EDIT
ELECTRONIC

Innovative Power Solutions & Voltage Stabilizers

General Catalog

ENG

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EDIT ELECTRONIC

In the supply of high quality power and continuity;

Experienced solution partner for voltage and power management

Edit Electronic was established in 1995 to develop professional solutions for industrial and commercial applications and to produce Voltage and Power Management Devices.

The production, which started with Voltage stabilizers and Industrial battery chargers, diversified and developed with the innovative vision of our R&D engineers and the efforts of our dynamic production staff.

We manufacture Automatic Voltage Stabilizer, Dynamic Voltage Stabilizer, Battery Charger, Network simulator, Adjustable Voltage Source and Power Transformers in our factory in İstanbul-Turkey.

We deliver our devices, which we produce using advanced technologies, to all over the world.

Our R&D and Production engineers use the latest technologies to increase product performance, operating safety and energy efficiency.

We are working to provide the best solutions with many years of knowledge and field experience.

Our current and performance-oriented equipment in our production line:

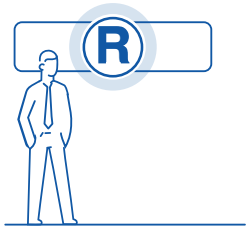
High-tech electronic circuit boards are produced with materials and processes that respect the environment and human health, and comply with European and world standard.

Powerful and long-lasting transformers are varnished under vacuum and dried at high temperature.

Testing and quality control processes are carried out by Expert Technical Personnel using sensitive measuring devices, with procedures in accordance with standards. Every product is tested and reported.

Mechanical assembly, electrical wiring and marking processes are done with great care and meticulousness by experienced and expert personnel.

HOW WE CAN COLLABORATE?

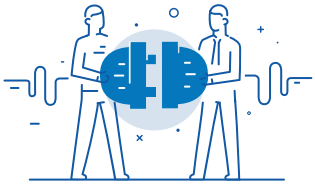


Distributorship or Dealership Agreement

Let us discuss the distributorship or dealership in order to offer the best solutions to your customers in your portfolio, in the fastest and most favorable terms..

Professional Solutions for Your Projects

Please contact with sales representatives to purchase the products you need for your project...

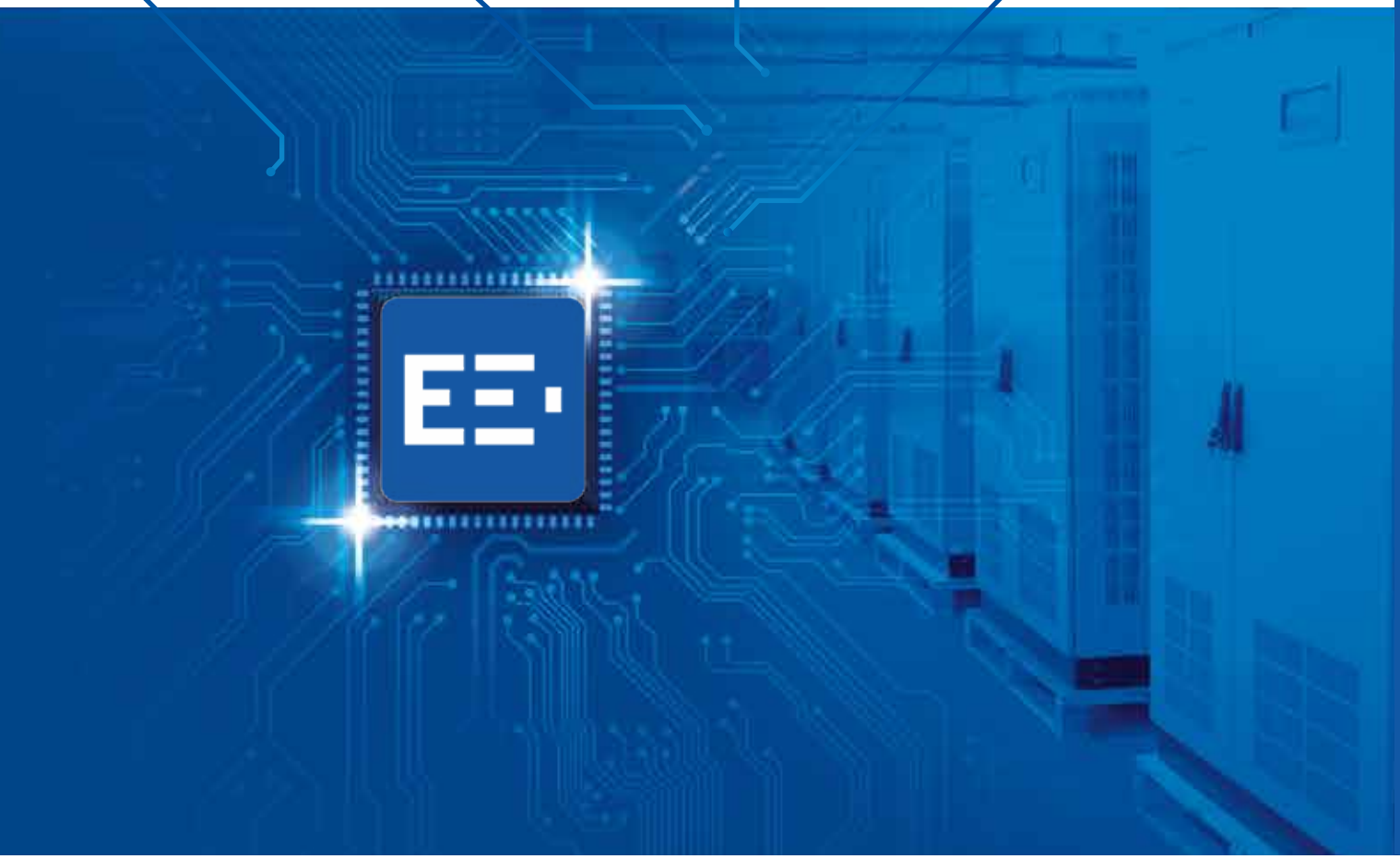


Manufacturer Partnership

Do you have a high capacity sales opportunity with your own internationally known brand? Let us re-design our products with the Physical and Technical features you demand. Let us produce for you in accordance with your standards.

OEM Manufacturing Agreement

Let us manufacture the products whose Know-How belongs to you, with your brand. Let us do OEM agreement for better price and high quality.



Voltage Stabilizers / Dynamic Voltage Restorer

The most effective solutions for network voltage fluctuations

EDIT Voltage Stabilizers and Dynamic Voltage Restorers solve the below problems which met in city network frequently.

- **Continuous voltage drops**
- **Continuous voltage rises**
- **Instant overvoltage drops (Sag)**
- **Instant overvoltage rises (Swell)**
- **Short-time voltage interruptions**
- **Phase asymmetry**
- **Loss of power and issues of efficiency**
- **Electrical noises,**
- **Harmonic distortions**

We offer different solutions for different electrical problems. You may find the most suitable product for you by using the brief information and the table below.

Key features of devices are listed on comparison table.

The advantages and disadvantages of devices are also included in the table to make your selection easier.

You can find detailed technical specifications of the products in the comparison table on the product pages.

Please contact with your sales representative for more detailed information.

1 For Continuous Voltage Drops and Rises;

VOR voltage stabilizers are the most right solutions for the problems of permanent voltage drop-rise and voltage fluctuation. VOR has the ability to increase power by connecting in parallel and has a changeable input voltage range. Patented VOR is unique and unrivaled thanks to these specifications. You may purchase VOR from stock right away and install it easily. If you need more power, you may purchase +1 more and connect them in parallel. It is produced with thyristor technology, operates quickly and fully automatically and does not require any maintenance. It has the best price performance ratio.

IMP voltage stabilizers have the same technology as VoR. It does not have parallel connection feature and Input voltage Range changing feature. It is produced specially according to customer requests. It can be produced in different powers as 1 phase, 2 phase and 3 phase.

ESV voltage stabilizers are electro-mechanical. It consists of a Variac unit controlled by a motor. The voltage correction speed is very slow and requires periodic maintenance due to its mechanical parts. It is the most economical solution. It is produced only in certain models.

2 For short-term and over Voltage Drops and Rises (Sag-Swell);

VSC Dynamic Voltage Restorers are the most suitable solution for problems such as short-term and instant voltage drops (SAG), voltage spikes (SWELL), short-term interruption of 1 phase or 3 phases. ***VSC Dynamic Voltage Restorers*** are manufactured using IGBT technology and detect voltage drops at 3msec and correct at 10msec. Models with a super capacitor bank or battery bank can balance the phase interruptions. In phase interruptions, the feeding time is maximum 30 seconds..

It is produced in accordance with customer demands.

It enables uninterrupted operation and full protection for very critical industrial machines and equipments.

It is larger in size than VoR Voltage Stabilizers.

3 For Energy Efficiency, Noise filtering and Protection;

The most suitable solution for energy efficiency, electrical noise and harmonic filtering is ***ELC Line Conditioner & Saver*** devices. It is mostly used in networks with high voltage, phase imbalance and electrical noise for supplying with the most suitable voltage and eliminating phase imbalance of industrial machines and equipments. It is produced with thyristor technology and does not require any maintenance. Filter units and protection units can be added to eliminate harmonic distortions, electrical noises and other electrical risks.

It is produced only in certain powers in accordance with customer demands.

Comparison table

	VoR Multi-master Parallel Voltage Stabilizer	IMP Static Voltage Stabilizer	VSC Dynamic Voltage Restorers	ELC Voltage Optimization and Energy Saving Unit	ESV Servo Voltage Stabilizer
					
Parallel Operation Feature	✓	✗	✗	✗	✗
N+1 Redundant Solution	✓	✗	✗	✗	✗
Equal Load Sharing	✓	✗	✗	✗	✗
Touchscreen Operator Panel	optional	optional	optional	✗	✗
LCD Display Panel	✓	✓	✓	✓	optional
Remote Management and Monitoring	optional	optional	optional	optional	✗
Electronic Protection for Low Voltage, High Voltage, Overload	✓	✓	✓	✓	optional
Voltage Regulation Technology	Thyristor controlled	Thyristor controlled	IGBT controlled	Thyristor controlled	Electromechanical Variac-Motor
Voltage Correction Time	200 msec	100 msec	10 msec	100 msec	2.000 msec
Which problems does it solve?	• Low voltage • High voltage • Fluctuation	• Low voltage • High voltage • Fluctuation	• Instant over voltage collapse • Sudden voltage rise • Short-term voltage interruptions	• Energy efficiency • Electrical noise • Harmonic distortion	• Low voltage • High voltage
Maximum Power	50.000 kVA	3.200 kVA	1.600 kVA	1.000 kVA	1.000 kVA
Advantages	• Parallel Operation • Power-up technology • Stock Sales • Best Price / Performance ratio	• New Technology • Maintenance-free • Production at All Powers • Reasonable Price/ Performance ratio	• Very high speed voltage correction • Compensating for phase interruption	• Energy-saving • Filtering options	• Traditional technology • Slow and safe • The most economical solution
Disadvantages	___	• No power-up technology • High stock cost • Long Delivery Time	• Long delivery time • Limited power	• Special production • Long delivery time • Limited power	• Regulation speed is slow • Electromechanical structure • It requires periodic maintenance

VoR

Multi-Master Parallel Voltage Stabilizer

Key Features

- Parallel Connected AC voltage Stabilizer
- Multi-master Parallel Operation Technology
- Power Range: 60kva, 200kva, 400kva, 600kva
- Up to 16 parallel connections
- Up to 50 MVA High power solution
- Equal Load Sharing
- Low Voltage Correction up to 60%
- Response time: 20 msec
- Correction Time: 100 msec – 200 msec
- Changing the input voltage range
- 100% Unbalanced Voltage and Load Capacity
- Continuous protection against voltage fluctations
- Independent voltage management on each phase
- Efficiency >97%
- Standard Operator Panel with 4x20 LCD display
- Electronic Overload, Over Temperature Protection
- Low Voltage / High Voltage Protection
- Suitable design for industrial environment
- TS EN ISO 9001: 2015 Quality Certified

Optional features

- 7” Touchscreen Operator Panel
- ETHERNET and MOD-BUS RTU interface
- Maintenance By-Pass Switch
- Output Circuit Breaker

Whats is VoR Parallel Voltage Stabilizer?

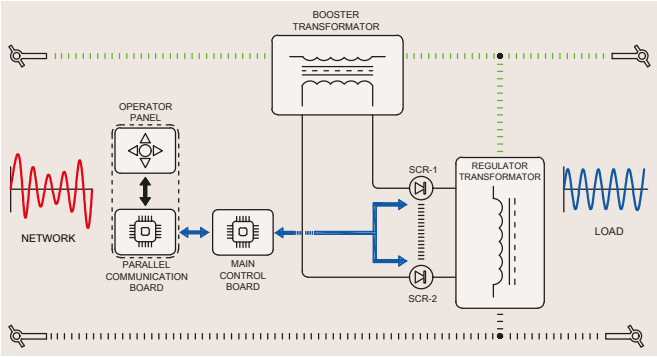
VoR is an Alternative Current (AC) voltage regulation and protection device which provides continuous, safe and stable voltage to sensitive industrial machines and equipments.

It adjusts and keeps constant unstable network voltage to the most proper voltage value for industrial facilities.

How does it work?

Each VoR unit works on the principle of injecting voltage to the load supply voltage by the help of transformer connected in series between the network and load. High-speed and sensitive measuring circuits of VoR measure voltage drops and fluctuations.

Microprocessor-based management board calculates the voltage value to be increased or decreased and performs the voltage injection with Thyristor switches.



The measuring time of
low voltage and high voltage is ***20 milliseconds.***
Voltage correction time is ***100-200 milliseconds.***

All operations are done automatically and without any operator assistance.

Eliminate the risk with Parallel Redundant VoR

Parallel Operation Technology

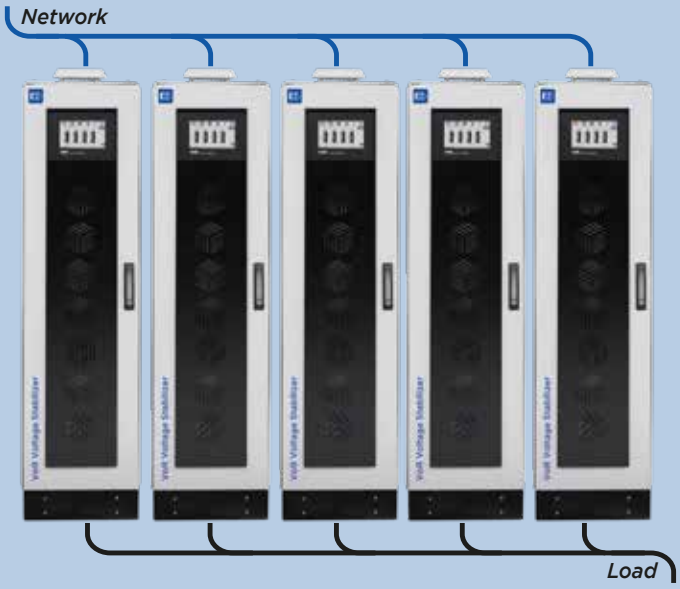
VoR voltage stabilizers have power-up technology by connecting in parallel. For parallel operation, the inputs and outputs of two or more VoR voltage stabilizers are short-circuited and the communication cable between the units is attached. Parallel connected devices operate together as one device and share the load between them. The number of device which can be connected in parallel is 16. VoR voltage stabilizers which have patented parallel operation technology provide uninterrupted, safe and flexible voltage regulation solution operating together and simultaneously.

Multi-master Modular System

VoR Voltage Stabilizers do not need a separate control unit for parallel operation. All VoR Voltage Stabilizers can operate as Master. The patented VoR software protocol enables automatic selection of the master unit. When the master unit is disabled, new master is selected in less than a second. There is no power interruption during master change.
For parallel operation, it is enough to connect the communication cable.

Equal Load Sharing

Parallel connected VoR Voltage Stabilizers share the load current. The imbalance in load sharing is less than 10%. The patented VoR software algorithm ensures that the output voltages are equal in all Stabilizers. Conductivity differences on semiconductor components are eliminated with the "Load Balancing Unit".
With this technology, the total load is shared equally among the VoR Stabilizers and there is no circulation current between the stabilizers.



N+1 Redundancy Solution

VoR Voltage Stabilizers provide the N+1 redundant power solution for uninterrupted operation of critical industrial devices.
For this, 1 spare VoR Stabilizer is added to the system.
When any unit is shut down due to maintenance or malfunction, the remaining devices continue to operate at full power.
VoR Voltage Stabilizer which is maintained can be put into use without any power interruption.

Modular and Flexible Design, Fast and Easy Installation

VoR Voltage Stabilizers provide flexible investment and planning opportunities to Industrial Enterprises, Product Suppliers and Design Engineers.

Industrial Plants, purchase VoR only in capacity that matches their existing power requirement. When needed more power, a new VoR can be added to system. When less power is required, one of the VoR Voltage Stabilizers is turned off and energy can be saved.

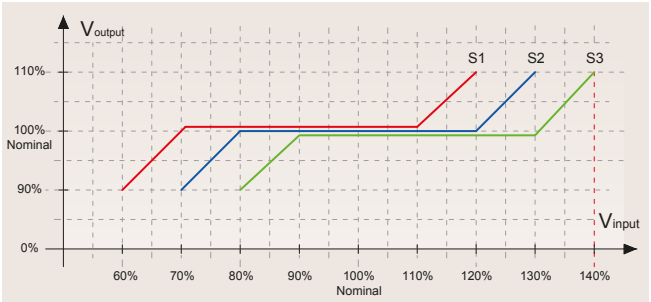
International Product Suppliers&Resellers, can deliver all customer requests swiftly from stock by keeping only 4 models of VoR Voltage Stabilizers in stock.

Design Engineers can easily design distribution rooms with small-sized modular VoR Voltage Stabilizers. VoR Voltage Stabilizers offer the best solution for additional power and backup needs.

Changing The Input Voltage Range

Input Voltage Correction range of VoR Voltage Stabilizers may be changed. This transaction is adjusted by changing a wiring on the power transformers. 3 different voltage range can be selected.

The adjustable Input Voltage Range specification provides the great advantage for Product Suppliers and Resellers. It is not necessary to wait for customer demands for stock product order. Standard VoR Voltage Stabilizers may be customized in accordance with customer needs.



S1-Input Voltage Range : -30%, +10%
S2-Input Voltage Range : -20%, +20%
S3:Input Voltage Range : -10%, +30%

Full Protection with Fast and Durable Thyristor Technology

In VoR Voltage stabilizers, voltage increasing and voltage decreasing are done using THYRISTOR switches. Voltage regulation transaction is done from AC to AC directly. It doesn't create harmonic distortion on network or load voltage.
VoR Voltage Stabilizers are equipped with protection systems of Low Voltage, High Voltage, Overload and Over Temperature for safe operation of critical industrial devices.

Production in All Industrial Voltages (Optional)

VoR Voltage Stabilizers is produced in all industrial input voltages.

3 Phase + Neutral connection , 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, 480VAC, 600VAC

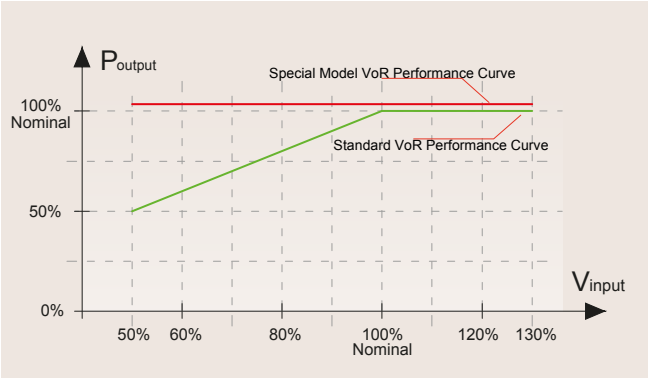
The nominal operating voltage of the VoR Voltage Stabilizers is determined at the order. It cannot be changed later.

Please contact with the sales representative for special production requests and the right solutions.

Full Power Performance at Low Voltage (Optional)

Standard type VoR voltage Stabilizers are designed to operate at full load at rated input voltage.

Input fuse, power transformers and thyristors of standard type VoR Voltage Stabilizers have been selected with capacities suitable for nominal voltage.



Therefore, when the input voltage drops, the output power drops at the same rate.

N+1 backup solution should be used for full load operation at low voltage.

For special applications, VoR Voltage Stabilizers can be produced to operate at full load at the lowest input voltage.

VoR's input fuse, power transformers and thyristors are selected with capacities suitable for the minimum input voltage for continuous full load performance at the lowest input voltage.

Copper Busbar Set for Parallel Connection (Optional)

Copper busbar sets required for parallel connection of VoR Voltage Stabilizers can be ordered together with the device. Copper busbars in suitable sizes for the ordered VoR model are marked according to color codes and insulated for safe use. Screw and Bolt sets required for connection are also supplied.

Maintenance By-Pass Switch (optional)

A Maintenance By-Pass switch can be added to the VoR voltage stabilizers, which ensures that the loads are transferred to the network in case of maintenance or failure. By-Pass mode is selected from the operator panel before the maintenance bypass operation is performed. During the Maintenance By-Pass operation, the power supplied to the loads is cut for a short time.

p.s: When one of the parallel connected devices is in the by-pass position, all devices turn off their output power. Therefore, for maintenance bypass in parallel system, external by-pass board should be used.

4 Models - 64 Solutions - 10 Megawatt Power

✓ VoR Voltage Stabilizers are produced in 4 different powers as standard.
60 kVA, 200 kVA, 400 kVA, 600 kVA

✓ VoR devices of the same power can be connected in parallel up to 16 units.

✓ With standard VoR models, 64 different power voltage stabilizers can be designed.

Solution 1:

600 kVA + 600 kVA + 600 kVA + 600 kVA + 600 kVA = **3.000 KVA**

Solution 2:

60 kVA + 60 kVA + 60 kVA + 60 kVA = **240 kVA**

Scope of Application

- *Industrial Plants*
- *Data Centers*
- *Medical Equipments*
- *Computer and Network Systems*
- *TV and Radio Stations*
- *Laboratory and Test Equipment*
- *Production Lines*
- *Banks and Financial Institutions*
- *Iron and Steel Plant*
- *Automotive and Sub-industry*
- *Factories*
- *Mining*
- *Shopping Malls*
- *Homes*

Advantages

1. VoR is suitable for suppliers and resellers of electrical and electronic products.
2. Suitable for swift sale from stock. Customer demands with different powers and technical specifications can be met by keeping only 4 models of products in stock.
3. There is possibility to increase power later.
4. It is in small and compact size. It is easy to transport and install inside the building, even in high-power applications.
5. It does not cause energy interruption in case of maintenance or malfunction.
6. It is the best solution for medium and high power plants affected by voltage fluctuations.

Special voltage and power management solutions are possible at high powers up to 50 MVA with the patented "Multi-Master Parallel Voltage Stabilizer Technology".

With easily accessible screens; your peace of mind, your job easier...

Operator Panel
VoR Voltage Stabilizers have an ergonomic and user-friendly Operator Panel designed for management and monitoring. All operating parameters of the Voltage Stabilizer can be monitored from this panel and some operating parameters can be adjusted. There is two-step password protection for parameter changing.

Monitorable parameters: Input Voltages, Output Voltages, Common Busbar Voltages, Load Percentages, Operating Frequency, Number of devices connected in parallel, Date-Time, Device Status Information, Fault and Error Codes.

Changeable Parameters: Output Voltage Set Value (limited), Device ID number, Communication Parameters, Date-Time Information.

Remote Monitoring and Management

Ethernet Web Server (optional)

It is designed for remote monitoring via network. The whole system can be monitored and managed by connecting to any of the VoR Voltage Stabilizers with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required.

With remote management interface; all parameters of all VoR Voltage Stabilizers connected in parallel can be monitored and some parameters can be changed.

There is two-step password protection for accessing the remote monitoring interface.

MOD-BUS RTU (optional)

It is designed for monitoring and management via Mod-Bus. The whole system can be monitored and managed using the Mod-Bus protocol by connecting with a cable to any of the VoR Voltage Stabilizers. Parameters of all VoR Voltage Stabilizers connected in parallel can be monitored and some parameters can be changed by connecting to any device with Mod-Bus protocol.

VoR Voltage Stabilizer has 2 different Operator Panel Options.

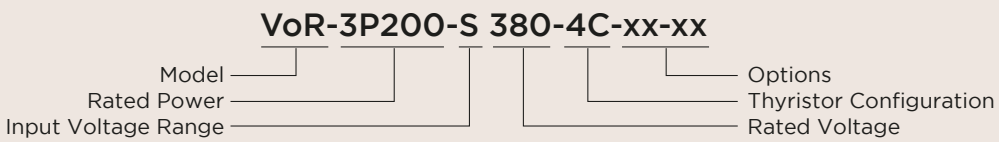
1. Touchscreen Operator Panel
- 7” inch Color Display
- Resistive Feature,
- Backlight
- Three Language Options (On Order)
- Simple and Understandable Menu

2. LCD Display Operator Panel
- 4 lines 20 characters LCD display
- Mimic Diagram
- Light indicators
- 5 pcs selection and application buttons
- Three Language Options (On Order)
- Economical and long lasting

Technical specifications

VoR Multi-master Parallel Voltage Stabilizer	
General Features	
Power (kVA)	60kva - 200 kva - 400kva - 600kva
Number of Parallel Connection	Up to 16 units can be connected in parallel
Maximum Power	10 MegaWatt with standard models (50 MegaWatt with special production devices)
Input	
Rated Input Voltage	400VAC 3Phase + Neutral + Ground (Different Voltage Values are Optional.)
Voltage Tolerance	-%25 , +%15 (Changeable)
Frequency	50Hz +/-5% (Optional 60Hz)
Output	
Rated Output Voltage	400VAC 3Phase + Neutral + Ground (Different Voltage Values are Optional.)
Voltage Tolerance	+/-2% (+/-1% and +/-3% are optional for special applications)
Frequency	50 Hz 3 5%
Overload Capacity	125% 1 minute, 150% 10 seconds, 151% and above 0.2 seconds
Response Time	20 msec
Correction Time	100 msec - 200 msec
Efficiency	> 97% typical
Management, Monitoring and Communication Interfaces	
Operator panel with LCD Display	4 lines 20 characters LCD display and Mimic Diagram. Input Voltage, Output Voltage, Load Percentage, Frequency, Status Information, Fault Information, Parameter settings
Touchscreen Operator Panel (optional)	7" Touchscreen Color Display Input Voltage, Output Voltage, Load Percentage, Frequency, Number of parallel connections, Status Information, Fault Information, Parameter settings.
Parallel Communication Interface	CAN-BUS communication up to 100 meters with CAT-5 cable
Remote Management and Monitoring Interface	Browser-based remote management with Ethernet connection. MOD-BUS RTU with RS485 connection
Protection Functions	
Voltage Protection	Electronic protection for Low Voltage and High Voltage
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)
Overload Protection	1 minute at 125% overload, 10 seconds at 150% overload, 0.2 seconds over 151% overload, after the power to the load is cut off.
Over Temperature Protection	Fan cooling works at 50 °C. At 80 °C, the power to the load is cut off.
Surge Arrester	Class-I or Class-II (optional)
Environmental Conditions	
Operating temperature	-10 °C ~ +40 °C
Altitude Working Height	1.500 m
Humidity	90% none condensed
Acoustic Noise	< 55dB
Cabinet Specifications	
Type – Protection Class	Free Standing Modular Cabinet, IP21 Indoor type (IP54 and higher protection class, Outdoor Type Cabinets are optional)
Paint – Color	Epoxy-Polyester Powder Paint - RAL 7035
Cooling	Air cooling with thermostat controlled fan.

ORDER CODE



https://www.editelektronik.com.tr

You may visit our Website for more detailed information and solutions.

IMP
Static Voltage Stabilizer

Key Features
- Automatic AC Voltage Stabilizer
- Maintenance-free Thyristor Technology
- 1kVA – 3.200kVA Power range
- Production at Single Phase, Two Phase, Three Phase
- Production at all industrial voltages
- Low Voltage Correction up to 60%
- High Voltage Correction up to 45%
- Response time: 20 msec
- Correction Time: 100 msec - 200 msec
- 100% Unbalanced Voltage and Load Capacity
- Continuous protection against voltage fluctations
- Independent voltage management on each phase
- Efficiency >97%
- Standard Operator Panel with 4x20 LCD display
- Electronic Overload, Over Temperature Protection
- Low Voltage / High Voltage Protection
- Suitable design for industrial environment
- TS EN ISO 9001: 2015 Quality Certified

Optional Features
- 7” Touchscreen Operator Panel
- Ethernet Web Server and Mod-bus RTU
- Galvanic Isolation Transformer
- Surge Arrester
- Automatic By-Pass Unit
- Maintenance By-Pass Switch

What is the IMP Voltage Stabilizer?

IMP Voltage Stabilizer is an Alternative Current (AC) voltage regulation and protection device which provides continuous, safe and stable voltage to sensitive industrial machines and equipments.

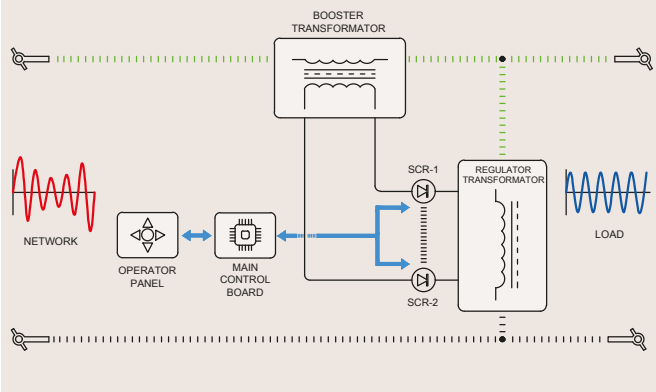
It adjusts and keeps constant unstable network voltage to the most proper voltage value for sensitive electronic devices. It ensures that critical industrial machines and equipments operate at the highest performance.

How Does It Work?

IMP Voltage Stabilizers work on the principle of injecting voltage to the load supply voltage by the help of transformer connected in series between the network and load.

High-speed and sensitive measuring circuits of IMP measure voltage drops and fluctuations.

Microprocessor-based management board calculates the voltage value to be increased or decreased and performs the voltage injection with Thyristor switches.



The measuring time of low voltage and high voltage ***20 milliseconds,***

Voltage Correction Time is ***100-200 milliseconds.***

All operations are done automatically and without any operator assistance.

Reliable Voltage Correction Solutions For Special Needs With The Latest Technology

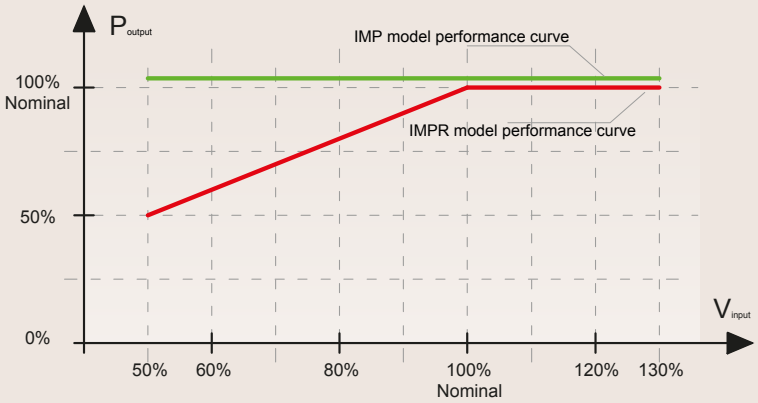
Design Features

IMP Voltage Stabilizers are at customizable structure for customer demands. IMP Voltage Stabilizers are produced on order as “Tailor Made” by adding options which is suitable for network voltage specifications, installation specifications, characteristics of loads and special demands of customer.

There are performance specifications and protection functions that can be selected while keeping same the basic production technology.

Operation Performance at Low Voltage

IMP model Voltage Stabilizers are designed to operate continuously at full load at the lowest input voltage.



Model IMP	Model IMP-R
FULL LOAD at Low Voltage	FULL LOAD at Nominal Voltage
Transformers	**Transformers**
Thyristors	**Thyristors**
Fuses	**Fuses**
at Nominal Capacity	**at Nominal Capacity**

Input fuse, power transformers and thyristors of IMP Voltage Stabilizers are selected with high capacity for full load performance at low voltage.

IMP-R Model Voltage Stabilizers are designed for applications that don’t need full load performance at low voltage. IMP-R Model Voltage Stabilizers can operate at full load at the rated input voltage, when the input voltage drops, output power that can support drops at the same rate.

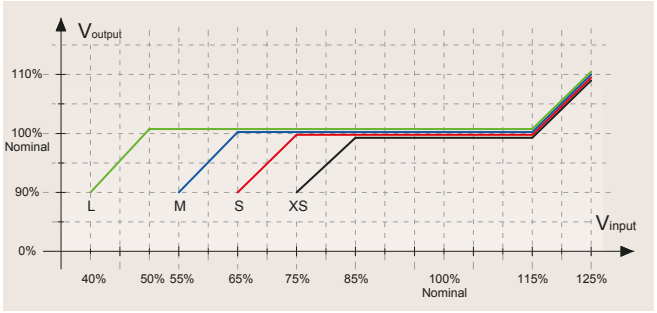
Input fuse, Power transformers and Thyristors of IMP-R Model Voltage Stabilizers are selected to operate at full load at nominal voltage.

Please contact with sales representative for special production requests and the right solutions.

Input Voltage Range – Output Voltage Tolerance

The input voltage range of IMP Voltage Stabilizers is determined at the order stage and can not be changed later. There are 4 different models as standard.

The below diagram shows the voltage regulation performance of each model.



The output voltage tolerances of IMP Voltage Stabilizers can be produced with +/-1% , +/-2% ,+/-3% options. Output voltage tolerance is related to the used thyristor configuration and affects the manufacturing cost.

Standard type 3 phase IMP Voltage Stabilizers can operate in 3 phase + Neutral (4 wire) installations. Neutral connection is required for safe operation. However, for special needs, it can be produced in accordance with 3-Phase 3-Wired Delta connection installations also.

Full Protection with Fast and Durable Thyristor Technology

In IMP Voltage Stabilizers, voltage increasing and voltage decreasing are done using THYRISTOR switches. There are no moving mechanical parts such as motors or brushes inside the device and no maintenance is required.

Voltage regulation is done from AC to AC directly. It doesn't create harmonic distortion on network or load voltage.

IMP Voltage Stabilizers are equipped with protection systems of Low Voltage, High Voltage, Overload and Over Temperature for safe operation of critical industrial devices.

Production in All Industrial Voltages

IMP Voltage Stabilizer is produced in all industrial input voltages.

3 Phase + Neutral connection , 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, 480VAC, 600VAC

The nominal operating voltage of the IMP Voltage Stabilizer is determined at the order . It cannot be changed later.

Please contact with sales representative for special production requests and the right solutions.

IMP-3P2000

IMP-3P400

IMP-3P30

IMP-1P10

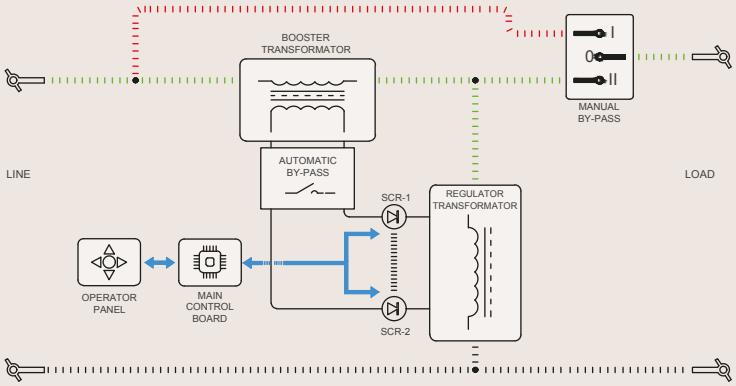
In case of Overload or Failure, it continues to work with Automatic By-Pass. There is Maintenance By-Pass Switch for operator intervention

Built-in Automatic By-pass (Optional)

An internal bypass system can be added to IMP voltage stabilizers, which ensures uninterrupted transfer of loads to the network in case of over-load or internal failure. In case of overload or failure, the circuit of internal bypass short-circuits the secondary side of booster transformer, provides a direct connection from the network to output. (This OPTIONAL specification is only available on some models.)

Maintenance By-Pass Switch (optional)

A Maintenance By-Pass switch can be added to the IMP voltage stabilizers, which ensures that the loads are transferred to the grid in case of maintenance or failure. Maintenance By-Pass switch is an I-0-II position changeover switch and is manually controlled. During the Maintenance By-Pass operation, the power to the loads is cut for a short time.



These features will increase your performance;

Galvanic Isolation Transformer

Some models of IMP voltage stabilizers can be produced with isolation transformers. An isola-tion transformer can be placed at the input or output of the stabilizer in accordance with the customer's request. Voltage changing or vector changing can be done with the isolation trans-former.

Voltage Switching Option

Input and output voltages can be different in IMP Voltage stabilizers. The output voltage can be adjusted to a different industrial voltage in accordance with the project requirement. (Example: Input Voltage can be 400VAC 3P+N, Output voltage: 220VAC 3P+N)

Please contact with sales representative for details.

IP44, IP54, IP65 Cabinet Option

There is IP44, IP54, IP65 cabinet option for outdoor applications. In special cabinets, full protection against corrosion is provided with zinc coating and prime paint applications before painting. There are also special cooling options for outdoor applications.

Surge Arrester-High Voltage Protection

Surge arresters can be placed at the inputs and outputs of IMP voltage stabilizers for protection against high voltage and lightning strikes. Please contact with your sales representative for Class-I or Class-II surge arrester options and all other requests.

Advantages

- ✓ It can be produced at all powers.
- ✓ It can be produced as 3 Phase, 2 Phase and 1 Phase
- ✓ It can be customized according to customer demands.
- ✓ Cabin design, dimensions and electrical connection features can be re-designed according to the project needs.
- ✓ It is small in size and compact structure.
- ✓ It can be produced with high protection features up to IP-65 for outdoor applications.

Applications

- ✓ Industrial Facilities
- ✓ Data Centers
- ✓ Medical Equipments
- ✓ Computer and Network systems
- ✓ TV and Radio Stations
- ✓ Laboratory and Test Equipment
- ✓ Production Lines
- ✓ Banks and Financial Institutions
- ✓ Automative, Iron and Steel, Mining

It is the best solution for all commercial businesses and home users affected by voltage fluctuations.

Remote Monitoring and Management

Ethernet Web Server (Optional):

It is designed for remote monitoring via network. The whole system can be monitored and managed with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required.

With remote management interface; all parameters of all IMP Voltage Stabilizers can be monitored and some parameters can be changed.

There is two-step password protection for accessing the remote monitoring interface.

MOD-BUS RTU (Optional):

It is designed for monitoring and management via Mod-Bus. The whole system can be monitored and managed by connecting with a cable. All parameters of IMP Voltage Stabilizers can be monitored and some parameters can be changed with Mod-Bus protocol..

IMP Voltage Stabilizers have 2 different Operator Panel Options

IMP Voltage Stabilizers have an ergonomic and user-friendly Operator Panel designed for management and monitoring. All operating parameters of the Voltage Stabilizer can be monitored from this panel and some operating parameters can be adjusted. There is two-step password protection for parameter changing.

Monitorable parameters: Input Voltages, Output Voltages, Load Percentages, Operating Frequency, Date-Time, Device Status Information, Fault and Error Codes.

Changeable Parameters: Output Voltage Set Value (limited), Date-Time Information.

1. LCD Display Operator Panel (Standard)

- **4 lines 20 characters LCD display**
- **Mimic Diagram**
- **Light indicators**
- **5 pcs selection and application buttons**
- **Three Language Options (On Order)**

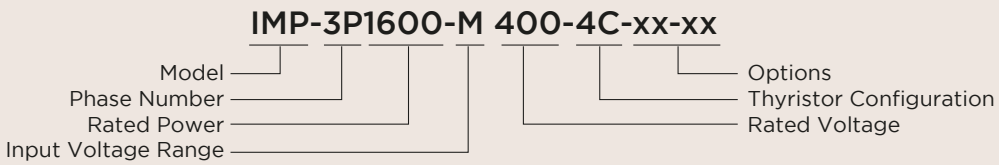
2. Touchscreen Operator Panel (Optional)

- **7” inch Color Display**
- **Resistive Feature**
- **Backlight**
- **Three Language Options (On Order)**
- **Simple and Understandable Menu**

Technical specifications

IMP Static Voltage Stabilizer				
General Features				
Power (kVA)	In the power range of 1KVA - 3.200KVA			
Technology	Thyristor Technology, High-speed Voltage Regulation, Maintenance-free Design			
Thyristor Configuration	6 Thyristor	8 Thyristor	10 Thyristor	
Input				
Rated Input Voltage	3 Phase Model: 400 VAC 3Phase+Neutral+Ground (Different voltages are optional)		1 Phase Model: 230VAC 1Phase+Neutral+Ground	
Voltage Tolerance	XS model -%15,+%15	S model -%25,+%15	M model -%35 , +%15	L model -%50 , +%15
Frequency	50 Hz. +/-%5 (60 Hz. Optional)			
Output				
Rated Output Voltage	3 Phase Model: 400 VAC 3Phase+Neutral+Ground (Different voltages are optional)		1 Phase Model: 230VAC 1Phase+Neutral+Ground	
Voltage Tolerance	Between +/-1% and +/-5% (optional)			
Frequency	50 Hz. +/-%5			
Overload Capacity	125% 1 minute, 150% 10 seconds, 151% and above 0.2 seconds			
Response Time	20 msec			
Correction Time	100 msec - 200 msec			
Efficiency	> 97% typical			
Management Monitoring and Communication Interfaces				
Operator panel with LCD Display	4x20 LCD display and mimic diagram Input voltage, Output voltage, Load percentage, Frequency, Status and Fault information, Parameter settings			
Touchscreen Operator Panel (optional)	7" Color Touchscreen Input voltage, Output voltage, Load percentage, Frequency, Status and Fault information, Parameter settings			
Remote Management Interface (optional)	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection			
Protection Functions				
Voltage Protection	Electronic protection for Low Voltage and High Voltage			
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)			
Overload Protection	1 minute at 125% overload, 10 seconds at 150% overload, at >151% overload the power to the load is cut off after 0.2 seconds.			
Over Temperature Protection	Fan cooling works at 50°C. At 80°C, the power to the load is cut off.			
Surge Arrester	Class-I or Class-II (optional)			
Environmental Conditions				
Operating temperature	-10 °C ~ +40 °C			
Altitude Operating Height	1.500m			
Humidity	90% none condensed			
Acoustic Noise	< 55dB (at 1m distance and doors closed)			
Cabinet Specifications				
Type – Protection Class	Free Standing Modular Cabinet, IP21 Indoor type (IP54 and higher protection class, Outdoor Type Cabinets are optional)			
Paint – Color	Epoxy-Polyester Powder Paint - RAL 7035			
Cooling	Air cooling with thermostat controlled fan.			

ORDER CODE



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You may visit our Website for more detailed information and solutions.

VSC
Dynamic Voltage Restorer

Key Features
- Dynamic Voltage Restorer (DVR)
- High Speed Voltage Correction with IGBT Technology
- Power range up to 1600 Kva
- Low Voltage Correction up to 70%
- Elimination of Voltage and Phase Interruption (Some Models)
- Response Time <3 milliseconds
- Correction Time <10 milliseconds
- Independent voltage regulation for each phase
- 100% Unbalanced Voltage and Load Capacity
- Full correction of instant voltage drops and fluctuations
- AC to AC direct voltage boosting technology
- Continuous voltage regulation feature
- Efficiency > 97%
- Built-in Automatic By-Pass
- Operator Panel with 7" Touchscreen
- Electronic Overload, Over-temperature protection
- Low Voltage / High Voltage protection
- Suitable design for industrial environment
- TS EN ISO 9001: 2015 Quality Certified

Optional Features
- Maintenance By-Pass Switch
- Ethernet Web Server / Mod-Bus RTU interface
- Surge Arrester

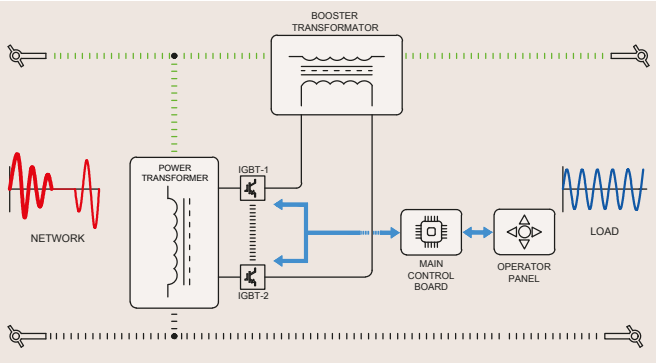
What is VSC Dynamic Voltage Restorer (DVR)?

VSC-DVR is an innovative voltage stabilizing system designed to mitigate and eliminate the effects of electrical disturbances such as severe voltage drops and spikes in critical industrial processes.

The VSC-DVR is designed to correct voltage drops and spikes in the network at the highest speed and to keep it stable.

It provides high efficiency and safe operation of industrial machinery and equipment with its continuous voltage regulation feature.

How does it work?



VSC-DVR work on the principle of injecting voltage to the load supply voltage by the help of transformer connected in series between the network and load.

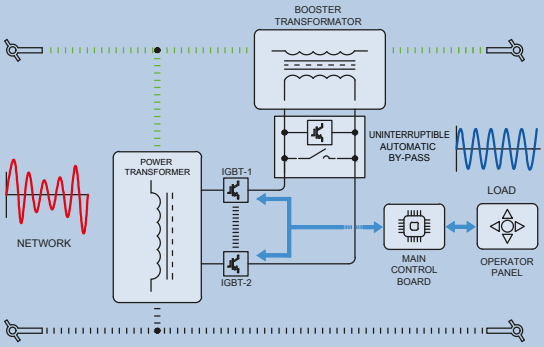
Voltage drops and fluctuations are measured with high-speed sensitive measuring circuits.

DSP-based management board calculates the voltage value to be increased or decreased and and very high-speed voltage injection is performed with IGBT switches.

Response Time	***<3 milliseconds***
Voltage Correction	***<10 milliseconds***

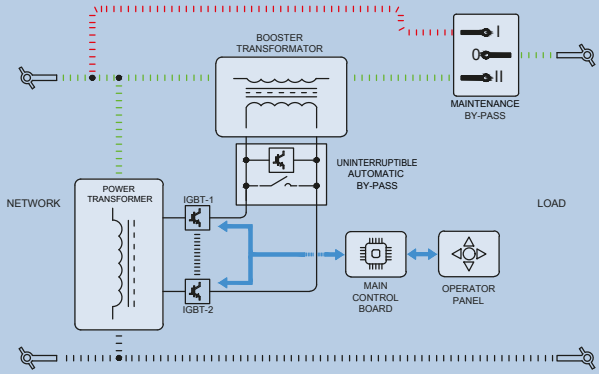
2 Models / 2 Solutions;

1 Standard VSC-DVR



Voltage correction are done directly from AC to AC using IGBT switches. It can compensate for voltage drops up to 60%.

2 VSC-DVR-SC with Super Capacitor



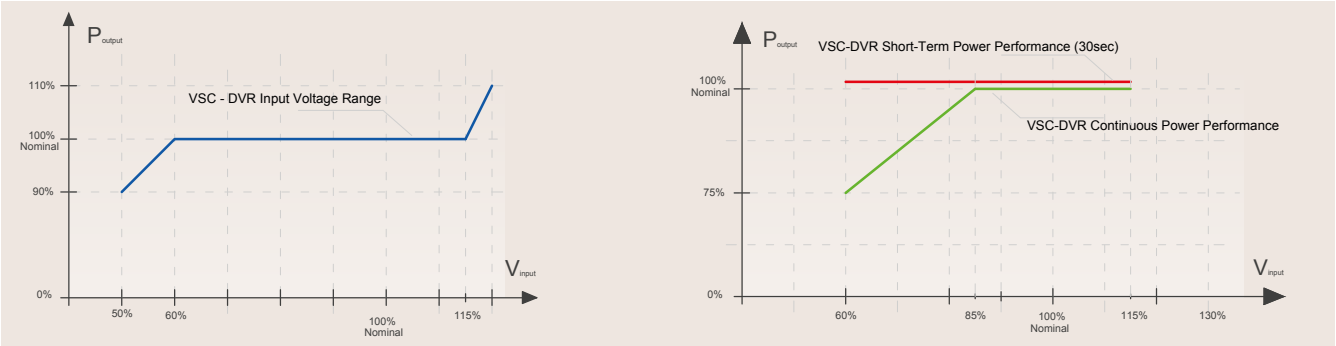
The voltage injection process is done using double conversion PWM technology. Super capacitor banks or battery groups are used for energy storage.

It can support short-term voltage interruptions. The maximum support time is 30 seconds. It is produced only in certain models.

Wide Input Voltage Range

The VSC-DVR quickly detects voltage drops or spikes. It responds in a few milliseconds and provides up to 70% voltage correction.

The operating range and features of the S model VSC-DVR are as follows.



Voltage correction performance is valid for each phase independently. Higher percentage of correction and wide input voltage range are possible.

VSC-DVR with Supercapacitor should be preferred for elimination in phase or voltage interruption.

Low Voltage Performance Curve

VSC-DVR has continuous voltage regulation feature. When the network voltages change in the range of +/-15%, it keeps the output voltage constant and goes on to operate at full load continuously,

When Network Voltages drop by -40%, the VSC-DVR can run at full load for 30 seconds.

For continuous operation at voltage drops above 15%, the output load must be reduced. The low voltage operating performance of the VSC-DVR is shown in the diagram.

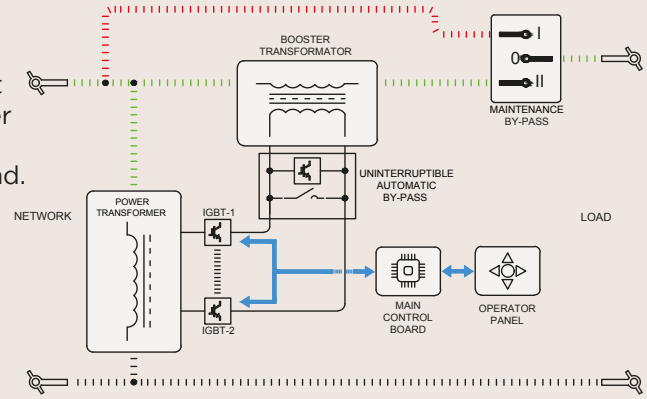
VSC-DVR has the option of continuous operation at full load at minimum network voltage.

Please contact with the sales representative for special production requests and the right solutions.

Internal Automatic By-pass (optional)

The VSC-DVR includes an internal bypass system that ensures uninterrupted transfer of loads to the network in case of overload or internal failure.

In case of overload or fault, the internal bypass unit short circuits secondary side of booster transformer and provides a direct connection from the network supply to the output without interruption of the load.



Maintenance By-Pass Switch (optional)

A Maintenance By-Pass switch can be added to VSC-DVRs, which ensures that the loads are transferred to the network in case of maintenance or failure. Maintenance By-Pass switch is an I-0-II position changeover switch and is manually controlled. During the Maintenance By-Pass operation, the power to the loads is cut for a short time.

Advantages

- ✓ It regulates voltage at very high speed.
- ✓ Sensitive industrial machines are never affected by voltage fluctuations.
- ✓ Voltage correction speed is <10msec
- ✓ It can be produced in certain powers up to 1600 Kva.
- ✓ It can be customized according to customer demands.
- ✓ In models with super capacitors, it continues to feed the loads during full power cuts.

Remote Monitoring and Management

Ethernet Web Server (optional)

It is designed for remote monitoring via network. It can be monitored and managed with an Ethernet cable. The remote management interface is designed as browser-based. No additional software is required.

With remote management interface; all parameters of VSC-DVR can be monitored and some parameters can be changed.

There is two-step password protection for accessing the remote monitoring interface.

MOD-BUS RTU (optional)

It is designed for monitoring and management via Mod-Bus. The whole system can be monitored and managed by connecting with a cable. All parameters of VSC-DVR can be monitored and some parameters can be changed with Mod-Bus protocol.

VSC-DVR has an ergonomic and user-friendly Operator Panel designed for management and monitoring.

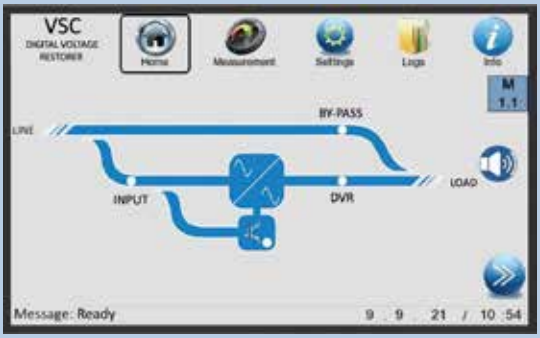
All operating parameters of VSC-DVR can be monitored from this panel and some operating parameters can be adjusted. There are 2-level password protection for parameter changing.

Monitorable parameters: Input Voltages, Output Voltages, Load Percentages, Operating Frequency, Date-Time, Device status information, Fault and error codes.

Changeable Parameters: Output Voltage Set value (limited), Date-Time information.

1. Touchscreen Operator Panel

- **7” inch Color Display**
- **Resistive Feature,**
- **Backlight**
- **Three Language Options (On Order)**
- **Simple and Understandable Menu**



Technical specifications

VSC Dynamic Voltage Restorer		
General Features		
Model	VSC-DVR	VSC-DVR-SC
Power (kVA)	Power range between 100Kva - 1600Kva	
Technology	IGBT Switch Technology	IGBT Double Conversion Technology
Input		
Rated Input Voltage	400VAC 3Phase+Neutral+Ground (Different voltages are optional)	
Voltage Tolarance	-%40 , +%15	-%70 , +%15
Frequency	50 Hz. +/-%5 (60 Hz. Optional)	
Output		
Rated Output Voltage	400VAC 3Phase+Neutral+Ground (Different voltages are optional)	
Voltage Tolerance	+/-%2	
Frequency	50 Hz. +/-%5	
Overload Capacity	125% 1 minute, 150% 10 seconds, 151% and above 0.2 seconds	
Response Time	< 3 msec	
Correction Time	< 10 msec	
Efficiency	> 97% typical	
SAG Performance		
Continuous Regulation Range	-%15 , +%15	
SAG Correction Range	-%40 , +%15	-%70 , +%15
Voltage Interruption Support Time	-	Maximum 30 seconds (some models)
Energy Storage Type	-	Super Capacitor Bank - Battery Pack
Management Monitoring and Communication Interfaces		
Touchscreen Operator Panel	7" Touch Screen, Input Voltage, Output Voltage, Load Percentage, Frequency, Status Information, Fault Information, Parameter settings.	
Remote Management Interface (optional)	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection	
Protection Functions		
Voltage Protection	Electronic protection for Low Voltage and High Voltage	
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)	
Overload Protection	1 minute at 125% overload, 10 seconds at 150% overload, at >151% overload the power to the load is cut off after 0.2 seconds.	
Over Temperature Protection	Fan cooling works at 50°C. At 80°C, the power to the load is cut off.	
Surge Arrester	Class-I or Class-II (optional)	
Environmental Conditions		
Operating temperature	-10 °C ~ +40 °C	
Altitude Operating Height	1.500m	
Humidity	90% none condensed	
Acoustic Noise	< 65dB (at 1m distance and doors closed)	
Cabinet Specifications		
Type–Protection Class	Free Standing Modular Cabinet, IP21 Indoor type	
Paint–Color	Epoxy-Polyester Powder Paint - RAL 7032	
Cooling	Air cooling with thermostat controlled fan.	

ORDER CODE

VSC-DVR-3P400-S 400-5C-xx-xx

- Model
- Rated Power
- Input Voltage Range
- Rated Voltage
- IGBT Configration
- Options

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You may visit our Website for more detailed information and solutions.

ELC

Voltage Optimization and Energy Saving Unit (Line Conditioner & Saver)

Key Features

- Voltage Optimization and protection function
- Energy Saving Feature
- Special management software for energy saving
- Maintenance-free Thyristor Technology
- Production in the power range of 10kVA – 1000kVA
- It can be produced as 1 Phase and 3 Phase Input
- Suitable for all industrial voltages
- Voltage reduction up to 30%
- Voltage boost up to 15%
- Response time: 20 msec
- Voltage correction time: 100 msec -200 msec
- 100% Unbalanced Voltage and Load Capacity
- Continuous protection against voltage fluctations
- Efficiency > 98%
- Operator Panel with 4x20 LCD display
- Electronic Overload, Over-Temperature Protection
- Low Voltage / High Voltage Protection
- Suitable design for industrial environment
- TS EN ISO 9001: 2015 Quality Certified

Optional Features

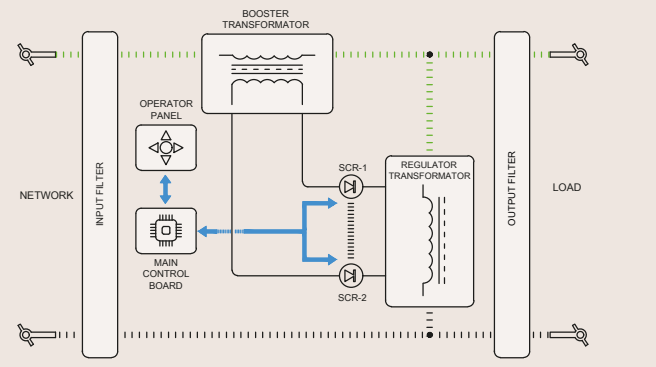
- Input EMC Filter
- Output EMC Filter
- Harmonic Filter
- Reactive Power Compensation
- Internal Automatic By-Pass Function
- Maintenance By-Pass Switch
- Lightning Protection, Surge-Spike Protection
- Ethernet Web Server and Mod-Bus RTU

What is ELC Line Conditioner&Saver?

ELC Line Conditioner&Saver is a voltage optimization and protection device that adjusts the network voltage to the optimum value, corrects the phase imbalance, and protects expensive equipment by filtering electrical noises so that electrical devices and machines can operate at the highest efficiency for the longest time.

It is mostly used in networks with high voltage, phase asymmetry, electrical noise and harmonic distortion problems. It is designed to provide energy savings between 5% and 20% depending on voltage and load characteristics.

How Does It Work?



ELC Line Conditioner&Saver works on the principle of injecting voltage to the load supply voltage by the help of transformer connected in series between the network and load.

The sensitive measuring circuits on the microprocessor-based management board measure voltage drops and fluctuations, calculate the voltage to be increased or decreased, and perform voltage injection with Thyristor switches.

The software algorithm specially developed for the ELC Line Conditioner&Saver allows the most accurate voltage value to be set for the machines and equipment to operate at the highest efficiency. ELC Line Conditioner&Saver's special software measures and records the actual energy saving rate. This information is interpreted by the engineers and the output voltage parameters are optimized for higher savings.

In order to ensure the highest efficiency and longevity of electrical machines and equipments, harmonic filter and EMC filter units that filter electrical noises and harmonic distortions in the network voltage can be added optionally.

Optimization filtering and protection solutions for highest efficiency

Design Features

ELC Line Conditioner&Saver is customizable. They are produced on order by adding options according to the network voltage characteristics, installation features, load characteristics and special requests of the customer. Following are the performance features and protection functions that can be selected while keeping the basic production technology the same.

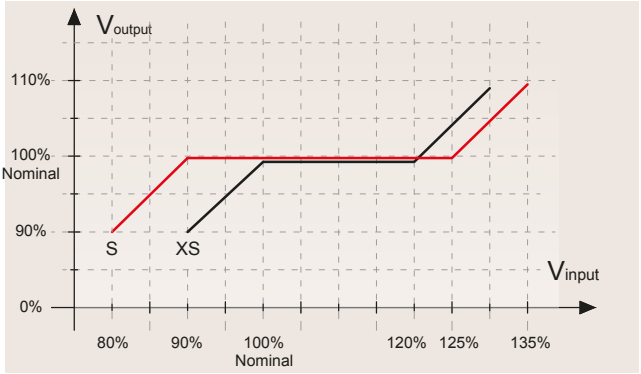
Input Voltage Range - Output Voltage Tolerance

The input voltage range of the ELC Line Conditioner&Saver is determined at the order and cannot be changed later.

There are 2 models as standard.

XS Model : -0% , +20%

S Model : -10% , +25%



There are 2 options for output voltage tolerance in ELC Line Conditioner&Saver as +/- 1% and +/- 2%. The output voltage tolerance is related to the thyristor configuration used and affects the manufacturing cost.

Standard type three phase ELC Line Conditioner&Savers can operate in 3 Phase + Neutral (4 wire) installations. Neutral connection is required for safe operation. However, for special needs, it can also be produced in accordance with 3-Phase 3-Wired Delta connection installations.

Please contact with sales representative for special production requests and the right solutions.

Operating Performance at Low-High Voltage

ELC Line Conditioner&Savers are designed to operate continuously at full load at the lowest and highest value of the network voltage.

Input fuse, power transformers and thyristors of ELC Line Conditioner&Savers are selected to operate at full load.

Optional Filters

1 EMC Filter

EMC filters can be added at the input and output of the ELC Line Conditioner&Saver. High electrical noises in the network voltage may adversely affect the safe operation and performance of sensitive electronic devices and machines. Electrical noise is reduced to levels that do not damage sensitive electronic equipment by adding EMC filters at the input and output of the ELC Line Conditioner&Saver. Filter needs and features are evaluated separately for each project.

2 Harmonic Filter

Harmonic filters can be added at the input and output of the ELC Line Conditioner &Saver. High harmonic distortions in the network voltage may adversely affect the safe operation and performance of sensitive electronic devices and machines.

Harmonic filters specially designed for the project to eliminate the negative effects of harmonic distortions and increase efficiency connect to the input or output of the ELC. For the design of harmonic filters, it is necessary to measure the harmonic distortions in the network. Filter needs and features are evaluated separately for each project.

Full Protection with Fast and Durable Thyristor Technology

In ELC Line Conditioner&Savervoltage increasing and voltage decreasing are done using THYRISTOR switches. There are no moving mechanical parts such as motors or brushes inside the device and no maintenance is required.

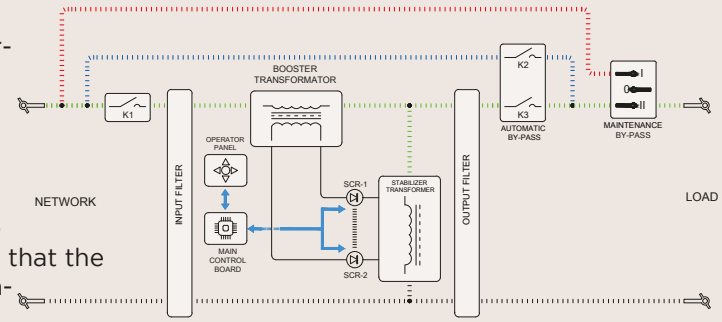
Voltage regulation is done from AC to AC directly. It doesn't create harmonic distortion on network or load voltage.

ELC Line Conditioner&Saver is equipped with protection systems of Low Voltage, High Voltage, Overload and Over Temperature for safe operation of critical industrial devices.

Internal Automatic By-pass (Optional)

An internal bypass can be added to the ELC Line Conditioner &Saver, which ensures uninterrupted transfer of loads to the network in case of overload or internal fault.

In case of overload or failure, the circuit of internal bypass short-circuits the secondary side of booster transformer, provides a direct connection from the network to output.



Maintenance By-Pass Switch (optional)

A Maintenance By-Pass switch can be added to the ELC Line Conditioner&Saver, which ensures that the loads are transferred to the grid in case of maintenance or failure. Maintenance By-Pass switch is an I-0-II position changeover switch and is manually controlled. During the Maintenance By-Pass operation, the power to the loads is cut for a short time.

Advantages

- ✓ It can be produced as 3 Phase and 1 Phase
- ✓ It can be customized according to customer demands.
- ✓ Cabin design, dimensions and electrical connection features can be re-designed according to the project needs.
- ✓ It is small in size and compact structure.
- ✓ It has filter options
- ✓ It has measuring and monitoring software
- ✓ It Saves Energy

Remote Monitoring and Management

Ethernet Web Server (Optional):

It is designed for remote monitoring via network. The whole system can be monitored and managed with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required.

With remote management interface; all parameters of ELC Line Conditioner&Saver can be monitored and some parameters can be changed.

There is two-step password protection for accessing the remote monitoring interface.

MOD-BUS RTU (Optional):

It is designed for monitoring and management via Mod-Bus. The whole system can be monitored and managed by connecting with a cable. All parameters of ELC Line Conditioner&Saver can be monitored and some parameters can be changed.

The ELC Line Conditioner &Saver has an ergonomic and user-friendly Operator Panel designed for management and monitoring.

All operating parameters of the ELC Line Conditioner&Saver can be monitored from this panel and some operating parameters can be adjusted. There is two-step password protection for parameter changing.

Monitorable parameters: Input Voltages, Output Voltages, Load Percentages, Energy Save Rates, Operating Frequency, Date-Time, Device status information, Fault and error codes.

Changeable Parameters: Output Voltage Set Value (limited), Date-Time information.

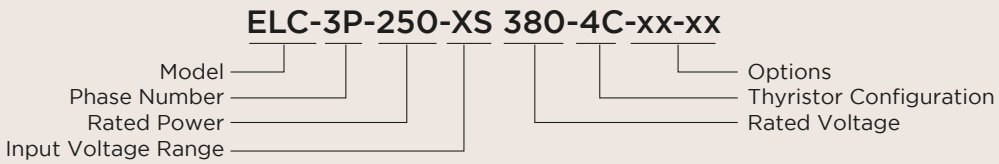
1. LCD Display Operator Panel (Standard)

- **4 lines 20 characters LCD display**
- **Mimic Diagram**
- **Light indicators**
- **5 pcs selection and application buttons**
- **Three Language Options (On Order)**
- **Economical and long-lasting**

Technical specifications

ELC Voltage Optimization and Energy Saving Unit	
General Features	
Model	ELC
Power (kVA)	In the power range of 10KVA - 1000KVA
Technology	Thyristor Technology, High-speed Voltage Regulation, Maintenance-free Design
Input	
Rated Input Voltage	3 Phase Model: 400VAC 3Phase+Neutral+Ground / 1 Phase Model: 230VAC 1Phase+Neutral+Ground
Voltage Tolerance	XS Model +%20 S Model -%10 , +%25
Frequency	50 Hz. +/-%5 (60 Hz. Optional)
Output	
Rated Output Voltage	3 Phase Model: 400VAC 3Phase+Neutral+Ground / 1 Phase Model: 230VAC 1Phase+Neutral+Ground
Voltage Tolerance	+/-%2
Frequency	50 Hz. +/-%5
Overload Capacity	125% 1 minute, 150% 10 seconds, 151% and above 0.2 seconds
Response Time	20 msec
Correction Time	100 msec - 200 msec
Efficiency	> 97% typical
Network Filtering and Energy Saving Options	
Energy Savings calculation and monitoring software	Special software developed to measure and monitor the Actual Saving rate
Harmonic Filter Unit	Passive Harmonic Filter specially designed for the project (designed according to the measurement report)
EMC Filter Unit	EMC filter for protection and high performance of sensitive electronic equipments
Automatic By-Pass	Automatic by-pass system to work in ECO mode in case of Low Voltage and Low load.
Management Monitoring and Communication Interfaces	
Operator panel with LCD Display	Input Voltage, Output Voltage, Load Percentage, Frequency, Status Information, Fault Information, Parameter settings
Remote Management Interface (optional)	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection
Protection Functions	
Voltage Protection	Electronic protection for Low Voltage and High Voltage
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)
Overload Protection	1 minute at 125% overload, 10 seconds at 150% overload, at >151% overload the power to the load is cut off after 0.2 seconds.
Over-Temperature Protection	Fan cooling works at 50°C. At 80°C, the power to the load is cut off.
Surge Arrester	Surge Arrester Class-I or Class-II (optional)
Environmental Conditions	
Operating temperature	-10 °C ~ +40 °C
Altitude Operating Height	1.500m
Humidity	90% none condensed
Acoustic Noise	< 65dB (at 1m distance and doors closed)
Cabinet Specifications	
Type – Protection Class	Free Standing Modular Cabinet, IP21 Indoor type
Paint – Color	Epoxy-Polyester Powder Paint - RAL 7032
Cooling	Air cooling with thermostat controlled fan.

ORDER CODE



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You may visit our Website for more detailed information and solutions.

ESV
Servo Voltage Stabilizer

Key Features
- Automatic AC voltage stabilizer
- Electromechanical structure
- It works with Brush-Charcoal system driven by motor
- 2kVA - 1000kVA power range
- Production at Single Phase and Three Phase
- Low Voltage Correction up to 30%
- High Voltage Correction up to 15%
- Response time: 40 msec
- Voltage correction time: 1-3 seconds
- Slow and safe
- 100% Unbalanced Voltage and Load Capacity
- Independent voltage management on each phase
- Efficiency >96%
- Periodic maintenance is required
- Input voltage range is determined at the order
- Output Voltmeter and Signal Lamp
- TS EN ISO 9001: 2015 Quality Certified

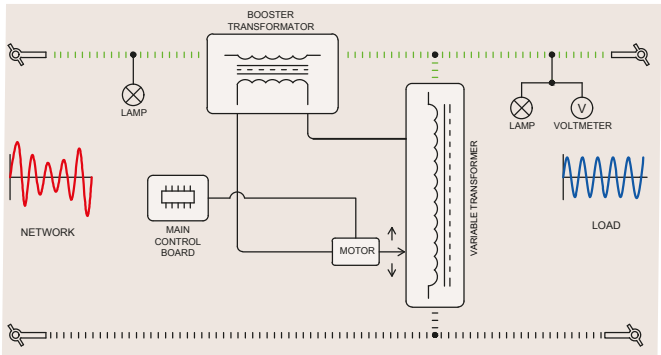
Optional Features
- Operator Panel with 4x20 LCD display
- Low Voltage / High Voltage Protection
- Maintenance By-Pass Switch
- Galvanic Isolation Transformer,
- IP44, IP54 cabinet option for outdoor applications
- Surge Arrester

What is ESV Servo Voltage Stabilizer?

ESV servo stabilizer is an Alternative Current (AC) voltage regulation and protection device which provides safe and stable voltage for businesses and home users who have constant low or high voltage problems.

It adjusts the low or high network voltage to the desired voltage value and keeps it constant.
It works slowly because it has an electromechanical structure. It is produced with traditional technology and offers the most economical solution for voltage correction.

How Does It Work?



ESV Servo stabilizer works on the principle of applying a variable voltage to the secondary of the Booster transformer connected in series between the network and the load. In order to adjust the variable voltage, a brush made of graphite is moved by the motor on the copper windings of the Variac unit. Microprocessor based control card decides how much the brush will be moved.

The measuring time of voltage drops and spikes approx ***< 40 milliseconds***

Voltage Correction time ***< 1-5 seconds***

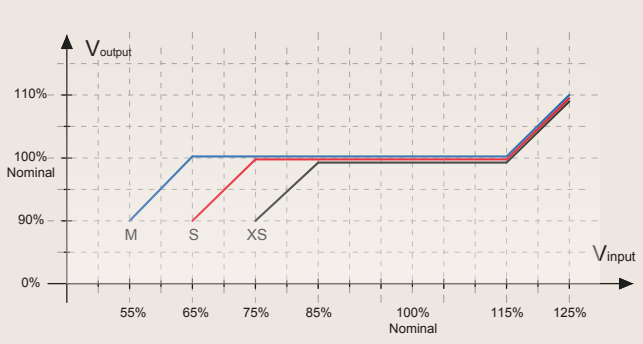
Simple and economical solution in traditional structure

The Variac-Motor system used in the ESV Servo Stabilizer has a simple structure. The electronic card controlling the motor is also small and economical. It is suitable for use in small commercial applications and homes where the network voltage does not change much.

It is the most economical voltage stabilizer solution. It requires periodic maintenance at least 1-2 times in a year. It is not suitable for use in dusty, humid, vibrating environments. It is specially produced for special projects.

Input Voltage Range

The input voltage range of the ESV Servo Stabilizer is determined at the order stage and cannot be changed later. There are 3 different models as standard. The below diagram shows the voltage regulation performance of each model.



Output voltage tolerance of ESV Servo Voltage Stabilizer are +/- 2%

Standard type 3 phase ESV Servo voltage stabilizers can operate in 3 phase + Neutral (4 wire) installations. Neutral connection is required for safe operation.

Maintenance By-pass Switch

A Maintenance By-Pass switch can be added to the ESV servo stabilizer, which ensures that the loads are transferred to the grid in case of maintenance or failure. Maintenance By-Pass switch is an I-0-II position changeover switch and is manually controlled. During the Maintenance By-Pass operation, the power to the loads is cut for a short time.

Applications

The ESV Servo stabilizer is the best solution for all commercial businesses, institutions and home users affected by voltage fluctuations, such as small factories, small commercial businesses, home applications, office blocks, shopping malls, stores, restaurants and chain stores.

Advantages

- ✓ It is the most economical Voltage stabilizer solution,
- ✓ It is produced with a traditional and simple technology.
- ✓ It is reliable and long-lasting,
- ✓ It can be customized according to customer demands.
- ✓ Cabin design, dimensions and electrical connection features can be re-designed according to the project needs.

Control Panel of ESV Servo Voltage Stabilizers is simple and easy.

There are Output Voltmeter, Output Signal Lamps and Input Signal Lamps as standard.

Input voltmeter and Output ammeter are optional.

LCD Display Operator panel is optional

You may visit our Website for more detailed information and solutions.

Technical specifications

ESV Servo Voltage Stabilizer		
General Features		
Power (kVA)	In the power range of 2KVA-1000 KVA	
Technology	Electromechanical Variac Motor System	
Input		
Rated Input Voltage	3Phase Model: 400VAC 3Phase+Neutral+Ground	1Phase Model: 230VAC 1Phase+Neutral+Ground
Voltage Tolerance	-%25 , +%15	
Frequency	50 Hz. +/-%5 (60 Hz. Optional)	
Output		
Rated Output Voltage	3Phase Model: 400VAC 3Phase+Neutral+Ground	1Phase Model: 230VAC 1Phase+Neutral+Ground
Voltage Tolerance	+/-%2	
Response Time	40 millisecond	
Correction Time	1-5 second	
Efficiency	>96% typical	
Indicators		
Voltmeter	Input Voltages, Signal Lamps	
LCD Display	Input Voltage, Output Voltage, Load Percentage, Frequency, Status Information, Fault Information (Optional)	
Protection Functions		
Voltage Protection	Electronic protection for Low Voltage and High Voltage (Optional)	
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)	
Environmental Conditions		
Operating Temperature	-10 °C ~ +40 °C	
Altitude Operating Height	1.500m	
Humidity	90% none condensed	
Cabinet Specifications		
Type-Protection Class	Monoblock welded cabinet, IP21 Indoor type	
Paint-Color	Epoxy-Polyester Powder Paint - RAL-7032	

FLT

FLT Battery Charger

Key Features

- Input Isolation Transformer
- Durable structure with thyristor technology
- Three phase and Single phase input voltage option
- Production at all industrial input voltages
- High power up to 500 Kva
- Ni-cd, Lead Acid and Stationary battery charging
- Constant Voltage / Constant Current Charge Function
- Float Charge / Boost Charge Facility
- Microprocessor based management card
- DC Earth Leakage protection
- Overload protection
- Over temperature protection
- Low Voltage / High Voltage protection
- Efficiency >% 85-95
- Operator Panel with 4x20 LCD Display
- Suitable design for industrial environment
- TS EN ISO 9001: 2015 Quality Certified

Optional Features

- Battery Deep Discharge Protection (LVD)
- DC Voltage Dropping with Silicon Dropper (SDU)
- Dry Contacts for Automation
- Battery Temperature Compensation
- Equalization / Commissioning Charge
- Parallel / Redundant Operation
- Battery Reverse Polarity Protection
- Input Harmonic Filter
- DC Distribution Fuses
- 7” Touchscreen Operator Panel
- ETHERNET and MOD-BUS RTU interface

What is FLT Battery Charger?

FLT Battery Chargers are AC/DC Rectifier and Battery Chargers that are designed to safely charge high-capacity battery packs and provide stable DC voltage to critical loads at the same time.

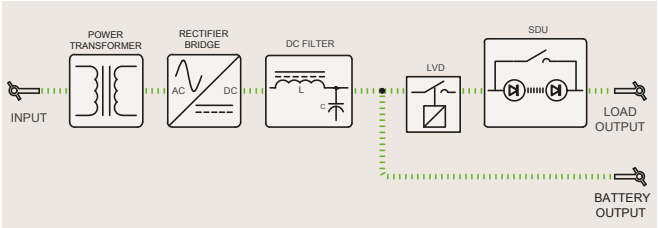
The network voltage is rectified by a microprocessor controlled Thyristor bridge. Specially designed LC filter units provide low ripple level and stable DC output voltage.

Optionally added Silicon Dropper Units provide voltage regulation at DC load output.

It can be used as an uninterrupted DC Power supply by connecting the battery to the FLT Battery Chargers.

How does it work?

FLT Battery Chargers consist of input power transformer, thyristor rectifier unit and electronic control units.



The power transformer adjusts the network voltage close to the DC charging voltage. Thyristor bridge that is connected to the secondary windings of the power transformer provides AC/DC voltage conversion and DC voltage adjustment. Output filters are used to keep the OUTPUT voltage stable and low ripple.

The microprocessor-based management board that is equipped with sensitive measuring circuits controls the thyristor bridge and adjusts the output voltage and current values to the most suitable value for battery charging. The special software algorithm of the FLT Battery Charger decides the charging characteristics of the batteries and the DC voltage supply regime.

Battery charging parameters can be adjusted by the user in accordance with the recommended information by the battery manufacturer.

Charging is done automatically and without any operator intervention.

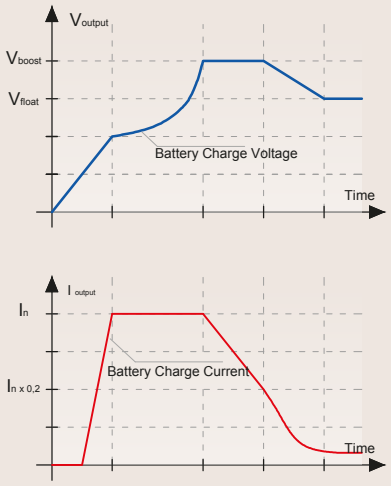
Constant Current / Constant Voltage Charging Algorithm

FLT Battery Chargers have a special charging procedure to keep the batteries at the highest performance.

FLT Battery Charger increases the DC output voltage to its nominal value with a soft-start curve.

Constant Current Function becomes active when battery charging starts. In ***Constant Current Mode***, current that is supplied to the batteries remains stable at the ***Battery Charge Current*** value set by the operator. When the battery voltage reaches its nominal value, the ***Constant Voltage function*** is activated.

Constant Current/Constant Voltage function is active again when the charging process restarts and the charging mode is changed.



Float Charge / Boost Charge Function

Battery charging in FLT Battery Chargers starts in ***Boost Charge*** mode and with ***Constant Current*** function. When the battery voltage reaches its nominal value, the Constant Voltage function is activated.

Float Charge mode is activated when the battery charge current falls below 20% of the nominal value. The nominal output voltage is adjusted to ***Float Voltage. Float charge*** mode is a continuous operation mode in which DC loads are supplied and the nominal charge voltages of the batteries are maintained.

There is ***Manual Boost Charge*** option on FLT Battery Charger. In ***Manual Boost Charge*** mode, the nominal output voltage is adjusted to Boost Voltage. Boost charging continues for the ***Boost Charge Time*** determined by the Operator. At the end of the Boost charging period, it switches to ***Float Charge Mode***.

Equalization / Commissioning Charge (optional)

Equalization charge / Commissioning charge feature can be added to FLT Battery Chargers optionally.

In the equalizing charge mode, the nominal output voltage is adjusted to the ***Equalizing Charge Voltage***. Battery Charge Current is adjusted to the ***Equalizing Current***. Equalizing charge starts with the ***Constant Current*** function. When the battery voltage reaches the ***Equalizing Charge Voltage***, the ***Constant Voltage*** function is activated. At the end of the ***Equalization Charge Time*** determined by the operator, it automatically returns to Float Charge mode.

Galvanic Isolation Transformer

The galvanic isolation transformer breaks the direct electrical connection between the Network installation and DC loads. This feature provides safe operation and detection of earth leakages in DC distribution installations. The secondary voltage of the isolation transformer is adjusted close to the DC output voltage. In this way, the thyristor controlled rectifier unit can produce the highest efficiency and stable DC voltage. The isolation voltage is 2.500V.

Earth Leakage Monitoring

FLT Battery Chargers have an Earth Leakage monitoring circuit. The isolation resistance between the DC output (+) and (-) terminals and the ground line is measured. In case of any DC leakage, the warning signal is activated.

Parallel Connection and Load Sharing (optional)

FLT battery chargers can be connected in parallel for redundancy and load sharing. Parallel connected FLT Battery Chargers share the output load. In case of failure, all loads are covered by a single device. There are load balancing inductors for equal load sharing. FLT battery chargers are suitable for parallel connection of 2 or 3 devices.

Production at All Industrial Voltages (optional)

FLT Battery Chargers are manufactured in all industrial input voltages.

3 Phase + with Neutral connection , 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, 480VAC, 600VAC

The nominal operating voltage of the FLT Battery Chargers is determined at the time of order and cannot be changed later.

Please contact with the sales representative for special production requests and right solutions.

Battery Deep Discharge Protection (LVD) (optional)

FLT Battery Chargers have load disconnection unit for battery deep discharge protection. When the measured battery voltage falls below the LVD Voltage set by the operator, the LVD contactor cuts the load current. There is dry contact information and light signal for LVD protection.

Silicon Dropper Unit (optional)

Silicon Dropper unit can be added to FLT Battery Chargers to regulate the DC voltage on the load supply line. Silicon Dropper units that are designed in accordance with DC load parameters and customer demand can be used in 2 pcs or more. Silicon Dropper units are automatically activated and deactivated.

Automation Unit / Dry Contact Information (optional)

Dry contact information can be added to FLT Battery Chargers for connection to automation systems or for remote monitoring.

Dry contact outputs: General Fault, Low Battery, Earth Leakage, Input Fault, Over-temperature, Overload, Input CB On/Off, Output CB On/Off, Battery CB On/Off

Please contact with the sales representative for special production requests and right solutions.

Remote Monitoring and Management

Ethernet Web Server (optional)

It is designed for remote monitoring over the network. It can be monitored and managed by connecting with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required. With the remote management interface, all parameters of FLT Battery Chargers can be monitored and some parameters can be changed. There is 2-level password protection for accessing the remote monitoring interface.

MOD-BUS RTU (optional)

It is designed for monitoring and management via Mod-Bus. It can be monitored and managed by connecting with a cable. All parameters of FLT Battery Chargers can be monitored and some parameters can be changed with Mod-Bus protocol.

FLT Battery Chargers have an ergonomic and user-friendly Operator Panel designed for management and monitoring.

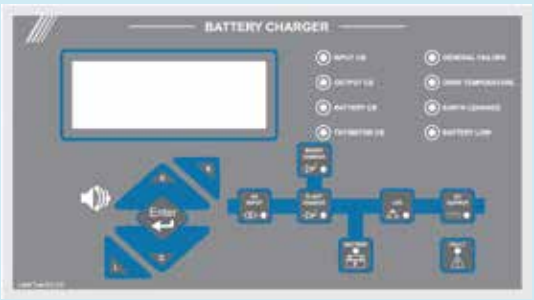
All operating parameters can be monitored from this panel and some operating parameters can be adjusted. There are 2-level password protection for parameter changing.

Monitorable parameters: Device Input Voltages, DC Output Voltage, Battery Voltage, Output Current, Battery Current, Operating Frequency, Charge Mode, Date-Time, Device Status Information, Fault and Error Codes.

Changeable Parameters: Float Charge Set Value, Boost Charge Set Value, Equalizing Charge Set Value, Output Current Set Value, Battery Charge Current, LVD Voltage, Manual Boost Charge Time, Communication Parameters, Date-Time Information.

1. LCD Display Operator Panel

- 4 lines 20 characters LCD display
- Mimic Diagram
- Light indicators
- 5 pcs selection and application buttons
- 3 language options (on order)
- Economical and long-lasting



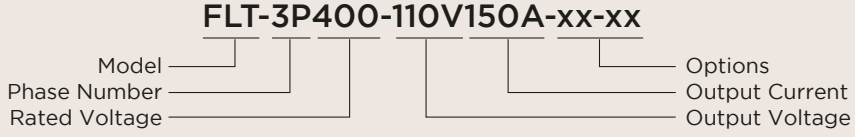
2. Touch Screen Operator Panel (Optional)

- 7” inch Color Display
- Resistive Feature,
- Backlight
- Three Language Options (On Order)
- Simple and Understandable Menu

Technical specifications

FLT Battery Charger		
General Features		
Model	FLT-1P	FLT-3P
Technology	Thyristor Controlled Rectifier, Microprocessor Controlled Industrial Type Battery Charging System	
Power Factor	< 0.65 (Power factor can be increased with optional Input Filter)	
Input		
Rated Input Voltage	3 Phase Model: 400VAC 3 Phase + Neutral + Ground (Different voltages are Optional)	1 Phase Model: 230VAC 1 Phase + Neutral + Ground (Different voltages are Optional)
Voltage Tolerance	+15 % , -15 %	
Frequency	50 Hz. +/-%5 (60 Hz. Optional)	
Output		
Rated Output Voltage	24 - 48 - 60 - 110 - 125 - 220 - 240 VDC (Different voltages are Optional)	
Voltage Tolerance	+/- 1 %	
Voltage Adjustment	+/- 20 %	
Rated Output Current	20 - 40 - 60 - 80 - 100 - 150 - 200 ADC (High currents are optional)	
Current Adjustment	Between 2 % - 100 %	
Charging Mode	Constant Voltage/Constant Current, Boost Charge, Float Charge	
Efficiency	85% - 95%	
Protection Functions		
Over Temperature Protection	Fan cooling works at 50C. At 80C, the power to the load is cut.	
Surge Arrester	Surge Arrester Class-I or Class-II for Over Voltage and Lightning Protection (optional)	
Earth Leakage Protection	It monitors the isolation between DC(+) or DC(-) and ground. It gives an alarm in case of leakage.	
Optional Features		
Silicon Dropper Unit	Automatic voltage regulation unit for DC load output. 1 Step or 2 Steps	
LVD Unit	Battery deep discharge Protection. It seperate the load connection when the battery voltage drops.	
Automation Unit	Dry Contact Outputs for fault and status information	
Battery Reverse Polarity Protection	It prevents the Battery Circuit Breaker from being set up when the Battery is connected in reverse.	
Management Monitoring and Communication Interfaces		
LCD Display Operator Panel	4 lines 20 characters LCD display and Mimic Diagram. Input Voltage, Output Voltage, Output Current, Battery current, Boost Voltage, Float voltage, Boost Timer, LVD voltage, Date-time, Status and Fault information, Parameter settings	
Touchscreen Operator Panel (optional)	7" Touch Color screen Input Voltage, Output Voltage, Output Current, Battery current, Boost Voltage, Float voltage, Boost Timer, LVD voltage, Date-time, Status and Fault information, Parameter settings	
Remote Management Interface (optional)	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection	
Environmental Conditions		
Operating temperature	-10 °C ~ +40 °C	
Altitude Operating Height	1.500m	
Humidity	90% none condensed	
Acoustic Noise	< 55dB (at 1m distance and doors closed)	
Cabinet Specifications		
Type–Protection Class	Free Standing Modular Cabinet, IP21 Indoor type (IP54 and higher protection class, Outdoor Type Cabinets are optional)	
Paint–Color	Epoxy-Polyester Powder Paint - RAL 7035	
Cooling	Air cooling with thermostat controlled fan.	

ORDER CODE



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MRC

Modular Rectifier and Battery Charger

Key Features

- Rectifier and Battery Charger that can be connected in parallel
- Multi-master Parallel Connection Technology
- Adjustable Output Voltage between 0V-1000VDC
- Parallel connection up to 16 units
- High power solution up to 10 MVA
- Equal Load Sharing
- Input Isolation Transformer
- Durable structure with thyristor technology
- Production at all industrial input voltages
- Ni-cd, Lead Acid and Stationary battery charging
- DC Earth Leakage protection
- Low Voltage / High Voltage protection
- Overload protection
- Over temperature protection
- Efficiency >% 95
- 7” Touchscreen Operator Panel
- Suitable design for industrial environment
- TS EN ISO 9001: 2015 Quality Certified

Optional Features

- ETHERNET and MOD-BUS RTU interface
- Battery Reverse Polarity Protection

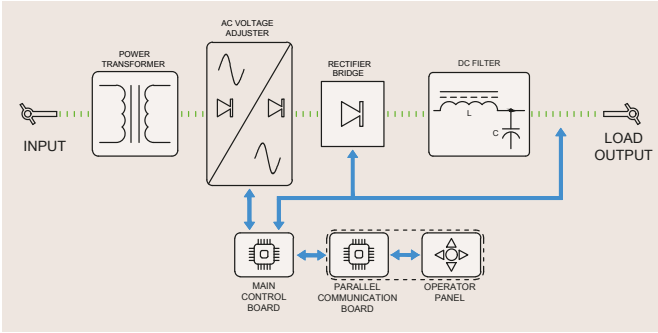
What is MRC Modular Rectifier and Battery Charger?

The MRC rectifier is designed for applications that require high power adjustable DC voltage. Many MRC rectifiers are connected in parallel to provide a very high power rectifier-charger solution. Output voltage and output current are adjustable between zero and nominal value.

It is suitable for using in projects that require High Power and High Current, in universal battery charging and DC supply applications that require adjustable output voltage and output current, in projects that need parallel connection and redundancy, and for industrial DC motor supply.

How does it work?

MRC modular rectifiers consist of Power Transformer, AC voltage adjusting unit, 3-phase Full-Bridge Diode rectifier unit, DC Filters and microprocessor based electronic control Boards.



Output voltage regulation in MRC modular rectifiers is done on the AC voltage side and with thyristors. The rectification process is done with a 3 phase Diode bridge. Since the voltage adjusting thyristors are switched at zero-crossings of the AC voltage, it does not generate harmonic distortion in the network voltage. Output filters keep DC voltage stable and at low ripple value.

MRC modular rectifiers have the parallel working feature. No external master unit or frame is required for parallel operation.

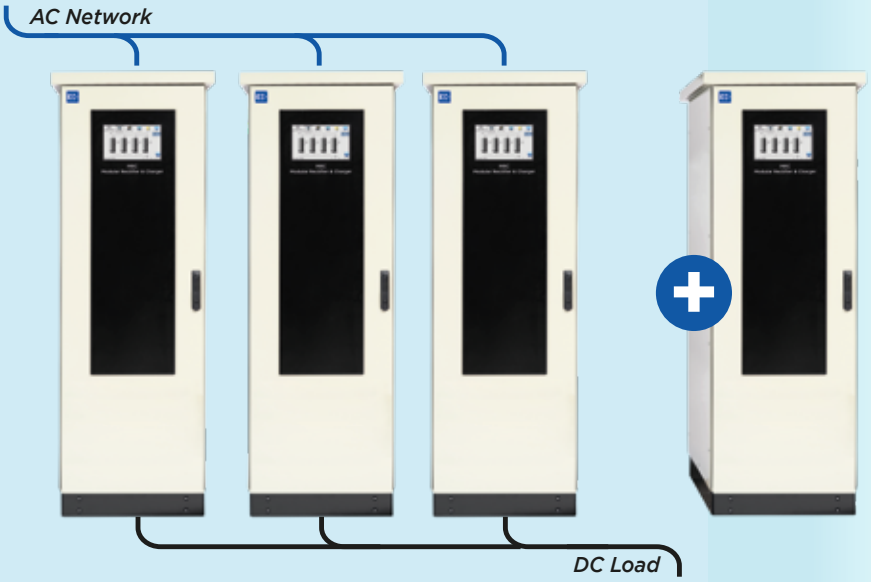
Microprocessor-based management board that is equipped with sensitive measuring circuits adjusts the output voltage and current values and keeps them constant.

Adjustable DC voltage needs at high powers up to 10 MegaWatts can be met with MRC modular rectifiers.

MRC Modular:
Easy, Power boost technology.
You are always ready to increase capacity.

Parallel Operation Technology

MRC modular rectifiers have power increasing technology by connecting in parallel. For parallel operation, the inputs and outputs of MRC rectifiers are short-circuited and the communication cable between the devices is plugged. Parallel connected devices operate together as one device and share the load between them. The number of devices that can be connected in parallel is 16 pcs. MRC rectifiers with patented parallel operation technology operate together and simultaneously and provide uninterrupted and safe DC power and battery charging solution at very high power.



Multi-Master Modular System

There is no need a separate master unit to operate MRC rectifiers in parallel.

All MRC rectifiers can operate as master. The master unit is selected automatically with patented software protocol. When the master unit is disabled, a new master is selected in less than a second. There is no power interruption during master change. For parallel operation, it is sufficient to be connected communication cable.

Galvanic Isolation Transformer;

There is galvanic isolation transformer in MRC rectifiers. Galvanic isolation transformer provides full isolation between AC input and DC output. Voltage of isolation is 2500V. Galvanic isolation transformer provides the adjustment of DC output voltage to requested value and cut off the direct electrical connection between the network installation and DC loads. This feature ensures the detection of earth leakages in DC distribution installations and safe operation.

Earth Leakage Monitoring:

MRC Battery Chargers have an Earth Leakage monitoring circuit. The isolation resistance between the DC output (+) and (-) terminals and the ground line is measured. In case of any DC leakage, the warning signal is activated.

Production at All Industrial Voltages (optional)

MRC Battery Chargers are manufactured in all industrial input voltages.

3 Phase + with Neutral connection , 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, 480VAC, 600VAC

The nominal operating voltage of the MRC Battery Chargers is determined at the time of order and cannot be changed later.

Standard type Three Phase input MRC rectifiers can operate in 3 Phase + Neutral (4-wire) installations.

Neutral connection is required for safe operation.

However, for special needs, it can also be produced in accordance with 3-Phase 3-Wired Delta connection installations.

Please contact with the sales representative for special production requests and right solutions.

Application

MRC Modular Rectifiers and Battery Chargers are designed to be used in the following applications.

- ✓ Battery Charging in industrial facilities,
- ✓ Emergency lighting systems
- ✓ Battery charging and DC supply in hydroelectric power plants
- ✓ Operation of commercial and industrial engines and machines
- ✓ Applications of Coating and Electro Galvanized
- ✓ Adjustable DC load supply at very high power
- ✓ Railway applications
- ✓ Offshore projects

Please contact with the sales representative for special production requests and right solutions.

Remote Monitoring and Management

Ethernet Web Server (optional):

It is designed for remote monitoring over the network. It can be monitored and managed by connecting with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required. With the remote management interface, all parameters of MRC Battery Chargers can be monitored and some parameters can be changed. There is 2-level password protection for accessing the remote monitoring interface.

MOD-BUS RTU (optional):

It is designed for monitoring and management via Mod-Bus. It can be monitored and managed by connecting with a cable. All parameters of MRC Battery Chargers can be monitored and some parameters can be changed with Mod-Bus protocol.

MRC Chargers have an ergonomic and user-friendly Operator Panel designed for management and monitoring.

All operating parameters can be monitored from this panel and some operating parameters can be adjusted. There are 2-level password protection for parameter changing.

Monitorable parameters: Device Input Voltages, DC Output Voltage, Battery Voltage, Output Current, Battery Current, Operating Frequency, Charge Mode, Number of Devices Connected in Parallel, Date-Time, Device Status Information, Fault and Error Codes.

Changeable Parameters: Float Charge Set Value, Boost Charge Set Value, Equalizing Charge Set Value, Output Current Set Value, Battery Charge Current, LVD Voltage, Manual Boost Charge Time, ID Number of Device, Communication Parameters, Date-Time Information.

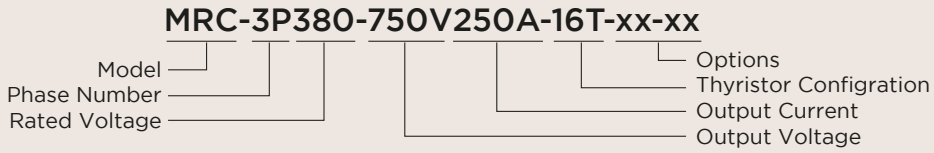
1. Touchscreen Operator Panel

- **7” inch Color Display**
- **Resistive Feature,**
- **Backlight**
- **Three Language Options (On Order)**
- **Simple and Understandable Menu**

Technical specifications

MRC Modular Rectifier and Battery Charger	
General Features	
Model	MRC
Technology	Parallel Connectable, Multi-master Rectifier and Charger
Number of Parallel Connection	It can be connected in parallel up to 16 units
Unit Power	50kva, 200kva
Input	
Rated Input Voltage	400VAC 3 Phase + Neutral + Ground (Different voltages are Optional)
Voltage Tolerance	+15 % , -15 %
Frequency	50 Hz. +/-%5 (60 Hz. Optional)
Output	
Nominal Output Voltage	Between 0VDC-1000VDC determined at order
Voltage Tolarance	+/-%2
Voltage Adjustment	It can be adjusted between 0% - 100%xV nominal
Soft Start	Adjustable between 0 – 30 seconds
Current Adjustment	Adjustable between 2% - 100%xI nominal
Charging Mode	Constant Voltage/Constant Current, Boost Charge, Float Charge
Efficiency	85% - 95% (Depends on device specifications)
Response Time	20 msec
Correction Time	100 msec - 200 msec
Protection Functions	
Over Temperature Protection	Fan cooling works at 50C. At 80C, the power to the load is cut.
Surge Arrester	Class-I or Class-II (optional)
Earth Leakage Protection	It monitors the isolation between DC(+) or DC(-) and ground. It gives an alarm in case of leakage.
Management Monitoring and Communication Interfaces	
Touchscreen Operator Panel	7" Touch Color screen, Input Voltage, Output Voltage, Output Current, Boost Voltage, Float voltage, Boost Timer, Date-time, Status and Fault information, Parameter settings
Remote Management Interface (optional)	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection
Environmental Conditions	
Operating temperature	-10 °C ~ +40 °C
Altitude Operating Height	1.500m
Humidity	90% none condensed
Acoustic Noise	< 55dB (at 1m distance and doors closed)
Cabinet Specifications	
Type–Protection Class	Free Standing Modular Cabinet, IP21 Indoor type (IP54 and higher protection class, Outdoor Type Cabinets are optional)
Paint–Color	Epoxy-Polyester Powder Paint - RAL 7035
Cooling	Air cooling with thermostat controlled fan.

ORDER CODE



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You may visit our Website for more detailed information and solutions.

SSG
Voltage Sag-Swell Simulator

Key Features
- High speed IGBT and Thyristor Technology
- Voltage adjustment range: 1% - 150%
- Test currents: 20A – 1000A
- Test duration: 0.01sec – 999sec (Adjustable)
- Independent voltage adjustment on each phase
- Star connected Network simulation
- Delta connected Network simulation
- IEC 61000-4-34 Standard tests
- Automatic test restart
- Production at all industrial input voltages
- 7" touchscreen Operator Panel
- IP20 Standard Cabinet
- TS EN ISO 9001: 2015 Quality Certified

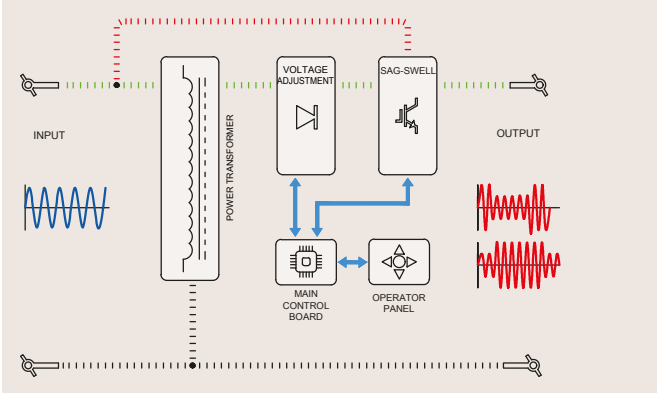
Optional Features
- Ethernet Web Server and Mod-Bus RTU
- Portable Aluminum Cabinet
- Power Analyzer
- Galvanic Isolation Transformer
- Surge Arrester

What is SSG Voltage Sag-Swell Simulator?

The SSG Sag Swell Simulator is an AC voltage source that artificially generate instantaneous voltage drops (sags) and spikes.

It is designed to test the operating performance of electronic devices and industrial machines in voltage disturbances and fluctuations and to measure Sag-Swell durability.

SSG simulator, in star and delta connected networks automatically performs voltage and vector distortions for the time set by the operator. Programmed voltage distortion tests can be repeated periodically.



Test time in SSG simulator between 10msec.-999sec. and output voltages between 1% and 150% Vnom. can be adjusted. Voltage adjustment is made independently for each phase.

Design Features

SSG Simulators are designed to operate at all industrial voltages. The supply voltage of the control units is separate and independent from the test voltage.

Power transformers are produced with aluminum or copper windings.

To ensure quiet and moisture-proof operation, transformers are vacuum-impregnated varnish and dried at high temperature.

Control unit and transformer in portable versions can be produced in separate cabinets.

Fast and Durable with Thyristor-IGBT Technology

Thyristor and IGBTs are used for voltage adjustment and voltage Sag-Swell crossing in the SSG simulator.

Voltage adjustment is made directly from AC to AC. There is no AC/DC, DC/AC Voltage conversion.

Therefore, it does not generate electromagnetic noise or harmonic noise on the input or output side.

It can work with the same high performance in all inductive, capacitive, non-linear loads.

Production at All Industrial Voltages (optional)

SSG Simulator is produced in all industrial input voltages.

3 Phase + Neutral connection , 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, 480VAC, 600VAC

The nominal operating voltage of the SSG Simulator is determined in the order. It cannot be changed later.

Galvanic Isolation Transformer

Some models of SSG Simulator can be produced with isolation transformer. Isolation transformer can be placed at the input or output of the SSG simulator in accordance with the customer's request. Voltage switching or vector switching can also be done with the isolation transformer.

High Voltage Protection-Surge Arrester

Surge arresters can be placed at the inputs and outputs of the SSG Simulator for protection against high voltage and lightning strikes. Please contact with your sales representative for Class-I or Class-II surge arrester options and all your other requests.

Applications

- ✓ Laboratories
- ✓ R&D Centers
- ✓ Serial production lines
- ✓ Industrial Machine manufacturers
- ✓ Electronic device manufacturers

Please contact with sales representative for special production requests and the right solutions.

SSG simulator has an ergonomic and user-friendly Operator Panel designed for management and monitoring.

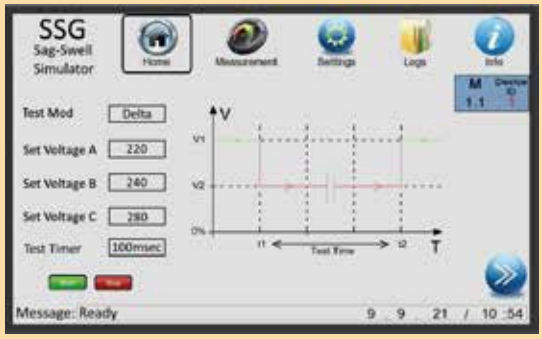
All operating parameters can be monitored from this panel and some operating parameters can be adjusted.

Monitorable parameters: Input Voltage, Test Voltage, Output Current, Operating Frequency, Test Duration, Operating Mode, Date-Time, Device Status Information, Fault and Error Codes.

Changeable Parameters: Operating Mode, Test Voltages, Test Duration, Communication Parameters, Date-Time information.

1. Touchscreen Operator Panel

- **7" inch Color Display**
- **Resistive Feature**
- **Backlight**
- **Three Language Options (On Order)**
- **Simple and Understandable Menu**



Remote Monitoring and Management

Ethernet Web Server (optional):

It is designed for remote monitoring via network. The whole system can be monitored and managed with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required.

With remote management interface; all parameters of all SSG Simulator can be monitored and some parameters can be changed.

There is two-step password protection for accessing the remote monitoring interface.

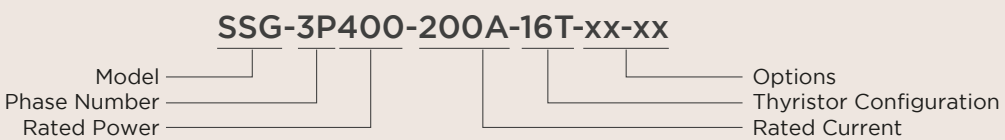
MOD-BUS RTU (optional):

It is designed for monitoring and management via Mod-Bus. The whole system can be monitored and managed by connecting with a cable. All parameters of SSG Simulator can be monitored and some parameters can be changed with Mod-Bus protocol.

Technical specifications

SSG Voltage Sag-Swell Simulator	
General Features	
Power (kVA)	In the power range of 10KVA-1000KVA
Technology	High-speed and Durable Structure with IGBT and Thyristor Technology
Input	
Voltage Range	Test Voltage: 100V-600VAC 3Phase+Neutral+Ground Control Unit Supply Voltage: 110V-250VAC 1Phase+Neutral+Ground
Voltage Tolerance	-%25 , +%15
Frequency	50 Hz. +/-%5 (60 Hz. optional)
Output	
Voltage Range	It can be adjusted between 0V-%150 Vnominal
Voltage Tolerance	+/-%2
Test Duration	It can be adjusted between 10msec-999sec.
Voltage SAG Test	Adjustable between 0% and 100% Vnominal in 2% steps
Voltage Swell Test	Adjustable between > 100% Vnominal and 150% Vnominal in 2% steps
Management Monitoring and Communication Interfaces	
Touchscreen Operator Panel	7" Touchscreen Display Input Voltage, Output Voltage, Load Percentage, Frequency, Status Information, Fault Information, Parameter settings
Remote Management Interface (Optional)	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection
Protection Functions	
Voltage Protection	Electronic Protection for Low Voltage and High Voltage (optional)
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)
Over Temperature Protection	Fan cooling works at 50°C. At 80°C, the power to the load is cut off.
Emergency Shutdown	Quick-off button of input power for emergency
Environmental Conditions	
Operating Temperature	-10 °C ~ +40 °C
Altitude Operating Height	1.500m
Humidity	90% none condensed
Cabinet Specifications	
Type–Protection Class	Free Standing Modular Cabinet, IP21 Indoor type
Paint–Color	Epoxy-Polyester Powder Paint - RAL 7035
Cooling	Air cooling with thermostat controlled fan.

ORDER CODE



AVS
Adjustable Voltage Source

Key Features
- Long-lasting and stable thyristor technology
- Voltage adjustment range: 0xVn% - 200xVn%
- Output Current: 0A – 600A
- Continuous operation at full load
- Independent voltage adjustment on each phase
- Soft-Start feature of Output Voltage
- Current Limiting and Overload protection
- 100% unbalanced Voltage and load capacity
- Production at all industrial input voltages
- 7” touchscreen Operator Panel
- It is produced on order

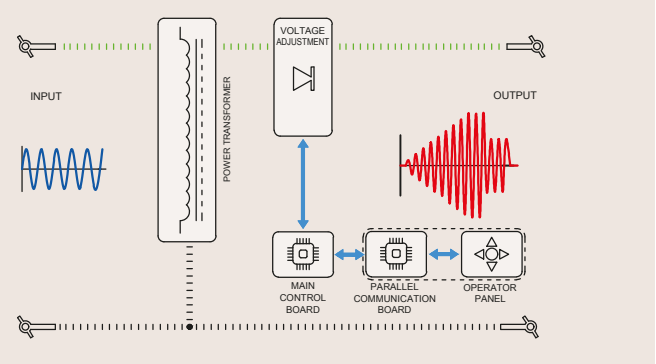
Optional Features
- Power boost feature by connecting in parallel
- Ethernet Web Server and Mod-Bus RTU
- Power analyzer
- Portable Aluminum Cabinet
- Galvanic Isolation Transformer
- Surge Arrester

What is AVS Adjustable Voltage Source?

AVS Voltage Source is an AC Power supply whose Output Voltage can be adjusted.

In AVS produced with thyristor technology, voltage changes are made without interruption. Voltage switching can be done under full load.

In standard devices, the output voltage can be adjusted from 0V to 2 times of nominal input voltage. Output voltage range can be changed for special projects.



In the AVS Voltage Source voltage adjustment is made directly from AC to AC. There is no AC/DC, DC/AC Voltage conversion.

Therefore, it does not generate electromagnetic noise or harmonic noise on the input or output side.

It can work with the same high performance in all inductive, capacitive, non-linear loads.

It is used in continuous operation and performance tests of electrical devices and machines at different voltages in laboratories or production lines.

AVS voltage source has Soft-Start feature. The output voltage drops or rises to the value set by the operator at the speed selected by the operator.

In the AVS voltage source, the output voltage adjustment is made independently for each phase.

Applications
- ✓ Laboratories
- ✓ R&D Centers
- ✓ Serial production lines
- ✓ Industrial Machine manufacturers
- ✓ Electronic device manufacturers

Reliable, Independent, Flexible Power Supply

Design Features

The AVS Voltage Source is designed to operate at all industrial voltages. The supply voltage of the control units is separate and independent from the test voltage.

Test voltages of AVS voltage source are 3 Phase + Neutral, 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, 480VAC.

The AVS voltage source can operate at frequencies of 50Hz and 60Hz. Input frequency and output frequency are always the same, there is no frequency change feature.

Expanding systems with parallel connection

Parallel Connection Technology (Optional)

AVS voltage source has a power boost feature by connecting in parallel. This feature is optional and can be added during production.

For parallel operation; The inputs and outputs of 2 or more AVS voltage sources with the same technical specifications are short-circuited and the communication cable between the devices is attached. Parallel connected devices work together as one device and share the load between them. The maximum number of devices that can be connected in parallel is 16 pcs. AVS voltage sources with patented parallel connection technology work together and simultaneously to provide a very high power, uninterrupted and safe adjustable AC power supply solution.

Multi-master Modular System (Only for AVS with parallel connection)

There is no need for a separate master unit to operate AVS voltage sources in parallel. All AVS voltage sources can operate as master. With the patented software protocol, the master unit is selected automatically. A new master is selected in less than a second when the master unit is disabled. No Power interruption during master change. For parallel operation, it is sufficient to connect the communication cable.

Please contact with sales representative for special production requests and the right solutions.

AVS Voltage Sources have an ergonomic and user-friendly Operator Panel designed for management and monitoring

All operating parameters can be monitored from this panel and some operating parameters can be adjusted. There is two-step password protection for parameter changing.

Monitorable parameters: Input Voltages, AC Output Voltage, Output Current, Operating Frequency, Date-Time, Device status information, Fault and error codes. (In models with parallel connection feature, Device ID number, Number of devices connected in parallel, communication information)

Changeable Parameters: Rated Input Voltage, Output Voltage Set Value, Soft-Start Speed, Output Current Setting, Automatic Test Duration, Communication parameters, Date-Time information.

1. Touchscreen Operator Panel

- 7” inch Color Display
- Resistive Feature
- Backlight
- Three Language Options (On Order)
- Simple and Understandable Menu

Remote Monitoring and Management

Ethernet Web Server (optional):

It is designed for remote monitoring via network. The whole system can be monitored and managed with an Ethernet cable. The remote management interface is designed as browser-based. It can be connected from any computer with a web browser. No additional software is required.

With remote management interface, all parameters of all AVS Voltage Source can be monitored and some parameters can be changed.

There is two-step password protection for accessing the remote monitoring interface.

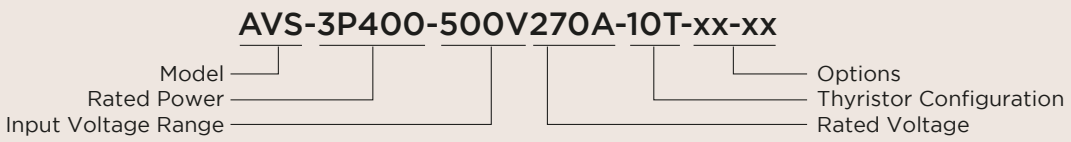
MOD-BUS RTU (optional):

It is designed for monitoring and management via Mod-Bus. The whole system can be monitored and managed by connecting with a cable. All parameters of AVS voltage source can be monitored and some parameters can be changed.

Technical specifications

AVS Adjustable Voltage Source	
General Features	
Power (kVA)	Between 10KVA - 6 Megawatts (With Parallel Connection Feature)
Technology	Fast and durable with Thyristor Technology
Number of Parallel Connection	Parallel connection up to 16 units
Input	
Rated Input Voltage	208-220-380-400-415-480 VAC 3Phase + Neutral
Voltage Tolerance	-%15 , +%15
Frequency	50 Hz. +/-%5 (60 Hz. Optional)
Output	
Voltage Range	Adjustable between 0% - 200%xVnominal
Voltage Tolerance	+/-%2
Output Current	50A - 90A - 120A - 160A - 270A - 570A
Soft-Start	Adjustable between 0 - 30 seconds
Constant Current Function	It can be used as a constant current source with output current limiting feature
Management Monitoring and Communication Interfaces	
Touchscreen Operator Panel	7" Touchscreen, Input Voltage, Output Voltage, Load Percentage, Frequency, Status Information, Fault Information, Parameter settings
Remote Management Interface	Browser-based remote management with Ethernet connection MOD-BUS RTU with RS485 connection
Protection Functions	
Overload Protection	It turns off the output voltage after 10 seconds at 115% load, 1 second at 125% load.
Current Protection	Input Circuit Breaker (Output Circuit Breaker optional)
Over Temperature Protection	Fan cooling works at 50°C. At 80°C, the power to the load is cut off.
Environmental Conditions	
Operating Temperature	-10 °C ~ +40 °C
Altitude Operating Height	1.500m
Humidity	90% none condensed
Cabinet Specifications	
Type-Protection Class	Free Standing Modular Cabinet, IP21 Indoor type
Paint-Color	Epoxy-Polyester Powder Paint RAL-7032
Cooling	Air cooling with thermostat controlled fan.

ORDER CODE



PCU

Uninterruptible Power Supply and Inverter

Key Features

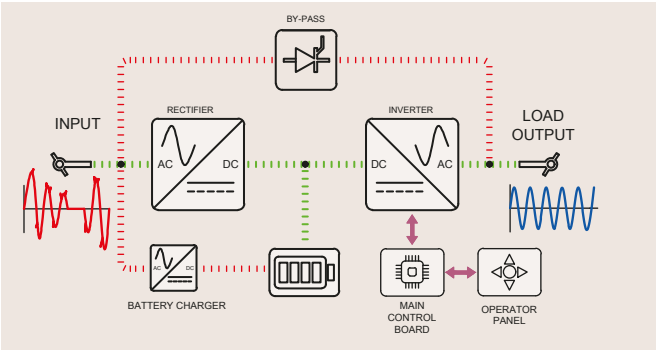
- On-Line Double Conversion Technology
- Galvanic Isolation Transformer
- 2KVA-60KVA power range for Single phase
- 10KVA-200KVA power range for three phase
- IGBT and PWM technology
- Automatic By-Pass system
- Maintenance By-Pass Switch
- Internal Battery Option
- Extendable Battery Duration
- Operator Panel with LCD Display
- TS EN ISO 9001: 2015 Quality Certified
- It is produced on order

Optional Features

- Inverter application
- 48V-110V-160V-250VDC input options (for Invertors)
- 50Hz - 60Hz frequency option
- Adjustable Output Voltage option
- High capacity Battery Charging
- Redundant operation (only 2 pcs)
- Ethernet Web Server and Mod-Bus RTU interface

PCU Uninterruptible Power Supply

PCU uninterruptible power supply is an AC power supply designed to supply sensitive electronic devices and machines with constant voltage and constant frequency.



It has been developed to completely filter all kinds of disturbances in the grid voltage and to protect sensitive electronic devices against low voltage, high voltage and phase interruptions.

It uses the battery group to continue working in power cuts.

Galvanic isolation transformer provides 2500V isolation between network installation and sensitive electronic loads.

Design Features;

PCU uninterruptible power supply is produced with actual on-line Double conversion technology. It supplies power to output loads in sinusoidal wave-form, constant frequency and constant voltage.

Automatic By-Pass Unit transfers the loads to the network without interruption in case of overload or fault.

Maintenance By-Pass switch is for operating the loads from the network in case of failure and maintenance. There may be an interruption during the Maintenance By-Pass process.

Applications

- ✓ Computer systems
- ✓ Office devices
- ✓ Sensitive electronic machines
- ✓ Industrial automation systems
- ✓ Security systems
- ✓ Audio and imaging system

Expandable Battery Capacity

The battery capacity of the PCU uninterruptible power supply can be increased. Battery capacity can be increased as desired by adding additional charging units. The charger uses the Constant Voltage/ Constant Current characteristic to operate the batteries for the longest time at peak performance.

Flexible and Durable

It has an easy installation feature, no calibration or adjustment is required during installation. It has a Wide Input Voltage range. It does not use batteries when the input voltage drops. It is resistant to electrical noises and voltage fluctuations in the network voltage. There is fuse protection for Input, Output and Battery. It can be customized in accordance with customer needs and produced in different technical specifications.

PCU Uninterruptible Power Supply has an ergonomic and user-friendly Operator Panel designed to monitor device parameters.

Operator panel has LCD display, mimic diagram, selection and application buttons and light signals.

Monitorable parameters: Input Voltages, Output Voltages, Load Percentage, Battery Voltage, Operating Frequency, Fault and error codes. Audible and light warnings

Please contact with sales representative for special production requests and the right solutions.

Technical specifications

PCU Uninterruptible Power Supply	
General Features	
Power (kVA)	In the range of 2KVA - 200KVA, at certain powers
Technology	Actual Double Conversion Technology with IGBT
Power Factor	0.70
Input	
Rated Input Voltage	220VAC 1Phase+Neutral+Ground / 380VAC 3Phase+Neutral+Ground (Different voltage values are optional)
Voltage Tolerance	-%15 , +%15
Frequency	50 Hz. +/-%5 (60 Hz. optional)
Output	
Voltage Range	220VAC 1Phase+Neutral+Ground / 380VAC 3Phase+Neutral+Ground (Different voltage values are optional)
Voltage Tolerance	+/-%1
Overload Capacity	For 125% 60sec., for150% 5 sec., for 200% 0.1 sec.
Efficiency	> 85%
THD	<3%
Transformer	Output Galvanic Isolation Transformer
By-Pass	Uninterruptible Static By-Pass and Maintenance By-Pass switch
Management Monitoring and Communication Interfaces	
Operator Panel	LCD Display Panel, Input Voltage, Output Voltage, Load Percentage, Frequency, Battery Voltage, Fault and Status information, Light and Audible Warnings
Remote Management Interface	Browser-based remote monitoring with Ethernet connection (optional)
Protection Functions	
Overload Protection	Electronic Overload Protection
Current Protection	Input Circuit Breaker and Output Circuit Breaker
Over Temperature Protection	Electronic Over Temperature Protection
Environmental Conditions	
Operating Temperature	-10 °C ~ +40 °C
Altitude Operating Height	1.500m
Humidity	90% none condensed
Cabinet Specifications	
Type-Protection Class	Specially designed cabinet, IP21 Indoor type
Paint-Color	Epoxy-Polyester Powder Paint RAL-7032
Cooling	Air cooling with thermostat controlled fan.

ORDER CODE

PCU-11P15-B240-xx-xx

- Model
- Number of Phase
- Rated Power
- Options
- Battery Voltage

ETR
Transformers

Key Features
- Copper and Aluminum Winding
- High Efficiency Sheet Core
- Varnishing under vacuum
- Oven drying at high temperature
- Strengthened isolation up to 2500V
- 1KVA-500KVA power range
- 3 Phases, 2 Phases and 1 Phase input
- Galvanic Isolation Transformer
- Supply transformers
- Voltage changing transformers

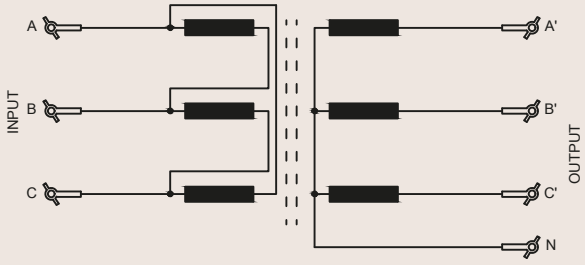
Optional Features
- Suitable cabinet for indoor and outdoor applications
- Input and Output Fuse Protection
- Soft-start feature
- Thermostat Controlled Fan Cooling
- Special production on order

ETR Isolation Transformers

Provide isolation between network installations and sensitive electronic loads.

Insulated aluminum or copper windings are wound on a high efficiency sheet core. ETR transformers are vacuum-impregnated varnished and high-temperature dried to ensure quiet and moisture-proof operation. It is safe and long lasting. It is designed and produced in different power, different voltage and different vector features according to customer demands.

It is produced in the power range of 1kva-500kva as single phase and three phases for industrial applications.



Voltage Changing and Supply Transformers

It is used for safe operation and voltage changing in machines or electronic devices. They are designed as double winding isolated type or single winding auto type.

Specially designed cabinet for indoor and outdoor applications. Outdoor cabinet with high protection class up to IP65 according to customer needs. Project-specific protection and display options.

Soft-Start Feature (optional)

A Soft-Start unit can be added to limit the high currents generated during initial energizing. Soft-Start circuit reduces the inrush current of the transformer by 1/3. It provides a solution for ship and yacht applications where instant high currents adversely affect electronic devices. Soft Start feature is available for cabinet option.

Please contact with sales representative for special production requests and the right solutions.

Outdoor Type Cabinet and Protection Options

Special cabinet option with high protection class up to IP54 for special applications. Voltmeter, Ammeter and signal lamp options are offered together with the special cabinet designed according to the project needs.

Fuse and over temperature protection can be added for Input and Output side.

Applications

- ✓ Medical devices
- ✓ Uninterruptible power supplies
- ✓ Ships and shipyards
- ✓ Machine production
- ✓ Iron and steel
- ✓ Lighting

Solutions and Applications

- ✓ Galvanic Isolation
- ✓ Voltage changing
- ✓ Phase number and Vector switching

Technical Specifications

ETR Transformers		
General Features		
Power (kVA)	1KVA - 500KVA power range	
Design	Open type	
Vector Group	Special design for all vector groups of standard type	
Core	High efficiency sheet core	
Windings	Copper or Aluminum wire with fiberglass or enamel insulation	
Insulation Class	F (H class is optional)	
Input		
Rated Input Voltage	3Phases Model: 400VAC 3Phases+Neutral+Ground	1Phase Model: 230VAC 1Phase+Neutral+Ground
	(Special design in different voltages upon request for voltage changing, device supply and other special applications)	
Voltage Tolerance	-%15 , +%15	
Frequency	50 Hz. +/-%5 (60 Hz. Optional)	
Output		
Rated Output Voltage	3Phases Model: 400VAC 3Phases+Neutral+Ground (Different voltages are optional)	1Phase Model: 230VAC 1Phase+Neutral+Ground (Different voltages are optional)
Short Circuit Voltage	5% (Average)	
Efficiency	>90% - 98%	
Optional Features		
Cabinet	Custom-designed monoblock welded cabinet between IP21 and IP54	
Over-current Protection	Protection with Circuit Breaker at Input and Output (can be selected with Cabinet Option)	
Over-Temperature Protection	Warning and protection with over-temperature thermostat	
Display and Signals	Measurement and signaling options for voltage, current, temperature parameters (It can be selected with Cabinet Option)	
Environmental Conditions		
Operating Temperature	-10 °C ~ +40 °C	
Altitude Operating Height	1.500m	
Humidity	90% none condensed	
Protection Class	IP00	

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EHR
Reactors

Key Features
- Copper and Aluminum winding
- High efficiency sheet core
- Varnishing under vacuum
- Oven drying at high temperature
- Three Phases and single Phase
- Harmonic Filter Reactors
- Line reactors
- Motor reactors
- Shunt reactors
- Special production on order

Optional Features
- Cabinet for indoor environment and applications
- Fuse protection
- Over temperature protection with thermostat

EHR Reactors

are produced in 4 different groups as single Phase and three Phases, according to the purpose of use and design features.

Copper and aluminum windings of EHR Reactors are wound on high quality sheet cores. They are vacuum-impregnated varnished and high-temperature dried to ensure quiet and moisture-proof operation. It is long-lasting and safe.

Harmonic Filter Reactors

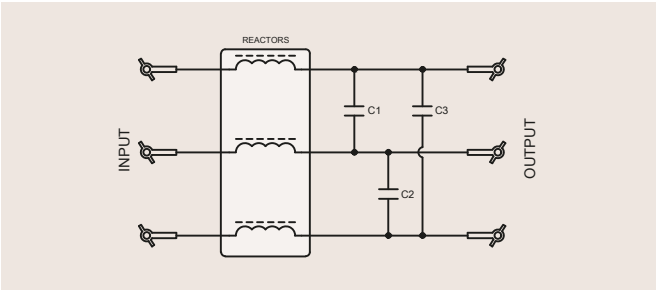
They are filter reactors used to reduce the current harmonics (THDI) in the network installation to the values required by the standards.

It is used in Reactive Power Compensation systems to limit the overcurrents that occur during the switching of the capacitor groups and to protect the capacitors.

In passive harmonic filter applications, it protects the connected loads against harmonic distortions and increases the immunity of the facility against electrical interference. It increases efficiency by reducing losses in power lines and power transformers.

Line Reactors

It reduces low-frequency harmonics and the distortions caused by it in the electrical installation. By limiting the starting currents of electrical machines and devices, it protects them and increases their lifetime. They are produced at 3% and 5% short-circuit voltage according to the needs of the facility.



Motor Reactors

It is used between motor drives and frequency inverters and motor. It filters high-frequency signals originating from motor drives and reduces inrush currents. It protects drives and inverters in short circuits in motor windings. It is designed and produced in accordance with the technical specifications and filtering needs of motors and motor drivers.

Shunt Reactors

It is used as an inductive load in reactive power compensation systems. They are specially produced at the suitable values for the needs of the facility.

Outdoor Type Cabinet and Protection Options

Special cabinet option with high protection class up to IP54 for special applications. Voltmeter, Ammeter and signal lamp options are offered with the special cabinet designed according to the needs. Fuse protection and over temperature protection for Input and Output.

Applications

- ✓ Reactive power compensation systems,
- ✓ Harmonic filter applications
- ✓ Industrial enterprises
- ✓ Automation systems
- ✓ Motor drive systems
- ✓ Iron and steel plants

Please contact with sales representative for special production requests and the right solutions.

Technical specifications

EHR Reactors		
General Features		
Power(KVAR) / Current(A)	Capable of power up to 100KVAR / current up to 1000A	
Design	Open type	
Rated Voltage	Three Phases 400V	Single Phase 230V
Rated Current	Between 5A-1000A	
Frequency	50 Hz. +/-%5 (60 Hz. Optional)	
Core	High Efficiency Sheet Core	
Windings	Copper or Aluminum wire with fiberglass or enamel insulation	
Insulation Class	F (H class is optional)	
Protection Class	IP00	
Production Method	Varnishing under vacuum - firing on high temperature	
Environmental Conditions		
Operating Temperature	-10 °C ~ +40 °C	
Altitude Operating Height	1.500m	
Humidity	90% none condensed	
Protection Class	IP00	

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EDIT
ELECTRONIC

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