

# Best Power Quality Solutions



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# CONTENT

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## POWER FACTOR CORRECTION SYSTEMS

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### A-REACTORS

- LV DETUNED REACTOR
- SHUNT REACTOR
- MV IRON CORE DETUNED REACTOR
- MV AIR CORE DETUNED REACTOR
- MV INRUSH CURRENT LIMITING REACTOR

### B-BANKS

- LV DETUNED CAPACITOR BANK
- LV THYRISTOR SWITCHING DETUNED CAPACITOR BANK
- LV IGBT BASED HYBRID CAPACITOR BANKS
- MV CAPACITOR BANK
- MV DETUNED CAPACITOR BANK
- REACTIVE POWER CONTROL RELAY

### C-IMPORTED PRODUCTS

- LV POWER CAPACITOR – ELECTRONICON
- MV POWER CAPACITOR – EPCOS
- CONTACTOR – BENEDICT
- THYRISTOR SWITCH – BELUK

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## POWER QUALITY

- POWER QUALITY MEASUREMENT
- HARMONIX – SERIAL PASSIVE HARMONIC FILTER
- SINUS FILTER
- LINE REACTOR
- LOAD REACTOR
- SMOOTHING REACTOR
- SOFIA – VOLTAGE CONTROLLED HARMONIC FILTER
- RESI – RESONANCE ELIMINATION SYSTEM
- COMSYS – ACTIVE FILTER
- COMSYS – P200 RESONANCE FILTER

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## RESISTORS

- BRAKING RESISTOR
- NEUTRAL GROUNDING RESISTOR
- GENERATOR NEUTRAL GROUNDING RESISTOR
- LOAD BANK
- LV MOTOR STARTING RESISTOR
- HARMONIC FILTER RESISTOR

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## TAILOR-MADE REACTORS

- LV MOTOR STARTING REACTOR
- MV MOTOR STARTING REACTOR
- NEUTRAL GROUNDING REACTOR
- MV SHORT CIRCUIT CURRENT LIMITING REACTOR









**Best  
Power Quality  
Solutions**



**TEXTILE**



**Cutting Edge  
Engineering  
Services**



**IRON&STEEL  
INDUSTRY**



**Dynamic Team  
with Experienced  
Professionals**



**GENERAL  
INDUSTRY**



**Tailor-made  
Flexible  
Production**



**AUTOMOTIVE  
INDUSTRY**



**4 Decades  
Of Unique Know-how**



**CEMENT  
INDUSTRY**



**Superior  
Product Quality**



**PETROCHEMICAL  
INDUSTRY**

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## ERGUN ELEKTRİK

We promise all our clients sophisticated engineering skills and four decades of unique know-how. Ergun Elektrik is a family business founded in 1980 in İzmir. With four decades of unique know-how and an expert team, we supply efficient and resilient products and engineering services to provide our customers the best solutions in power quality.

Today, with the change in the characteristics of loads, the concept of electric power quality has become more important. Electric power quality can theoretically be defined as a set of electrical parameters and limits that enable all loads fed from the electrical grid to operate without any significant loss of performance or lifespan.

In general, power quality problems are mainly categorised under the title of "Harmonics".

Contrary to common knowledge of resonance; voltage oscillations, transients, common mode currents/voltages and EMC are problems that need to be examined individually, demanding different solutions. Our company performs detailed power quality measurements which makes it possible to measure these problems much faster than the source through harmonic analysis between 2-9 kHz and supraharmonics analysis up to 170 kHz and harmonic analysis up to the 50th harmonics.

Based on the measurement results analysed by our experienced technical team, we offer our customers the most accurate and suitable solutions. These include filters, reactors and capacitor banks that we manufacture and also the filters and products imported from our solution partners, each of which is a world leader in their fields.

Furthermore, Ergun Elektrik designs and manufactures custom reactors according to function and power that will also fulfill its function in permissible overloads and custom resistors by selecting metal alloy resistance material for each different application.

Our strengths including Custom Flexible Production, Advanced Engineering Skills, High Product Quality, Fast Delivery Periods enable us to stand out in the sector and makes us the leading Turkish company in the production of LV-MV Reactors, Filters, Compensation Systems and Resistors up to 36kV, exporting products and solutions to more than 30 countries.



# LV DETUNED REACTOR



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: 3...1000kVAr
Rated Frequency	: 50/60Hz
Detuning Degree	: 7% - 14%
Inductivity Tolerance	: $\pm 3\%$
Insulation (winding-core)	: 3kV
Phase	: 1 - 3

## STANDARD

TS EN 60076 – 6, TS EN 61558 – 2 – 20  
CE Conformity

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor Mounting
Insulation	: F Class, 155°C
Impregnation	: H Class Vacuum Varnish Impregnation
Cooling	: Natural Cooling/T40
Temperature Switch	: 125°C, 1NC at Middle Phase

## DESIGN

Design	: Iron Core, Dry Type
Winding	: Aluminium Foil Aluminium / Copper Wire
Core	: Low Loss Steel Sheet
Terminals	: Copper Bar, Terminal Block or Cable Lug

# SHUNT REACTOR



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: 0,1...100kVAr
Rated Frequency	: 50/60Hz
Detuning Degree	: 100%
Inductivity Tolerance	: - %5
Insulation (winding-core)	: 3kV
Phase	: 1 – 3

## STANDARD

TS EN 60076 – 6, TS EN 61558 – 2 – 20  
CE Conformity

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor Mounting
Insulation	: F Class, 155°C
Impregnation	: H Class Vacuum Varnish Impregnation
Cooling	: Natural Cooling/T40
Temperature Switch	: 125°C, 1NC at Middle Phase

## DESIGN

Design	: Iron Core, Dry Type
Winding	: Copper / Aluminum
Core	: Low Loss Steel Sheet
Terminals	: Copper Bar, Terminal Block or Cable Lug



# MV IRON CORE DETUNED REACTOR



## OPERATING DATA

Rated Voltage	: 3kV...36kV
Rated Power	: up to 4000kVAr
Rated Frequency	: 50/60Hz
Detuning Degree	: 7% -14%
Inductivity Tolerance	: $\pm 3\%$
Phase	: 1

## STANDARD

TS EN 60076 – 6

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor Mounting
Insulation	: F Class, 155°C
Impregnation	: H Class Vacuum Varnish Impregnation
Cooling	: Natural Cooling/T40

## DESIGN

Design	: Iron Core, Dry Type 3 pieces of 1 phase reactors
Winding	: Copper / Aluminium
Core	: Steel Sheet Ensuring Low Loss
Terminals	: Copper Bar, Terminal Block or Cable Lug



# MV AIR CORE DETUNED REACTOR



## OPERATING DATA

Rated Voltage	: 3kV.....36kV
Rated Power	: 100kVAr....4000kVAr or tailor-made
Rated Frequency	: 50/60 Hz
Detuning Degree	: 7% - 189Hz, 14% - 134Hz or tailor-made
Inductivity Tolerance	: $\pm$ %3
Phase	: 1 Phase

## STANDARD

TS EN 60076 – 6

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor/Outdoor
Impregnation	: Epoxy Resin
Heating	: B Class
Cooling	: Natural Cooling/T40

## DESIGN

Design	: Air Core, Dry Type 3 pieces of 1 phase reactors vertical or horizontal configuration
Winding	: Aluminium
Terminals	: Aluminium Bar



# MV INRUSH CURRENT LIMITING REACTOR



## OPERATING DATA

Rated Voltage	: 3kV.....36kV
Rated Current	: 30A....400A or tailor-made
Rated Frequency	: 50/60Hz
Tolerance of Inductance	: +20%

## STANDARD

TS EN 60076 – 6

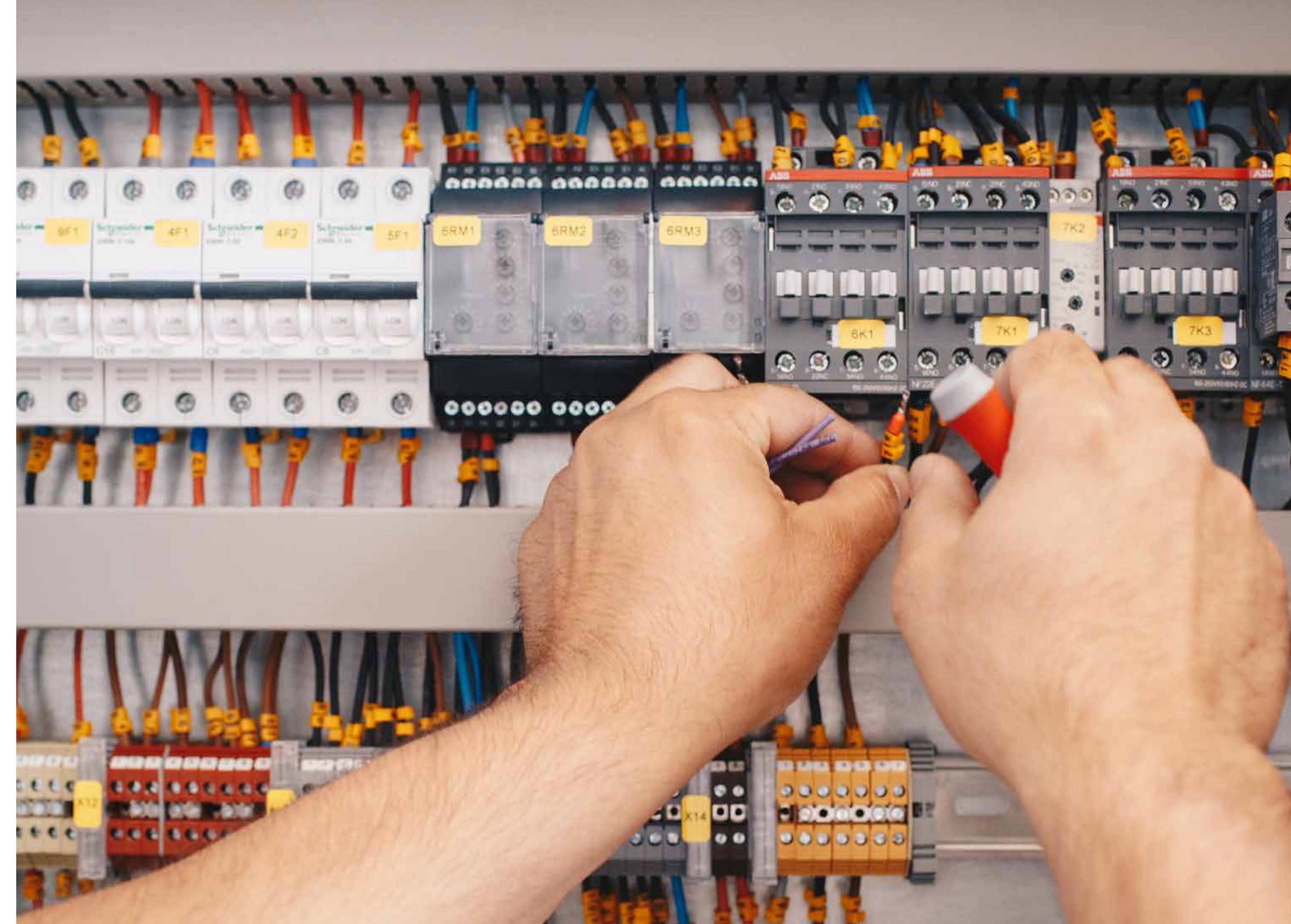
## SAFETY AND PROTECTION

Installation	: Indoor / Outdoor
Impregnation	: H Class Vacuum Impregnation for Indoor Epoxy varnish for Outdoor
Heating	: B Class max 125°C
Cooling	: Natural Cooling/T40

## DESIGN

Design	: 1 Phase, Air Core, Dry Type
Winding	: Aluminium Foil Aluminium / Copper Wire
Terminal	: Indoor: Aluminium / Copper Bar Outdoor: Aluminium Bar







# LV DETUNED CAPACITOR BANK



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: up to 2000kVAr or tailor-made
Rated Frequency	: 50/60Hz

## STANDARD

TS EN 61439 – 1, TS EN 60076 – 6, TS EN 60831 – 1  
CE Conformity

## ELECTRICAL DESIGN

Short Circuit Protection	: NH Fuse Switching Disconnecter
Power Factor	: Microprocessor based Power Factor Correction Relay
Switching	: Contactor
Detuning	: 7% – 14%
Capacitors	: MKPg Type

## ENCLOSURE DESIGN

Protection Degree	: IP20...IP54
Cooling	: Natural / Forced Ventilation
Mounting	: Floor Standing, Indoor / Outdoor
Enclosure	: 2mm Painted Galvanized Steel Sheet



# LV THYRISTOR SWITCHING DETUNED CAPACITOR BANK



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: Up to 2000kVAr or tailor-made
Rated Frequency	: 50/60Hz

## STANDARD

TS EN 61439 – 1, TS EN 60076 – 6, TS EN 60831 – 1  
CE Conformity

## ELECTRICAL DESIGN

Short Circuit Protection	: NH Fuse Switching Disconnecter
Power Factor	: Microprocessor based Power Factor Correction Relay
Switching	: Thyristor Switch
Detuning	: 7% -14%
Capacitors	: MKPg Type

## ENCLOSURE DESIGN

Protection Degree	: IP20...IP54
Cooling	: Natural / Forced Ventilation
Mounting	: Floor Standing, Indoor / Outdoor
Enclosure	: 2mm Painted Galvanized Steel Sheet



# LV IGBT BASED HYBRID CAPACITOR BANK



## OPERATING DATA

Rated Voltage	: 230V...690V
Rated Frequency	: 50/60Hz
Rated Power	: Tailor-made according to request

## STANDARD

EN 50091 – 3, IEC 62040 – 3

## DESIGN

CosØ Target	: 100% Inductive or Capacitive
Inverter Technology	: 3 Level Topology with 12 IGBT
Safety and Protection	: Overvoltage & Undervoltage, Inverter Bridge Inverse Overload Protection, Internal Short-circuit Protection Overheating Protection, Fan Fault Alarm,
Connection	: 3 Phase and Neutral

## ENCLOSURE DESIGN

Protection Degree	: IP20 (other IP classes are customizable)
Cooling	: Forced Ventilation with Thermostat Control
Mounting	: Floor-mounted, Wall-mounted



# MV CAPACITOR BANK



## OPERATING DATA

Rated Voltage	: 3kV...36kV
Rated Power	: Up to 5000kVAr or tailor-made
BIL	: According to the rated voltage
Rated Frequency	: 50/60Hz
Ambient Temperature	: ≤55°C

## STANDARD

TS EN 60871 – 1

## ELECTRICAL DESIGN

Connection	: Fixed / Automatic : Double star connection with unbalance protection
Short Circuit Protection	: MV Fuses
Protection Units	: Earthing Switches, Discharge Coils, Surge Arresters,
Power Factor	: Microprocessor based Power Factor Correction Relay
Switching	: MV Contactors / Circuit Breakers
Reactors	: Air core, Dry Type, Current Limiting Reactor
Capacitors	: APP Type

## ENCLOSURE DESIGN

Installation	: Indoor or Outdoor
Protection Degree	: IP00...IP54
Cooling	: Natural / Forced Ventilation
Enclosure	: Hot Dip Galvanized Steel Sheet, : Painted Galvanized Steel Sheet or tailor-made



# MV DETUNED CAPACITOR BANK



## OPERATING DATA

Rated Voltage	: 3kV...36kV
Rated Power	: up to 12000kVAr or tailor-made
BIL	: According to Nominal Voltage
Rated Frequency	: 50/60Hz
Ambient Temperature	: ≤55°C

## STANDARD

TS EN 60871-1

## ELECTRICAL DESIGN

Connection	: Fixed / Automatic Double star connection with unbalance protection
Short Circuit Protection	: MV Fuses
Protection Units	: Earthing Switches, Discharge Coils, Surge Arresters,
Power Factor	: Microprocessor based Power Factor Correction Relay
Switching	: Vacuum/SF6 Contactor – Circuit Breaker
Detuning Factor	: 7% – 14%
Capacitors	: APP Type

## ENCLOSURE DESIGN

Installation	: Indoor or Outdoor
Protection Degree	: IP00...IP54
Cooling	: Natural / Forced
Enclosure	: Hot Dip Galvanized Steel Sheet Painted Galvanized Steel Sheet or tailor-made



# REACTIVE POWER CONTROL RELAY



## OPERATING DATA

Voltage Measurement Input	: 10VAC...600VAC
Current Measurement Input	: .../5A (5...10000/5A)
Over Current Withstanding	: 50A 1 sec., 10 sec. continuous
Switching steps by	: Thyristor Switch or Contactor
Current harmonics measured	: 2,3,4,5,...,60,61,62,63 ve THD
Voltage harmonics measured	: 2,3,4,5,...,60,61,62,63 ve THD
Current Measurement Accuracy	: 0,2%
Voltage Measurement Accuracy	: 0,2%
Apparent Power Accuracy	: 0,2%
Active Power Meas Accuracy	: 0,5%
Reactive Power Meas Accuracy	: 0,5%

## DESIGN

Supply Voltage	: 230V (±%20) 50 Hz 57VAC, 100VAC optional
L-N in	: 344VAC 50 Hz
L-L in	: 600VAC 50Hz
Operating Temperature	: -5...55°C
Power Consumption of Measuring	: <0,5VA
Monitor	: 3×4" Graphical LCD
Connection	: 3P4W







# LV POWER CAPACITOR – ELECTRONICON



## OPERATING DATA

Rated Voltage	: 230V...800V
Rated Frequency	: 50 / 60 Hz
Maximum permissible current	: 1,5In...1,9In
Total Loss	: 0.25W...0.4W/kVar

## STANDARD

IEC60831 (2003), VDE 0560 – 46/47,  
CSA C22.2 No. 190-M 1985, UL Standart No. 810, GOST 1282-88

## DESIGN

Design	: Dry Type, Polypropylene Film, Self Healing Technology
Internal connection	: Delta
Impregnant (filling material)	: Inert Insulation Gas (N <sub>2</sub> )
Temperature class	: -40 °C/D
Max. relative humidity	: 95%
Max. relative humidity	: >130.000 Hours



# MV POWER CAPACITORS - EPCOS



## OPERATING DATA

Type of Capacitor	: Film, Foil, Oil Impregnated (APP type)
Application	: Shunt Compensation of Reactive Power
Rated Voltage	: 1kV...38kV
Rated Output	: 50kVAr...800kVAr
Rated Frequency	: 50/60 Hz
Phase-Bushing	: 1 Phase – 1B, 1 Phase – 2B, 1 Phase – 3B, 3 Phase – 3B, 3Phase – 4B
Connection	: 1 Phase, 1 Phase Twin, 3 Phase Delta, 3 Phase Star

## STANDARD

IEC 60871, IS 13925

## MATERIAL

Di-Electric	: Polypropylene Film
Electrode	: Aluminum Foil
Impregnant	: NPCB Oil
Protective Enclosure	: Mild Steel (CRCA), Stainless Steel (SS409 / SS304)
Bushing	: Ceramic
Discharge Device	: Metal Oxide Film Resister
Paint	: Epoxy Based, Light Grey 631 of IS 5***

## CONSTRUCTION

Element End Connection	: Soldered Type
Fuse Type	: Internal / External
Discharge Device	: Internal Resistor
Container Sealing	: Hermetically Sealed

## CHARACTERISTICS

Insulation Class	: Y
Protection Class	: IP00
Cooling	: ONAN
Application Duty	: Indoor / Outdoor
Temperature Category	: – 20/-5/0°C to +45/+50/+55°C
Capacitor Unit Losses	: ≤ 0.2 Watt/kVAr at 25°C After Stabilization
Discharge Time	: 300/600 Seconds
Residual Voltage	: Less than 50/75 V



# CONTACTOR – BENEDICT



## OPERATING DATA

Rated Voltage	: 380V – 400V – 690V
Rated Frequency	: 50 / 60 Hz
Current	: 18-...-115A (AC3) / 18-...-144A (AC6b)
Insulation Voltage	: 690V

## STANDARD

IEC/EN 60947 – 4 – 1, IEC/EN 60947 – 5 – 1, VDE 0660

## DESIGN

Ambient Temperature	: -40°C ...+90°C
Atmospheric Humidity	: 90 – 95%
Mounting	: 35mm DIN Rail
Protection Degree	: IP00
Mechanical Life	: 10x10 <sup>6</sup>



# THYRISTOR SWITCH – BELUK



## OPERATING DATA

Rated Voltage	: 400V-690V
Current	: 72A – 42A
Insulation Voltage	: 690V
Switching Time	: 10 ms after the switching signal is applied
Re-Switching Time	: 20ms
Voltage trigger signal	: 8 – 30 VDC

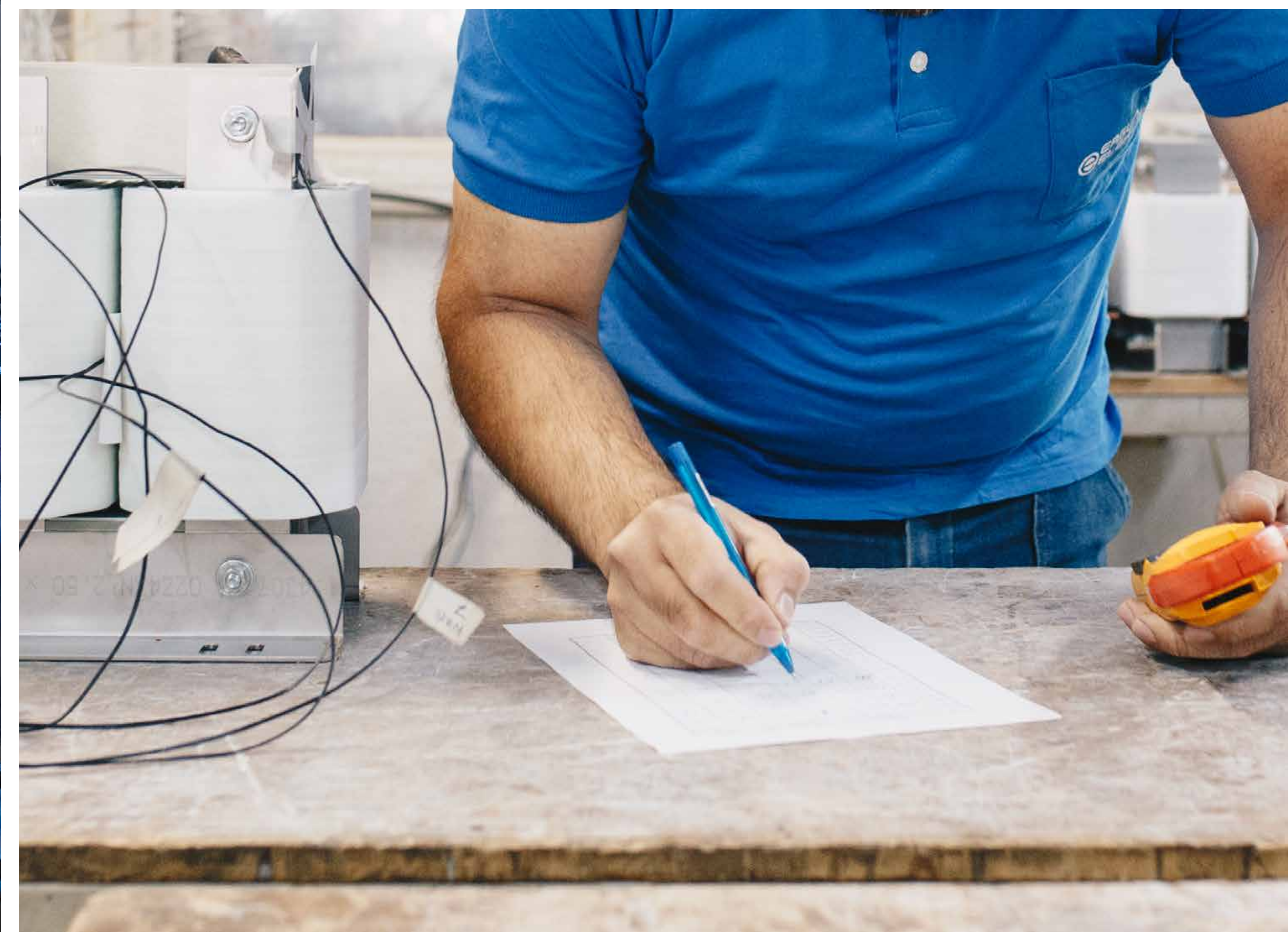
## STANDARD

UL 508: 2018

## DESIGN

Ambient Temperature	: -10°C ...+45°C
Atmospheric Humidity	: 10% – 95%
Protection Degree	: IP10

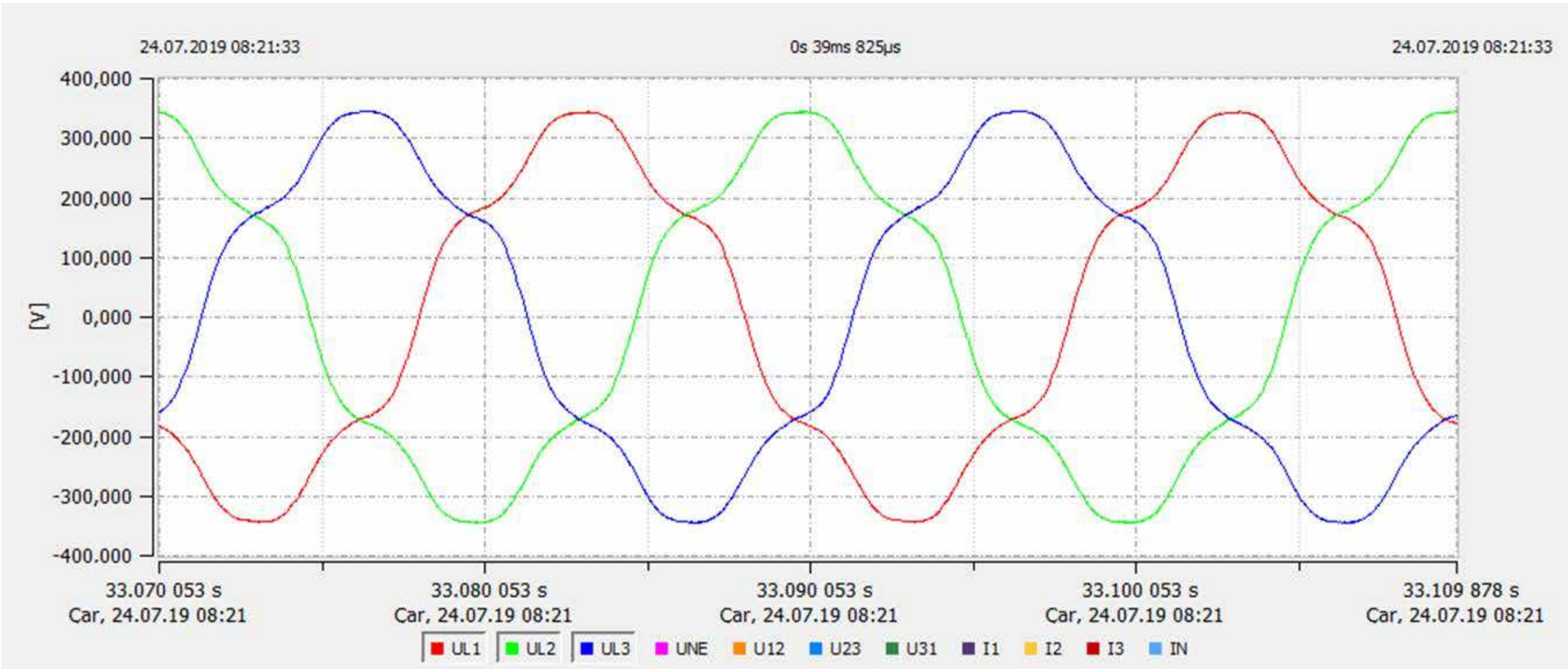




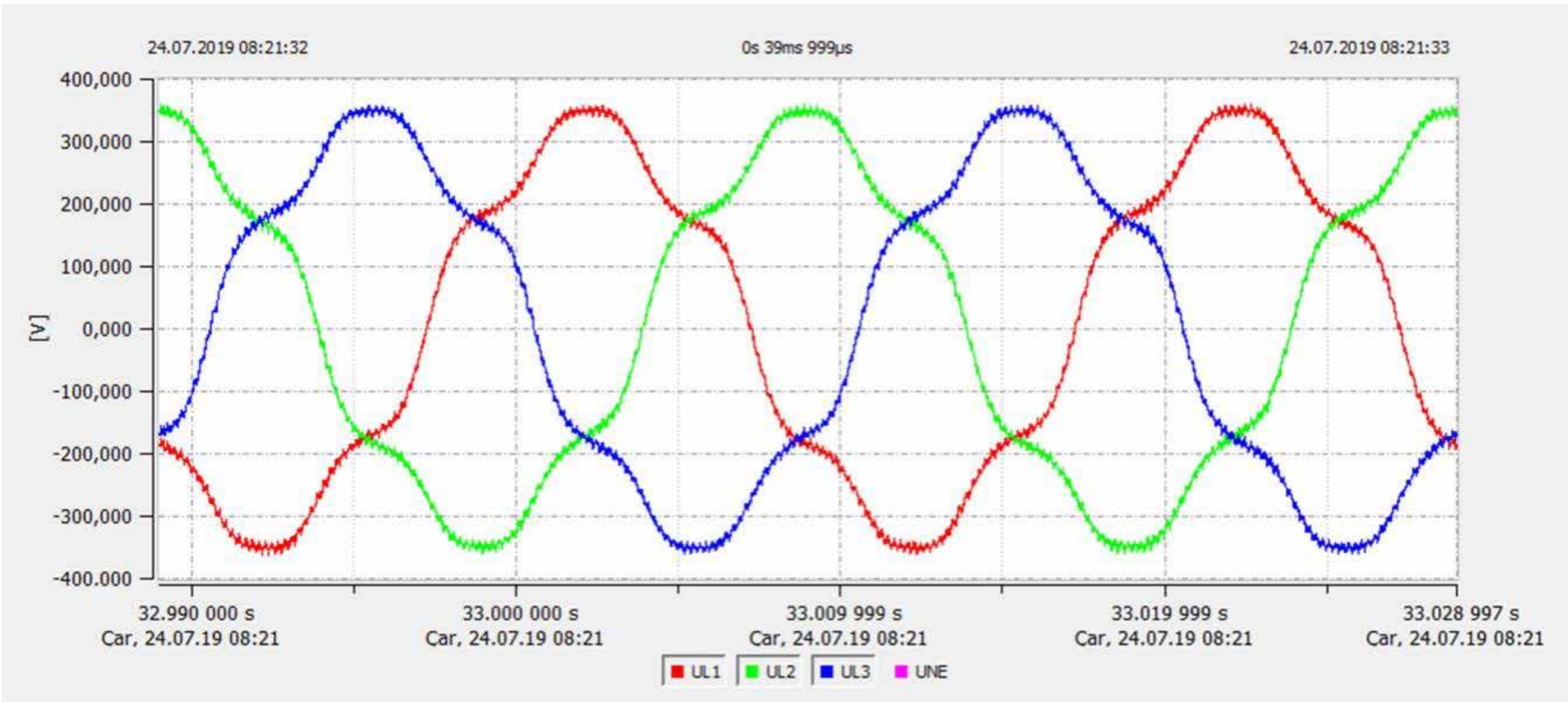


# POWER QUALITY MEASUREMENT

Measurement with 40 khz



Measurement with 4 Mhz



Electrical measurements are carried out for the root analysis of issues like detection of undesired events or malfunctions in facilities, automation systems operating out of plan, electrical component overheating or noisy parts.

Today, errors or losses are higher than ever due to the increase of both frequency converters and DC rectifiers in networks. More so, the installation of more complex and controlled systems has increased sources of malfunction on account of undesired interactions between electrical components.

Therefore, field work must be carried out with high-speed devices which are more sophisticated than the speed rate of the malfunctions to clearly determine problems. To tackle such problems, Ergun Elektrik works with a device capacity that can measure frequencies up to 170 kHz and transients up to 5 kV in LV. With device resolutions of up to 4 MHz, we can detect even the most risky and latent malfunctions and electrical events.

The graphics on the left provide an example of the difference detections achieved with the resolution of the devices.



# HARMONIX - SERIAL PASSIVE HARMONIC FILTER



## OPERATING DATA

Rated Voltage	: 230V...690V
Rated Power	: 5.5kW...1000kW or tailor-made
Rated Frequency	: 50/60Hz
Temperature	: ≤55°C

## STANDARD

TS EN 60076 – 6, TS EN61558 – 2 – 20, TS EN60831

## ELECTRICAL DESIGN

Filtered Harmonics	: 5 (also additionally 7.-9.-11.-13. and above)
THDI	: ≤ 10% at Full Load or tailor-made
Capacitors	: Oil Type, LC Filter Capacitor, High Harmonic Current withstand Level

## ENCLOSURE DESIGN

Protection Degree	: IP00...IP54
Cooling	: Natural / Forced ventilation
Mounting	: Floor Standing, Indoor / Outdoor
Enclosure	: Electrostatic painted steel sheet, Hot Dip Galvanized steel sheet



# SINUS FILTER



## OPERATING DATA

Rated Voltage	: 400V...690V
Rated Power	: 5,5kW...355kW or tailor-made
Rated Current	: 12A.....640A
Phase	: 3
Frequency	: 50Hz
Inductivity Tolerance	: $\pm$ 5%
Insulation (winding – core)	: 3kV

## STANDARD

TS EN 60076 – 6, TS EN61558 – 2 – 20

## SAFETY AND PROTECTION

Protection Class	: IP00, indoor mounting
Insulation	: F class, 155°C
Impregnation	: H class Vacuum varnish impregnation
Cooling	: Natural/T40

## DESIGN

Winding	: Aluminium / Copper
Core	: Steel Sheet Ensuring Low Loss
Terminals	: Copper Bar, Terminal Block or Cable Lug



# LINE REACTOR



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: 0,37kW...1600kW
Rated Current:	: 4A.....3000A
Phase	: 1 – 3
Frequency	: 50Hz
Impedance	: 4%
Inductivity Tolerance	: ± 5%
Insulation (winding-core)	: 3kV

## STANDARD

TS EN 60076 – 6, TS EN61558 – 2 – 20  
CE Conformity

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor
Insulation	: F class, 155°C
Impregnation	: H Class Vacuum Varnish Impregnation
Cooling	: Natural/T40

## DESIGN

Design	: Iron core, Dry Type
Winding	: Aluminium / Copper
Core	: Steel Sheet Ensuring Low Loss
Terminals	: Copper Bar, Terminal Block or Cable Lug



# LOAD REACTOR



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: 0,37kW...1600kW
Rated Current	: 4A.....3000A
Phase	: 1 – 3
Frequency	: 50Hz
Impedance	: 1,2%
Inductivity Tolerance	: $\pm$ 5%
Insulation (winding-core)	: 3kV

## STANDARD

TS EN 60076 –6, TS EN61558 – 2 – 20  
CE Conformity

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor
Insulation	: F class, 155°C
Impregnation	: H Class Vacuum Varnish Impregnation
Cooling	: Natural/T40

## DESIGN

Design	: Iron core, Dry Type
Winding	: Aluminium / Copper
Core	: Steel Sheet Ensuring Low Loss
Terminals	: Copper Bar, Terminal Block or Cable Lug



# SMOOTHING REACTOR



## OPERATING DATA

Rated Voltage	: 230V...1000V
Rated Power	: 10A.....3000A
Rated Frequency	: 50Hz
Inductivity Tolerance	: $\pm$ %5
Insulation (winding-core)	: 3kV
Phase	: 1

## STANDARD

TS EN 60076 – 6, TS EN 61558-2-20

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor mounting
Insulation	: F Class, 155°C
Cooling	: Natural Cooling/T40

## DESIGN

Design	: Iron core, Dry Type
Winding	: Aluminium foil
Core	: Steel Sheet Ensuring Low Loss
Terminals	: Copper bar



# SOFIA – VOLTAGE CONTROLLED HARMONIC FILTER



## OPERATING DATA

Rated Voltage	: 400 – 690V / 50Hz
Filter Current/Frequency	: H5: 200 – 300 – 360A / 250Hz H7: 125 – 150 – 180 / 350Hz H11: 80 – 100 – 120 / 550Hz
No Load Current	: H5: 133...162 / 134...158A H7: 51...55 / 58...69A H11: 37 / 29A
Capacitor Dimensioning	: >900 / 1400V
Losses	: H5: <1250W / 1500W / 2070W H7: <900W / 1200W / 2070W H11: <460W / 600W / 1000W

## STANDARD

EN 61000-2-4

## SAFETY AND PROTECTION

Protection Class	: IP21 / IP42 / IP54
Cooling	: Natural / Forced (with Fans)

## DESIGN

Ambient Temperature	: -5/+40°C, 24 hour average ≤ 35°C
Cable Entry	: From Bottom
Connections	: L1, L2, L3 and PE



# RESI – RESONANCE ELIMINATION SYSTEM



## OPERATING DATA

Rated Voltage	: 400V – 480V – 690V / 50 Hz
Frequency	: 50Hz ±5%
Losses	: <1500 W
No Load Losses	: <100 W

## STANDARD

EN 61000-2-4

## SAFETY AND PROTECTION

Protection Class	: IP20
Cooling	: Forced Cooling with Fans

## DESIGN

Ambient temperature	: -5/+40°C, 24 Hour Average ≤ 35°C
Cable entry	: From Bottom
Connections	: L1, L2, L3, N and PE or PEN (Protection earthing and Neutral are used as the same conductor)





## OPERATING DATA

Rated Voltage	: 208V – 400V – 415V – 480V – 690V
Frequency	: 50/60Hz ±5%
Compensation Current Cap.	: 50 – 75 – 90 – 120 – 150Arms
Har. Current Compensated	: Individual compensation up to 49th order
Rate of harmonic reduction	: Better than 98%
Compensation of cosØ	: Up to 1.0
Response time	: < 1 ms

## STANDARD

EN 61000-6-4, EN 61000-6-2, EN50178, EN60529, EN50581

## SAFETY AND PROTECTION

Protection Class	: IP20, IP21 (other ratings are available upon request)
Cooling	: Forced Cooling with Fans

## DESIGN

Operating temperature	: 0 to 50 °C, up to 40 °C Without Derating
Cable entry	: From Bottom
Expandability	: Up to 15 Units can be used in Parallel



# P200 RESONANCE FILTER



## OPERATING DATA

Rated Voltage	: 280V – 480V
Frequency	: 50/60Hz ±5%
Compensation Current Cap.	: 120Arms
Har. Current Compensated	: Curve Selectable Harmonics, Interharmonics Compensation up to 5 kHz (100th order)
Filter efficiency	: Better than 97%
Compensation of cosØ	: Up to 1.0
Response time	: <20s

## STANDARD

EN 61000 – 6 – 4, EN 61000 – 6 – 2, EN50178, EN60529, EN50581

## SAFETY AND PROTECTION

Protection Class	: IP20, IP21 (other ratings are available upon request)
Cooling	: Forced with Fans

## DESIGN

Operating Temperature	: 0 to 50 °C, up to 40°C without derating
Cable Entry	: From bottom
Connection	: 3 Phase without Neutral (TN, TT, IT)
Expandability	: Can be used in parallel



## POWER QUALITY ANALYZER - PQUBE



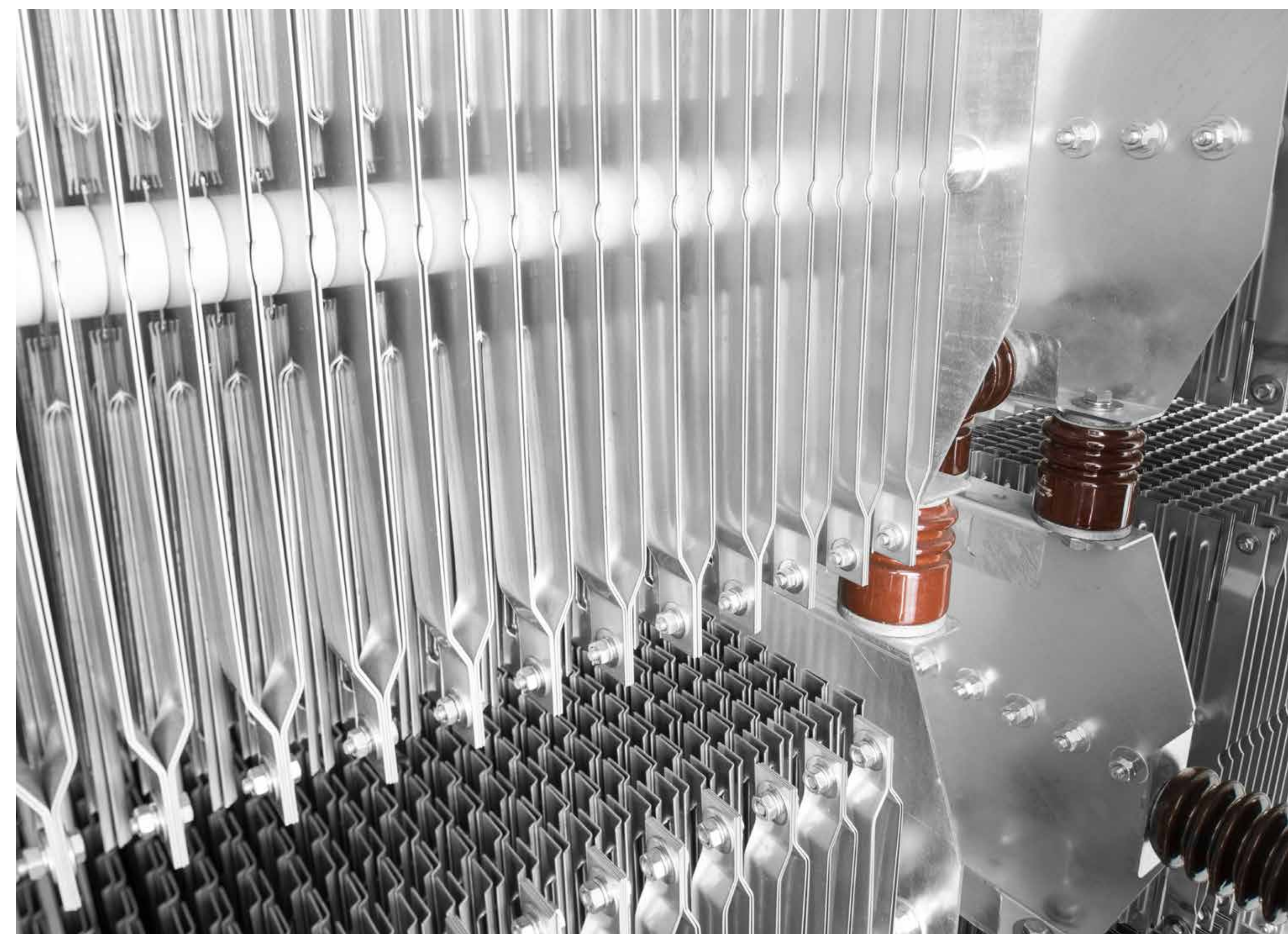
Power quality measurements are carried out to detect malfunctions in factories. However, in some cases, malfunctions occur in variable periods instead of specific periods. The preferred scenario in measurements is being on record when the malfunction occurs which allows us to examine these records to make suggestions or provide solutions accordingly.

This is why there are cases when malfunctions go undetected in measurements made with mobile devices or serious costs may be incurred due to long-term measurements.

In some cases, the question is about whether the malfunctions in the facility are caused by the network or by the facility itself. Fixed power quality analysers must be used in such cases since retrospective checks cannot be carried out.

For such problems, we recommend class A PQube constant power quality analysers. Their compact design allows easy installation and capability of direct measurements up to 690 V. With the 8-current transformer (2 pieces of 3-phase loads and 1-piece neutral, 1-piece earth) and 14-current transformer (4 pieces of 3-phase load and 1-piece neutral, 1-piece earth) models available, it is now possible to measure 2 or 4 different loads with a single device simultaneously.







# BRAKING RESISTOR



## OPERATING DATA

Rated Voltage	: up to 1kV
Rated Power	: 50W...300kW or tailor-made
Rated Resistance	: Customizable

## SAFETY AND PROTECTION

Enclose Protection Degree	: IP20...IP23
Cooling	: Natural
Mounting	: Indoor / Outdoor

## DESIGN

Enclose Material	: Galvanized Steel Sheet / Stainless Steel Sheet
Resistor Element	: CrAl / NiCr / AISI304
Terminal	: Terminal Block
Resistor Element Supports	: Steatite Ceramics



# NEUTRAL GROUNDING RESISTOR



## OPERATING DATA

Network Voltage	: 1kV ... 52kV
Rated Frequency	: 50/60Hz
Fault Current	: Up to 3000A
Ohmic value at 25°C	: According to Fault Current
Rated Operation Duration	: 5 sec. – 10 sec. or tailor-made
BIL	: According to the rated NGR Voltage
Ambient Temperature	: ≤55°C

## STANDARD

IEEE32

## SAFETY AND PROTECTION

Protection Degree	: IP00 ... IP65
Cooling	: Natural / Forced Ventilation
Installation	: Indoor / Outdoor

## DESIGN

Input	: Bushing or Cable From Bottom, Side or Top
Output	: Bushing or Cable From Bottom, Side or Top
Accessories	: Current Transformer, Voltage Transformer, Disconnecter
Enclosure	: Hot Dip Galvanized Steel Sheet / Painted Galvanized Steel Sheet or tailor-made



# GENERATOR NEUTRAL GROUNDING RESISTOR



## OPERATING DATA

Network Voltage	: 1kV ... 52kV
Rated Frequency	: 50/60Hz
Fault Current	: Up to 3000A
Ohmic value at 25°C	: According to Fault Current
Rated Operation Duration	: 10 sec or tailor made
BIL	: According to the rated NGR Voltage
Ambient Temperature	: ≤55°C

## STANDARD

IEEE32

## SAFETY AND PROTECTION

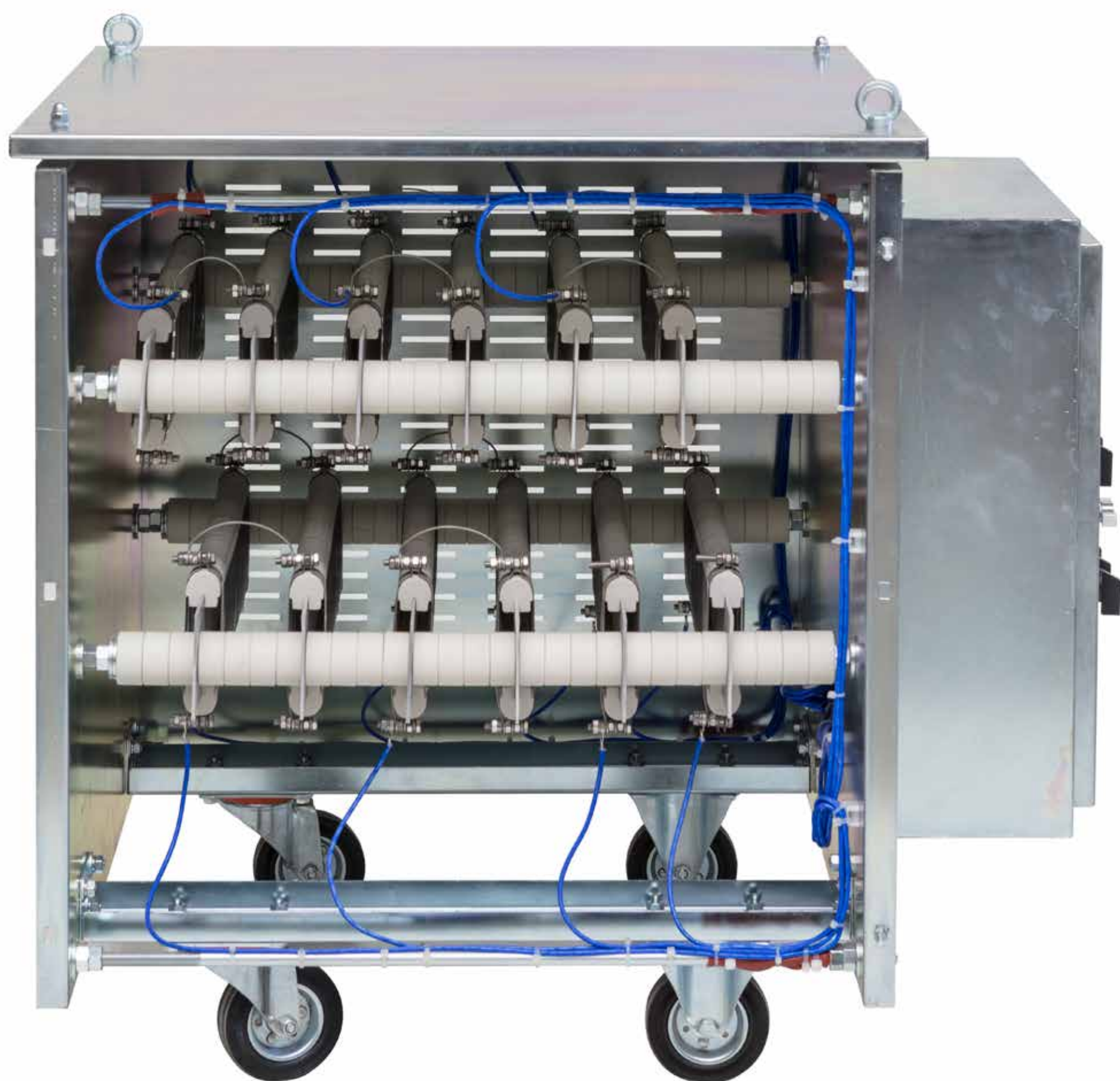
Protection Degree	: IP00 ... IP65
Cooling	: Natural / Forced Ventilation
Installation	: Indoor / Outdoor

## DESIGN

Input	: Bushing or Cable From Bottom, Side or Top
Output	: Bushing or Cable From bottom, Side or Top
Accessories	: Current Transformer, Voltage Transformer, Disconnecter
Enclosure	: Hot Dip Galvanized Steel Sheet / Painted Galvanized Steel Sheet or tailor-made



# LOAD BANK



## OPERATING DATA

Network Voltage	: 230V....690V
Rated Frequency	: 50/60Hz
Rated Power	: Tailor-made according to the request
Step	: Single or multi steps according to request
Switching	: Manually or automatically
Switching Control Unit	: Contactor
Short Circuit Protection	: NH00 Fuses
Ambient Temperature	: ≤55°C

## SAFETY AND PROTECTION

Protection Degree	: IP00.....IP54
Cooling	: Natural / Forced ventilation
Installation	: Indoor / Outdoor

## DESIGN

Resistance	: Stainless Steel Plates or Wire
Connection	: Copper Bar with Control Panel
Enclosure	: Hot Dip Galvanized Steel Sheet / Painted Galvanized Steel Sheet or tailor-made



# LV MOTOR STARTING RESISTOR



## OPERATING DATA

Motor Power	: Up to 1200kW or tailor-made
Duty Cycle	: Cycles carried by the motor
Frequency	: 50/60Hz
Starting condition	: Soft – Medium – Heavy

## SAFETY AND PROTECTION

Protection Degree	: IP20.....IP54
Cooling	: Natural or Forced ventilation
Installation	: Indoor / Outdoor

## DESIGN

Resistor Material	: Cr Alloy
Enclosure	: Galvanized or Stainless Steel or tailor-made
Design Requirements	: Rotor Current – Voltage Type of the driven machine Sequential starting number and time



# HARMONIC FILTER RESISTOR



## OPERATING DATA

Network Voltage	: 1kV ..... 132kV
Rated Frequency	: 50/60Hz
Fault Current	: Up to 200A
Ohmic value at 25°C	: Tailor-made according to the request
Rated Operation Duration	: Continuous
BIL	: Tailor-made according to the request
Ambient Temperature	: ≤55°C

## STANDARD

IEEE32

## SAFETY AND PROTECTION

Protection Degree	: IP00.....IP23
Cooling	: Natural
Installation	: Outdoor

## DESIGN

Enclosure	: Hot dip Galvanized Steel Sheet, Stainless Steel Sheet
Input	: Bushing
Output	: Bushing







# LV MOTOR STARTING REACTOR



## OPERATING DATA

Rated Voltage	: 230V...400V
Rated Power	: up to 600kW
Frequency	: 50/60Hz

## STANDARD

TS EN 60076 – 6, TS EN 61558 – 2 – 20

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor
Insulation	: F Class, 155°C
Cooling	: Natural/T40

## DESIGN

Design	: Iron or Air core
Winding	: Copper / Aluminium
Terminals	: Copper Bar, Terminal Block or Cable Lug



# MV MOTOR STARTING REACTOR



## OPERATING DATA

Rated Voltage	: 1kV...15kV
Rated Power	: up to 5000kW or tailor-made
Frequency	: 50 / 60Hz

## STANDARD

TS EN 60076 – 6

## SAFETY AND PROTECTION

Protection Class	: IP00, Indoor
Insulation	: F class, 155°C
Cooling	: Natural/T40

## DESIGN

Design	: Air Core
Winding	: Aluminium / Copper
Terminals	: Aluminium / Copper Bar



# NEUTRAL GROUNDING REACTOR



## OPERATING DATA

Network Voltage	: Up to 36kV
Rated Frequency	: 50/60Hz
Fault Current	: Up to 1000A
Ohmic value at 25°C	: According to Fault Current
Inductance	: According to Fault Current
Rated Operation Duration	: 5 sec. – 10 sec. or tailor-made
BIL	: According to the rated NGR Voltage
Ambient Temperature	: ≤55°C

## STANDARD

IEEE32, TS EN 60076 – 6

## SAFETY AND PROTECTION

Installation	: Indoor / Outdoor
Protection Class	: IP00
Cooling	: Natural

## DESIGN

Winding	: Copper / Aluminium
Support Frame	: Hot Dip Galvanized Steel Sheet
Insulators	: Silicone, Porcelain or Epoxy
Terminals	: Aluminium / Copper
Accessories	: Current Transformer, Disconnecter



# MV SHORT CIRCUIT CURRENT LIMITING REACTOR



## OPERATING DATA

Rated Voltage	: 3kV...36kV
Rated Current	: up to 3000kVA
Rated Frequency	: 50/60Hz
Tolerance of Inductance	: +20%

## STANDARD

TS EN 60076 – 6

## SAFETY AND PROTECTION

Installation	: Indoor / Outdoor
Insulation	: F class 155°C
Impregnation	: H class Vacuum Impregnation for Indoor : Epoxy Varnish for Outdoor
Cooling	: Natural Cooling/T40

## DESIGN

Design	: 1 Phase, Air Core, Dry Type
Winding	: Aluminium / Copper
Terminal	: Aluminium / Copper













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