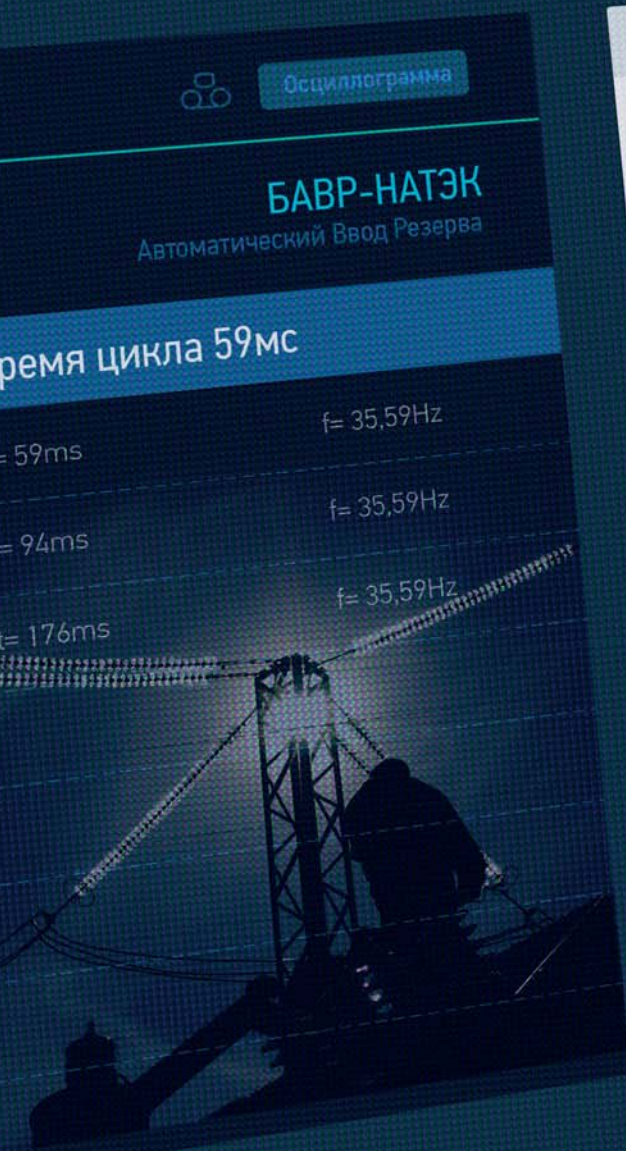
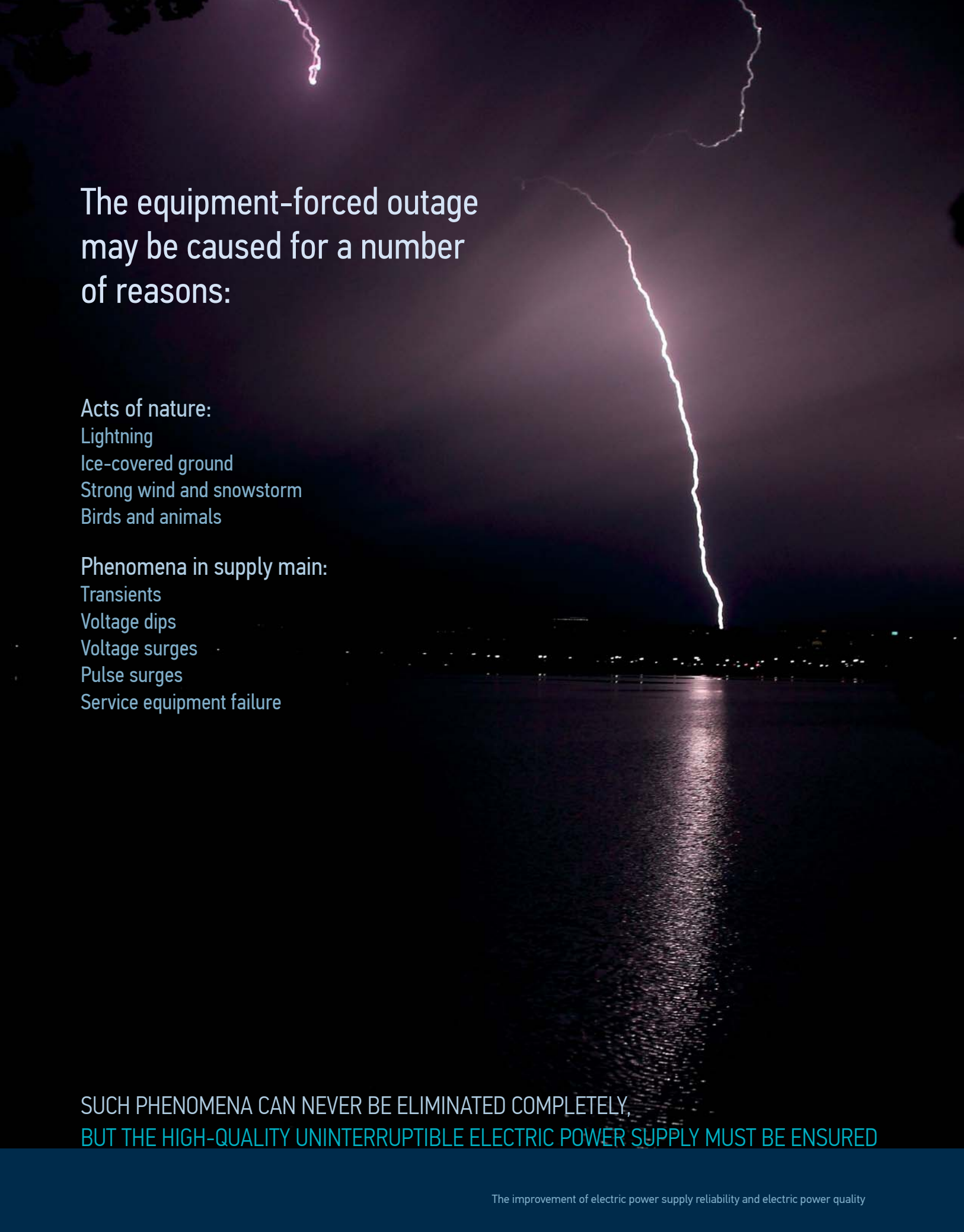


The improvement of electric power supply reliability and electric power quality





The equipment-forced outage
may be caused for a number
of reasons:

Acts of nature:

Lightning

Ice-covered ground

Strong wind and snowstorm

Birds and animals

Phenomena in supply main:

Transients

Voltage dips

Voltage surges

Pulse surges

Service equipment failure

SUCH PHENOMENA CAN NEVER BE ELIMINATED COMPLETELY,
BUT THE HIGH-QUALITY UNINTERRUPTIBLE ELECTRIC POWER SUPPLY MUST BE ENSURED



NATEC Group:

designs power facilities on turnkey basis

facilities of small energy

invest projects in the power industry

power facilities operation

The project on implementation
of the innovative equipment to improve
the electric power supply quality:

БFABT

DCVD

DCDC

Active Filter

Protective relay





NATEC Group has existed since 2002 and it specializes in providing the major Russian industrial enterprises with services.

NATEC Group has existed since 2002 and it specializes in providing the major Russian industrial enterprises with services.

NATEC Group mainly produces and implements the microprocessor equipment to improve the quality and reliability of electric power supply at the facilities, which contributes to complete elimination of process shutdown during the interruption of electric power supply. One of the directions is the complex of the fast automatic bus transfer system «NATEC-FABT», which is widely used in oil refineries and petrochemical enterprises such as OJSC «Rosneft», PJSC «Gazprom», OJSC «Novatek», OJSC «TNK – VR», PJSC «Nizhnekamskneftekhim», OJSC «TAIF – NK» and other major Russian companies.

Since 2014, the equipment NATEC-FABT is obligatory for all oil refineries of OJSC «Rosneft». In the period from 2013 to

2014, the complex NATEC-FABT implemented at 12 DS of the plants SR, EO, BR, BHM of the PJSC «Nizhnekamskneftekhim». The effectiveness of implemented systems NATEC-FABT confirmed the first place diploma for the implementation in



the company's plants the complex of fast automatic bus transfer system (FABT) in the competition «Energy Efficient Equipment and Technologies».

There were also the development and delivery of a unique complex «NATEC-FABT-0107.074.3» for a three-stage substation of the object «Complex of heavy residues advanced refining unit of the OJSC «TAIF-NK». The complex FABT allows controlling simultaneously 5 switches by single device to provide a continuous process.

The results of the equipment implementation of the NATEC Group are:

- complete elimination of process shutdown during the power failure and, accordingly, the absence of defective products;
- uninterrupted power supply and, consequently, reduction of equipment re-starts;
- increase in automatic production and improvement of working conditions



The implementation of the equipment made by us leads to a reduction of financial losses, while the average return on investments of our customers is 1.5–3 years

Fast Automatic Bus Transfer System FABT-NATEC 0107.074



Specifications:

management of any type
of existing switches

intrinsic action time 10-25 ms

work in all types of external pockets
or short circuit

feasibility of commissioning

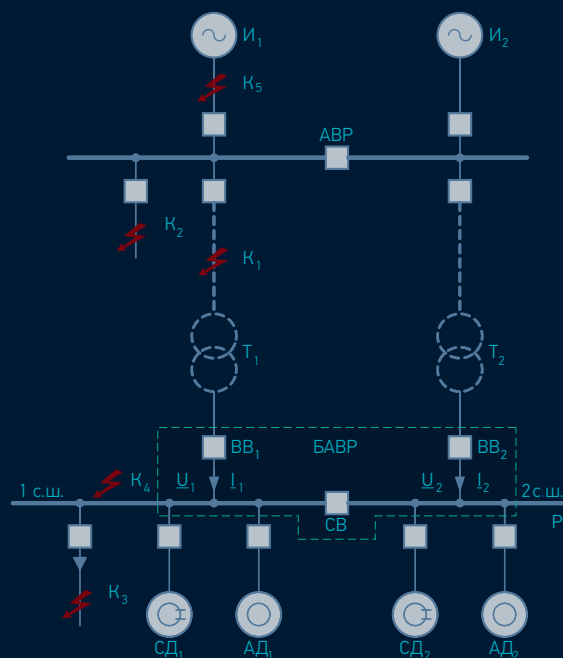
average time of the complex FABT with
the modern vacuum or gas-insulated
switches is 40 ms

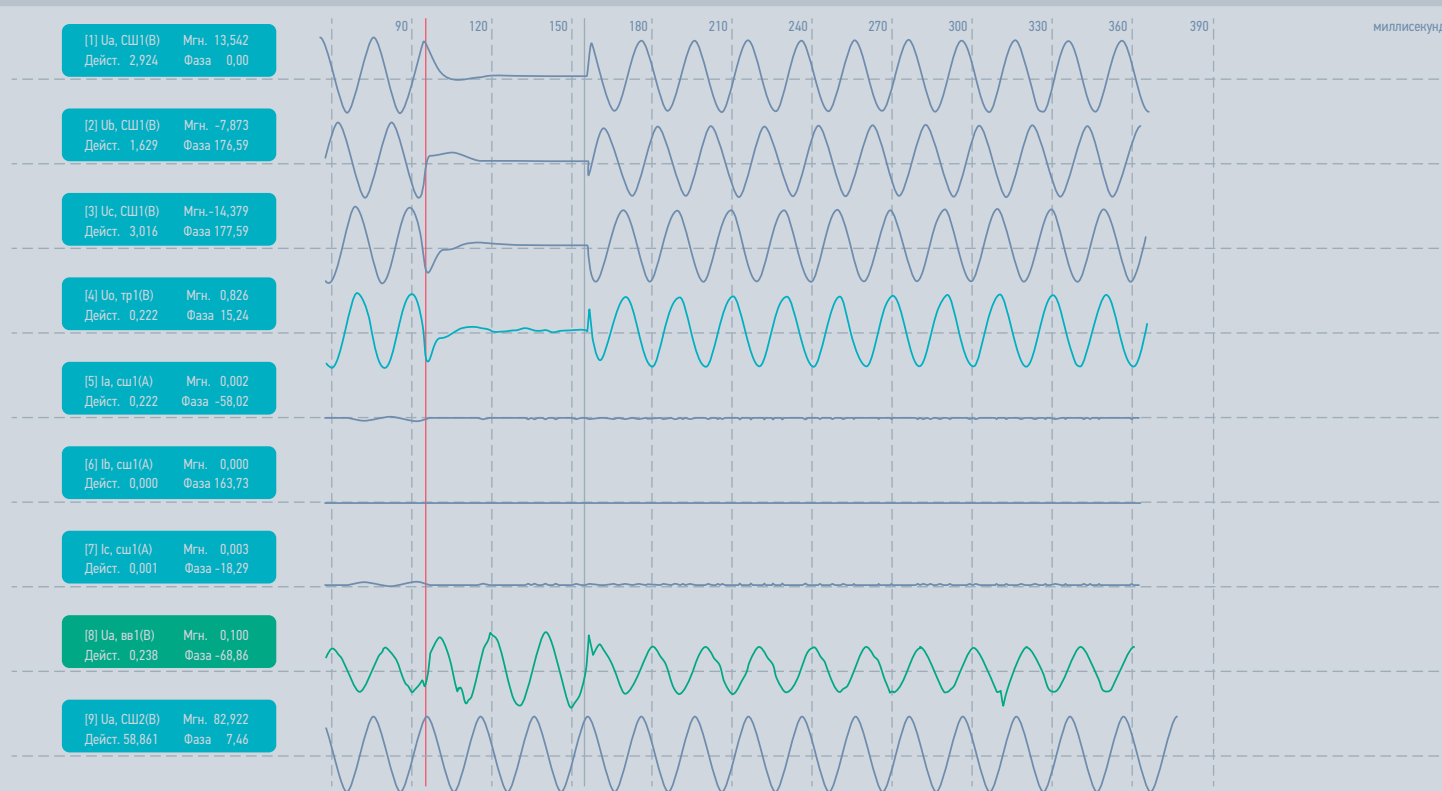
Peculiarities:

implementation on a microprocessor terminal
Bresler 0107.074

implementation on voltage of 0.4 kV as to a set
of switches as a turnkey solution and with
a separate control cabinet

performance to the ambient temperature
up to -55°C





The oscilloscope recording of the work of FABT-NATEC 0107.074, total time of cycle 59 ms

The power part is made on the switches Evolis 1250 A



Dynamic compensator of voltage distortion (DCVD)

Purpose, scope:

The dynamic compensator of voltage distortion (DCVD) is designed to eliminate the deviations of the parameters of the supply voltage.

The installation to a network gradually (on the lead-ins of transformer substations or on the outgoing lines to the consumer)

The speed of work when the divergence of parameters is more than 1%:

From 0–2 ms — 85% from ΔU

From 2–8 ms — 15% from ΔU

Performance coefficient: 98.5–99.5%

Capacity of singular block:

on voltage of 0.4 kV: from 150kW to 2400 kW

on voltage of 6–10–35 kV:

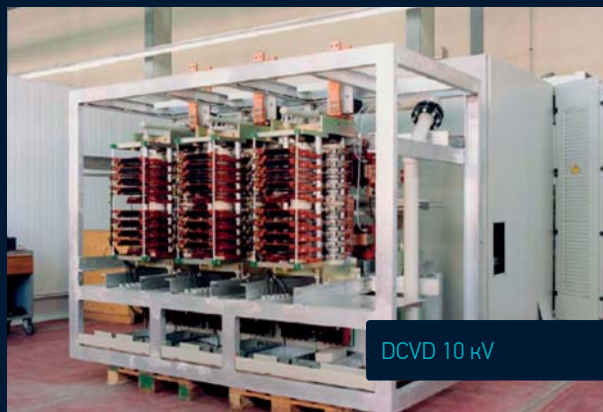
from 400kW to 50000kW

Contingent consideration of planting depth:

30%, 40%, 100% from U_{nom}

Constant long-term consideration $\pm 10\%$ of divergence of voltage parameters

DCVD may be performed for use both indoors and outdoors

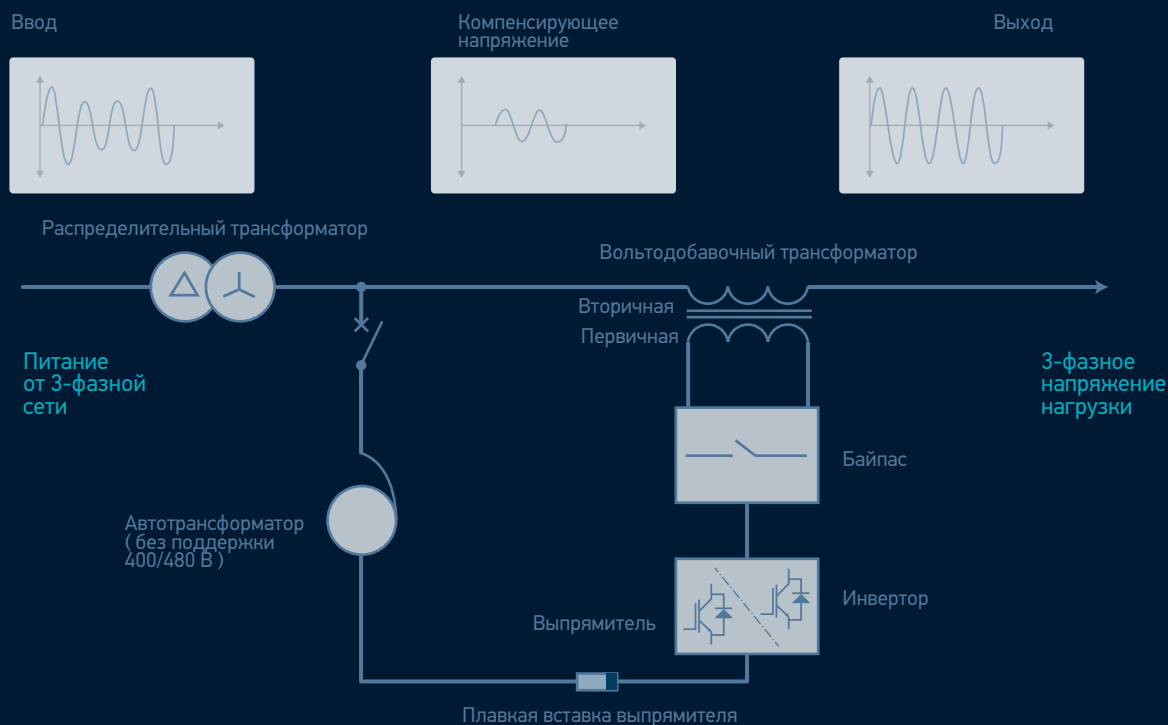


DCVD 10 kV



DCVD 0,4 kV





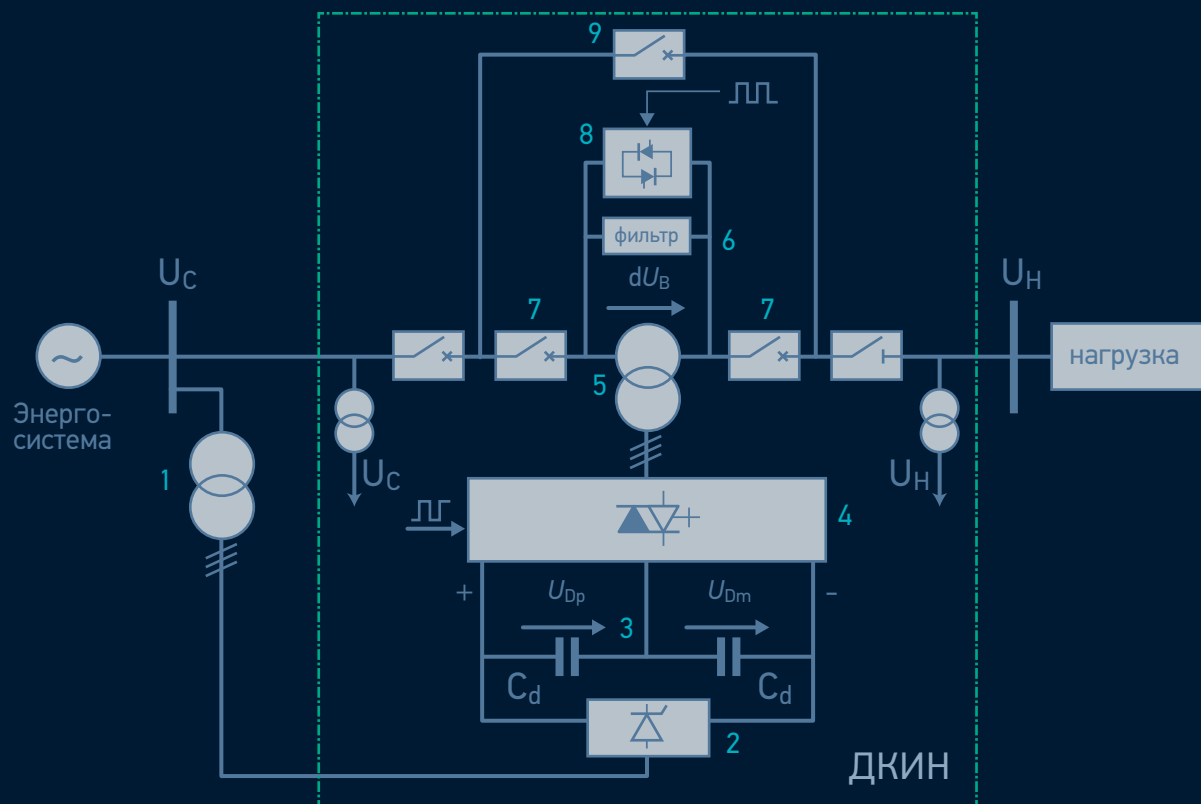
DCVD consists of the voltage inverter operating in series with the boost transformer, which is installed in addition to the load. It measures the input power voltage and provides almost instant correction of any deviation.

DCVD may include a bypass system for the backup inverter. If the inverter is overloaded, the bypass system shunts booster transformer, dropping the load from the inverter and it effectively provides a direct connection to the load.

The overload capacity of facilities

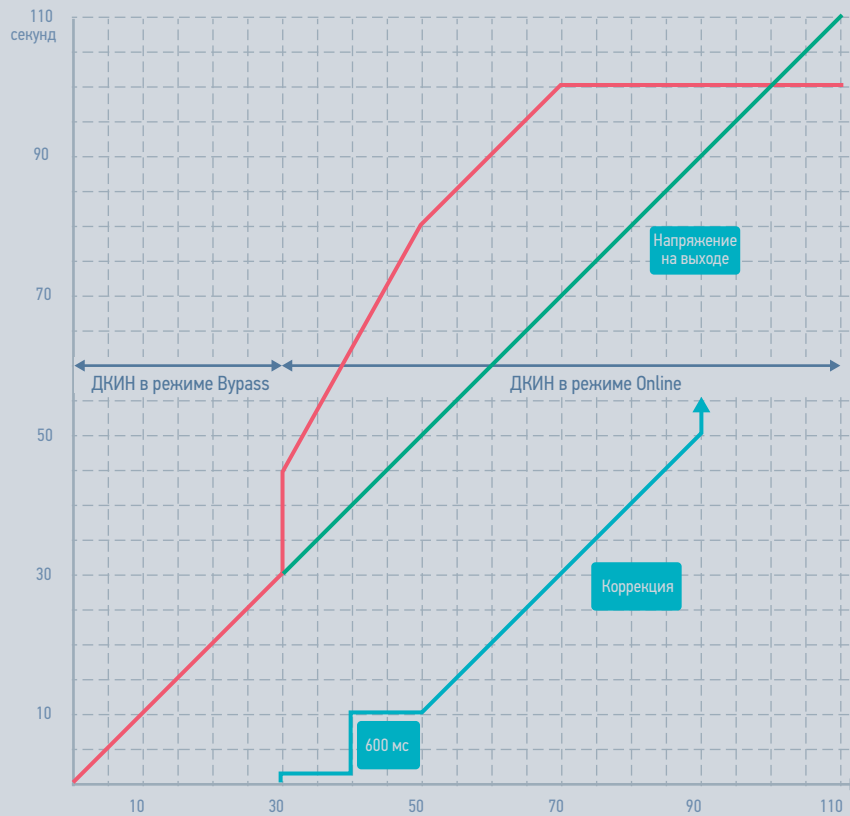
% from the nominal power	Overload time
125	10 minutes
150	1 minute
500	1 second
2000	200 ms (no more than 1 time for 30 minutes)

The functional diagram of DCVD facility work



- 1 – input transformer
- 2 – thyristor-controlled rectifier
- 3 – accumulate condensates
- 4 – controlled inverter on the basis of bearing housing
- 5 – booster
- 6 – filter of voltage higher harmonic components
- 7 – switches
- 8 – protective device DCVD
- 9 – bypass switch

- U_c – electric energy system voltage
- U_H – load voltage
- U_{Dp} – positive voltage of direct current
- U_{Dm} – negative voltage of direct current
- dU_B – voltage of dip consideration



Classification of DCVD (DCVD Range)

Type of DCVD	Voltage, kV	Minimal voltage of single block, kW	Maximal voltage of single block, kW	Pace of capacities, kW	Range of voltage regulation, in % from nominal	Control time, seconds
With protection from total extinction	220–0,4	150	2400	150 kW in the range from 150 to 900 300 kW in the range from 300 to 2400	«0»–«110»	0.5–30 seconds for full mode extinction, long range $\pm 10\%$
	6–10–35	400	50000	By order	«0»–«110»	0.5–30 seconds for full mode extinction, long range $\pm 10\%$
Without protection from total extinction	0,4	200	2400	100 kW in the range from 200 to 400 kW 200 kW in the range from 400 to 1200 kW 500 kW in the range from 1200 to 2400 kW	«-40»–«+10»	$\pm 10\%$ for a long time for large deviations: 30 sec. (with a break 500 sec.)
	6–10–35	400	50000	By order	«-40»–«+10»	

The dynamic compensator of direct current (DCDC) — the protection of variable-frequency electric drive from voltage slumps

Description:

DCDC is based on a rectifier that protects sensitive industrial VFE from the violations in the feed power grid. The compensation of voltage slumps is reached at the expense of a somewhat larger current consumption or use of electric energy accumulator systems (depending on the mode and model).

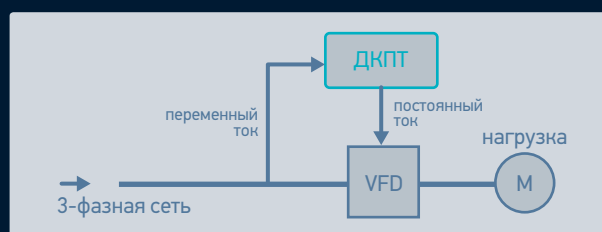
DCDC adjusts the supply voltage and protects against harmonic component the separate VFE or group, connected to the bus bar section.



Models of DCDC

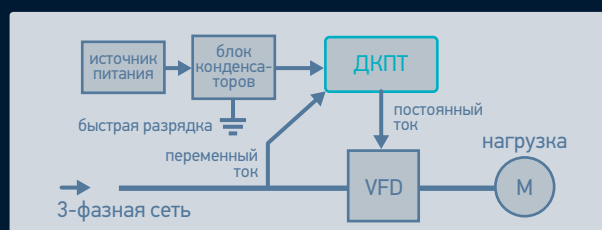
DCDC-R

Adjustment of deep slumps
up to 2 seconds



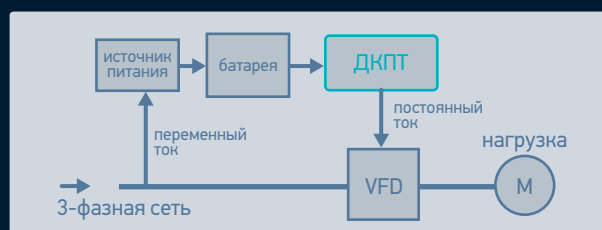
DCDC-C

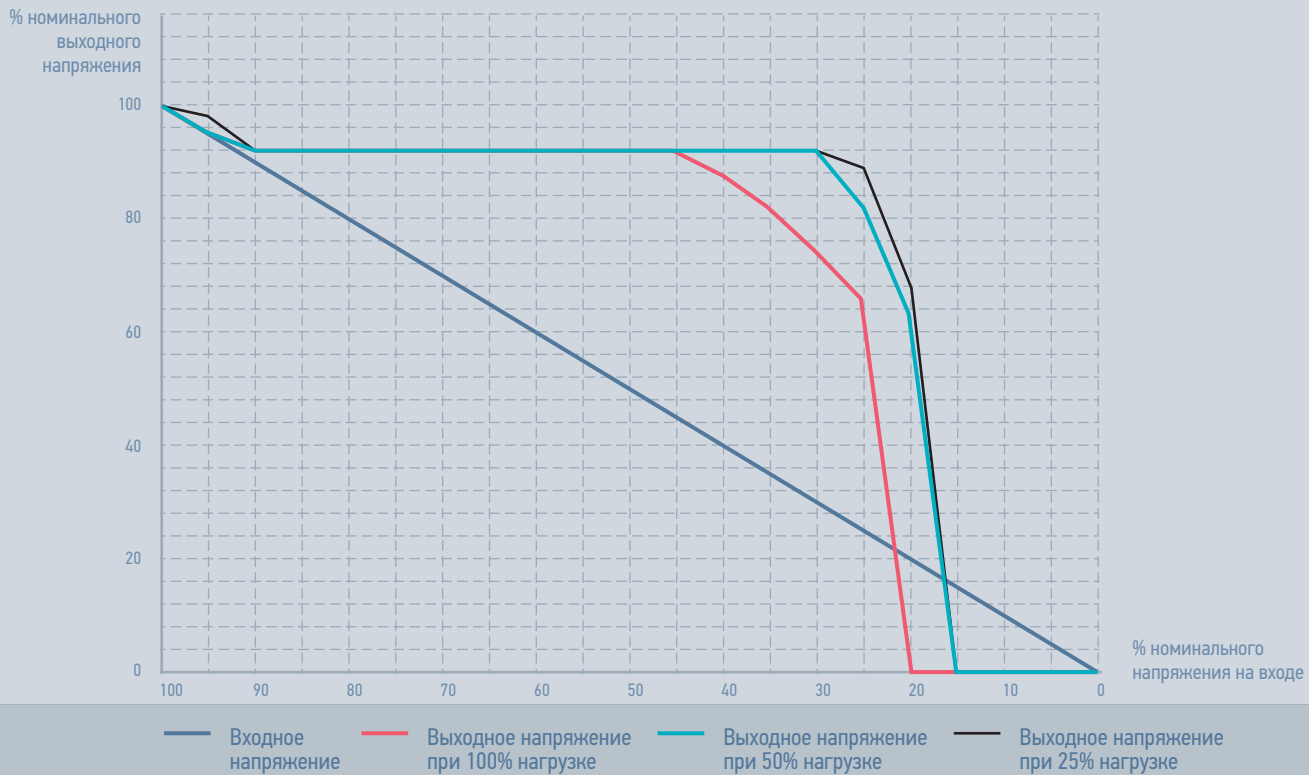
Protection from total extinction up to 2 seconds



DCDC-U

Protection from total extinction
up to 15 minutes





Technical parameters	DCDC-R	DCDC-C	DCDC-U
Voltage input	208–600 В, 3-phase, 50/60 Hz	208–600 В, 3-phase, 50/60 Hz	208–600 В, 3-phase, 50/60 Hz
Voltage output of direct current	290–805	290–805	290–805
Nominal level of output voltage	90%	90%	90%
Power range (max)	5–1350 kW	5–1350 kW	5–1100 kW
Performance coefficient in the standby mode	> 99%	> 99%	> 99%
Level from U_{nom} and duration of compensation voltage slumps	50% in three phases, 100% for one to 2 seconds	100% in three phases up to 2 seconds	100% on three phases up to 4 minutes (optional up to 15 min.)
Conformance to standards	SEMI-F47 IEC 61000-4-11 IEC 61000-4-34	SEMI-F47 IEC 61000-4-11 IEC 61000-4-34 Samsung Power Vaccine	SEMI-F47 IEC 61000-4-11 IEC 61000-4-34 Samsung Power Vaccine
Execution	NEMA 12	NEMA 12	NEMA 12
Environmental parameters (max)	+ 40°C, humidity up to 90% without condensation	+ 40°C, humidity up to 90% without condensation	+ 40°C, humidity up to 90% without condensation
Output signal	Opto FET 350B, 120 mA	Opto FET 350B, 120 mA	Opto FET 350B, 120 mA

Active harmonic filters

Description:

Активная компенсация гармоник тока

Digital control based on the Fourier transform (the Fourier transform shows the entire structure of harmonics in the current)

Fast reaction

Filtering up to the 49th harmonic including

Application:

welding machines, induction furnaces

The ability to compensate the individual harmonics on level

Application:

constant load, all kinds of drives

Active reactive power compensation*

Response without delay and without resonance

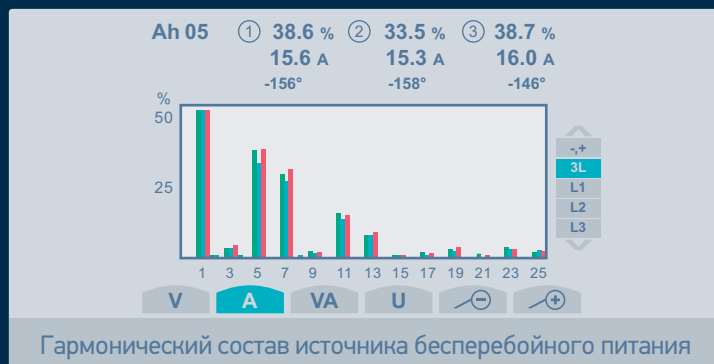
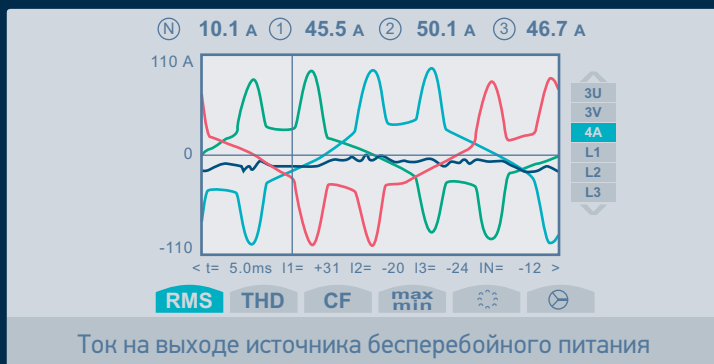
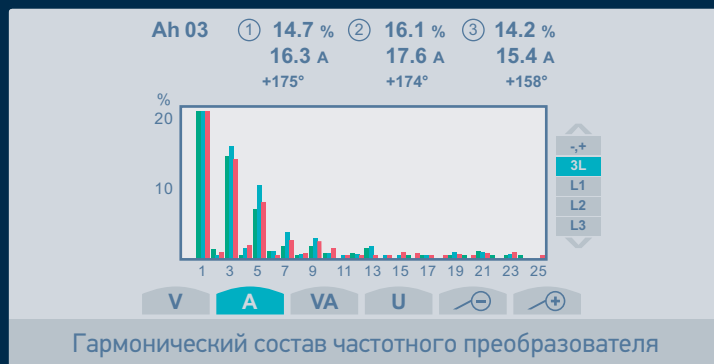
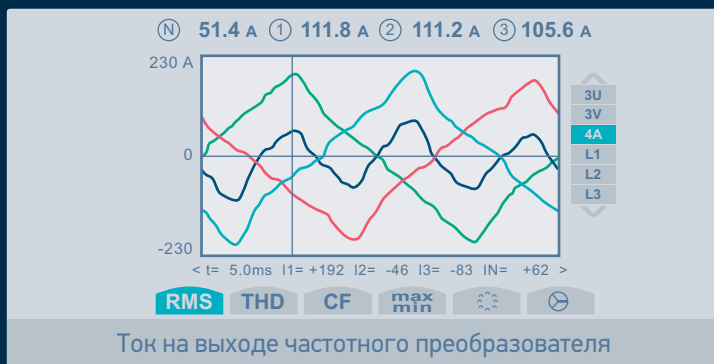
*Comes optional

Active filter
100–300 A

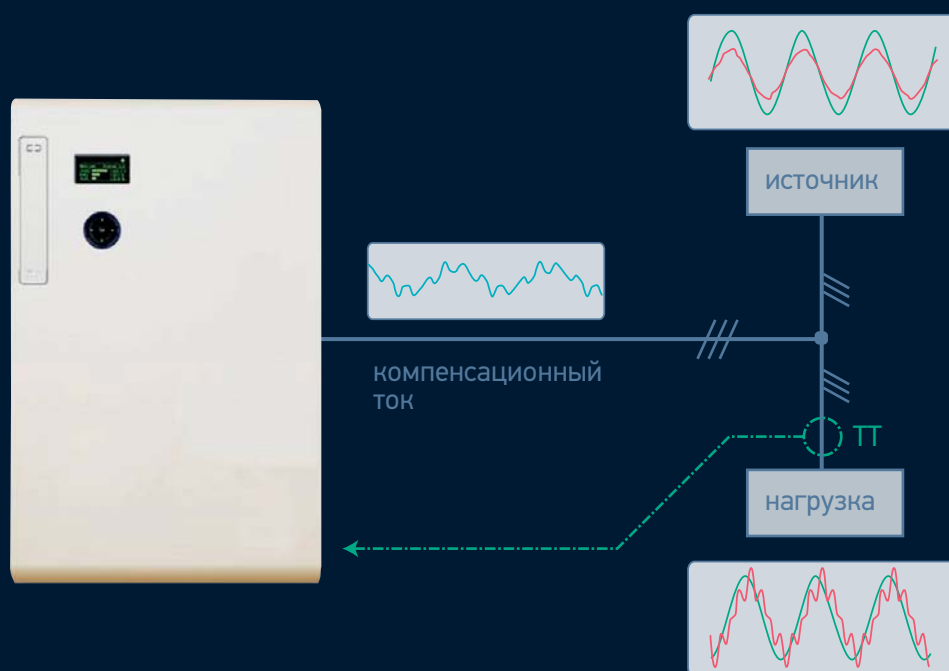
Active filter
30–50 A



The effect — the quality of energy



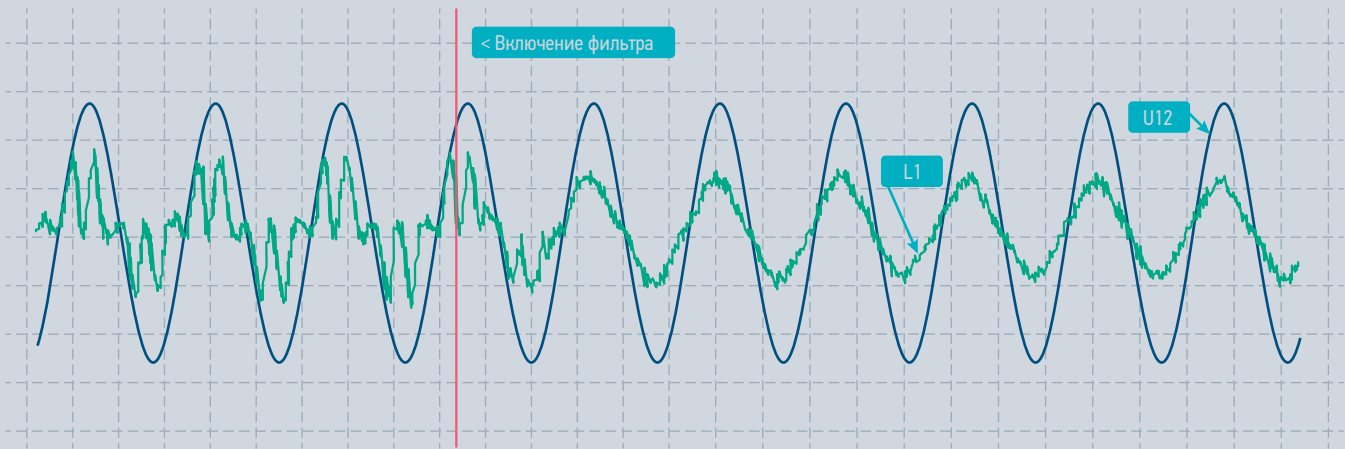
Principle of operation



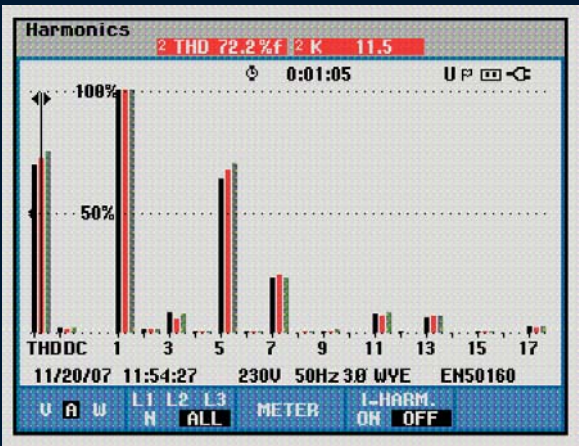
An example of action of the active harmonic filter

Action of the active harmonic filter

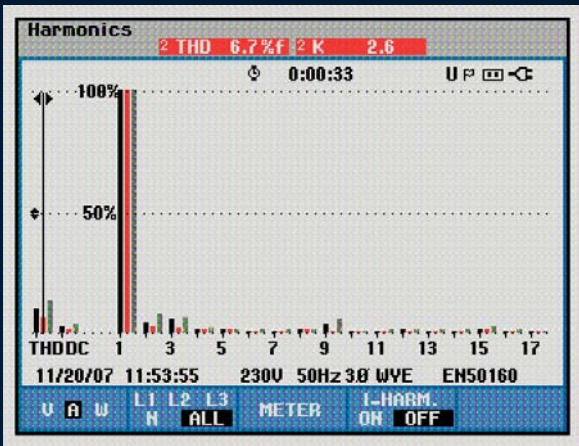
oscillogram



Harmonic spectrum analyzer readings



Without action of the active harmonic filter



Active harmonic filter works

Electric power supply quality analyzers



Functions

Monitoring of electric power supply

Energy management

Registration of emergencies

Monitoring of electric power supply

Energy management

Registration of emergencies

Hardware

Power quality
monitoring devices

Connection

Communication servers Ethernet/Modbus

Built-in Ethernet port

Variety of interfaces
and protocols

IT-developments

Software, Database and Drivers

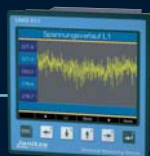
Web server

Report generation instruments



Компьютерная среда.
Программируемое анализирующее
ПО, база данных коммерческого
учета, качество электроэнергии,
средства анализа, СУБД и прочее

Связь по TCP-IP
через коммутатор



Janitza UMG511
европейский стандарт EN50160
мониторинг качества
электроэнергии, класс A



Janitza UMG508
мониторинг надежности
источника питания и
кратковременных провалов
напряжения



Janitza UMG604, UMG503–507
коммерческий учет электроэнергии, сбор данных о
потребителях. Janitza Profi контроль реактивной мощности



Janitza UMG103 / 96S
измерение и контроль электрических показателей в распределительных установках,
замена аналогового оборудования

Janitza ProData
регистратор данных



Janitza UMG507 EMax
менеджер нагрузок



Janitza. Решения
по контролю качества
электроэнергии

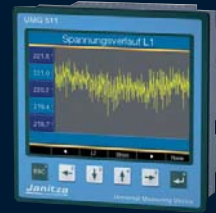


Our solutions

UMG 511

Power quality analyzer for basic units / inputs

- Monitoring of electric power quality / Signals / Transients / Short breaks
- Data logging, alarm
- Isolated inputs and outputs



UMG 604E / 508

Power quality analyzer for basic units / outgoing lines

- Power Quality Monitoring
- Data logging, alarm
- Isolated inputs and outputs (open / closed / disconnected)
- Temperature control



UMG 96L, RM

Power quality analyzer for outgoing lines

- main electrical quantities
- monitoring of U, I, cosφ, P, Q, S, Harmonics



Software GridVis

Price

Power Quality Analyzer
Class 0.5S, RS485
mount on DIN-Rail
Sub-Measurement



Power Quality Analyzer
Class 0.5S, Modbus,
Ethernet



Power Quality Analyzer
Class 0.5S,
Ethernet
mount on DIN-rail



Power Quality Analyzer
Class 0.2S,
Ethernet
graphic display



PQ-analyzer
Class-A according to
IEC61000-4-30



Capacity

Relay protection (production of LLC 'SPE Bresler')

Microprocessor protection
and automation of distribution networks:

Protection of current-limiting devices (CLD) 110 kV

Lines defense 110–220 kV

Transformers protection 110–220 kV

Protection of tires and bus bars 110–220 kV

Protection of distribution networks 6–35 kV



'NATEC' also provides:

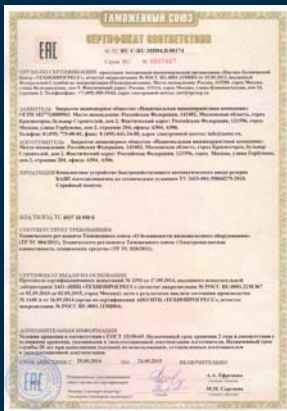
Emergency events recorder

Software for multilateral, bilateral and unilateral CMP

Adaptive Security Devices of remote backup
of the tapped transformers

Protection devices of local back-up

Centralized and distributed systems OTF





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