



Technical & Sales Presentation EE

# About us

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**An Italian company since 1999 with headquarter, R&D and production unit in the North East of Italy and distribution in all the country and in a number of relevant international markets.**



# Mission

**Develop and produce advanced technology to allow companies and public administration to reach significant levels of energy efficiency and saving.**

**Contribute with our products to the protection of the environment.**

**Energia Europa Institutional Video:**

[https://www.youtube.com/watch?v=Yp\\_gGuiBiNs](https://www.youtube.com/watch?v=Yp_gGuiBiNs)



# Certifications



ISO 9001:2015, ISO 14001:2015,  
UNI CEI 11352:2014,  
ISO 45001:2018.



CE Mark in accordance  
with IEC/EN 61439-1-2.



UL Mark for compliance with US and  
Canadian safety requirements. The UL  
mark guarantees approval and  
recognition worldwide.



RCM Mark for compliance with  
Australia and New Zealand safety  
requirements.



Patent 1: EP-X System protected by  
international patent N. PCT/IT2011/000275  
Patent 2: Bypass System protected by  
international patent N. VI2007A000272.



Short circuit tests according to the  
international standard IEC/EN 61439-1-2.



**EMC**

Electromagnetic compatibility according to  
IEC/EN 61000-6-2 and IEC/EN 61000-6-4.



The EP-X system is in compliance with the  
Low Voltage Directive, 2014/35/EU.

**COMPLIANCE  
AND TESTS**

Compliance of IEC/EN 50449 regarding the  
evaluation of workers exposure to  
electromagnetic fields produced by EP-X  
systems, tests of the Fault Loop Impedance.

## Smart Green Technology

**PATENTED FILTER** that reduces **DISTURBANCES** and **LOSSES**, acting mainly on the **CURRENT** waveform, useful for **OPTIMIZING** the energy consumption, **DECREASING** the downtimes and **REDUCING** greenhouse gas emissions.



EP-X closed

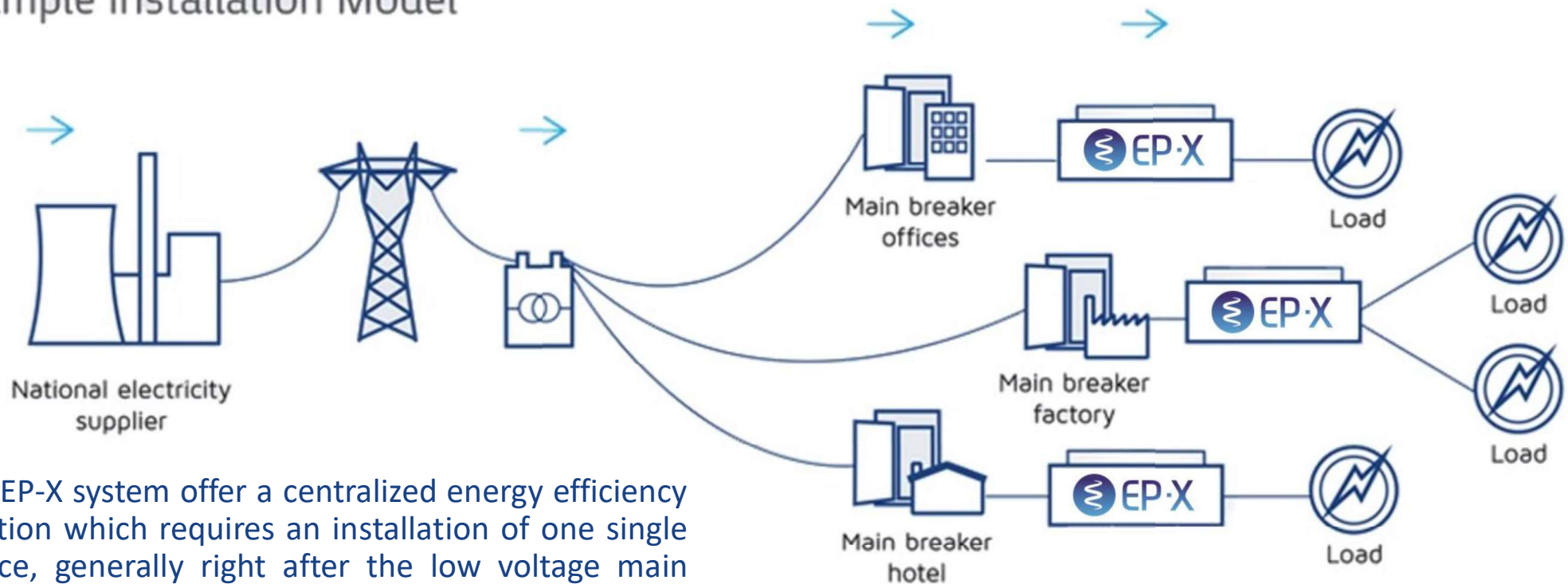


EP-X open

The new EPX serie: <https://www.youtube.com/watch?v=XqtzMf5nTNc>

# Where is it installed?

## Sample Installation Model



The EP-X system offer a centralized energy efficiency solution which requires an installation of one single device, generally right after the low voltage main breaker and before the loads.

# Why use it?

Until the 80's, in all industrial and commercial sites the linear loads were largely prevalent; that is, electrical loads not influenced by power electronics.

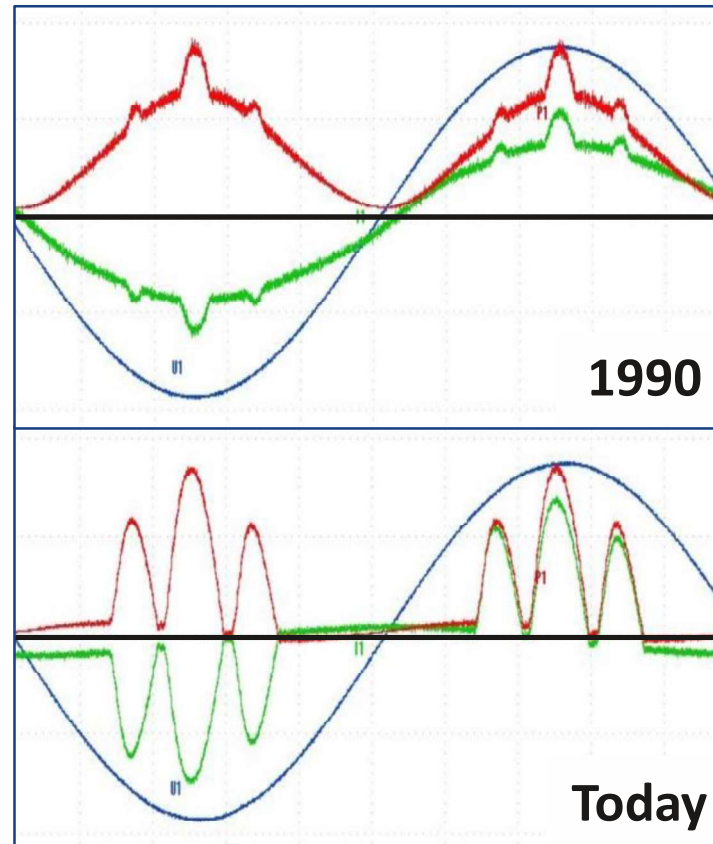
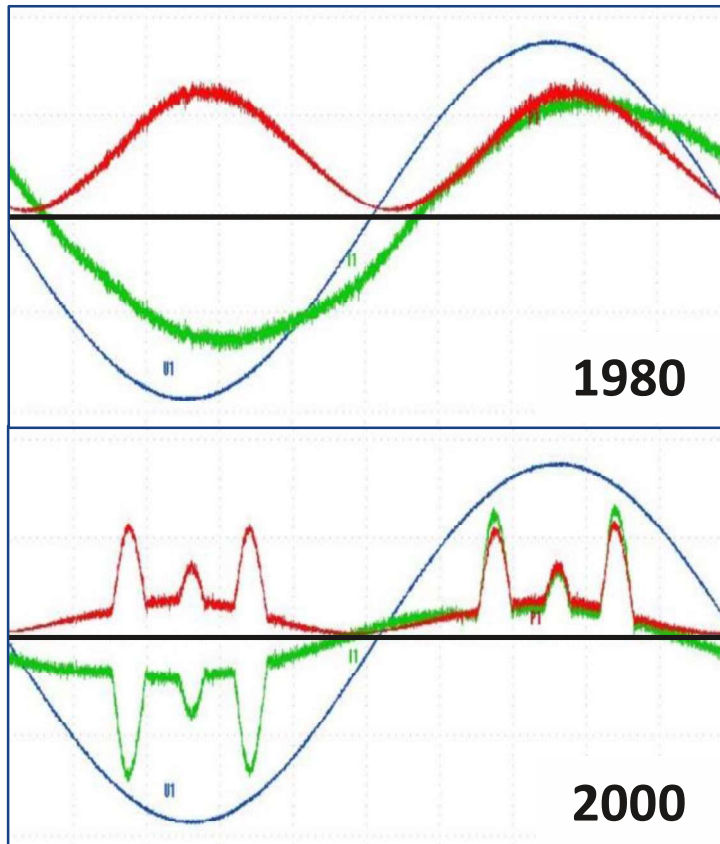
At the end of the 80's the electronic components become smaller and more efficient. New effective technologies linked at the electronic control of power are emerging, which generate a positive impact on energy consumption but a negative one on the power quality.

Since the years 2000, the global electrical energy consumption is constantly increasing at a very fast pace; energy produced by renewable sources is increasing as well, with a negative impact on power quality too. Today in the production sites the non-linear loads regulated by power electronics are largely prevalent.

**It becomes essential to save energy through the optimization of energy transmission and the improvement of power quality.**



# Why use it?



How the power waveforms have changed in productive and commercial sites from the 80's till today...

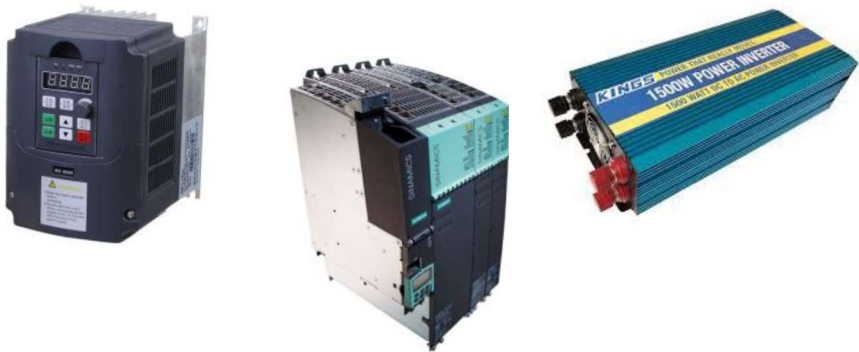
Current: 

Power: 

Voltage: 

# Non-linear loads reduce Power Quality

## Inverter - VSD/VFD - Power electronics



## Inverter on renewable sources



## LED lighting



## Switching power supply



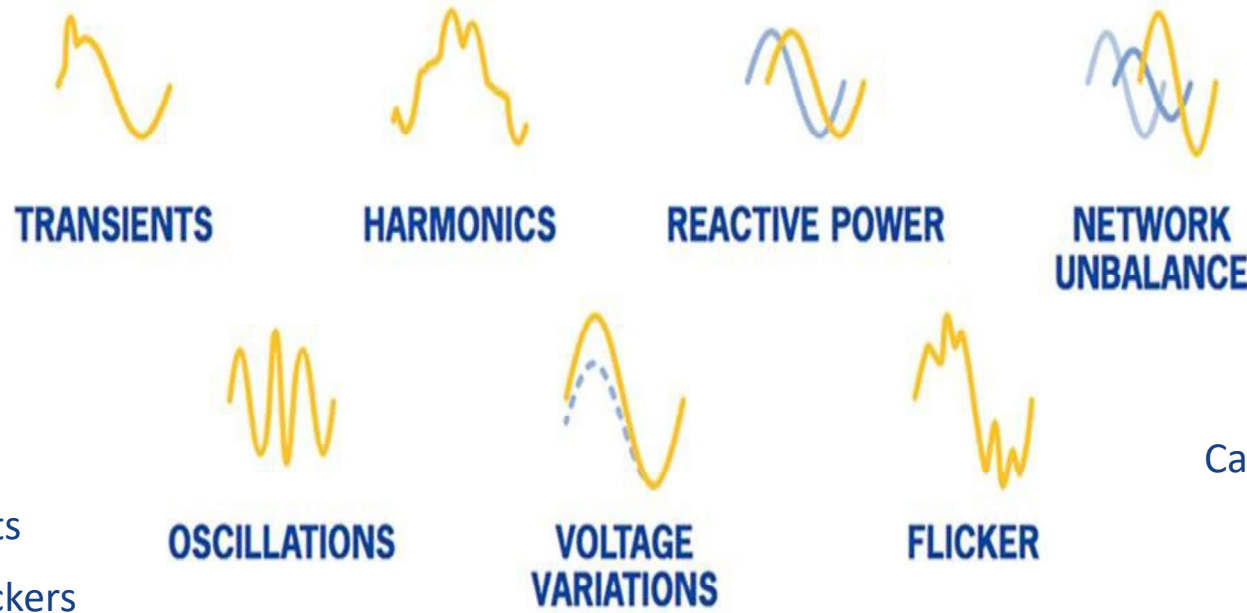
## Computer - IT devices



# Low Power Quality

## Disturbances

- Harmonics
- Oscillations
- Voltage Dips
- Interruptions
- Voltage Drops
- Voltage Surges
- Unbalancing and transients
- Voltage Variations and Flickers

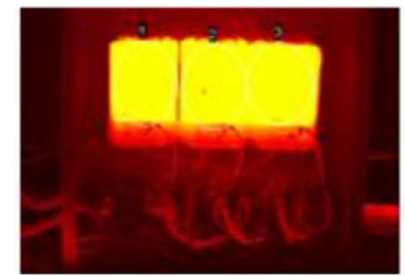
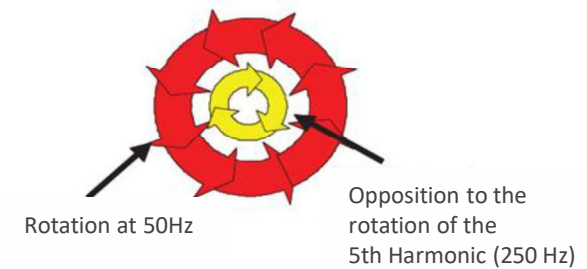
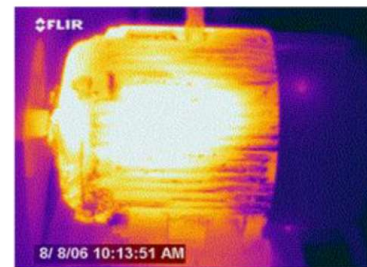
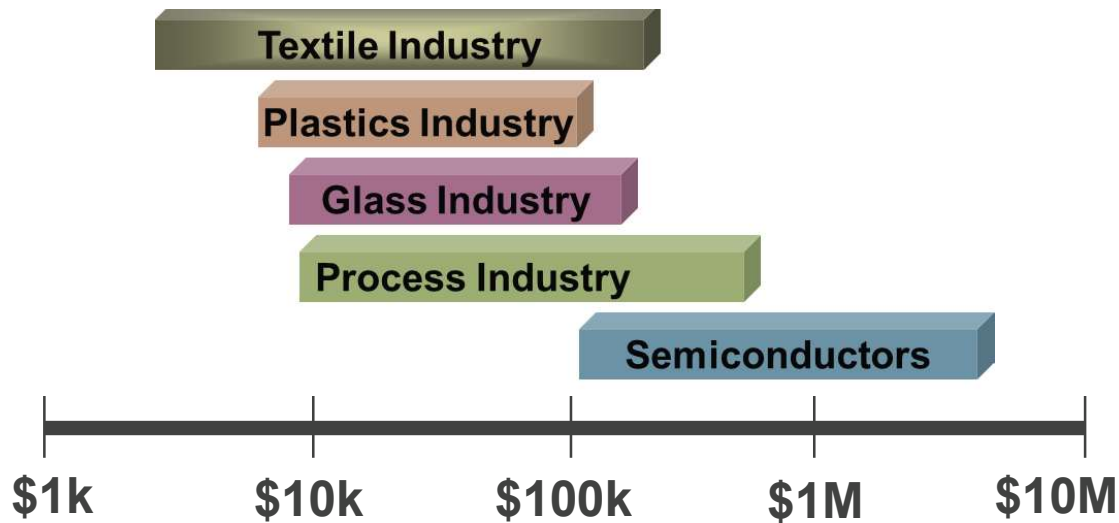


## Losses

- Motors
- Neutral
- Capacitors
- Transformers
- Harmonic Power
- Cables/Electrical Line

# Low Power Quality - Consequences

Financial losses per industrial sector calculated for a single voltage dip event.



Sources:

EPRI, "The Economics of Custom Power", IEEE T&D Show 2003

SINTEF, Study on Estimation of Costs due to Electricity Interruptions and Voltage Disturbances, 2010

Economic evaluation of harmonic cost, 2016 IEEE 8th International Power Electronics and Motion Control Conference (IPEMC 2016)

# What is the main purpose of EP-X?

**100% Energy Efficiency**

=

**Work**

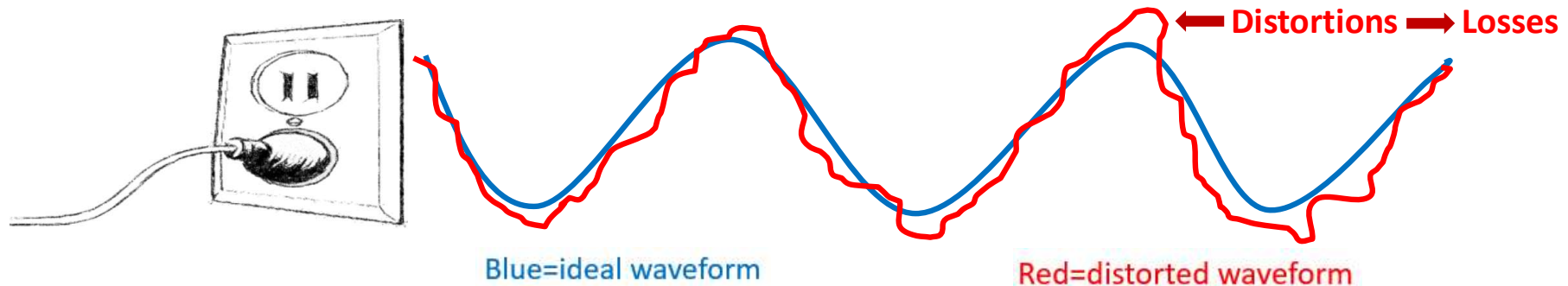
without

**Losses**

In an electrical network

Energy required  
by the loads to work

Unnecessary energy consumed  
by the loads due to disturbances/distortions  
in the network (low Power Quality)



The main purpose of the EP-X system is to reduce disturbances and losses in the electrical network, thus generating energy efficiency for the same amount of work performed.

# More than 1.200 installations



Industrial buildings, Warehouses, Plants...



Department stores, Retail...



Offices, PA, Municipalities...



Hospitals, Clinics, Hotels, SPA...



Schools, Colleges, Sport facilities...



Airports, Ports, Stations...

# EP-X is a REAL TIME filtering technology

One of the technologies used in the development of the EP-X system comes from the world of audio and acoustics, where distortions are undesirable background noise that can be attenuated with appropriate filtering technology.

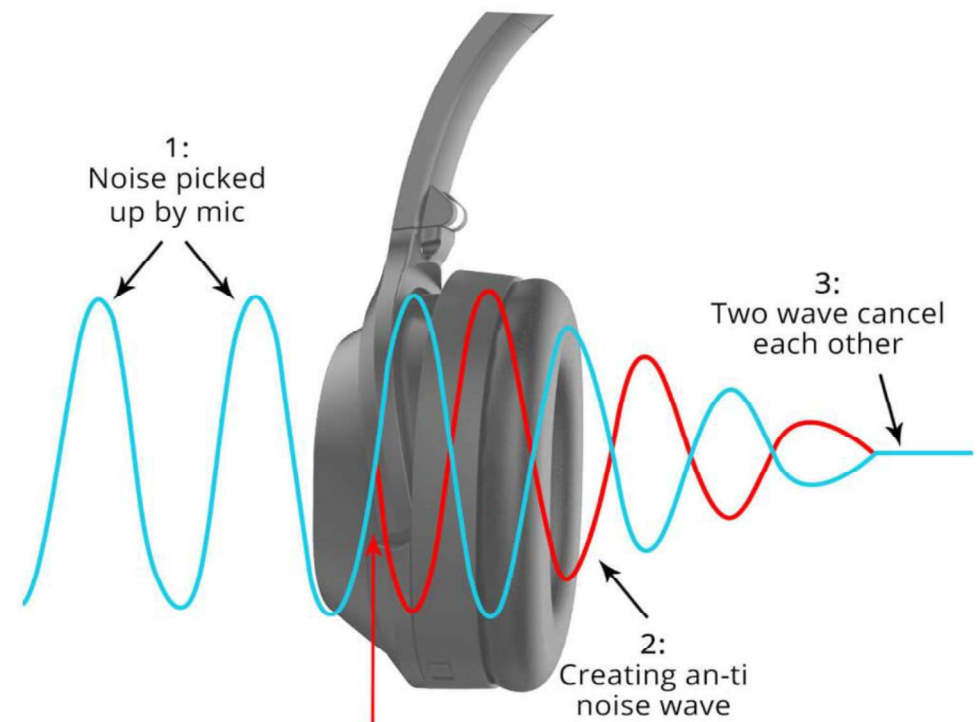
**EP-X is a Patented Inductive Filter that creates a counter-component for disturbances caused by electrical devices in the network with the aim of reducing the losses in the electrical system and optimizing the transmission of energy on the electrical system.**

The basic concept of operation can be compared to the Active Noise Cancellation technology used in the audio and acoustic world.

**E-Power a Wonderful Innovation Video:**

<https://www.youtube.com/watch?v=mKNi7kelxw8>

## ACTIVE NOISE CANCELLATION



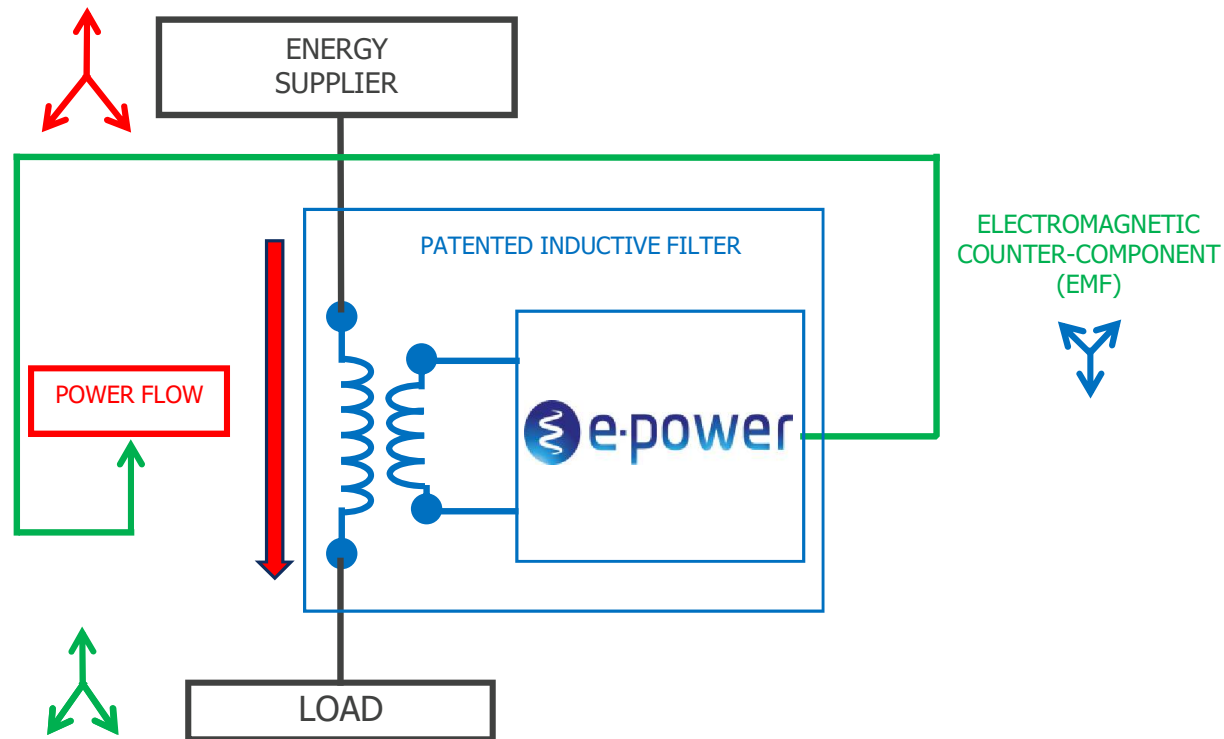
# A patented and unique filtering technology

- EP-X is an electromagnetic device that creates a counter-component for disturbances caused by electrical devices in the network.
- The EP-X is composed by passive components since it has inductors, reactive components and contactors, there are no losses produced by the system, so it consumes little energy. The internal losses are due to the components in the control panel, iron losses and conductor losses. These losses are limited because the transformer windings are in aluminium.
- The filtration of disturbances occurs in four levels, the level depends by the input voltage that enables electromagnetic counter-component of varying intensity.
- The cleaner the waveform of current and voltage we can arrange to the grid, the less resistance forces are generated on the loads. This saves energy. In other words, the forces against the engines will be reduced, providing benefits as reduced braking torque, reduced heat loss, reduced stress and extended lifespan.



# How does the EP-X filter work?

EP-X is a patented inductive filter that reduces disturbances and losses, acting mainly on the **current waveform**, thanks to its capabilities to **manage, control and modulate the electromagnetic counter-component (EMF)**.

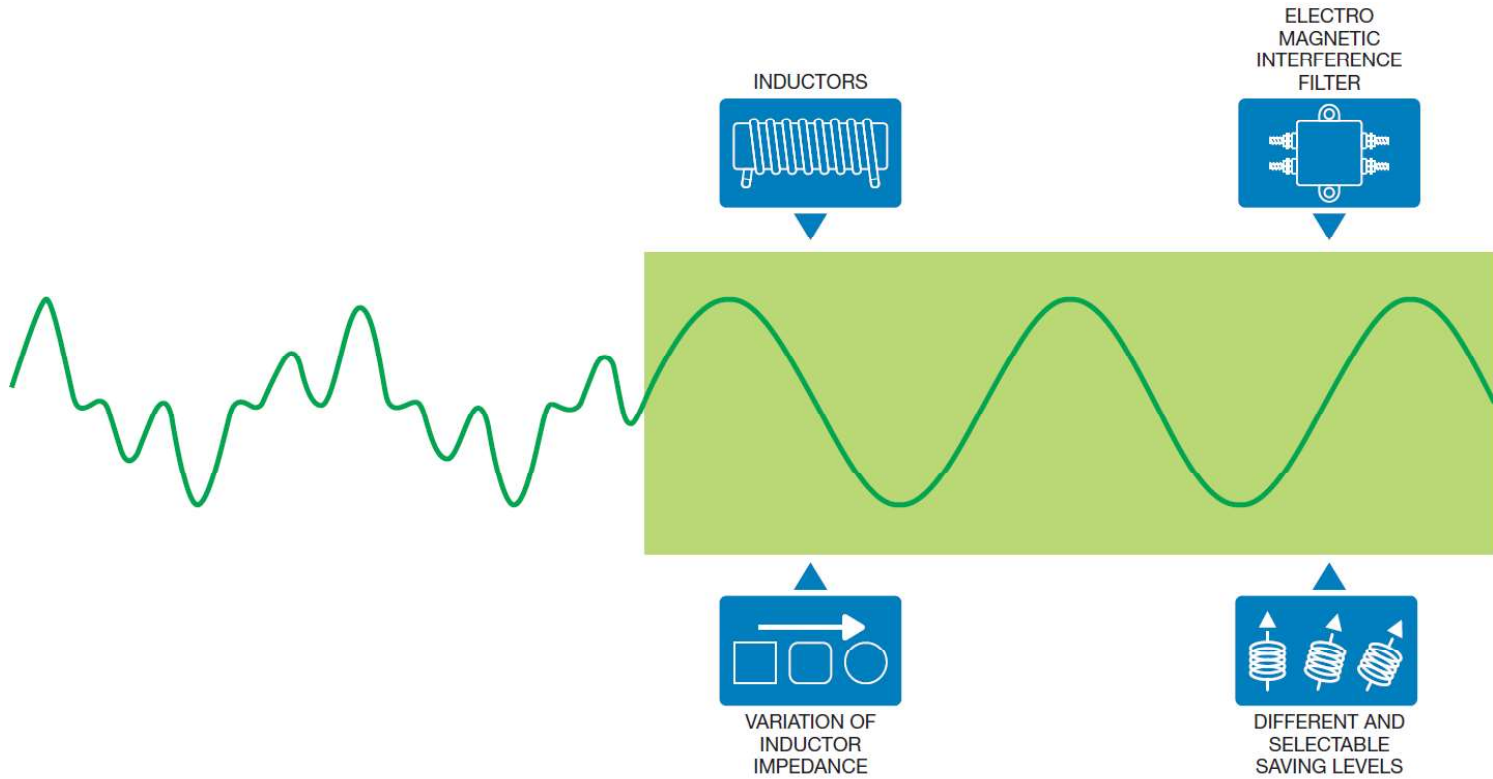


# The 4 working principles

1. **Inductors**: Energia Europa has appropriately **designed the geometric characteristics of its high efficiency inductors** to achieve the full control of the inductance, **and thanks to the winding on a core of material with high magnetic permeability** it is possible to **manage the electromagnetic counter-component** to achieve the best possible energy efficiency results.
2. **Electro Magnetic Interference filter**: a part of the EP-X filter's operation is based on the same principle and **technique** to attenuate the interference components **thanks to its special electrical connection, the inductor windings and the core**; so that the **electromagnetic counter-component can be controlled in REAL TIME**.
3. **Variation of inductor impedance**: due to a **system of mutually coupled inductors and contactors**, the EP-X system **inductance dynamically changes its value according to the selected saving levels**, thus offering the possibility to **modulate the filtering capacity of disturbances** aiming to increase the Power Quality.
4. **Different and selectable saving levels**: the EP-X filtering system **has the possibility to intensify the EMF counter-component**, through the **selection of 4 saving levels that allow the modulation of the primary circuit current ( $I_{\text{Feedback loop}}$ )**. Therefore, a **higher EMF counter-component implicates a proportional difference in voltage** values between the **incoming and outgoing of the filter**.

# The synergic effect of the 4 principles on the current waveform save energy save CO<sub>2</sub>

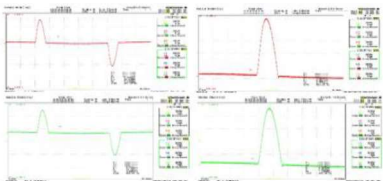
As a result of this synergic action the current waveform will be smoother and much more like an ideal sine waveform.



# Which parameters and phenomena are improved?

The patented EP-X technology generates significant energy efficiency improving Power Quality and by acting on: reduction and reconfiguration of the harmonics, correction of the power factor, reduction of disturbances and losses, load balancing on the three phases, improvement of energy distribution, stabilization of current and voltage, **all in one product!**

## Harmonics Reconfiguration and Reduction



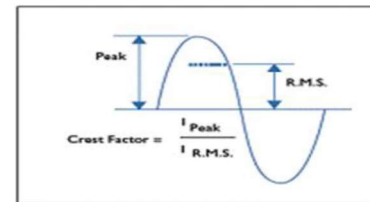
Reduces the THD and reconfigures the current's harmonics, improving the waveform

## Power Factor Correction (PF)

$$PF = \frac{1}{\sqrt{1 + \left(\frac{THD(\%)}{100}\right)^2}}$$

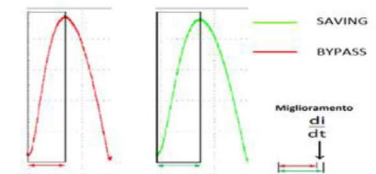
Improves the power factor and reduces reactive energy

## Crest Factor Correction (CF)



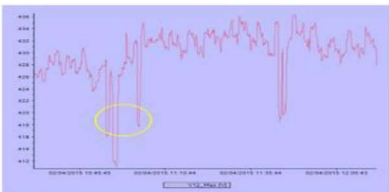
Reduces the ratio between the peak value and the rms value of the current

## Smoothing Effect



Generates a smoother waveform, decreasing the steepness of current climbs and drops, reducing the peaks

## Disturbances Reduction on the Electrical Line



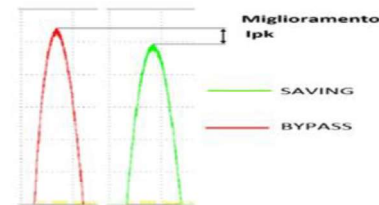
Reduces and controls the current peaks, flickers, sags, surges and micro-interruptions

## Losses and Dispersions Reduction



Improves the distribution of energy and reduces thermal losses (Joule)

## Stabilises Voltage and Current



Stabilizes the current and voltage, reducing peaks

## Equipment's Lifespan Improvement



Optimizes transmission through the electrical line (maintenance saving)

## EP-X - 3 key benefits

**ENERGY EFFICIENCY:** decreases disturbances and losses of the electrical network, bringing a real energy efficiency; improves the quality of energy (Power Quality) on the loads, extending their lifespan.

**FINANCIAL SAVING:** reduces the electricity consumption providing the same work performed, normally generating a variable economic saving between 3% to 6% according to the kinds of loads which are present in the line; the result is scientifically measurable thanks to the Patented Bypass System.

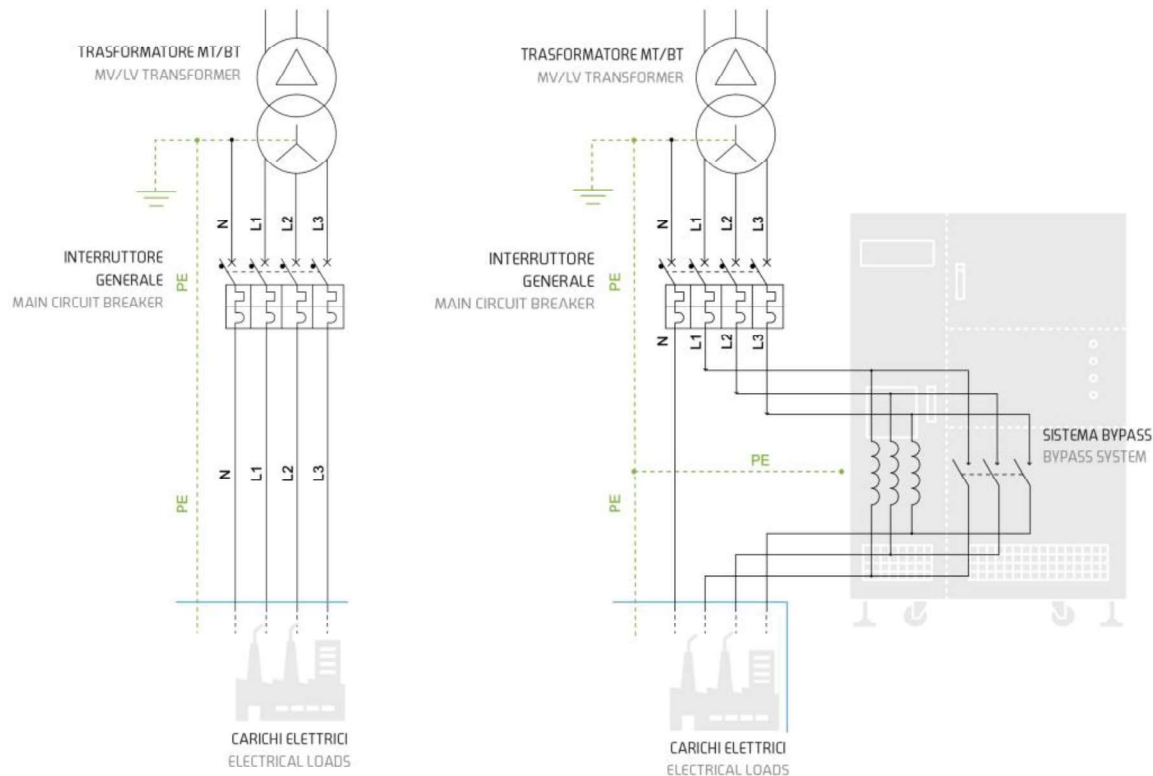
**ENVIRONMENTAL SAVING:** every kWh saved is equivalent to 0,5 kg of lower CO<sub>2</sub> emissions (EU 28), where each kg of CO<sub>2</sub> saved corresponds to 0,0025 kg of lower NO<sub>x</sub> (nitrogen oxides) emissions, and each kg of CO<sub>2</sub> saved amounts to 0,005 kg of lower SO<sub>x</sub> (sulfur oxides) emissions, thus contribute to the preservation of the planet for future generations.

**EP-X has been selected as one of the recommended and validated solutions of Zero Carbon Target**, the new international program engineered to support the client in the development of an effective process for CO<sub>2</sub> emissions reduction, aimed at obtaining the prestigious Zero Carbon Target certification (<https://www.zerocarbontarget.com/validated-technologies/>).

A study by Leonardo ENERGY conducted in 8 countries out of 16 different industrial sectors concluded that the cost of low Power Quality is equal to almost 4% of turnover.

According to Electric Light and Power Magazine, a value ranging between 30-40% of the downtime of all companies is related to Power Quality problems.

# The Patented Bypass System



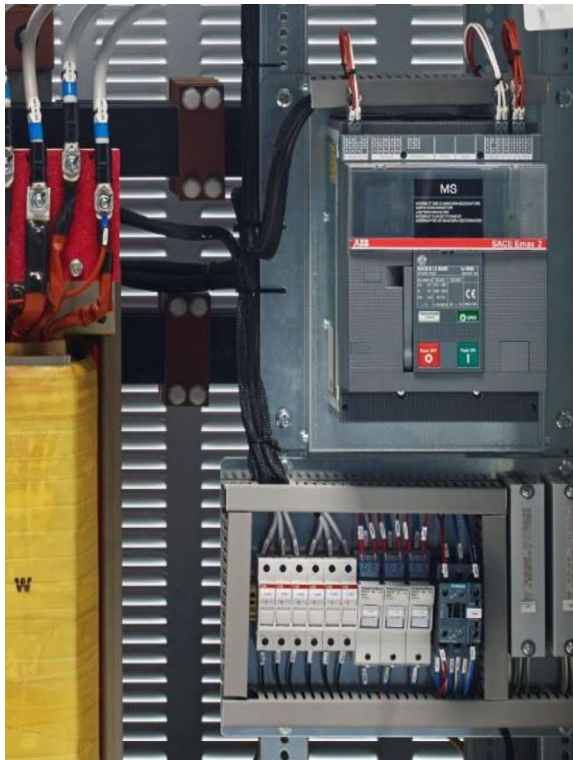
## Safety:

The EP-X is a 100% secure technology thanks to the 24 hours remote control and its patented Bypass System that automatically excludes the EP-X from the line in case of malfunctions, thus ensuring continuity of power supply to the loads, avoiding any disruption.

## Measurability:

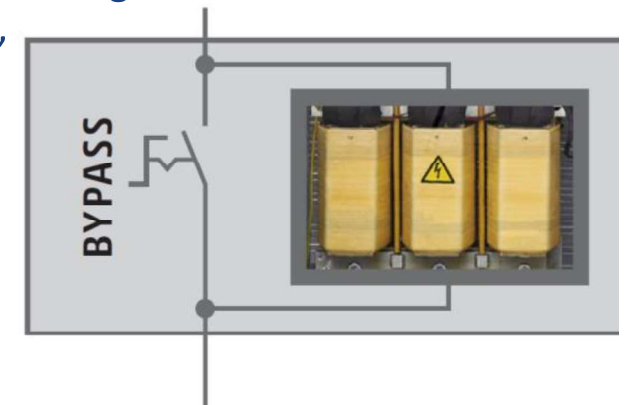
The Bypass System and the measuring instruments inside the EP-X system, allow to activate and deactivate the technology, objectively highlighting the diversity of power absorption between the two modes (Saving/Bypass).

# The Patented Bypass System



The Bypass System ensures the continuity of the power supply on the load and allows the measurability of the performance. The heart of the Bypass System consists of an ABB switch-disconnector that has a useful electrical life cycle of about 10.000 switching cycles, and 20.000 switching cycles as mechanical life cycle.

The series ABB Tmax and Emax2 switch-disconnectors, are fundamental for our technology, perform two main functions: first, it allows the EP-X to ensure continuity of the power supply to the electrical network, excluding the machine in case of malfunction or problems on the line. Second, allows you to make, according to a predefined protocol, a series of switching between the two operating modes: Saving mode, “filter activated”, and Bypass mode, “filter deactivated”, which allow to have an exact comparison between operation with and without the filter, measuring the value of the energy saving obtained.



**Patent No VI2007A0072**

ABB presents the E-Power system of Energia Europa:  
<https://www.youtube.com/watch?v=fst0CNTuee8&t=157s>

# Measurement of Energy Efficiency

The logo for SMARTENERGYLAB features a stylized blue and green wave symbol above the text 'SMARTENERGYLAB' in a bold, blue and green, sans-serif font. Below this, the text 'Laboratorio Congiunto per la Power Quality nei Sistemi Elettrici' is written in a smaller, blue, sans-serif font.

**energia** | power quality maximum saving

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## E-Controller - What is it?

The E-Controller device equipped into the command board of the EP-X system, allows to collect the measured data from the output analyzer and send them via the web to the Energia Europa's server.

Together with the Bypass System, the E-Controller device allows you to view and monitor the data and performance of the EP-X system.



## E-Controller - Benefits

- Allows monitoring and analysis of the energy saving generated by EP-X through a fast-sampling process conducted by the output analyzer, down to 2 seconds.
- Allows the setting of alarms and saving levels from remote.
- Allows the immediate view and control of energy data and all electrical parameters (power, voltage, current, PF, energy, etc).
- Allows multiple access from different locations by a browser; no need to install any other application.
- Allows local offline activity thanks to its display and keyboard.

# E-Controller - Monitoring

- Thanks to the patented Bypass System and to the E-Controller monitoring is possible to accurately measure the energy saving generated by the EP-X with scientific precision and in a very short time.
- The measurement of energy saving is followed directly by Energia Europa technical department from remote in cooperation with the client, following the International Performance Measurement and Verification Protocol (IPMVP) and IMQ (Istituto Italiano del Marchio di Qualità);
- The EP-X unique components enable highly accurate tests and efficiency measurement, compliant with the latest guidelines in the field (IPMVP and IMQ).
- The tests are conducted remotely thanks to the E-Controller and the Bypass System, without physical presence at site.
- Clients have full access to check the accuracy of the data, testing and results, thanks to:
  - ✓ private access to the E-Controller account;
  - ✓ e-powerNOW software;
  - ✓ S.A.T. software (Smart Analytics Tool).



## CHECK:

Allows to check immediately the performance of the EP-X device, in terms of energy efficiency and environmental benefits.

## UPDATE:

Allows to receive weekly automatic updates on all requested data and set a fast interactive channel with Energia Europa.

## CONTROL:

Allows a complete and autonomous control on EP-X performance through Saving/Bypass switchings that generate update on the efficiency results.

### Video Tutorial e-powerNOW:

[https://www.youtube.com/watch?v=C9qJXPIbeW0&list=PLd rkjfP-TYm\\_jlRZrf0-22vBu6b1nMRtW](https://www.youtube.com/watch?v=C9qJXPIbeW0&list=PLd rkjfP-TYm_jlRZrf0-22vBu6b1nMRtW)

# S.A.T. - Smart Analytics Tool

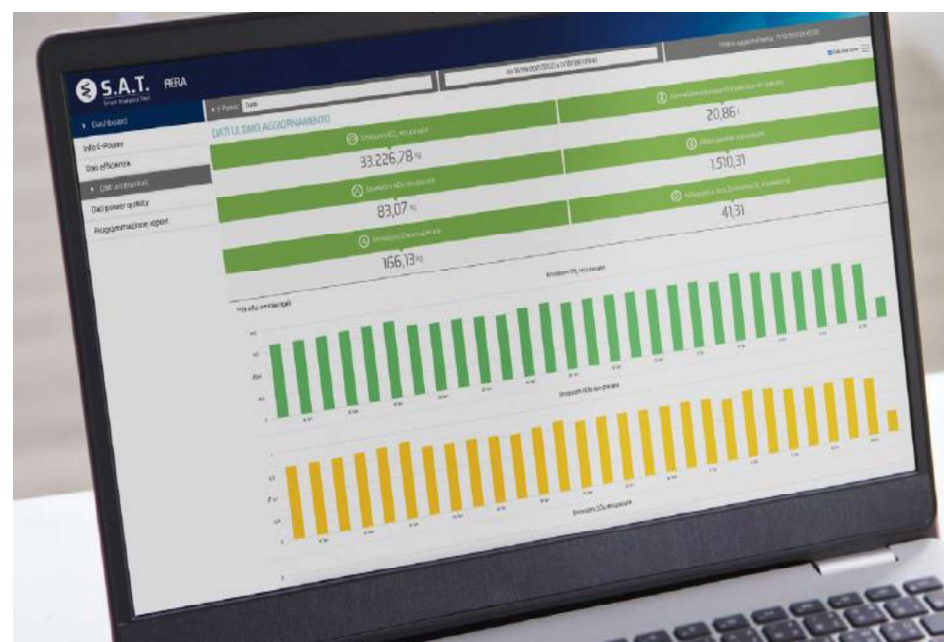
## Smart analytics for smart reporting.

The new software platform that allows access to the EP-X data in the cloud for a simple, effective and complete reporting service.

Immediate access to energy, economic and environmental data generated by EP-X and stored in the cloud in terms of energy consumption, energy saving, economic benefits, environmental benefits and power quality:

- **Capability to select and aggregate data from multiple EP-X installed in the same or different sites;**
- **Capability to view and download all data in the desired time periods;**
- **Capability to download instant reports for selected devices in the desired time periods;**
- **Possibility to schedule the sending of pre-packaged reports in the desired time periods.**

We innovate to evolve: <https://www.youtube.com/watch?v=0waQz7ZdDLc>



## EP-X - Incentives, Grants and ISO 50001

Thanks to the web-based performance monitoring interface and the analysis of electrical parameters on the plant, the EP-X technology is fully in line with the interconnected technology solutions that can benefit from Industry 4.0.

Thanks to the reduction of greenhouse gas emissions (CO<sub>2</sub>, NO<sub>x</sub>, SO<sub>x</sub>), the energy efficiency generated and sustainability by the EP-X technology, it is possible to obtain subsidies and economic benefits at regional or national level.

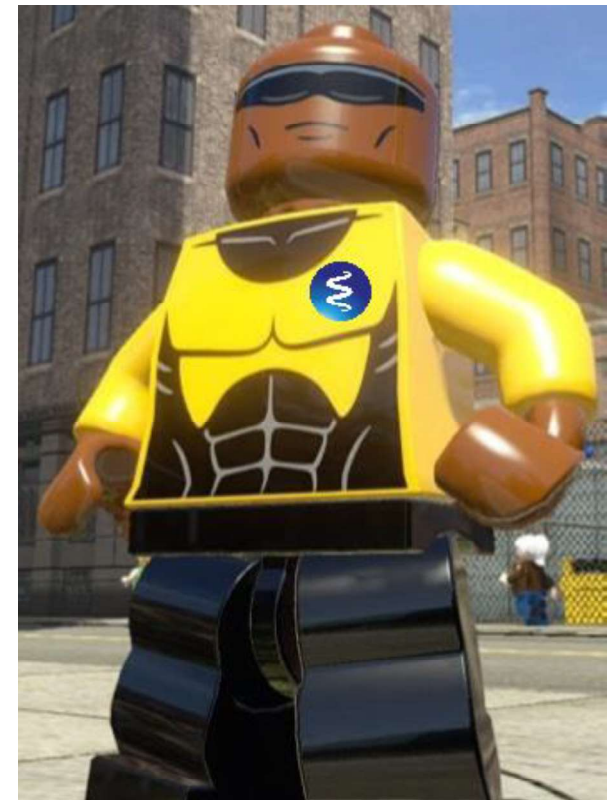
The EP-X technology can benefit from incentives and subsidies that vary from Country to Country.

Documentation issued by Energia Europa and monitoring software, such as the Energy Efficiency Report, the weekly e-powerNOW reports and S.A.T. reports can be used as supporting documentation to obtain and maintain ISO 50001, as well as to justify and continuously show the economic, energy and environmental results (ISO 14001 - ISO 45001), that the EP-X technology generates.

# Conclusions - What can EP-X do?

The patented filter, properly designed and based on electromagnetism, allows to:

- Reduces the losses on the electrical line
- Improves the power quality thanks also to enhanced current waveform
- Improves the power factor
- Improves the energy efficiency of the electrical facility connected
- Improves and stabilizes voltage and current
- Improves the balancing of electrical parameters
- Improves the equipment's lifespan
- Reduces the downtimes, particularly in the industrial sector, that in specific operations can lead to great economic losses
- Controls the EP-X functionality and monitors the electrical parameters
- Reduces greenhouse gas emissions



## EP-X appears as an electrical switchboard

The **Control Unit (1)** is mainly used to manage, monitor and protect the EP-X system, ensuring better and constant safety. This includes the protection for the primary filter circuit, the contactors for selecting saving levels, the backup system with super-capacitors, the output analyzer, the E-Controller data logger, two PLCs and other devices.

The **Control Unit** can be removed to facilitate access to the power bars during installation. This simplicity of disassembly allows for quick replacement and a reduction in time.

**Control Units** are the same from the EP-X 160A to the EP-X 500A and then from the EP-X 600A to the EP-X 4000A.



## The POWER UNIT

The **Bypass System** for purpose of bypassing the EP-X filter, ensuring the continuity of the power supply on the load and allows the measurability of the performance.

The heart of the Bypass System consists of an **ABB Switch-Disconnecter (2)**, fundamental for our technology, and is completed with **Bars (3)** short-circuited between the input and output power bars of the EP-X filter.

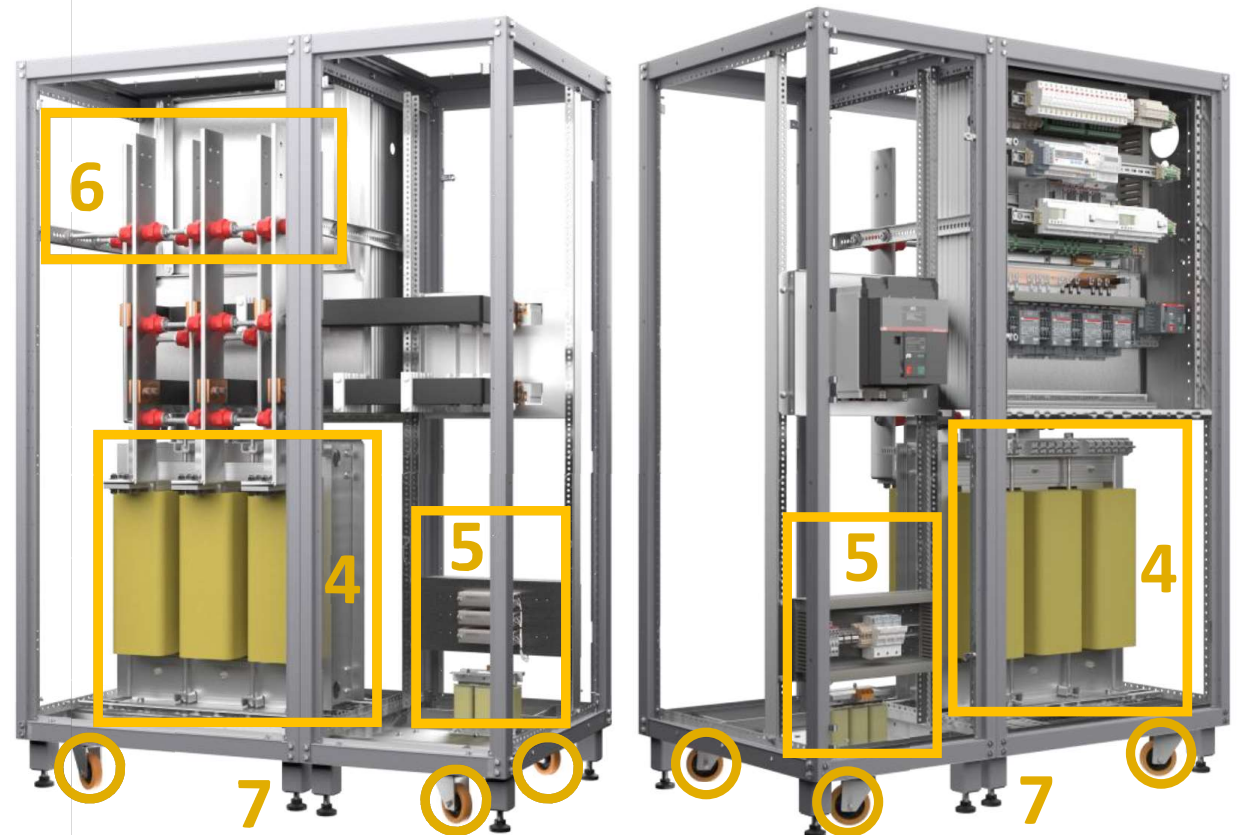


The **Patented Inductive Filter (4)** that allows the improvement of the current waveform, the reduction of losses in the network due to the reduction of electrical disturbances/distortions.

The **Damping Circuit (5)** that reduces peaks during the changes of saving levels or activation of the Saving/Bypass modes, and **Power Connection (6)** through 3 phase IN and 3 phase OUT on the aluminium filter bars.

The EP-X system also has additional supportive **four wheels (7)** attached for easier mobility to place it into the electrical rooms properly.

**Note:** EP-X is composed of reactive components, switches and contactors, which results in no losses by the system and neglectable self-consumption.



# EP-X - Installations pictures



# EP-X - Installations pictures



# EP-X Connectivity



# EP-X connectivity options

The EP-X is always delivered with a router Teltonika RUT950 also acting as a modem: DUAL SIM, 4 x ETHERNET, IPsec, WIFI with WAN FAILOVER. Here is a summary of the 3 available connectivity options:

- 1) The default connectivity has 3 communication options and consists of:
  - a) 4G/LTE (Cat 4), 3G, 2G (EE can prepare EP-X systems with a proprietary SIM card in slot 2 which will then be disabled);
  - b) Connection via Ethernet cable to take benefit of the wired network - no need to change firewall rules thanks to IPsec tunnel;
  - c) Same as above but via WIFI antenna if a good signal is present (no need for Ethernet cable).
- 2) ISA99 ready: the IEC 62443 standard also known as ISA99 is an excellent reference for building an ICS (Industrial Control Systems) infrastructure that is safe from the ever-increasing cyber threats;
- 3) VPN: this configuration, onerous on the IT side, then speeds up the IT installation of a considerable numbers of EP-X systems.





# KIT Teltonika RUT950

Top quality modem dual SIM with auto failover, backup WAN and other switching scenarios

Helps to solve the connectivity problems

Modern connection and complying with mandatory safety requirements

Equipped on board



Delivered pre-configured

We make use of the 4 Ethernet ports to also connect the HMI touch panel

Wan Failover function for automatic switching to the available backup connection

It is an important brick in the infrastructure of the future

# Research & Development



**SMARTENERGYLAB**

Laboratorio Congiunto per la Power Quality nei Sistemi Elettrici



power quality  
maximum saving



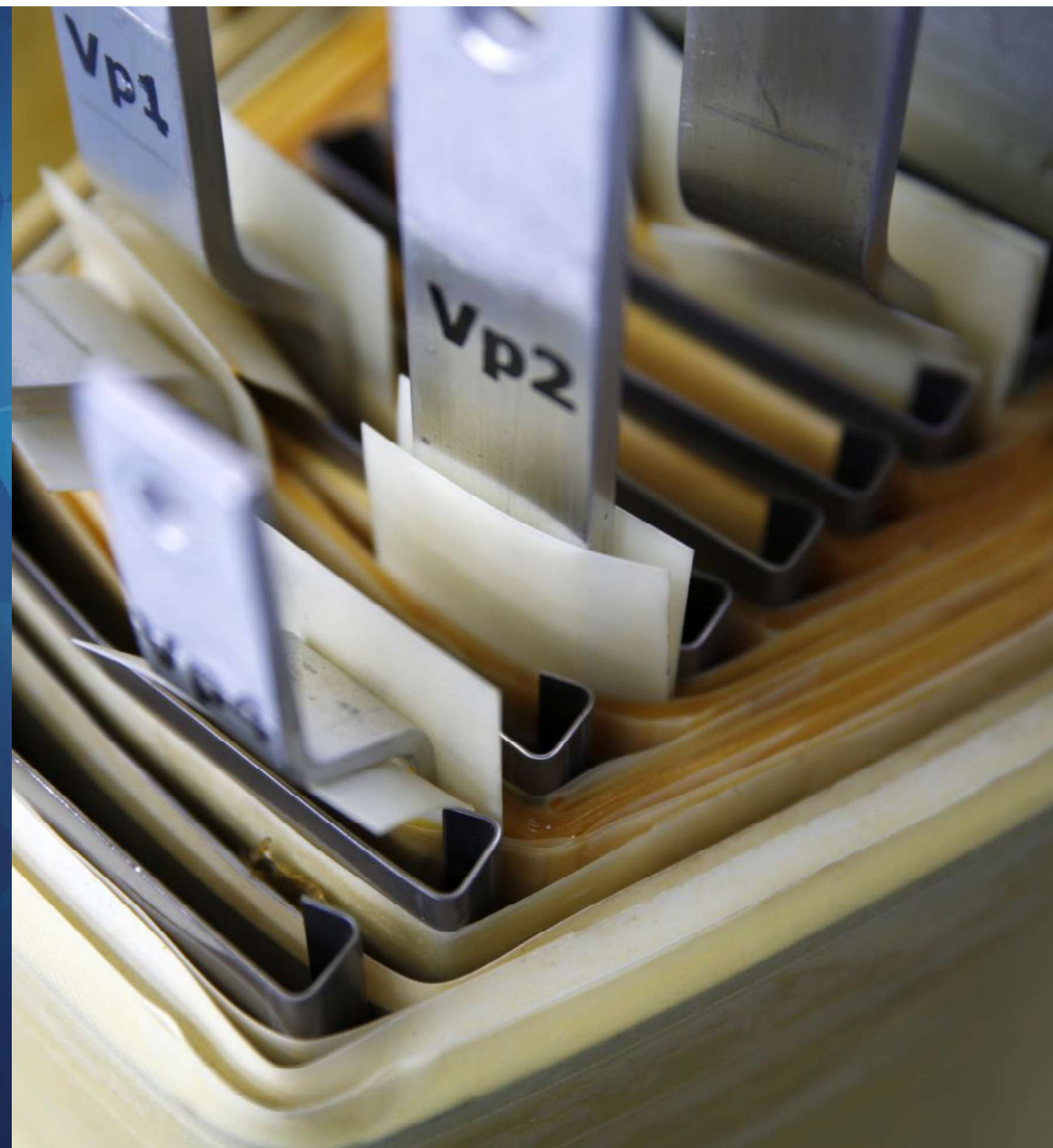
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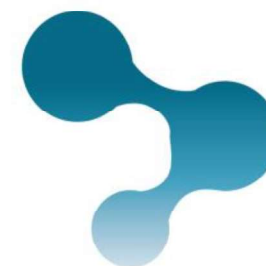
## Lab Analysis - Joint R&D

Energia Europa owns a state-of-the-art laboratory, jointly managed with the University of Florence: the Smart Energy Lab. The lab is equipped with the most sophisticated equipment available today in terms of the capability to analyze all the parameters that affect the power quality. Thanks to this equipment our engineers, together with the researchers from the department of Information Engineering of the University of Florence, can measure and analyze the effects of the EP-X device on the all sorts of loads. Through this analysis we can demonstrate the impact of our devices on the loads and carry on a constant experimental activity on new technological solutions.

Our cooperation with universities and research institution does not stop at the Italian borders. We keep an intense joint R&D activity with prestigious international institutions, such as the Polytechnical University in Madrid (Spain), University of Krefeld in Germany and other prestigious research institutes in Germany.

### Smart Energy Lab Video:

<https://www.youtube.com/watch?v=9EARnS8Qxuw&t=6s>



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DELL'INFORMAZIONE



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FIRENZE

**DIEF**  
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INGEGNERIA INDUSTRIALE



 **nergia** | save energy  
save CO<sub>2</sub>