

Typhoon HIL DSP Interface

Accelerate controller development with the plug-and-play TI DSP based HIL Interface. Pin-to-pin compatible with all Typhoon HIL emulators.



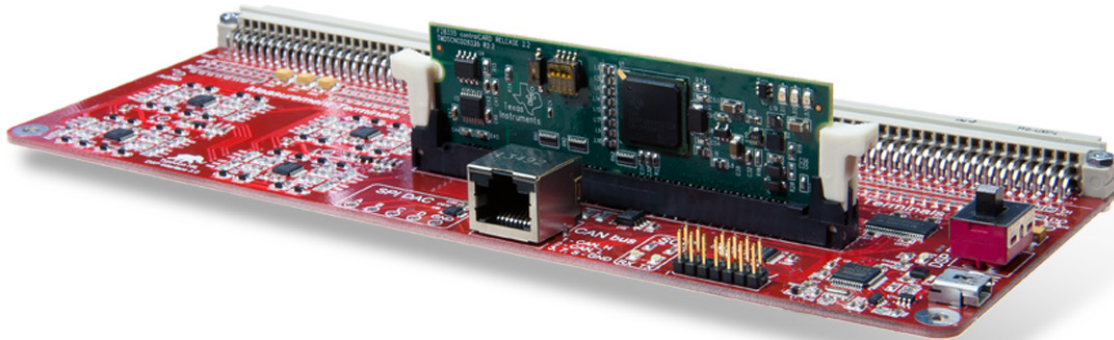
Testing made Simple.



Typhoon HIL

HIL DSP Interface

Plug in a TI controller card and start controlling your power converter via a pin-to-pin compatible Typhoon HIL connection.



Applications

Typhoon HIL DSP Interface built for a family of Texas Instruments C2000 control cards (F28335, F28377, F28035, F28069) is the way to go if you want to accelerate the development of power electronics applications. A plug-and-play, pin-to-pin compatible interface with Typhoon HIL family of real-time HIL emulators eliminates setup time and enables developers to focus on control code development in the comfort of their office.

Plug-and-play HIL interface

Plug the HIL DSP Interface with a TI control card directly into your HIL emulator and start running your power electronics application from get go. Easily port any of Typhoon's and TI packaged control code examples directly into the DSP without worrying about interfaces (i.e. voltage levels and interface compatibility). All digital and analog signals from/to the HIL DSP Interface are routed directly to HIL analog and digital IO pins to TI controller side for any C2000 control card family.

Features and Benefits

- Directly connect the HIL DSP Interface to any Typhoon HIL emulator (no cables or external power supplies needed).
- Compatible with: Delfino F28335 and F28377; Piccolo F2803x and F2806x control cards.
- 48 TI control card pins connected.
- Measurement terminals for monitoring all HIL signals.
- Onboard JTAG XDS100v1 emulator.
- UART serial communication with host PC.
- CAN bus.
- SPI 12 bit DAC.

TI Control Panel.

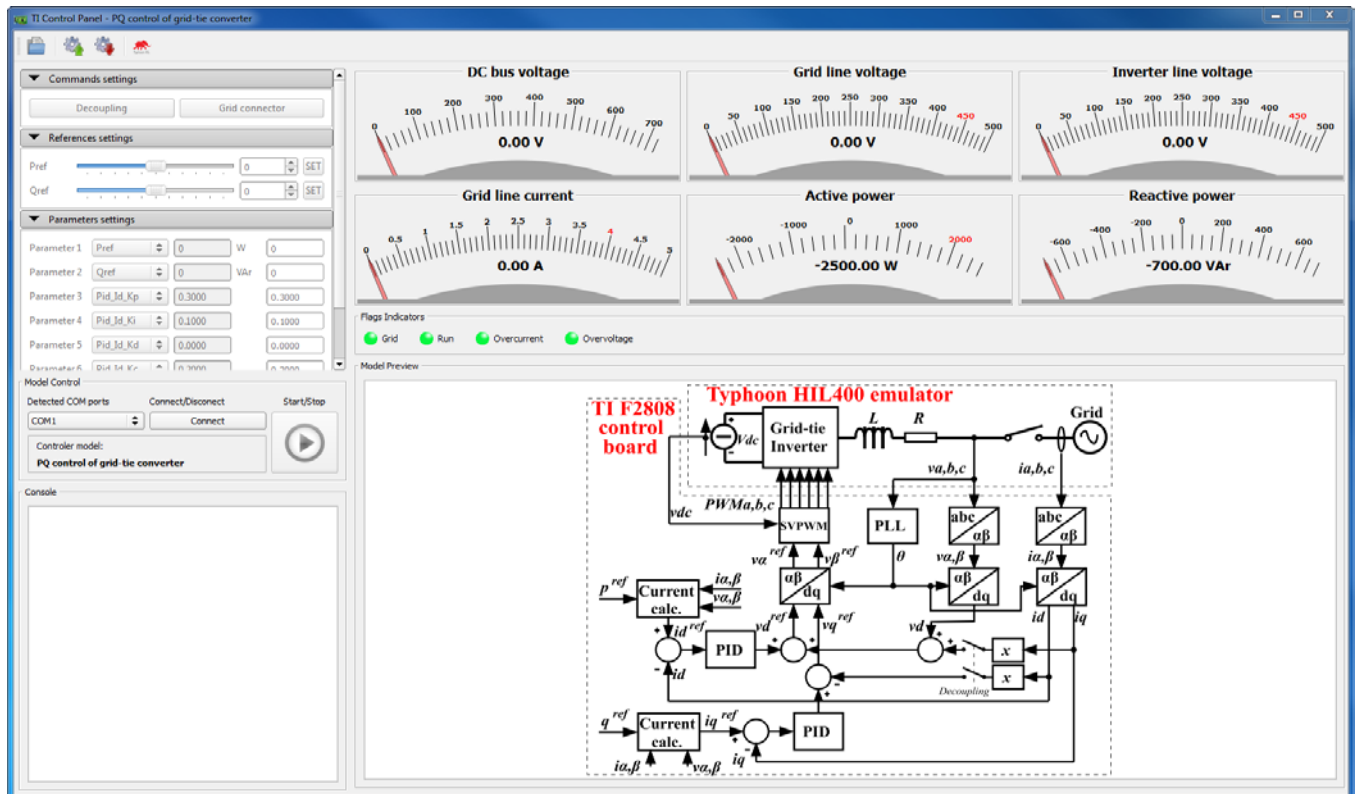
Dynamically reconfigurable GUI interface for TI DSP control applications.

Simple graphical user interface.

The TI Control Panel provides a dynamically configurable (depending on the control application) and easy to use graphical user interface (GUI) enabling run-time interaction with control application running on the HIL DSP Interface with TI control cards. TI Control Panel communicates through UART serial link with DSP controller code implemented on a specific TI control card. User can quickly evaluate the corresponding power electronics application (Typhoon HIL demo or any TI free example C2000 code) emulated on the HIL system.

TI Control panel features

- Model Control - interact with control code on the TI Control Card.
- Model Preview – see the control algorithm implemented in the TI Control Card which is used with selected project.
- Model Commands – gives ability to run/stop some parts of the control algorithm or to set/clear some of the control flags.
- Model References – allows the user to give input reference values for the control algorithm.
- Model Parameters – ability to Read/Modify different parameters in the control code.
- Model Analog Meters – monitor control system variables.
- Flag Indicators – monitor the operating mode and status of the control code.
- Console – gives feedback information to the user on the action taken.



TI Control Panel GUI layout (dynamically configured for grid-tie inverter application)

HIL DSP Interface use case.

Control code development for a grid-tie inverter.

Control system development.

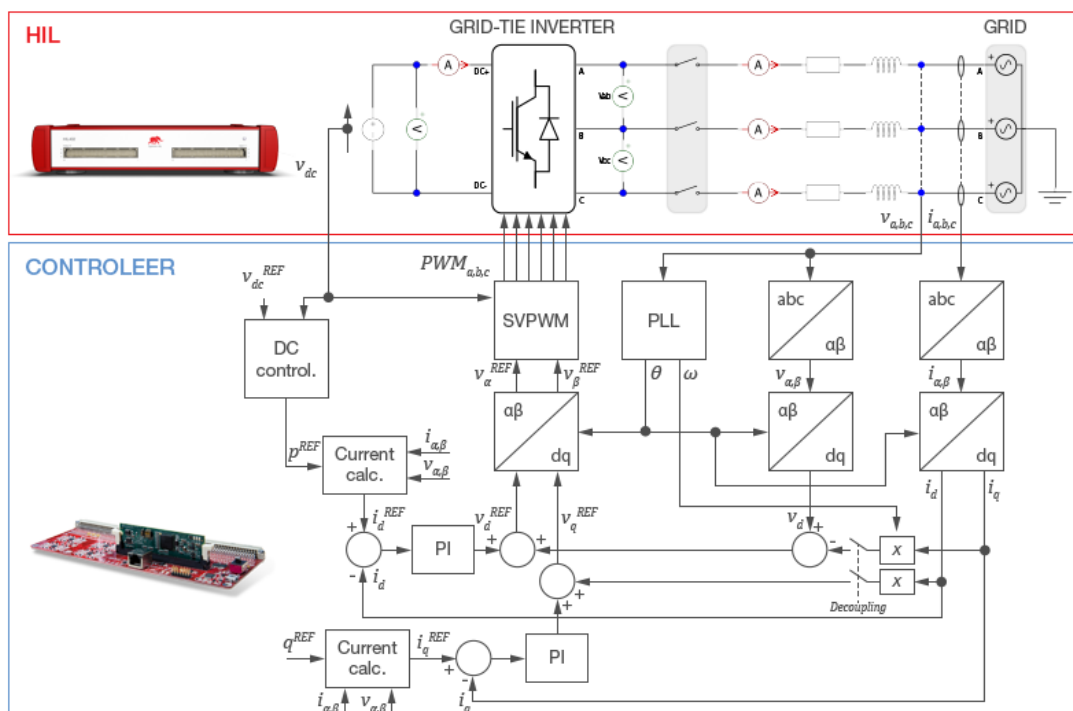
A grid-tie inverter is an essential part of distributed generation units like wind turbines, photovoltaics, fuel cells, etc. They can control active and reactive power flows, inject current harmonics, etc. Additionally, ancillary control services like local voltage and frequency regulation, voltage harmonic compensation, or active filtering can also be obtained.

Test without limits

In HIL, grid voltage sources can be specified with arbitrary magnitude, frequency and phase shift values in just a few steps. Additionally, in runtime the user can program and reload grid voltage waveforms defined in order to emulate utility grid disturbances such as:

- voltage sags,
- spikes,
- phase angle jumps,
- magnitude ramp,
- frequency change, and
- harmonic distortion.

Indeed, the HIL approach enables the user to build and deploy completely safe “Megawatt” (MW) grid-connected inverter test installation at their office desk, without the need for expensive hardware test equipment and a high-power laboratory, which simultaneously eliminates all safety and cost issues of a laboratory setup. A developer can easily conduct standard controller tests required for grid-connected power electronics applications (i.e. BDEW, or the National Electric Code, IEEE 1547) and also non-standard test scenarios that might arise in real-life deployment. Typhoon HIL environment is distinguished from the traditional approach where expensive hardware test equipment like AC power sources for grid simulation are used. In addition, it allows engineers to focus on the evaluation of the software-based functionalities which are provided by the inverter’s controller, in order to satisfy most of the technical specifications for grid-connected converter systems.



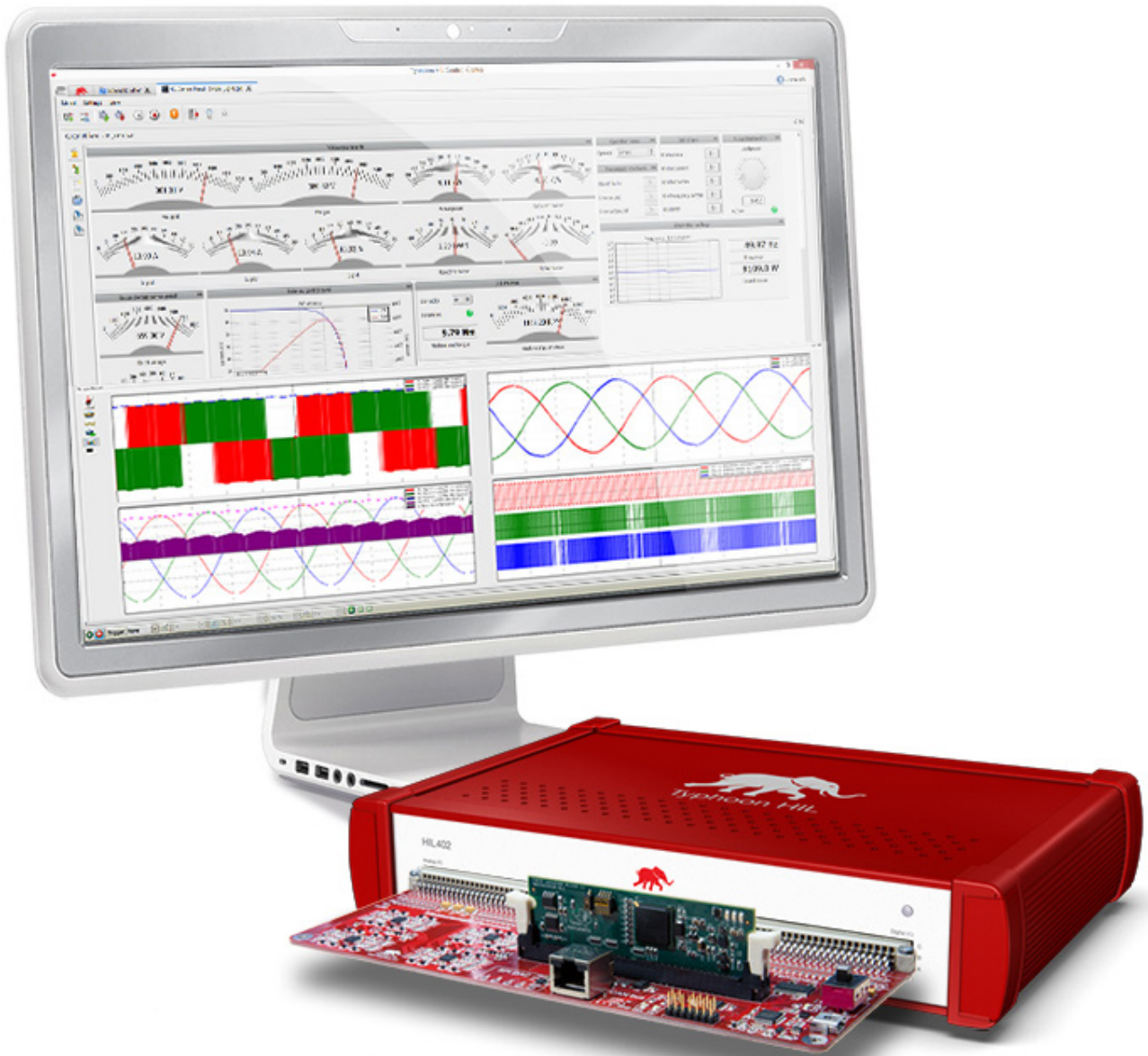
HIL DSP Interface technical details.

TI C2000 control card compatible	Delfino F28335, F28377 (with Adapter card), Piccolo F28035, F28069	
Analog Inputs (AI), (DSP AI pins connected to HIL AO pins)	Channels	16
	Voltage range	$\pm 5\text{ V}$ (0-3 V on DSP)
Digital Inputs (DI), (DSP DI pins connected to HIL DO pins)	Channels	16
	Voltage range	0-5 V (0-3.3 V on DSP)
Digital Output (DO) PWM & GPIO (DSP DO pins connected to HIL DI pins)	Channels	12 PWM + 4 GPIO
	Voltage range	0-5 V (0-3.3 V on DSP)
Host interface	JTAG UART CAN Bus	Onboard XDS100v1 or external Through onboard JTAG emulator RJ45 connector
Additional on-board peripherals	SPI DAC	12-bit resolution
Measurement terminals	For all analog and digital HIL signals	

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