

OP1400 Series

4-Quadrant PHIL Amplifier

**High-speed and
low-latency**
closed loop
communications
for real-time
simulation

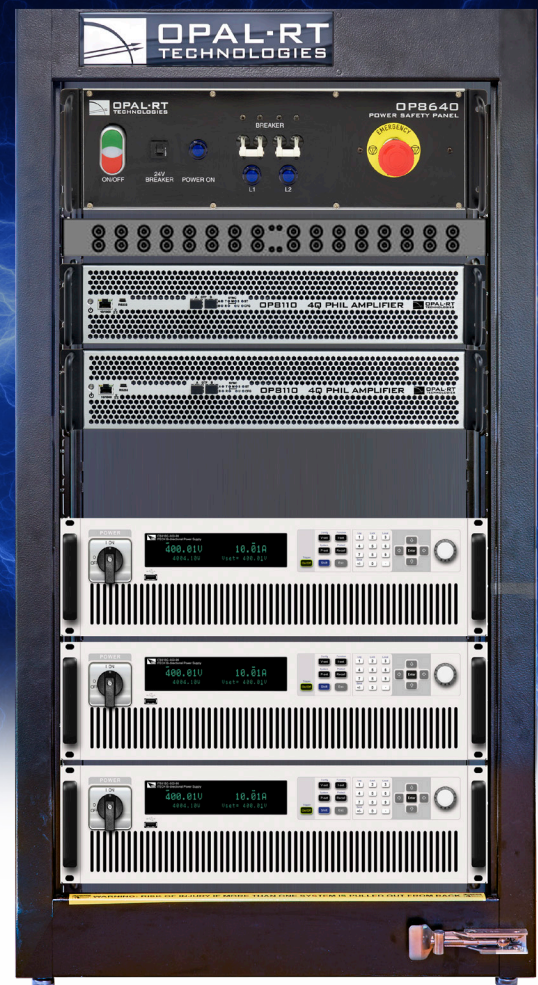
Introducing the OP1400 Series 4-Quadrant PHIL Amplifier: Optimize testing and validation of power systems and power electronics controls, in applications such as microgrid and protection.

The OPAL-RT OP1400 Series is a 4-Quadrant Power Amplifier featuring high-speed and low-latency closed loop communications for real-time digital simulation. It is designed to be used as a Power Hardware in the Loop (PHIL) testing tool in combination with an OPAL-RT simulator to form a complete PHIL testing solution.

Enhance operational safety and develop safer products and systems with OPAL-RT's OP1400 4-Quadrant PHIL Amplifier.

Key Features:

- High-fidelity 4-Quadrant PHIL Amplifier with 100% non-dissipative regeneration
- Available as 5, 10, or 15KW 3-phase modules with independent phases (other configurations available upon request)
- AC & DC mode
- Overload, short circuit and over temperature protections
- Specially designed for real-time PHIL applications, such as, powergrid, motor or DER emulator
 - Large Signal Bandwidth: DC to 10kHz (-3dB), 0.5% THD
 - Integrated coupling inductors
 - Integrated voltage and current measurements transferred to PHIL models



PRODUCT HIGHLIGHTS

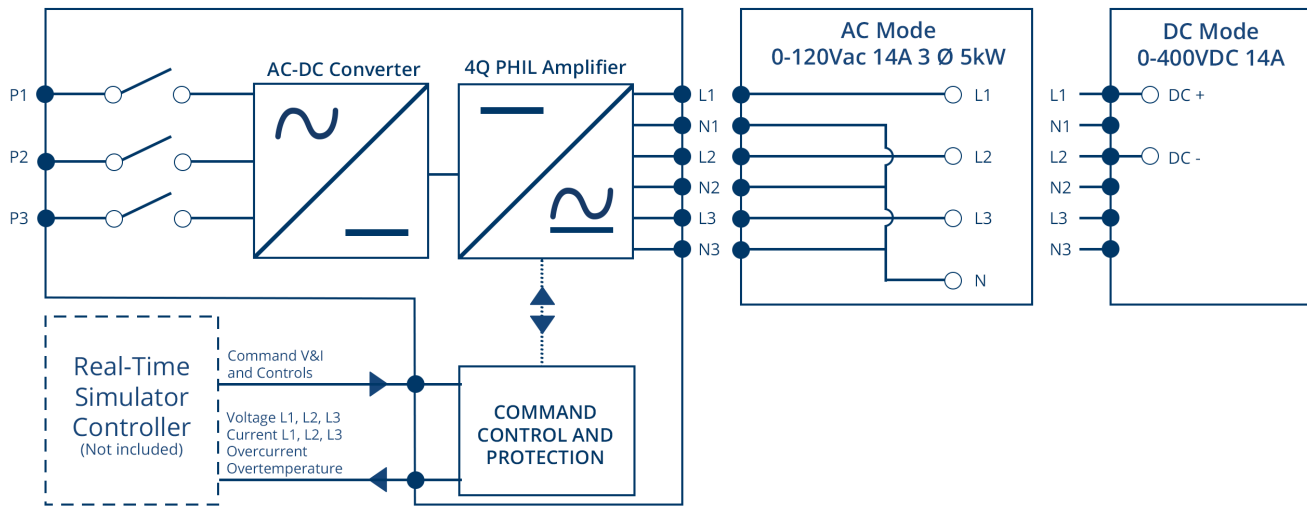
- Innovative soft-switching cell based on SiC Transistors Technology
- Very high efficiency >96%
- 100% regeneration
- Low output harmonic distortion (THD):
 - THD <0.5% for DC to 2kHz, full power
 - THD <2% for 2kHz to 10kHz, full power

APPLICATIONS

- RT-LAB Multi-Domain - Simulink-Based Software Platform: Ideal for research laboratories
- PHIL System Device Testing: Test your system controller, your algorithm or topology under real-world electrical conditions
- MicroGrid PHIL Testing: Create a microgrid topology where you can connect physical equipment. Analyze its interaction with other emulated DER and power grids (photo-voltaics, wind turbines, batteries, load)

OP1400-10 | TYPICAL DIAGRAM 5KW / 120V

Configuration Example



POWER MODULE SPECIFICATIONS

CHARACTERISTIC	OP1400-10	OP1400-20	OP1400-30	
	Configuration for 120Vrms			Configuration for 240Vrms
AC Mode Voltage Range (L-N)	0-120/208VRMS			0-240V/380Vrms
Total nominal Power	5KW at 120Vrms	10KW at 120Vrms	15KW at 120Vrms	10KW at 240Vrms
Maximum number of phase	3 phases	6 phases	9 phases	3 phases
DC Mode Voltage Range (DC+ DC-)	+/- 400VDC 1 DC ouput	+/- 400VDC 2 DC outputs	+/- 400VDC 3 DC ouputs	
Current Range per phase	0-14 Arms			
Current Peak	20A _{pk}			
Bandwith (Hz)	DC to 10 KHZ (-3db)			
Absorption capacity	100%, power regenerated, no dissipation			
Cooling	Air forced			
Efficiency	90%			
THD (3dB)	0.5% @ 0 - 1kHz / 1% @ 1kHz - 2kHz / 2% @ 2kHz - 10kHz			
Slew Rate	5V/us, independant of the load			
Time delay Input to ouput	5.5us to 8.3us			

ABOUT OPAL-RT TECHNOLOGIES

OPAL-RT is the world leader in the development of PC/FPGA Based Real-Time Digital Simulator, Hardware-In-the-Loop (HIL) testing equipment and Rapid Control Prototyping (RCP) systems to design, test and optimize control and protection systems. used in power grids, power electronics, motor drives, automotive industry, trains, aircraft and various industries, as well as R&D centers and universities.



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