WHY USE MAINS PROTECTION RELAYS?

ComAp

Protection relays for the grid and equipment in parallel-to-mains applications

Maintaining power supply stability

As the installed capacity in decentralized sources of energy continues to increase, the distribution system can become less stable resulting in a fluctuation of grid parameters such as voltage and frequency. To keep the equilibrium and ensure safe operation of the grid, mains protection is essential for every power source operating in parallel to grid.

As a result, Utilities and Distribution Network Operators (DNOs) issue regulations, which every site generating power must comply with. These regulations highlight the need for protection relays in order to protect the distribution network from dangerous effect of asynchronous generation and minimises the likelihood of equipment damage caused by disturbances coming directly from the mains network.

The importance of mains protection to Utility Companies

- Ensures safe balanced operation of the distribution system
- Guarantees reliable delivery of high quality electricity
- Allows smooth involvement of the distributed generation
- Enables remote control of power supply sources

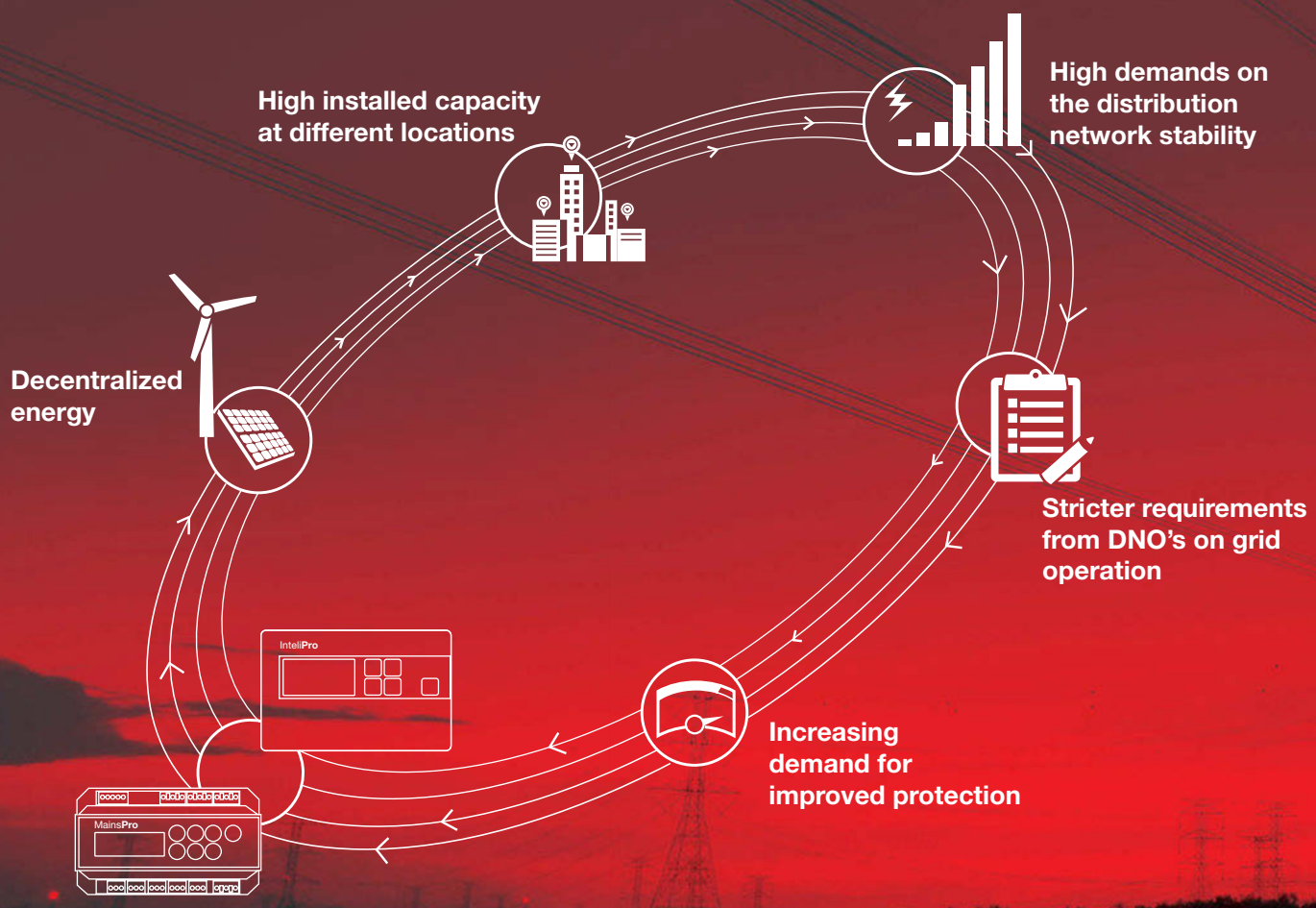
The importance of mains protection to Plant Operators

With the responsibility for reliable protection of plant, operators must install and maintain adequate protection equipment. Protection settings at the interfaces between the network operator and the plant operator/connection owner is governed using country specific guidelines, whilst the network operator determines whether and which protection devices are to be sealed or otherwise protected against alterations*.

The plant operator then must ensure

- Compliance with locally applicable standards and rules
- Compliance with technical conditions on connection to the distribution network
- Prevention of generator damage caused by grid parameters out of limits
- Reduction of down time after generation disconnection / interruption

** extract from German standard BDEW*



Development of ComAp MainsPro and InteliPro

Why are protection relays important?

The purpose of a mains protection relay is to automatically disconnect decentralized power generation system from the distribution network in the event the admissible parameter values of the grid are surpassed.

- Protect the generating units from mains disturbances
- Safely disconnect generator from the grid as soon as a failure is detected
- Prevent the distribution network from failure
- Maintain the quality of power delivered to customers

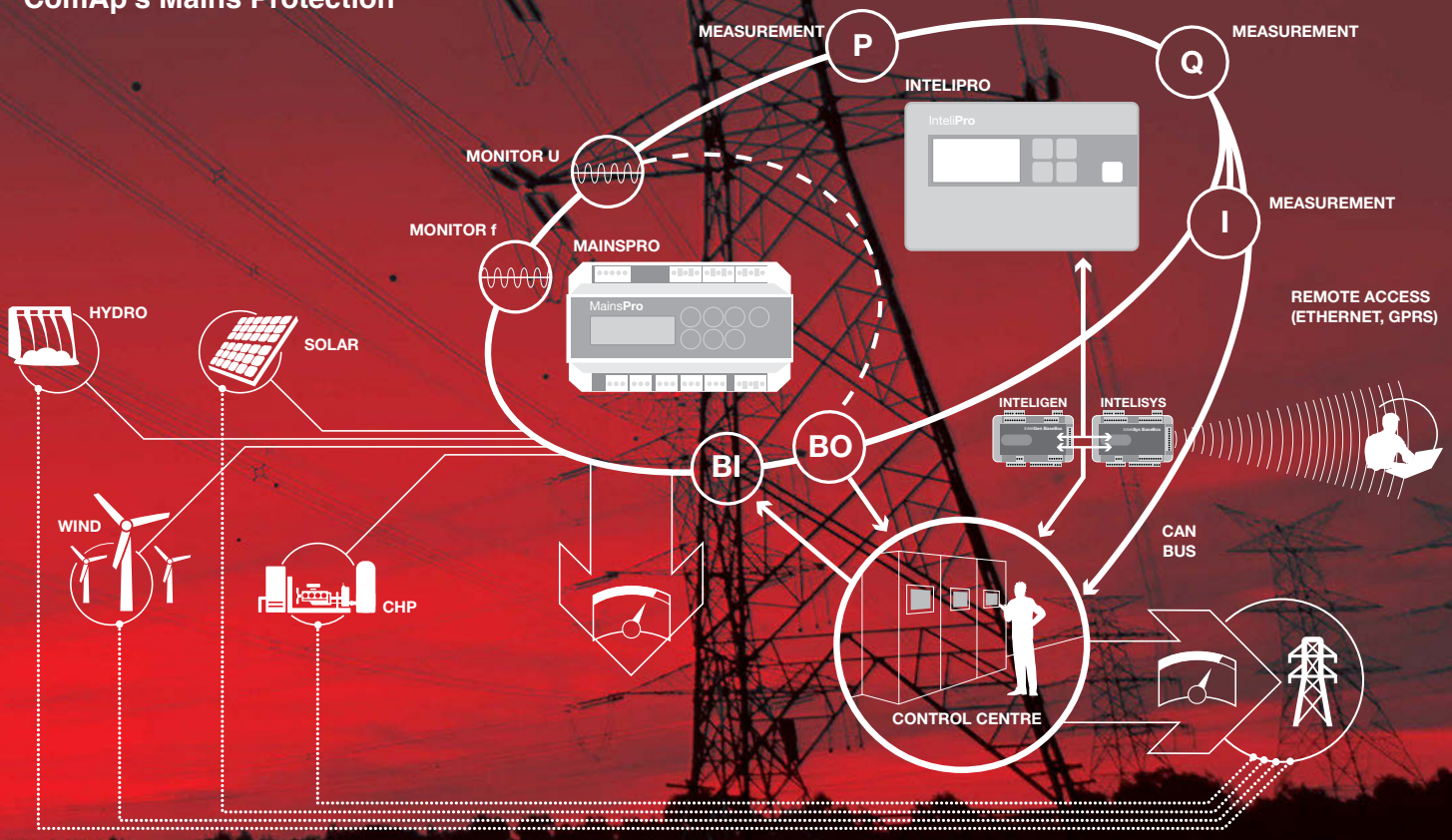
Where are protection relays necessary?

Mains protection relays are a necessary part of all distribution networks that feature a variety of decentralized energy sources.

- Combined heat and power (CHP) generation
- Renewable sources of energy
- Single or multiple generating units
- Synchronous or asynchronous generators

How it works…

ComAp's Mains Protection



Regulations around the world

Protection equipment is important for the secure and reliable operation of networks, connection facilities and generating plants. However, the regulatory requirements placed upon mains protection performance varies across countries, and is dependent upon a number of key factors.

- Level of decentralized generation involvement
- Overall condition of the distribution system
- Agreed standard limits of the grid parameters

General requirements which mains protections have to cover*

- Prompt response time to failure (not exceeding 100 ms)
- Accurate measurement of critical values
- Seal or other protection against unintentional change of settings
- Testing and inspection prior commission

** extract from German standard BDEW*

MainsPro and InteliPro approvals and acceptances

Country	MainsPro	InteliPro	Certified	Approved by Utilities*
Australia	✔	✔	IEC 60255	
Czech Republic	✔	✔		✔
Denmark	✔	✔		✔
Europe	✔	✔	IEC 60255	
France	✔	✔	VDE V 0126-1-1	
Germany	✔	✔	VDE V 0126-1-1	
Greece	✔	✔	VDE V 0126-1-1	
Hungary	✔	✔		✔
Italy	✔		CEI 0-21	
Ireland		✔		✔
Poland	✔		CERTYFIKAT len	
Slovakia	✔	✔		✔
Turkey	✔	✔	VDE V 0126-1-1	
United Kingdom	✔	✔		✔
USA	✔	✔	UL 508	

***no certificate is required**

Why inverters are not sufficient

In the specific case of PV installations, Mains Protection ensures:

Safety
Independent protection allows immediate circuit breaker disconnection for secure power supply separation from the grid.

Reliability
Redundant unit with individual processor and different logic ensures higher reliability.

Capability
Wider range of protective functions, which include reverse power, directional overcurrent, neutral voltage displacement and earth fault current measurement.

Accuracy
Higher accuracy as standard, with protections tested on precise failure evaluation, shortest tripping times and detection of internal failures.

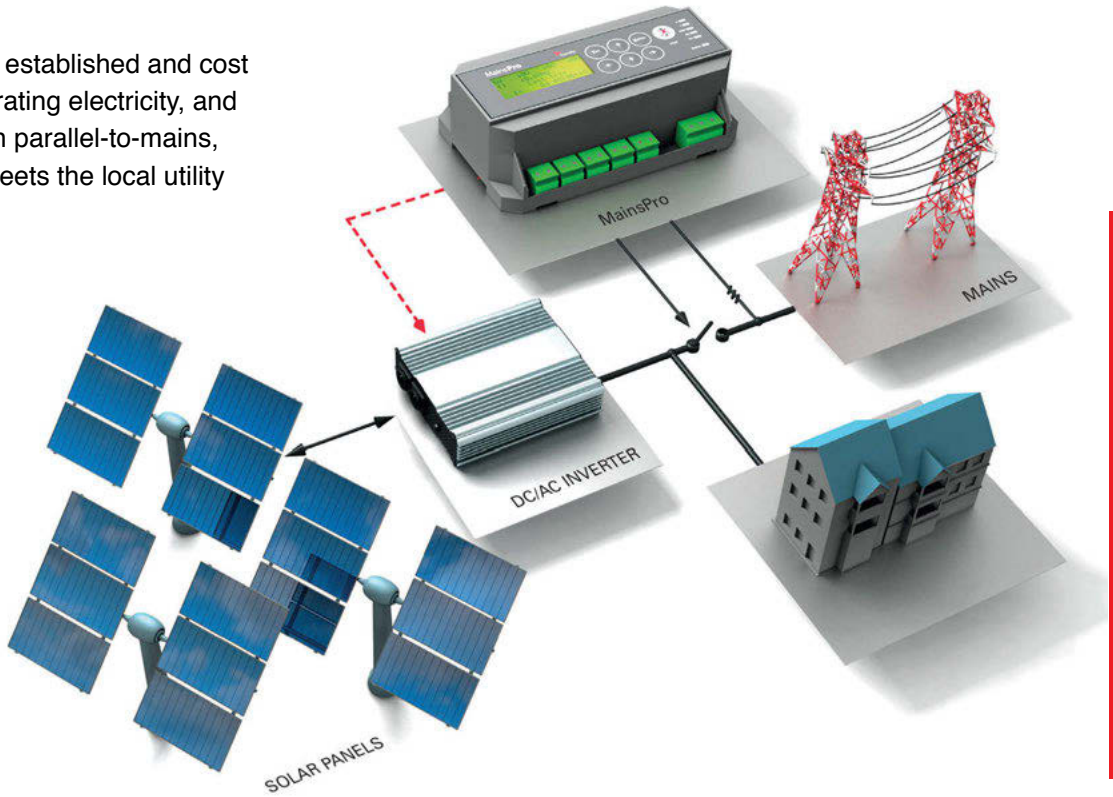
Simplicity
Intuitive and user friendly with easy operation and wiring, allowing for remote control from external device.

Applications and case studies from around the world

Solar Panels

Solar panels are now an established and cost effective option for generating electricity, and as the supply operates in parallel-to-mains, require protection that meets the local utility supply standards.

Benefit:
Increased safety of the installation



Solar (PV) application

Clotted Cream making factory, Cornwall, UK

For over 120 years Rodda's have been the world-recognised brand of Cornish clotted cream achieving the coveted Protected Designation of Origin for the delicious product they manufacture in Redruth, Cornwall.

As a way of managing future energy costs, a high performance photovoltaic system capable of generating 50 kWp even in low light conditions was recently installed on the factory roof, with the promise of delivering sustainable and reliable power output over a 25 year period. A necessary part of the commissioning process was the testing and protection verification of the complete system by the local electricity company as part of the UK G59/2 grid connection procedures.

"On future projects like these where complete grid protection solutions are needed by our clients we will always use MainsPro as a central component in our system. With the benefit of on-line product training we prefer MainsPro because it's a virtually plug and play solution".

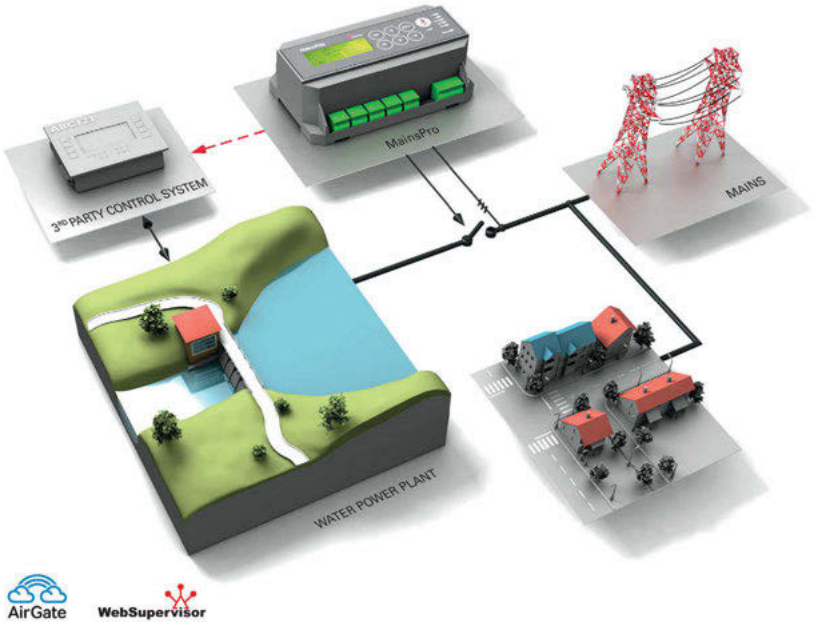
Ronnie Bakker, Technical Director, 2020 Solar

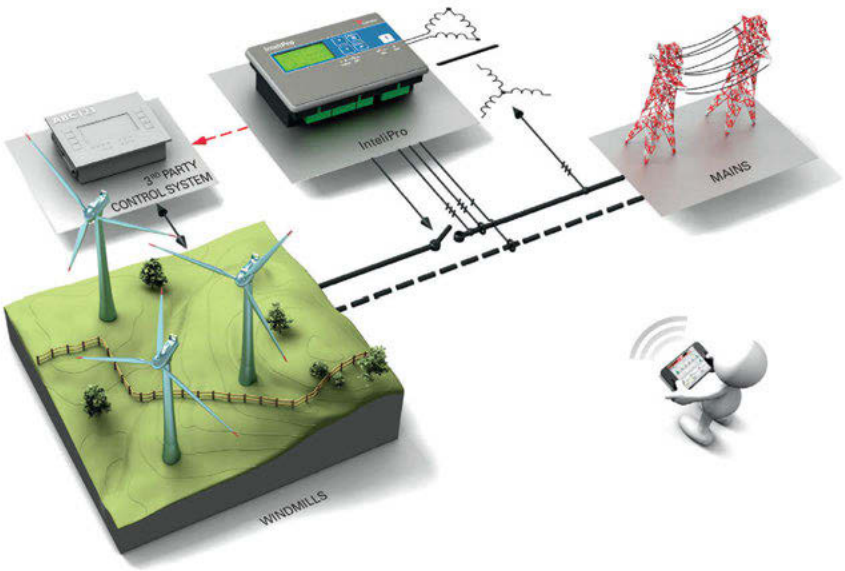
Applications and case studies from around the world

Water power

Small to medium water power plants are now increasingly common across Europe with the principal purpose of generating electricity directly back to the grid to cover demand peaks and benefit from ComAp modules providing full protection for generators operating parallel-to-mains.

Benefit: Easy to install and intuitive to use

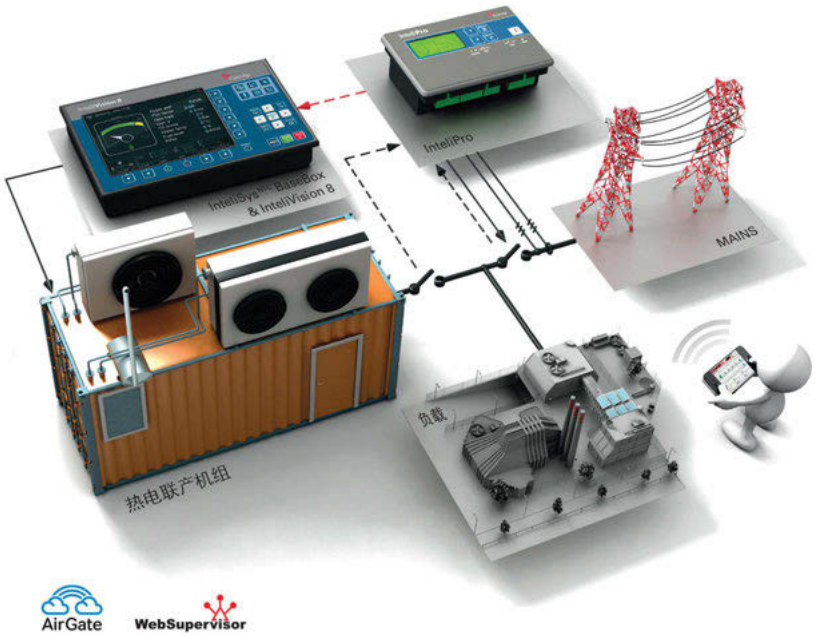




Wind turbines

Large-scale wind farms supply direct to the electric power transmission networks, whilst smaller facilities are used to provide electricity in remote locations for individual homes and communities.

Benefit: Remote communication capability for isolated applications



CHP

Mini cogeneration (CHP) installations between 5 – 500 kWe in buildings or medium sized business can take full advantage of a completely integrated range of mains protection products that operate seamlessly with dedicated generator controllers (measuring all values via CAN BUS) and displaying the whole installation on one screen using the free PC tool InteliMonitor.

Benefit: Seamlessly integrated packages

CHP application

D'Vine Ripe Tomato growing facility, Adelaide, Australia

In this major CHP application installed by Power and Drive Solutions, five onsite generators help deliver the necessary power required to operate climate control systems that includes fans, shutters and evaporative coolers as well as irrigation pumps, hydroponic articulation systems, robotic picking machines and power generally across the plant.

The project features a full range of ComAp dedicated hardware and pre-configured software and represents the largest application to date for ComAp's MainsPro model. The generators operate in parallel and in harmony to the mains utility supply of 400 kW delivering additional power through a combination of three diesel generators comprising two 1020 kW CAT 3512 and one 400 kW Cummins QSQ15 package. These are complemented by two CAT 3508 gas power generating providing 480 kW – all of which were managed via a central control room.

The power configuration is designed so the gas generators run in permanent parallel with the mains supply, and as the site load increases through the day the three diesel generators start and run in parallel with the mains and gas generators in a form of peak lop operation.

MainsPro helps maintain a stable, reliable and safe protection system providing true RMS measurement for increased accuracy, event record, as well as protective functionality, such as vector shift and rate of change of frequency (ROCOF) all in one unit.

Why ComAp protections?

- International recognition among utilities
- Wide range of certifications and standard compliance
- Flexibility in usage
- User friendly and intuitive setting and operation
- ComAp customized attitude

Useful product information

MainsPro
MAINS DECOUPLING RELAY

MainsPro is a protection relay for mains-to-parallel applications, including generator sets, cogeneration, micro turbines or renewable energy sources such as photovoltaic plants or wind turbines. It provides adjustable voltage, frequency and loss of mains protections to safeguard both the distribution network and the generators.

- Flexible supply voltage and measurement range
- Suitable for standard DIN rail installation or door-mount (optional)
- Friendly interface with easy setting
- Compact design allows installation into restricted spaces
- Simple wiring with detachable connectors
- Increased efficiency of commissioning tests
- Integrated mechanical lock to secure your setting

MainsPro complies with IEC 60255, G83, G59/2, UL508, CEI 0-21, IEn NR 005/2012 and VDE V 0126-1-1.

InteliPro
UTILITY PROTECTION RELAY

AirGate WebSupervisor PoleSlip

InteliPro is a highly flexible interconnection/mains decoupling protective relay and with extensive protective functions it meets the strictest utility interconnection requirements and can be used in wide range of distributed generation applications.

- Detailed history log fully records the nature of mains disturbances including brown-outs
- Watchdog reporting provides increased reliability of the installation
- Door-mount possibility with clear graphical display allows full accessibility
- Password protection ensures settings are fully secured
- Advanced on-line communication notifies you immediately of changes in your mains-connection
- Extensive communication and extension modules support

InteliPro complies with G83, G10, G59/2, UL508, IEEE 1547, IEC 60255 and VDE V 0126-1-1.

For further information go to www.comap.cz/protections.
Certifications, approvals and other files are available on request.

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