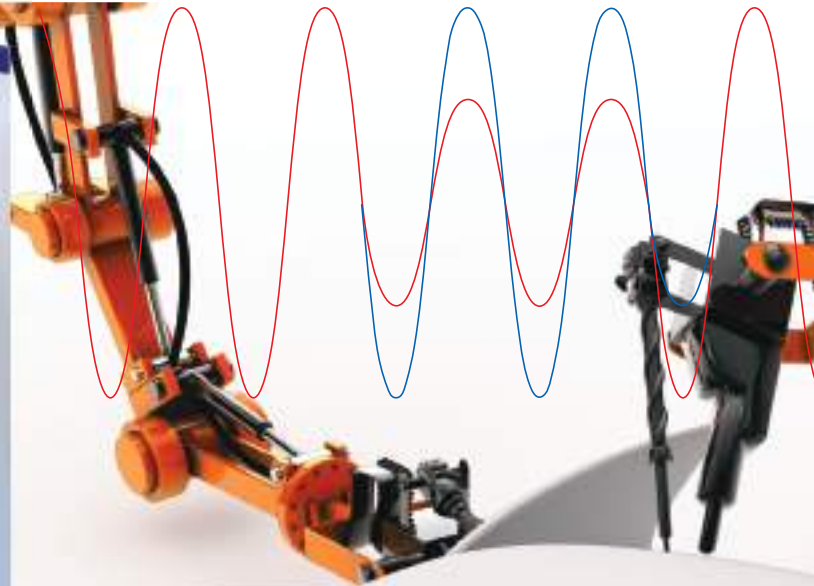


DYNAMIC VOLTAGE RESTORER

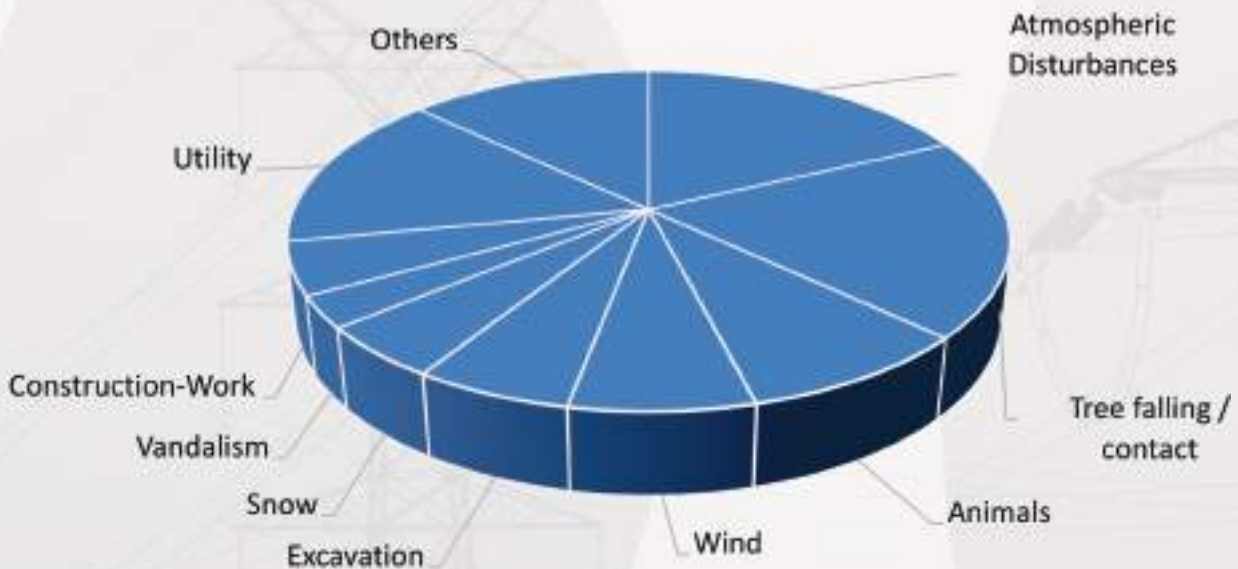
YOUR VOLTAGE - OUR PASSION



OSKOR[®]

▶ CHALLENGE

- ▶ Production down time are in 92% of the cases caused by voltage dips.
- ▶ Frequent causes of voltage dips are short circuits in the transmission & distribution grid or faults in the customer's equipment.
- ▶ The duration of voltage dips is often depending on the response time of the protection equipment, e.g. Distance relay. The typical duration is greater than 20 ms and less than 1 second.²⁾
- ▶ The depth of voltage dips depends on the network topology and the distance from the fault location. Almost all voltage dips are leaving the remaining voltage greater than 40 %. ²⁾
- ▶ Quantity and depth of voltage dips differs strongly depending on region and season of the year. ²⁾



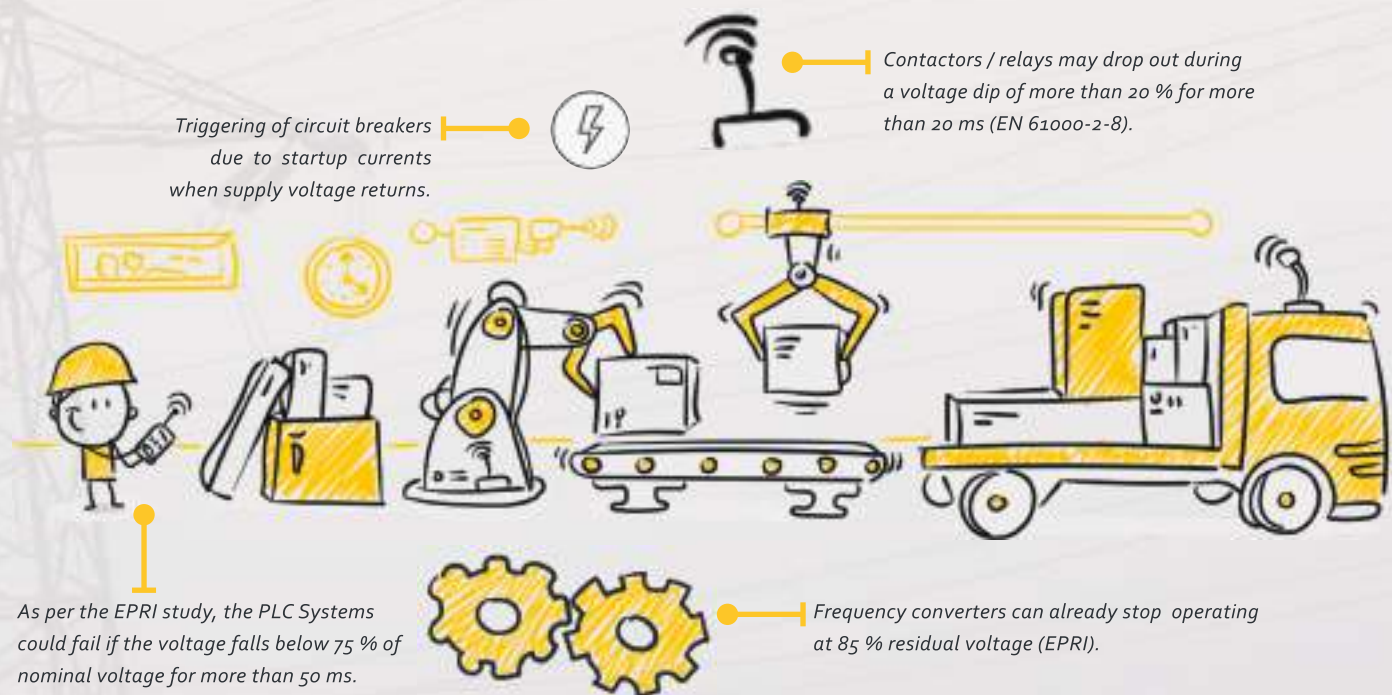
Causes of voltage dips in the transmission and distribution network ¹⁾

¹⁾Based on EPRI, Electric Power Research Institute, Palo Alto CA

²⁾ Source: EN 50160, Voltage characteristics of electricity supplied by public distribution networks, Edition February 2011

▶ SOLUTION

- ▶ The most important production factor is the electrical power, OSKOR® reduces significantly the risks of improper power quality:
- ▶ Prevention of production downtimes and downtime expenses
- ▶ Effective reduction of setup costs and reject rates
- ▶ Compliance with production criteria for industrial goods and testing guidelines
- ▶ Reduction of maintenance- and repair costs
- ▶ Ensuring of quality and reproducibility

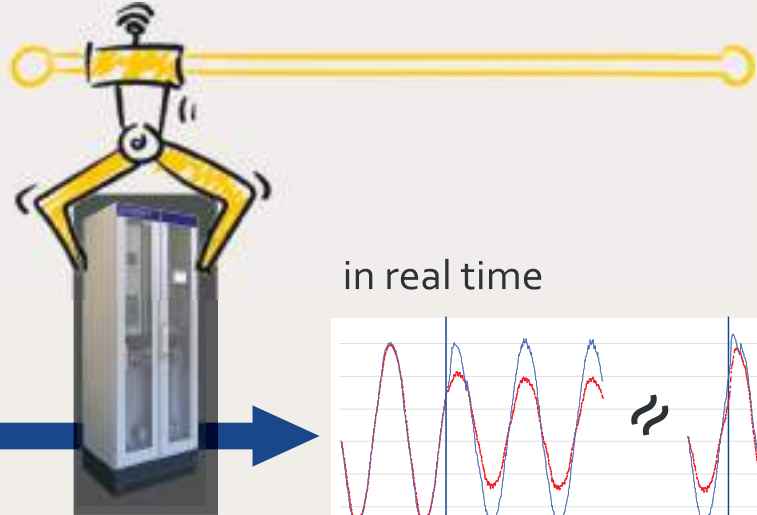




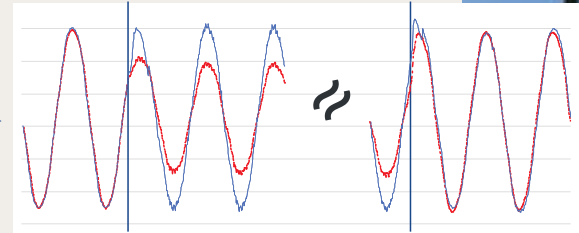
Voltage and phase correction ...



INPUT



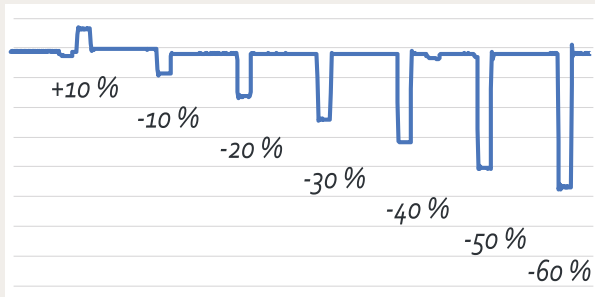
in real time



OUTPUT

40 % correction capability 3-phase

Voltage correction ...



INPUT

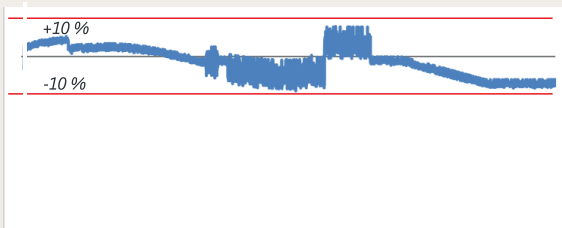
Measurement
Half cycle RMS



OUTPUT

60 % correction capability 1-phase

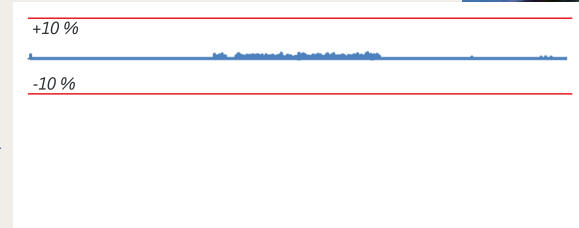
Continuous correction...



INPUT



min. ± 10 %



OUTPUT

▶ OSKOR® – PERFORMANCE FEATURES

▶ **± 10% continuous correction capability**

▶ **Short circuit power remains unchanged**
No adjustment of protection equipment required

▶ **Robust overload capability**
150% overloading for approx. 30 seconds

▶ **Economical solution**
No battery storage required = very low maintenance costs

Very high Efficiency = very low operating costs

▶ **Highly scalable**
Modular system, adaptable for required power levels

Customized output voltages available

System power extension through parallel connection

Flexible adaption of short circuit capability



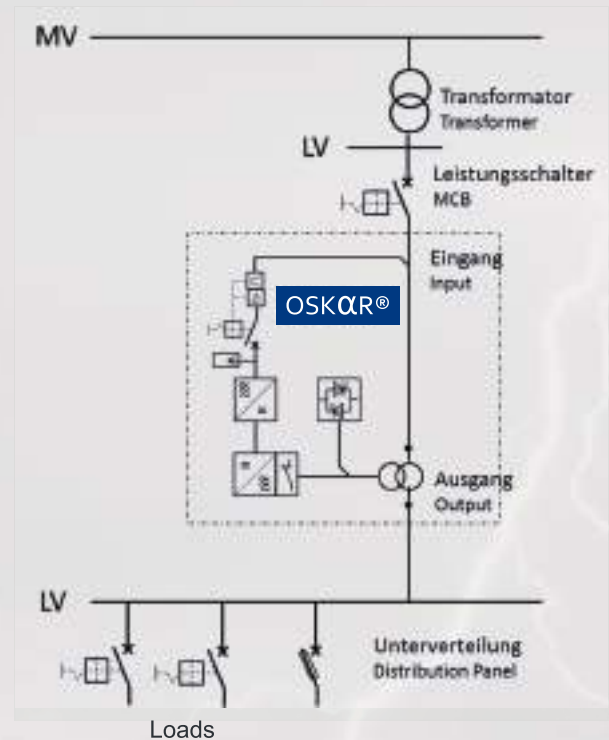
300 kVA + 300 kVA = 600 kVA

▶ OSKAR® INSTALLATION

OSKAR® is connected in series between the upstream distribution transformer and the equipment.

Overload and short circuit settings of the upstream circuit breaker can be adjusted as usual corresponding to the rated power of OSKAR®.

The protection of the loads remains usually unchanged, because of the minimal changes of the short circuit current.



▶ OSKAR® BASIC SETUP

OSKAR® is delivered in one or more standard control cabinets.

The basic setup consists of the components rectifier, inverter with integrated overloadable bypass, short circuit protection and the serial transformer.

As additional safety features, OSKAR® is equipped with an over-voltage protection and depending on the requirements also includes a temperature monitor for the serial transformer.

This combination and the elaborated interaction are ensuring a very high level of supply security, an optimal voltage quality and therefore the best possible conditions for sophisticated equipments and production processes.

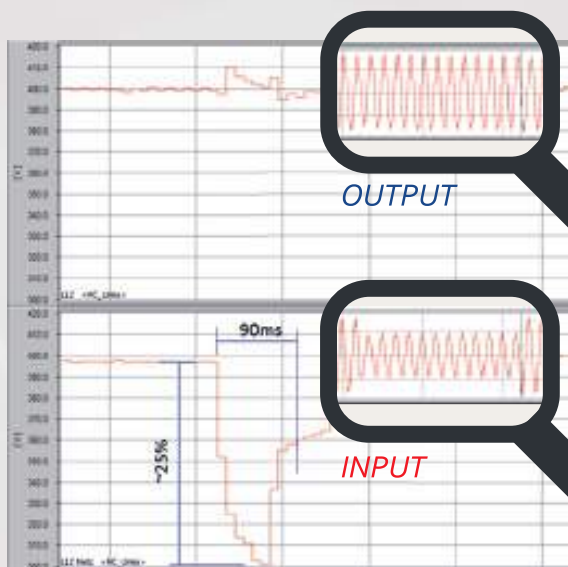
▶ OSK α R[®] WORKING PRINCIPLE

OSK α R[®] is an active three phase voltage stabilizing system which corrects the source voltage in magnitude and phase to the desired level with the help of state-of-the-art power electronics. The supply of the correction voltage through a robustly designed low-impedance serial transformer is significant for the rugged and overload capable design of the voltage stabilizer, while the power electronics enable an almost instantaneous correction of the output voltage.

To serve also regenerative loads, the full power converter is a 4-Quadrant operation converter equipped with an Active Front End converter which ensures the bi-directional power flow between the source and the load.



▶ OSK α R[®] APPLICATION EXAMPLE



The real-time measurements shown are actual effective voltage values.

As clearly visible in the detailed view, the first half-wave of the effective voltage is already within the standard range.

Other application areas:

- automotive industry
- pharmaceutical and chemical industry
- automated processes (Industry 4.0)
- food industry
- medicinal technology

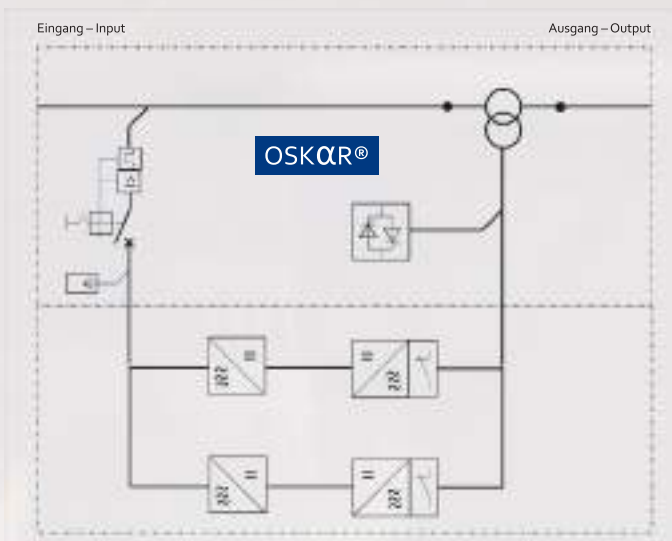
The above real time measurements give an impression of a 400V network, prone to voltage fluctuation and how the active voltage stabilizer OSK α R[®] is correcting the voltage.

▶ OSKAR® MODULAR AND EXPANDABLE

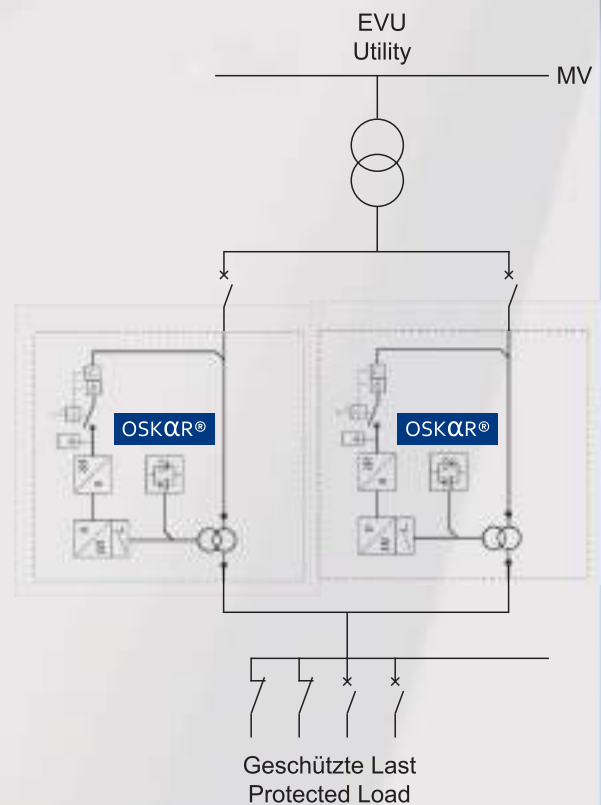
The system power of OSKAR® can be extended for different power requirements by paralleling the power electronic modules. Based on the fundamental sizing of the modules, the most economical solution would result in the multiples of 300kVA for 40% voltage correction or the multiples of 400kVA for 30% voltage correction.

One of the most unique feature offered by OSKAR® is the scalability. OSKAR® systems with the same power ratings can be operated in parallel. This feature has been developed keeping future expansions in mind.

Due to its easy parallel connection, OSKAR® is also the perfect solution whenever a parallel supply through two or more transformers is present.



Scalable OSKAR®-Power



Paralleling of OSKAR® systems with equal power rating

▶ ROBUST SHORT-CIRCUIT AND OVERLOAD PROTECTION

When protecting critical industrial production processes, under no circumstances the supply of the process must be interrupted if a fault within OSKOR® occurs.

On the other side, the high-tech power electronic modules in OSKOR® must not be damaged if there is an overload or a fault within the connected equipment.

Also, short circuits at the connected loads or in the distribution panel should not only be bypassed by OSKOR®, but should also be guided in a way that the protection equipment on the customers side is tripping safely.

We call such a system robust. Only a robust system is suitable for applications in industrial processes.

In order to meet these challenges, our R&D engineers have designed a multi-redundant bypass system which ensures that the connection between source and load remains intact if any kind of fault occurs.

The key part is a short-circuit protection with a bypass based on thyristor modules. These modules become active in short-circuit or under any other fault conditions.

The bypass module is shielded by mechanical bypass switches, integrated into the inverter module, offering a backup protection in case the bypass module fails. Those mechanical bypass switches are designed for twice the rated current of the system. Therefore, these mechanical switches are ensuring all forms of redundancy for guaranteeing the protection of the load.

Now that's what we call ROBUST!



OSKOR®-Short-circuit-protection

▶ OSKOR® BENEFITS

	UPS	SERVO STABILIZER	OSKOR®
SHORT CIRCUIT POWER	—	■	■
CORRECTION TIME	1 half wave (< 10 ms)	1,5 – 2,5 sec.	1 half wave (< 10 ms)
EFFICIENCY	94 %	98 – 99 %	98,5 %
SPACE REQUIREMENTS AT 300 kVA	1,0 m ²	2,4 m ²	0,5 m ²
WEIGHT	1.170 kg	2.300 kg	900 kg
WEAR & TEAR	high-maintenance (loss of power of the energy storage)	high-maintenance (mechanical wear)	low-maintenance (no use of energy storage and mechanical components)

Values of the above comparison table are based on data sheets of third parties.



OSKAR® powered by Condensator Dunit

▶ OSKAR® DIGITAL

WEB product over view:

<https://www.condensator-dunit.de/en/products/oskar/>





© fotolia.com

OSKOR® animation:



<https://www.youtube.com/watch?v=-K52Sz86N4s>



▶ OSKOR® MODELS



◀ DVR for
300 kVA loads with
40% voltage correction



▲ DVR for
600 kVA loads with
40% voltage correction



◀ DVR for
2.400 kVA loads with
30% voltage correction

▶ OSKQR® – TECHNICAL SPECIFICATIONS

OSKQR® DVR Power Ratings			
Rated Power Sr [kVA]	40% Compensation	30% Compensation	20% Compensation
	300 kVA	400 kVA	500 kVA
	600 kVA	800 kVA	1000 kVA
	900 kVA	1200 kVA	1500 kVA
	1200 kVA	1600 kVA	2000 kVA
	1500 kVA	2000 kVA	2500 kVA
	1800 kVA	2400 kVA	3000 kVA
Rated Power Sr			

OSKQR®							
Nominal Voltage	400 V	415 V	440 V	480 V	690 V	208 V	220 V
Rated Frequency	50 Hz and 60 Hz						

OSKQR® DVR Performance				
	40% Compensation	30% Compensation	20% Compensation	Max. Compensation Duration[s]
3 - Phase Voltage Band	50%Un - 120%Un	60%Un - 120%Un	70%Un - 120%Un	30 Sec.
1 - Phase Voltage Band	30%Un - 130%Un	40%Un - 130%Un	50%Un - 130%Un	35 Sec.
Continuous Correction Band	10%Un	10%Un	10%Un	Continuous
Reaction Time	200µs			
Correction Time	5ms			
Efficiency	>98.5%			

OVERLOAD CAPACITY	Peak current / Crest factor:	3
	Effective power:	150 % (30 s)

Voltage Level [Un]	40% Compensation		30% Compensation		20% Compensation	
	Voltage Band 3 - Phase 50%Un - 120%Un	Voltage Band 1 - Phase 30%Un - 130%Un	Voltage Band 3 - Phase 60%Un - 120%Un	Voltage Band 1 - Phase 40%Un - 130%Un	Voltage Band 3 - Phase 70%Un - 120%Un	Voltage Band 1 - Phase 50%Un - 130%Un
400V	200V-480V	120V-520V	240V-480V	160V-520V	280V-480V	200V-520V
415V	208V-498V	125V-540V	249V-498V	166V-540V	291V-498V	208V-540V
440V	220V-528V	132V-572V	264V-528V	176V-572V	308V-528V	220V-572V
480V	240V-576V	144V-624V	288V-576V	192V-624V	336V-576V	240V-624V
690V	345V-828V	207V-897V	414V-828V	276V-897V	483V-828V	345V-897V
208V	104V-250V	62V-270V	125V-250V	83V-270V	146V-250V	104V-270V
220V	110V-264V	66V-286V	132V-264V	88V-286V	154V-264V	110V-286V

INTERFACE	Parameterization / Analysis:	Touch Panel / Log-SD-Card / Mail
	Communication:	Ethernet (RJ45) / FTP-Server / Mail-Server / Modbus



YOUR VOLTAGE – OUR PASSION

Condensator Dominit
Power Quality Solutions India Pvt. Ltd.
Block No. 1160/4
Opp. Universal College
Moti Bhoyan
Gandhinagar 382721
Phone +91 6355371098
+49 15140720527
Email Karan.Patel@dominit.eu
info@cd-india.com
Web www.cd-india.com