



PT Global Twin Star



Global Twin Star

## PT Global Twin Star Product Catalog 2023

testing instrument  
protection & control  
control relay panel  
high voltage equipment  
testing & assessment  
installation &  
commissioning



**PT.Global Twin Star**

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# PT GLOBAL TWIN STAR – PRODUCT CATALOG 2023





**PT Global Twin Star** is established in 2008 and we focus on testing instruments, protections & relays, and monitoring systems for utility of industries.

We provide you with the latest & proven technology products which are backed up by manufacturer. We also provide in house technical support, system designing and training to support your business, empowering you seamlessly with our ultimate solutions to solve the problem

## CERTIFICATE AND ACCREDITATION





### Certificate of Registration

This is to certify that the  
Occupational Health and Safety Management System  
of

**PT. GLOBAL TWIN STAR.**  
Ruko Union Square Kav. 21, Gading Serpong km. 7,  
Kel. Pakualam Kec. Serpong Utara,  
Tangerang Selatan,  
Indonesia.

Has been independently assessed and is  
compliant with the requirements of:

**OHSAS 18001:2007**

For the following scope of activities:

Provision of engineering, procurement, construction for electrical  
and other related works including trade

Certificate Number: HS 0766

Initial Registration Date	05 <sup>th</sup> February 2018
Issue Date	05 <sup>th</sup> February 2018
1 <sup>st</sup> Surveillance on or before	04 <sup>th</sup> February 2019
2 <sup>nd</sup> Surveillance on or before	04 <sup>th</sup> February 2020
Recertification Due on or before	04 <sup>th</sup> January 2021
Certificate Expiry Date	04 <sup>th</sup> February 2021

(subject to the company maintaining its system to the required standard)

  
Authorised Signatory

This certificate is the property of ACM Limited and shall be returned immediately on request.





### Certificate of Registration

This is to certify that the  
Quality Management System  
of

**PT. GLOBAL TWIN STAR.**  
Ruko Union Square Kav. 21, Gading Serpong km. 7,  
Kel. Pakualam Kec. Serpong Utara,  
Tangerang Selatan,  
Indonesia.

Has been independently assessed and is  
compliant with the requirements of:

**ISO 9001:2015**

For the following scope of activities:

Provision of engineering, procurement, construction for electrical  
and other related works including trade

Certificate Number: QM 0766

Initial Registration Date	05 <sup>th</sup> February 2018
Issue Date	05 <sup>th</sup> February 2018
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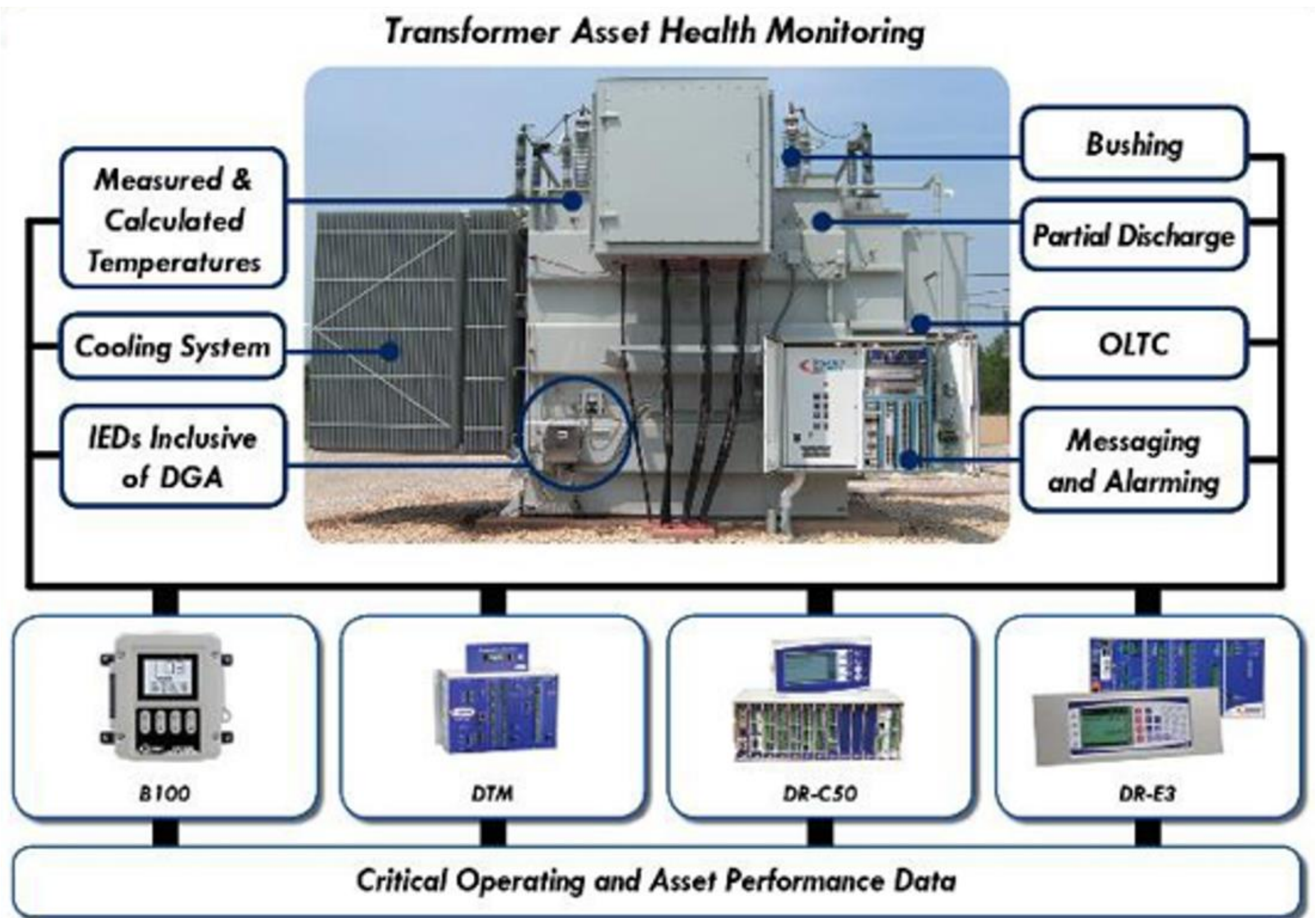
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## Substation Transformer Monitors

From sensors to software, Dynamic Ratings helps utility and industrial customers improve transmission substation systems reliability, leading to increased maintenance savings and reduced outages. We design, manufacture and integrate innovative sensors, monitors, and controls for data collection, analysis, and diagnostics. With the use of our asset management tools, our customers realize maximum benefit from online transformer and bushing monitoring.

- 1. DR-C50 – User Configurable Transformer Monitoring
- 2. B100 OTI/WTI digital
- 3. BHM Bushing Monitoring
- 4. PDM Partial Discharger Monitoring for Transformer
- 5. RMM Partial Discharge for Motor & Generator
- 6. Circuit Breaker Performance Monitoring
- 7. Switchgear and Cable Monitor
- 8. Breather health check
- 9. ibridge
- 10. VaultSafe dan SubSafe
- 11. Metrix software







NOW AVAILABLE WITH  
INTEGRATED BUSHING  
MONITORING AND  
PD SUPPORT

## The C50 provides:

- A Modular design allows for future expansion
- Bushing Health Monitoring and PD Support
- DGA Monitoring and Diagnostics
- Provisioned with Windows compatible Configuration Software
- Stores the transformer definition profile, monitored data & SCADA points.
- Acts as an alarm and data logger
- Provides expert modeling, calculations & analytics using industry standards.
- Has built-in web server accessed using Ethernet (and USB-Ethernet).
- Provides communications & secure access.
- Compatible with the iBridge IED Communication Solutions

AFFORDABLE. EFFECTIVE. CONVENIENT.

## ASSET MONITORING MADE EASY.



## Main Dashboard

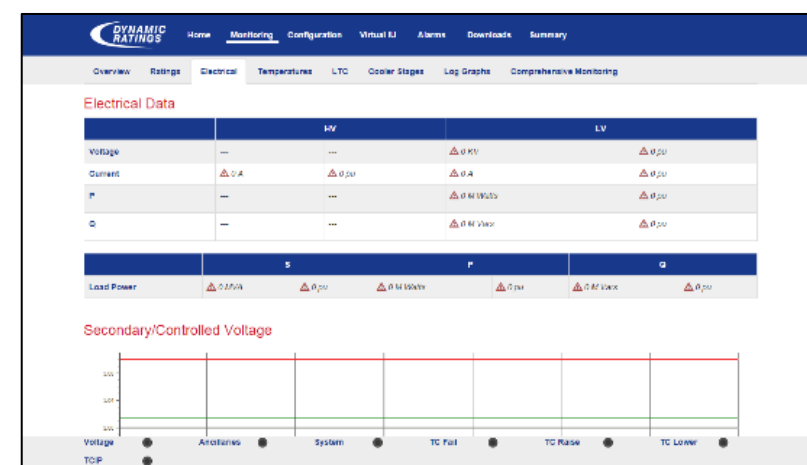


## MONITORING

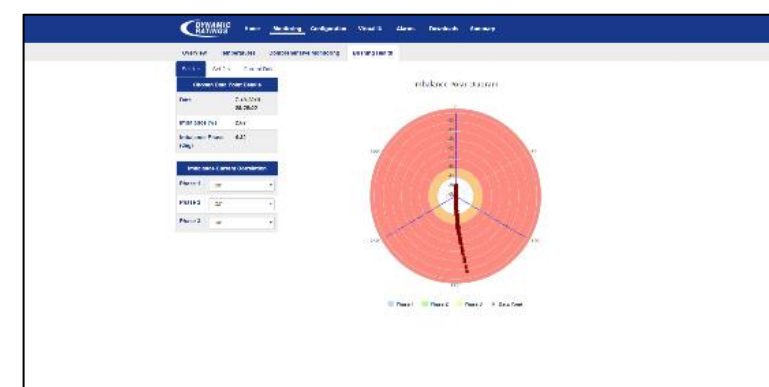
- **Temperatures**
  - Top & Bottom Oil
  - Winding Hot Spots
  - Ambient
- **Bushing Health**
  - Partial Discharge Monitoring
- **Cooling System**
  - Fan/Pump Current
  - Status Inputs
  - Loss of Power
- **Data Logging**
- **System Health Monitoring**
  - Internal Self-Checking
- **Tap Changer**
  - Position
  - Operation Counters
  - Temperature Differential
  - Drive Motor Monitoring
  - Contact Wear
  - Reversing Switch Operation
  - Hunting
- **Communications to Third Party Devices**
  - DGA and Moisture
  - Fiber Optic Temp.
  - Smart Device Integraton

## CONTROL

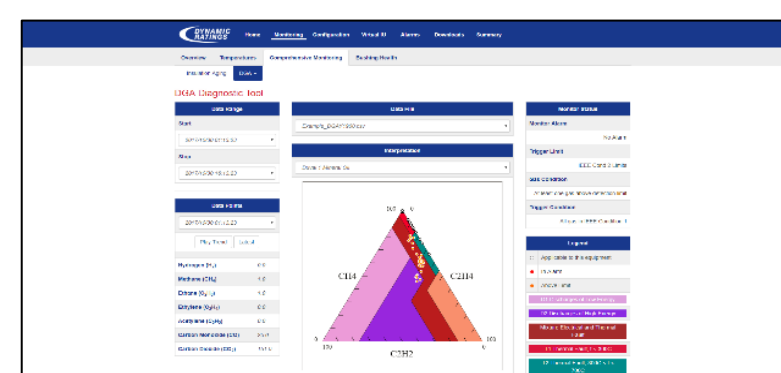
- **Cooling Control**
  - Automatic Control
    - Winding Temp
    - Top Oil Temp
  - Form C Relay Output for Fail-Safe Control
  - Cooling Stage Sequencing
  - Automated Cooler Exercising
- **Device Control**
  - Local (User Display or Hardwired Controls)
  - Remote (via SCADA)
- **Voltage Control**
  - Paralleling Options
    - Master/Follower
    - Reverse Reactance
    - Circulating Current
  - Line Drop Compensation
- **Alarms**
  - Standard Alarms and Trips
  - Configurable Misc. Alarms
  - Major/Minor Groups



## Electric Data



## Bushing Health & PD Monitor



## DGA IED Analytics

## COMMUNICATIONS

- **iBridge Networking Solution**
  - Use snap-on inductive couplers to transmit data over existing wires
  - Seamlessly transmit and deliver data from the C50, IEDs, RTUs, cameras, and more
  - 128-bit encryption for enhanced security
- **USB Connectivity**
  - USB connection for local device configuration
  - Automatic config & data download to USB drive
- **Ability to Test SCADA**
  - Serial (Half or Full Duplex)
    - Fiber, RS-485, RS-232
    - Protocols: DNP 3.0, Modbus, IEC 61850
  - Ethernet
    - Copper, 10/100 Base T; Fiber, 100 Base FX; Ethernet over USB
    - Protocols: IEC-61850, DNP 3.0, Modbus
    - DNS
  - SCADA Test Utility



## B100 ETM with Hydrogen Monitoring



Shown with H<sub>2</sub> Sensor

The pairing of Dynamic Ratings' B100 with a hydrogen sensor introduces the most complete, cost effective transformer monitoring solution available.

The integration of these devices allows the asset owner to have real-time access to vital transformer data, such as

- Top oil temperature
- Calculated winding hot spot
- Ambient temperature
- Insulation loss of life calculation
- Hydrogen monitoring



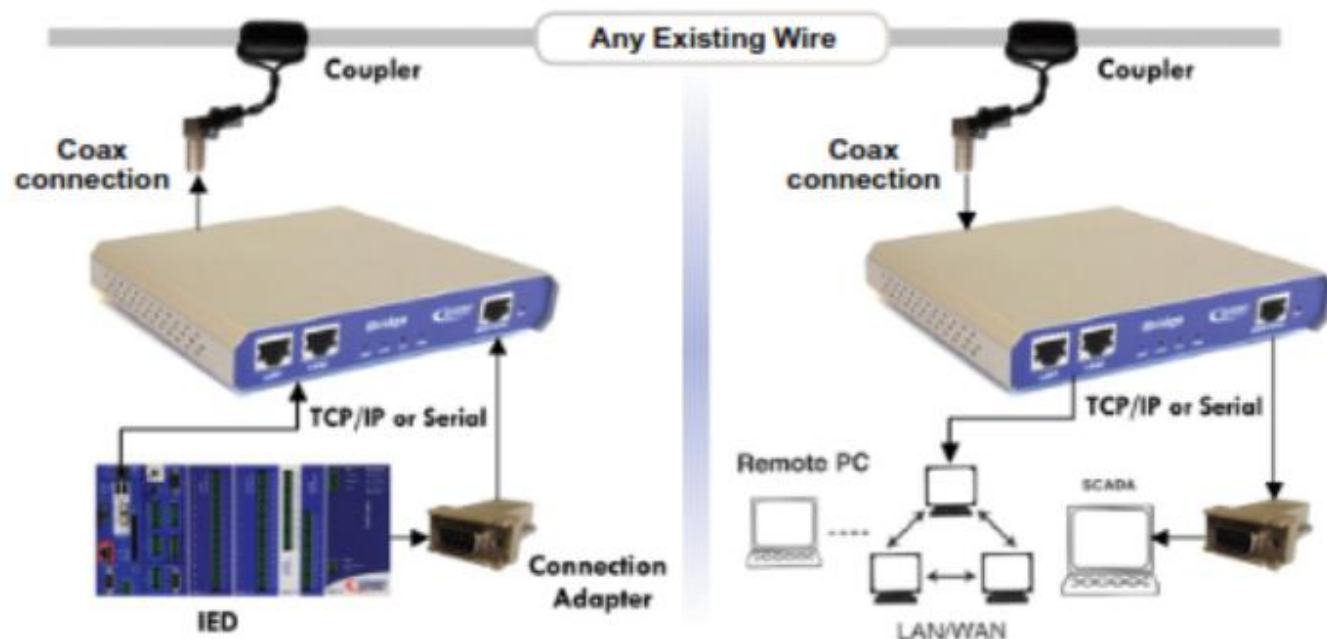
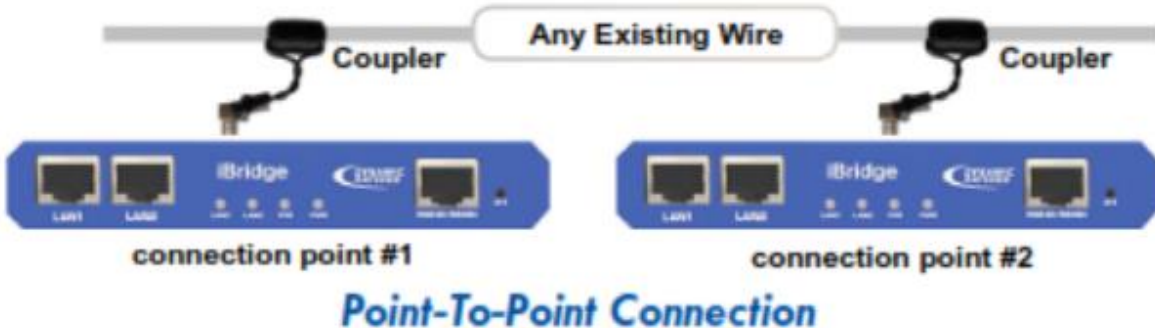
- Large, Digital Temperature Display
- Display Oil and 3 Winding Temperature
- Tap Changer Temperature Monitor (Option)
- Max Temperature Reached



## iBridge – Networking and Communications Solution



Installing data connections in a substation can be expensive and time consuming. The Dynamic Ratings iBridge product saves time and money while avoiding the security concerns associated with wireless antenna systems. The iBridge inductively couples the data onto existing conductors, providing the ability to send serial and ethernet based data utilizing hardware that can be installed in just a few minutes.

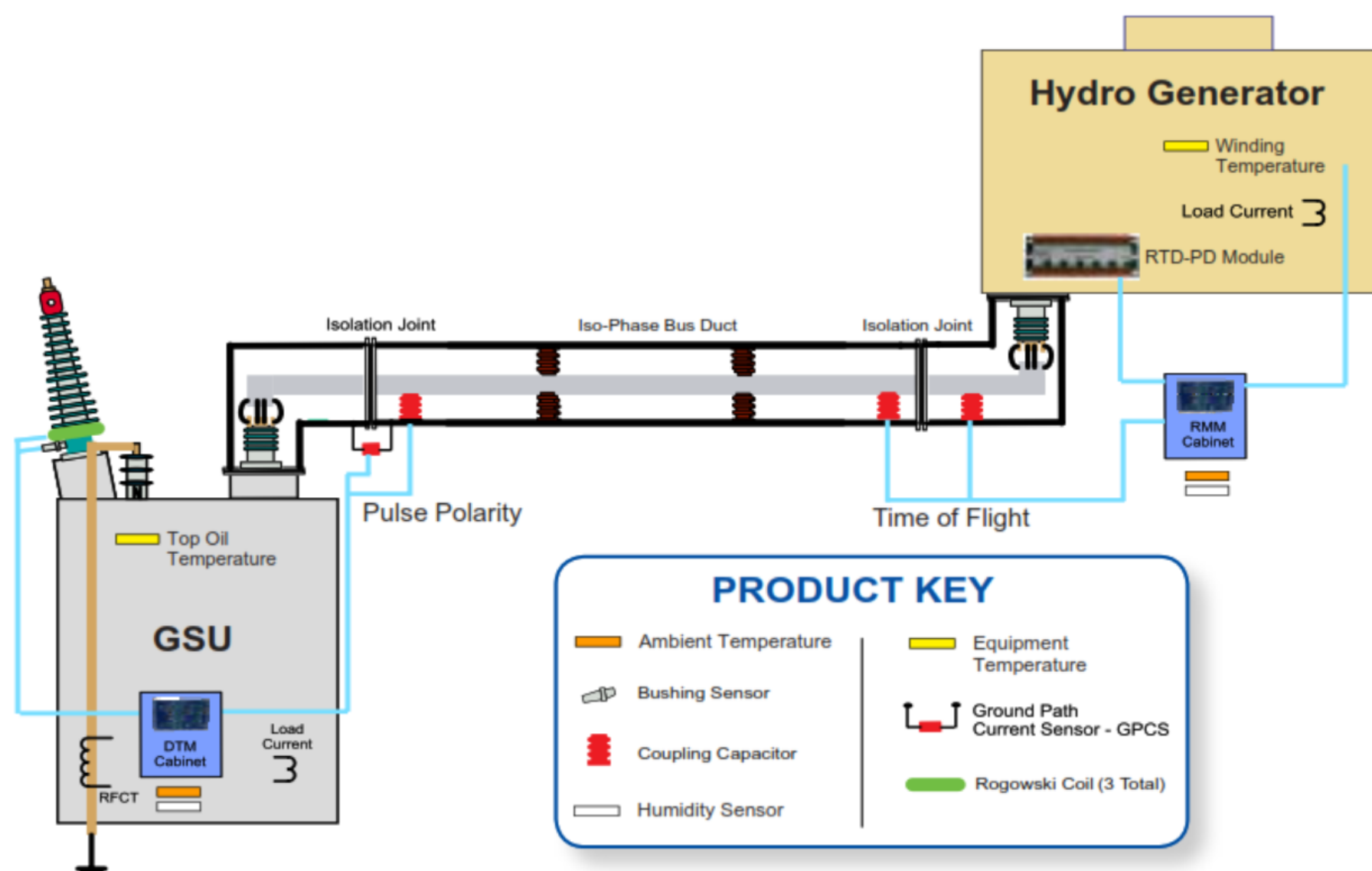






The rotating machine monitor (RMM) is a continuous partial discharge monitor, which also monitors, stores, and correlates operating dynamics. All industry accepted partial discharge graphical results and IEC defined quantities are measured, calculated and recorded.

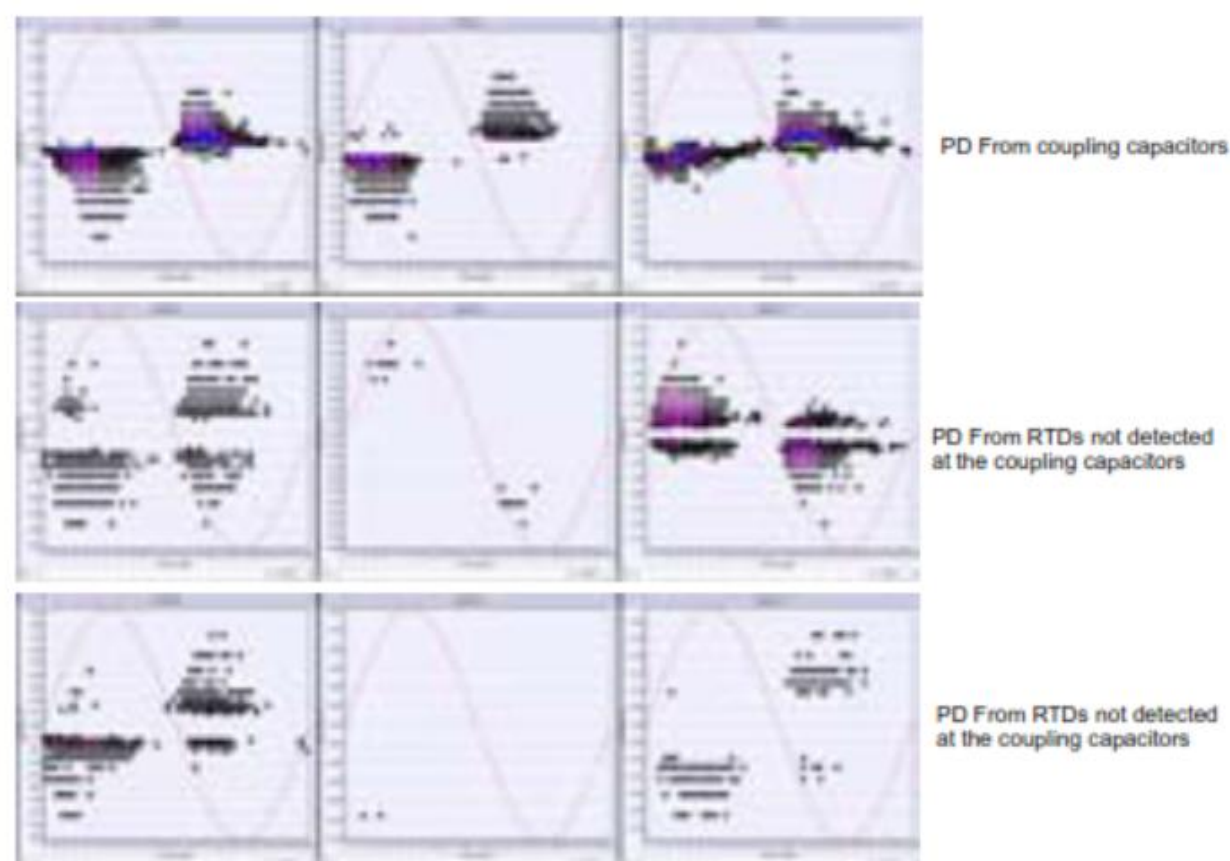
The RMM provides information as to the health of the stator winding insulation in medium and high voltage motors and generators, and can be used on variable frequency drives (VFD).



Since the coupling capacitors alone only provide 10-15% winding coverage, the system was upgraded to reuse six existing RTDs as additional PD sensors, thus expanding the coverage. The RMM is now detecting PD that is occurring deeper in the winding, which was not being detected previously. Using both of these complementary sensors, the customer is receiving more information therefore making better decisions as to the health of the equipment.

In conjunction with monitoring the generators, the customer decided to monitor the Isolated Phase Bus Duct and the Generator Step-up Transformer (GSU) by installing the Dynamic Ratings Diagnostic Transformer Monitor (DTM).

PD From coupling capacitors PD From RTDs not detected at the coupling capacitors 3D Phase Resolved Polar Phase Resolved PD From RTDs not detected at the coupling capacitors This complete system monitors the generator, bus duct, and transformer. The customer has further reduced their off-line maintenance costs for these critical assets.

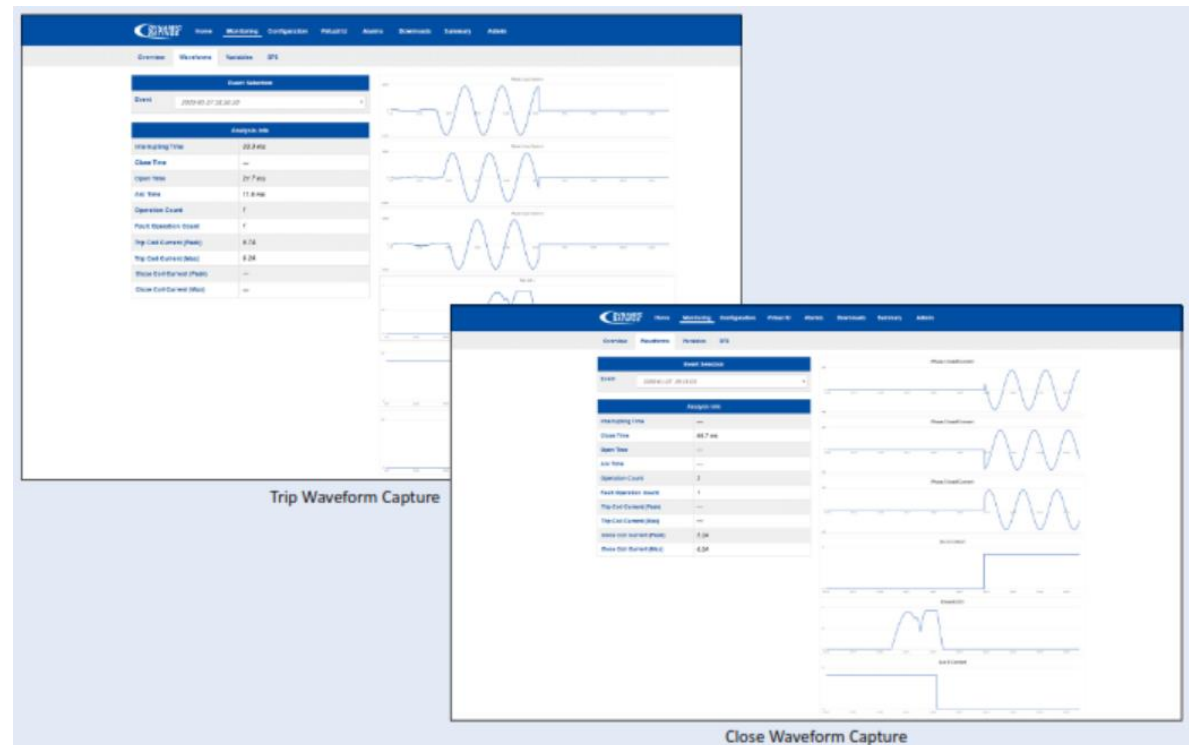




# BPM – BREAKER PERFORMANCE MONITOR



Dynamic Ratings Breaker Performance Monitor (BPM) is the most comprehensive breaker monitoring solution available. With the inclusion of high-speed waveform capture, the BPM combines the most effective offline and online testing methods into a highly customizable online monitoring package, resulting in a monitor capable of performing the Advanced analytics required to detect operating Deficiencies well in advance of breaker failure.



## Features & Benefits

High speed waveform capture of operating coils and main contacts	Complete diagnosis of the breakers' mechanical and electrical systems with every operation. Waveform analysis allows for graphical comparison of breaker operations. This allows for detailed analysis of first trip open and close times, identification of latch and bearing performance, lubrication issues, auxiliary contact condition and fault current values.
Gas monitoring for SF6 and dry air	Multi-parameter sensors monitor density, temperature and humidity in insulating gasses. Alarms alert asset owners of leakage rates, trending of time till lock out and mass gas loss.
Trip coil integrity monitoring	Monitoring of trip coil integrity provides the ability to detect changes in the trip circuit resistance, indicative to the condition of the trip coil and related components.
Interrupter condition	Precise cumulative I <sup>2</sup> T calculations allow internal inspections to be scheduled on an as needed basis. Reducing both the cost and manpower associated with time based cyclic maintenance schedule.
Cabinet heater monitoring and environmental conditions monitoring	Current and voltage monitoring of heaters to detect failures which can often occur between maintenance cycles, leading to condensation in control cabinets which causes corrosion of control wiring, short circuits, and premature aging of electrical components.
Charging motor starts, currents and runtimes	Provides data concerning the condition of the stored energy system.
Environmental	Provides temperature for ambient, control cabinets and SF6 gas
Modular construction	Configure your monitor with only those modules required for your application
Multiple communication options	Easy integration via DNP, Modbus or IEC 61850 using Ethernet (Fiber & Copper) or Serial (Fiber, RS485 & RS232) ports.



## AC and DC DIELECTRIC HIGH POTENTIAL (HIPOT) TEST SYSTEMS

### Applications

- Verify electrical insulation integrity and safety in any type of electrical apparatus
- Perform Dielectric Breakdown Tests, Dielectric Withstand Tests, Insulation Resistance Tests, Partial Discharge Tests

### Phenix offers

- Ratings from 1 kV to over 1 million volts AC or DC
- Basic or advanced computerized control options
- Rugged design for field, industrial, and laboratory settings
- Stand-alone, modular, caster-, truck-, trailer- or skid-mounted
- Models meeting specific standards such as ASTM D149 for material testing and ANSI A92.2 for insulated work platforms
- Units integrated with Partial Discharge Detectors
- Stackable DC test sets up to 600 kV DC and custom systems with voltage levels up to 1.5 million volts DC
- Oil insulated or epoxy cast high voltage transformers



AC, Cascade Type, 400 kV, 800 kVA



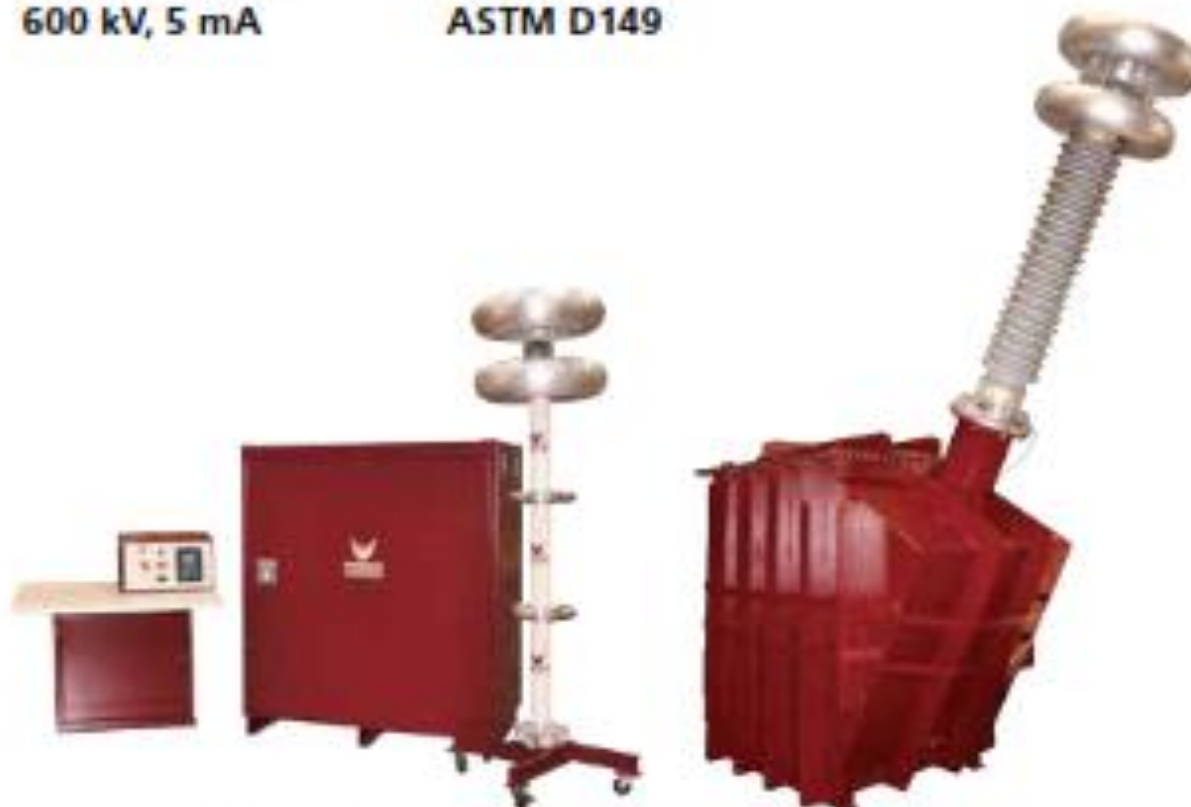
Stackable DC,  
600 kV, 5 mA



AC, 100 kV,  
ASTM D149



AC, Tank Type,  
75 kV, 20 kVA



AC, Tank Type, 300 kV, 150 kVA



DC, 1200 kV, 20 mA



## PORTABLE TEST EQUIPMENT

Easy to transport and set-up, Phenix Technologies offers a wide variety of Portable Test Equipment that is durably built for years of dependable service.

- **AC Hipots**
  - 6CP Series (15-200 kV)
  - 600P Series (5-15 kV)
  - BK Series (36-180 kV) for Aerial Lift, Elevated Platform, Insulated Boom
  - Vacuum Interrupters (40-60 kV)
- **DC Hipots** (40-200 kV)
- **AC/DC Hipot/Megohmmeters** and **Insulation Analyzers**
- **Oil Dielectric Testers** (60-100 kV)
- **High Current Test Sets** (1000-5000 A)
- **Transformer Turns Ratio, Winding Resistance, Current Transformer Testers**
- **Micro-Ohm Meters** (10-200 A)
- **Ground Jumper Tester**
- **Earth Resistance Testers**
- **AC/DC Kilovoltmeters** (50-300 kV)
- **Variable Voltage Power Supplies**
- **Partial Discharge/Corona, Radio Influence Voltage Measurement**
- **Tangent Delta Measurement**
- **Ground/Discharge Sticks**

PHENIX Technologies also offers various complimentary items including:

- **Cable Fault Locators**
- **Standard Capacitors**
- **Coupling Capacitors**
- **Voltage Dividers**
- **Motor Generator Sets**



Aerial Lift Test Set  
Model BK 130/36



AC/DC Kilovoltmeter  
200 kV



AC Hipot 30 kV



DC Hipot 75 kV



Benchtop AC Hipot  
5 kV



Microhm meter  
200 Amp



Ground Stick



## MOTOR TEST SYSTEMS

### Applications

- Testing motors to ensure quality production/rewind
- Testing the stator and armature steel

### Phenix offers

- Motor Test Systems rated from 100 kVA to 10 MVA for load and no-load testing of all types of AC & DC motors, including traction motors, synchronous motors, and induction motors
- Core Loss Test Sets rated to test up to 20,000 HP motors
- Water-Brake Dynamometers to provide the load for the motor under test



125 kVA Core Loss Tester



100 kVA



200 kVA



5000 kVA



1000 kVA



## ELECTRICAL PROTECTIVE RUBBER GOODS TEST SYSTEMS

### Application

- Testing utility worker protective equipment including rubber gloves, sleeves, overshoes/boots, hoses, hoods, switch sticks, and blankets

### Phenix Offers

- Single-position, portable testing equipment
- Test systems configured for optimal efficiency
- Multiple test stations powered from one power supply
- Complies with latest ASTM, IEC, and OSHA standards
- Washers and Dryers for cleaning protective equipment



Glove Tester



Washer



Dryer



Blanket Tester





1. VLF Test Sets
2. VLF Diagnostic System
3. Transformer Oil Tester



## VLF Cable Testing



### HVA28 & HVA28TD

Output voltage 29 kV<sub>peak</sub>, 21 kV<sub>rms</sub>  
Load 0.5 μF @ 0.1 Hz @ 20 kV<sub>rms</sub>  
Weight 14 kg / 31 lbs



### HVA34-1 & HVA34TD-1

Output voltage 34 kV<sub>peak</sub>, 24 kV<sub>rms</sub>  
Load 1.5 μF @ 0.1 Hz @ 24 kV<sub>rms</sub>  
Weight 39 kg / 86 lbs



### HVA45 & HVA45TD

Output voltage 45 kV<sub>peak</sub>, 32.3 kV<sub>rms</sub>  
Load 0.9 μF @ 0.1 Hz @ 32 kV<sub>rms</sub>  
Weight 39 kg / 86 lbs



### HVA30-7

Output voltage 34 kV<sub>peak</sub>, 24 kV<sub>rms</sub>  
Load 6.0 μF @ 0.1 Hz @ 24 kV<sub>rms</sub>  
Weight 57 kg / 125.6 lbs



### HVA34

Output voltage 34 kV<sub>peak</sub>, 24 kV<sub>rms</sub>  
Load 0.5 μF @ 0.1 Hz @ 24 kV<sub>rms</sub>  
Weight 19.5 kg / 43 lbs



### HVA40-5

Output voltage 45 kV<sub>peak</sub>, 32 kV<sub>rms</sub>  
Load 5.0 μF @ 0.1 Hz @ 27 kV<sub>rms</sub>  
Weight 57 kg / 125.6 lbs



### HVA54-3

Output voltage 54 kV<sub>peak</sub>, 38 kV<sub>rms</sub>  
Load 3.0 μF @ 0.1 Hz @ 36 kV<sub>rms</sub>  
Weight 57 kg / 125.6 lbs



### HVA60

Output voltage 62 kV<sub>peak</sub>, 44 kV<sub>rms</sub>  
Load 1.0 μF @ 0.1 Hz @ 44 kV<sub>rms</sub>  
Weight 57 kg / 125.6 lbs



### HVA68-2

Output voltage 68 kV<sub>peak</sub>, 48 kV<sub>rms</sub>  
Load 2.0 μF @ 0.1 Hz @ 44 kV<sub>rms</sub>  
Weight 57 kg / 125.6 lbs



### HVA90

Output voltage 90 kV<sub>peak</sub>, 64 kV<sub>rms</sub>  
Load 1.0 μF @ 0.1 Hz @ 64 kV<sub>rms</sub>  
Weight 127 kg / 280 lbs



### HVA94

Output voltage 94 kV<sub>peak</sub>, 66 kV<sub>rms</sub>  
Load 0.9 μF @ 0.1 Hz @ 66 kV<sub>rms</sub>  
Weight 128 kg / 282.2 lbs



### HVA120

Output voltage 120 kV<sub>peak</sub>, 85 kV<sub>rms</sub>  
Load 0.5 μF @ 0.1 Hz @ 85 kV<sub>rms</sub>  
Weight 198 kg / 436.5 lbs



### HVA200

Output voltage 200 kV<sub>peak</sub>, 141 kV<sub>rms</sub>  
Load 0.6 μF @ 0.1 Hz @ 141 kV<sub>rms</sub>  
Weight ca. 950 kg / 2.094 lbs





## Innovation in High Voltage

VLF Cable Testing and Diagnostics & Transformer Oil Testing

## VLF Cable Diagnostic



### TD DIAGNOSTICS

In connection with hipot testers of the HVA series, systems for Tan Delta (and Partial Discharge) measurements can be built. They are either integrated into the high voltage source (HVA models), into the PD diagnostic system (PD models) or available as dedicated external device to upgrade existing HVA hipot systems. Tan Delta measurements are performed with resolution of  $1 \times 10^{-5}$  with an accuracy of  $\pm 1 \times 10^{-4}$ .

### TD SYSTEMS



#### TD30

Operating voltage (sine wave)  
34 kV<sub>peak</sub>, 24 kV<sub>rms</sub>  
Tan Delta (resolution/accuracy)  
 $1 \times 10^{-5} / \pm 1 \times 10^{-4}$



#### TD60-MC

Operating voltage (sine wave)  
62 kV<sub>peak</sub>, 44 kV<sub>rms</sub>  
Tan Delta (resolution/accuracy)  
 $1 \times 10^{-5} / \pm 1 \times 10^{-4}$



#### TD90-MC

Operating voltage (sine wave)  
90 kV<sub>peak</sub>, 64 kV<sub>rms</sub>  
Tan Delta (resolution/accuracy)  
 $1 \times 10^{-5} / \pm 1 \times 10^{-4}$



#### TD120-MC

Operating voltage (sine wave)  
120 kV<sub>peak</sub>, 85 kV<sub>rms</sub>  
Tan Delta (resolution/accuracy)  
 $1 \times 10^{-5} / \pm 1 \times 10^{-4}$

### PD & PDTD SYSTEMS



#### PD30-E

Operating voltage (sine wave)  
34 kV<sub>peak</sub>, 24 kV<sub>rms</sub>  
PD localization (resolution/accuracy)  
0.1 m / 1 %



#### PD60-2 & PDTD60-2

Operating voltage (sine wave)  
62 kV<sub>peak</sub>, 44 kV<sub>rms</sub>  
PD localization (resolution/accuracy)  
0.1 m / 1 %



#### PD90-2 & PDTD90-2

Operating voltage (sine wave)  
90 kV<sub>peak</sub>, 64 kV<sub>rms</sub>  
PD localization (resolution/accuracy)  
0.1 m / 1 %



#### PD120-2 & PDTD120-2

Operating voltage (sine wave)  
120 kV<sub>peak</sub>, 85 kV<sub>rms</sub>  
PD localization (resolution/accuracy)  
0.1 m / 1 %



#### PDTD200-2

Operating voltage (sine wave)  
200 kV<sub>peak</sub>, 141 kV<sub>rms</sub>  
PD localization (resolution/accuracy)  
0.1 m / 1 %



#### BA75

max. Output voltage 75 kV<sub>rms</sub>  
Weight 22 kg (incl. battery)



#### BA80

max. Output voltage 80 kV<sub>rms</sub>  
Weight 22 kg (incl. battery)



#### BA100

max. Output voltage 100 kV<sub>rms</sub>  
Weight 32 kg (incl. battery)

## Transformer Oil Testing



## Electrical metrology

Circuit breaker testing	ACTAS
Resistance measurement	PROMET
Protection relay testing	ARTES
Meter testing	METES
Digital fault recording	SHERLOG
Power quality analysers	EPPE
Power sources	EPOS



### Circuit Breaker Testing – ACTAS P260/P360



Portable Switchgear Test Systems  
Flexible and compact test systems for carrying out tests on medium-, high- and extra-high-voltage switchgear.

### Resistance measurement - PROMET



**PROMET SE** - High-accuracy, compact micro-ohm meter

**PROMET L100** High-accuracy micro-ohm meter for ohmic and inductive loads

**PROMET L10** is a compact, battery-operated micro-ohm meter for ohmic and inductive loads.

### Automatic Relay Test System - ARTES



#### ARTES 600

Compact test system for highly complex test tasks. 4 voltage outputs and 6 current outputs which can provide particularly high output power



#### ARTES 460

Compact test system for three-phase tests, can be used as a universal tool for testing digital protection relays.

### Digital Fault Recorder Systems for professional event analysis



The measuring devices of the **SHERLOG** range combine the monitoring functions of a high-class digital fault recorder with the features of a power quality analyser in a single system.



**SHERLOG CRX** is a **multi-functional** measurement and analysis system for comprehensively monitoring electricity supply systems. It combines the monitoring functions of high-resolution digital **fault recorders, power quality analysers, phasor measurement units, continuous data recorders** and **event recorders** in one device.

### The Multi-Functional Three-phase Signal Generator - EPOS



**EPOS 360** is the multi-functional three-phase generator which comes into its own whenever maximum power and high signal accuracy are required.



**EPOS CV** voltage sources are designed to output single or three-phase AC/DC voltages especially for high power values.

### Power Quality Analysers - EPPE



#### EPPE CX

Stationary monitoring system for panel mounting. Measurement inputs for 4 voltages, 4 currents as well as 5 additional sensor inputs make the device extremely flexible to use.



#### EPPE PX

The portable solution in a carrying case, has been specially developed for mobile measurements and installation monitoring.

### Meter test systems



**METES 320** is an on-site measuring instrument for testing single and three-phase meters and for power quality measurement.



**DryTrans** is a brand under the AVACO banner specializing in custom engineering and design of On-Line Continuous Moisture Management Systems for Oil Filled Transformers. Transformers are one of the most important capital assets that a utility can own. Maintaining a healthy transformer is a core practice of any maintenance program.

There are many variables that affect the life expectancy of the transformer. The most important of all being the moisture content in the solid and liquid insulation. Moisture in the transformer is the enemy and its presence is directly related to the dielectric strength of the oil and the paper.

Excessive moisture has a direct correlation on the age of a transformer. Existing technical papers and authorities around the world have linked the life of the transformer to the life of the solid insulation. Any attempt to protect the solid insulation will increase life and slow the ageing process.

At DryTrans, we believe in a healthy, reliable and well-maintained network. The goal is to optimize the performance of transformers, extend life, protect the environment, and create a safe and efficient workplace.



**MODEL TR5:** The SMALLEST and Most RELIABLE Moisture Management System for 5 MVA Transformers and under.  
Flow Rate: 300 - 500 LPH  
Moisture Removal Capacity: 3 - 5 Liters  
Compact Design



**MODEL TR20:** A ROBUST Moisture Management System for < 20 MVA Transformers.  
Flow Rate: 100 - 500 LPH  
Moisture Removal Capacity: 5 - 7 Liters  
Enclosed and Rugged Design



**MODEL TR50:** A ROBUST & RELIABLE Moisture Management System for < 50 MVA Transformers.  
Flow Rate: 100 - 500 LPH  
Moisture Removal Capacity: 10-12 Liters  
Enclosed and Rugged Design

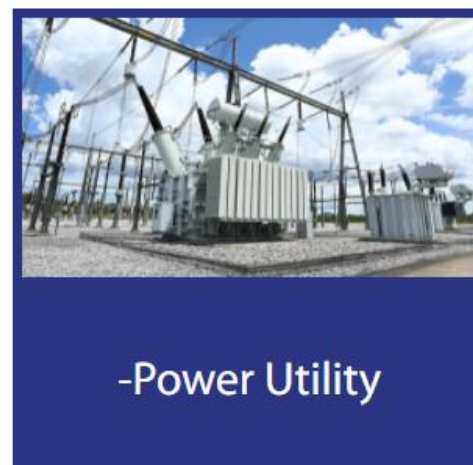
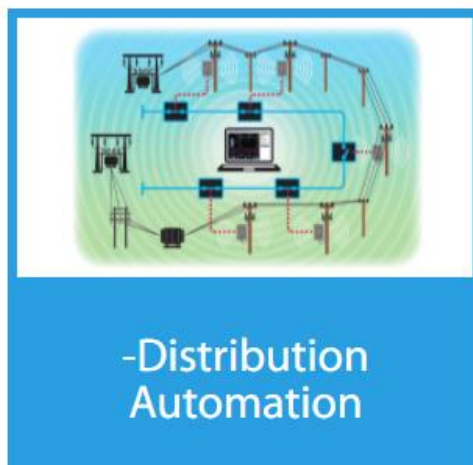
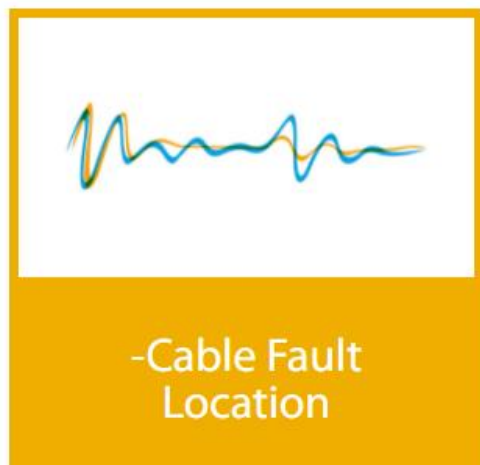


**MODEL MMS90:** A SMART Moisture Management System for 50 MVA Transformers and above.  
Flow Rate: 100 - 500 LPH  
Moisture Removal Capacity: 10-12 Liters  
SMART Communications and HMI Interface



# OUR SOLUTIONS

Kehui's product developments are characterised by the use of top quality components, exhaustive testing and innovative thinking. The quality of the products is underlined by the company's certification to ISO 9001.



## Transmission Line & Cable Fault Location

### XC-2100E

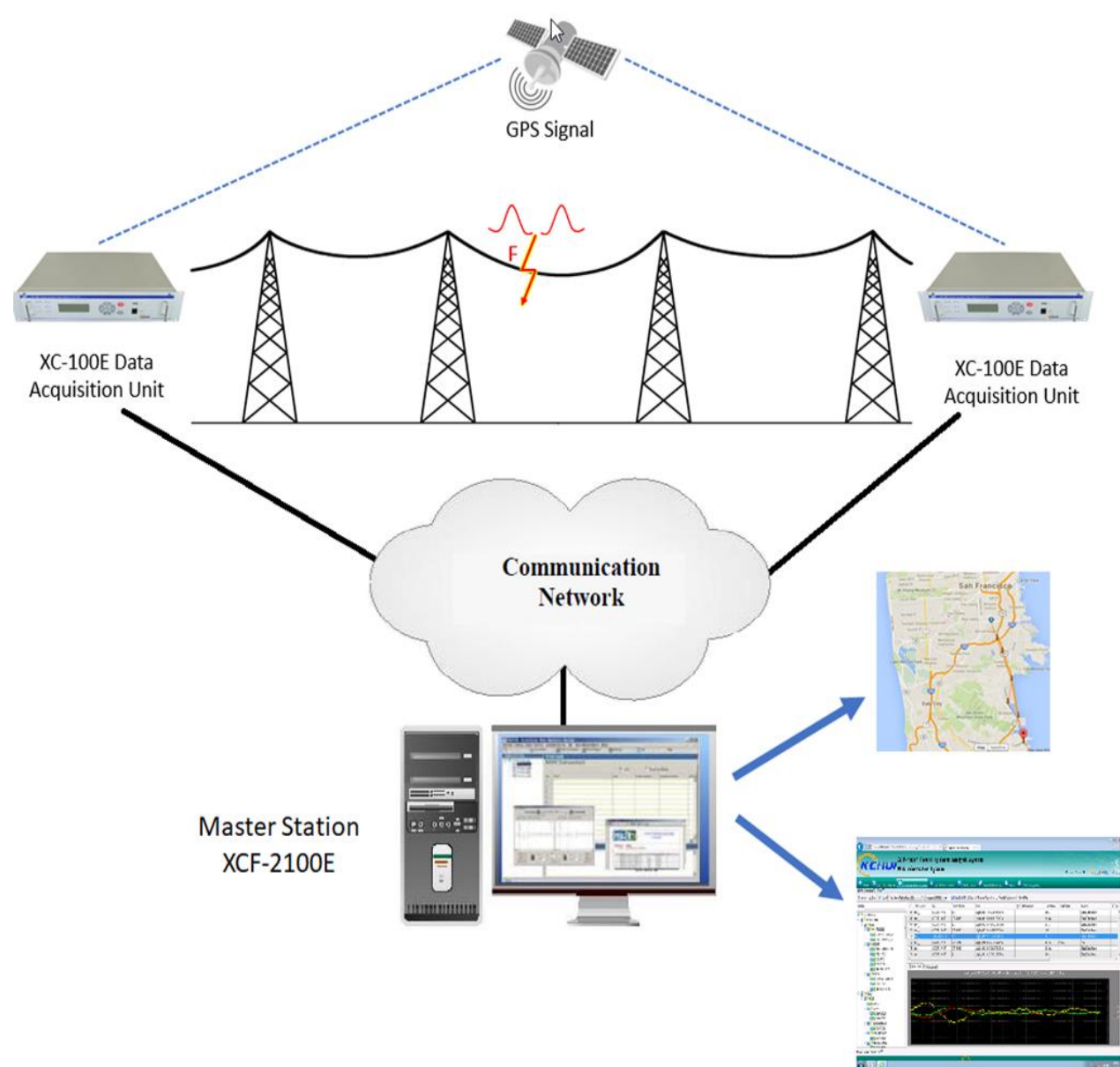


### T-GPS



### XC-2100E Travelling Wave Fault Location System

Transmission systems are at the heart of the power network and their availability is essential to the reliability of the system. When a fault does occur, it can be difficult to locate, particularly on long remote lines. Conventional fault locators work on the principle of measuring the impedance of the loop through which the fault current flows. In most cases, this includes a return path through the ground for which knowledge of the actual impedance is hard to obtain and is often estimated, leading to inaccuracies in the measurement of the distance to the fault. By utilising travelling waves, created when the fault occurs, the XC-2100E can measure the fault position independently of impedance and identify the fault point much more accurately.



	XC-100E Travelling Wave Fault Locator - Data Acquisition Unit
Analogue inputs	3 - 24 channels configurable for 1 - 8 lines
Current inputs	Clip-on CT or direct line CT connection
	Nominal: 1A or 5A
	Burden: <0.2VA (In = 1A), <0.4VA (In = 5A)
	Overload withstand: 4In continuous, 40In for 1s
Voltage inputs	From line VT/PT
	Nominal: 110V ± 10%
	Burden: <0.4VA
	Overload withstand: 2Vn continuous, 2.5Vn for 10s
Digital inputs	5 dry contacts (standard, extendable to a maximum of 16)
Communications port	1 Serial port, 2 Ethernet ports + 1 maintenance Ethernet port, 1 modem RJ-45
GPS time synchronisation	Internal GPS module time accuracy: 100ns
LCD display	Number of pixels: 256 x 64; dimensions: 132 x 39 mm
Memory space:	8GByte, 1000 records minimum
Power supply	85 - 264V, 50/60 Hz AC or 90 - 260V DC (other ranges available)
Dimensions	483 x 323 x 83 mm (2U, 19" Rack)
Weight	4kg – 6kg depending on the number of optional extras

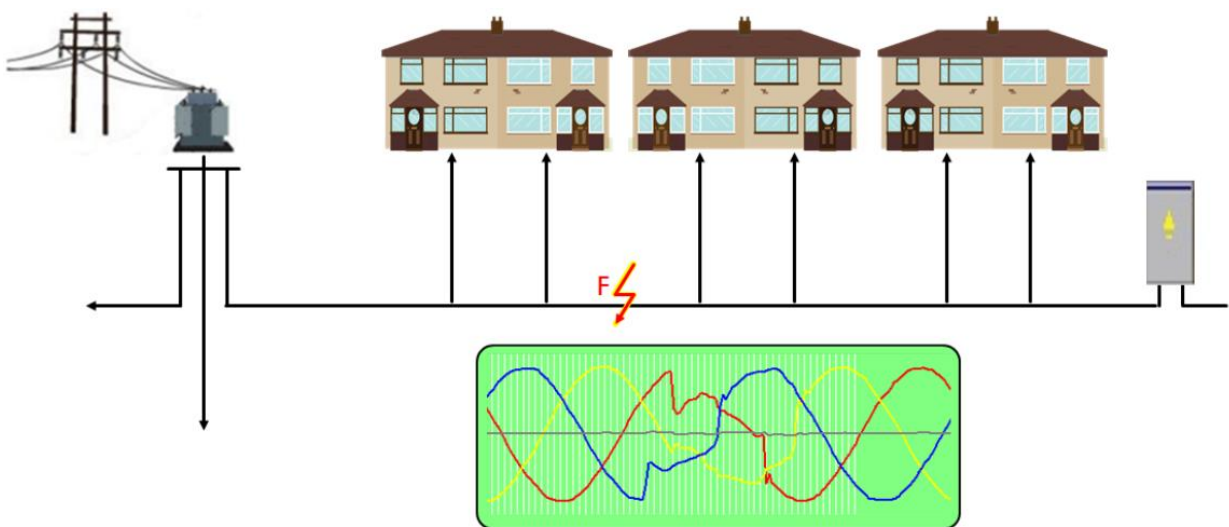


# CABLE FAULT LOCATION



## T-P22 AND T-P23 LOW VOLTAGE FAULT LOCATOR FOR FINDING PERMANENT AND INTERMITTENT FAULTS ON LIVE CABLES

The Kehui T-P22 and T-P23 have been designed for locating all types of low voltage cable fault, but especially the difficult and troublesome transient and intermittent fault. It is especially suitable for branched cables. The difference between the two devices is the T-P22 has a current channel in addition to the three voltage channels.



## T-305E HIGH VOLTAGE SURGE GENERATOR

The T-305E high voltage surge generator, is used for locating high impedance and flashing faults on distribution cables. It works in conjunction with a cable fault locator for pre-locating the fault position and then with a pinpointer to find the precise fault location. It is applicable for different cable fault location techniques



## T-906 POWER CABLE FAULT LOCATOR

Fault Pre-location As the fault (F) is unlikely to exhibit a low resistance, it is usually necessary to modify the fault to create a situation where the it is suitable for pre-location techniques to be applied. This is carried out using a surge generator to inject energy in to the cable.



## T-506 PINPOINTER

The T-506 is used together with a high voltage surge generator, to pinpoint high resistance and flashover faults on power cables. It utilises an Application (App) running on an Android device, connected wirelessly to a hand-held sensor. The sensor detects magnetic and audio signals emanating from the faulted cable.



## PZG Fault Passage Indication

The PZG series distribution line fault locating system is composed of three acquisition and/or indicating units (one per phase), and a pole-mounted collection unit. The system gives a visible, flashing indication of the passage of fault current, whilst collecting data to locate the fault and Comtrade waveforms for subsequent analysis. It will also monitor the switch position and provide measurements of current, voltage, and temperature. This data can then be used for automated fast supply restoration, or can be transmitted to a remote master station for appropriate action to be taken.



## PZK-560F Demarcation switch controller

The demarcation switch controller is used for the measurement and control of the connection between the power utility and the consumer on a medium voltage distribution line. It can detect and respond to faults on the user side. It can also be used for tees from overhead lines and cable ring circuits providing commands for the operation of the switch, together with its measurement and control. The equipment is available in panel-mounted or bell-type format, suitable for installation on overhead lines and cables.





**GREENJACKET®**

**RELIAGUARD®**  
SUPERIOR PORTFOLIO OF WILDLIFE MITIGATION PRODUCTS

## Greenjacket Prevents Wildlife Caused Outages

- Precise-Fit animal protective covers for substations
- Greenjacket take the time to create a solution that is customized to the unique needs and dimensions of our customers' equipment.
- Improve your power system reliability

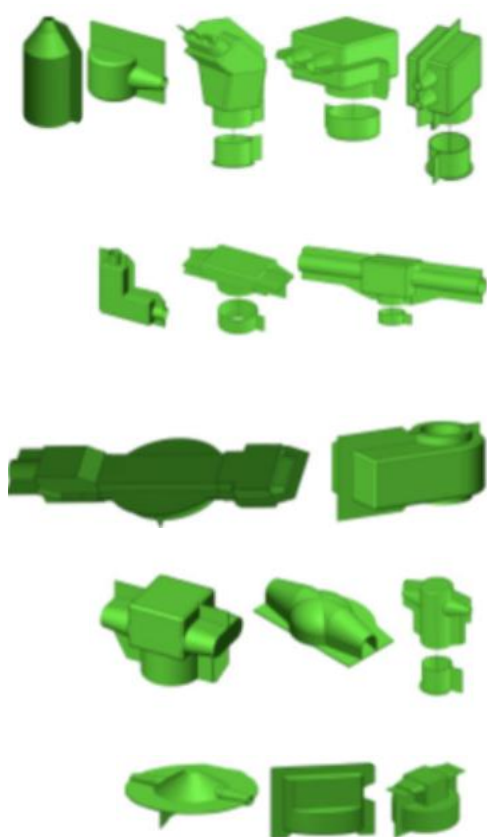
## The Impact of Animal Outages

As consumer demand for reliable energy increases, the global electric utility industry needs to minimize interruptions and increase reliability. Although outages related to weather or acts of nature are hard to anticipate, animal-caused power outages are preventable..



## Greenjacket Custom Designed Cover-up Over 600 Product Designs

Applications: Able to Cover any type of substation or powerline equipment



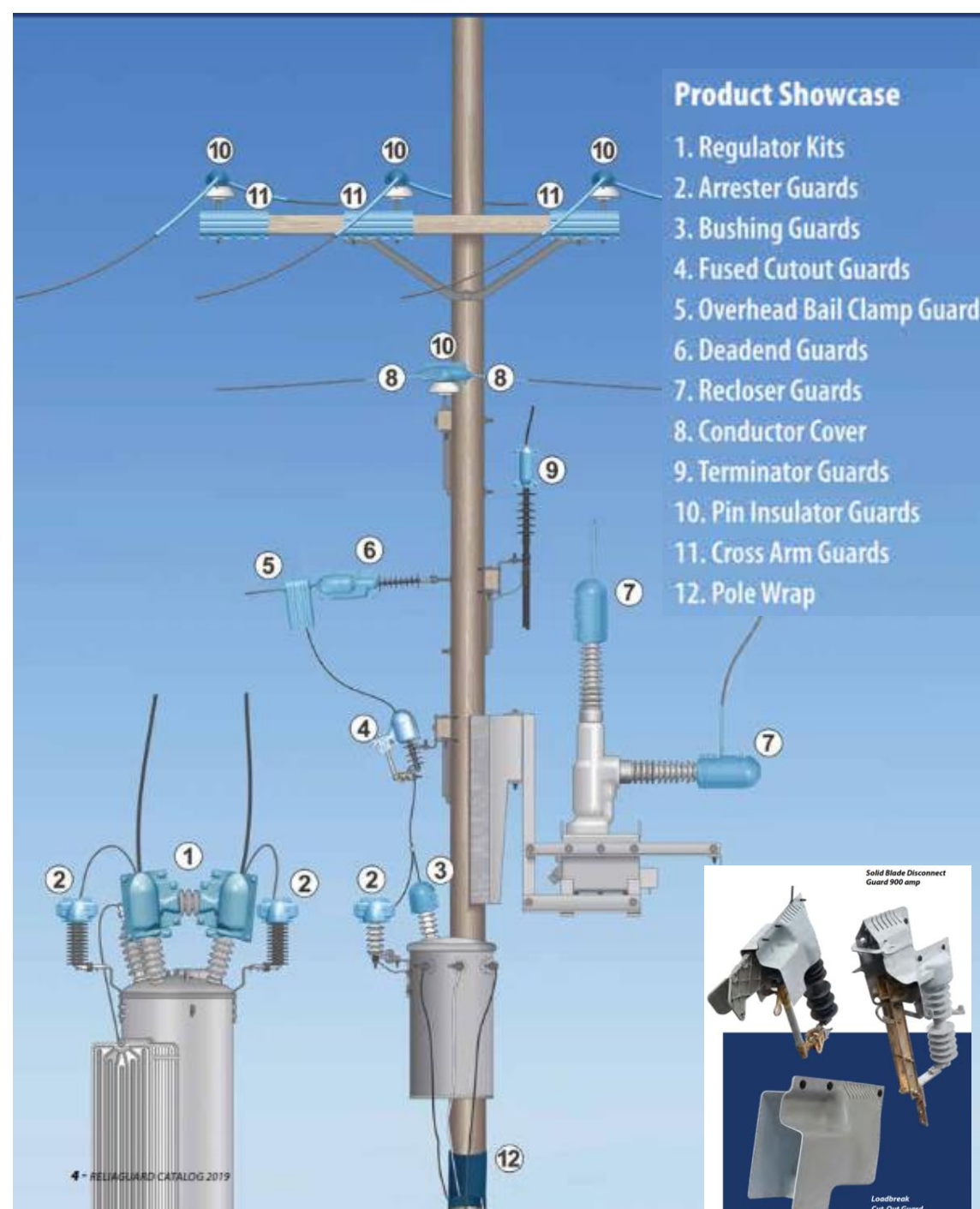
- Greenjacket Bushing Covers
- Greenjacket Bus and Flat Bar Covers
- Greenjacket CT Covers
- Greenjacket Drive Arm Covers
- Greenjacket Expansion Joint Covers
- Greenjacket Insulator, Post Insulator Covers
- Greenjacket Lightning Arrestor Covers
- Greenjacket Terminator Covers
- Greenjacket PT VT Covers
- Greenjacket Recloser Covers
- Greenjacket Transformer Covers
- Greenjacket Connector Covers
- Etc.

## Protect Your Assets from Wildlife Contact



## WILDLIFE CONTACT CAUSES 3 MAJOR RISKS

When an animal bridges the gap from phase to phase or phase to ground an arc/flash can occur resulting in a power outage, equipment damage and wildlife electrocution – Reliaguard can prevent these contacts with its range of protective guards and conductor cover.



**BUSHING GUARDS**



**LIGHTNING ARRESTER GUARDS**



**CABLE TERMINATOR GUARDS**



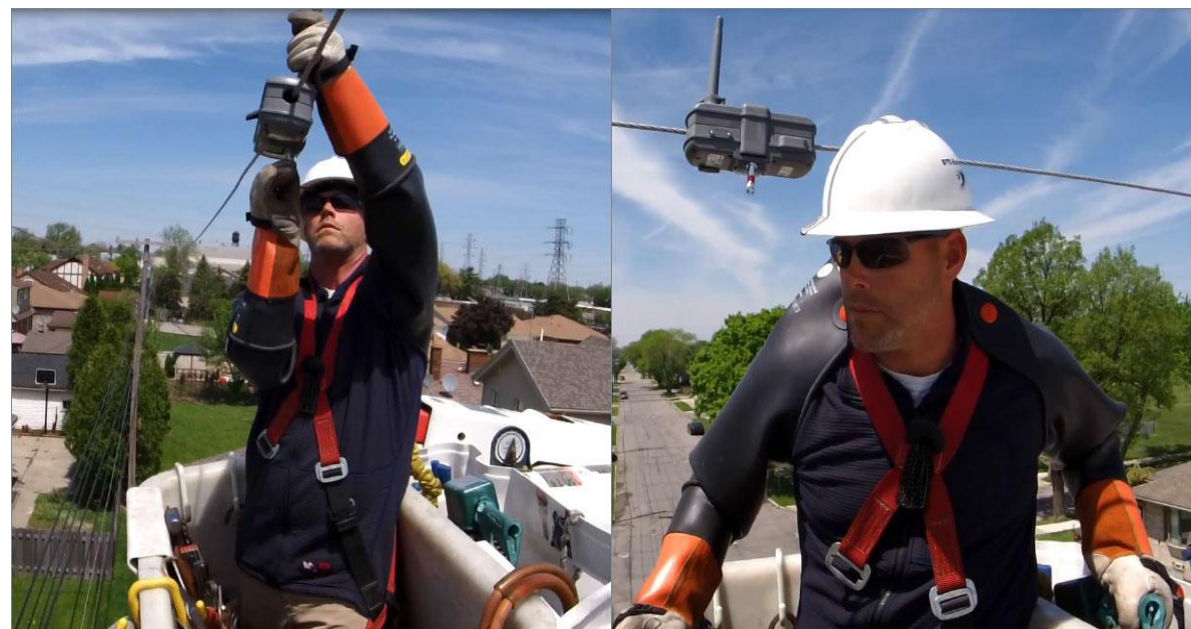
**VOLTAGE REGULATOR KITS**



## Aclara's Grid Monitoring Platform

With Aclara's Grid Monitoring platform utilities can detect faults with real-time information and continuously monitor power quality across all three phases of their medium voltage distribution network. With this actionable data, utilities can boost the reliability, efficiency and power quality across their distribution system with enhanced situational awareness to:

- Detect overload and imbalance conditions.
- Perform real-time load and substation monitoring.
- Reduce outage duration (e.g. improve SAIDI and CAIDI) and momentaries (e.g. improve SAIFI, MAIFI).
- Improve power quality and customer satisfaction.
- Maximize asset life and utilization.



### Aclara Power Sensor

First battery-free Smart Grid Sensor measuring voltage with 0.5% accuracy. Power Sensors provide key inputs to a wide range of applications including:

- CVR and Volt/VAR Optimization
- Enhanced Substation Monitoring
- Distributed Generation (DG) and DER Integration
- Enhanced DMS Powerflow Modeling
- Power Quality Monitoring
- Reliability, Fault Notification and Location

### Features

- No field calibration or sensitive cabling
- Simple line mount sensor
- DNP3 input to Volt/VAR, Historian and DMS
- Direct measurement of feeder voltage and power
- Inductively powered (no batteries)
- Hotstick installation
- Integrated wireless communications options
- Real-time fault detection and location (GPS)
- Interval data logging
- Fault waveform capture
- Up to 48Kv

### Benefits

- Voltage, Current, Power
- Power Factor, Phase Angle
- Sags, Surges, Harmonics
- Faults, Momentaries, Line Disturbances
- Bi-directional power flow
- supports a wide range of communications including 3G / 4G and WiFi

### Power Sensor



### Aclara MV Sensor

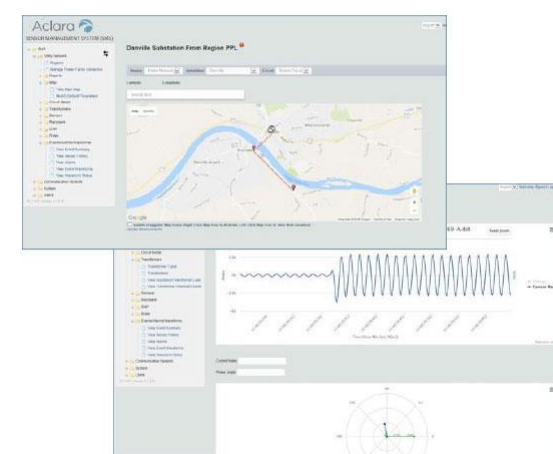
Key measurements include: load current, fault current, electric field strength, power factor, phase angle, sags, surges, wire temperature and harmonics, current (0-17,000 RMS amperes), voltage, conductor temperature,, nominal RMS current, fault and surge current, power quality (sags, swells, harmonics), phase angle power factors, and waveform capture.

### MV Sensor



### Sensor Management System (SMS) with Predictive Grid® Analytics

Aclaras' Sensor Management System (SMS) software classifies power disturbance events and provides the visualization and situational awareness needed to quickly transition from monitoring and reporting of grid events to having the actionable intelligence to respond to real-time conditions. Easy-to-use software management tool, SMS is designed to simplify remote management and configuration of sensors. In addition, it combines predictive analytics features including fault event classification, load logging, reporting and graphing of data, alarms, and waveforms capture for analysis.

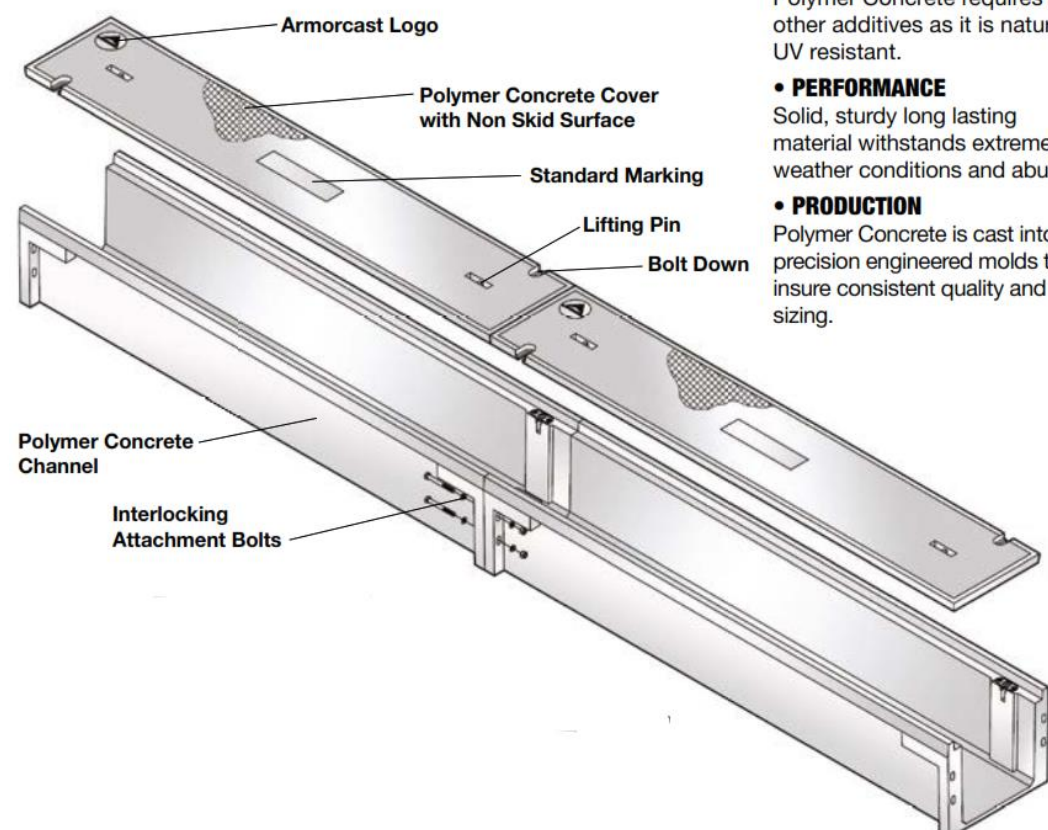






## POLYMER CONCRETE CABLE TROUGH

Armorcast Products cable trough are manufactured using high density polymer concrete material. Cable trough provide railroad, mass transit and power plants with durable and cost effective enclosures for power and fiber optic cables. Cable troughs are installed in areas subject to occasional heavy vehicular traffic. The heavy-duty design of the trough and cover assembly can withstand sidewall pressure due to heavy vehicles and train loading and has a tremendous strength to weight ratio as well as high impact resistance. Cable troughs can be supplied with optional dividers to segregate electric and telecommunications cables. They are quickly connected with bolts without the need to remove cover and can be field cut to easily adapt to different field conditions. High density polymer concrete is resistant to UV chemicals, freezes or thaws and does not conduct electricity.



- **UV RESISTANCE**  
Polymer Concrete requires no other additives as it is naturally UV resistant.
- **PERFORMANCE**  
Solid, sturdy long lasting material withstands extreme weather conditions and abuse.
- **PRODUCTION**  
Polymer Concrete is cast into precision engineered molds to insure consistent quality and sizing.

## FEATURES

Armorcast Products Cable Trough are manufactured using high strength polymer concrete material. Cable Trough provide Railroad, Mass Transit and Power Plants with durable and cost effective enclosures for cable and fiber optic cables. Install in areas subject to occasional heavy vehicular traffic. The heavy-duty design of the trough and cover assembly can withstand sidewall pressure due to heavy vehicles and train loading and has tremendous strength to weight ratios as well as high impact resistance. Cable Trough can be supplied with optional dividers to segregate electric and telecommunications cables. They are connected with interlocking bolts and can be field cut to modify and adapt to different field conditions. Polymer concrete is not affected by chemicals, quick freezes or thaws and does not conduct electricity, no grounding is necessary. Cable Trough is lightweight and the interlocking system makes installation quick and simple. Does not require heavy-duty equipment.



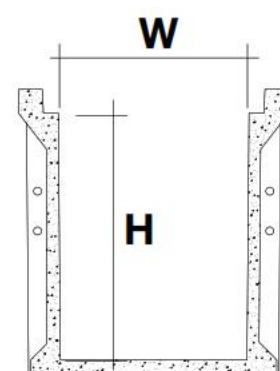
ARMORCAST PRODUCTS COMPANY

## CABLE TROUGH ASSEMBLY STANDARD DIMENSIONS

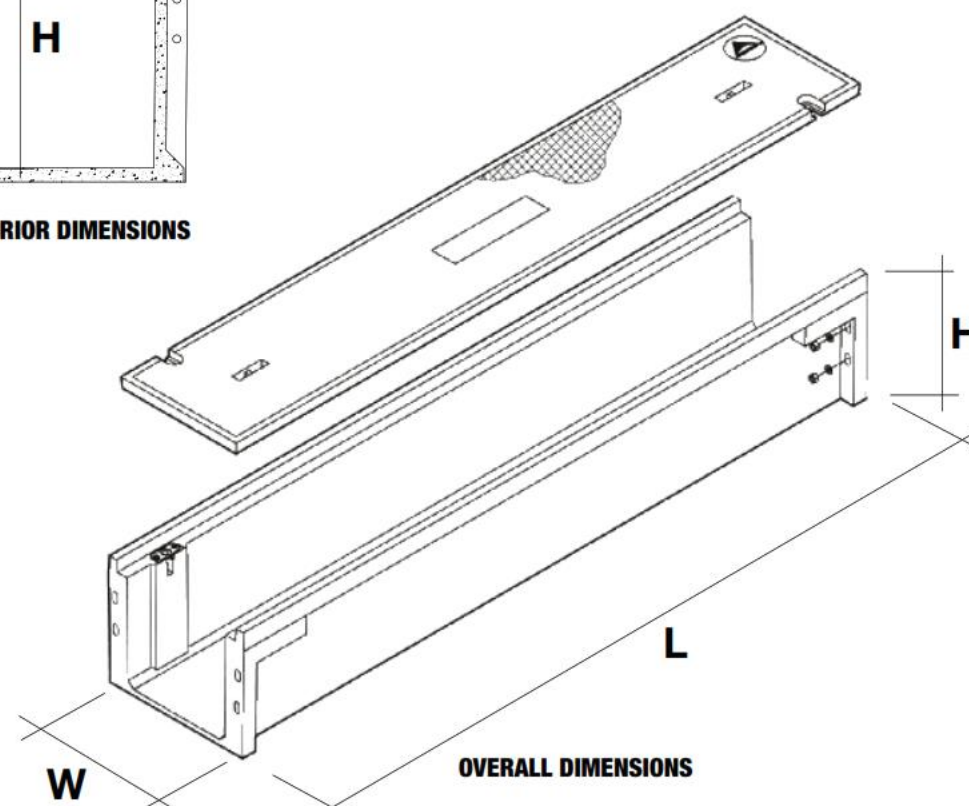
POLYMER CONCRETE

NOMINAL SIZE W x L x H	INTERIOR WIDTH	INTERIOR HEIGHT	OVERALL WIDTH	OVERALL HEIGHT	PART NUMBER	APPROX. WEIGHT
6" x 8" x 60"	6.25"	7.875"	11"	9.625"	A6001301	105lbs.
12" x 8" x 60"	12"	7.5"	17"	9.875"	A6001303	225 lbs.
12" x 16" x 60"	12"	15.5"	17"	17.875"	A6001304	275 lbs.
20" x 12" x 60"	20.25"	12"	25"	14.375"	A6001306	335 lbs.
20" x 16" x 60"	20.25"	16"	25"	18.375"	A6001307	355 lbs.
30" x 12" x 60"	30"	12"	35"	14.375"	A6001309	325 lbs.

**TROUGHS ASSEMBLIES INCLUDE:** Interlocking Attachment Bolts, Protection Rods,



INTERIOR DIMENSIONS



OVERALL DIMENSIONS

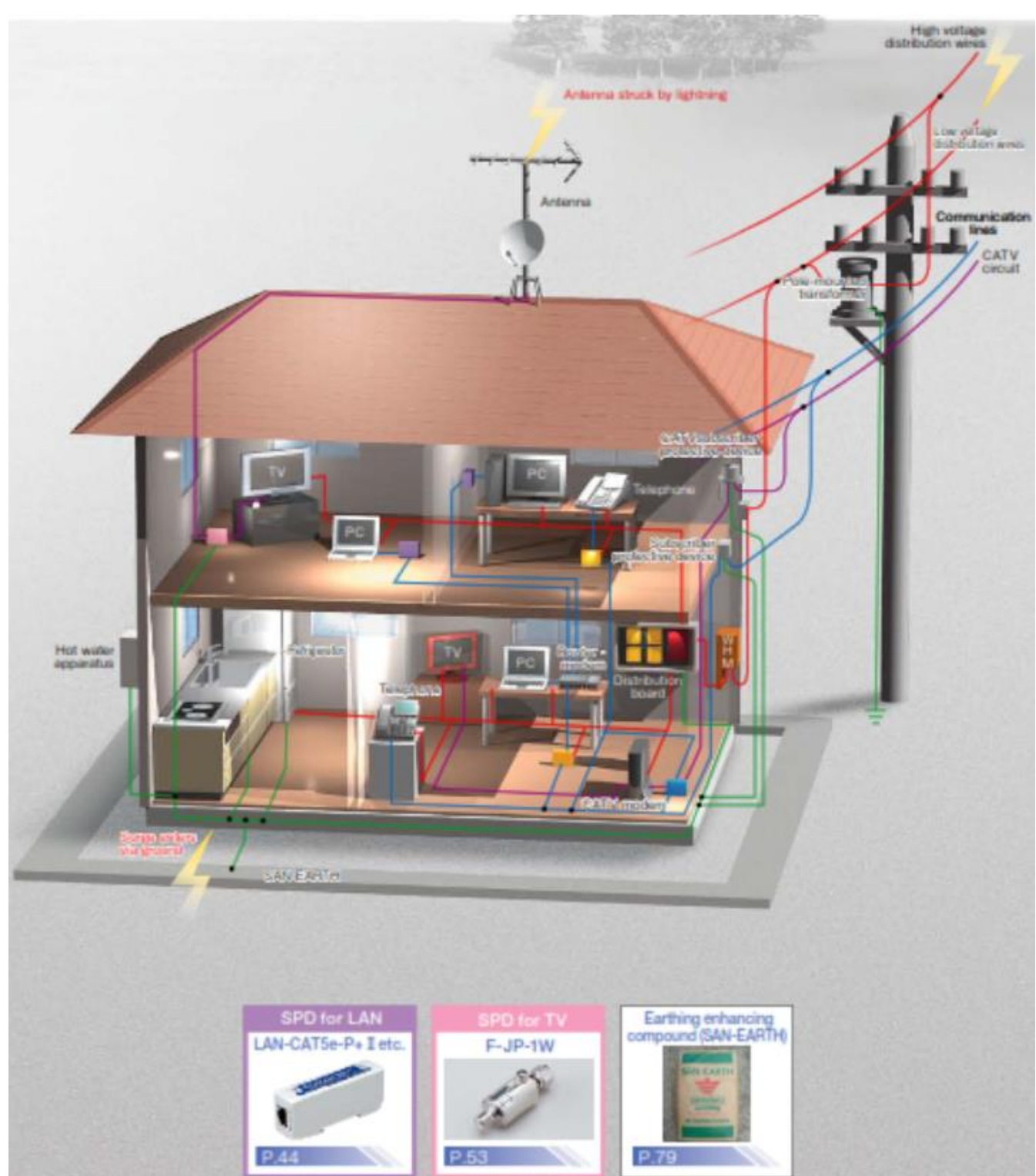
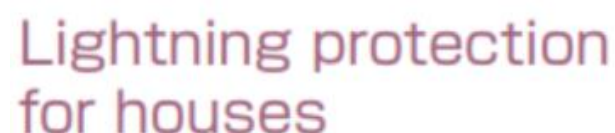




- ...Power supply SPD
- ...SPD for communication equipment
- ...SPD for LAN



- ---Power supply SPD
- ---SPD for communication equipment
- ---SPD for LAN







**SAN-EARTH® M5C Conductive Concrete (Ground Enhancement Material)**

SAN-EARTH® M5C is used to build conductive concrete grounding electrodes. SAN-EARTH M5C electrodes provide the low resistance ground that is essential to any lightning protection system. Good grounds are possible even where soil resistivity is high.

- Applications:**
- Cellular Telephone Sites
  - Wind Farms
  - Electric Power Substations
  - Central Office Facilities
  - Microwave Towers
  - Electric Transmission Systems
  - Computer Systems



**Sankosha LAN Surge Protectors**

- Features:**
- Gigabit Ethernet In-Line Protection
  - Complies with IEC 61643-21, 61000-4-5
  - IEEE 802.3ab Compliant
  - Cat5e and Cat6 Performance Ratings
  - Connectors: RJ45 In/Out (Line/Equip)
  - 35mm DIN Rail or Surface Mountable
  - Lead-Free (RoHS Compliant)
  - All pins protected
- Applications:**
- 10/100/1000 Base-T Ethernet
  - Transportation / Traffic Systems
  - Power Over Ethernet (PoE)
  - Wireless Client Devices
  - Surveillance Cameras
  - IP Security and Phone Systems
  - Advertising Billboards / Displays
  - Network Appliances



**Power supply SPD IEC Class I (Type 1)**

- Low voltage power supply circuits in switchboards and distribution boards (AC 100V/200V) / AC 400V / 300VDC
- Power supply circuits in control equipment (AC 100V/200V) / AC 400V / 300 VDC



**Power supply SPD IEC Class II (Type 2)**

- Smart SPD® System
- Maximum discharge current up to 40 kA (induction lightning waveform 8/20 μs)
- Lightning surge current measurement, Replacement recommendation display function
- Lightning surge information display function (3 phases-Small, Middle, Large with date, hours, minutes and seconds)
- Remote monitoring via LAN (for Windows PC)
- Deterioration display function (warning contact output terminal attached)
- External view M5
- DIN rail mountable (35 mm)



**Power supply SPD IEC Class II (Type 2)**

- Maximum discharge current up to 140kA (induction lightning waveform 8/20μs)
- Deterioration display function
- DIN rail mountable (35mm)
- Low voltage power supply circuits in switchboards and distribution boards (AC 100V/200V/400V)
- Power supply circuits in control equipment (AC 100V/200V/400V)



**SPD for communication equipment**

- Smart SPD®
- SPD deterioration desplay
- Lightning surge current measurement
- Remote monitoring with contact output
- Recognition of line type by label color
- Capable to choose driving power source (external power (DC24V) or battery)

**Operation**



Operation		Display	State
External power	Battery		
Alltime lighting	Press button one-time	Green	Nomal
		Yellow	Replacement recommendation
		Red	Replacement
Press button twice		Blink	Surge operation count number  red: Hundreds digit Yellow: Tens digit Green: Ones digit

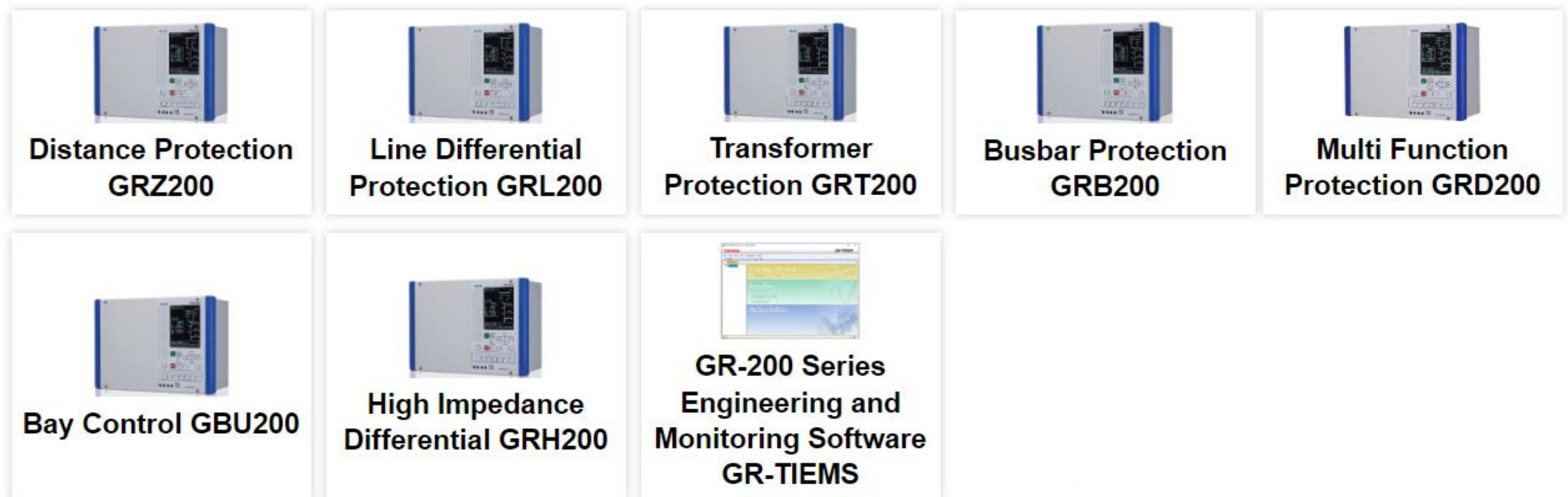


## GR-200 Series

The GR-200 Series is a state-of-the-art protection and control IED platform, combining high quality relay design with the latest in digital substation technology. This flexible and powerful platform will satisfy all of your protection and control requirements, while its user-friendly software tool, GR-TIEMS, ensures a smooth engineering process.



## GR-200 Series Products and Software

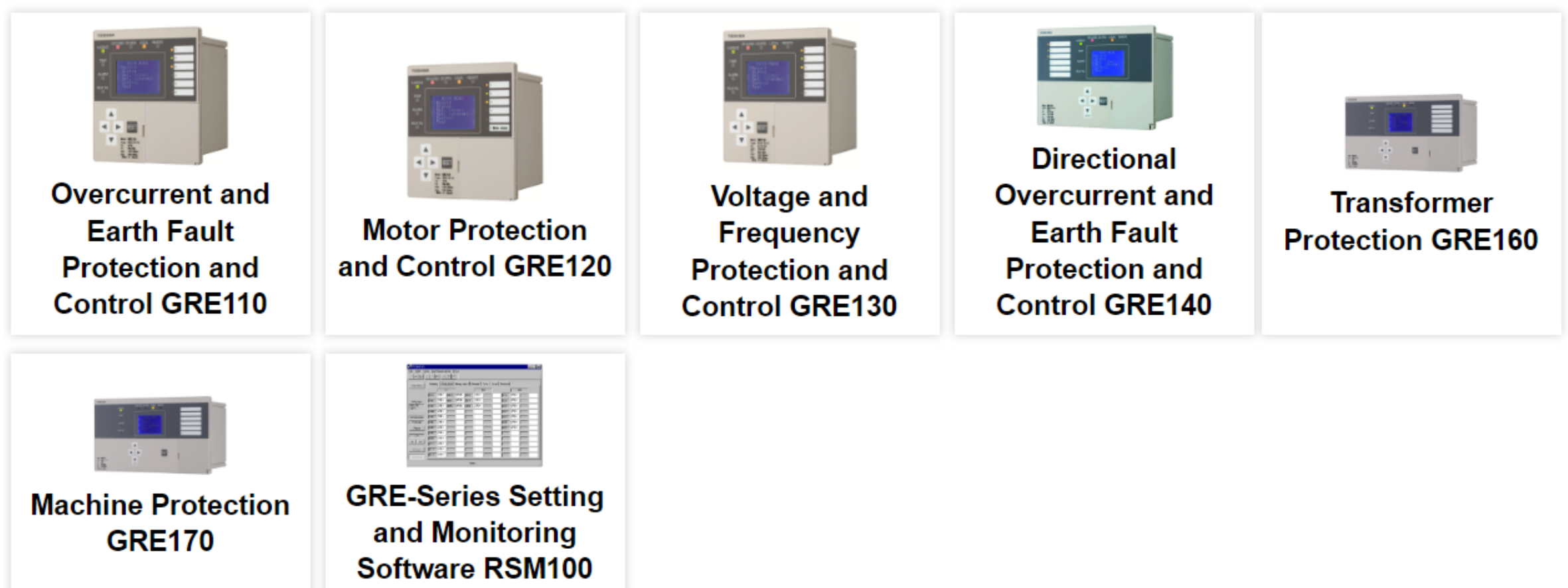


## GRE-Series

The GRE-Series multi-function protection relays have been designed specifically for application in MV networks. These compact, cost-effective devices provide a comprehensive range of protection and control functions, supported by the easy-to-use RSM100 software package.



## GRE-Series Products and Software





## Toshiba Digital Substation

Digital substation brings digital technology into the heart of the substation. The digital substation focuses on digitalization of both station level and process level by converting analog measurement data and binary status information into digital data.

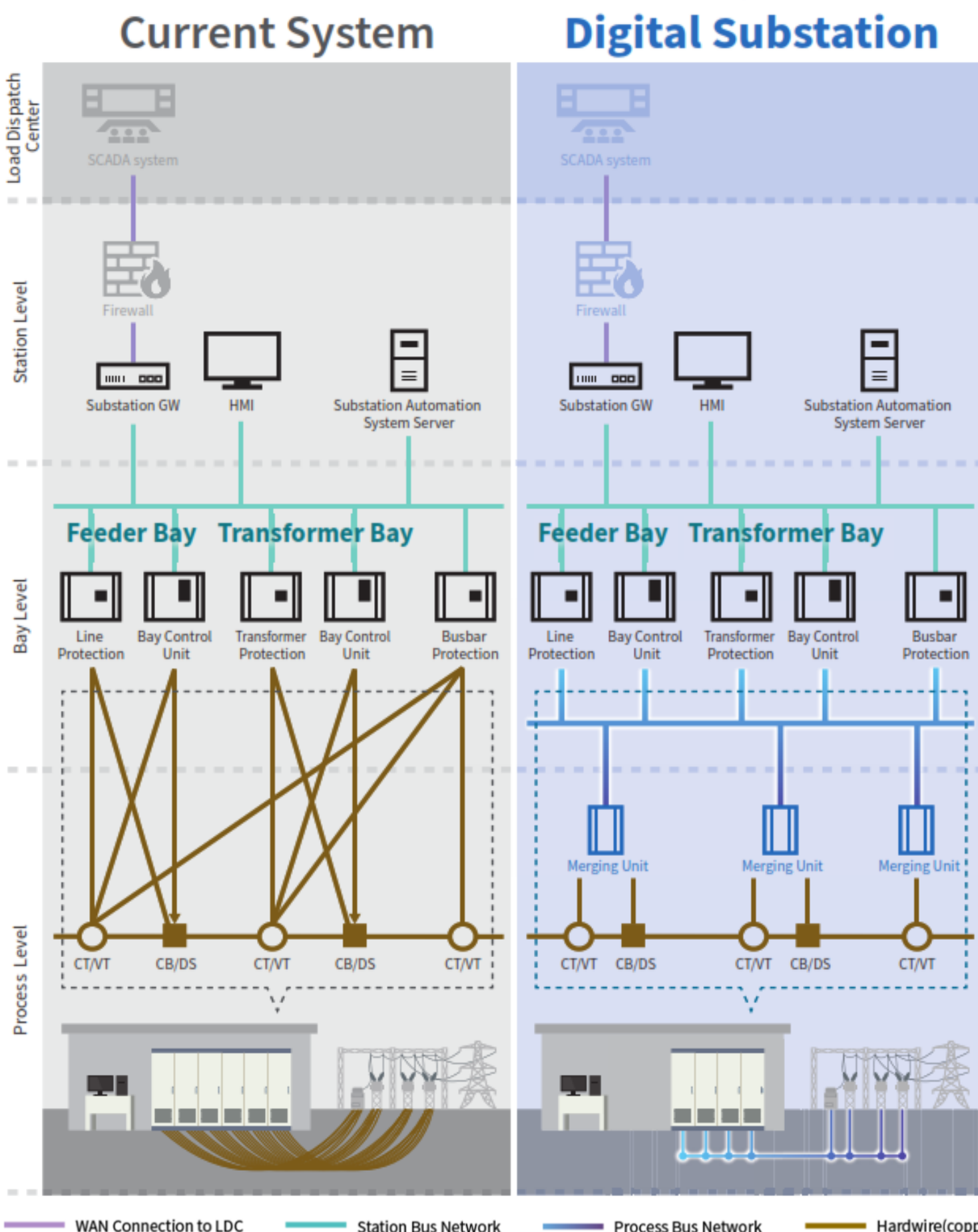
Digitalization provides a secure and reliable method of data transmission, as well as significantly reduced investment and operating cost.

### Implementing Process Bus Technology to Achieve Digital Substation

The process bus solution is implemented by introducing new equipment called Merging Units (MU) near the primary equipment in the switchyard. The merging unit reads the output values of the instrument transformers, converts to digital signals and sends to the secondary equipment (BCU, protection relays) via sampled values (SV) over Ethernet-based connection.

This approach reduces the reliance on external hardware such as hardwired connections between IED and instrument transformer. Process bus technology is developed in compliance with substation communication international standard IEC 61850-9-2, which ensures interoperability between primary and secondary equipment for easy and flexible system upgrade and extension.

**The Digital Substation concept improves not only the operation of the substation, but also optimizes the maintenance of the overall system by improving asset management.**



### Merging Unit GMU200

GMU200 is the latest addition to the Toshiba GR-200 Series Line-up.

GMU200 provides merging unit functionality to digitize analog measurement data as well as Process Interface Unit (PIU) functionality for converting binary input/output signals.

**GMU200 is equipped with the following functionality that provides versatile solutions for the digital substation:**

- 1.Full support for IEC 61850-8-1 GOOSE
- 2.Full support for IEC 61850-9-2 SV
- 3.Full support of network redundancy protocol IEC 62439 PRP/HSR
- 4.Time synchronization with external clock via SNTP, IEEE 1588, and IRIG-B
- 5.Support for various types and configurations of CT, VT
- 6.Trip circuit supervision
- 7.Highly customizable input and output configurations
- 8.High speed tripping contacts
- 9.Support for various types of substation monitoring inputs such as analog inputs for temperature and gas pressure
- 10.Digital inputs for switching equipment status and tap changer positions
- 11.Advanced cybersecurity features



**Sofamel S.L. is a Spanish company dedicated to the production of electrical material of connection, as well as safety and electric protection material**

**SAFETY PRODUCTS**

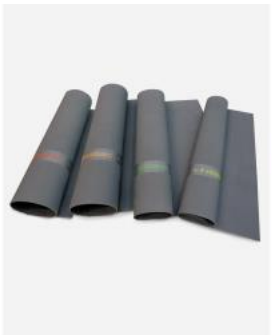
- Gloves
- Personal protection equipment
- Insulation
- Insulating poles
- Earthing and short circuit equipment
- Voltage detectors
- Rescue and First Aid
- Padlocks
- Signalization and beacons
- Ladders



531 5G



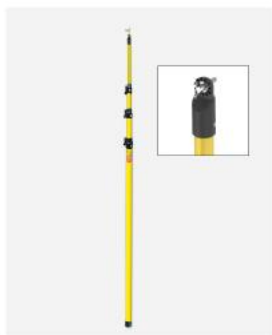
580 ST



585 AD



615 BMTS



615 BMTS



659 ECBT-PTA4



617 BMAE V



659 ECBT-MPUBTH



661 PATL-MC-3



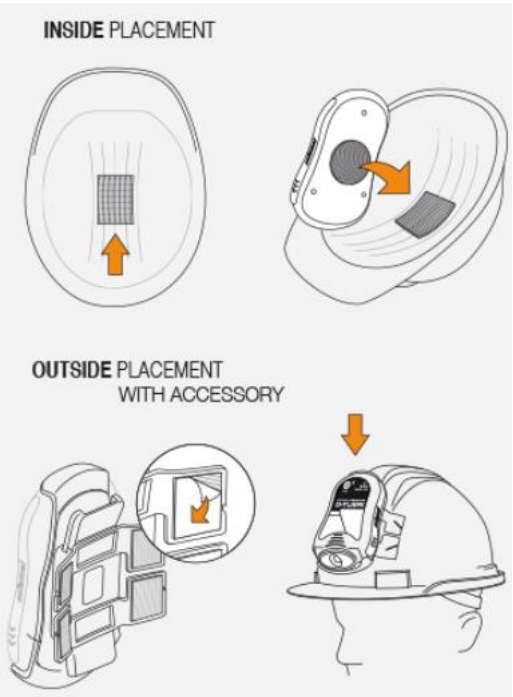
665 PAT-MPL



510 EF/T



527 EF/3



**648 D-Tueri EXPERT**

Personal voltage detector - Medium voltage / Optical & Acoustic  
 Additional safety device for individual use.  
 Personal omnidirectional electric field detector. When the user is close to an electric field between 10kV – 66kV and exceeds a distance of approximately 1 meters for 10kV and 3 meters for 66kV, the detector sounds a signal. The alarm does not stop sounding until you move away from the dangerous zone.

The detector can be placed both INSIDE and OUTSIDE, depending on the characteristics and requirements of the helmet.



648 D-Tueri PRO



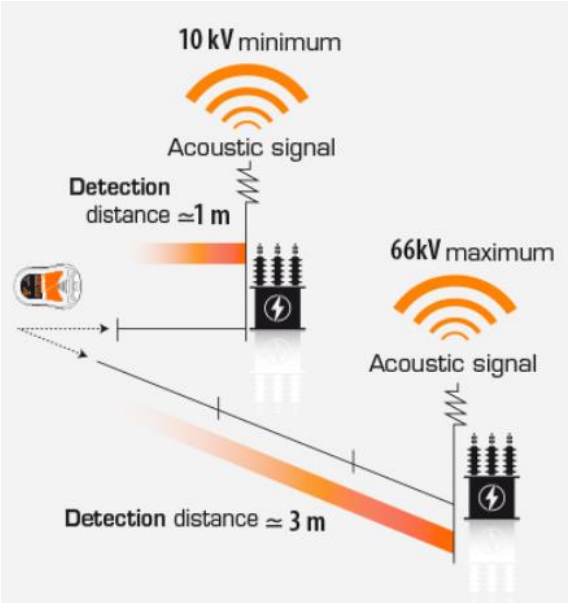
565 ARMOUR-2



Combo Expert



648 D-Tueri PRO 66kV





ZIV provides HV-MV-LV Automation Solutions with a wide range of high-tech equipment and systems

Protections

Feeder Protection



IRF – Modular Feeder Protection Relay IEC 61850 2



IRL – Compact Feeder Protection



IRV – Feeder Protection ("V" Platform)

Line Protection



DLF – Line Differential Protection Relay IEC 61850



ZLF – Distance Protection Relay IEC 61850 2



ZLV – Distance Protection ("V" Platform)



DLX – Line Differential Protection ("X" Platform)

Transformer Protection



IDF – Transformer Protection Relay IEC 61850 2



IDV – Transformer Differential Protection



IDX – Transformer Differential Compact Protection

Busbar Protection



DBF – Distributed Busbar Protection



DBC – Busbar Protection Central Unit



DBP – Busbar Protection Bay Unit



DCV – Busbar Protection Bay Unit + Capacitor Bank Protection



DRV – Busbar Protection Bay Unit + Feeder Protection



ZIV provides HV-MV-LV Automation Solutions with a wide range of high-tech equipment and systems

Breaker Protection



6IRV – Bay Control and Breaker Management Unit



6MCV – Bay Control Unit

Capacitor Bank & Reactance Protection



IRF – Modular Feeder Protection Relay IEC 61850 2



BCV – Capacitor Bank Protection IED

Automatic Voltage Regulator (AVR)




RTF – (AVR) Automatic Voltage Regulator – IEC 61850



6RTV – Automatic Voltage Regulator (“V” Platform)


Disturbance Recording



8PRN – Disturbance Recorder

RTUS

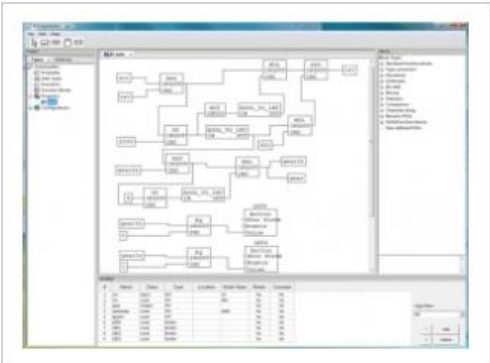
Substation Gateway / HMI / Central Unit



XCell – Automation Platform for HV and MV Substations



Substation Central Unit



SmartControllers – Universal Platform for Distribution Automation & Substation Automation

Substation Automation Systems

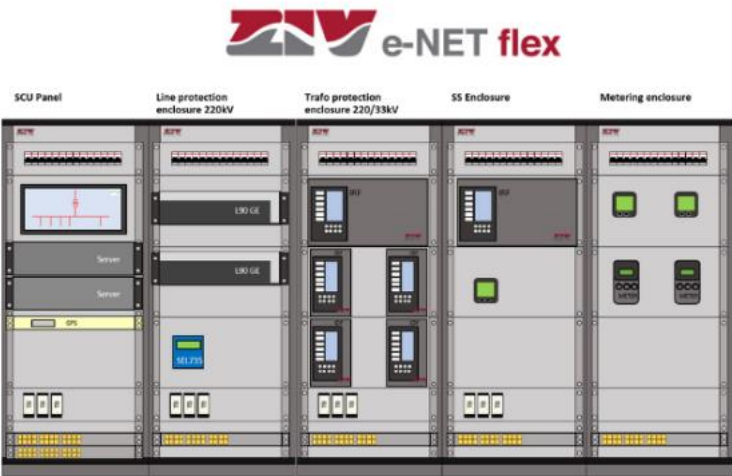
ZIV support centers provide **engineering services** based on experience and latest technology to optimize the cost and resources of every single project, based on:

- Well experienced protection, automation and communication engineers.
- A full range of products with in-house developed technology:
  - Protection and control relays,
  - HV Communication devices,
  - Networking Solutions,
  - RTUs
- Dedicated R&D & Application resources to [fully support](#) the products.
- A total commitment to customer satisfaction.

MULTIVENDOR IEC 61850 SAS

A complete substation protection & control system, based mainly on ZIV relays.

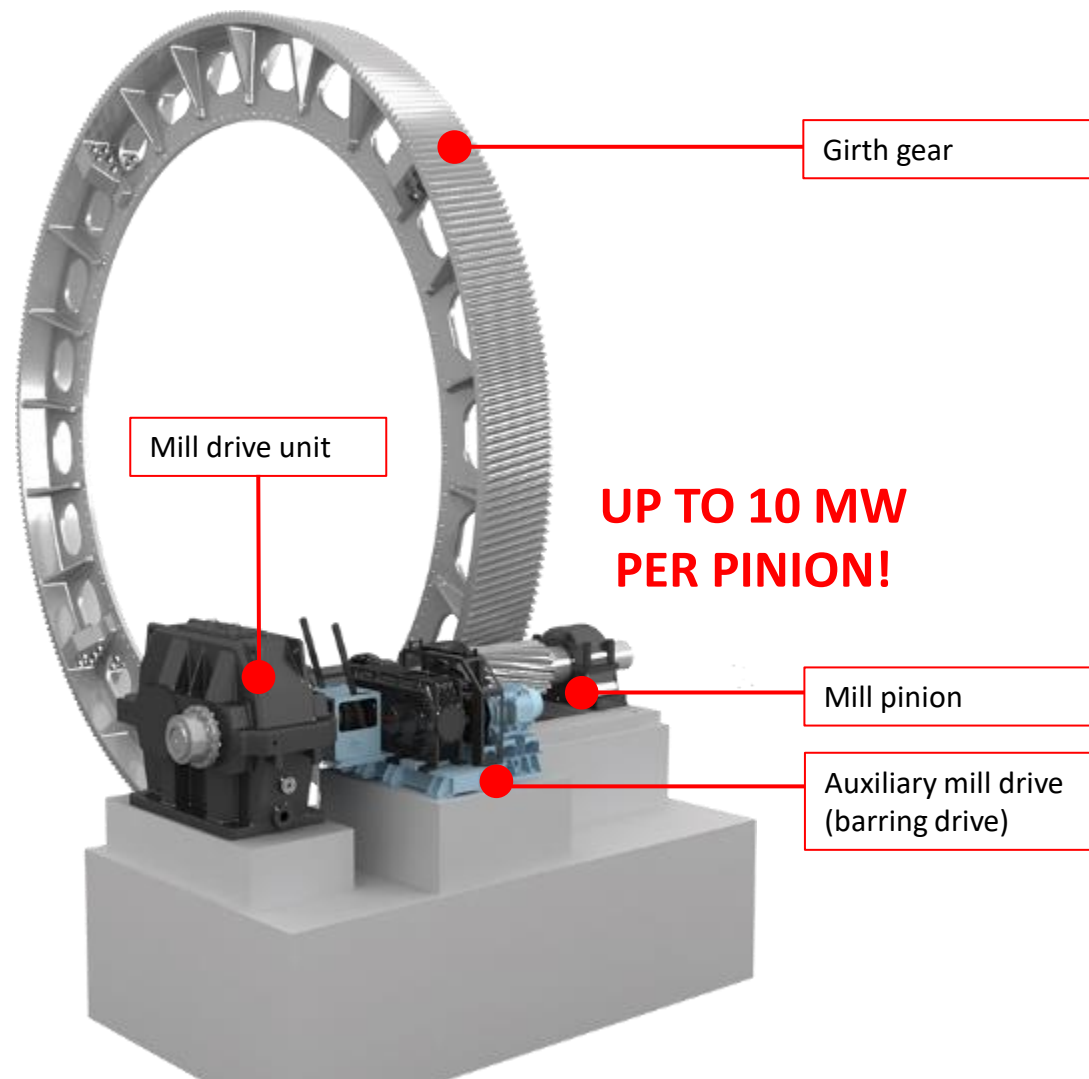
IEDs communicated over CFO, in a simple ring with a redundant RTU-Gateway



ZIV e-NET flex

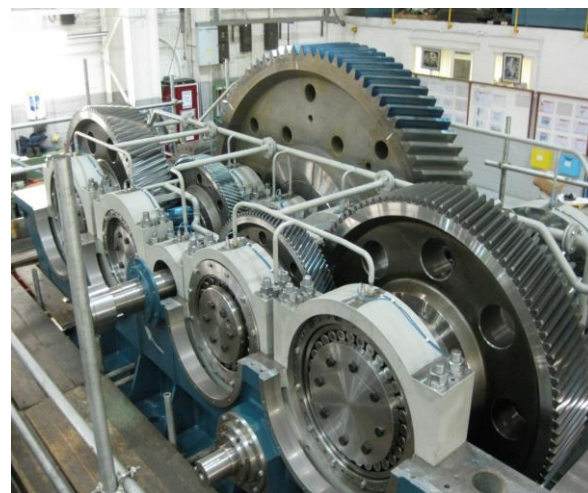


## GEARBOX: Products, Service and Repair

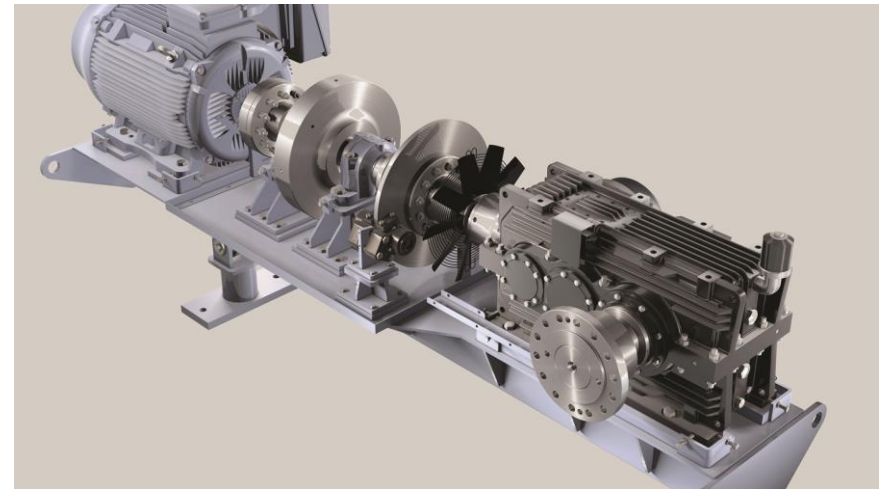


- Mill Drive System can comprise all the elements shown here
- David Brown Santasalo is one of few manufacturers in the world able to design, manufacture, install and maintain all these elements
- This means we can be a “one stop shop” for a full system, keeping responsibility in one place
- We can often optimise the individual components, matching ratios to our design and manufacturing capabilities, to give an optimum overall package

### Gearbox



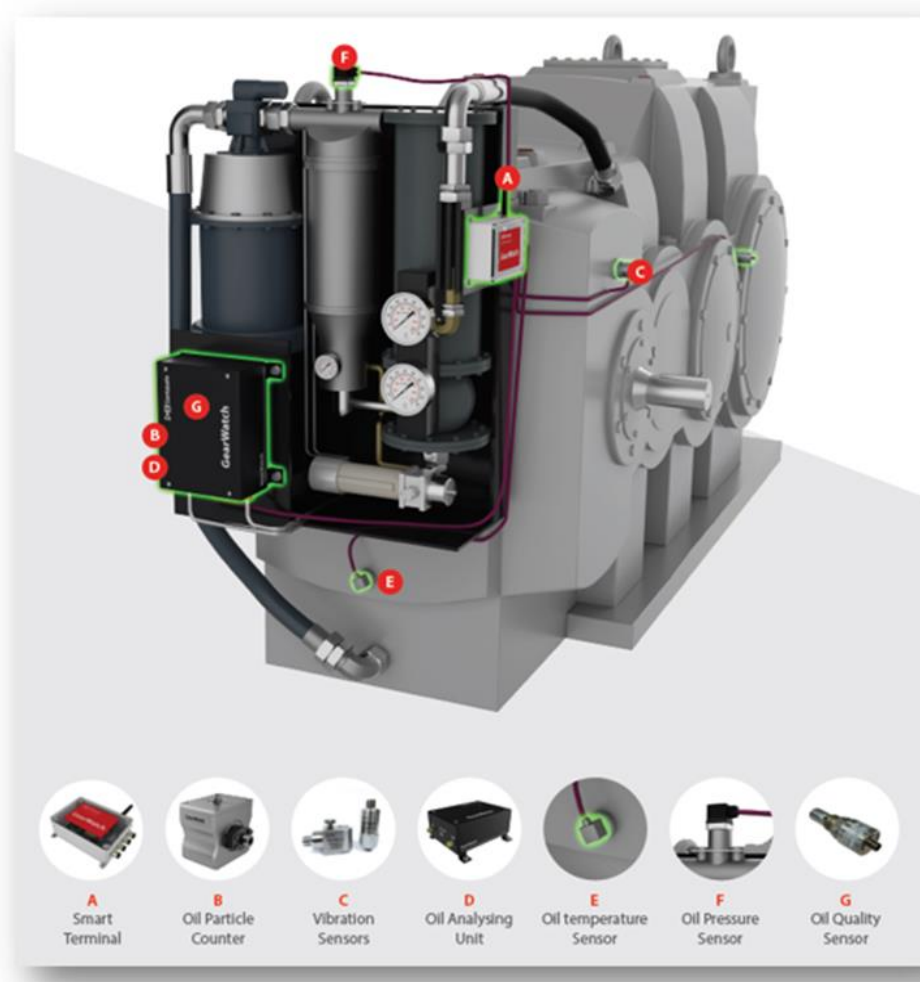
### Conveyor Gearbox



### DB Santasalo GearWatch

The Future of Gear Unit Condition Monitoring Solutions

- Cost efficient solution
- Detection of defects at an early stage through particle counting
- Effective maintenance planning
- Improved process reliability & extension of gear unit's lifetime
- Developed from the industrial gear condition monitoring point of view with experience of the decades
- Cloud based server
- Analysis support by gearbox and drive train experts
- Available in three different packages; Standard, Oil Monitoring and Pro



### DBS GearWatch Oil Monitoring

Oil analyzing unit combines early detection of the wear process with Particle Counter and proactive approach to operation with Oil Quality measurements:

- Particle counter
- Oil Quality sensor:
  - Water saturation
  - temperature

### DBS GearWatch Pro

Tailored monitoring system for gear units and drive trains with selected parameters:

- Oil particle counter
- Vibration
- Rotational speed
- Temperature
- Oil quality
- Oil pressure
- Load



# Electrical systems & services



## Low-voltage distribution

- Panelboards and safety switches
- IEC and NEMA/ANSI ratings
- Hazardous area transformers
- NEMA 1 and 3, IP66 and IEC and NEC hazardous area solutions



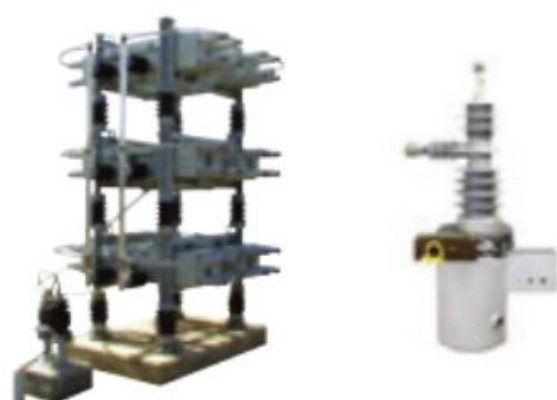
## Medium- and low-voltage switchgear

- Metal-clad and gas-insulated medium-voltage switchgear to 38 kV, 3000 A
- Metal-enclosed low-voltage switchgear to 600 V, 6000 A
- Integral motorized breaker racking
- Arc Quenching switchgear
- ANSI and IEC, arc classified option



## Medium- and low-voltage motor control centers

- Medium-voltage ratings to 13.8 kV, 800 A
- Low-voltage ratings to 600 V, 3200 A
- Both NEMA/ANSI and IEC certified motor control centers
- Freedom, arc-resistant and FlashGard MCCs



## Capacitor banks, filters and voltage regulators

- Low-voltage capacitor solutions
- Medium-voltage capacitor solutions
- Passive and active filters
- Medium- and low-voltage regulators



## Medium- and low-voltage drives

- Medium-voltage ratings to 4160 V, 12000 hp, optional 15 kV input
- 24-pulse 2.4 kV and 4.1 kV with encapsulated technology
- Low-voltage ratings to 690 V, 2200 hp
- 6- and 18-pulse converter
- IEEE® 519 harmonic compliance



## Power and distribution transformers/busway

- Liquid-filled to 12 MVA (ANSI)
- Non-segregated medium- and low-voltage busway
- FR3 environmentally-friendly fluid
- NEMA 4X Class I Division 2 hazardous location transformer



## Low-voltage circuit protection

- Hazardous area and marine circuit breakers
- Molded-case industrial breakers
- Bussmann™ series current-limiting fuses
- Arcflash Reduction Maintenance System™
- Arcon fault protection system
- Low-voltage air circuit breakers



## Meters and relays

- Revenue grade energy monitors
- Panel meters
- Motor and feeder protective relays
- InsulGard partial discharge relays

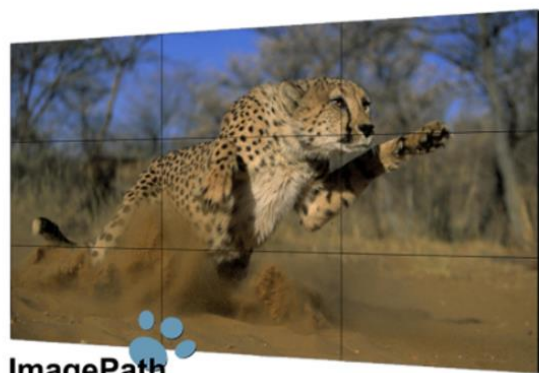


## Overhead distribution equipment

- Single- and three-phase reclosers
- Overhead cutouts
- Grid Advisor™ Series II smart sensor
- Single- and three-phase switches



## Video Wall Display



### ImagePath Infinite VW5502

- High superior detail quality
- Bezel to Bezel 0.4 mm (btb 0.8mm)
- 24/7 operation support
- Industrial grade quality
- High Precision Video Wall Bracket (OPVB)



## Video Wall Processor



### ImagePath RealView

- Advanced Crossbar technology
- Robust FPGA video data process technology
- Multi-window overlay ability
- Multi input and output formats
- No PC vulnerabilities
- IP streaming decode support
- Low power consumption
- Fast start up within 5 seconds, Low capture & display latency
- HDCP support for DVI/HDMI
- Support 4K input capture
- Input signal preview
- Support Control by Windows OS and iPad

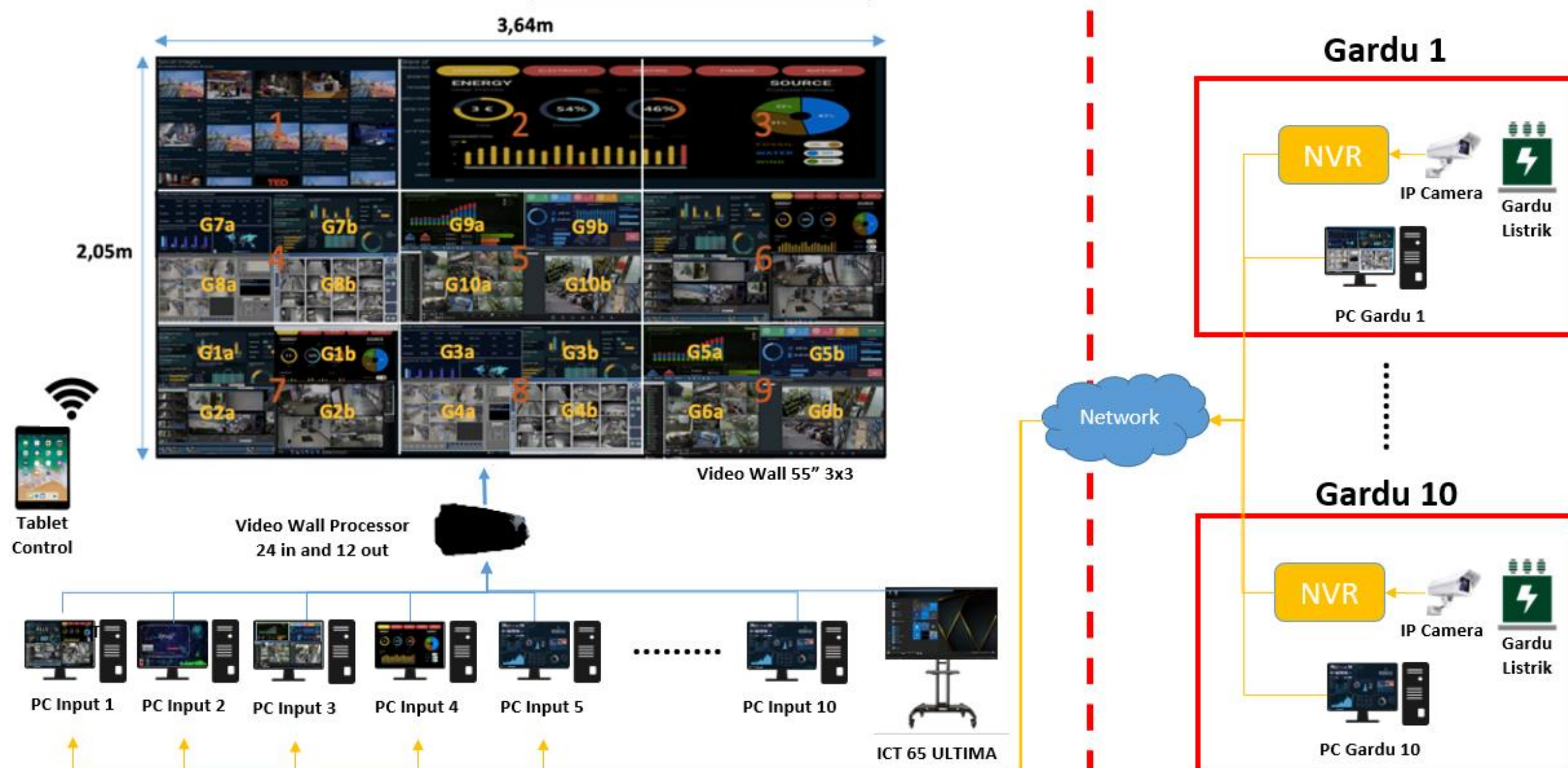
## Display Inteactive

### ImagePath ICT Ultima



- Multi Touch with 4K Resolution
- Touch Screen Writing Pen or Finger
- Tempered Glass 4mm Protection, Anti-Glare
- Built-in Apps Annotation & White Board
- Built-in Speaker 10W x 2
- Support Duplicate Display with HDMI
- Support Mirroring Display with Apps
- Support Quad View Mirroring Display
- OPS Intel Processor Core i5
- Support Video Conference Apps

### System Diagram Monitoring Gardu Induk PLN





# SF6 ONLINE MONITORING



- Online monitoring with **WIKAI GDHT-20** sensor
- Decision based on **continuous data**

- SF<sub>6</sub> gas service by **WIKAI GAD-2000**
  1. A small amount of SF<sub>6</sub> is recovered
  2. Filter SF<sub>6</sub> gas
  3. The dried SF<sub>6</sub> is filled back into compartment
  4. Process is repeated until desired values are reached

World Assets Map > Substation View > Bay View

Software - letzte 7 Tage





## The Hirschmann IT High Performance and Multi-purpose Switches Portfolio Set the Standard for Quality, Reliability and Service



### MTS2600 Series Switch - MAMMUTHUS Layer2 Gigabit Ethernet Switch with 10G Uplink Ports

#### Entry-level access and port extension switch

MTS2600 series switch is the entry level access switch in Mammuthus series, providing sufficient performances and flexible functions. 10 Gigabit port is available so uplink speed to core switch is assured.

All RJ45 ports in MTS2600 series switch support auto-negotiation and MDI/MDI-X, and all SFP+ slots can work under 1/10G mode. All SFP+ slots support 1G and 10G MTS SFP modules, including fiber and UTP/STP\*.

\* detailed information please see SFP chapter in this brochure.

For higher port density and performance at access level, MTS2600 supports stacking and downlink-oversubscribe design, in which 24 GE access ports couples with 4 10G SFP+ uplink ports. Since the MTS2600 series switch supports ERPS and have hardware based broadcast control, the switch can be deployed in ring topology.

### MTS2700 Series Switch - MAMMUTHUS Layer3 PoE/PoE+ Gigabit Ethernet Switch with 10G Uplink Ports

#### Access/aggregation switches that have comprehensive function with PoE/PoE+

MTS2700 series switches provides a whole set of access solution, which is able to support complex network design. The switches can prevent unauthorized network access or mitigate the impact of network attacks via plenty of security features.

All RJ45 ports in MTS2700 series switches support PoE/PoE+ function, which are able to provide up to 30W power supply for the PoE PD device, such as webcam, IP telephone etc. What's more, modular PSUs can provide FRU and the device can work properly under maximum temperature up to 55°C.

MTS2700 switches have comprehensive L2/L3 feature set, which can provide flexible, reliable and secure choice for network planning. Network consultant can enhance network security via DAI/DHCP snooping or can optimize multicast via IGMP snooping or can use broadcast control to ensure the network stability when UMB flooding.

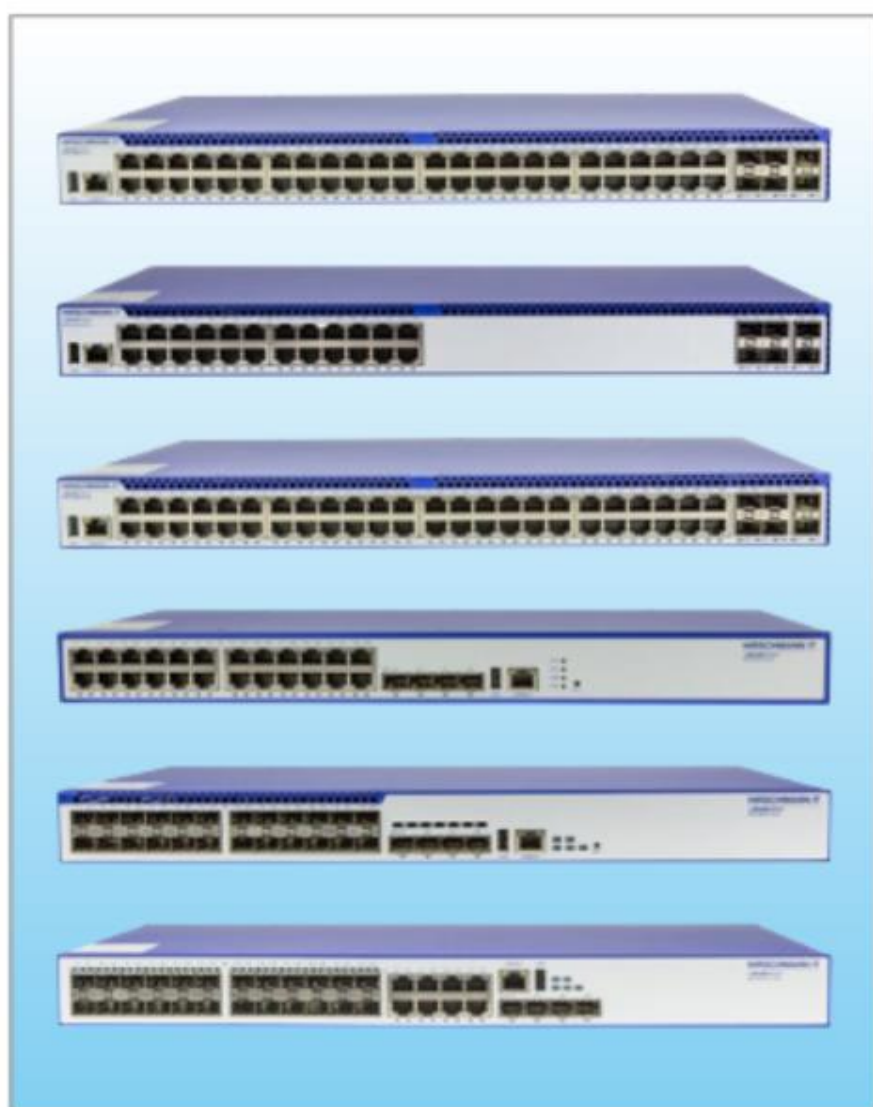
### MTS2800 series switch - MAMMUTHUS Layer3 Gigabit Ethernet Switch with 10G Uplink Ports

#### Access/aggregation switches that can offer comprehensive L2/L3 feature sets

MTS2800 series switches provide a whole set of access and aggregation solution. All switches in this series are equipped with redundant PSUs. The switches has compact mechanical design with low noise which can fit in with 600mm × 600mm compact cabinet. In addition, the switches can work properly under maximum temperature up to 55°C.

All the RJ45 ports in MTS2800 series switches support auto-negotiation and MDI/MDI-X. The switches can be applied to various working situations such as desktop, ELV room and data aggregation layer. The switches have 4 or 6 SFP+ slots and support stacking configuration, which can eliminate single point of failure and provide MC-LAG.

MTS2800 series switches have comprehensive L2/L3 feature sets and furthermore can provide flexible, reliable and secure choice for network planning. The general security and flow control technology such as DAI, DHCP snooping, IGMP snooping and 802.1x that the switches have can help administrator to deploy a secure & robust network infrastructure.





**PT Global Twin Star also provide solutions such:**

**CONTROL RELAY PANEL**



**ELECTRICAL ENGINEERING & CONSTRUCTION**







**PT.Global Twin Star**

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