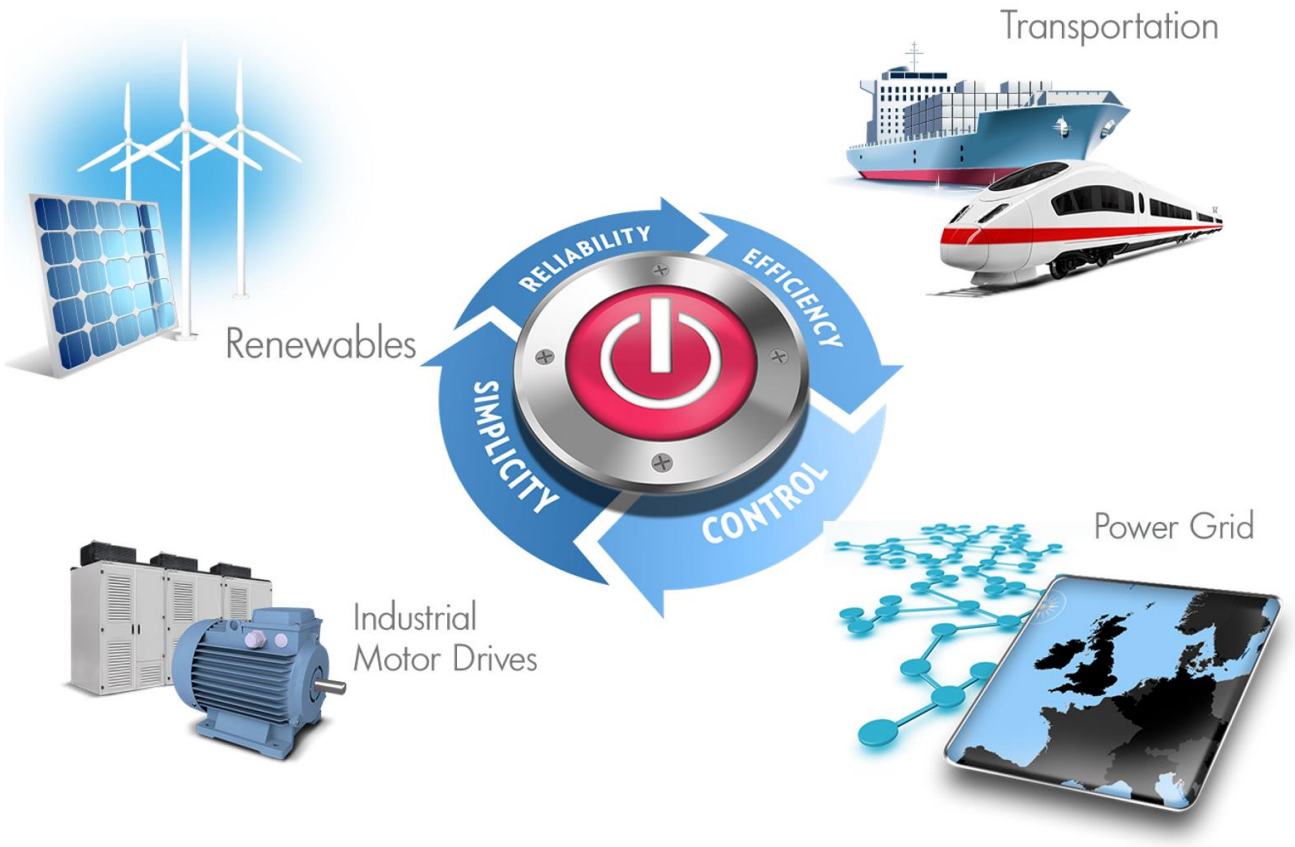
Smart Power Stack Technology



Company Brochure

COMPANY

Amantys delivers scalable, cost-effective solutions to meet the challenges of designing reliable and efficient power conversion in medium and high voltage applications.

Amantys is ISO9001 certified and backed by Maschinenfabrik Reinhausen GmbH (MR), a majority family-owned business founded in 1868 that is the world market leader in power transformer switching.

Company

Amantys is headquartered in Cambridge, UK, where a multi-disciplined team of engineers develop innovative products and solutions for power electronics switching.

- Digital Gate Drives
- Standard and custom designs
- Amantys Power Insight platform
- Amantys Data Logger
- Design and consultancy services

Applications

Our products are designed for operation in a wide variety of medium and high voltage switching applications.

- HVDC Voltage Source Converters
- STATCOMs
- Motor drives, locomotive traction
- Renewable energy converters
- Uninterruptible Power Supplies (UPS)
- Energy Storage Systems (ESS)
- Hybrid and Electric Vehicles (EV)

Quality

Amantys assures the quality of its products through a rigorous approach to design, qualification, verification and certification.

Design

- DFMEA
- Full component de-rating

Qualification

- Highly Accelerated Life Testing (HALT)
- Operation at extended temperature (HTOL)
- Shock and vibration testing
- Thermal cycling and damp heat
- Supply chain qualification

Verification

- Full envelope safe operating analysis
- In-house High Energy Test
- Single and double pulse testing
- Type I and Type II short-circuit test

Certification

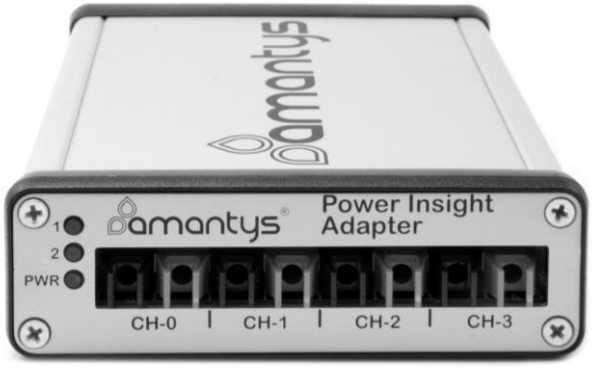
- ISO9001:2016 certified
- IPC Class 3 workmanship
- Full functional test on all products
- 100% partial discharge test

Amantys Power Insight™

Amantys Power Insight allows the power electronics designer or the operator to gain new insights into the performance of the inverter system without a major additional change or overhead to the system design.

Overview

Through the incorporation of on-board monitoring technology on an Amantys Digital Gate Drives a system enabled with Insight technology can provide real time data on the performance of the system, remote configuration of the gate driver and logging of important system parameters such as fault codes.



Graphical User Interface

Capability to monitor gate drive parameters remotely in real-time through the PC-based Power Insight Configurator tool.

Monitor Events

- Type I short circuit
- Type II short circuit
- Gate supply under-voltage
- Over-voltage clamp activation

On-board fault logging

- Fault events
- Parameter statistics
- NTC temperature measurement
- Data export capability

Remote Parameter Configuration

- Gate resistor values
- Gate-emitter capacitor value
- Fault lock out time
- Desaturation detection time
- Desaturation threshold voltage

Amantys Power Insight Protocol

- Compatibility mode similar to industry standard protocol for basic operation but access to monitored data on the receive channel
- Power Insight “normal” mode with configuration and control data superimposed on transmit and receive channel providing detailed monitoring and logging data
- IP protocols

Key Benefits

- Low complexity design
- Easy to upgrade an existing system
- Reduced number of sensors
- Extra data generated without additional sensors
- Monitoring of DC Bus voltage presents potential to remove the voltage transformer
- Remotely change gate drive parameters
- Remotely change gate drive parameters

Amantys Power Insight monitoring the thermal behaviour of individual IGBTs in a traction converter

Amantys Digital Gate Drives

Amantys gate drives are designed to support standard available IGBT and SiC modules from all main suppliers.

Please visit http:/www.amantys.com/products to see the full range.

Key Benefits

- High reliability design and testing
- Manufactured to ISO9001
- EMC EN61000-6-4:2007, EN61000-6-2:2005
- Monitors all rails for safe start-up with IGBT held off
- Integrated isolated on board DC/DC power supply for all gate drives up to 3300V
- External isolated DC/DC power supply for 4500V and 6500V gate drives
- Creepage & clearance to IEC 60077-1

Compatible with commercial alternatives

- Drop in replacement with same fibre-optic and power interfaces
- Improved start-up and programmable recovery times
- One gate drive per operating voltage for multiple vendor modules reduces inventory
- Simplified design and commissioning
- Lower no-load power dissipation
- Reduced self-heating for longer lifetime

Outline Specification

- Fibre optic interface
- IGBT short-circuit protection
- Two and three-level converter desaturation protection
- Active clamping
- Under-voltage lockout
- Extensive range of fault codes

Supported Module Outlines

- Single Channel
  - 140x130 mm HPM
  - 190x140 mm HPM
- Dual channel (Next Generation)
  - nHPD^2/LinPak
  - LV100/XHP2
  - XHP3

High Energy Test Facilities

- Single and parallel modules
- Up to 6500V and 3600A

Features	1700V/3300V Next Gen	1200V/1700V HPM	1700V/3300V HPM	4500V HPM	6500V HPM
Active Clamp	No	Yes	Yes	Yes	Yes
Type I/II desaturation protection	Yes	Yes	Yes	Yes	Yes
Multiple programmable desaturation levels	No	Yes	No	Yes	Yes
Programmable thresholds	No	No	Yes	Yes	Yes
Under-voltage protection	Yes	Yes	Yes	External	External
Isolated DC/DC converter	On board	On board	On board	Off board	Off board
Configurable gate resistors	No	Yes	Yes	Yes	Yes
Interface type	Fibre	Fibre	Fibre	Fibre	Fibre
Amantys Power Insight	Yes (compat mode)	Yes	Yes	Yes	Yes

CASE STUDY

Amantys Digital Gate Drives in Action

Multiple demanding and high reliability traction applications

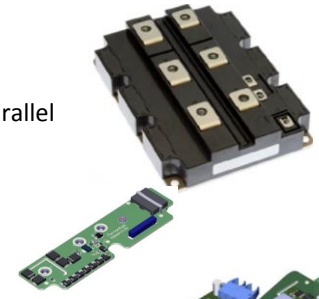
Korail (Korea Railroad) Line 1

Objective

- New build project
- Rectifying converter with two IGBTs in parallel
- 3-phase inverter with single IGBT
- Auxiliary SiV converter with single IGBT

Solution

- Mitsubishi CM1800HC-66X IGBT
- Amantys AP03LA80C gate drive
- Amantys AP33A used in brake chopper
- Project started in 2020 with production in 2021



Busan City Subway Line 2

Objective

- Retrofit project for auxiliary SiV converter

Solution

- Dynex DIM1500ESM33-TL000 IGBT
- Amantys AP33A gate drive
- Project started in 2018 and concluded in 2021

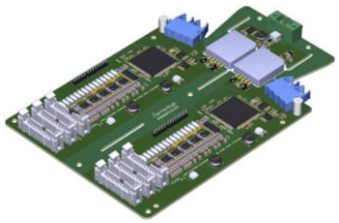
Korail Ilsan Line

Objective

- 3-phase VVVF inverter
- Chopper

Solution

- Amantys AP03LA80C gate drive used in VVVF
- Amantys AP33A used in chopper
- Project started in 2020 with production in 2021



DATA LOGGER

Amantys Data Logger

The Amantys Data Logger provides accurate, reliable and synchronous on-state voltage and current measurements and data logging functions for both the IGBT/MOSFET and diode devices in an operational converter.

Key Features

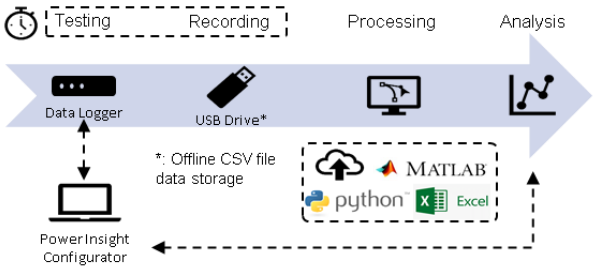
- Monitoring of key operating parameters in a half-bridge (phase leg)
- Accurate measurements of on-state voltages VCE(on) /VDS(on) and VF, synchronized with IC(on) /ID(on)
- Compatible with any gate drive
- 4 BNC outputs supporting oscilloscope connection
- Up to 6 months of continuing data logging with 4x 512GB USB drives
- Compatible with Si and SiC devices up to 3.3 kV, including:
  - Si IGBTs and PiN diodes
  - SiC MOSFETs and Schottky diodes
  - Hybrid Si/SiC power modules

The Data Logger is a prime enabler of semiconductors' Junction Temperature (TJ) Estimation and Condition Monitoring (CM).

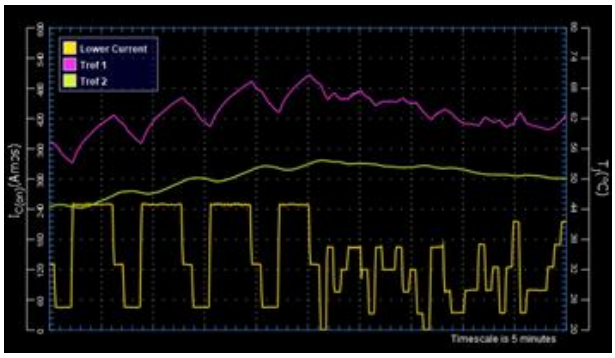
Applications

- Converter research and development
- Converter stack design and characterization
- Laboratory test and product validation
- Field testing and on-site diagnostics
- Condition Monitoring, including retrofit applications

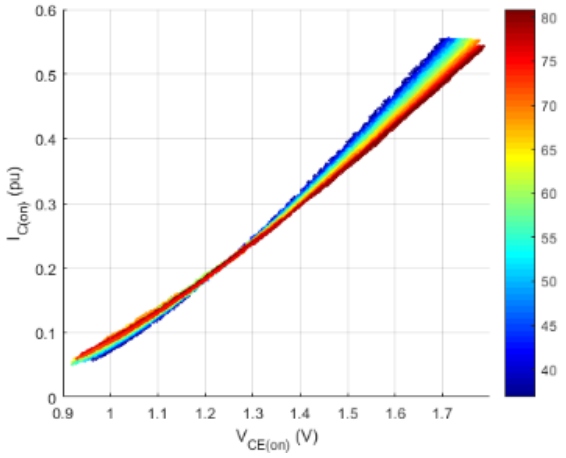
Workflow



The Power Insight Configurator enables the user to configure the Data Logger and to monitor live electrical and thermal signals on a running converter.



Data is logged in CSV files on USB memory and can be post-processed on any software platform.



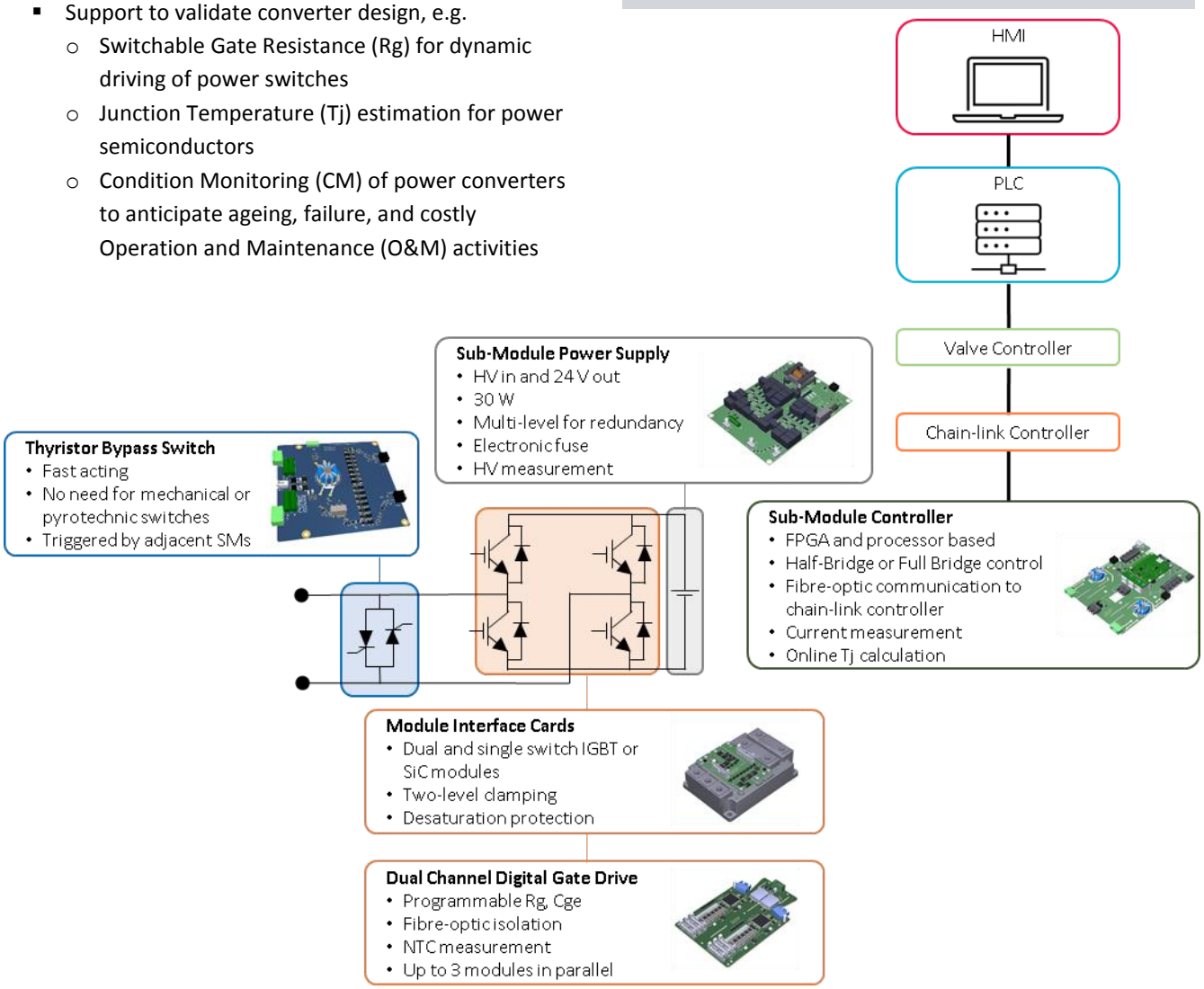
Modular Multi-level Converter Case Study

Amantys has an extensive record of working with customers across multiple industries to deliver tailor-made solutions to solve their problems. State of the art solutions enabled by Amantys expertise and technology

- Customised Digital Gate Drives
  - Connectors, voltage levels, and form factors
  - Custom feedback protocol
- Converter design for grid-tied applications
- Tailor-made industrial-grade communications protocols and architectures
- Support to validate converter design, e.g.
  - Switchable Gate Resistance (Rg) for dynamic driving of power switches
  - Junction Temperature (Tj) estimation for power semiconductors
  - Condition Monitoring (CM) of power converters to anticipate ageing, failure, and costly Operation and Maintenance (O&M) activities

MMC STATCOM

Amantys has developed, designed, tested and validated all the electronics, power electronics, hardware, software and a multi-layer communication protocol for an MMC-based STATCOM.



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