



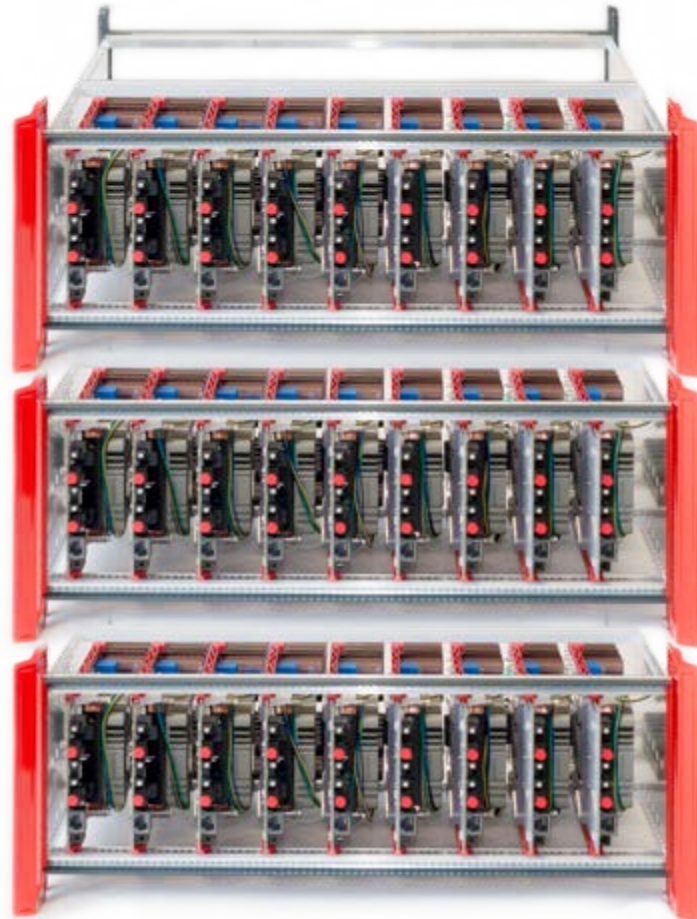
imperix

Modular power electronics

Everything you need to build up low-voltage converter prototypes

POWERTRENCH MODULES

Semi-industrial prototyping building blocks



REALISTIC ARCHITECTURE

Experiment at low voltage, while facing all the challenges of the control of advanced power converters in realistic conditions using the PowerTrench modules.

These building blocks implement not only the power switches, but all the necessary measurements, protections and signalling to mimic large power converters to help you identify the true control challenges, accelerate your developments and reach concrete and publishable results in no time.

MODULAR CONSTRUCTION

Work with power hardware that is not only perfectly suited for your immediate developments, but also your next one and those after that.

With the PowerTrench modules, reconfiguring the converter topology can be done by simple changes in the board-to-board cabling and rack-level configuration. This way, there are practically no limitations in the converter topologies you imagine and test inside your laboratory.

BOOMBOX CONTROLLER

The ultimate controller for fast and reliable development and testing



TAILORED INPUTS

The BoomBox power electronics controller embeds software-independent protections that block every output in case of any error within a few microseconds. This mechanism is often very useful when the control software is not yet entirely stable and allows to work in real-life applications with a total peace of mind.

Also, thanks to a flexible front-end featuring high- or low-Z inputs, filters and gains, moving from one application to another can be done within minutes.

DEDICATED OPERATING SYSTEM

Simple is beautiful is the guideline behind the BoomBox's operating system! It contains just what it needs to control your converter, including protection, communication and real-time supervision.

By avoiding the usual burden of conventional operating systems, control and interrupt frequencies up to several tens of kHz can be achieved, which brings high performance controls within everyone's reach, including for the most complex converter topologies.

VARIOUS POWER MODULES

A broad choice of building blocks for various types of applications

SEMI-INDUSTRIAL MODULES

PowerTrench modules embed two power switches from IXYS semiconductors (i.e. a half bridge), which can be freely selected among four possible types of devices. This allows various configurations, ranging from $600V_{DC}$ to $1200V_{DC}$ and 40–100 A depending on the switching frequency (LF- or MF-oriented).

The modules also possess desaturation detection, as well as voltage and current sensors, hence facilitating a quick implementation.

Two cooling variants are available, either using forced air cooling (80 W TDP) or water cooling (250 W TDP).

TEACHING-ORIENTED MODULES

The reduced ratings (10–15 A and 200–400 V) of the smaller modules are designed for proof-of-concept and teaching-oriented applications.

Hence, in addition to the simultaneously available voltage and current measurements, these modules also possess over-voltage, over-current and over-temperature protections, which are managed by an independent onboard microcontroller.

Due to their simple air-cooled design, these modules are mostly limited by the thermal power envelope, although powerful devices can be selected, allowing for surge power applications.

AIR-COOLED HALF-BRIDGE



- » Freely selectable SMPD-X devices from IXYS
- » Up to 8 kVA per module
- » Up to 500 μF @ 800 V
- » Voltage and/or current measurement

DOWNSCALED FULL-BRIDGE



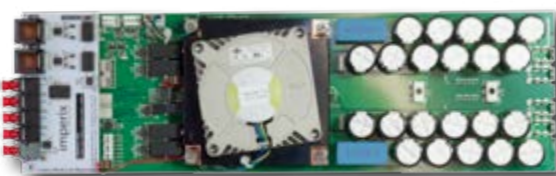
- » TO247 packages
- » Usable in full- or half-bridge mode
- » High short-circuit SOA
- » Programmable protections

WATER-COOLED HALF-BRIDGE



- » Freely selectable SMPD-X devices from IXYS
- » Up to 15 kVA per module
- » Up to 500 μF @ 800 V
- » Voltage and/or current measurement

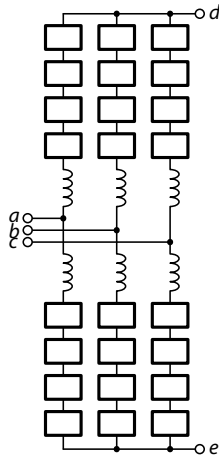
DOWNSCALED NPC CELL



- » Three-level NPC cell (one phase)
- » Up to $1200V_{DC}$ and $20A_{RMS}$
- » Programmable protections
- » Configurable local logic

UNLIMITED TOPOLOGIES

Build whatever you can imagine based on building blocks



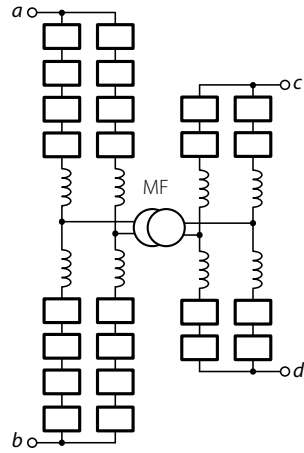
3X



24X



- » 15-30 kW on 230/400V AC grid
- » Up to 1200 V_{DC}
- » Upgradable to 6 BoomBoxes and 48 MMC cells



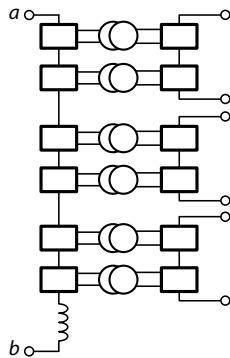
3X



24X



- » 10-25 kW between 1200 V_{DC} and 600 V_{DC}
- » Up to 1200 V_{DC}
- » Available with various IGBT devices and capacitor banks



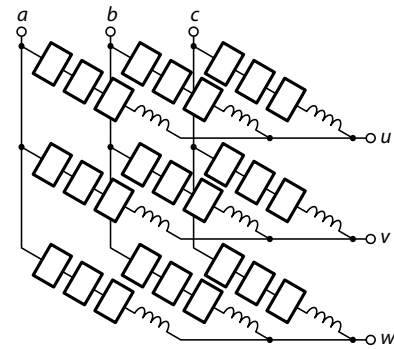
3X



12X



- » 3-10 kW depending on the topology
- » Up to 800 V_{DC}
- » AC and DC configurations are possible



6X



45X



- » 6-12 kW on 230/400V AC grid
- » Up to 600 V_{AC}
- » Usable with a lower cells count

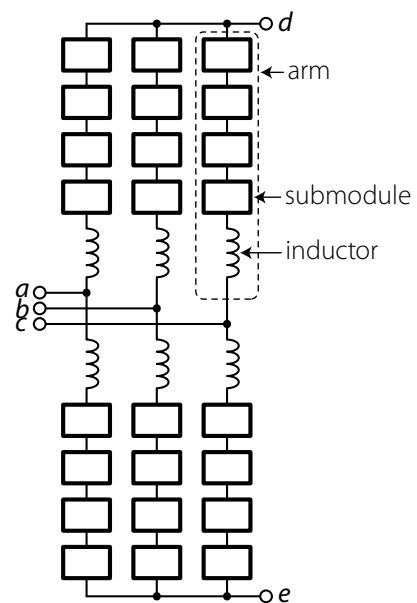
MMC QUICK-START PACKAGE

The easiest way to enter the world of Modular Multilevel Converters (MMC)

Make a grand entrance in the world of Modular Multilevel Converters (MMC) with a practically ready-to-use power conversion system.

The standard MMC prototyping bundle contains everything your need to implement a 230/400V grid-tied converter of 5-10 kW, including 3 BoomBoxes, 24 full-bridge submodules and the necessary software and cabling.

The only missing part is your own control strategy, and even for that you can get inspiration from our control examples, or even ask us to develop the control for you!



3x 

24x 

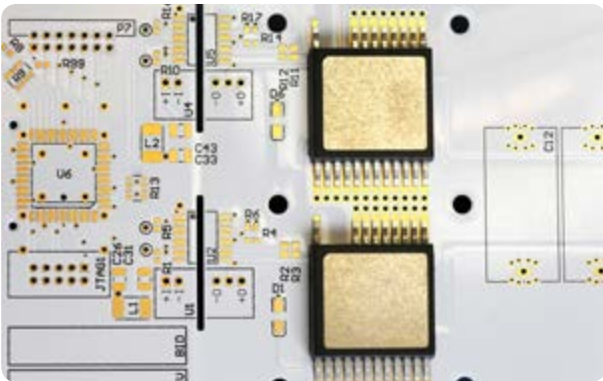
- » 5-10 kW on 230 / 400V AC grid
- » Up to 800 V_{DC}
- » Upgradable to full-bridge operation (with gating signals encoded on 2 bits)

PRODUCT CUSTOMIZATIONS

Customer-oriented solutions for control development and testing

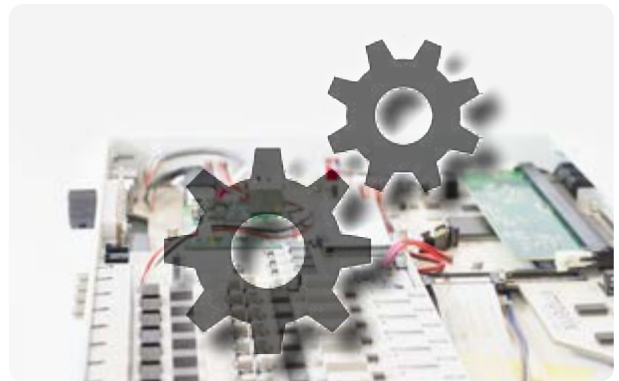
ALTERNATIVE CELL TOPOLOGIES

For those who desire to study and test alternative cell topologies, imperix offers custom development services, typically aiming to implement clamped double submodules, cross-type submodules, etc.



FPGA-BASED IP BLOCKS

Advanced firmware blocks are available for customized FPGA implementation, typically corresponding to sort-and-select voltage balancing algorithms, digital signal conditioning, etc.



ADDITIONAL MEASUREMENTS

When additional measurements are needed, power modules can be completed with our voltage or current sensors, ranging up to $50A_{RMS}$ and $800V_{DC}$. These sensors can be easily mounted on 35 mm DIN rails.



CUSTOMIZED ASSEMBLIES

Finished assemblies can be ordered, including independent temperature monitoring (LCD), precharge circuits, passives, additional cooling etc. Such systems are typically integrated into 4U rack-mountable units.



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