

EN

# ENERGY - GRID MANAGEMENT





# EXPERIENCE AT THE SERVICE OF INNOVATION

>40

energy providers  
served

>100%

in-house production

## SMART GRID MANAGEMENT

Our Grid Management division at Bonomi dates back to 2015, when we acquired OEMB. However, the tradition of the company has more distant roots: in fact, since the 1960s, its production has concentrated on **solutions for energy distribution between 12 and 36 kV**, supporting **organisations and customers around the world**. Following a corporate reorganisation aimed at specialisation technology and resource optimisation, Bonomi has focused on innovative, high-performance products: solutions that operate both in the field of **traditional systems** (singlepole switches, pole-mounted load break switches and medium voltage 24 and 36 kV switchgears and Ring Main Unit) and **automated systems** for smart grid management.

## A FEW REFERENCES:

ENDESA - TERNA - CPFL ENERGIA - ENERGISA - EQUATORIAL  
CODENSA - TEIAS - OFFICE NATIONAL DE L'ELECTRICITÉ  
ENERGIA - SAUDI - ÉLECTRICITÉ DU LIBAN - IBERDROLA  
TENNET - CEMIG - ENEL - RED ELECTRICA DE ESPAÑA  
EDUSER EGYPTIAN ELECTRICITY HOLDING COMPANY  
ABU DHABI WATER & ELECTRICITY AUTHORITY  
OMAN ELETRICITY TRANSMISSION COMPANY  
EVN VIETNAM ELECTRICITY - NATIONALGRID  
SWISSGRID

# SMART MANAGEMENT OF ELECTRICAL NETWORKS

Today's energy demand exceeds the availability of primary resources.

This means a **more conscious and efficient use of energy**, whose management will then follow the production rhythms in a more targeted manner.

In this transitional period, however, traditional systems will continue to co-exist along with the newer automated systems.

Strengthened by our experience, we are able to offer our customers a **wide range of solutions** and to support them in engineering terms for **optimal grid management**.

**Network digitalization, sensorization and automation** represent the new challenges that will guide us towards a new era for GTD (generation, transmission and distribution) of energy.





### SMART ENGINEERING

A smart grid continuously monitors the entire electrical flow of the system. Our products **allow prompt intervention** in the event of electricity failures and **minimization of dispersion and interruption** of energy through self-healing systems.

This translates into faster energy recovery after a power outage, in addition to a noticeable decrease in the CAIDI (Customer Average Interruption Duration Index) and CAIFI (Customer Average Interruption Frequency Index) indicators.



### MANY SOLUTIONS FOR A DIVERSIFIED MARKET

Bonomi's Grid Management division offers solutions that are able to **better manage the energy of distribution lines.**

**Security and automation** in safe conditions become crucial issues for us, especially with a view to migrating to new smart grid technologies.

We work every day to ensure **reliability, speed** in identifying and **resolving** any problems, **improving performance and security.**



### GRID FLEXIBILITY AND RELIABILITY

Thanks to the Insulation and Grid Management departments, we are able to offer the **widest range in the energy sector.** For years we have worked with customers and electricity companies around the world and **we have profound knowledge of the market:** for this reason, **we have implemented both traditional and automated systems.**

# RESEARCH AND DEVELOPMENT

## R&D and CONTINUOUS TRAINING

Every year, Bonomi invests part of its turnover in R&D activities and in staff training.

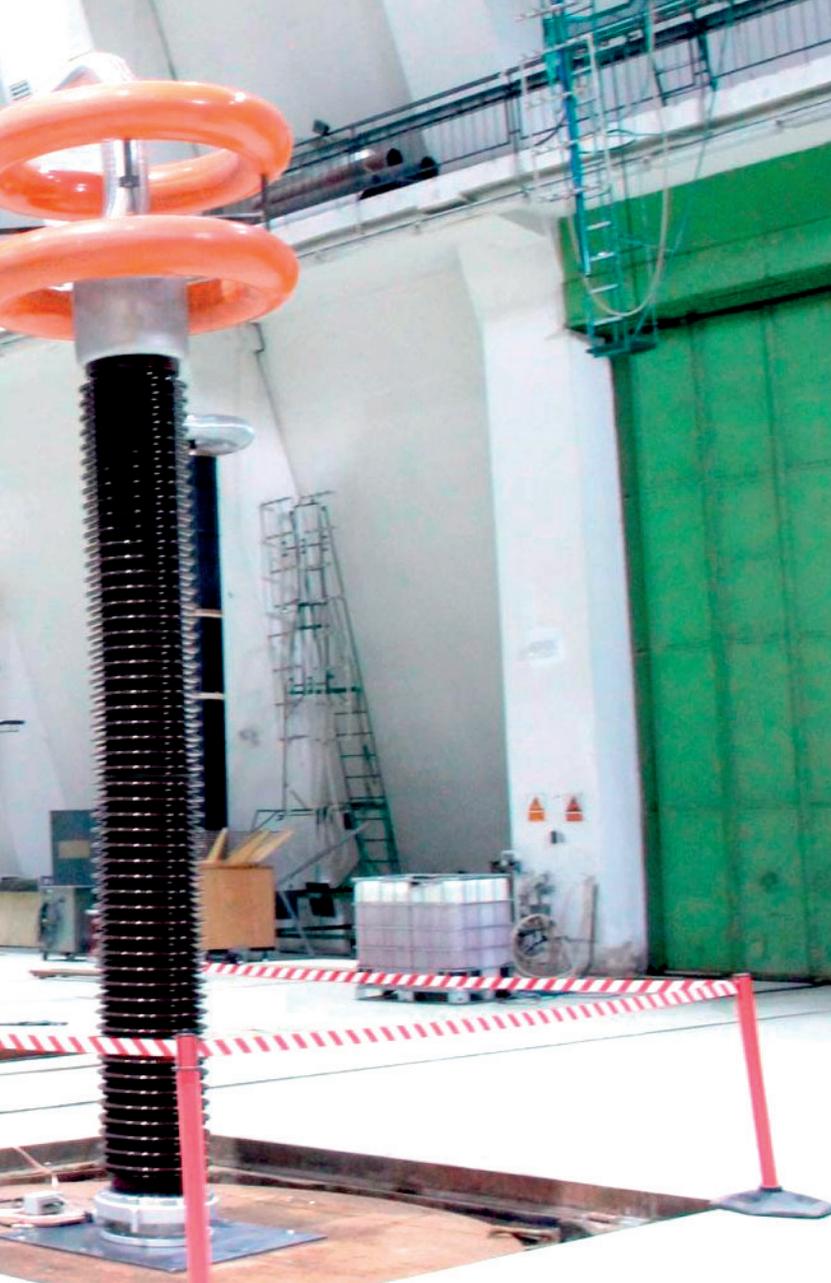
We have always been committed to **designing** new products capable of predicting market demand or renovating current solutions.

Furthermore, in our constant effort towards efficiency enhancement we are committed to studying **new materials with lower environmental impact while simultaneously maintaining increasingly higher performance.**

## CALCULATION TOOLS

Our technical department uses the **most innovative calculation softwares**, specifically customised to study overhead power lines.





### **MECHANICAL, CHEMICAL AND ELECTRICAL TEST ROOMS**

Our laboratories are designed for conducting various types of tests including:

- dimensional tests using electronic systems
- hardness tests
- roughness tests
- galvanised coating tests
- mechanical traction, compression, bending and torsion tests, even combined with thermal cycles
- fatigue tests
- electrical, insulation (dry and wet frequency and impulse) and partial discharge tests
- ageing test in climatic chamber
- Insulating materials resistance tests to tracking and erosion
- Insulating materials dielectric strength tests.

Furthermore, our laboratories are open to customers and railway services providers for visits and in-house testing.

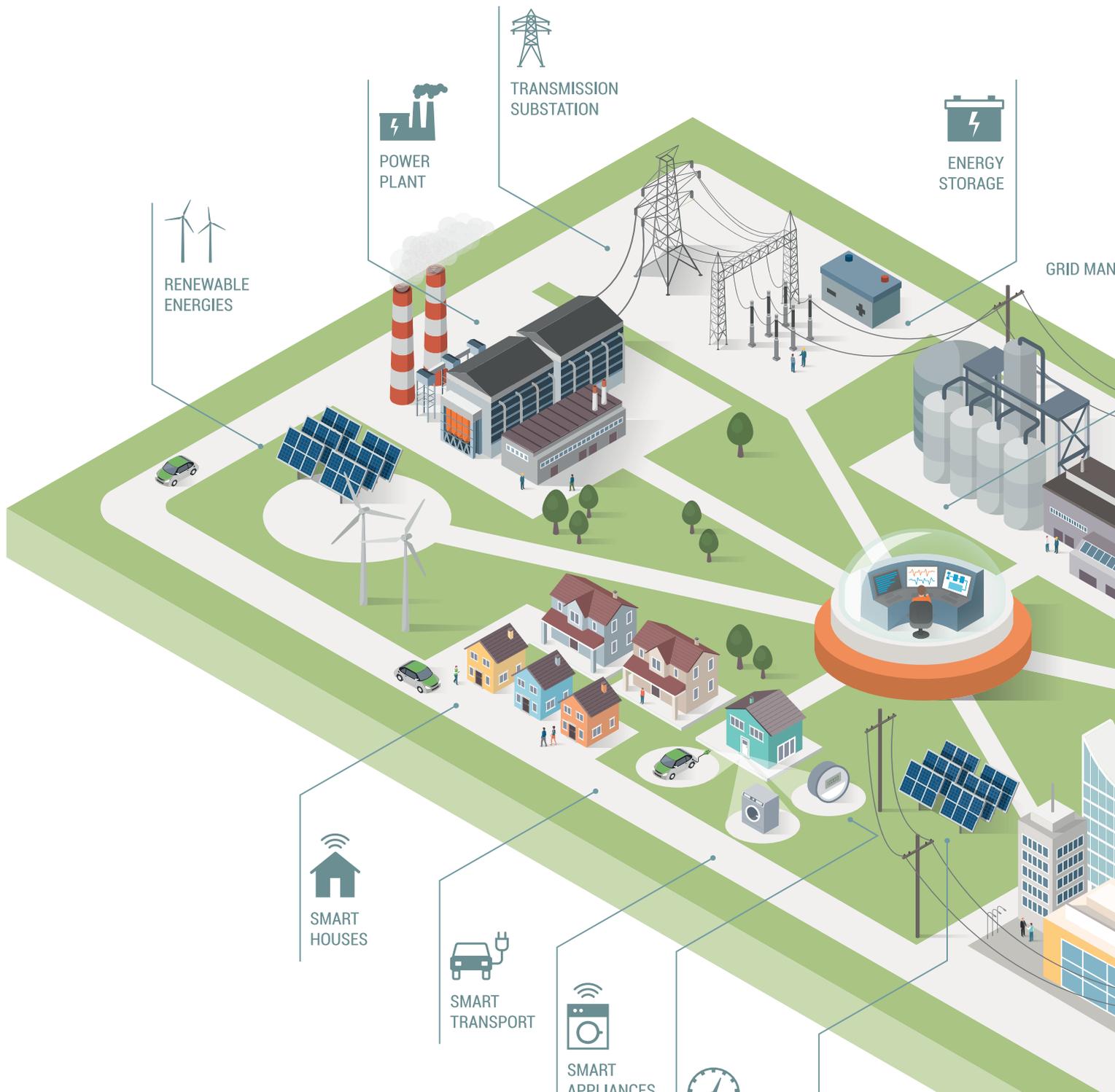
### **TESTING IN EXTERNAL LABORATORIES**

We collaborate with external laboratories for certified tests as an extra support.

### **STRATEGIC PARTNERSHIPS**

We have established solid partnerships with market leading companies for communication and management data, as well as the logic programming of functioning of the protections. This guarantees the efficiency of the equipment and their simple adaptation to the new versions of the various communication protocols.





**TRADITIONAL SYSTEMS**



Load Break Switches—ESG



GIS – MV switchboards with LBS in SF<sub>6</sub> gas — ENERGY 24 and 36



RMU – Metal enclosed Ring Main Unit



POWER INTEGRATION



SMART METERS



SMART APPLIANCES



SMART TRANSPORT



SMART HOUSES

## AUTOMATIC SYSTEMS

### UP - CONTROL UNIT



Automatic Sectionalizer -  
ESG MATIC

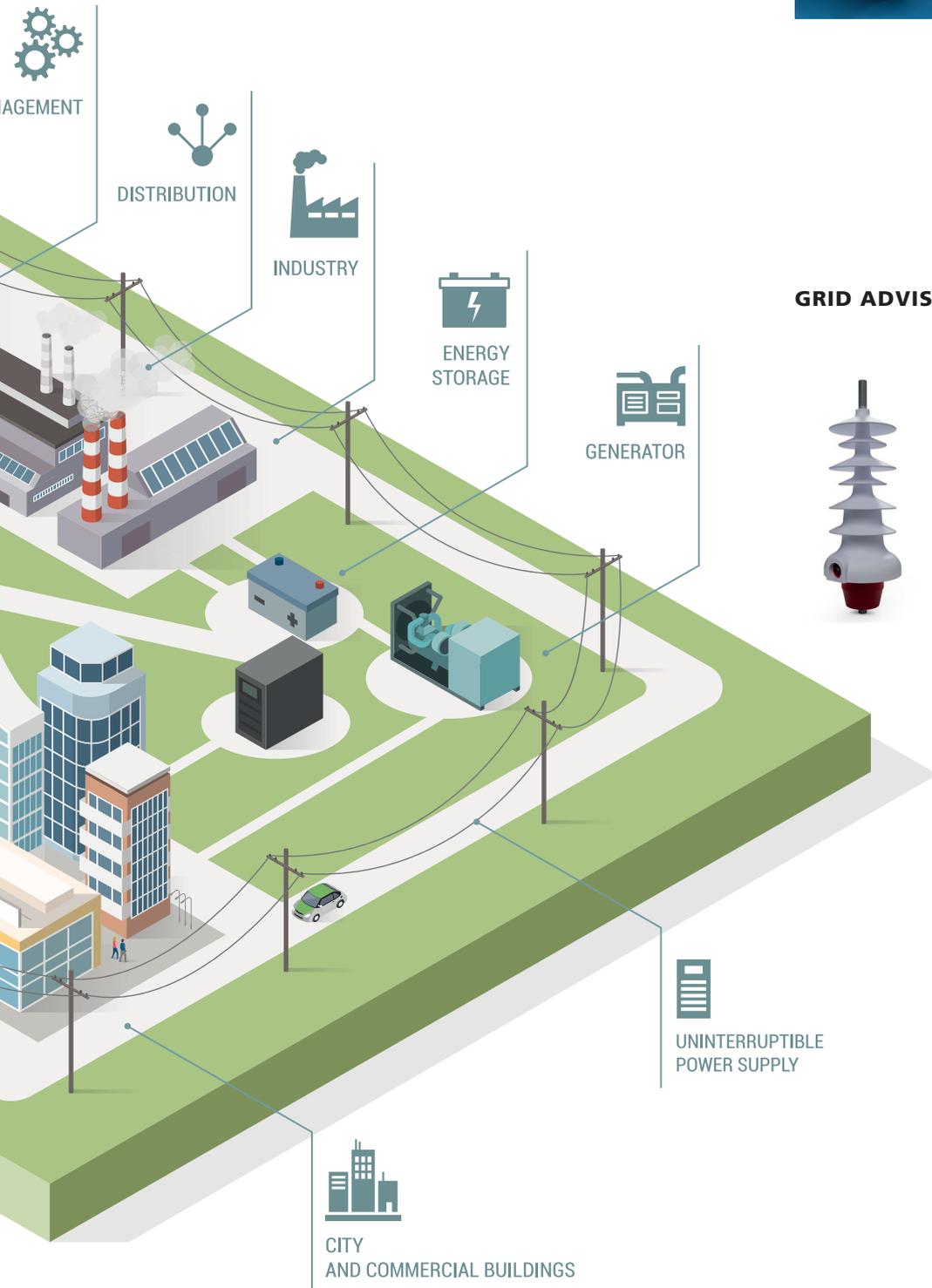
Full panel for  
ESG MATIC management

RMU Protection Relays

### GRID ADVISE SENSORS



Smart bushings and  
smart sensors



# PRODUCTS TRADITIONAL SYSTEMS

## LOAD BREAK SWITCHES - ESG

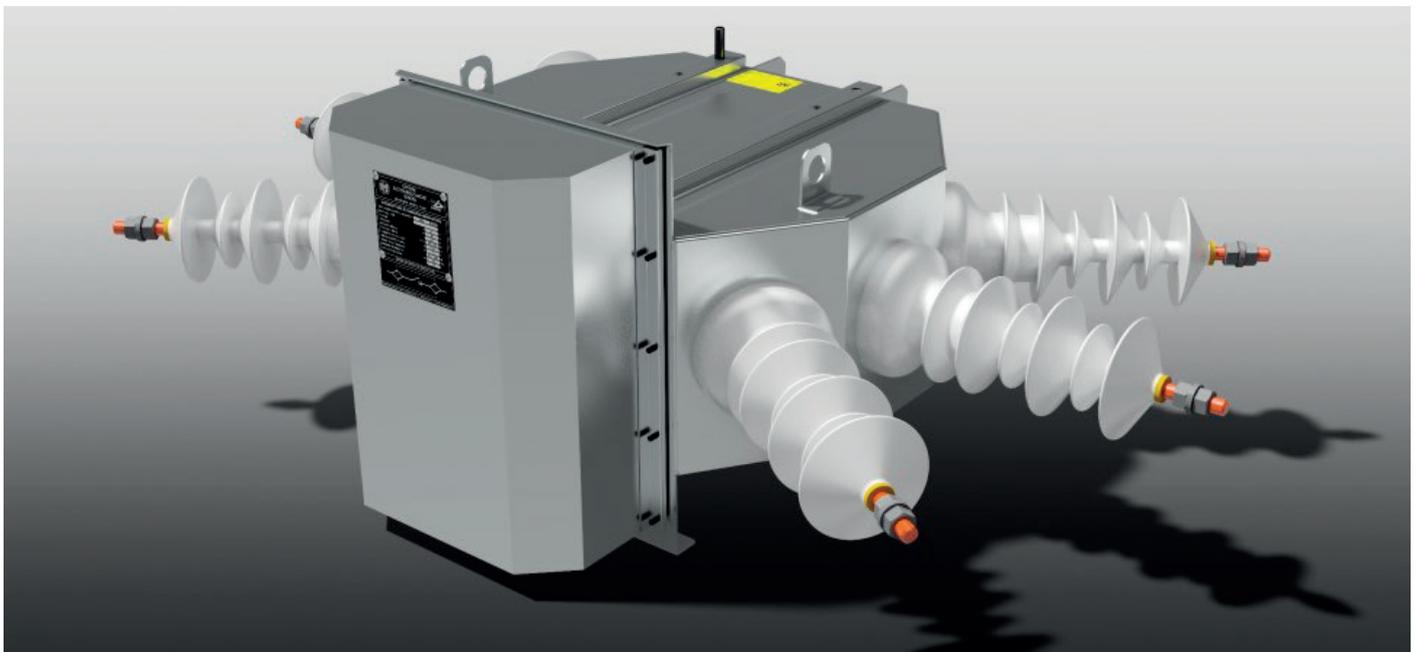
Bonomi's ESG is an outdoor pole-mounted SF<sub>6</sub> – insulated load break switch for medium voltage applications (24 - 36 kV).

The ESG is supplied with a motorized control but can always be operated manually with the frontal lever or postponed.

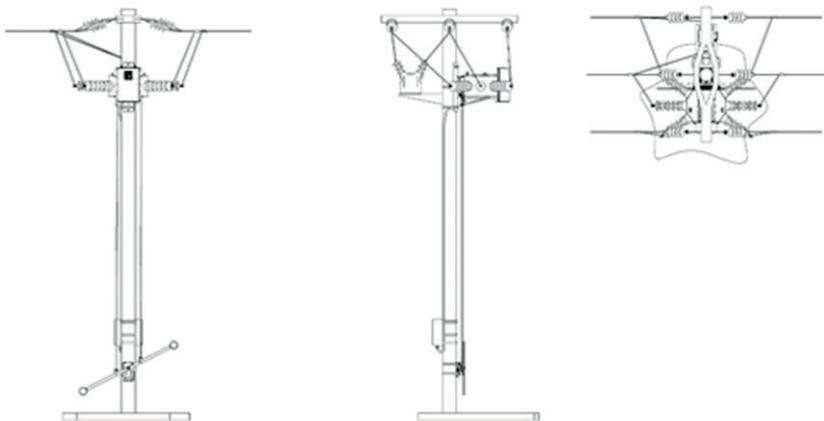
Features	kVrms	24	36
Rated frequency	Hz	50/60	
Earth Industrial frequency insulation test	kVrms	50	70
Earth lightning impulse insulation test	kVpeak	125	170
Isolation test on industrial frequency disconnection	kVrms	60	80
Isolation test on sectioning	kVpeak	145	195
Thermal current	A	630	
Breaking capacity	A	630	
Short time current at 1 sec.	kArms/ peak	25/65	
Making capacity	kApeak	40	
Mechanical endurance		M2	
Electrical class		E2	
Protection degree		IP54	

Installation with front control and remote-control panel.





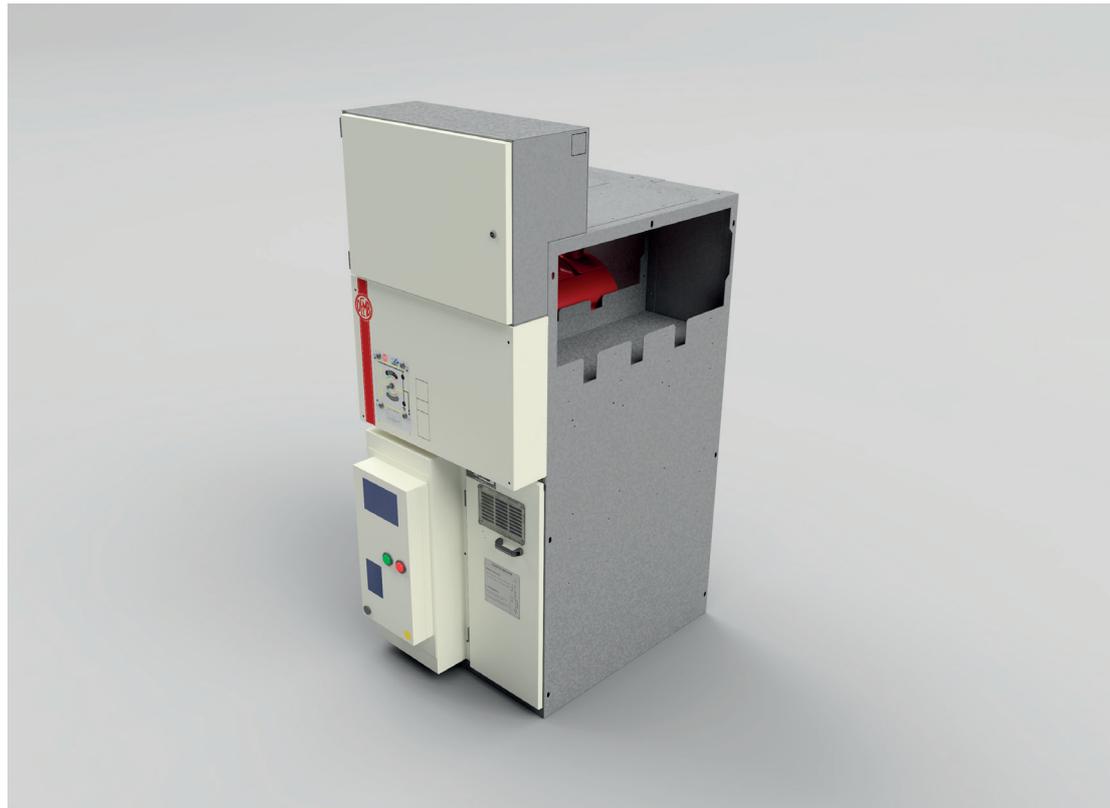
Installation with postponed  
down-to-pole control and  
remotecontrol panel.



# AIS – MV SWITCHBOARDS WITH SF<sub>6</sub> INSULATED LBS IN RESIN ENERGY 24 & 36

Our AIS medium voltage switchboards, with mixed Air/SF<sub>6</sub> insulation, are used in various applications - from civil construction to distribution substations. They have the great advantage of compactness compared to the classic air compartments.

**ENERGY 24** MV panels with LBS in SF<sub>6</sub> - 24 kV



<b>Rated voltage</b>	kV	12 - 17,5 - 24
<b>Rated current</b>	A	400 - 630
<b>Short duration current (1s)</b>	kArms	12,5 - 16 - 20
<b>Typical unit width</b>	mm	375

**ENERGY 36** MV panels with LBS in SF<sub>6</sub> - 36 kV



<b>Rated voltage</b>	kV	36
<b>Rated current</b>	A	400 - 630
<b>Short duration current (1s)</b>	kArms	12,5 - 16 - 20
<b>Typical unit width</b>	mm	750

## RMU – RING MAIN UNITS

### RMU - METAL ENCLOSED SF<sub>6</sub> - INSULATED FOR SECONDARY DISTRIBUTION

Bonomi RMUs are a GIS (Gas Insulated Switches) metal enclosed for medium voltage applications (12 - 17.5 - 24 - 36 kV).

This technology guarantees excellent product performance and does not require maintenance, and is also indicated for insertion into ring networks with voltage up to 36 kV - 630 A - 20 kA and to power transformers of various voltages. The RMU allows extensibility based on installation needs in addition to the possibility of remote control and activation.

Features	kVrms	12	17,5	24	36
Rated frequency	Hz	50/60			
Earth Industrial frequency insulation test	kVrms	28	38	50	70
Earth lightning impulse insulation test	kVpeak	75	95	125	170
Isolation test on industrial frequency disconnection	kVrms	32	45	60	80
Isolation test on sectioning	kVpeak	85	110	145	195
Thermal current	A	630			
Breaking capacity	A	630			
Short time current at 1 sec.	kArms/peak	20/25.5			
Making capacity	kApeak	52.5			
Mechanical endurance		M1			
Electrical class		E2			

### EARTH SWITCH

Features	kVrms	12	17,5	24	36
Making capacity	kApeak	52.5			
Mechanical endurance		M0			
Electrical class		E2			

### CIRCUIT BREAKER

Features	kVrms	12	17,5	24	36
Making capacity	kArms	25		16	
Short time current at 1 sec.	kArms/ peak	25/65		16/42	
Mechanical endurance		M2			
Electrical class		E2			

### COMPACT SYSTEM

The product range is available in the following standard configurations:  
2L + 1T, 2L + 2T, 3L, 3L + 1T, 4L, 4L + 1T,  
2L + 1 VCB, 2L + 2 VCB, 3L + 1 VCB,  
4L + 1 VCB, 2 VCB + 1T



### MODULAR SYSTEM

The product range is available in the following units:

- RMU 1L
- RMU 1T
- RMU VCB

## UP - CONTROL UNIT

### **AUTOMATIC SECTIONALIZER – ESG-MATIC**

ESG-MATIC is the evolution of ESG which includes 3 integrated voltage transformers (LPVT) and 3 current transformers (LPCT) for measurements, with programmable control logic and automatic intervention. All this ensures an even more functional continuity of service thanks to the automatic reconfiguration of the networks in less time. In addition to the advantages mentioned above, ESG-MATIC allows you to maintain and consult the event log remotely.

ESG-MATIC comes with a motor-driven control, but still manually manoeuvrable through the front lever or through a postponed down-to-pole mechanism.

Features	kVrms	24	36
Rated frequency	Hz	50/60	
Earth Industrial frequency insulation test	kVrms	50	70
Earth lightning impulse insulation test	kVpeak	125	170
Isolation test on industrial frequency disconnection	kVrms	60	80
Isolation test on sectioning	kVpeak	145	195
Thermal current	A	630	
Breaking capacity	A	630	
Short time current at 1 sec.	kArms/ peak	25/65	
Making capacity	kApeak	40	
Mechanical endurance		M2	
Electrical class		E2	
Protection degree		IP54	
Low pressure electrical locking device		optional	



## REMOTE CONTROL UNIT

### STANDARD ACCESSORIES - FEATURES:

- Painted steel panel (other materials and treatments on demand);
- Pole/wall mounting;
- 24V 7Ah batteries;
- Battery fault indicator;
- 220V Anti-condensation resistance;
- Thermal-magnetic circuit breaker;
- Thermostat;
- Ethernet port (RJ45);
- 220 V power socket;
- 'Door-open' indicator;
- Modem (LTE, UMTS, GSM/GPRS/EDGE, ETHERNET, WIFI);
- IP66/IK08;
- Multi-pin connector.

Communication protocol

DNP3.0 - IEC61850 - IEC101 - IEC 104

### OPTIONAL ACCESSORIES - FEATURES:

- Padlocking availability;
- Windproof door lock;
- Interior light;
- Overvoltage protection.

### STANDARD ACCESSORIES - FEATURES:

Communication: IEC 61850-8-1 Protection:

- 50 - Instantaneous Overcurrent
- 50N - Neutral Instantaneous Overcurrent
- 51 - Overload
- 51N - Neutral Time Overcurrent
- 49 - Machine or Transformer

Thermal/Thermal Overload

- 46 - Reverse-Phase or Phase Balance Current or Stator Current Unbalance

### OPTIONAL ACCESSORIES - FEATURES:

Communication: IEC 61850-5-101/104, DNP3, MODBUS Protection:

- 67 - AC Directional Overcurrent
- 67N - Neutral Directional Overcurrent
- 32N - Wattmetric Zero-Sequence Directional
- 21N - Reactance and Mho Phase

Directional-Distance 27 - Undervoltage

- 59 - Overvoltage
- 81 - Frequency
- 47 - Phase-Sequence or Phase Balance Voltage



# PRODUCTS AUTOMATED SYSTEMS

## GRID ADV ISE SENSOR

SMART BUSHINGS & SMART SENSORS





# MAIN PROJECTS

The **development of Smart Grids** requires ever higher levels of **network flexibility and reliability**, which must be able to manage the energy withdrawal peaks from the transmission system, as well as the best way to collect and distribute the energy produced.

For this reason, the topic of **remote control and network automation** acquires crucial importance, i.e. the **control of remote installations in safe conditions**.

**Remote control systems** are essential for the operation of distribution networks, allowing territorial Operating Centres to carry out all the operations necessary to ensure the quality and continuity of the supplied electricity service.

In Latin America, Bonomi is a partner of ENEL in the development of the "Projeto Telecontrol", which involves **thousands of kilometres of electricity networks** in the Brazilian states of Ceará, Goiás, Rio de Janeiro and São Paulo, as well as some cities in Colombia, Peru, Chile and Argentina.

The implemented **automation system** allows the detection of the trunk of medium voltage network affected by failure, its isolation and automatic resupply of the "healthy sections" upstream of the faulty network section.

This procedure is performed independently by the peripheral units thanks to the signals coming from the fault and voltage absence detectors installed in secondary cabins, without any intervention of the central system.

To date, Bonomi has been a supplier of over **11,300 ESGs**, installed throughout the ENEL area of responsibility.



Via A. Mercanti 17  
25018 Montichiari (BS) - Italy  
info@gruppo-bonomi.com  
+39 030 96 50 304

[www-gruppo-bonomi.com](http://www-gruppo-bonomi.com)