowledge page
- Acknowled. All
- Confirm acknowledgement
- Confirm acknowledgementemer
- Print
- Execute function

**Navigation Buttons (Bottom):**

- Home Page
- SSS A Network Diagram
- SSS B Network Diagram
- SSS A/B One Line
- SSS One L
- SSS-A One Line
- SSS-A Line Up
- SSS-B One Line
- SSS-B Line Up
- Logout
- Events Page
- Reload Project
- User Login
- Alarm Page
- Exit Runtime

# Digital Solution Center

ABB Zenon for electrification solution

## Energy Management System

Centralized power monitoring and control

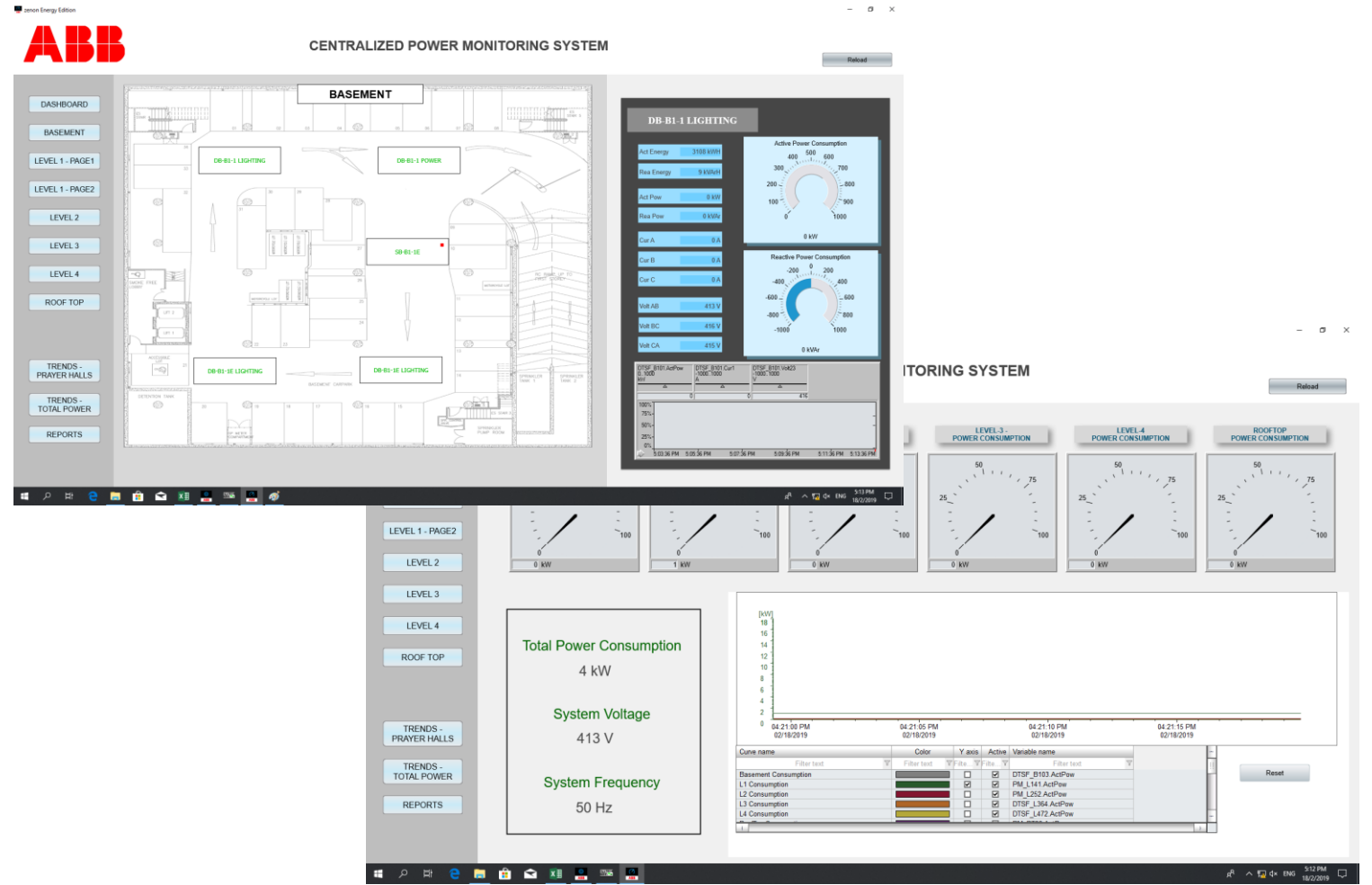
Energy tracking

Load shedding

Load profile

Automatic reports

Power consumption optimization

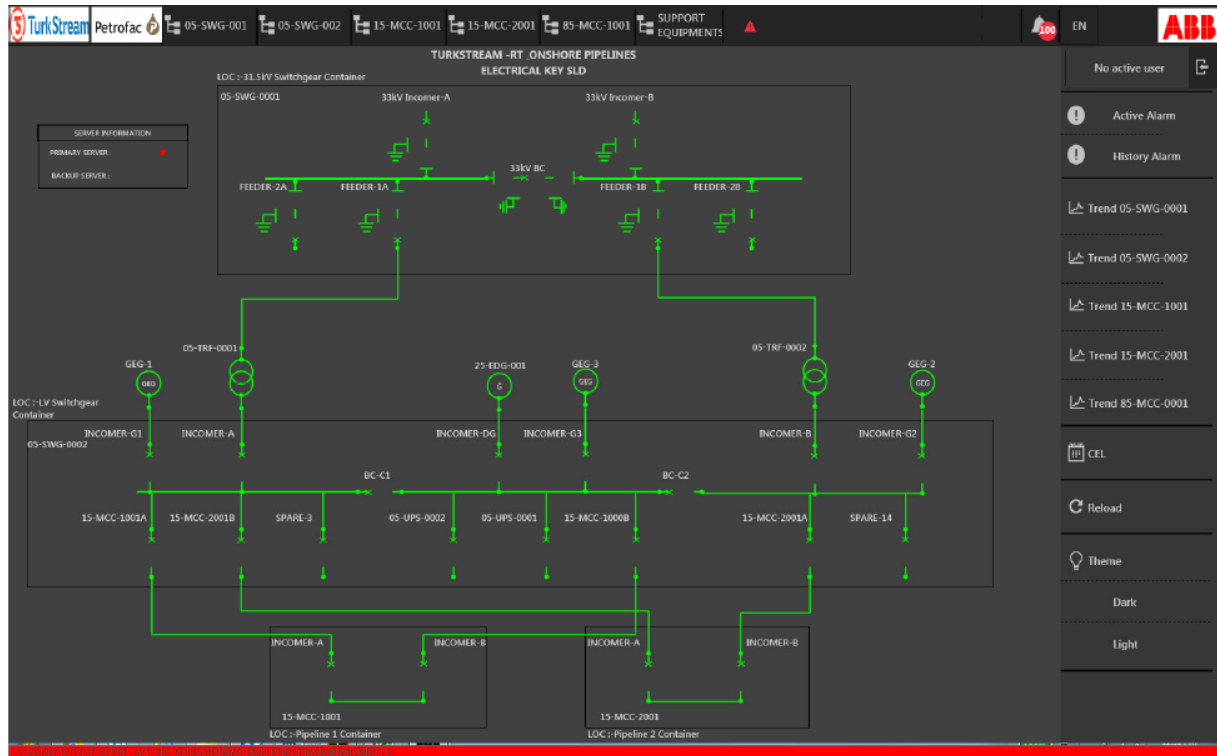




# Digital Solution Center

ABB Zenon for electrification solution

## Examples for oil and gas application

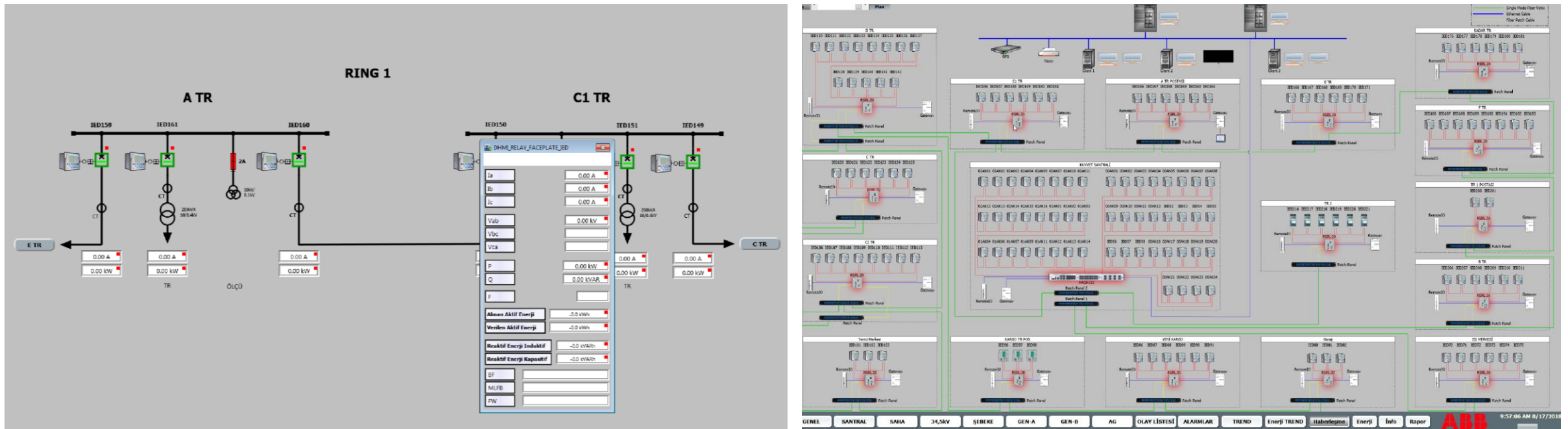


STATUS	ALARMS	MEASUREMENTS																																																																																																															
<h3>HV_FEEDER_FACEPLATE FEEDER_2A</h3> <table border="1"><thead><tr><th>STATUS</th><th>ALARM</th><th>MEASUREMENT</th></tr></thead><tbody><tr><td colspan="3"><b>STATUS</b></td></tr><tr><td>Circuit Breaker Closed</td><td><input type="checkbox"/></td><td></td></tr><tr><td>Circuit Breaker Open</td><td><input type="checkbox"/></td><td></td></tr><tr><td>Disconnecter Closed</td><td><input type="checkbox"/></td><td></td></tr><tr><td>Disconnecter Open</td><td><input type="checkbox"/></td><td></td></tr><tr><td>Earth Switch Closed</td><td><input type="checkbox"/></td><td></td></tr><tr><td>Earth Switch Open</td><td><input type="checkbox"/></td><td></td></tr><tr><td>@L/R Switch in Local</td><td><input type="checkbox"/></td><td></td></tr><tr><td>@L/R Switch in Remote</td><td><input type="checkbox"/></td><td></td></tr><tr><td>Ready to Close</td><td><input type="checkbox"/></td><td></td></tr></tbody></table> <p><b>CIRCUIT BREAKER</b></p> <p>SELECT CB CLOSE CB OPEN</p> <p><b>DISCONNECTOR</b></p> 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type="checkbox"/></td></tr><tr><td>Current -L2</td><td>0 A</td><td><input type="checkbox"/></td></tr><tr><td>Current -L3</td><td>0 A</td><td><input type="checkbox"/></td></tr><tr><td>Power Factor</td><td>0.0</td><td><input type="checkbox"/></td></tr><tr><td>Frequency</td><td>0 Hz</td><td><input type="checkbox"/></td></tr><tr><td>Active Power</td><td>0.0 kW</td><td><input type="checkbox"/></td></tr><tr><td>Reactive Power</td><td>0 kVAr</td><td><input type="checkbox"/></td></tr><tr><td>Energy-KWhr</td><td>0 kWhr</td><td><input type="checkbox"/></td></tr></tbody></table> <p><b>CIRCUIT BREAKER</b></p> <p>SELECT CB CLOSE CB OPEN</p> <p><b>DISCONNECTOR</b></p> <p>SELECT DC CLOSE DC OPEN</p> <p><b>EARTH SWITCH</b></p> <p>SELECT ES CLOSE ES OPEN</p>	STATUS	ALARM	MEASUREMENT	<b>MEASUREMENTS</b>			Voltage L1-L2	0.00 kV	<input type="checkbox"/>	Voltage L2-L3	0.00 kV	<input type="checkbox"/>	Voltage L3-L1	0.00 kV	<input type="checkbox"/>	Current -L1	0 A	<input type="checkbox"/>	Current -L2	0 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# 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

**ABB** HOME → OFFERINGS → MEDIUM VOLTAGE PRODUCTS → DISTRIBUTION AUTOMATION PRODUCTS AND SOLUTIONS → DIGITAL SOLUTIONS GLOBAL SITE

## Digital Solutions

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

ABB's versatile 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 substation, 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
Engineering support	Solution center products				

<https://new.abb.com/medium-voltage/distribution-automation/digital-solutions>



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# EPDS Digital Solution Centers

## Envisage SCADA

[← BACK](#)



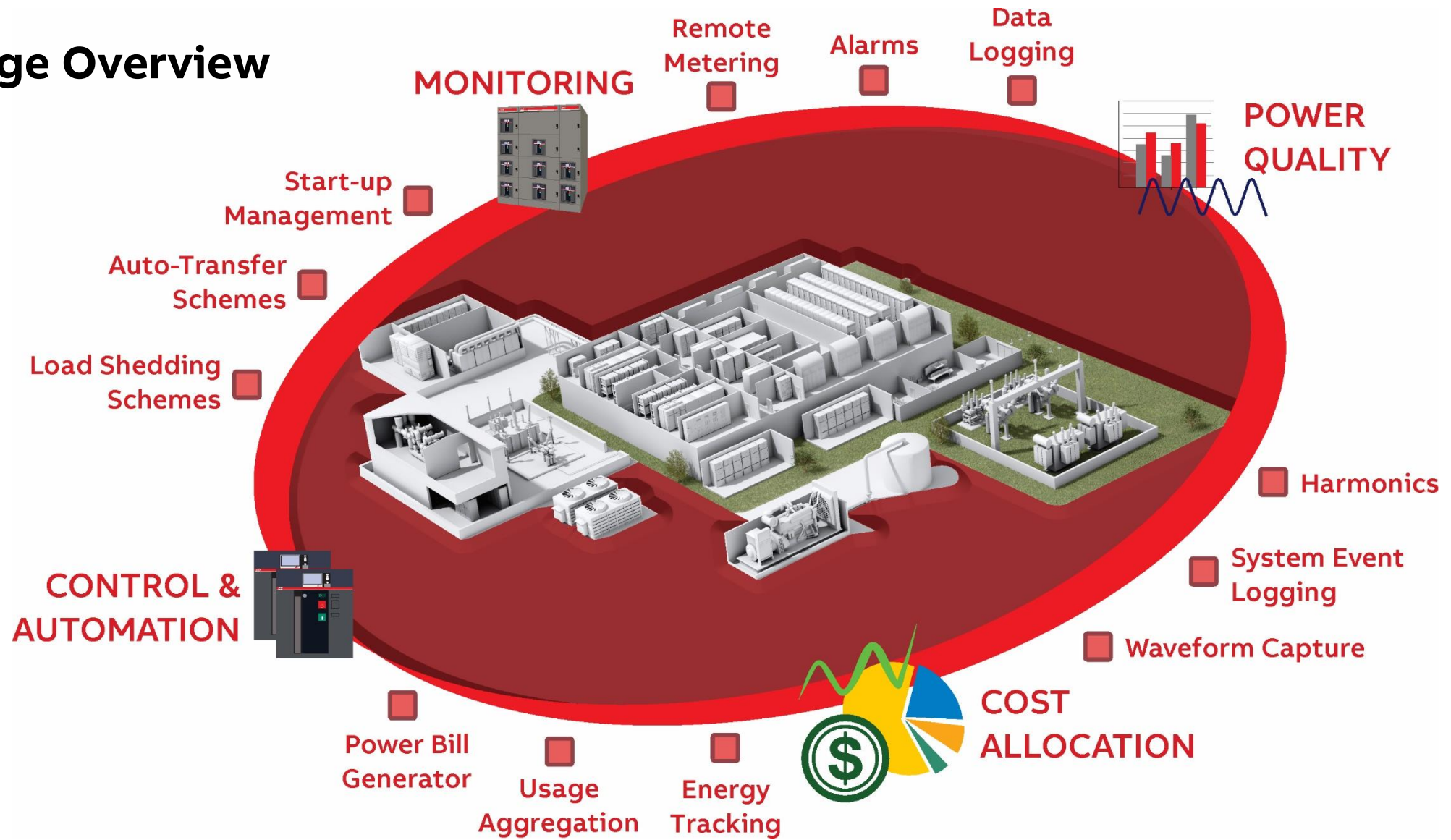
# Energy Management Solution

## 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



# Envisage Overview

## Facility Monitoring

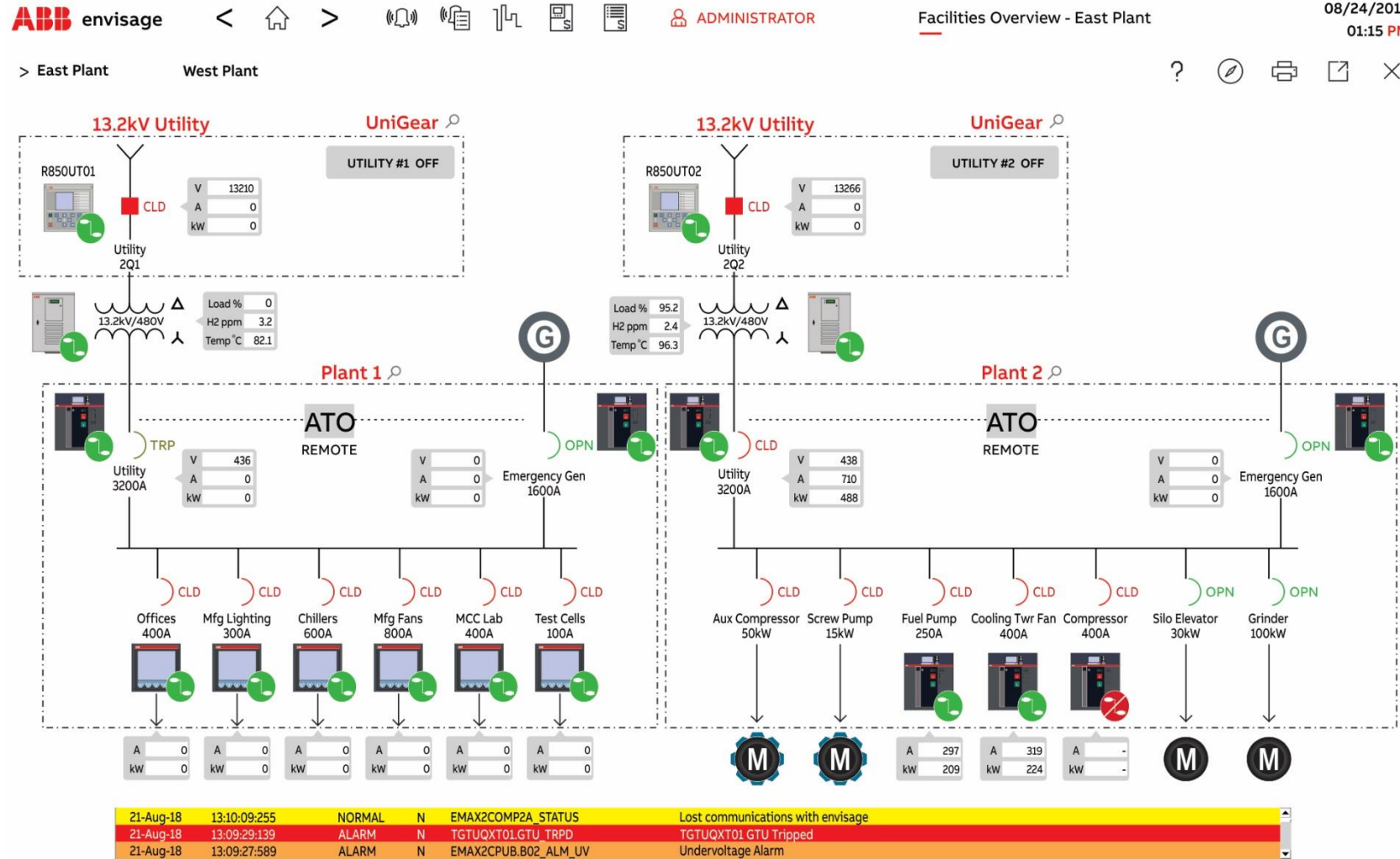
- Provides a bird's-eye view of the entire network
- Intuitive navigation
- Tabular displays for all devices
- Prioritized alarm annunciation
- Precise sequence of events recording
- Advanced security and safety functions



# 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





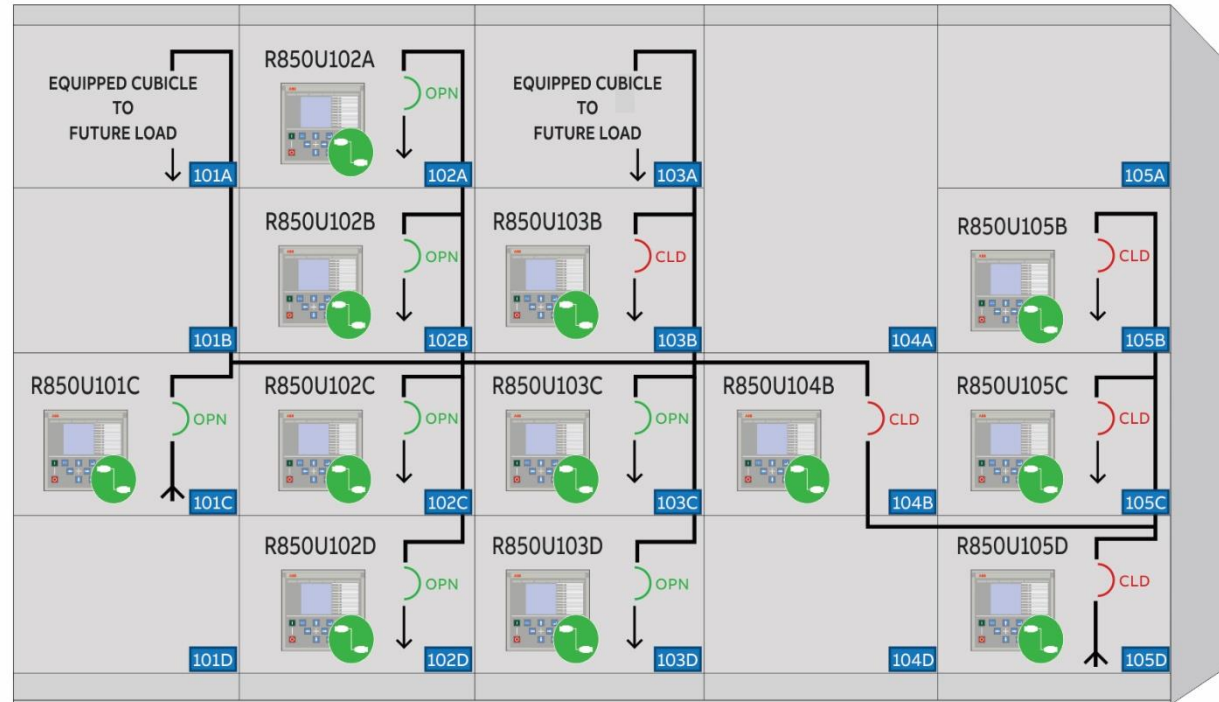
# Envisage Overview

## Facility Monitoring

- When clicking a lineup of Switchgear from the System Overview screen, a mimic bus screen (elevation) can be shown

ABB envisage < Home > [Icons] ADMINISTRATOR Elevation Switchgear A-1 08/24/2018 01:15 PM

> Switchgear A-1 Switchgear A-2 Switchgear A-3 ? [Icons]



27-Jun-18	13:10:09:255	NORMAL	N	EMAX2COMP2A_STATUS	Lost communications with envisage
27-Jun-18	13:09:29:139	ALARM	N	TGTUQXT01.GTU_TRPD	TGTUQXT01 GTU Tripped
27-Jun-18	13:09:27:589	ALARM	N	EMAX2CPUB.B02_ALM_UV	Undervoltage Alarm

# 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

Substation 2A - LVS 104B - Tie

Tie

	A	B	C	3 Ph
CURRENT	792.1	798.4	792.6	794.6
kW	219	221	219	661
Volts (Ph-Ph)	484	484	484	484
Volts (Ph-N)	279	280	279	279

Breaker Name	104B - Tie
Serial No.	MFDA16000365
Hardware Rev.	5
Firmware Rev.	501

Open/Closed	CLOSED
Racking	RACKED IN
Sec. Disconnect	CONNECTED

Closing Spring	CHARGED
----------------	---------

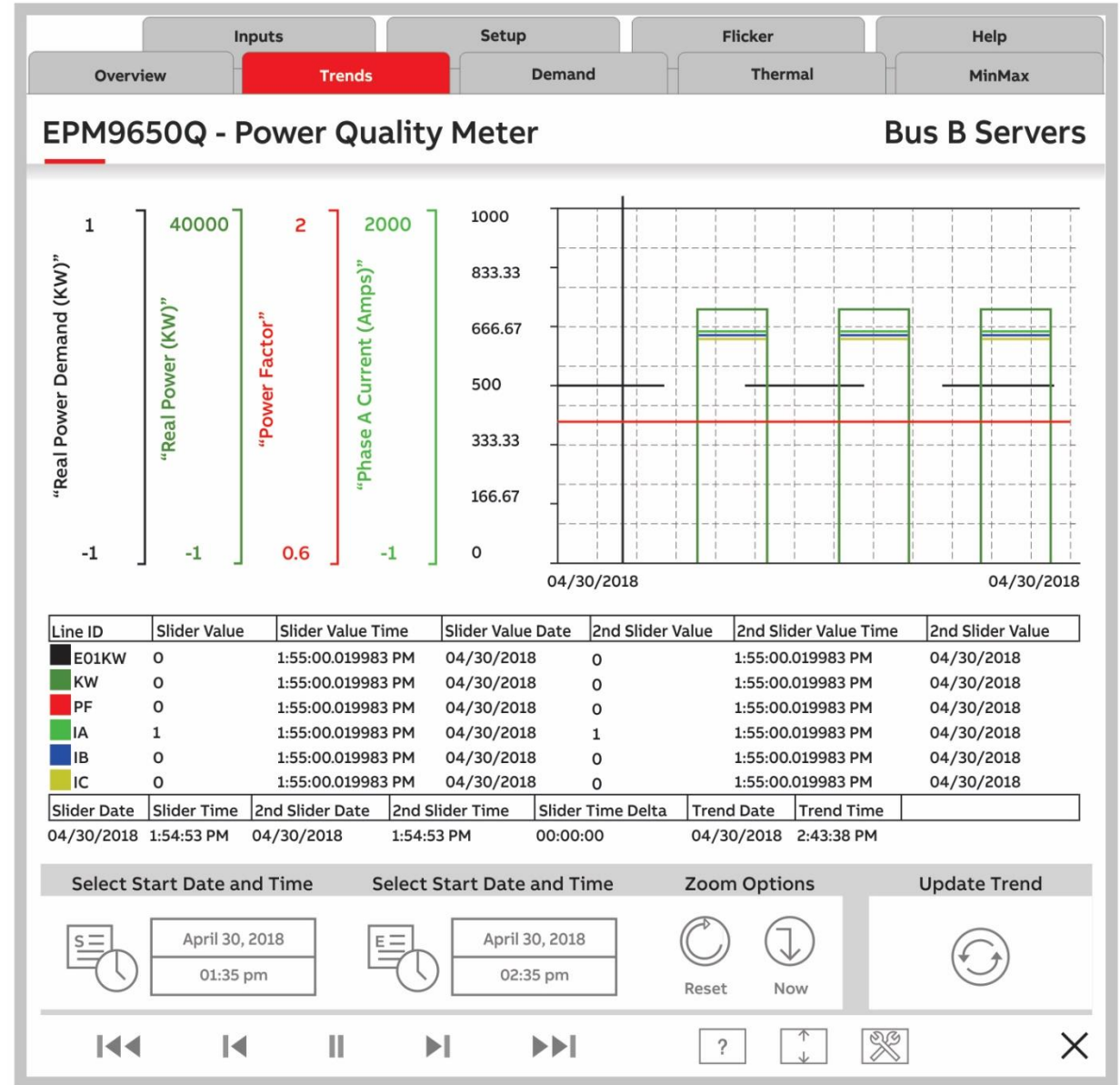
Protection Status	Trip	Alarm
Overvoltage	●	●
Undervoltage	●	●
High Current Trigger	N/A	●
Phase Loss	●	●
Reverse Power	●	●
High Resistance GF	●	●
Under Frequency	●	●
Over Frequency	●	●
Instantaneous Protection	●	
Short Time Protection	●	
Ground Fault Protection	●	

● Enabled  
● Disabled  
● Error

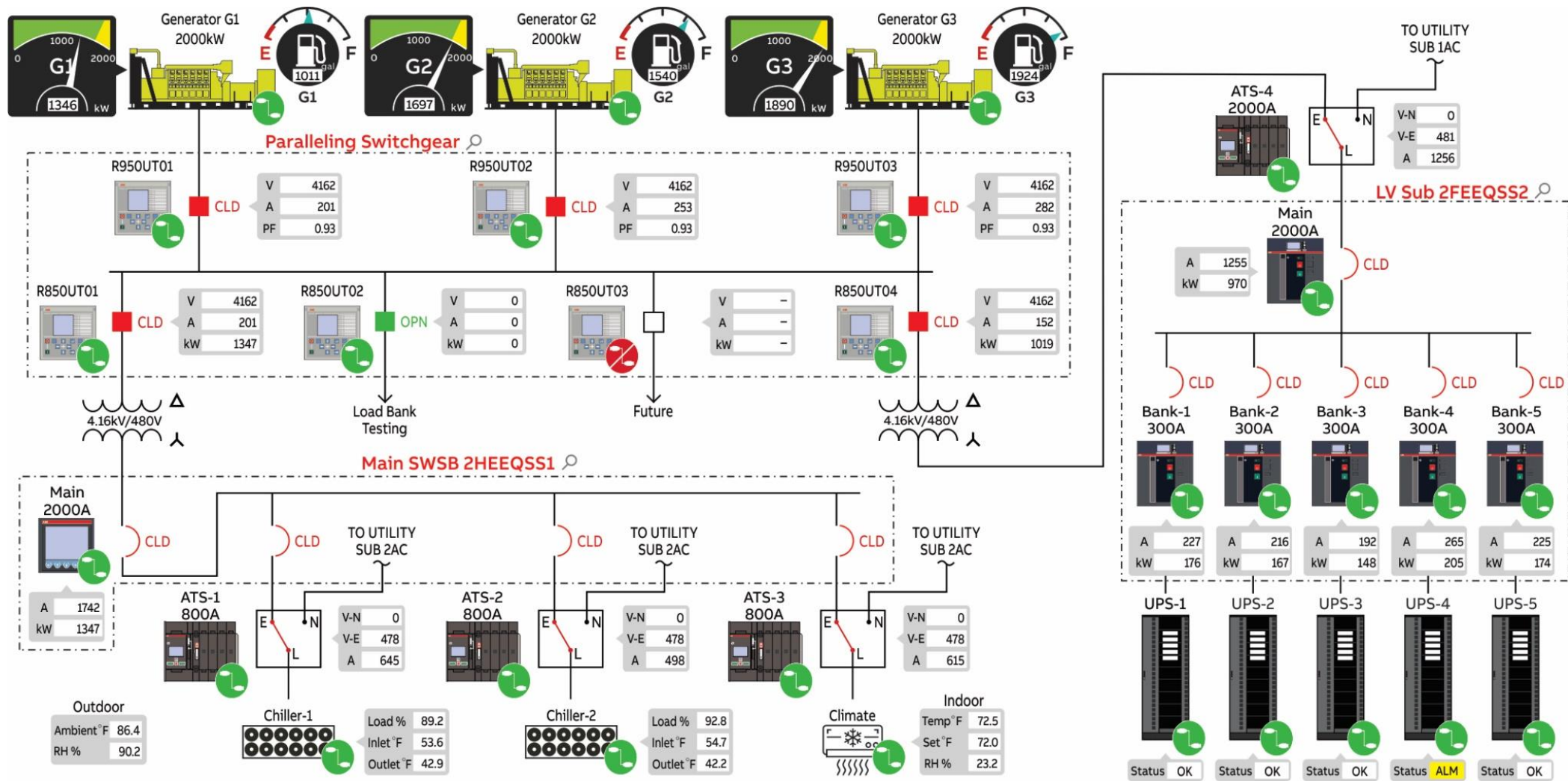
# Envisage Overview

## Trending

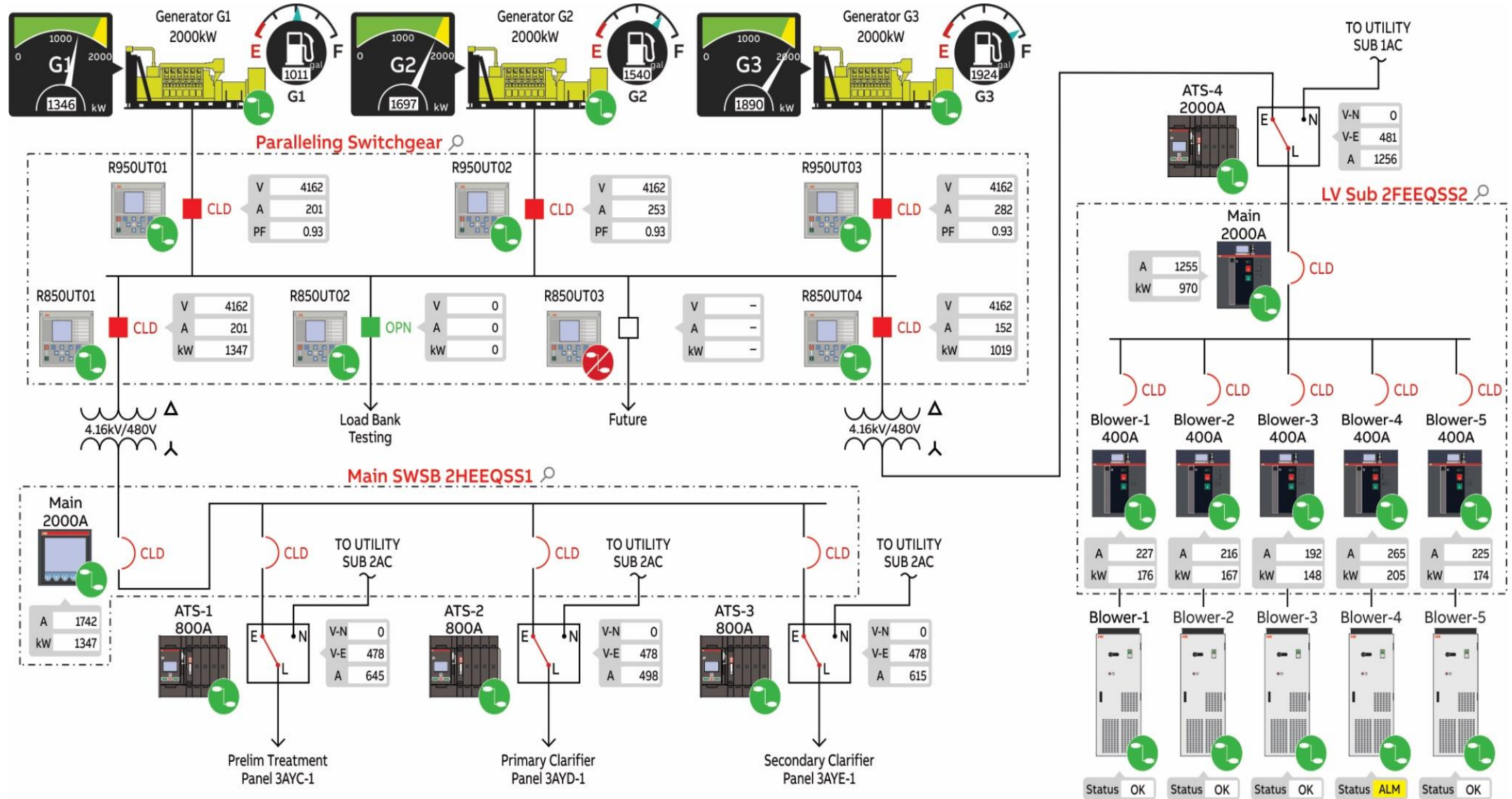
- A powerful trending tool allows you to drag and drop parameters that are of most interest for graphing



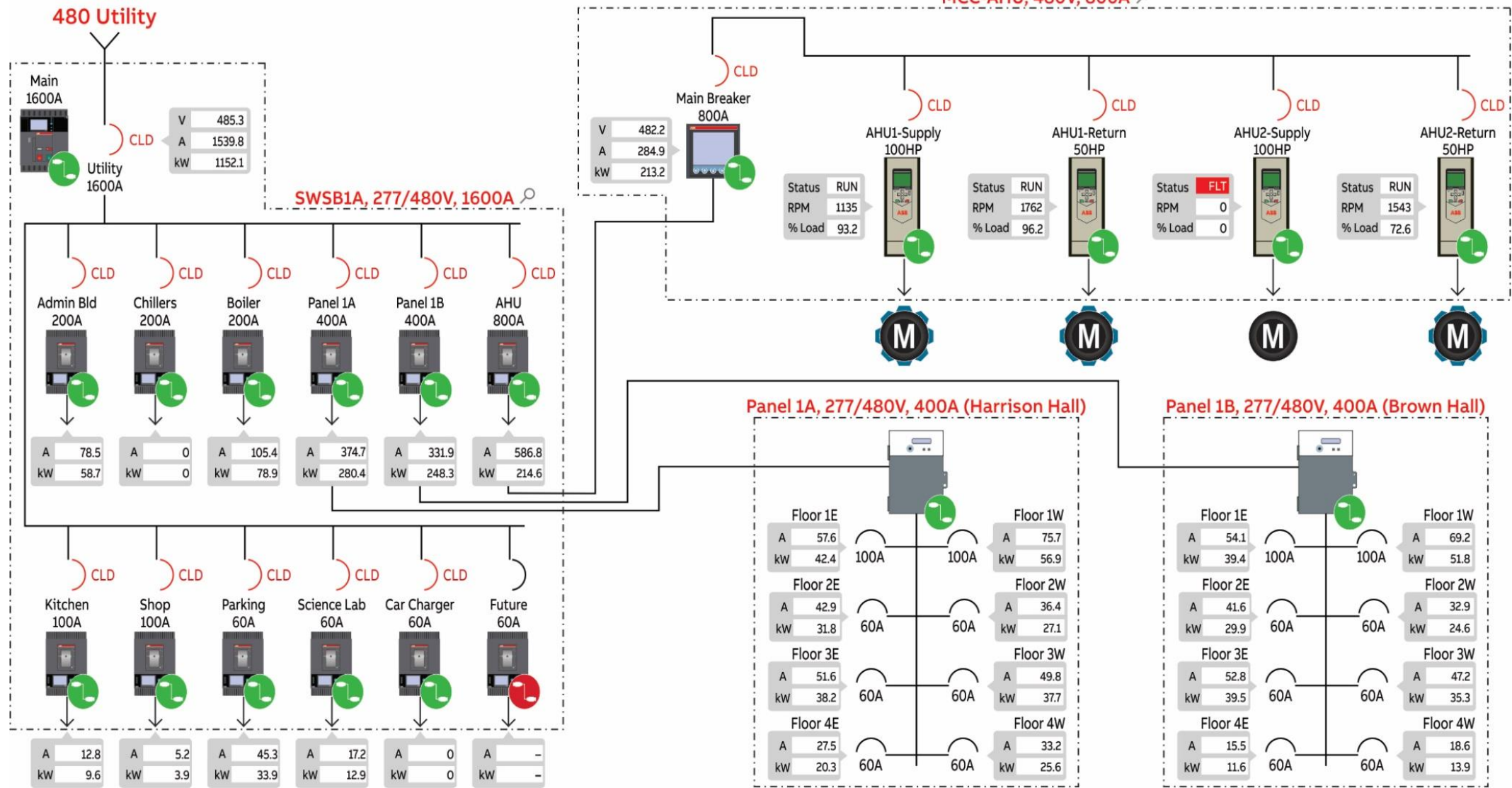
# DATA CENTER EXAMPLE



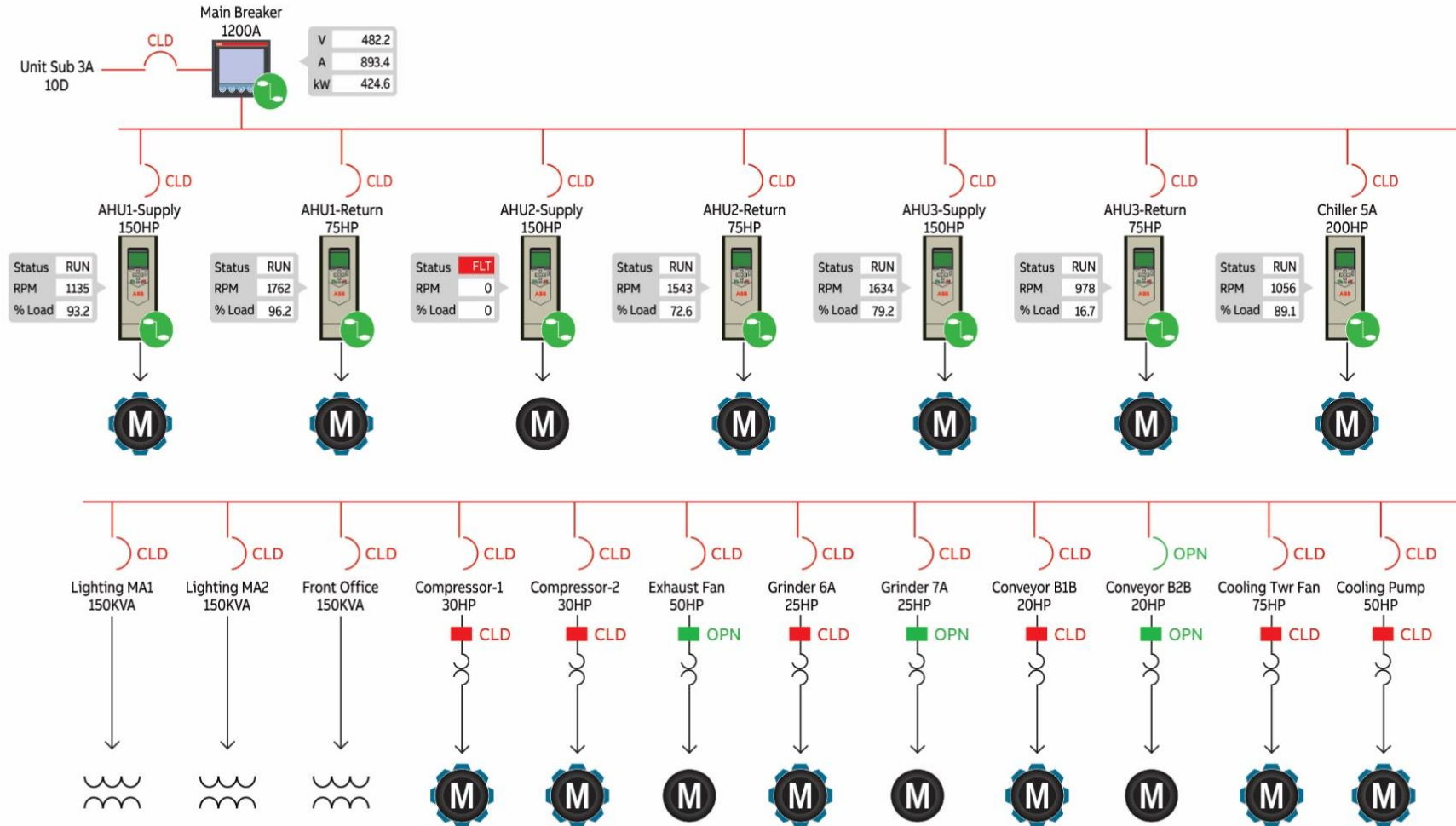
# WTP/WWTP EXAMPLE



# OFFICE/SCHOOL EXAMPLE



> One-line



21-Aug-18	13:10:09:255	NORMAL	N	EMAX2COMP2A_STATUS	Lost communications with envisage
21-Aug-18	13:09:29:139	ALARM	N	AHU2SUPPLY_STATUS	AHU2SUPPLY1B29 Tripped
21-Aug-18	13:09:27:589	ALARM	N	EMAX2CPUB.B02_ALM_UV	Undervoltage Alarm

# Envisage Overview

## MCC One-line Screen – Drive Icon

- An example of a drive detail screen focused on communications

Overview
Trends
Communications
Alarms 1
Alarms 2
Supporting Documents
Help

Extruder S1 Drive
ACS880-S1-SPD



STATUS WORD			CONTROL WORD		
Bit	Name	Value	Bit	Name	Value
0	RDY_ON	1	0	OFF1_CONTROL	1
1	RDY_RUN	1	1	OFF2_CONTROL	1
2	RDY_REF	1	2	OFF3_CONTROL	1
3	TRIPPED	0	3	INHIBIT_OPERATION	1
4	OFF_2_STA	1	4	RAMP_OUT_ZERO	1
5	OFF_3_STA	0	5	RAMP_HOLD	0
6	SWC_ON_INHIB	0	6	RAMP_IN_ZERO	0
7	ALARM	1	7	RESET	0
8	AT_SETPOINT	1	8	JOGGING_1	0
9	REMOTE	1	9	JOGGING_2	0
10	ABOVE_LIMIT	0	10	REMOTE_CMD	0
11	USER_0	0	11	EXT_CTRL_LOC	0
12	EXT_RUN_ENABLE	1			

Inactive  
 Active

XAI Reference voltage and analog inputs		
1	+VREF	10 VDC
2	-VREF	-10 VDC
3	AGNG	Ground
4	Ai1+	Speed Reference (Hand)
5	Ai1-	0(2)...10V
6	Ai2+	Speed Reference (Auto)
7	Ai2-	0(4)...20 mA

XAO Analog outputs		
1	Ao1	Motor speed rpm
2	AGND	0...20 mA
3	Ao2	Motor current
4	AGND	0...20 mA

XD2D Drive-to-drive link		
1	B	Drive-to-drive link
2	A	Drive-to-drive link
3	BGND	

XRO1, Xr02, XRO3 Relay outputs		
1	NC	Ready
2	COM	250 VAC / 30 VDC, 2A
3	NO	
1	NC	Running
2	COM	250 VAC / 30 VDC, 2A
3	NO	
1	NC	Faulted (-1)
2	COM	250 VAC / 30 VDC, 2A
3	NO	

Xd24 Digital interlock		
1	DIIL	Digital Interlock, By default, not in use.
2	+24VD	+24 VDC, 200mA
3	DICOM	Digital input ground
4	+24VD	+24 VDC, 200mA
5	DIOGND	Digital input/output ground

XDIO Digital inputs/outputs		
1	DIO1	Output: Ready
2	DIO2	Output: Running

XDI Digital inputs		
1	Di1	Stop (0) / Start (1) - Hand
2	Di2	Forward (0) / Reverse (1) - Hand
3	Di3	Hand (0) / Auto (1)
4	Di4	Constant speed 1 (1 = On)
5	Di5	Forward (0) / Reverse (1) - Auto
6	Di6	Stop (0) / Start (1) - Auto

XSTO	Safe torque off circuits must be closed for the drive to start. See Hardware manual of drive.	
X12	Safety options connection	
X13	Control panel connection	
X205	Memory unit connection	



# Envisage Overview

## MCC One-line Screen – Drive Icon

- Another example of a drive detail screen - Alarms

ACS880-S1-SPD

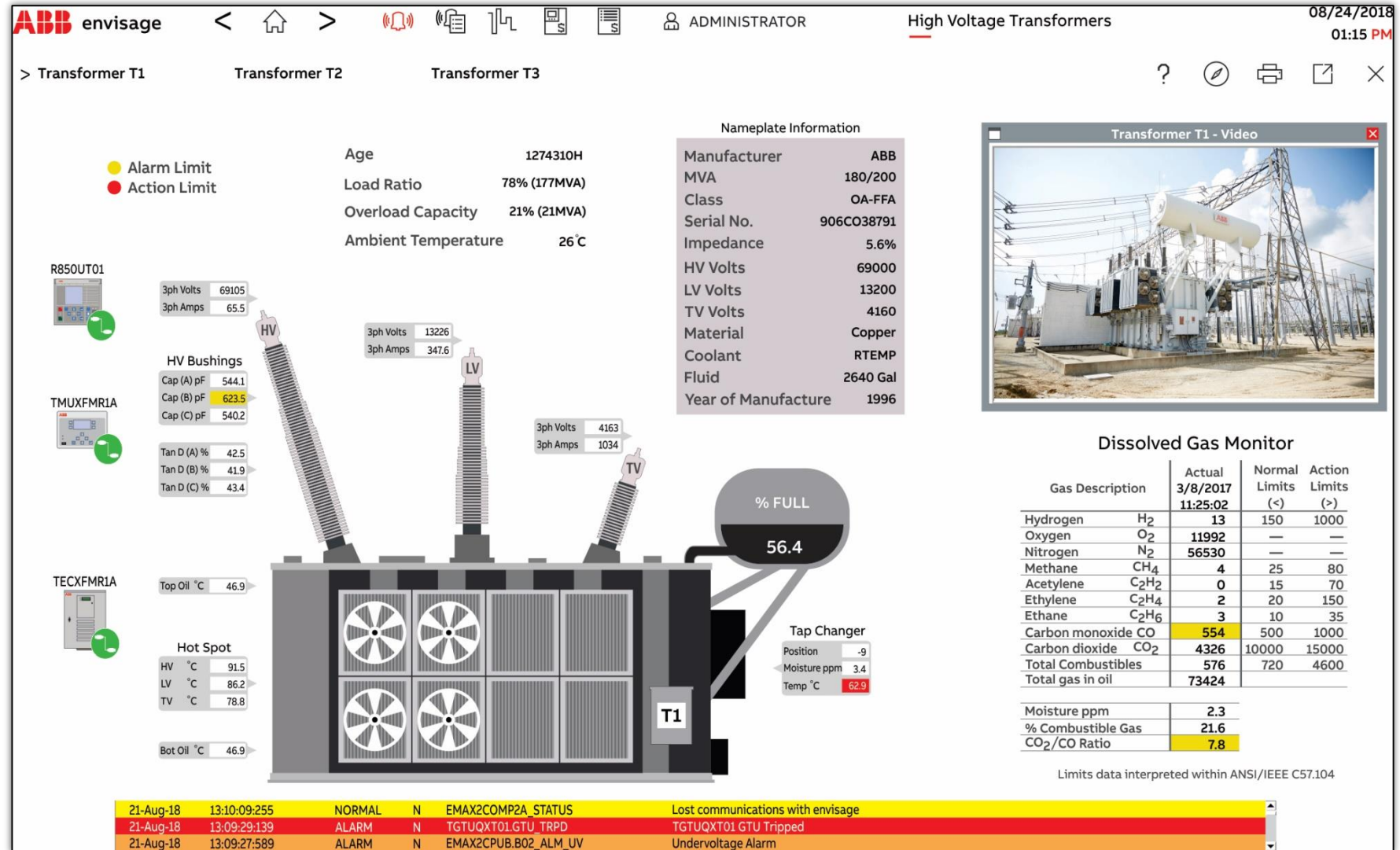
<input type="checkbox"/> Overcurrent	<input type="checkbox"/> DC Link Difference	<input type="checkbox"/> STO Hardware Failure
<input type="checkbox"/> Earth Leakage	<input type="checkbox"/> Output Phase Loss	<input checked="" type="checkbox"/> Safe Torque Off
<input type="checkbox"/> Short Circuit	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

Legend:  = Inactive Alarm  = Active Alarm  = Active Warning

# Envisage Overview

## Facility Monitoring

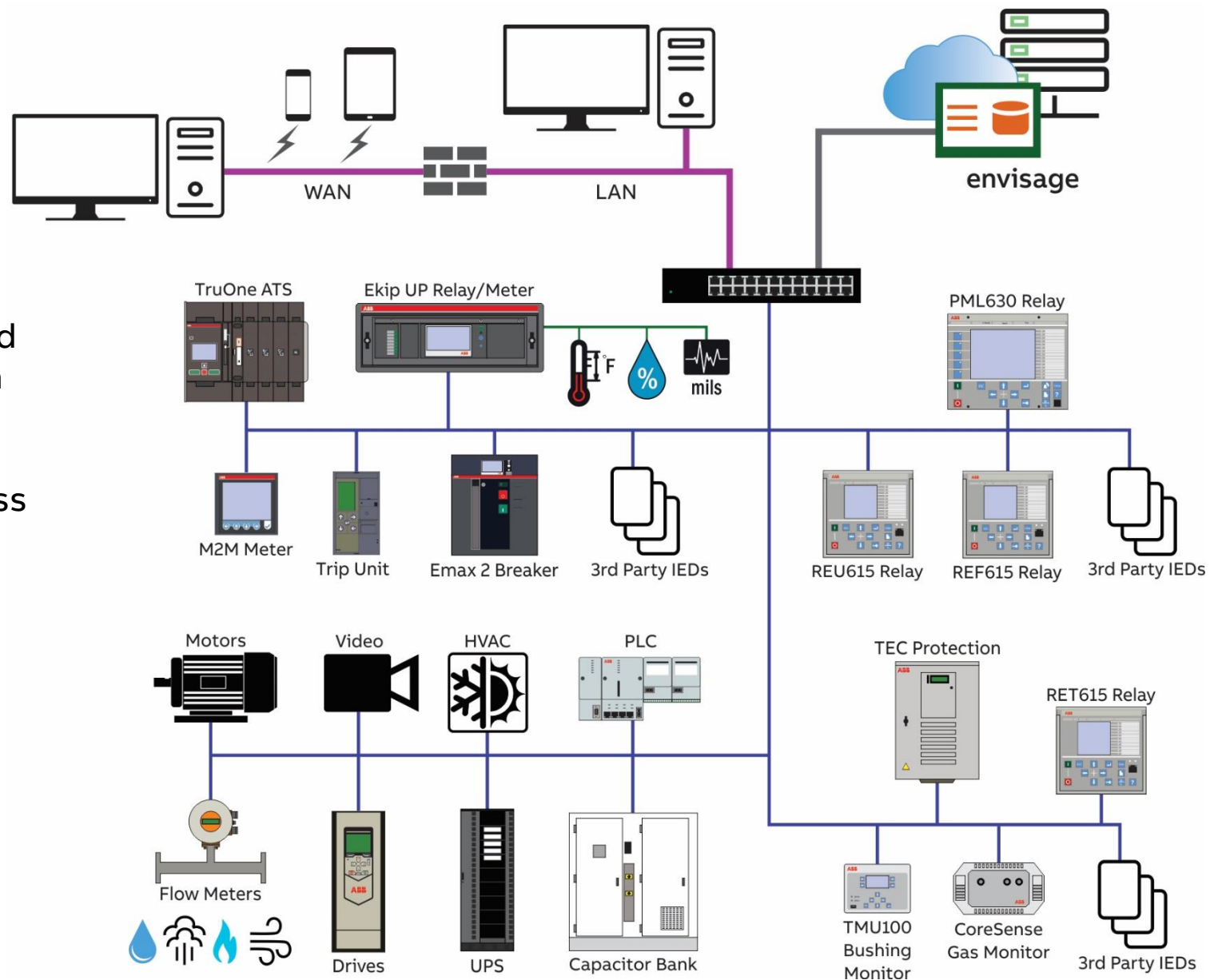
- An example Transformer Overview screen that can provide real-time information including:
  - Oil temperatures
  - Winding hot spots
  - Tap changer status
  - Oil gasses
  - Bushing health
  - Volts & Amps
  - Overload capacity
- Red/Yellow indicators for quick scanning



# 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.**



# Envisage Overview

Communications such as:

MODBUS OVER ETHERNET

MODBUS RTU

PROFINET

PROFIBUS

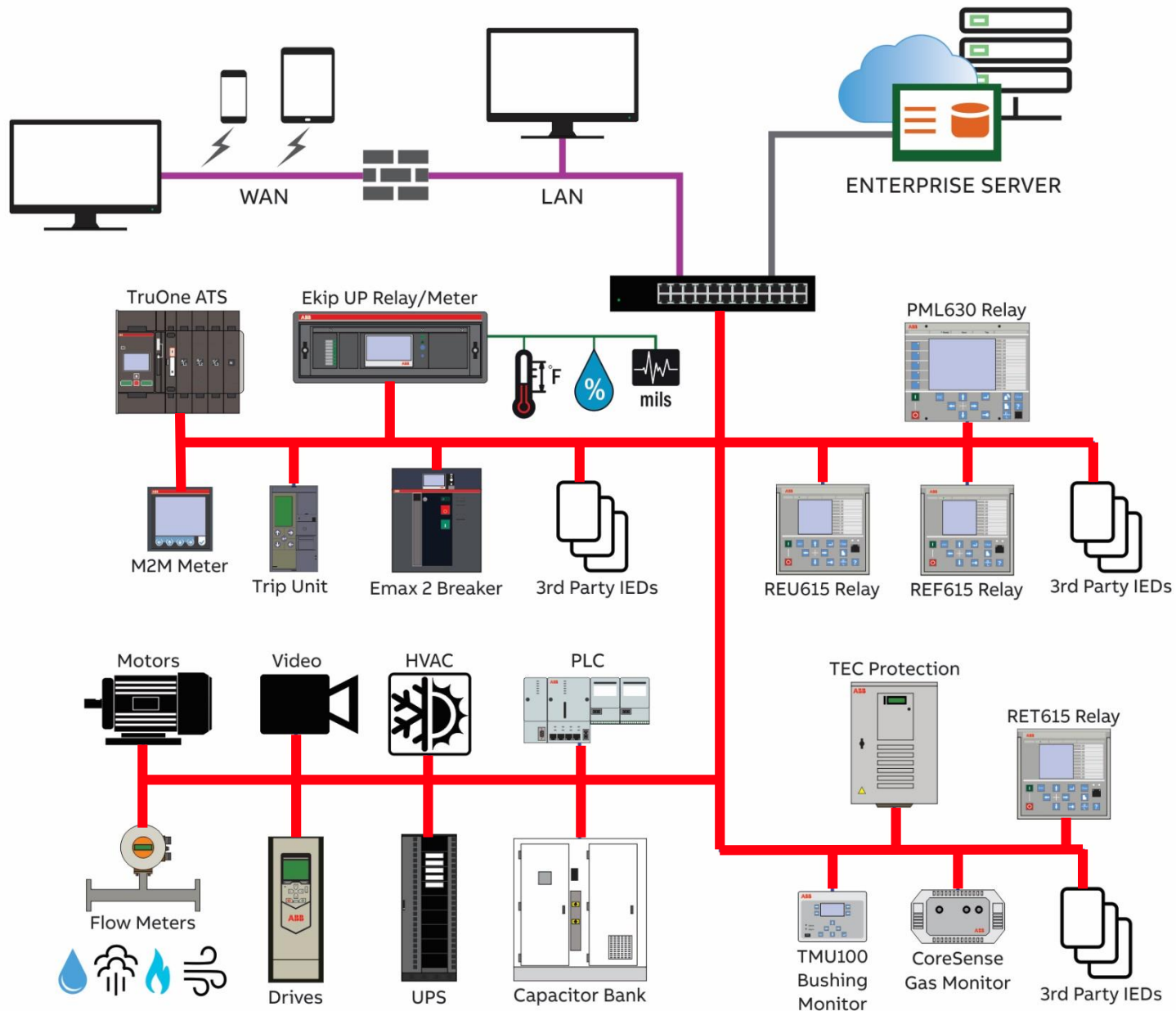
IEC61850

BACNET

DNP3

LONWORKS

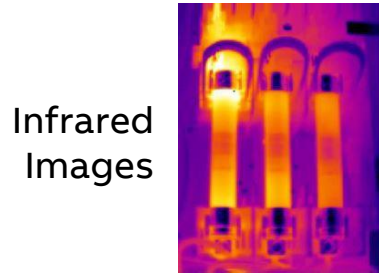
>300 more available



# Envisage Overview

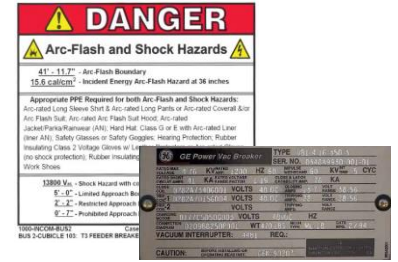
## Asset Management

- 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



Infrared Images

Maintenance History

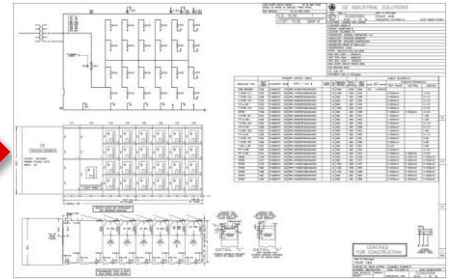


Labels and Nameplates



Plant Asset on Monitoring Screen

envisage database



Factory Docs & Manual

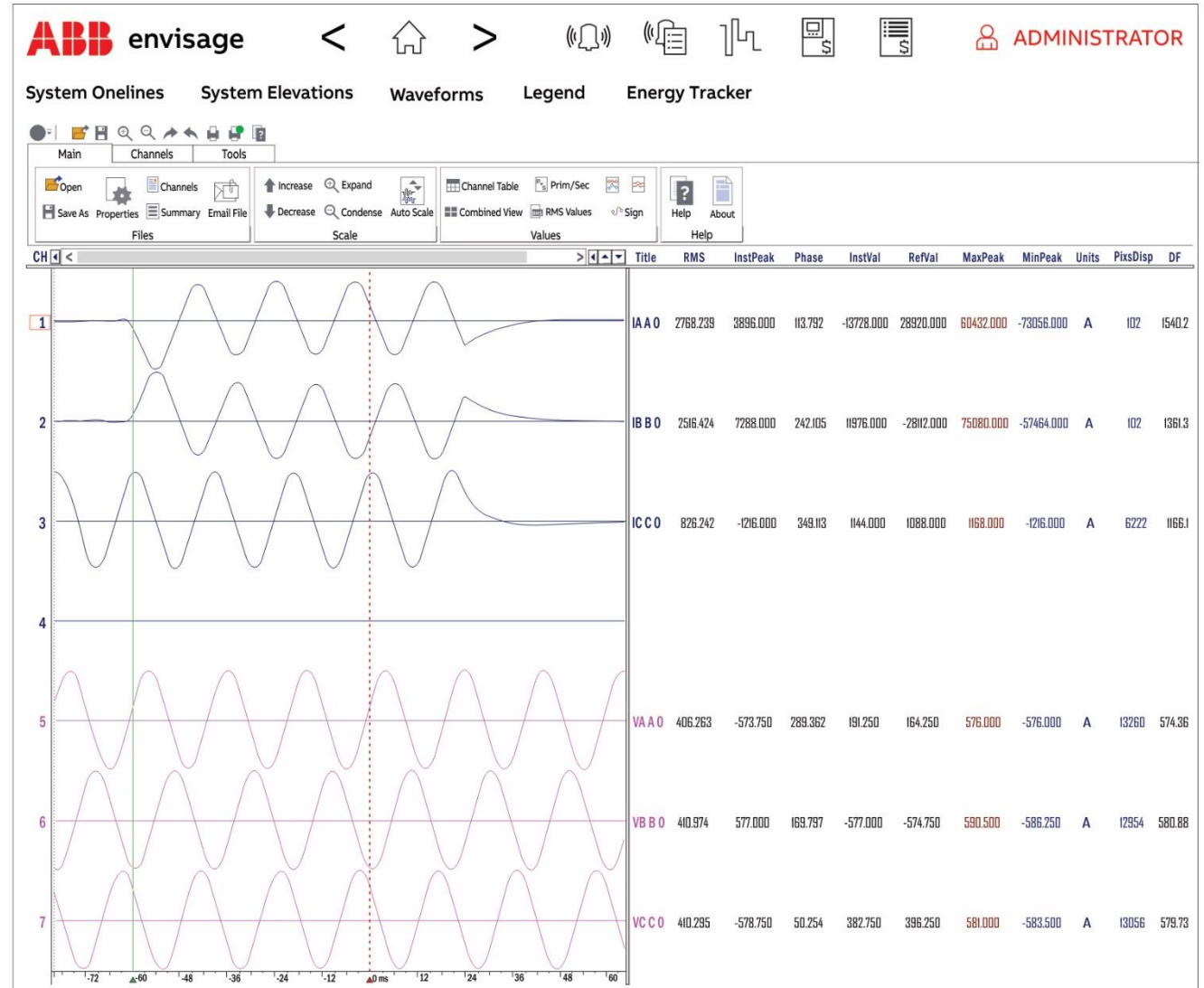
TABLE 05  
LOW VOLTAGE CIRCUIT BREAKER SETTINGS TABLE

Bus ID	ID Name	Min. Operating Unit	Physical Amps	LTU Amps	Long Time	Short Time	Ground	Curve
					PU (Min)	PU (Delay)	PU (Delay)	PU
30-PNL-A	PAN-A BKR (TYPICAL)	GE SEL7 Spectra RMS	150	150	1	1	Fixed	Max
40-PNL-B	PAN-B BKR (TYPICAL)	GE SEL7 Spectra RMS	150	150	1	1	Fixed	Max
50-SUBS	T-3000 (S-IV)	GE WPS-08 / MV7 Plus	2500	2250	0.5	2	In	Out
50-SUBS	1-20	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-25	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-30	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-35	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-40	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-45	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-50	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-55	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-60	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-65	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-70	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-75	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-80	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-85	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-90	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-95	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-100	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-105	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-110	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-115	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-120	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-125	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-130	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-135	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-140	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-145	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-150	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-155	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-160	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-165	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-170	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-175	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-180	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-185	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-190	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-195	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-200	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-205	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-210	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-215	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-220	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-225	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-230	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-235	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-240	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-245	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-250	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-255	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-260	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-265	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-270	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-275	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-280	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-285	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-290	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-295	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-300	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-305	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-310	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-315	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-320	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-325	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-330	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-335	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-340	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-345	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-350	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-355	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-360	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-365	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-370	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-375	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-380	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-385	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-390	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-395	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-400	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-405	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-410	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-415	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-420	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-425	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-430	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-435	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-440	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-445	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-450	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-455	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-460	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-465	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-470	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-475	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-480	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-485	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-490	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-495	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-500	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-505	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-510	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-515	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-520	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-525	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-530	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-535	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-540	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-545	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-550	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-555	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-560	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-565	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-570	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-575	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-580	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-585	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	Min In
50-SUBS	1-590	GE WPS-08 / MV7 Plus	400	380	0.85	2	0.5	

# 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

Maintenance Data	
Total Number of Operations	75
Number of Trips and Trip Tests	52
Number of Manual Operations	23
Contact Wear %	9
Percent Mechanical Life	97
Last Breaker Operation	08/30/2018 08:55:04
Initial Energization	12/10/2017 19:00:00

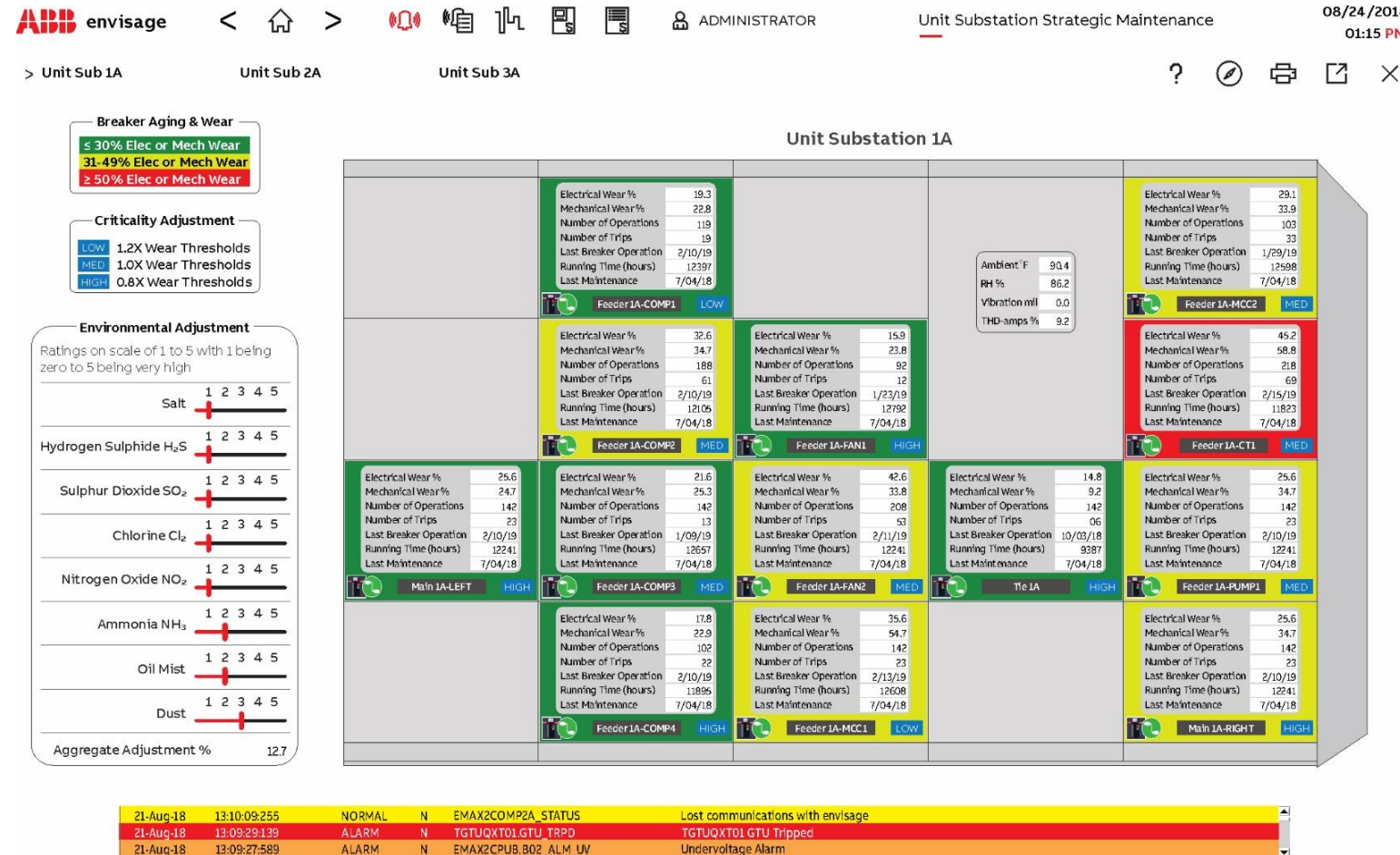
- Total Number of Operations
- Number of Trips and Trip Tests
- Number of Manual Operations
- Contact Wear %
- Percent Mechanical Life
- Last Breaker Operation
- Initial Energization

# 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





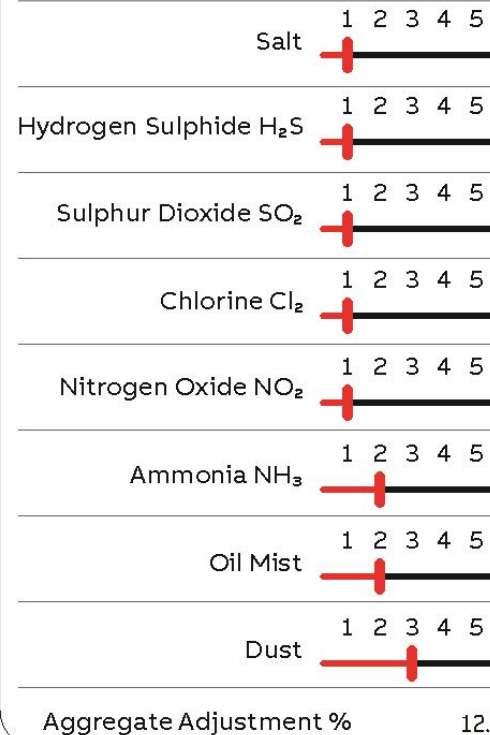
# Envisage Overview

## 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

Ratings on scale of 1 to 5 with 1 being zero to 5 being very high



Electrical Wear %	25.6
Mechanical Wear %	34.7
Number of Operations	142
Number of Trips	23
Last Breaker Operation	2/10/19
Running Time (hours)	12241
Last Maintenance	7/04/18

 **Main 1A-RIGHT** **HIGH**

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

### Criticality Adjustment

<b>LOW</b>	1.2X Wear Thresholds
<b>MED</b>	1.0X Wear Thresholds
<b>HIGH</b>	0.8X Wear Thresholds

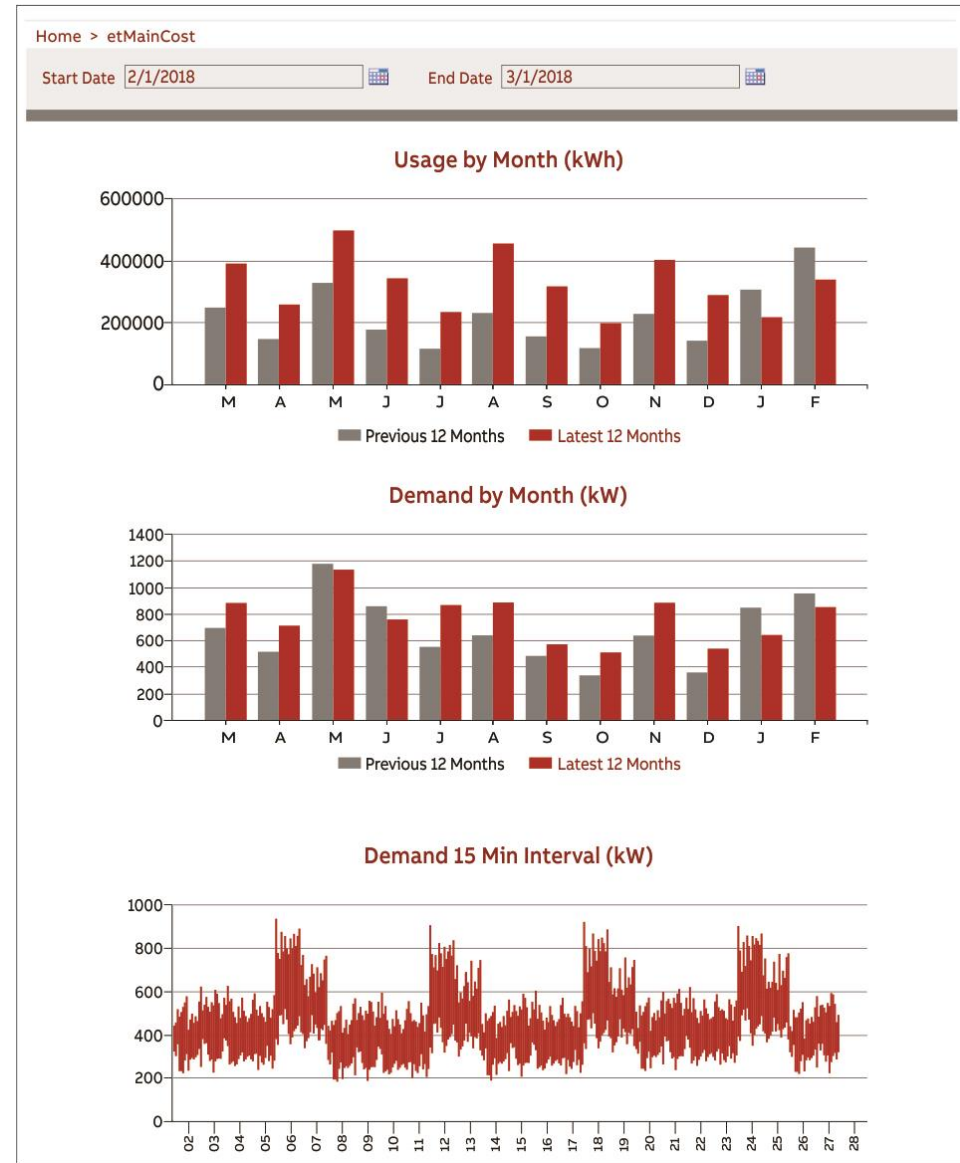
### Breaker Aging & Wear

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

# 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

**ABB envisage** **Utility Cost Report**

Summary - Body Weld Plant 5/1/2018 - 6/1/2018

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Total Cost	\$3174.13
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Device	Body Weld 1
Device Identifier	S1E7000A
Device Class	M2M LV

ABB M2M

Active energies

3P ---MWh

L1 ---kWh

L2 ---kWh

L3 ---kWh

← ↑ ↓ → ✓

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- Max Demand for the month of 62.32 kW was recorded for the period ending 2:00:00 PM on 5/19/2018
- The total usage this month is 30459.5 kWh
- The calculated average cost per kWh is 0.10421

---

**Cumulative Positive kWh**

Month Begin	60729.0
Month End	91188.5
Difference	30459.5

---

# 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

**SHADOW BILL**

Summary - Body Weld Plant

5/1/2018 - 6/1/2018

Total Cost	\$45,891.23
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Device	Service Entrance
Device Identifier	S1E7000B1
Device Class	M2M MV

- Max Demand for the month of 62.32 kW was recorded for the period ending 2:00:00 PM on 5/19/2018
- The total usage this month is 30459.5 kWh
- The calculated average cost per kWh is 0.10421

Cumulative Positive kWh	
Month Begin	60729.0
Month End	91188.5
Difference	30459.5



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# **EPDS Digital Solution Centers References (public)**

[← BACK](#)



# 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 substation 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.

## ABB solution

- 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.

## Customer benefits

- 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



**Contractor/End user:** PCK Schwedt

**Year of delivery:** 2005, 2008, 2012, 2014, 2015

**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

CaseCase: 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.

## ABB solution

- 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.
- Using the bus transfer with SUE 3000 at the substations ensures availability respectively by automatically transferring supply to a healthy incoming feeder.

## Customer benefits

- 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



**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.

## Customer benefits

- 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



**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.

## Customer benefits

- 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



**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



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# 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://abtm.fi.abb.com/PST/#/>

## Steps:

- 1) Get registered online
- 2) Once registered, you can sign in
- 3) Import your pricelist to setup up 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-past the specs.

The screenshot displays the ABB Product Selection Tool (PST) interface. The top section shows the 'PRODUCT SELECTION TOOL v1.2.22396 - ONLINE MODE' with the ABB logo and user login information. Below this, there is a grid of product images including COM600 4.0, COM600 4.1, REC615 1.1, RED615 3.0, RED615 4.0 / 4.0 FP1, RED615 5.0, REF542Plus, REF611 1.0, REF615 4.0 / 4.0 FP1, REF615 5.0, REF630 1.1, REF630 1.2, REF630 1.3, and REG630. A red arrow points from the REF615 4.0 / 4.0 FP1 product to a detailed configuration window. This window shows the 'Standard Configuration' section with a list of options (A through N) and their descriptions. Below the configuration window, there is a table titled 'Your current product selection overview' showing two selected products: REF615 5.0 and REF630 1.3. The table includes columns for Pos. #, Selected product, Unit price in EUR, Quantity, and Total price in EUR. The total price for the selection is 478464 EUR. A red arrow points from the 'Send email' button in the table to the 'Send email' button in the configuration window.

Pos. #	Selected product	Unit price in EUR	Quantity	Total price in EUR
1	REF615 5.0 HBFCADABAAB4BCN2XG THIS COMMENT WAS ADDED BY USER! <a href="#">Show details</a>	3132	123	385236
2	REF630 1.3 SBTNABABABAZAADBXD AND THIS ONE TOO! <a href="#">Show details</a>	7769	12	93228

Total price in EUR of your selection: **478464**

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# EPDS Distribution Automation

## Global Contacts

- Global Product Manager
- Global Product Marketing Manager
- Global Digital Solutions Centers Manager
- Global DA DSC portfolio Manager

Tero Talvitie [tero.talvitie@fi.abb.com](mailto:tero.talvitie@fi.abb.com)

Marco Nunes [marco.nunes@ch.abb.com](mailto:marco.nunes@ch.abb.com)

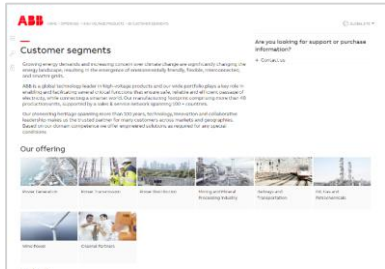
AiQi Liang [aiqi.liang@sg.abb.com](mailto:aiqi.liang@sg.abb.com)

Ganesh Kulathu [ganesh.kulathu@in.abb.com](mailto:ganesh.kulathu@in.abb.com)

# Distribution Solutions Control and Protection products

Wide portfolio at the tip of your fingers

## Resources



### Segment & Channels Linecards

Matching our solutions to your needs

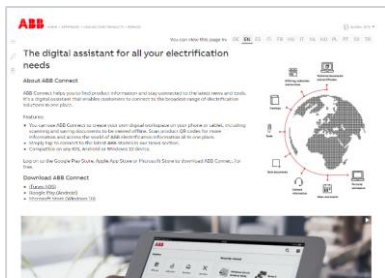
- Global coverage, fulfilling local needs
- Maximize potential with bundling opportunities



### Landscape flyers

ABB offering, at a glance

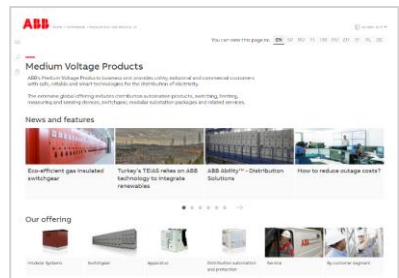
- Indoor Products & Instrument Transformers and Sensors
- Outdoor Products
- Distribution Automation



### ABB Connect App

Your personal, digital assistant

- Electrification Products mobile application
- Browse by industry, solution or product family



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