VOR

VOR-3P200x5-S400-4CT-MTP
MODULAR VOLTAGE REGULATOR

- 200 kVA - 3,200 kVA power range with one device.
- Multi master parallel voltage regulator systems with high speed CAN BUS communication protocol.
- Standalone and Parallel working Capability
- Post-add feature for Parallel working function.
- Adjustable input voltage range,

  S1: -25%,+15% range.
  S2: -20%,+20% range.
  S3: -15%,+25% range.

- High speed regulation with Smart voltage correction software (5 cycle).
- Maintenance-free desing with CPU controlled thyristors.
- 100% unbalanced voltage and Load Capability
- High Efficiency (typical %97)
- Equal load sharing,
- Selective remote on / off for each regulator.
- Remote management and monitoring with ETHERNET and MOD-BUS RTU interfaces.
- User friendly, easy and comprehensive LCD Display and mimic diagram.
- Electronic overload proctection.
- Under voltage/over voltage protection.
- Over temperature and thyristör failer proctection.
- Manuel by pass switch for maintenance (optional).
- Uninterabtable automatic by pass function (optional).
- Special design for dusty industrial environments with high humidity or vibration.
- Production according to ISO 9001:2008 Quality Management System.

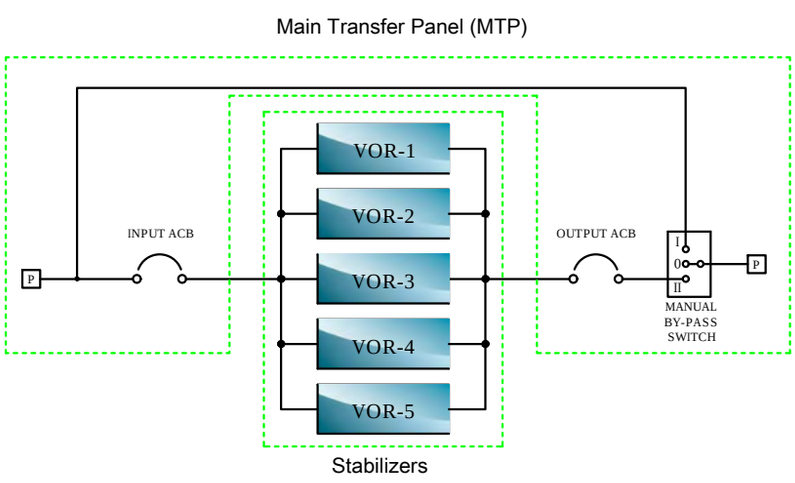


Figure - 1: Parallel redundant voltage management solution.

What is the Parallel Redundant Voltage Stabilizer?

VOR is an AC optimisation and regulation unit which supplies continuous,safe and constant voltage to the critical industrial machines and equipments. It adjusts the unstable grid voltage to the rate which is calculated according to the facility's unique conditions.

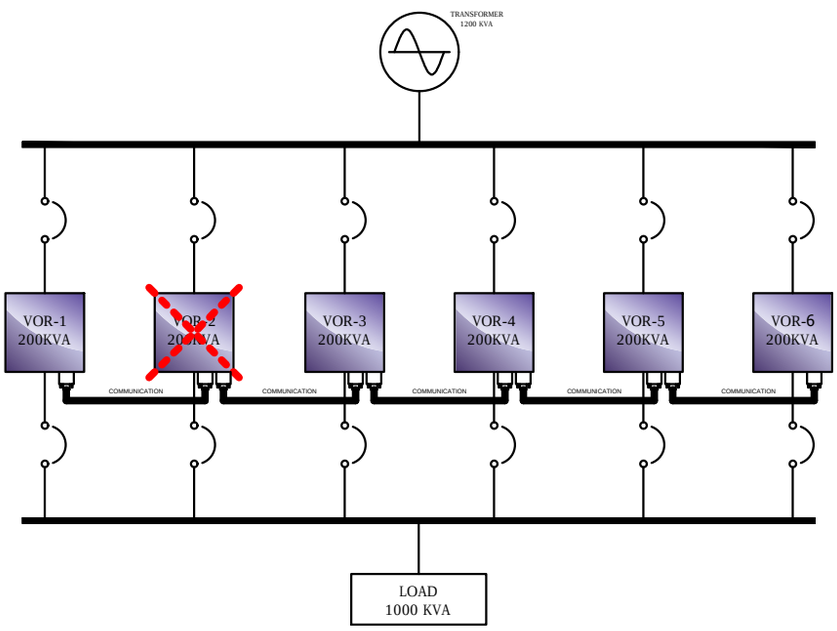
Parallel Architecture;

VOR voltage regulators can operate in parallel, by short-circuiting the inputs and the outputs . Up to 16 units connected in parallel, can run as a single unit. With the patented "parallel voltage regulator" technology, they can maintain synchronous operation , fast and safe voltage regulation. All the units can work as a "master" with the specially developed high speed CAN BUS communication protocole.

There is no need for an extra unit or a device for parallel operation. If any of the regulators fails, the remaining units will continue to work in parallel without any interruption.

N+1 Redundancy;

Uninterruptable redundant full power operation with parallel connection of one more additional regulator! If any of the regulators are shut-down for reparing or maintenance purposes , the remaining ones will continue to supply the system. Repaired unit can be taken online automatically without any interruption.



Normal Condition : All units working, each unit with %80 capacity.
Failure or Maintenance : If 1 unit fails, 4 units continue to work, each unit with 100% capacity.

Figure - 2 : N+1 Redundancy

Scalable and Flexible Design;

Invest in your facility's power plant step by step. With scalable and flexible VOR regulators, don't make the procurement according to your future plans. Just invest in your current power requirement.

At the beginning stage , you don't need to decide the total system power or the quantity of the units. Just decide one single unit's power rating then when you need more power , you can make an addition to the system with a new regulator. When you need less power, you can just simply shut down one of the regulators. Manage your capacity and efficiency with scalable and flexible VORs.

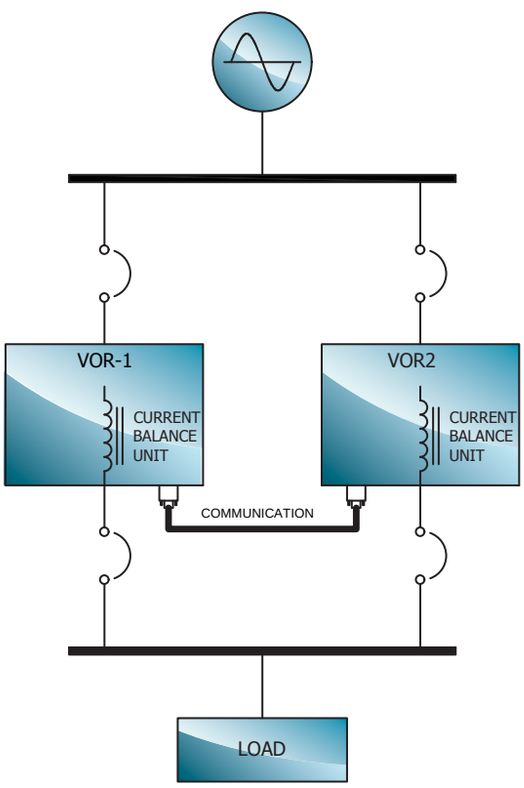


Figure - 3: Current sharing

Load Sharing;

The VOR regulators which have the same power and technical specifications, share the load current. The load sharing accuracy is better than +/-%5 . With the patented " parallel voltage regulator" technology, equal output voltage is maintained on all units. With this technology total load is shared equally between the parallely connected regulators and no circulation current occurs between the regulators. The conductivity difference on the semi-conductor components , is eliminated with "load balance unit" included in the VOR's.

High Power Applications up to 3200KVA;

One and only voltage management solution for the high power industrial applications! You can supply safe and stabilized voltage to a huge plant with totally 3200KVA power capacity, by parallely connecting 16 regulators with 200KVA power rating for each. Stand alone VOR regulators are manufactured for 3 phase systems from 15kva up to 3.200kva.

Share out the Risk by Parallel Redundant Voltage Management;

Use parallel redundant voltage and power management system for safe and continuous operation!
Do not rely on just one single machine for your facility and investment. All electrical devices and machines can fail. To use 1 x HV/LV transformer , 1 x voltage regulator, 1 x distribution unit, have a high risk. In any case of failure, all the facility will stop until the problem is fixed. For high power ratings, in stock spare parts supply is hard and takes time. To eliminate this risk, use parallel redundant solution. If any of the regulators are shut down for reparing or maintenance purposes , the remaining ones will continue to supply the system. With using VOR, we offer you a solution consisting of 2 or more regulators connected in parallel, for almost the same price of a single unit.

Industrial Voltage Management For All Kind of Grid Network Applications;

VOR units, as a stand alone unit or as a parallel system, can be manufactured compatible for all kind of grid voltages.
(208V AC - 380V AC - 400V AC - 415V AC - 480V AC - 600V AC ,etc. Three Phase/Single Phase/50,60 Hz.

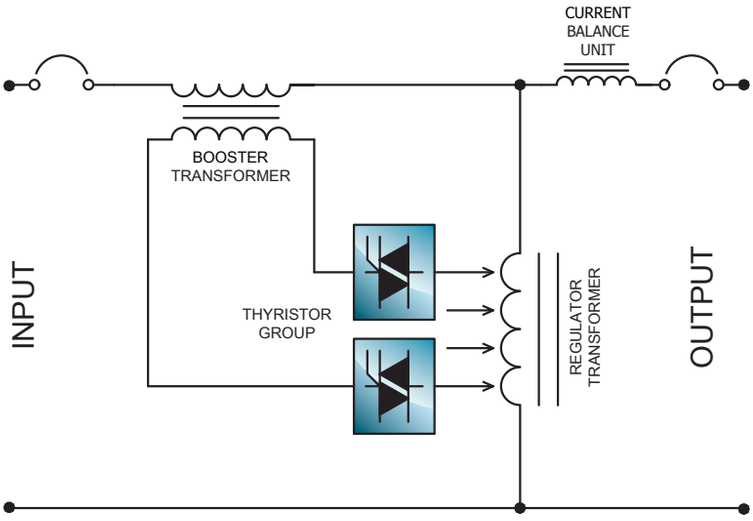


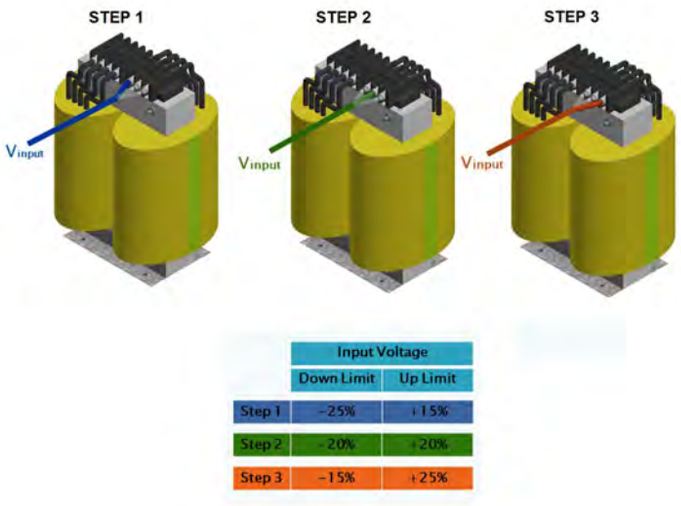
Figure - 4: With high speed SCR technology

With High Speed SCR Technology;

CPU controlled, high speed switching thyristor technology is used in VOR units. Tyristors which switch on the zero-cross of the grid signal, do not create any harmonics. Real power is transmitted via the booster transformer to the load. Only the necessary power for voltage buck and boost , is transmitted through the thyristors. Very fast voltage stabilization is done on instant voltage changes. Sensitive electronic devices do not get affected or harmed from this voltage fluctuation.

Ajustable Input Voltage Range and High Output Accuracy;

VOR have adjustable input voltage range featured regulation transformers. To change the range of voltage all you have to do change the connection point on regulation transformer.



	Input Voltage	
	Down Limit	Up Limit
Step 1	-25%	+15%
Step 2	-20%	+20%
Step 3	-15%	+25%

Figure - 5: Wide input voltage range. High output accuracy.

TECHNICAL SPECIFICATIONS OF VOR SERIES 3 PHASEPARALLEL REDUNDANT VOLTAGE STABILIZERS

Model	VOR-3P200x5-S400-4CT-MTP		
Unit Power (kVA)	200		
Total Power	1000		
Parallel Configuration	Up to 16 units can be connected in parallel.		
INPUT			
Voltage	400 V AC Three Phase + Neutral (Different voltage ratings are available.)		
Adjustable Voltage Tolerance	**S1**: -%25, +%15	**S2**: -%20, +%20	**S3**: -%15, +%25
Max. Input Current	Total Current: 1450A (Each unit current: 290A)		
Frequency	50Hz ± 5% (Optional 60Hz)		
OUTPUT			
Voltage	400 V AC Three Phase + Neutral (Different voltage ratings are available.)		
Voltage Tolerance	± 2% (up to ± 1%)		
Frequency	50 Hz ± 5%		
Current	Total Current: 1935A (Each unit current: 387A)		
Overload Capability	101%-125% 3 min., 126%-150% 10 sec., 151% load 0,2 sec., after then output shut-off		
Response Time	20 msec		
Correction Speed	500 V/sec full regulation up to 3 cycles		
Efficiency	> 97% typical		
Output Connection	Copper busbar terminal		
COMMUNICATION INTERFACE			
Parallel Communication Interface	CAN-BUS communication up to 100mt distance with CAT-5 cable		
Remote Management and Monitoring Interface	✓ Browser based remote management with ethernet connection. ✓ MOD-BUS RTU with RS485 connection		
LCD Display	Input Voltage Value, Output Voltage Value, Output Load Percent, Output Frequency,Stabilizer settings, Stabilizer Condition and Failure Info, Warnings (Overload, over temperature, input failure, output failure, etc)		
Dry Contacts	Dry contacts for device status (optional)		
PROTECTION			
Input Voltage Protection	Stabilizer shut off electronically under / over voltage		
Output Voltage Protection	Stabilizer shut off electronically under / over voltage		
Input Current Protection	MCB		
Output Current Protection	MCB		
Output Overload Protection	101%-125% 3 min., 126%-150% 10 sec., 151%-200% load 0,2 sec., above 200% immediately output shut-off		
Over Temperature Protection	Stabilizer shut off fo over - temperature		
Manual By-Pass Switch	(I-0-II) position manual By-Pass switch for failure and maintenance (optional)		
Surge Arrester	Suitable surge arrester unit for lightning and high voltage (optional)		
ENVIRONMENTAL CONDITIONS			
Operating Temperature	-10 °C ~ +40 °C (optional cooling units on request)		
Altitude	< 3000 m		
Humidity	90% none condensed		
Acoustic Noise	< 55dB		
CABINET SPECIFICATIONS			
Type - Protection Class	Indoor - IP 21 (optional outdoor cabinets on requets)		
Color	RAL 7035		
Base	Wheel / Plinth		
Cooling	Air forced Fans		
Unit Dimensions (WxDxH) cm	60x100x160		
Unit Weight (kg)	600-700 (Optional choices affect weight)		

Optional Specifications

OPTION	CODE	DESCRIPTION
Non-standard input voltage value	xxxV	VOR series voltage regulators can be produced at any required input voltage value that must ve stated clearly by the order confirmation.
Non-standard input voltage range	XS,M,L,XL	VOR series voltage regulators can be produced at different input voltage range. The required levels must be stated clearly by the order confirmation. Maximum input voltage range: -%60, +%40
Non-standard output voltage value	xxxV	VOR series voltage regulators can be produced at any required output voltage value that must be stated clearly by the order confirmation.
Non-standard output voltage tolerance	R	Output voltage tolerances of regulators can be +/-1%, +/-2%, -3%, +/-5%
Adjustable output voltage	ADJ	Output voltage of VOR series regulators can be adjusted by the LCD panel. Maximum adjusting range is +/-15%
Non-standard frequency	FRQ	VOR series voltage regulators are produced to function with 50Hz network frequency. If 60 Hz is required this must be stated cleary order confirmation.
Output protection MCCB	OCB	Optional MCCB may be added to the regulator output to provide additional protection.
Automatic uninterruptible By-Pass	ABP	Automatic Uninterruptible By-Pass unit may be added to the output of VOR series voltage regulators.
Input/Output transformer	TRF	Isolation Transformer or Voltage Changing Auto-Transformer can be supplied for both input and output of VOR series voltage regulators. Reguired transformer specification must be given by the order
Special enclosure	K	VOR series voltage regulators can be produced both INDOOR and OUTDOOR in special cabinets having different IPXX protection classes.
Input/Output EMC filter	EMC	Specially designed EMC-Filters can be added optionally to the both input and output of VOR series voltage regulators. Filter specifications must be stated by offer/order.
Input/Output surge protector	SPD	High-Voltage Protection and Surge Arrester can be added to the both input and output of VOR series voltage regulators. The required protection classes and the specifications (CLASS-I, CLASS-II, SLASS-III) must be given with the order.
Remote monitoring and management unit	RMU	For remote monitoring and managing of VOR series voltage regulators, Remote Management and Monitoring unit can be added optionally. No any other software is needed for this RMU unit which provides a browser based communication over LAN- connection or internet.
Dry contacts	C	NO-NC dry contactor sockets can be applied for ON-OFF and Automatic By-Pass modes of the regulators.
Non-standard Input/Output terminal	T	According to the various customer needs. Input and output terminals can be designed and located specially on the cabinet. The required terminal drawings must be supplied together with the offer/order.
Special design and accessories	SPM	VOR voltage regulators can be designed specially with respect to direct customer needs and teachnical specifications. All special requirements and detailed teachnical drawings and specifications for accessories must be provided by the customer at the offer/order stage.
Parallel connection management unit	PCM	Up to 4 svs units can be connected in parallel for special high power aplications. A PCM unit is used for management and syncronization when svs unit are connected in parallel.
Special operating temperature	SOT	Custom device these can operate in special operating temperatures can be manufactured on demand.

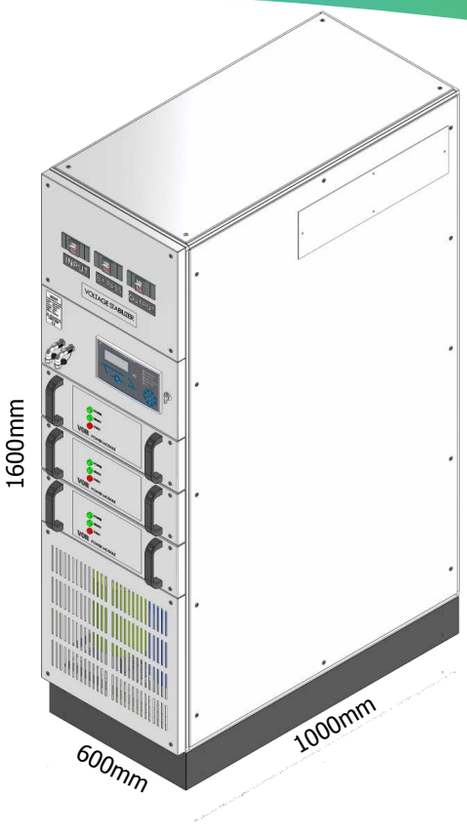


Figure - 6: Front View

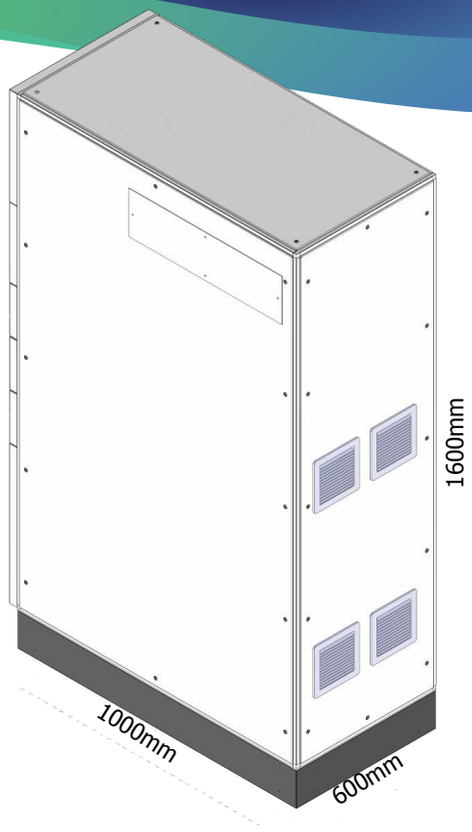


Figure - 7: Rear View

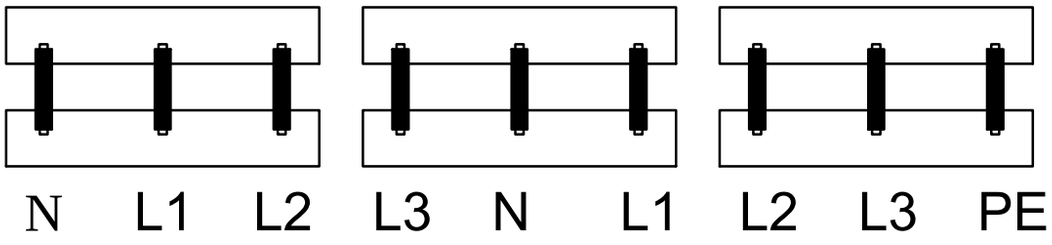
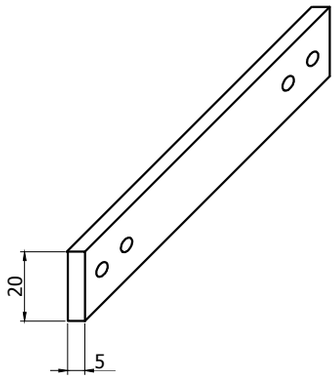


Figure - 8: Input Output Terminals and Copper Bus Bar Dimensions



Note: The above busbar measures are the S model device.
Busbar measures change in other models.

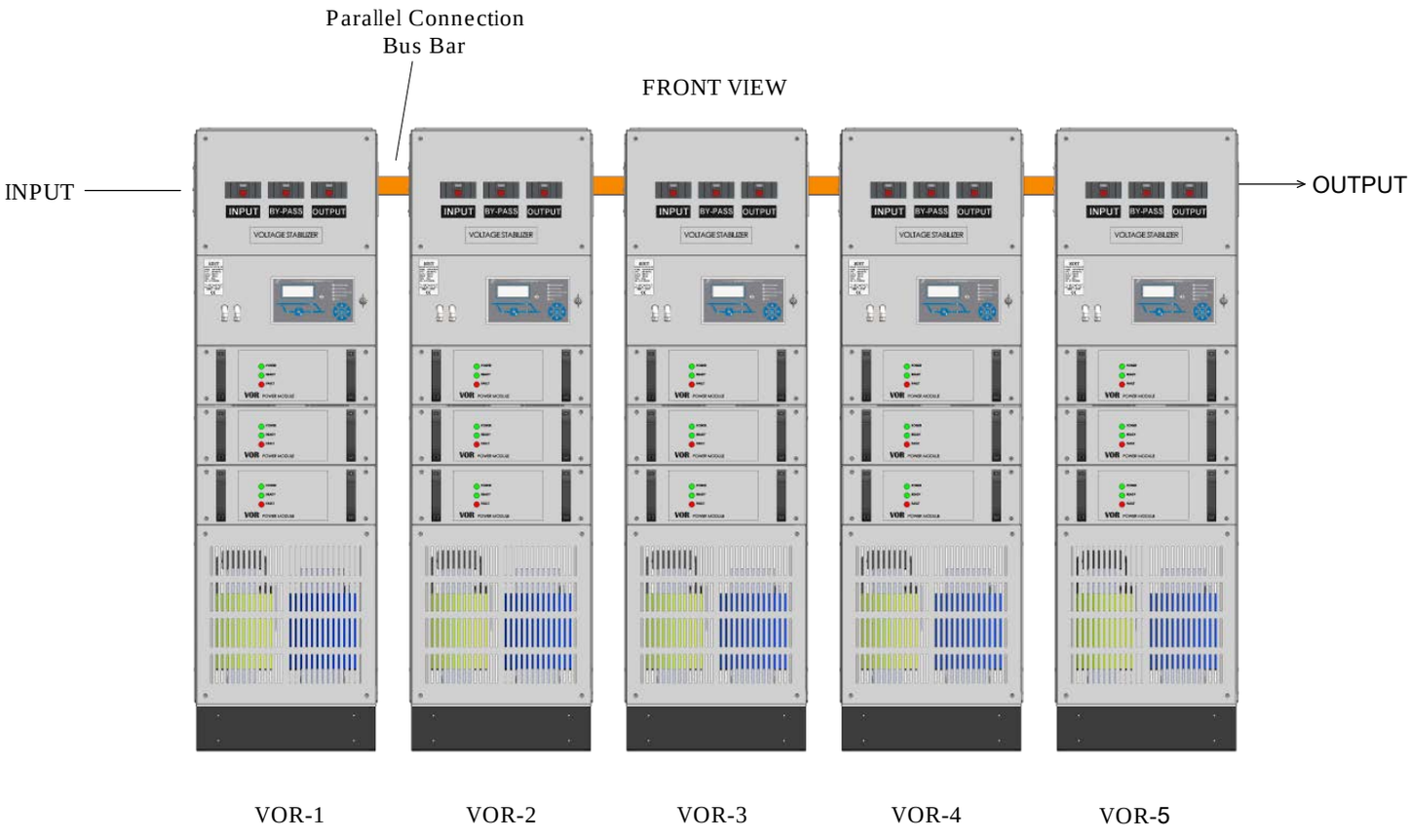


Figure - 9: Parallel Connection Application - I

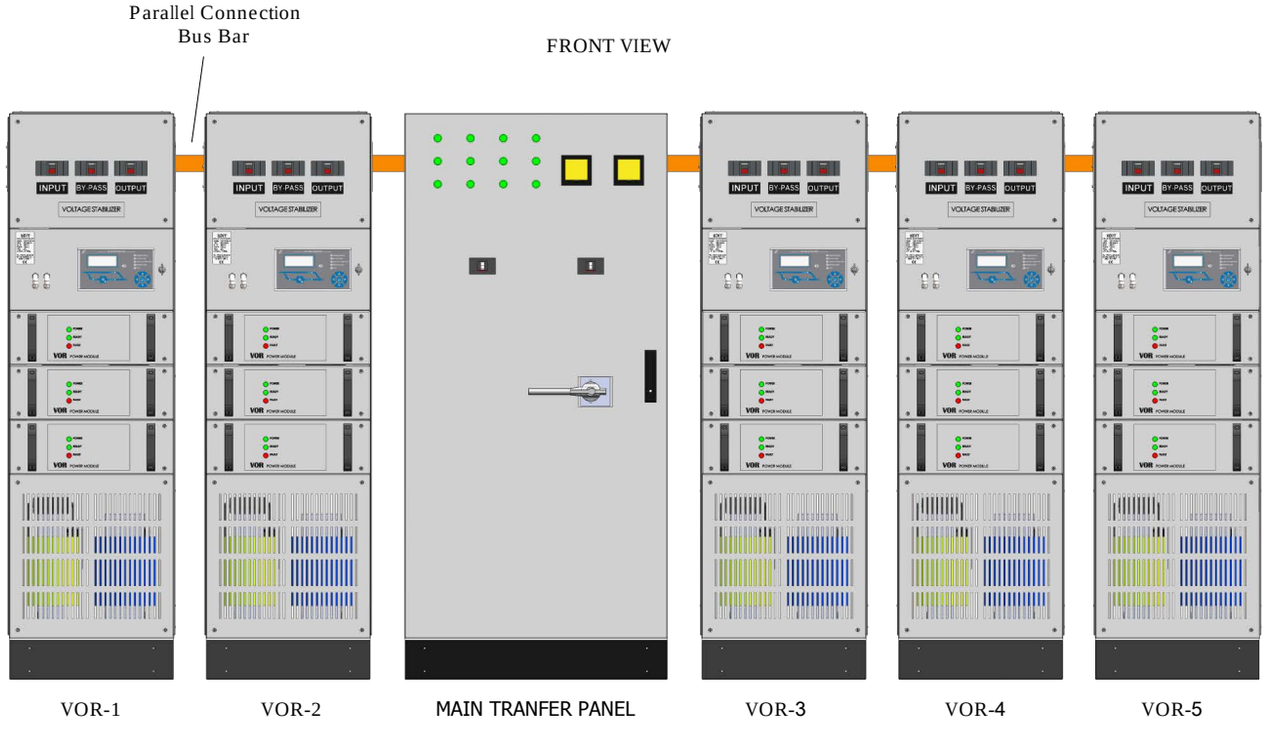


Figure - 9: Parallel Connection Application - II