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Hall 9, Stand 207

**Flexible power based
on a modular concept:
VARIS™ –
the modular inverter system**

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Flexible Power Based on a Modular Concept

Ready-to-use inverters from the most varied manufacturers in diverse power classes simplify the realisation of projects because no expensive development of the electronic output stage is required. The user receives a complete and qualified solution, but variability and consideration of specific wishes are often neglected. VARIS™, the new modular inverter system, has the appropriate response.

By Erik Rehmann, Marketing Manager, and Daniel Rückert, Product Manager, GvA Leistungselektronik GmbH

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 a new and innovative conceptual approach. It is precisely this concept that has recently been pursued by the Man-

Small components with big power

The smallest basic unit of VARIS™ consists of an IGBT half-bridge module available in the familiar PrimePACK™ housings in various power classes.

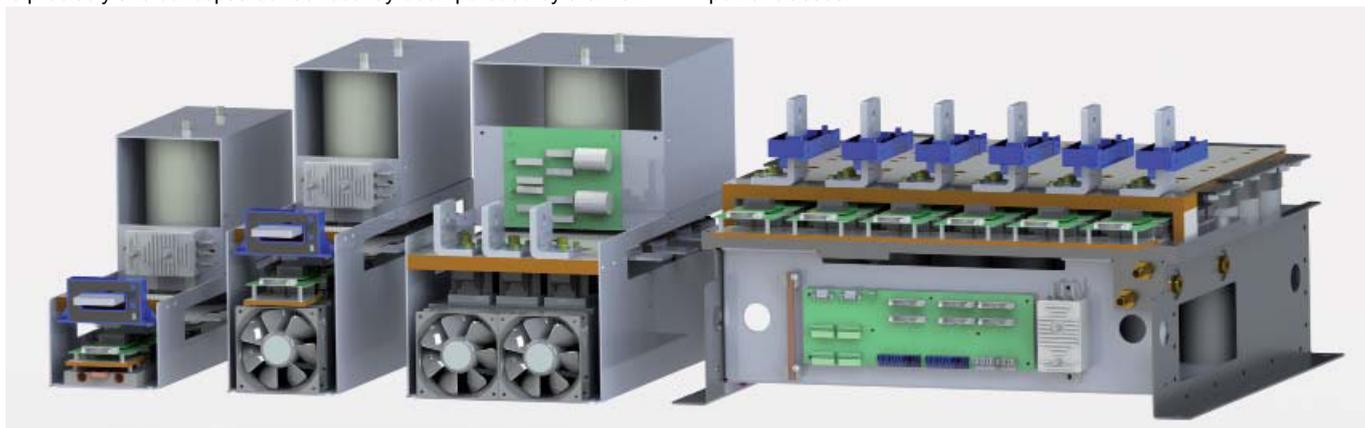


Figure 1: The modular VARIS™ inverter system offers flexible power from a modular concept

nheim-based GvA Leistungselektronik GmbH under the brand name VARIS™. The distributor, developer and producer of customer-specific power electronics considers this the ideal approach to flexibly address customer wishes despite standardisation. 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. Air or water cooling can be chosen as required. 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.

“Black box thinking”, in which the individual components are not clearly recognisable or can’t even be replaced, is no longer up to date. Instead, the wish is for a certain degree of flexibility and influenceability with respect to the individual requirements for the usage of the reliable system components. And nonetheless, the power electronics output stage should already have been tested and be immediately useable. The user now only needs to connect his controller and the system is ready to use.

The basic unit already includes the necessary DC link capacitors, the cooling unit, the IGBT driver and the current sensor. An optional voltage sensor 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.

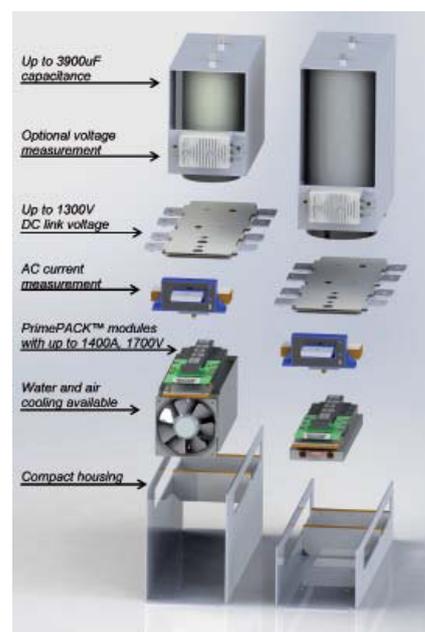


Figure 2: The modular concept enables flexibility, economic efficiency and sustainability

In order to build, for example, a common 3-phase inverter, three, at 22kg relatively light, VARIS™ units are now simply connected in parallel. The units are connected with the standard interlinking system. In case of maintenance, this also enables easy replacement of individual units from an installed system. The power range of the 3-phase VARIS™ versions starts at approx. 150kW and extends to 1.4MW with water cooling and the most powerful IGBT modules.



Figure 3: The link system facilitates the connection of the units into a 3-phase inverter extremely

The technical details of VARIS™ in brief:

- IGBT modules in PrimePACK™ housing
- IGBT voltage classes: 1200V or 1700V
- IGBT current classes: up to 1400A
- Capacity of the capacitors: up to 3900µF per module (expandable with external capacitor bank)
- Parallel connectability of the modules
- Air or water cooling
- Use of plug & play drivers (optional with Amantys Power Insight™; transmission and real-time analysis of IGBT operating data)
- Variable supply voltage, DC link voltage, frequency and output frequency

VARIS™ R – rectification made easy

If necessary, the user also has a suitable rectifier available, which fits seamlessly into the VARIS™ family - in uncontrolled, semi-controlled or fully-controlled versions as required. Sensibly, a choice can also be made here between air or water cooling. As standard, the control unit for the secure firing of the thyristors, the suppressor circuit and the DC filter capacitors suitable for the entire system.



Figure 4: The appropriate VARIS™ R (left) rectifier docks easily onto the existing inverter

VARIS™ XT – the compact high-performance unit

VARIS™ XT is the choice if high power density is required in very confined space. Depending on the ambient conditions, power values of up to 2.0MW may be reached with one module.



Figure 5: VARIS™ XT delivers a lot of power with a very compact design

In contrast to VARIS™, six PrimePACK™ IGBTs are positioned compactly on a highly efficient water cooling unit and either directly or softly connected in parallel as two separate inverters. 21 capacitors ensure the necessary capacity of up to 24000µF in the DC link. Possible connection topologies are: a 3-phase inverter with two IGBT modules connected in parallel, two individual 3-phase inverters, single exclusively as an active front end (AFE) or as a complete back-to-back converter. All AC inputs or outputs have an actual current value acquisition of their own. As standard, the DC link voltage is recorded, too.

As with the basic version VARIS™, parallel connection of the VARIS™ XT components is easy to realise with the interlinking system, thus multiplying the power values. Up to 2MW are possible with a back-to-back configuration with two VARIS™ XT units connected in parallel and up to 4MW with an active front end configuration.



Figure 6: VARIS™ XT, too, convinces with its variety of variants – here in a back-to-back configuration

High level of information depth, also in terms of activation

The GvA plug & play driver for the PrimePACK™ modules, which has proven itself in practical use, has already long been available on the market. 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 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) and IGBT activation and status signals, thus simplifying connection to the user's system.

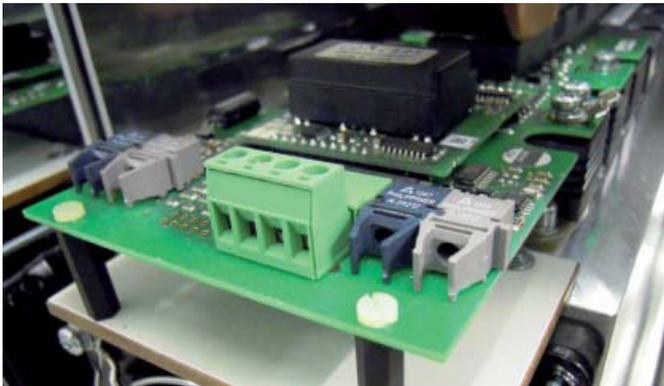


Figure 7: The plug & play driver for the PrimePACK™ modules is a development of GvA

Alternatively, the Amantys Power Drive™ plug & play drivers for VARIS™ are available. With Power Insight™ IGBT data can be received online in real time, operating statuses visualised, long term measurements or remote and fault diagnoses carried out.

The user receives real-time data on the performance of the system and, if necessary, can take targeted preventive measures, regardless of whether the system is close by or, as in the case of an offshore wind turbine, difficult to reach. This makes diagnosis or maintenance planning very comfortable and cost-efficient even from a distance.

Type	Output / Input Voltage [V _{rms}]	Cooling	Output Phase Current [A _{rms}]*	System Power 3-phase [kW]*
VARIS-06-12-A	400V	forced air	440	289
VARIS-14-12-A	400V	forced air	747	491
VARIS-06-17-A	690V	forced air	292	332
VARIS-10-17-A	690V	forced air	464	527
VARIS-06-12-W	400V	water	827	545
VARIS-14-12-W	400V	water	1619	1065
VARIS-06-17-W	690V	water	671	762
VARIS-10-17-W	690V	water	1056	1199
VARIS-14-17-W	690V	water	1242	1410
VARIS XT-14-12-W	400V	water	1619	2130
VARIS XT-10-17-W	690V	water	1056	2398
VARIS XT-14-17-W	690V	water	1242	2820
VARIS R-580-U	400V / 690V	air / water	suitable for all	VARIS™ types
VARIS R-400-H	400V / 690V	air / water	suitable for all	VARIS™ types
VARIS R-400-C	400V / 690V	air / water	suitable for all	VARIS™ types

* Values at $f_{sw}=2kHz$, $T_{ref}/T_{amb}=25^{\circ}C$, $\cos(\varphi)=0.95$

Figure 8: Overview of the VARIS™ family

Welcome to the PCIM

Initial feedback is already corroborating the market attractiveness and diverse usage possibilities of the VARIS™ family. At the upcoming PCIM Europe in Nuremberg, the individual family members will be presented to an interested specialist public from 20 to 22 May at the GvA stand 9-207.

www.gva-leistungselektronik.de/VARIS

Note: PrimePACK™ is a registered trademark of Infineon Technology AG; Amantys Power Drive™ and Power Insight™ are registered trademarks of Amantys Ltd.

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