Test technology

Useful facts about Test technology

To ensure compliance with norms, guidelines and guarantee product safety, manufacturers and vendors of electrical and electronic components need to implement comprehensive validation testing. REO has specialized in this market for many years and is today the market leader in the area of test technology using variable-ratio transformer control. Whether for workshop tests on small loads or for testing converters on rail proving grounds – REO has the right solution; from an individual low-power supply all the way up to complex module testing stations with voltage supply, load unit and electronic control. REO can supply standard equipment or a device made to a customer's specifications, with exceptional functionality, like a regenerative unit to save energy, REO testing equipment causes no electromagnetic incompatibility and is an optimal solution for testing to the highest standard of quality.

Service

Training

REO AG is your holistic partner in the area of inductive, resistive and electronic components and full solutions. A wide range of training services are also a key aspect of this partnership. These simplify commissioning of new devices and systems and guarantee hassle-free use during the whole product life cycle. Training sessions at your site or on the premises of REO AG form the basis for this. Our internal training managers instruct your employees in the technology and provide valuable tips on the correct and safe use of REO components. Our training sessions are available for both standard solutions and high-quality individualised components. Multimedia and easy to understand content supplement the training and also permit international deployment.

Guarantee

Winning quality – extra peace of mind, thanks to the expanded REO manufacturer's guarantee.

We believe in the quality of our own products and are confident of the durability of all components used, which is why we have extended the legal guarantee from one to two years.

Safety

We offer you devices with the highest possible operational safety. Should any unwanted events occur with any of our products, your professional emergency responder will be available to help you over the telephone free of charge. If the situation or query cannot be resolved over the telephone, you have the opportunity to have the defective device sent back after consultation.

Repairs

After telephone consultation, and after the defective product has been received, we can even offer you express repairs if possible. This minimises downtime in the event of a fault and guarantees a swift exchange.

Hotline

Our REO sales specialists look forward to giving you a helping hand. Contact your REO contact partner or call our hotline to receive further information about our services and the REO portfolio.

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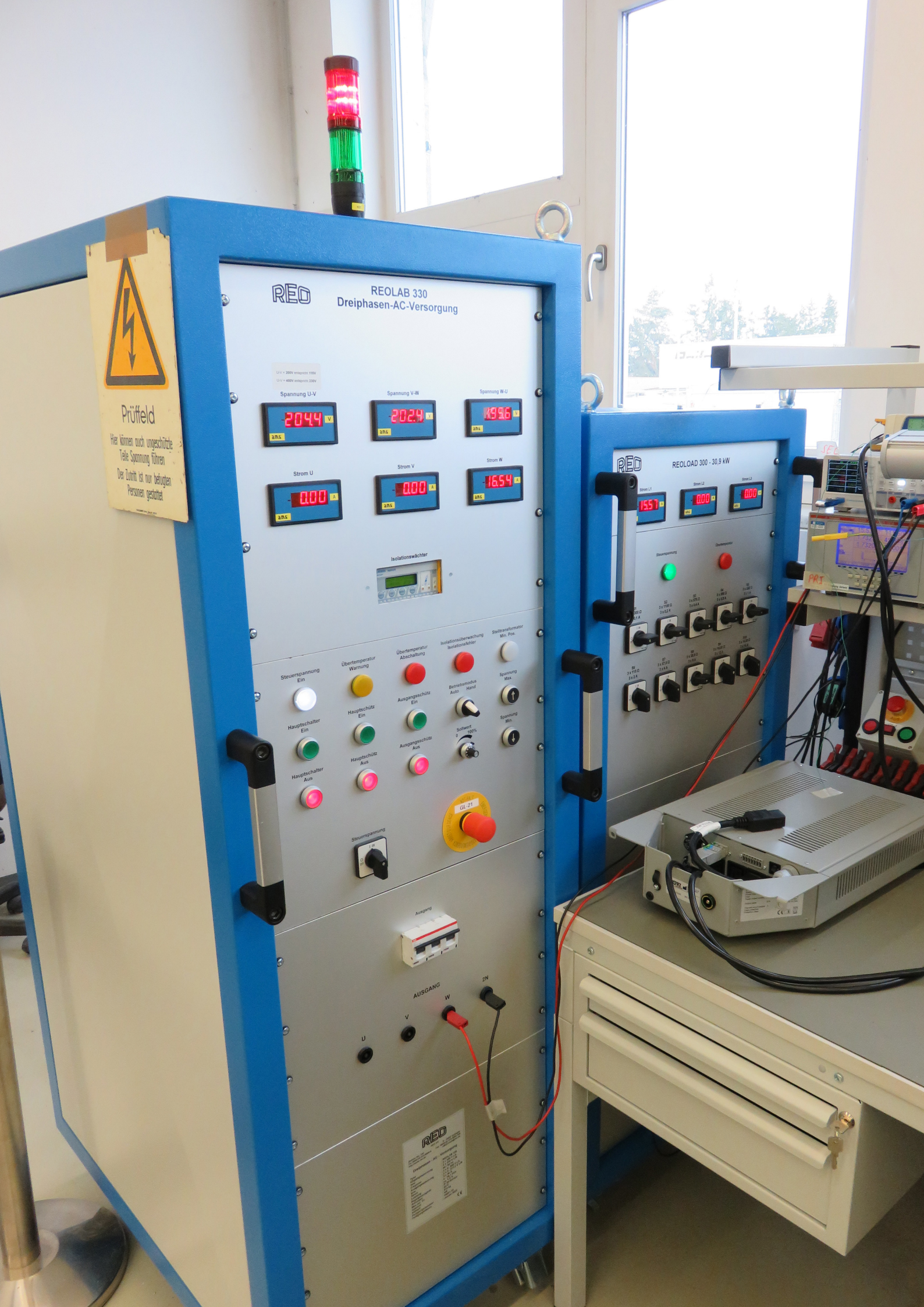
RED
REOLAB 330
Dreiphasen-AC-Versorgung
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Isolationswächter
Steuerspannung Ein
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Spannung Min.
Steuerspannung
Ausgang
AUSGANG
U
V
W
2N
Prüffeld
Hier können auch ungeschützte Teile Spannung führen
Der Zutritt ist nur befugten Personen gestattet
REOLOAD 300 - 30,9 kW

Variable-ratio transformers

Constant sinusoidal form for every application

A variable-ratio transformer is used when output voltages are to be matched while constantly retaining sinusoidal form. REO variable-ratio transformers generate no interference or harmonics and are therefore particularly suitable for use in proving grounds or research institutes where high-frequency interference can cause problems with recorded test results. REO variable-ratio transformers are manufactured according to VDE 0552 and EN 61558-2-14 and use materials listed by UL to comply with international norms as well. Variable-ratio transformers with a compensation winding are included in our range of supplies for applications requiring a low voltage drop.

REO takes a systematic approach in this field too: besides transformers, we offer complete high-voltage and heavy-current testing equipment with the latest PLC controllers to ensure that testing functionality correspond to state of art requirements.

All equipment is available in standard versions as well as special designs and requirements.

Three-phase toroidal variable-ratio transformers

REOVAR
Power range 0,69 - 25 kVA,

Advantages

- High-precision adjustment
  (turn-to-turn voltage only approx. 0.7 V)
- Generate no harmonic currents or voltages
  (clean sinusoidal output voltage, no harmonics)
- No EMC interference

Three-phase toroidal variable-ratio transformers

Technical data

DRRTG/ DRRTO	
Input voltage	3 x 400 V
Output voltage	3 x 0 - 400 V oder 3 x 0 - 450 V
Output current	3 x 0,6 A to 32 A
Output power	0,66 kVA to 24,9 kVA
Frequency range	50 - 400 Hz
Ambient temperature	max. 40° C
Vector group	Stern/Spar
IP Code	IP 00 - IP 20

Version: Series: DRRTO DM 4 to DN 10 Three-phase version with autowindings

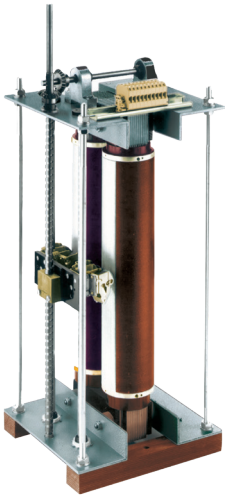
Single-phase column variable-ratio transformers

Power range 2-300 kVA

Advantages

- High-precision adjustment (turn-to-turn voltage approx. 0.7 V)
- Generate no harmonic currents or voltages (clean sinusoidal output voltage, no harmonics)
- High overload capability for shorttime duty
- No EMC interference

Single-phase column variable-ratio transformers



Earthquake restistant
Manufactured by UL guidelines

Technical data

RTE		
Input voltage	230 V	400 V
Output voltage	0 - 230 V	0 - 400 V
Output current	8,5 - 435,0 A	250 A
Output power	2,0 - 100,0 kVA	
Frequency range	50/60 Hz	
Vector group	Auto	
IP Code	IP 00 - IP 20	

RTE-S		
Input voltage	230 V	400 V
Output voltage	0 - 230 V	0 - 400 V
Output current	47 - 1360 A	
Output power	18 - 300 kVA	
Frequency range	50/60 Hz	
Vector group	Auto	
IP Code	IP 00 - IP 20	

RTEU		
Input voltage	230 V	400 V
Output voltage	± 0 - 230 V	2x ± 0 - 200 V
Output current	8,5 - 435,0 A	250 A
Output power	2,0 - 100,0 kVA	
Frequency range	50/60 Hz	
Vector group	I0	
IP Code	IP 00 - IP 20	

RTEU-S		
Input voltage	230 V	400 V
Output voltage	± 0 - 230 V	2x ± 0 - 200 V
Output current	47 - 1360 A	
Output power	18,0 - 300,0 kVA	
Frequency range	50/60 Hz	
Vector group	Auto	
IP Code	IP 00 - IP 20	

RTGE		
Input voltage	230 V	400 V
Output voltage	0 - 240 V; 0 - 440 V	
Output current	8,3 - 290,0 A	
Output power	2,0 - 128,0 kVA	
Frequency range	50/60 Hz	
Vector group	Ii0	
IP Code	IP 00 - IP 20	

Version: RTE series: with autowindings, RTE-S series: autowound with compensation winding (low voltage drop), RTEU series: autowound with double brush, RTEU-S series: autowound with double brush and compensation winding (low voltage drop), RTGE series: with separate windings

Three-phase column variable-ratio transformers

Power range 2-400 kVA

Three-phase column variable-ratio transformers

Earthquake restistant
Manufactured by UL guidelines

Technical data

DRTE		
Input voltage	3 x 400 V	3 x 500 V
Output voltage	3 x 0 - 400 V	3 x 0 - 500 V
Output current	3 x 8,7 - 208 A	
Output power	6,0 - 153kVA	
Frequency	50/60 Hz	
Vector group	Star/auto	
IP Code	IP00 - IP20	

DRTE-S		
Input voltage	3 x 400 V	
Output voltage	3 x 0 - 400 V	3 x 0 - 690 V
Output current	3 x 21,5 - 557,0 A	
Output power	15 - 400 kVA	
Frequency	50/60 Hz	
Vector group	Star/auto	
IP Code	IP00 - IP20	

DRTEU		
Input voltage	3 x 400 V	
Output voltage	3 x ± 0 - 400 V	3 x ± 0 - 500 V
Output current	3 x 8,7 - 208 A	
Output power	6,0 - 153 kVA	
Frequency	50/60 Hz	
Vector group	Star/auto	
IP Code	IP00 - IP20	

DRTEU-S			
Input voltage	3 x 400 V	3 x 0 - 400 V	3 x 0 - 660 V
Output voltage	3 x ± 0 - 400 V		
Output current	3 x 21,5 - 557,0		
Output power	15 - 384 kVA		
Frequency	50/60 Hz		
Vector group	Star/auto		
IP Code	IP00 - IP20		

DRTGE		
Input voltage	3 x 400 V	
Output voltage	3 x 0 - 400 V	3 x 0 - 660 V
Output current	3 x 84 - 336,0 A	
Output power	3 - 384 kVA	
Frequency	50/60 Hz	
Vector group	Star/auto	
IP Code	IP00 - IP20	

Version: DRTE series: autowindings, DRTE-S series: autowound with compensation winding (low voltage drop), DRTEU series: autowindings with double brush, DRTEU-S series: autowound double brush and compensation winding (low voltage drop), DRTGE series: with separate windings

Options for Variable transformers

Options for column variable-ratio transformers	
Manual drive by spindle	With ordering suffix „SP“ (vertical spindle)
Manual drive by spindle bevel gear drive	With ordering suffix „SPW“ (horizontal spindle)
Connection ±	U
Motor drives	AC motor drive 230 V 50/60 50Hz with ordering suffix „MoK“ DS motor drive 3 x 400/230 V 50/60 Hz with ordering suffix „Mo“
Case designs	Are available with ingress protection IP 20 in standard paint finish RAL 7035.
Output voltage	If there is requirement for automatic output voltage regulation REO can supply control units which can help achieve this: NLR 7000 controller for three-phase motors NLR 2012 PID controller for AC motors
Further special designs	On request

Options for toroidal variable-ratio transformers	
Manual drive by spindle	With ordering prefix „RRTW“ (vertical spindle)
Manual drive by spindle bevel gear drive	With ordering prefix „RRTSPW“ (horizontal spindle)
Connection ±	FZ 60, FZ 90, scale 90, scale 120
Motor drives	AC motor drive 230 V 50/60 Hz with ordering suffix - MoK DC motor drive 24 VDC with ordering suffix - MoG
Case designs	Are available in the standard IP Code IP 20 also in the standard paint finish RAL 7035.
Output voltage	If there is requirement for automatic output voltage regulation REO can supply control units which can help achieve this: NLR 7000 controller for three-phase motors NLR 2012 PID controller for AC motors
Further special designs	On request

REOLINE with autowindings

AC voltage supplies

A way to vary AC voltages is essential in a test environment, and this portable laboratory power unit is designed to be easily and safely used in laboratories, proving grounds, workshops and service areas. The output voltage is continuously adjustable from 0...250 V. The absolute zero position results in a no-voltage condition at the zero position.

Advantages

- Mains lead 2 m long with plug with earth socket
- Illuminated mains switch
- Toroidal variable-ratio transformer with absolute zero position
- Fuse protection on the secondary side
- Analogue or digital voltmeter and ammeter at the output
- Earthing contact socket or safety labs at the output
- Carrying handles

Plus AC-S/A

Plus AC-S/D

Technical data

Plus AC-S/A, Plus AC-S/D	
Input voltage	230 V
Output voltage	0 - 250 V
Output current	0,6 - 8 A
Output power	0,15 - 2,00 kVA
Frequency	50 / 60 Hz
Vector group	Auto
Max. ambient temperature	+ 40° C
IP Code	IP 40
Produced in accordance with	EN 61010-1 / VDE 0441 Teil 1

REOLINE with autowindings

AC voltage supplies

A way to vary AC voltages is essential in a test environment, and this portable laboratory power unit is designed to be easily and safely used in laboratories, proving grounds, workshops and service areas.

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Advantages

- Mains lead 2 m long with plug with earth socket
- Illuminated mains switch
- Toroidal variable-ratio transformer with absolute zero position
- Fuse protection on the secondary side
- Analogue or digital voltmeter and ammeter at the output
- Earthing contact socket or safety labs at the output
- Carrying handles

Plus AC-SG/A

Plus AC-SG/D

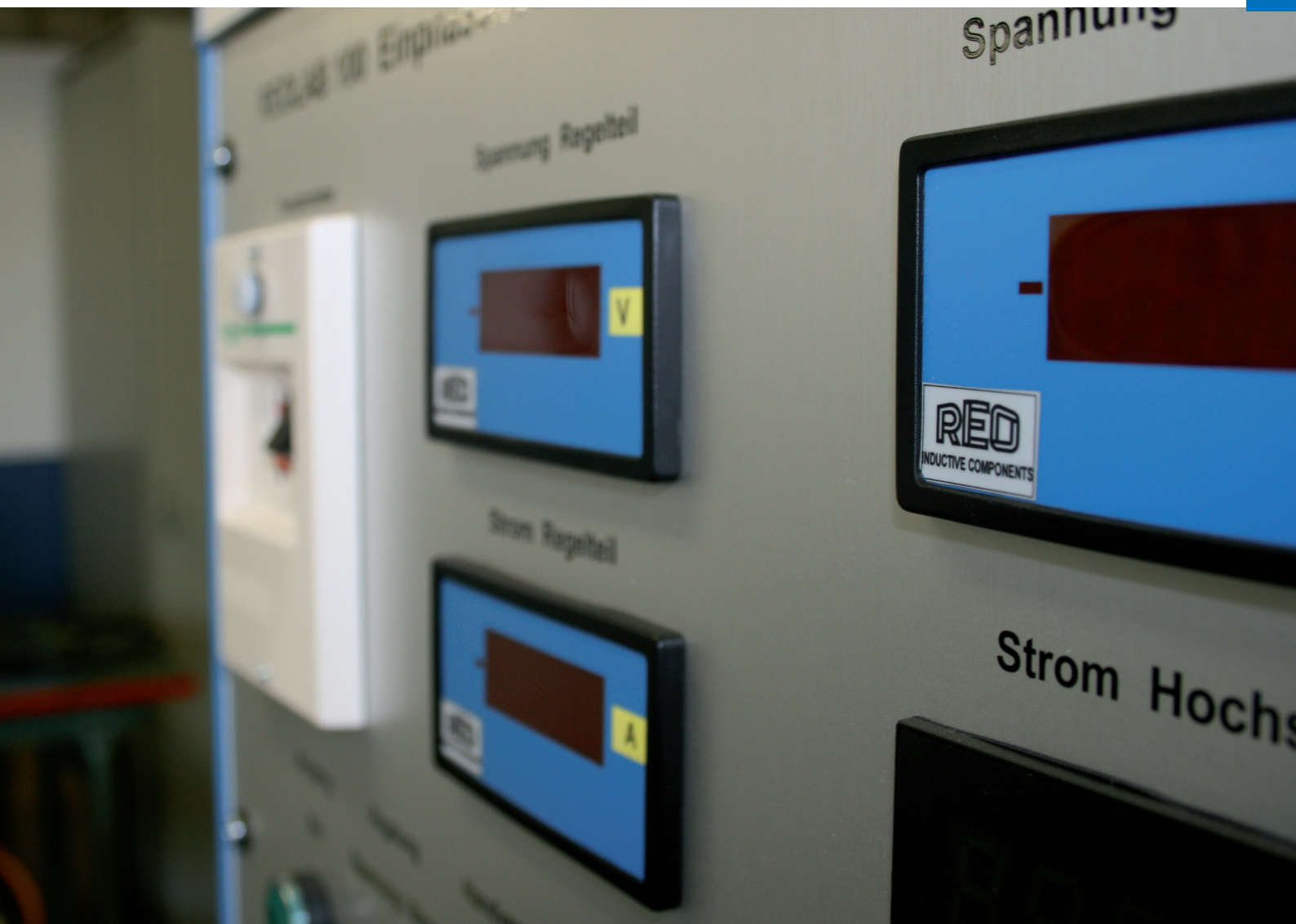
Technical data

Plus AC-SG/A, Plus AC-SG/D	
Input voltage	230 V
Output voltage	0 - 250 V
Output current	3 x 0,6 - 8 A
Output power	0,15 - 2,00 kVA
Frequency	50/60 Hz
Vector group	Ii0
Max. ambient temperature	+ 40° C
IP Code	IP 40
Produced in accordance with	EN 61010-1 / VDE 0441 Teil 1

REO adjustable and constant voltage supplies

REO voltage supplies are free of electromagnetic interference and correspond with the applicable EC Directives (EN 61558-2-14 or the older VDE 0552).

REO testing equipment is used in proving grounds, development laboratories, institutes, schools, universities, in industry and in all mobile stations (also in the automotive sector in particular). REO test equipment has made a name for itself by providing constant quality and ongoing continuous development - our REOLAB units are successfully used worldwide.



Single-phase voltage supplies

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

Description

Single-phase voltage supplies with separate windings and motor drive

REOLAB 125

Technical data

REOLAB 125*	
Input voltage	230 - 1000 V
Output voltage	0 - 400 V
Output current	26 - 375 A
Output power	0 - 150 kVA
Vector group	Ii0
IP Code	IP 00 or IP 20
Frequency range	50/60 Hz

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Single-phase voltage supplies

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

Description

Single-phase voltage supplies with separate windings and motor drive

REOLAB 126, 127, 128, 129

Technical data

REOLAB 126, 127*	
Input voltage	230 VAC or 400 VAC
Output voltage	0 - 230 VAC or 0 - 400 VAC
Output current	9 - 40 A
Output power	2,07 - 16 kVA
Vector group	Auto
IP Code	IP 20
Regulation precision	± 1%

REOLAB 128, 129*	
Input voltage	230 VAC oder 400 VAC
Output voltage	0 - 230 VAC bzw. 0 - 400 VAC
Output current	10 - 40 A
Output power	2,3 - 16 kVA
Vector group	Separate windings
IP Code	IP 20
Regulation precision	± 1%

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Three-phase voltage supplies

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

REOLAB 123, 124

Description

REOLAB 123
Three-phase AC/DC voltage supplies with separate windings and motor drive for testing/developing e.g. AC and DC static converters or auxiliary converters

REOLAB 124
Three-phase AC/DC voltage supplies with separate winding and motor drive. Used for motor testing

Technical data

REOLAB 123*	
Input voltage	3 x 400 VAC
Output voltage	0 - 2500 V or 0 - 5000 DC or 0 - 430 VAC
Output current	60 ADC, 30 ADC, 335 AAC
Output power	150 kW as standard version / 144 kVA
Vector group	Delta/Star/Star/2 x B6U/li0
IP Code	IP20
Frequency range	50/60 Hz

REOLAB 124*	
Input voltage	3 x 400 VAC
Output voltage	0 - 500 VDC bzw. 3 x 0 - 600 VAC bzw. 0 - 300 DC
Output current	200 ADC, 3 x 200 AAC, 15 ADC
Output power	100 kW aas standard version / 208 kVA bzw. 4,5 kW
Vector group	Star/star/2 x B6U
IP Code	IP20
Frequency range	50/60 Hz

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Three-phase AC voltage supplies with autowindings + electrical voltage control

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

REOLAB 310, 312

Description

REOLAB 310
Three-phase voltage supplies with autowindings, motor drive and electronic control of the output voltage to approx. 1.5% regulation accuracy.

REOLAB 312
Three-phase voltage supplies with autowindings for manual adjustment of output voltage

Technical data

REOLAB 310*	
Input voltage	3 x 400 V L/L bzw. 3 x 230 V L/N
Output voltage	3 x 0 - 450 VAC (3 x 0 - 400 V)
Output current	3 x 10 - 100 A
Output power	7,8 bis 69 kVA as standard version
Vector group	Star/auto
IP Code	IP20 in mobile housing
Frequency range	50/60 Hz

REOLAB 312*	
Input voltage	3 x 400 V L/L bzw. 3 x 230 V L/N
Output voltage	3 x 0 - 450 VAC
Output current	3 x 18 A
Output power	14 kVA as standard version
Vector group	Star/auto
IP Code	IP20 in mobile housing
Frequency range	50/60 Hz

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Three-phase AC voltage supplies with separate windings + automatic output regulation

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

Description

Three-phase-voltage supplies with separate windings, motor drive and electronic voltage control with safety circuits and warning beacons are suitable for the endurance testing of cable terminations. The regulation precision of the output voltage is approx. 1.5%.

REOLAB 320

In conjunction with the REOLAB 220 as a heavy current source for temperature rise testing, the REOLAB 320 can be used for insulation tests on cables and cable terminations

Technical data

REOLAB 320*	
Input voltage	3 x 400 V L/L or 3 x 230 V L/N
Output voltage	3 x 0 - 3000 VAC, 3 x 0 - 4000 VAC, 3 x 0 - 5000 VAC
Output current	3 x 0,25 AAC
Output power	1,3 - 2,16 kVA
Vector group	Star/star
IP Code	IP 20 in mobile housing
Frequency range	50/60 Hz

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Three-phase AC voltage supplies with separate windings + automatic output regulation

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

Description

Three-phase-voltage supplies with separate windings, motor drive and electronic control of the output voltage to approx. 1.5%

REOLAB 330, 370

Technical data

REOLAB 330*	
Input voltage	3 x 400 V L/L or 3 x 230 V L/N
Output voltage	3 x 0 - 450 VAC
Output current	3 x 12 A - 3 x 63 AAC
Output power	9,4 - 49 kVA as standard version
Vector group	Star/star
IP Code	IP20 in mobile housing
Frequency range	50/60 Hz

REOLAB 370*	
Input voltage	3 x 400 V L/L or 3 x 230 V L/N
Output voltage	3 x 0 - 520 VAC
Output current	3 x 10 AAC
Output power	9 kVA as standard version
Vector group	Star/star
IP Code	IP20 in mobile housing
Frequency range	50/60 Hz

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Three-phase AC voltage supplies

Adjustable and constant voltage supplies

Advantages

- No harmonic waves
- No EMC interference
- Clean sinusoidal form

Description

REOLAB 340
These three-phase voltage supplies with separate windings regulate the output voltage with an accuracy of approx. 1.5% from the final value.
Switchable output voltage ranges ensure a low voltage drop. These transformers are rated in accordance with the existing harmonic of the test specimens so that the voltage drop of the harmonic affects the sinusoidal form of the output voltage as little as possible. Suitable for testing frequency converters and motors in accordance with IEC 60 034.

REOLAB 350
These three-phase and single-phase voltage supplies with separate windings have a variable single-phase output voltage and a mains frequency of 16 2/3 Hz. The REO sinewave filter ensures a clean output voltage. Assisted by electronic voltage control, the output voltage can be regulated to approx. 1%.
For testing railway applications

REOLAB 340

Technical data

REOLAB 340*	
Input voltage	3 x 400 V L/L or 3 x 230 V L/N
Output voltage	3 x 50 - 700 VAC
Output current	3 x 400 A falling to 3 x 291 A
Output power	max. 381 kVA
Vector group	Star/auto
IP Code	IP20
Frequency range	50/60 Hz

REOLAB 350*	
Input voltage	3 x 400 / 230 VAC
Output voltage	700 - 1300 VAC 16 2/3 Hz
Output current	143 A
Output power	100 - 185.9 kVA
Vector group	Separate windings
IP Code	IP20
Frequency range	50/60 Hz

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

Three-phase DC high-voltage power supplies

Adjustable and constant voltage supplies

This three-phase DC high-voltage power supply is suitable for the development and testing of frequency converters for railway engineering. It is situated in development laboratories, proving grounds, test institutes, schools and universities. Because of the high DC output voltage, appropriate safety measures have been taken, such as:

- Emergency-off circuit with external inputs and outputs as double-pole potential-free contacts for emergencyoff circuits and safety circuits
- Warning lights and additional connections for external warning systems.
- Discharge circuit for the intermediate-circuit capacitor
- Earth trip with compressed-air drive to short out and earth the DC output

To ensure safety, in the event of mains failure, the DC output is shorted out and earthed by the compressed-air drive.

Description

Three-phase DC high-voltage power supplies with separate windings, motor drive and electronic control of the output voltage to approx. 1.0%, with short-circuit proof DC output.

REOLAB 420

Technical data

REOLAB 420*	
Input voltage	3 x 400 V L/L or 3 x 230 V L/N
Output voltage	0 - 12000 VDC
Output current	2 x 20 - 300 A
Output power	100 kW - 800 kW as standard version
Vector group	Delta/Star/star/2 x B6U
IP Code	IP20
Frequency range	50/60 Hz

REOLAB 520*
REOLAB 520 supplies have the same design as REOLAB 420 supplies, but with an additional separately regulated DC output of 0 - 150 VDC, 30 AC or 50 ADC for the control voltage of power semiconductors. This can be augmented with an optional uninterruptible power supply (UPS) so that, even in the event of a mains failure, the power semiconductors still receive control voltage for a certain period to ensure that they can be safely shut down.

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

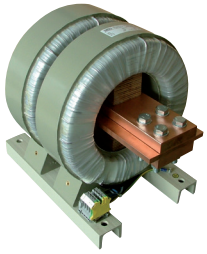
Three-phase AC heavy-current power supplies

Adjustable and constant voltage supplies,
for temperature rise testing

Description

These three-phase heavy-current power supplies have separate windings and separate electronic output current control. The separate modular construction of the control section and the heavy current section makes it possible, to connect different heavy current transformers to the control section to ensure flexibility.

REOLAB 220



In connection with REOLAB 320

Technical data

REOLAB 220*	
Input voltage	3 x 400 VAC 50/60 Hz
Output voltage	3 x 0 - 10 V per phase
Output current	bis 3 x 10.000 A
Output power	bis 300 kVA
Vector group	Star/open/open/open
IP Code	IP20

Application: Temperature rise testing of components such as cables and contacts, Low-voltage distribution, Switchgear with low-ohmic impedances

*Other voltages and loads are also available on request. Different operating modes/concepts and industry interfaces are also possible.

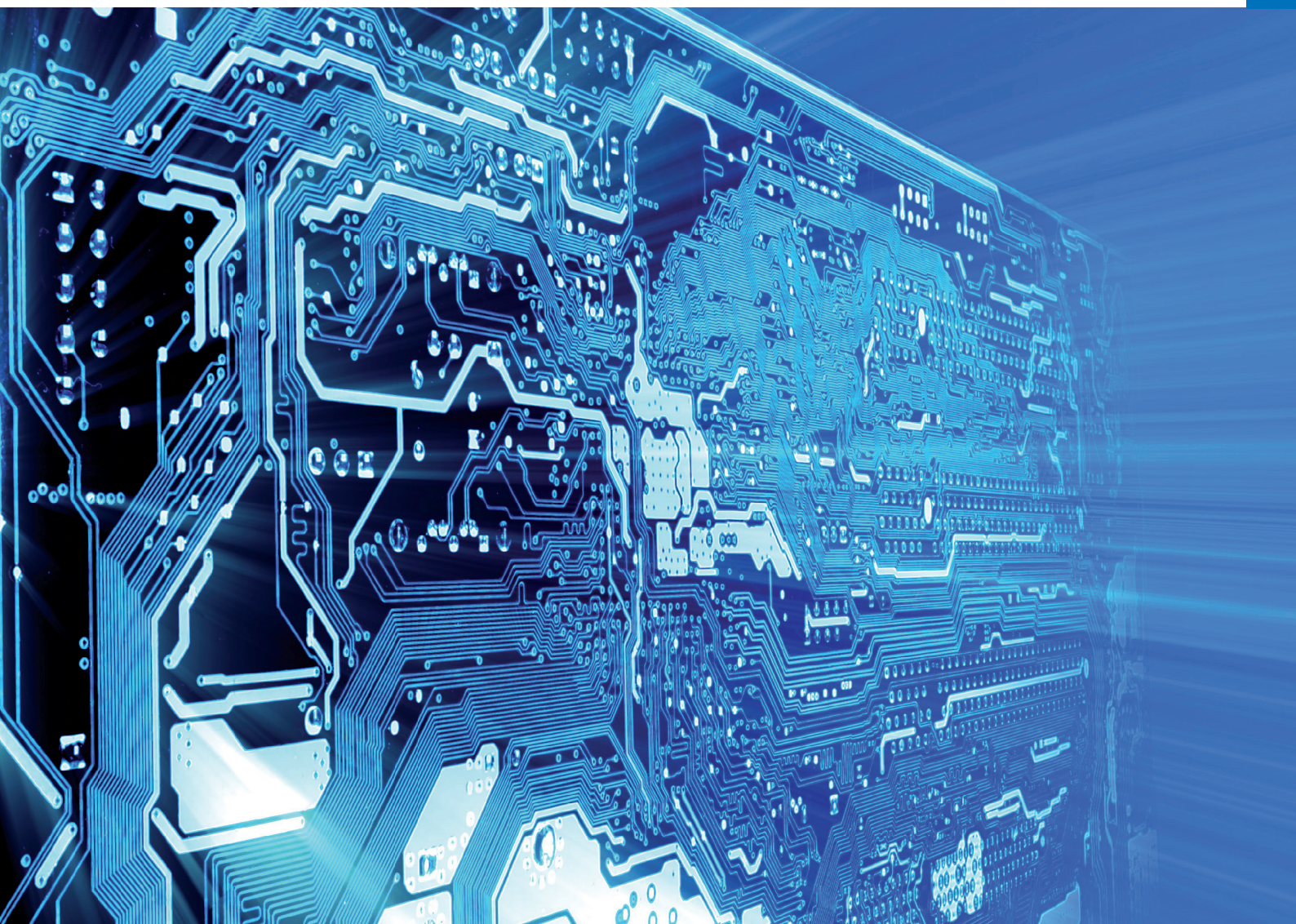
REO voltage supplies - electronic solutions

Adjustable and constant voltage supplies

In addition to our transformer solutions for the regulation of AC voltages whose advantages lie in their robust construction and favourable short-term overload capacity, REO also makes electronic voltage supplies.

Advantages

- Very high dynamics (short response times and control times, very precise regulation)
- Variable frequency
- Freedom from maintenance



Three-phase AC high-voltage power supplies

Adjustable and constant voltage supplies,
Electronic solution

All power supplies can be fitted as an option with a computer interface for external operation. This equipment can of course be designed with other technical parameters to suit a customer's wishes.

REOLAB 600

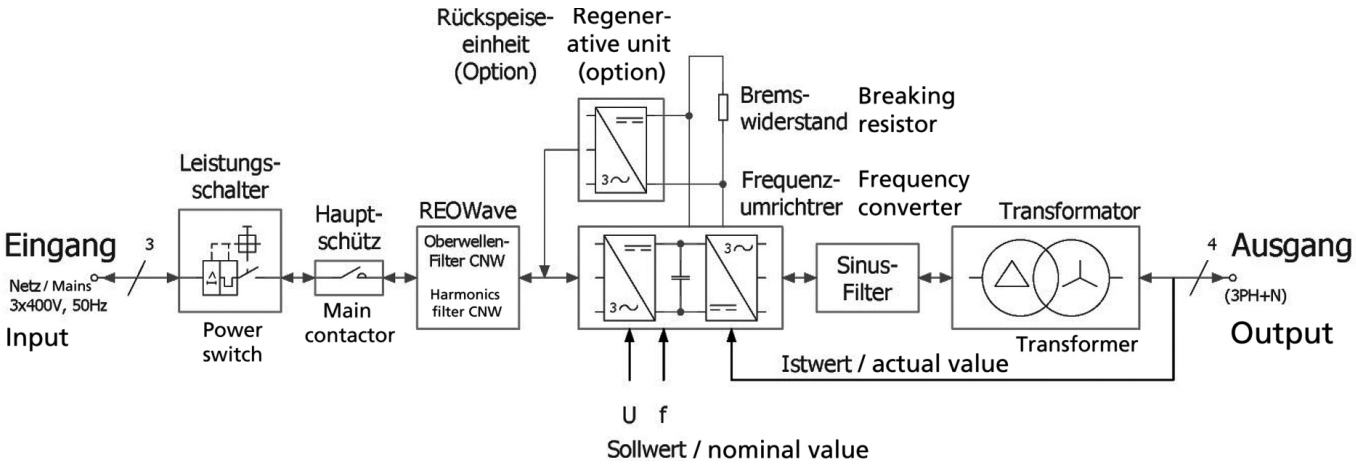
Description

These three-phase AC supplies with separate windings have an adjustable variable output voltage and a variable output frequency. These AC supplies are suitable for simulating a mains network and for testing devices, components or installations typically for 60-Hz networks. They consist of an inverter with adjustable frequency and, ensure with REO sinewave filters, a clean sinusoidal form at the output.

Technical data

REOLAB 600	
Input voltage	3 x 400 V L/L or 3 x 230 V L/N
Output voltage max.	3 x 0 - 500 VAC
Output current	3 x 22 A
Output frequency	16 - 1600 Hz variabel
Output power	19 kVA as standard version
Vector group	Delta / Star
IP Code	IP 20
Frequency range	50/60 Hz

Block diagram



Three-phase AC/DC resistive load unit

Mobile voltage supplies

REOLOAD mobil

Description

These resistive load units make it possible to test auxiliary converters and DC battery-charging units in train carriages for correct function while under load. Since they often have to be used in large halls, the supplies can be carried by vehicles via a shaft to the train carriage to be tested. A 20-metre mains lead is supplied with plug with earthing contact. The resistance steps are connected to safety laboratory sockets. The individual stages can be switched on and off while under load. Operation and display are on an inbuilt panel. This equipment can of course be designed with other technical parameters to suit a customer's wishes.

Technical data

REOLOAD 300 AC mobil 75,9 kW						
Voltage	3 x 400 VAC 50/60 Hz / 75,9 kW; IP code: IP 20					
Current	3 x 1 A	2 x 3 x 2 A	3 x 5 A	3 x 10 A	2 x 3 x 20 A	3 x 50 A
Power	0,69 kW	2 x 1,38 kW	3,45 kW	6,9 kW	2 x 13,8 kW	34,5 kW

REOLOAD 100 DC mobil 12,65 kW							
Voltage	110 VDC 12,65 kW; IP code: IP 20						
Current	1 A	2 A	4 A	8 A	10 A	2 x 20 A	50 A
Power	0,11 kW	0,22 kW	0,44 kW	0,88 kW	1,1 kW	2 x 2,2 kW	5,5 kW

REOLOAD 100 DC mobil 8,26 kW							
Voltage	72 VDC 8,26 kW; IP code: IP 20						
Current	1 A	2 A	4 A	8 A	10 A	2 x 20 A	50 A
Power	0,072 kW	0,14 kW	0,28 kW	0,57 kW	0,72 kW	2 x 1,44 kW	3,6 kW

REOLOAD 100 DC mobil 4,13 kW							
Voltage	36 VDC 4,13 kW; IP code: IP 20						
Current	1 A	2 A	4 A	8 A	10 A	2 x 20 A	50 A
Power	0,036 kW	0,072 kW	0,14 kW	0,28 kW	0,36 kW	2 x 0,72 kW	1,8 kW

REOLOAD 100 DC mobil 2,76 kW							
Voltage	24 VDC 2,76 kW; IP code: IP 20						
Current	1 A	2 A	4 A	8 A	10 A	2 x 20 A	50 A
Power	0,024 kW	0,048 kW	0,096 kW	0,19 kW	0,24 kW	2 x 0,48 kW	1,2 kW

Single-phase test inductors

Mobile voltage supplies

Description

For testing frequency converters with inductive load. Load testing with a high reactive current component causes the reactive current component to be compensated by the capacitance in the DC intermediate circuit, so that only the losses are supplied to the frequency converter to be tested, e.g. with the REOLAB mobile 70 kW mobile AC/DC supply. Approx. 70% to 80% of the energy costs for testing are saved thereby.

REOCHOKE 100 mobil
0,25 mH / 2000 A

Technical data

REOCHOKE 100 mobil 0,25 mH / 2000 A	
Inductance	0,25 mH - 0 % + 10 %
Voltage	4500 VAC 50 Hz
Current	2000 A DB max. 4000 A KB
Power	157 kVA DB max. 628 kVA KB
IP Code	IP44

REO ohmic load units

Starting with the manufacture of arc lamps for the cinema industry, REO has been utilising its knowledge and expertise in the electrotechnical field for 80 years. Constant development means that REO now offers a very wide portfolio of testing systems and products to allow testing of converters to braking resistors and everything in-between. Ohmic load units are used when power supply systems or other test specimens, such as switches, contacts or transformers, have to be loaded with a resistive load. Ohmic load units are used in development laboratories, proving grounds, test institutes, schools and universities.

Single-phase resistive loads

Ohmic load units

Advantages REOLOAD 101

- Seven fixed stages
- Fine control stage for testing contacts, static converters, witched-mode power supplies
- Remote control via 24 VDC coupling relay; the individual stages can be switched on and off while under load
- Connections are made via laboratory screw terminals and plug and socket connections. The individual stages can be operated via switches in local operation, and via potential-free contacts
- controlled by the 24 VDC coupling relay for remote operation.

Advantages REOLOAD 102

- Two fixed stages for testing generators
- Batteries for simulating different types of load
- The individual stages can be switched off while under load
- Connections via laboratory screw terminals and plug and socket connections
- Built-in analogue voltmeter and ammeter

REOLOAD 101

Technical data

REOLOAD 101*	
Voltage max.	230 V 50 / 60 Hz
Resistance values	1 - 10.000 Ohm
Current	0,1 - 250 A
Precision of resistances	+/- 5 %
IP Code	IP20

REOLOAD 102*	
Voltage max.	1000 V AC oder DC
Resistance values	1 - 2500 Ohm
Current	max. 250 A
Power	5 kW, 10 kW, 15 kW, 20 kW and 25 kW
Precision of resistances	+/- 5 %
IP Code	IP20

 *This equipment can of course be designed with other technical parameters to suit a customer's wishes.

Single-phase resistive loads

Ohmic load units

Advantages

- 17 fixed stages for testing switch contacts in accordance with IEC 60669-1-3.1 and IEC 61058-1/A2
- All 17 stages are connected in series and can be bridged via contactors.
- High precision
- The required resistance values are able to be set via Ethernet connection
- Low-inductance
- Switching by means of contactors while ON load

REOLOAD 100

Technical data

REOLOAD 100					
Resistance	**Current**	**Power**	**Tolerance**	**Voltage max.**	**Total power of all resistances**
0,1 Ω	16 A	25,6 W	+/- 5%	265 VAC or less from the 0.1 ohm to the 10 ohm stage	17,091 kW
0,2 Ω	16 A	51,2 W			
0,3 Ω	16 A	76,8 W			
0,4 Ω	16 A	102,4 W			
1 Ω	16 A	256 W			
2 Ω	16 A	512 W			
3 Ω	16 A	768 W			
4 Ω	16 A	1024 W			
10 Ω	16 A	2560 W			
10 Ω	15 A	4500 W			
30 Ω	10 A	3000 W			
40 Ω	7,5 A	2250 W			
100 Ω	3 A	900 W			
200 Ω	1,5 A	450 W			
300 Ω	1 A	300 W			
400 Ω	0,75 A	225 W			
1000 Ω	0,3 A	90 W			

Three-phase resistive loads

Ohmic load units

Advantages

- Ten fixed stages per unit for testing contacts, static converters and switched-mode power supplies with active current
- Individual stages are switched on and off with rotary switches
- The three units can be switched for single-phase and three-phase operation
- Manual changeover by means of solid conductor links, allows versatile resistances and currents settings.
- Connections via laboratory screw terminals and plug and socket connections inside the switch cabinet
- Three standard sizes for selection:

REOLOAD 301

Technical data

REOLOAD 301*			
REOLOAD 301 / 69	230 V	10 stages, each 10 A	69 kW
REOLOAD 301 / 120	400 V		120 kW
REOLOAD 301 / 201	690 V		207 kW
IP class	IP 20		

*This equipment can of course be designed with other technical parameters to suit a customer's wishes.

Three-phase resistive loads

Ohmic load units

Advantages

- Eight fixed stages of three-phase alternating current for testing power supplies and temperature testing with active current regulation
- Individual stages can be switched on and off while under load by means of rotary switches
- True effective display by digital ammeter (96 x 48 mm) in the operating panel
- Connections to safety laboratory sockets 4 mm

REOLOAD 302

Technical data

REOLOAD 302*					
Resistance	**Currents**	**Power**	**Nominal voltage**	**Total power**	**IP Code**
3 x 2300 R	3 x 0,1 A	69 W	3 x 400 V L/L or 3 x 230 V L/N 50/60 Hz	11,385 kW	IP 20
3 x 1150 R	3 x 0,2 A	138 W			
3 x 575 R	3 x 0,4 A	276 W			
3 x 288 R	3 x 0,8 A	552 W			
3 x 230 R	3 x 1 A	690 W			
3 x 115 R	3 x 2 A	1380 W			
3 x 57,5 R	3 x 4 A	2760 W			
3 x 28,8 R	3 x 8 A	5520 W			

*This equipment can of course be designed with other technical parameters to suit a customer's wishes.

Three-phase resistive loads

Ohmic load units

With optional liquid cooling, our test equipment combines compact construction, low weight and high protection class. When using this cooling method, much less waste heat in total is dissipated at the units themselves - this is a great advantage, in particular in smaller rooms or at high ambient temperatures. Another benefit of this system is that energy taken away by the water can be sustainably integrated into the company heating process by REO liquid-cooled resistive load units. This can contribute positively to the energy efficiency of the whole company.

Advantages

- Four fixed stages of three-phase alternating current for testing auxiliary converters with active current regulation
- Individual stages can be switched on and off by means of illuminated push-buttons while ON load
- Display of voltages, currents and direction of rotation
- Line side inductors for damping voltage spikes
- Outputs for measuring current and voltage
- Connections to suitable terminals with the control housing

REOLOAD 310

Technical data

REOLOAD 310*				
Nominal voltage	3 x 440 V L/L or 3 x 254 V L/N 50/60 Hz			
Currents	3 x 8 A	3 x 15,7 A	3 x 31,5 A	3 x 63 A
Power	6 kW	12 kW	24 kW	48 kW
Total power	90 kW			
Frequency	50/60 Hz			
IP Code	IP 20			

*This equipment can of course be designed with other technical parameters to suit a customer's wishes.

Water-cooled resistive loads

Water-cooled load units

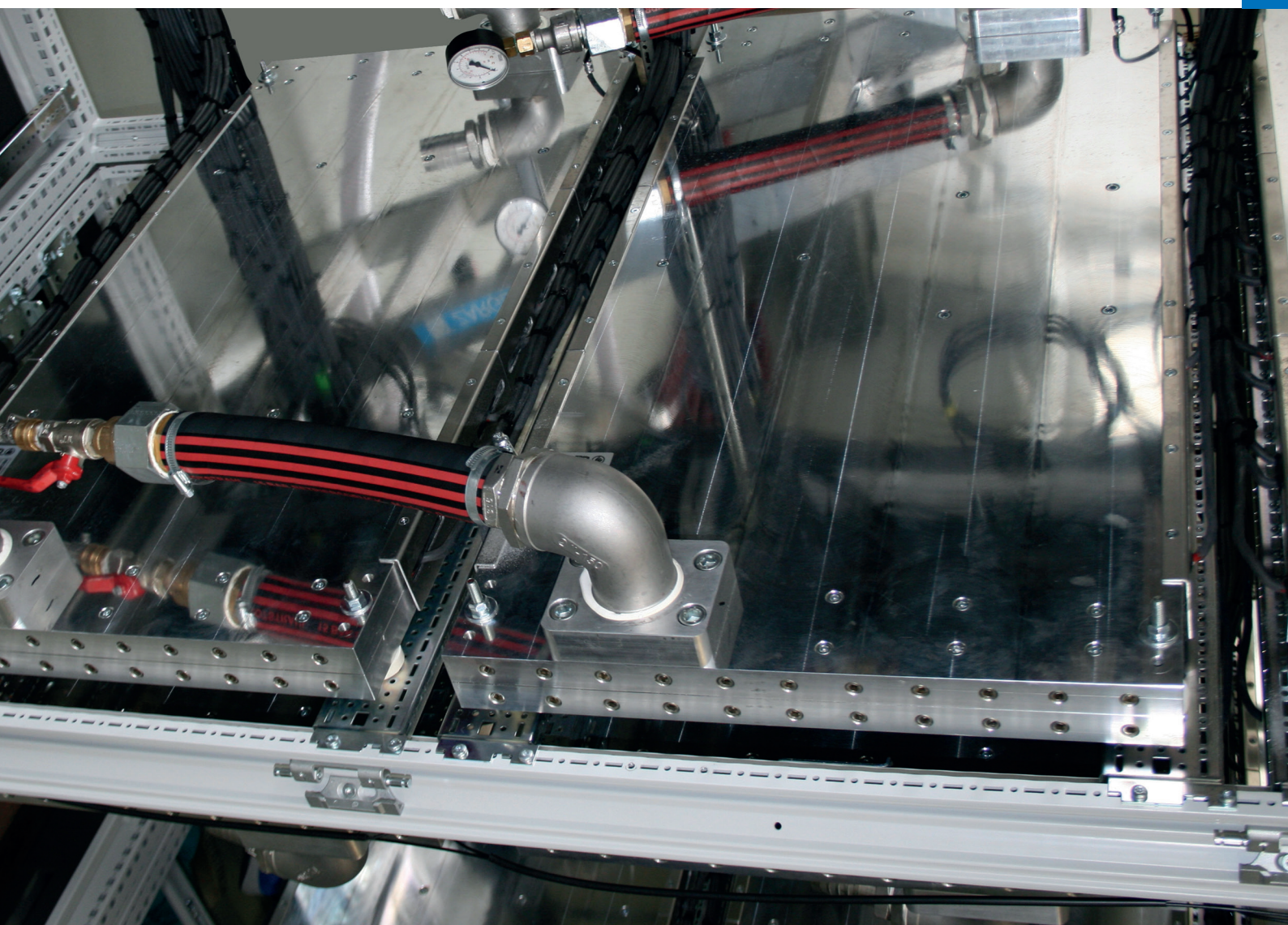
Description

Example of a client-specific resistive load unit that consists of 15 resistance groups (liquid-cooled) and 4 rheostats with AC motor drive. All resistances are connected via contactors that are controlled via 24 VDC relays. Two stainless steel distributors are built in for connecting the water cooling.

All resistance groups can be hydraulically regulated or switched individually. All fittings for the cooling circuit are in stainless steel. The resistances and the control are connected to suitable terminations.

Technical data

REOLOAD 300	
Nominal voltage	3 x 440 V L/L or 3 x 254 V L/N; 10/60 Hz
Total power	253,45 kW
Frequency	50/60 Hz
Duty cycle	100 %
Res. tolerance	+/- 5%
Cooling	Water/Glykol (70:30)
Volume of flow	ca. 800 l/min
Flow temperature	max. 25° C



Inductive loads - the individual components

Inductive loads are usually specially designed for an application and with reference to the applicable norms. These standards detail the tests required but also the test setups and procedures. The inductances are specially adapted to the area of application so an optimal solution may be provided.

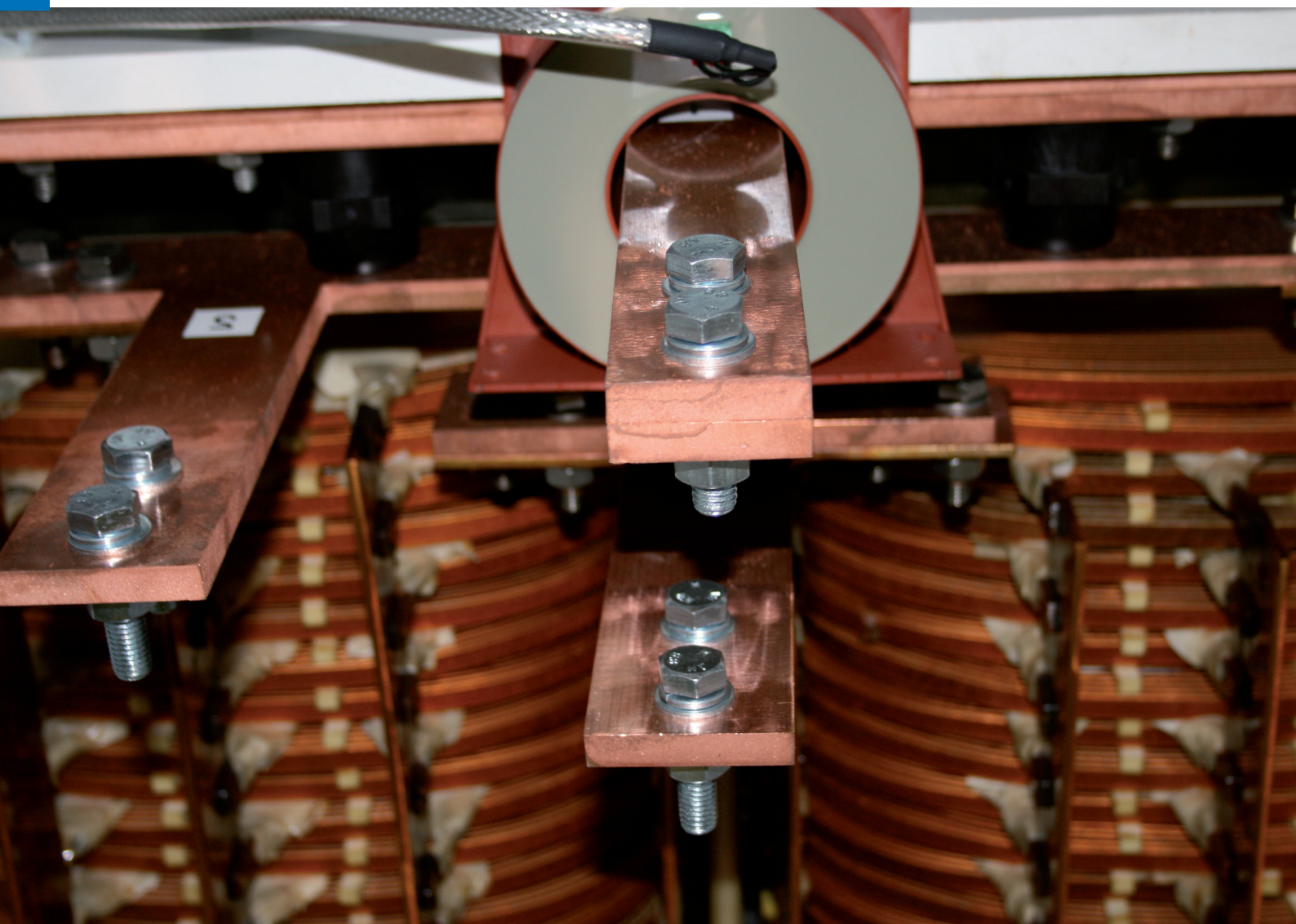
Inductive load units are used when power supply systems or other test specimens, such as switches, contacts or frequency converters have to be loaded with a standardized effective and reactive power.

Frequency converters that are loaded with an inductive load require substantially less energy when being tested, because compensation is effected by the DC intermediate-circuit capacitor. For this reason, only the losses are supplied for the testing, as a result of which an energy saving of approx. 70% - 80% can be achieved during such tests.

Additional resistive loads are required to achieve the cos phi (power factor) values required for testing. This particularly applies to switch and contact testing. The application is used in development laboratories, proving grounds, test institutes, schools and universities.

Additional resistive loads are required to achieve the cos phi (power factor) values required for testing. This particularly applies to switch and contact testing. The application is used in development laboratories, proving grounds, test institutes, schools and universities.

Please feel free to contact us for individual adjustment measures or accessories.



Three-phase inductive loads

Inductive load units

Description

The three-phase-inductive load consists of three iron-cored inductors, each with three tappings, and is used for testing static converters and switched-mode power supplies. The individual tappings are connected directly to the inductor. A REO DC closed loop current transformer is built in for each phase for measuring current.

REOCHOKE 300

Technical data

REOCHOKE 300	
Voltage	3 x 4000 V
Inductance values	3 x 1 mH with tappings at 0,75 mH, 0,5 mH and 0,25 mH
Current	3 x 1500 A
Tolerance of the inductor	+/- 10 %
IP Code	IP20

Three-phase inductive loads

Inductive load units

Description

Infinitely adjustable three-phase inductive loads consisting of a three-phase column variable-ratio transformer and a downstream three-phase iron-cored inductor on the secondary side for testing static converters and power supply units with reactive current. The reactive current can be set from approx. 5% to 100% by means of min/max push-buttons via the variable-ratio transformer. With built-in digital measuring equipment for current and voltage.

REOCHOKE 300 / 69

Technical data

REOCHOKE 300 / 69	
Voltage	3 x 400 V
Frequency	50 Hz
Current	3 x 2 - 100 A
Power	3 x 0,46 - 23 = 69 kVA
Connection	Star/auto
AC motor drive	230 V 50 Hz
Actuating time approx.	30 seconds
IP Code	IP20

Iron-cored inductors

Inductive load units, Inductors for testing switches and relays

Advantages

- Matched linearity to the application, so no saturation in the relevant working range
- Several tappings, so there amount of inductors can be reduced
- Matched winding resistance, therefore reduced number of external resistors
- Designed for continuous load and short-time loading
- Costs reduced by optimized weight and dimensions
- High nominal voltage, standard up to 1000 V

Description

Electrical switches have to pass many different tests during the approval phase. Some of these tests concern their switching behaviour under various test conditions. A switch is tested under nominal load, overload and with several values of cos phi (power factor). Besides continuous loading, switching on and off processes are also investigated. Throughout testing, it is crucial for the set parameters not to be altered. Air-cored inductors were used as inductive loads in the past, because they almost never saturate. Air-cored inductors are however larger and have a stronger leakage field than comparable iron-cored inductors with corresponding magnetic energy. In order to set the relevant cos phi (power factor) value, matched resistances must be connected up in addition. In order to meet all the required test points, many various inductive and ohmic loads must be available.

REOCHOKE NPT 892-2-450

Relevant norms: IEC 60669 und IEC 61058

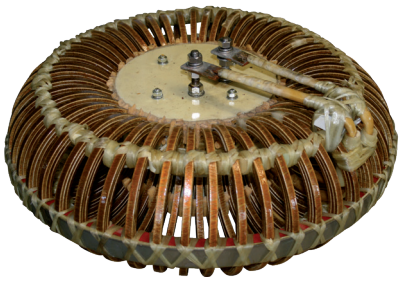
Technical data

REOCHOKE NPT 892-2-450					
Tapping	**Inductance L**	**Nominal current I_{rms}**	**Linear up to I_{lin}**	**Nominal voltage U_r**	**IP Code**
L_2	115 mH	2 A	8 A	1000 V	IP 00
L_3	190 mH		8 A		
L_4	240 mH		6 A		
L_5	300 mH		6 A		
L_6	370 mH		5 A		
L_7	410 mH		4 A		
L_8	440 mH		4 A		
L_r	450 mH		4 A		

Toroidal inductors

Inductive load units

Toroidal inductors NPT LD Td-AF



Low leakage

Description

Electrical switches must undergo several different tests during the approval phase. Some of these tests relate to switching behaviour under various load conditions. The switch is tested under rated load, overload and multiple cosφ. In addition to continuous load, switch-on and switch-off processes are also tested. During this process, it is crucial not to modify the set parameters throughout the entire test. In the past air chokes were used as inductive loads, as these almost never saturate. However, air chokes are larger and have a stronger stray field than comparable iron-core chokes with a corresponding magnetic energy. To set the respective cosφ value, adjusted resistors must also be connected. To satisfy all of the requested test points, several different inductive and ohmic loads must exist. This special toroidal construction of the air core choke offers the advantage of a linear inductance curve over the current and, despite this, has a very load, negligible stray field comparable with a saturable iron core inductor.

Technical data

Toroidal inductors NPT LD Td-AF									
Type	**Inductance**	**Max. load current S1/S2**	**Frequency**	**Cooling type**	**Resistance 20° C max.**	**Design**	**Thermal class**	**Application**	**IP Code**
LD 432 Td	1200 µH	600 A_{rms}	DC / AC	AF	25 mΩ	Toroid	H	Filterdrossel	IP00
LD 10.14 Td	6 µH	200 / 1800 A_{rms}		WF	1.3 mΩ			di/dt-Drossel	
LD 8.5 Td	15 µH	18 / 750 A_{rms}		AN	1.2 mΩ			di/dt-Drossel	
LD 1.72 Td	35 µH	222 A_{rms}		AF	8.5 mΩ			Filterdrossel	
LD 82.9 Td	160 µH	720 A_{rms}		AF	6.9 mΩ			Filterdrossel	
LD 115.2 Td	320 µH	600 A_{rms}		AF	12 mΩ			Filterdrossel	
LD 57.6 Td	640 µH	300 A_{rms}		AF	33 mΩ			Filterdrossel	
LD 9.7 Td	40 µH	375 A_{rms}		AN	3.9 mΩ			Filterdrossel	
LD 4.5 Td	200 µH	150 A_{rms}		AN	20 mΩ			Filterdrossel	
LD 0.05 Td	16 µH	- / 40.000 A_{rms}		AN	2.9 mΩ			di/dt-Drossel	

Air-cored chokes

Inductive load units

Air-cored chokes NPT LD

High Inductances

Description

These inductors are used in the long-term testing of inverters. Realisation as air-cored inductors avoids the thermal overloading that would occur in an iron core due to switching spikes. High inductance is achieved in air-cored inductors with a cylindrical construction. Another advantage is very good natural or forced cooling.

Technical data

Air-cored chokes NPT LD*	
Type	LD 715 / 597
Nominal voltage	800 V
Nominal current	450 A
Selectable inductance	2,95 / 3,53 mH
Copper	ca. 250 kg
Weight	ca. 279 kg
IP Code	IP 00

* For a sample product, this product is produced in line with customer data and requirements. Other voltages and loads are also available on request

Solenoid inductors

Inductive load units

Solenoid inductors NPT LD

High Inductance

Description

These inductors are distinguished by their highly linear inductance (LI) or (Lf). Their frequency dependence changes with the conductor and the cooling efficiency. Depending on requirements, the winding can be of copper or aluminium. Natural and forced air cooling are possible.

Technical data

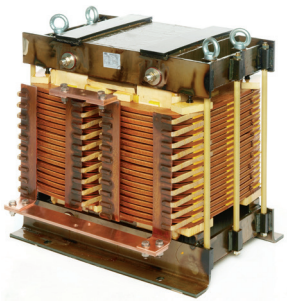
Solenoid inductors NPT LD*						
Type	**Nominal voltage**	**Nominal current**	**Inductance**	**Copper approx.**	**Weight approx.**	**IP Code**
LD 7,2	500 V	12 A	50 mH	19 kg	21 kg	IP 00
LD 115	1000 V	107 A	10 mH	75 kg	100 kg	
LD 145	1000 V	189 A	4 mH	36 kg	46 kg	
LD 173	350 V	350 A	1,4 mH	56 kg	70 kg	
LD 206	750 V	250 A	3,3 mH	32 kg	45 kg	
LD 317	1000 V	310 A	3,3 mH	52,4 kg	65 kg	
LD 1180	750 V	530 A	4 mH	114 kg	145 kg	
LD 1200	1500 V	480 A	5,2 mH	140 kg	160 kg	
LD 2240	1000 V	800 A	3,5 mH	285 kg	375 kg	
LD 2500	1650 V	400 A	10 mH	298 kg	520 kg	

* Other voltages and loads are also available on request.

Iron-cored inductors for converters

Inductive load units

Iron-cored inductors for converters



High dielectric strength 10 KV

Description

These inductors are used as load inductors for testing single-phase and multiphase traction converters and individual circuit breakers. Three inductors are required in three-phase applications.

Technical data

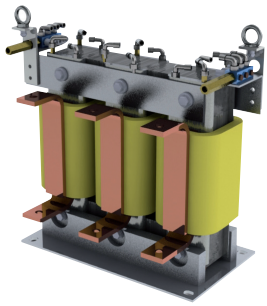
Single-phase load inductor NPT*		
Type	NPT 100; 1500	NPT 100; 2000
Voltage	4000 V	4500 V
Inductance	1 mH	0,25 mH
Frequency	15 - 75 Hz	50 Hz
Current	1500 A	2000 A
Copper	ca. 600 kg	ca. 300 kg
Weight	ca. 1800 kg	ca. 815 kg
IP Code	IP 00	

* Other voltages and loads are also available on request.

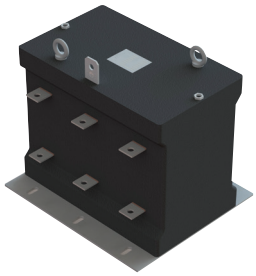
Liquid-cooled inductors for test technology

Inductive load units

Open version



Full encapsulation



Liquid cooling

Description

We can also supply all inductors in liquid-cooled versions as alternatives to the test inductors mentioned above.

- Inductors in open version, in which heat sinks are integrated into the winding. With this technology, heat can be constrained directly at the source and redirected away from the local environment.
- Fully encapsulated inductors in which „water bags“ incorporated within the encapsulated windings are connected to a liquid cooling system. This technology combines the advantages of the encapsulation technique to achieve a high protection class with an effective heat transfer at the source.

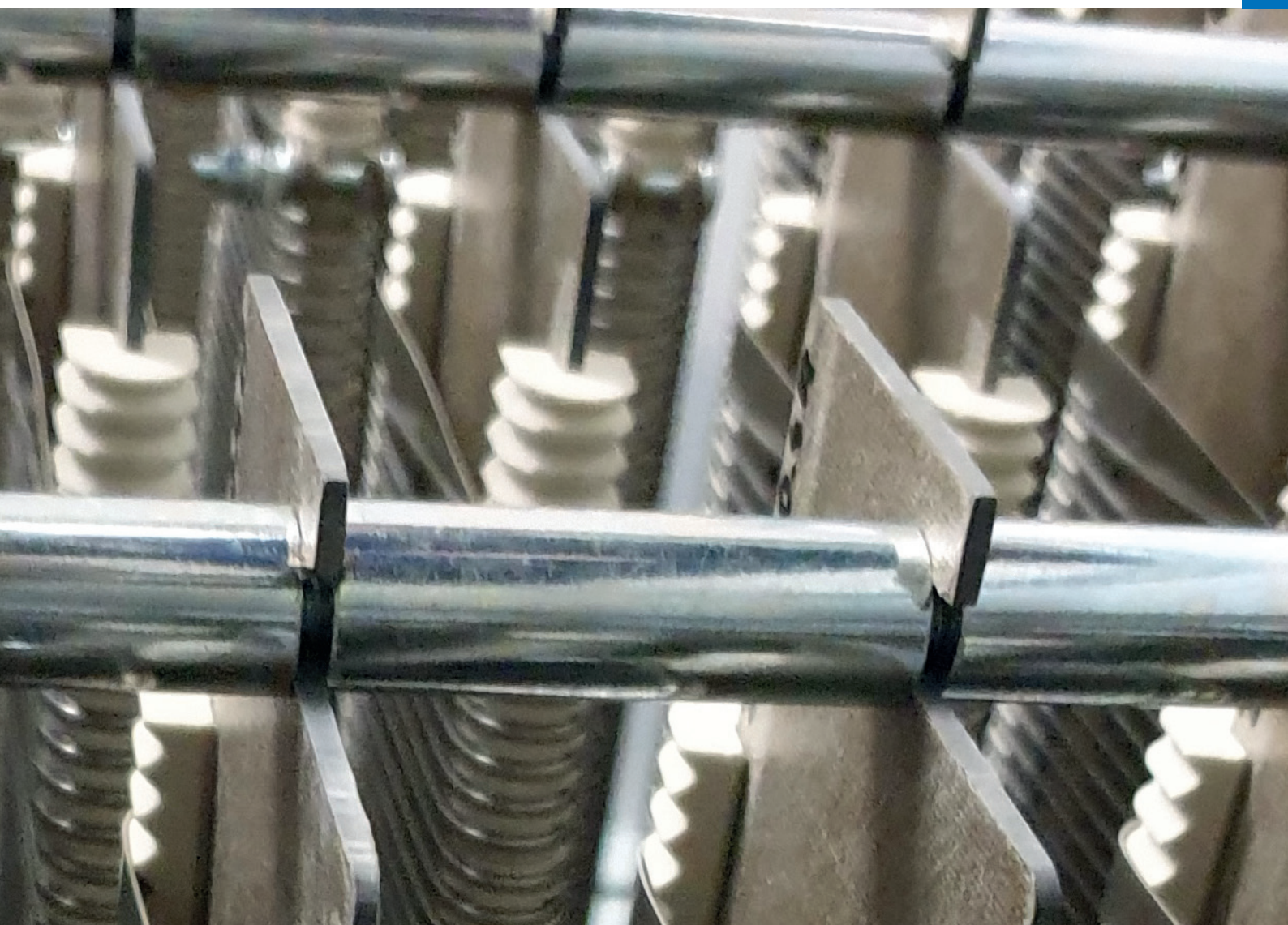
Technical data

CNW MD	
Version	Open version or fully encapsulated with water bags
Current	100 - 3000 A
IP Code	IP 00 - IP 65
Inductance	5 - 200 mH

REO voltage stabilizers - optimal performance

Voltage stabilizers are used in single-phase and three-phase networks with unstable voltages in order to smooth these mains voltage fluctuations. This provides a constant voltage to the connected consumer, resulting in constant machine output regardless of the variable incoming supply.

In three-phase networks with asymmetrical voltages and asymmetrical loads, voltage stabilizers that regulate the three phases separately must be used. If however the mains voltage and the load behave symmetrically, a voltage stabilizer that regulates the three phases in unison can be used.



Single-phase/three-phase voltage stabilizers

Voltage stabilizers

Description

REOSTAB 100 RSK

For portable use with output power up to max. 6 kVA. With 2-metre supply cable and socket at the output. With built-in switch at the input and automatic circuit breaker at the output. In sturdy aluminium case with carrying handles in accordance with IP Code IP 20.

REOSTAB 100 NK 111

Single-phase voltage stabilizers for fixed installations with output power from 0.9 kVA to a max. 276 kVA (size S 1 to S 20) Up to size S 14 with built-in on/off switch at the input. The equipment is built into a base frame in IP 00 (version A) or switch cabinets or angle iron frames in accordance with IP Code IP 20 (version B and C).

REOSTAB 200 DNK 213 / 313

Three-phase voltage stabilizers for fixed installations with common or individual regulation of the three phases (size SD 1 to SD 20). With built-in on/off switch at the input up to size SD 14. The equipment is built into a base frame in IP 00 (version A+D) or switch cabinets or angle iron frames in accordance with IP Code IP 20 (version B+C, E+F) and has an analogue voltmeter and ammeter at the output (version C+F).

REOSTAB 200 DNK 213 / 313

Joint (DNK 213) or separate (DNK 313) phase regulation

Technical data

REOSTAB 100 RSK*	
Input voltage	230 V
Frequency	50/60 Hz
Mains voltage fluctuations	+/- 10 % or +/- 15 %, 20 %, 25 %
Output voltage	230 V + /- 1 %
Power	0,8 kVA - 6,0 kVA
IP Code	IP20

REOSTAB 100 NK 111*	
Input voltage	230 V
Frequency	50/60 Hz
Mains voltage fluctuations	+/- 10 % or +/- 15 %, 20 %
Output voltage	230 V +/- 1 %
Power	0,9 kVA bis 276 kVA
IP Code	IP00 - IP20

REOSTAB 200 DNK 213 / 313*	
Input voltage	3 x 400 V L/L bzw. 3 x 230 V L/N
Frequency	50/60 Hz
Mains voltage fluctuations	+ / - 10 % or + / - 15 %, 20 %
Output voltage	3 x 400 V L/L or 3 x 230 V + / - 1,0 %*[1]
Power	0,9 kVA - 276 kVA
IP Code	IP00 - IP23

* Other voltages and loads are also available on request.
*[1] Or 1.5% with joint regulation

Optional interfaces - the practical space-savers

Interfaces such as Modbus/TCP, Profibus or Profinet can be built in as an additional option for external operation of the equipment. Interfaces give the advantage that our equipment no longer has to be operated locally but can be operated remotely and even from different workstations. This saves expensive laboratory space, while the power sections can be set up elsewhere. The parameters or functions that are to be available on the bus can be specified by the customer. A bus protocol is then provided for them.

REO's range of bus systems includes the following:

- Profibus in conjunction with Siemens SPS
- Modbus/TCP or Profinet as option

With complex installations it is advisable to also provide for local operation in case no bus should be available. This can also be very helpful when bringing a test stand into service. Furthermore, the equipment can still be used even if the bus fails or is not available.

Operating modes for REOLAB devices

The following operating methods are available:

Locally at the equipment

By Touchscreen

Manually by keyboard

And/or by remote control

Optional REO test technology interfaces

S7 als Modbus / TCP Server (Preferred)

- Connection via Modbus/TCP as Modbus server (alternatives on request)
- Standard interface with S7-1200
- Networking possible using proven components
- Access to PLC from various points
- Near simultaneous read access to several devices
- Linking with operating panel possible
- Remote access for monitoring and programming
- Bus can also be used for communications in installations with several PLCs
- Linking to system software such as LabView

S7 mit Profibus (On Request)

- Simple integration into common S7 systems
- Master and slave operation possible
- A widely used bus system for which many components are available
- Data exchange cycles prescribed by the master

S7 mit Profinet

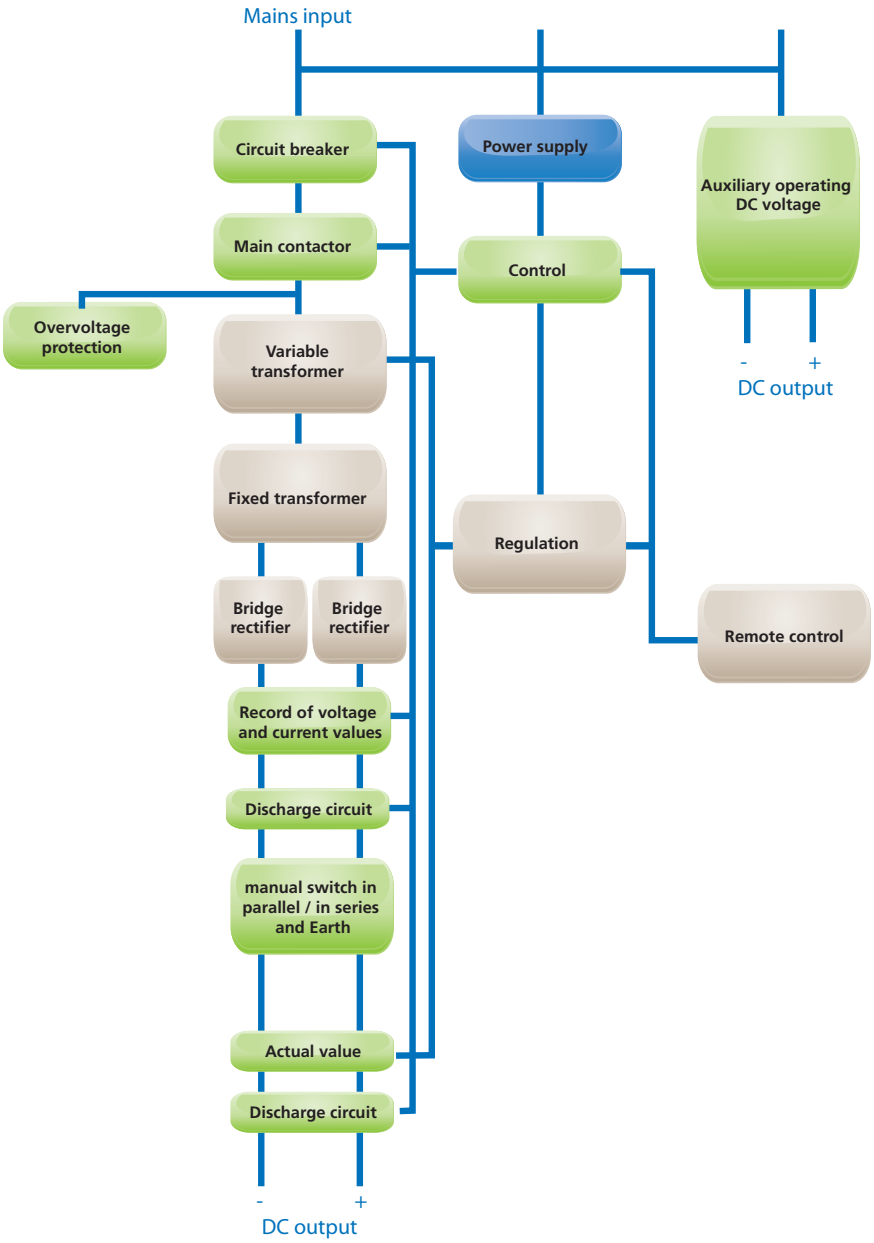
- Operation as I/O device

Modular construction of REO test equipment

Technology of REO test equipment

REO testing devices can also be combined with each other. Modular construction has the following advantages:

- Fast and flexible adaptation of our testing equipment if the client wishes to change the default test settings
- Easier maintenance in the event of possible component failures (short downtimes)
- Individual modules are delivered from stock
- REO testing systems have been developed to the highest standard of safety so that we can guarantee the inherent safety of our testing equipment and the safety of its users



Efficient principles of energy regeneration

Energy regeneration

The installation draws its energy from the mains and brings it to the desired power via the AC/DC power supply module. A test specimen can be loaded using three energy-saving principles instead of a resistive load.

20% saving

The load is generated by a motorgenerator set and the energy is fed back to the test specimen. Only the lost power is balanced by the AC/DC power supply module. This procedure likewise permits dynamic tests and, in the REO testing system, yields an energy saving of 80%.

56% saving

The load is generated by a motorgenerator set and the energy is fed back into the mains via a regenerative unit. This procedure permits dynamic tests, such as braking or accelerating, to be performed. Tests have shown an energy saving of 56%.

95% saving

The load is generated via a load inductor. A resonant circuit with the capacitors in the converter is thus generated and the principle of reactive power compensation is followed. Only the losses are balanced via the AC/DC power supply module. This procedure permits an energy saving of 95%.

Note

Note

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