

→ VARIS™ – THE MODULAR CONVERTER SYSTEM



# THE VARIS™ CONCEPT: MODULAR, VARIABLE, SUSTAINABLE AND EFFICIENT

A modular system, in which individual phase components are defined as a standard and can be combined with one another depending on the power required, is GvA's innovative conceptual approach.

As in a modular system, individual phase components can be configured flexibly. Individual half-bridge modules are configured to form single-phase or three-phase inverter topologies and are connected in parallel depending on the required total power. This ensures scalability to various

power classes. Step-up and step-down converters as well as rectifier components are available, too. The user can choose between air or water cooling.

With this concept, a high degree of sustainability is achieved through the use of standard components, which can also be easily replaced at a later date if necessary. This ensures a high degree of economic efficiency.



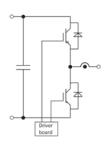
### VARIS™ - SMALL COMPONENTS WITH BIG POWER

Based on the renowned PrimePACK® modules available in various power classes, VARIS $^{\text{TM}}$  is a complete IGBT half-bridge module comprising all components required for immediate use.

This basic unit already includes the necessary DC-link capacitors, the cooling unit, the IGBT driver and the current sensor. An optional voltage transformer may also be included. VARIS™ is available with air or water cooling.

Maximum power density is achieved through the individual cooling of each individual IGBT module and optimised heat dissipation. Control signal transmission for activation and error reporting may be implemented both optically and electrically as required.





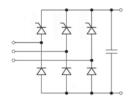


#### **WELCOME TO THE HOUSE OF COMPETENCE**

## VARIS™ R - THE MODULES FOR RECTIFICATION

If necessary, a suitable rectifier is available, which fits seamlessly into the VARIS<sup>TM</sup> family – in uncontrolled, semi-controlled or fully-controlled versions as required. Moreover air or water cooling can be chosen as desired. The control unit for the secure firing of the thyristors, the surge suppressor circuit and the DC filter capacitors suitable for the entire system are included as standard.





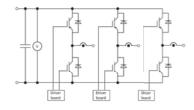


### VARIS™ XT COMPACT - POWER IN A COMPACT PACKAGE

VARIS™ XT Compact is the powerful alternative to individual VARIS™ phase legs. Three PrimePACK® IGBTs sharing a common heat sink generate an output power of 300 kW up to 1.4 MW. Air or water cooling is optionally available. The parallel connection of VARIS™ XT Compact components with the interlinking system of the DC link for multiplying the power of the entire system is as easy

as with the basic version VARIS $^{\text{TM}}$ . An interface board collects the IGBT signals as well as current, voltage and temperature values and transfers them to the plant control system.



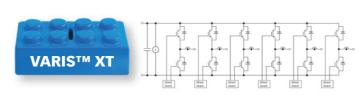




### VARIS™ XT - MEGAWATTS IN INTELLIGENT DESIGN

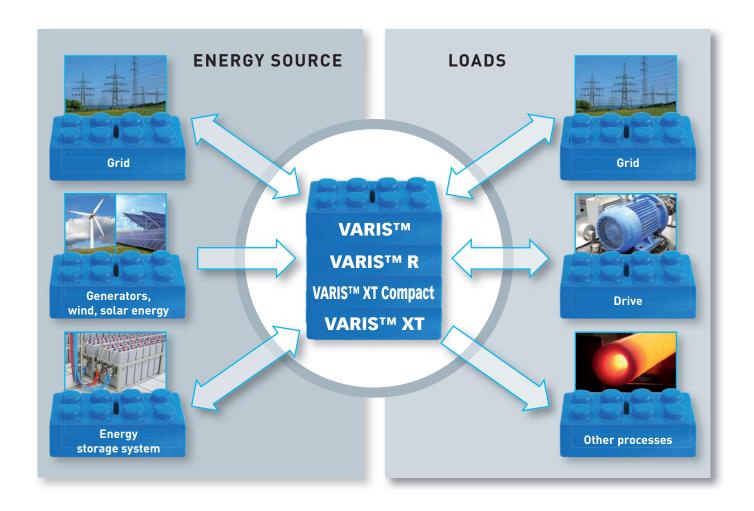
VARISTM XT is the choice if high power density is required in very confined space. Depending on the ambient conditions, power values of up to 2 MW can be reached with one module. Six PrimePACK® IGBTs are positioned compactly on a highly efficient water-cooling unit and connected to a common DC link. This means that two separate inverters (active rectifier and load inverter) can be configured in the same way as the parallel connection of individual PrimePACK® modules for an increase in

power. 21 capacitors provide the required capacity in the intermediate circuit. VARIS™ XT, using the interlinking system on the DC bars too, enables the low-induction interconnection of VARIS™ XT modules. With a back-to-back configuration of two VARIS™ XT units connected in parallel up to 4 MW can be achieved.





# VARIS™ - YOUR CONNECTION BETWEEN ENERGY SOURCE AND LOAD



### HIGH LEVEL OF INFORMATION DEPTH IN TERMS OF ACTIVATION

The GvA plug & play driver for the PrimePACK® modules, which has proven itself in practical use, has already been available on the market for some time. It is also used in the standard version of VARIS™. In addition to the actual driver functions, it is also equipped with an analog or pulse-width-modulated temperature output for the thermal monitoring of the IGBTs. Moreover the driver features short-circuit disconnection and status feedback of the individual IGBTs to the user's control system.

The signal transmission may be either optical or electrical. An optional interface board gathers all measurement signals (current, voltage, temperature) as well as the IGBT activation and status signals thus simplifying connection to the user's system.



## MECHANICAL AND ELECTRICAL FLEXIBILITY

The VARIS™ concept offers the user a vast mechanical flexibility regarding the possible combinations of components and their arrangement in the switchgear cabinet. Therefore, customer requirements can be fulfilled easily.

The electrical flexibility can be implemented easily with the phase modules. But the powerful VARIS™ XT and VARIS™ XT Compact modules also impress with their flexibility. The central interface board not only

gathers all the signals, but also enables the easy and variable interconnection of the half-bridge modules. Therefore, a variety of interconnections can be implemented without any mechanical modifications.

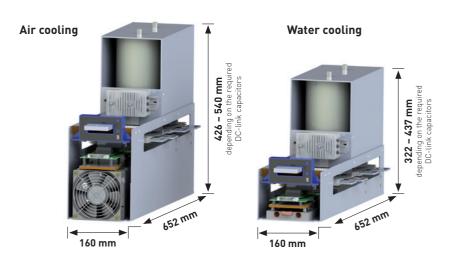




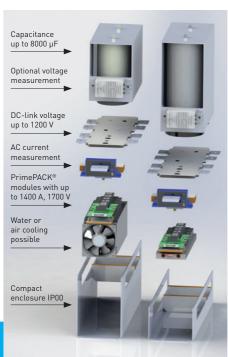
### THE TECHNICAL DETAILS OF VARIS™ IN BRIEF

- → IGBT modules installed in the PrimePACK® enclosure
- → IGBT voltage classes: 1200 V or 1700 V
- → IGBT current classes: up to 1400 A
- → Capacitance of the capacitors: up to 8000 µF per module (expandable with external capacitor bank)
- → Parallel connectability of the modules
- → Air or water cooling
- ◆ Use of plug & play drivers
- → Variable supply voltage, DC link voltage, pulse frequency and output frequency

#### **VARISTM**



For detailed data sheets of the VARIS™ series visit our website: gva-leistungselektronik.de/en/varis



# VARIS™ MODULES AT A GLANCE

Туре	Output / Input voltage [V <sub>rms</sub> ]*	Cooling	Output phase current [A <sub>rms</sub> ]*	System output 3-phase [kW]*
VARIS-06-12-A	400 V	Air	440	289
VARIS-14-12-A	400 V	Air	747	491
VARIS-06-17-A	690 V	Air	292	332
VARIS-10-17-A	690 V	Air	464	527
VARIS-06-12-W	400 V	Water	827	545
VARIS-14-12-W	400 V	Water	1619	1065
VARIS-06-17-W	690 V	Water	671	762
VARIS-10-17-W	690 V	Water	1056	1199
VARIS-14-17-W	690 V	Water	1242	1410
VARIS-R-580-U	400 V / 690 V	Air / Water	for all VARIS™ types	
VARIS-R-400-H	400 V / 690 V	Air / Water	for all VARIS™ types	
VARIS-R-400-C	400 V / 690 V	Air / Water	for all VARIS™ types	
VARIS XT-Compact-06-12-A	400 V	Air	440	289
VARIS XT-Compact-14-12-A	400 V	Air	747	491
VARIS XT-Compact-06-17-A	690 V	Air	292	332
VARIS XT-Compact-10-17-A	690 V	Air	464	527
VARIS XT-Compact-06-12-W	400 V	Water	827	545
VARIS XT-Compact-14-12-W	400 V	Water	1619	1065
VARIS XT-Compact-06-17-W	690 V	Water	671	762
VARIS XT-Compact-10-17-W	690 V	Water	1056	1199
VARIS XT-Compact-14-17-W	690 V	Water	1242	1410
VARIS XT-14-12-W	400 V	Water	2591	1703
VARIS XT-10-17-W	690 V	Water	1690	1916
VARIS XT-14-17-W	690 V	Water	1987	2254

\* Values at  $f_{sw}$  = 2 kHz,  $T_{inlet}/T_{amb}$  = 25 °C,  $cos(\phi)$  = 0,95

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