

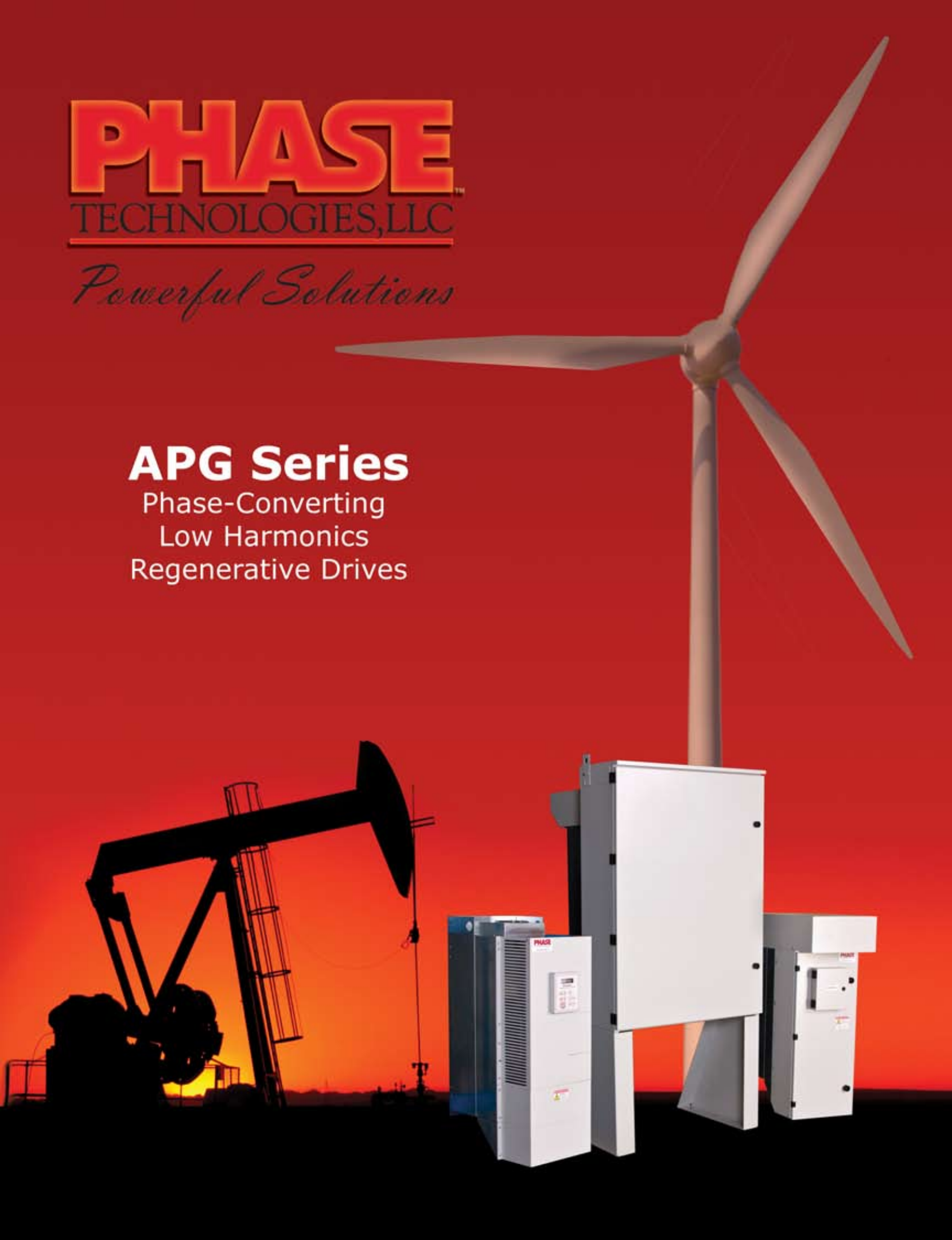
# PHASE

TECHNOLOGIES, LLC

*Powerful Solutions*

## **APG Series**

Phase-Converting  
Low Harmonics  
Regenerative Drives



# FEATURES

## Regenerative Design

APG Series variable frequency drives (VFD) are inverter-based devices that convert single-phase input to three-phase variable frequency output to provide speed control for three-phase AC motors. The drives have regenerative capability, allowing regenerative power from the load to pass through the converter back to the line-side power source.

## Save Energy

Rather than burn regenerative power through a braking resistor, the APG Series regenerative drive puts the power back onto the line. Returning the regenerative power to the source will reduce the total power consumption of the load, saving money through reduced electrical power usage and also simplifying the installation by eliminating the braking resistor.



## Phase Conversion

Traditional three-phase regenerative drives cannot function as a phase converter. APG Series drives are purpose-built phase converting drives, and doubling the HP of the drive relative to motor HP is not required. Regenerative three-phase loads can now be connected to a single-phase source with all the benefits of a regenerative drive.

## Voltage Conversion

Active switching control of the line-side module allows the drive to boost 240V single-phase input to 480V three-phase output. Some models can be specified with either a 240V or 480V line-side converter. The load-side inverter is rated 480V on all models. Voltage doubling can realize significant savings from reduced wire size in long motor lead applications. This feature also allows connection of a 480V three-phase wind turbine to a 240V single-phase grid.

## Low Harmonics

Electronic power factor correction produces a sine-wave line-side current, greatly reducing the current distortion and line harmonics. Because of its favorable harmonic profile, input line reactors and harmonic filters are not required on the line side of an APG Series drive. Models are available with either an LC filter or an LCL filter. The LCL filter produces cleaner wave forms with lower harmonic distortion. Installations in many cases will comply with IEEE 519, the international standard for allowable harmonic distortion on utility mains.

# COMPARISON OF DRIVE CHARACTERISTICS

	APG Series Drive	3-Phase Regenerative Drive	Diode Rectifier Drive
<b>Phase Converter</b>	YES Built specifically for phase conversion — HP doubling not required	NO Cannot function as a phase converter	YES HP doubling required when used as phase converter
<b>Regenerative</b>	YES Saves energy by passing regenerative power back to source	YES Saves energy by passing regenerative power back to source	NO Regenerative power is wasted, and requires the addition of a braking resistor
<b>Low Harmonics</b>	YES Very low THD — most installations comply with IEEE 519	YES Not all regenerative drives produce THD that will comply with IEEE 519	NO Harmonic filters required — low THD difficult to achieve when used as phase converter
<b>Factory Outdoor 3R Enclosure</b>	YES Two types of outdoor Type 3R enclosure available from factory	NO* Most not available in outdoor enclosure— must go through 508 panel shop	NO* Most not available in outdoor enclosure — must go through 508 panel shop
<b>Boost 240V Input to 480V Output</b>	YES** Electronic control on the input module boosts the DC bus voltage to provide 480V output	NO Not available	NO Not available
<b>Field Replacement of Major Components</b>	YES APG Series designed for easy access to most components	NO Generally not designed for easy field repair	NO Generally not designed for easy field repair
<b>User-Friendly Interface Specialized for Pumping</b>	YES Keypad allows simple operation with familiar look and feel of HOA pump controls	NO Typically designed for industrial automation with complicated controls, set-up and confusing manuals	NO Typically designed for industrial automation with complicated controls, set-up and confusing manuals
<b>Line reactor required</b>	NO Input line reactors are not required with APG Series drives	NO Input line reactors are generally not required on drives with an active front end	YES Input line reactors are required on most diode bridge drives to prevent damage to the diodes from line surges
<b>Constant Pressure Water System</b>	YES Only Phase Technologies drives provide either analog or affordable digital CP water systems	YES/NO Not all VFDs support CP water systems. Most that do, require expensive analog transducers and complex set-up	YES/NO Not all VFDs support CP water systems. Most that do, require expensive analog transducers and complex set-up

\*A few manufacturers integrate their drive in outdoor enclosures as 508 panel shops

\*\*Available on 20 and 30 HP models only

**Toll Free (866) 250-7934**

# APG Series Features and Specifications

## 240V Input Models

Model	HP Rating	Rated Output kW	Rated Input Voltage	Rated Input Current	Rated Output Voltage	Rated Output Current	I out (10 sec)*	I out (1 sec)**
APG220	20	20.9	240	97	480	30	40	50
APG230	30	31.1	240	144	480	45	59	73

## 480V Input Models

Model	HP Rating	Rated Output kW	Rated Input Voltage	Rated Input Current	Rated Output Voltage	Rated Output Current	I out (10 sec)*	I out (1 sec)**
APG420	20	20.9	480	48	480	30	40	50
APG430	30	31.1	480	72	480	45	59	73
APG440	40	42.4	480	98	480	61	82	102
APG450	50	52.2	480	121	480	77	101	125
APG460	60	61.7	480	143	480	91	121	149
APG475	75	73.5	480	170	480	107	141	174

\*150% of rated current for 10 seconds out of every 60 seconds  
\*\*185% of rated current for 1 second out of every 60 seconds  
Output as v/f control or sensorless vector control

## Interface

Keypad and display mounted on enclosure or mounted remotely and connected by extension cable. Functions include:

- Display of normal operating parameters
- Read measured values
- Fault log
- Timers
- Setting adjustable parameters
- Hand/Off/Auto (HOA) controls

Digital and Analog I/O including:

- Digital signal indicating drive fault
- Digital inputs for drive run signal
- 0-5 VDC output indicating motor torque
- 0-5 VDC output indicating motor speed
- 0-5 VDC input to control motor speed
- 4-20 mA input for motor speed control
- Additional I/O functions user programmable
- MODBUS RTU 19.2 kBPS or higher, RS-485 (4 wire)

Utilities

- Windows based software to monitor and configure the drive via RS-485 (4 wire) MODBUS or Ethernet protocol
- Field programmable via USB port

## Control Algorithms

- Digital constant pressure system control
- Analog constant pressure system control
- V/f control or space-vector torque control
- Wind turbine optimization parameters

## Environmental

- Operating ambient temperature range: -10 to 50° C
- Enclosure: Type 1 indoor with optional flange mount, small Type 3R outdoor, or large Type 3R outdoor with sub-panel for integration of additional components by 508 panel shop

[www.phasetechnologies.com](http://www.phasetechnologies.com)

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