AIT Vindobona General Purpose Inverter Controller (GPIC) Kit
AIT’s Vindobona GPIC is a DSP based general purpose inverter control platform designed for rapid controls prototyping and development in power conversion applications. It’s employable in both a hardware-in-the-loop (HIL) simulation and a real power converter.

Key features:

- Provisions for any power converter topologies
  - AC/DC, DC/AC, 1,3ph,4ph 2-level and multi-level
  - DC/DC – Hard, Soft, Resonant switched
  - Cascaded DC/DC+DC/AC
  - Line Commutated Rectifiers
- C-code or Model based control development with optimised code-generation
- Rugged design proven in harsh industrial environment subjected to wide range of temperature swings and highly polluted EMC environment
- Normalized Inputs/Outputs (IOs) for simplified integration with a power converter via pre-conditioning modules (optional)
- Gate drive hats (optional) for support of various logic and voltage levels, current driven and fiber optic gates signals for driving power trains from few Watts to several Mega Watts
- Ready-made hardware-in-the-loop (HIL) interface accessory kit (optional)
- AIT firmware stack and built-in bootloader allowing for secure remote field upgrade
- Built in hardware protections and application specific and user settable firmware faults
- Includes a widgets based user-interface suitable for a custom-made applications
- Includes powerful AIT diagnostics featuring Data logger and Scope/Phasors/Locus tool
- Reference designs and examples
- Technical documentation and support
- Design support (Limited)
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<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Notes / Ranges</th>
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<tbody>
<tr>
<td>PWMa, PWMb, PWMc, PWMn, AUX PWM</td>
<td>Logic level PWMs &amp; HW signals &amp; temperature measurement</td>
<td>20 PWMs / 0..3.3V 1 DO HW ENA / 0..3.3V 1 DI HW FAULT / 0..5.0V Ta...Td/0..10mA / 0..3.0V</td>
</tr>
<tr>
<td>AIs DC</td>
<td>Analog Inputs DC side</td>
<td>3 VDC AIs /0..5.0V 1 VDC AI /0..5.0V or IDC AI 1 IDC AI / -45..45mA* 1 DI &amp; 1 DO / 0..3.3V +3.3V</td>
</tr>
<tr>
<td>AIs AC</td>
<td>Analog Inputs AC side</td>
<td>9 VAC AIs /-5..+5V 8 IAC AIs /-60..60mA* 2 GP AIs / 0..+3.0V +1.5V Ref, +3.0V Ref +3.3V</td>
</tr>
<tr>
<td>AOs</td>
<td>Analog Outputs (optional)</td>
<td>4 AOs / 0..3.0V</td>
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<tr>
<td>DIOs</td>
<td>Digital Inputs and Outputs</td>
<td>25 DIOs / 0..3.3V</td>
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<tr>
<td>Ta, Tb, Tc, Td, T1, T2</td>
<td>Temperature measurements</td>
<td>Ta...Td / 0..10mA/0..3.0V T1,T2 / 0..3.0V</td>
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<tr>
<td>SCI1, SCI2</td>
<td>Serial Interfaces</td>
<td>GUI/CLI/Diagnostic Tool</td>
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<tr>
<td>IPC</td>
<td>Inter-processor communication port</td>
<td>Not used</td>
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<tr>
<td>PS</td>
<td>Power Supply</td>
<td>4.5..15V / 1A</td>
</tr>
<tr>
<td>JTAG</td>
<td>DSP JTAG</td>
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</table>

* by default, scalable to accept wider current transducer signals or bipolar voltage signals 0..3.0V referenced to +1.5V Ref

Note: Exact pinout available at request

Size (L x W x H): 24 x 8.68 x 1.27 cm or 9.460 x 3.420 x 0.500”

Mounting orientation: Horizontal or Vertical (along longer side)

Connectors: Standard 0.1” vertical, horizontal female sockets and flat cables
Pre-conditioning: Modules available for preconditioning of the AC and DC voltage and current ranges from 0...3.3kV and 2...+2kVA respectively

Gate drive hats: Digital logic and voltage levels, current driven and fiber optic gates signals for driving power trains from few Watts to several Mega Watts
AIT’s Vindobona GPIC Packages

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<th>Vindobona GPIC Kit B2B</th>
<th>Vindobona GPIC Kit Free*</th>
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<tr>
<td>HIL interface</td>
<td>Optional</td>
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<td>Accessory Kit</td>
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<td>Reference Power</td>
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<tr>
<td>Converter Applications</td>
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<tr>
<td>Diagnostics &amp; FW/SW update</td>
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<td>✓</td>
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<tr>
<td>HW Protections and FW Faults</td>
<td>HW Protections only</td>
<td>HW Protections only</td>
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<tr>
<td>Connectivity</td>
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<tr>
<td>Documentation</td>
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<tr>
<td>RCP Reference Design &amp; Examples</td>
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<td>Design support</td>
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<tr>
<td>Technical support</td>
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</table>

- **Reference Power Converter Applications:**
  - 3-Phase PV/BESS/AFE/DC Source/Battery Simulator/EV Charging Station
  - Grid support functions (P(U)-Volt/Watt, Q(U)-Volt/Var, P(f)-Freq/Watt, Anti-Islanding, Fault Ride Thru (FRT), Grid Faults & Trips according to Grid codes
  - Grid forming (Droop, Virtual Synchronous Machine) – available by Q4, 2020
  - Nominal rating as per user request (default 35KVA), support for Grids world wide

- **Diagnostics**
  - Widgets based GUI - ease to tailor to fit custom application
  - AIT CLI (Command Line Interface) - access to user and custom settable parameters
  - AIT Data Logger – log target application and power converter data in CSV file
  - AIT Scope/Phasor/Locus tool – powerful diagnostic tool able to scope out controls waveforms, state space vectors, statuses and display it as scope snapshot, phasor and locus diagrams

- **Firmware/Software upgrade**
  - Remote field FW upgrade via secure built in bootloader and BootFlasher application (no JTAG required)
  - SW upgrade (applicable only for AIT HIL Controller)

- **Hardware Protections and FW Faults**
Built in hardware protections designed to ensure protection of a power converter hardware
   Application specific and user settable firmware faults

Connectivity
   ModBus, SunSpec, IEC61850, other protocol stacks available upon request

AIT Firmware Stack
   Real Time Multi-tasking kernel
   Low level peripheral drivers
   State Machine
   Controls & Signal processing tool box
   Command Line Interface – to Widgets based GUI
   Bootloader and Debug Interface – to BootFlasher
   Inter Processor Communication (with networking processor AIT HIL Controller only)
   IOs handler
   Interface with Typhoon HIL C code Auto Gen tool

Documentation:
   Typhoon HIL simulation models
   App notes & video tutorials
   FW and SW updates

RCP Reference Design and Example
   Reference design of the Control of 3PH Solar/Battery Storage inverter

Design support
   Up to 50 Hrs of hands on consulting including an on-site or a digital workshop

Technical support via emails - 1 year
   * Exclusive offer for qualified Academic partners & Key customers signed up to Vindobona community volunteer squad and/or willing to produce reference design & examples according to mutually agreed application example within 6 months from acquiring the kit. The offer is also valid for all funded research and customer design services projects.

List of Abbreviations:

HW – Hardware

FW – Firmware

RCP – Rapid Control Prototyping (Development and Deployment)

GPIC – General purpose inverter controller

Vindobona – trade name for AIT RCP Kit

PV – Solar

BESS – Battery Energy Storage System

AFE – Active Front End

B2B – Business to Business