

GRID AUTOMATION PRODUCTS

## Self-healing distribution grid RTU500 efficient and effective field automation



Striking a balance between cost and quality while delivering energy to the end consumer is a major target of distribution system operators.

New technology based on RTU500 series supports this target by efficiently and effectively managing the ever growing and changing electrical network.

### Challenge

New technology should address several key aspects in their respective applications within utility, industry and transportation. Important among these are:

1. Optimizing network utilization and power quality
2. Extending both, lifecycle and safe operation of assets.

Fast fault detection and fast network restoration after fault clearance is another key deliverable. This is a general requirement to reduce not only SAIDI and SAIFI but also guarantee power quality by keeping voltage and frequency values within a defined range. More specifically, in industry and transportation there is a high demand on power quality to keep the power infrastructure process running smoothly. While in distribution, network operators need to comply with regulation codes to ensure a stable and available supply of electricity.

From a people and environment perspective, any new automation technology should ensure that assets operate safely and conforms to high standards of health, safety, environment and quality (HSEQ).

### Solution

The decentralized automation solution installed in the field reduces the flood of data and makes monitoring and control easier for the operator in the control center. Such automatic network reconfiguration is safer and more reliable compared to manual operation by service personnel.

The RTU530 main controller with an integrated predefined algorithm, the modularity of RTU500 components and the DIN rail communication portfolio of EDS500 allow simple integration of typical applications into the medium and low voltage grid as follows:



### Automatic transfer system (ATS)

ATS provides continuous power supply made possible by a detection function and an automatic switch over function from the main source to an alternative energy source. The automatic switchover is triggered by the failure of the active main source.



### Transformer monitor and control

This consists of a simple monitoring of the current flow and fault detection. The application detects long-term or periodical overload stresses and supports in calculation of the asset's maintenance plan. Oil temperature and level monitoring allows detailed analyses of the transformer and protects the environment in case of a transformer leakage. Measuring voltage and current in the feeders allows an automatic tap changer control to maintain voltage within a defined range in the distribution network.



### Generator patrol and control

The application fulfils the requirements of a distribution code connecting small scale or mobile power stations to a distribution system. A communication link, automatic speed, power factor and voltage control are all part of this RTU based application. Generators are rotating machines that are subject to vibration and heat while running. Monitoring of temperature and unbalance caused by a rotor imbalance and unbalance or overload from the grid helps in evaluating the generator's lifetime.



### Fault detection isolation and restoration

Automatic logic functionality with measurement and fault detectors and motorized switches allows to identify a faulty cable within a short period of time, to isolate the fault and to restore the supply. This application starts with ATS as a simple reconfiguration functionality and goes up to a high-level solution with peer to peer communication.

## Enabling products



### RTU530

- The logic-based algorithm in combination with the gateway functionality enables a wide range of usability
- Scalable input and output modules can be adapted based on customer application requirements
- Versatile combinations with intelligent multimeter 500CVD-series for indoor and outdoor applications
- Efficient footprint allows to fit the RTU530 into small control cabinets



### 500CVD90

- Three-phase current and voltage measurement in one device
- Offers advanced features such as detection functionality (e.g., under-voltage, directional overcurrent and earth fault) and disturbance recorder
- Power quality measurement up to 31<sup>st</sup> harmonic



### 500CVD21

- Interface with 4 voltage and 24 current inputs
- 3 phase measuring for voltage and current
- Offers advanced features such as detection functionality (e.g., under-voltage, directional overcurrent and earth fault) and disturbance recorder
- Power quality measurement up to 17<sup>th</sup> harmonic



### EDS500

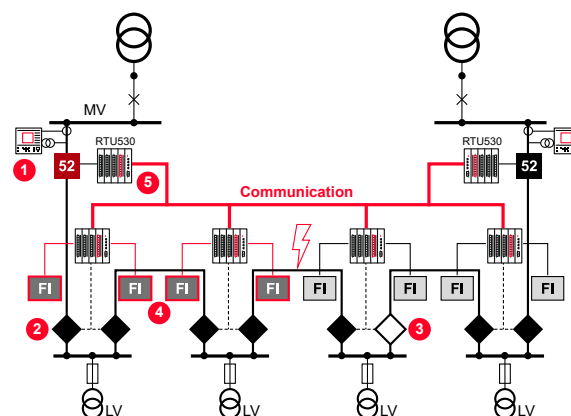
Robust communication solution for copper and fiber optic transmission between secondary substations

- Offers simplified transfer between copper and fiber transmission

- SFP-technology for flexible connection of fiber optic media
- Support of predictive fault notification
- Equipped with serial interface (RS-232/RS-485) to connect legacy serial devices,
- Monitoring via IEC 60870-5-10x possible, IEC 61850-3 compliant

## Application example

Fault detection isolation and restoration (FDIR) for an open ring configuration:



- 1 Circuit breaker and protection device in incoming feeder to isolate the fault in the ring
- 2 Motorized load break switches or sectionalizer
- 3 Normally open point (NOP) in a ring
- 4 500CVDs detection function/ fault indicator (FI)
- 5 Reconfiguration logic in RTU530 in each secondary substation including peer to peer communication

### Benefits

- Safety for the utility personnel through more exact fault location
- Reduces SAIDI and SAIFI for more reliable operations
- Modular step-by-step approach
- Single solution for fast restoration of the entire grid
- Flexible for use as a retrofit solution, regardless of switchgear vendors
- Based on proven RTU500 series with predefined application functionality
- Secure communication in public networks saves time and money as also fulfils highest cyber security standards