

Alternators for Prime Power Applications



Prime Power

At Cummins Generator Technologies, we understand the challenging demands placed on generator sets in prime power applications - especially when it comes to efficiency and durability.

As an industry leader in advanced alternator design, we have a proven track record of delivering dependable products. The quality of every **STAMFORD** and **AvK** alternator is based on thousands of hours of product development and endurance testing.

Globally recognised for their quality and technology, **STAMFORD** and **AvK** brands have a history of reliability that dates back as far as 1904. Since these early beginnings, continuous innovation has allowed the brands to remain at the forefront of prime power technology today.



EST.
1904



STAMFORD | AvK®

STAMFORD Range

With an output extending from 4 – 5,000 kVA, genuine **STAMFORD** alternators are designed to deliver superior efficiencies. **STAMFORD** alternators are available with a choice of SAE adaptors to ensure easy coupling to a wide range of prime movers.

- 4 – 6 pole / 1,000 – 1,800 rpm
- Power Range: 4 – 5,520 kVA
- Voltage Range: 220 – 13,800V



AvK Range

AvK low, medium and high voltage alternators are robustly engineered products up to 11,000 kVA, manufactured to surpass the critical requirements of the most arduous environments.

Our experience and knowledge gathered from a large number of diverse alternator installations worldwide provides expertise in offering integrated design solutions to help our customers compete more successfully throughout the world. **AvK** alternators can be customised to meet specific needs:

- 4 – 10 pole / 600 – 1,800 rpm
- Power Range: 600 – 10,200 kVA
- Voltage Range: 380V – 13,800V



Prime Power Alternator Specifications

| | P0/P1 | UC22 | UC27 | HC4 | HC5 | DSG 62 | HC6 | DSG 74 | P7 | DSG 86 | P80 | DSG 99 | DSG 114 | DIG 110 | DIG 120 | DIG 130 | DIG 140 | DIG 142 | DIG 150 | DIG 156 |
|---|---------|----------|---------|---------|---------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
| Poles | 4 | 4 | 4 | 4 | 4 | 4 | 4/6 | 4/6/8 | 4/6 | 4/6/8/10 | 4 | 4/6/8/10 | 4/6/8/10 | 4/6 | 4/6 | 4/6/8 | 4/6/8 | 4 | 4/6/8 | 4/6/8/10 |
| Max kVA Rating 50/60Hz | 42.5/55 | 85/103.8 | 200/255 | 400/500 | 670/825 | 1,100/1,320 | 1,135/1,450 | 2,000/2,400 | 2,200/2,750 | 2,990/3,408 | 4,253/5,190 | 4,700/5,300 | 5,000/5,940 | 1,080/1,300 | 2,050/2,600 | 3,850/4,000 | 4,600/5,300 | 5,800/6,700 | 7,400/8,500 | 9,400/10,200 |
| Technology | | | | | | | | | | | | | | | | | | | | |
| Wire Wound | • | • | • | • | • | | • | | • | | • | | | | | | | | | |
| Bar Wound | | | | | | • | | • | | • | • | • | • | • | • | • | • | • | • | • |
| Voltage | | | | | | | | | | | | | | | | | | | | |
| Low - 380 - 690V | • | • | • | • | • | • | • | • | • | • | • | • | • | | | | | | | |
| Medium - 3,300 - 6,600V | | | | | | | | | | | • | | | • | • | • | • | • | • | • |
| High - 6,600 - 13,600V | | | | | | | | | | | • | | | • | • | • | • | • | • | • |
| Bearings | | | | | | | | | | | | | | | | | | | | |
| Single bearing / SAE coupling disc | • | • | • | • | • | Δ | • | Δ | • | Δ | Δ | Δ | Δ | Δ | Δ | Δ | | | | |
| Double bearing arrangement | Δ | Δ | Δ | Δ | Δ | • | Δ | • | Δ | • | • | • | • | • | • | • | • | • | • | • |
| Sleeve bearing arrangement | | | | | | | | Δ | | Δ | | Δ | Δ | Δ | Δ | Δ | Δ | | Δ | • |
| Enclosure, Coolings & Insulation | | | | | | | | | | | | | | | | | | | | |
| Insulation Class | H | H | H | H | H | H | H | H | H | H | H / F | H | H | F | F | F | F | F | F | F |
| IP23 | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| IP23 Air Filters | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ |
| IP44 IC01 (Fan ventilated) | | | | | | Δ | Δ | Δ | Δ | Δ | | Δ | Δ | Δ | Δ | Δ | | | Δ | |
| IP44 IC616 / IC611 (Air-to-air cooler) | | | | | | Δ | | Δ | | Δ | | Δ | Δ | Δ | Δ | Δ | | | Δ | |
| IP44 IC8W (Water-to-air cooler) | | | | | | Δ | | Δ | | Δ | | Δ | Δ | Δ | Δ | Δ | | | Δ | |
| Excitation Systems | | | | | | | | | | | | | | | | | | | | |
| Self-starting | • | • | • | • | • | Δ | | Δ | | Δ | | Δ | Δ | | | | | | | |
| EBS | Δ | | | | | | | | | | | | | | | | | | | |
| PMG | | Δ | Δ | Δ | Δ | Δ | • | Δ | • | Δ | • | Δ | Δ | Δ | Δ | Δ | | | | |
| Auxiliary Winding | | | | | | • | | • | | • | | • | • | • | • | • | • | • | • | • |
| Application | | | | | | | | | | | | | | | | | | | | |
| Base load | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Peak shaving | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| CHP | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Grid Code ready | | • | • | • | • | | • | | • | • | • | • | | • | • | • | • | • | • | • |

Key
 • Standard
 Δ Option

Base Load Power

For standard base load power supply, the **STAMFORD** and **AvK** ranges offer low, medium and high voltage alternators up to multi-megawatt capabilities which are manufactured to successfully serve base load applications in a comprehensive range of environments.

Cummins Generator Technologies can meet a range of requirements that allow continuous power supply utilising an array of alternators suitable for many prime power applications. The suitability of **STAMFORD** and **AvK** products for continuous operation is proven, time after time.



Case Study

Cloudbreak Mine

Where:
Pilbara Region, Western Australia

Specified:
19 x **STAMFORD** P80

Purpose:
To provide dependable and reliable prime power for round-the-clock mining production.

The chosen alternators had to be durable and robust in order to operate successfully in the harsh environmental conditions of the Pilbara region, which reaches temperatures of 50°C and has limited accessibility.

Island Mode

Island mode comes into operation when the generator set is disconnected from the grid.

For towns and businesses in rural regions or areas with no access to standard grid power supply, island mode creates a continuous, stand-alone platform for the location to retrieve the same levels of power, just from an entity separate from the grid.

Due to their ability to meet challenges in the most arduous of environments, **STAMFORD** and **AvK** alternators are completely reliable in island mode, and are supported by regional service centres worldwide.



Case Study

Barrow Island

Where:
Western Australia

Specified:
12 x **AvK** DIG 140

Purpose:
Supplying continuous power 24/7 for seven years supporting construction of one of the world's largest natural gas projects



Peak Shaving

Peak shaving is increasingly popular as a supplement to base load generation due to the cost of purchasing additional power when demand exceeds available power. On-site power generation is used to provide extra power during peak times. We can supply alternators uniquely selected to meet these requirements.

On-Site Generation

Cummins Generator Technologies can support you with on-site generation capabilities with our diverse product range. Depending on the cost of electricity, you may well be able to make savings by generating remotely and selling an agreed percentage of surplus energy back to the grid.

On-site generator sets can be installed to increase the available power without increasing demand, and could provide a cheaper alternative in compensating for demand fluctuations.

We understand that levels of efficiency can fluctuate between products, their specifications and how they are used, but what we can promise you is that we select the right products to optimise performance and deliver maximum efficiency requirements.



World-Leading Safety in High Voltage Prime Power Alternators

Ever since the Cutting Brothers established their electrical engineering business in Stamford, UK in 1904 and Arthur van Kaick founded the AvK business in Frankfurt, Germany in 1919, the **STAMFORD** and **AvK** brands have built up powerful reputations for electrical machine manufacturing excellence.

Through the many years that followed and with unwavering dedication to collaborating with customers, today we are able to boast a proven history of delivering success for our customers across a variety of high voltage prime power applications.

Building on that legacy, our recent investment into the Craiova site ensures we are able to continue to focus on enhancing our high voltage product range from a recognised Cummins centre-of-excellence.

In the latest step of our journey, as well as achieving CSA compliance we have become the world's first alternator manufacturer to achieve UL safety certification for low, medium and high voltages – meaning high voltage UL approved alternators are now available for our customers across the **STAMFORD | AvK** ranges.



Combined Heat and Power

With over 30 years of experience providing alternators into combined heat and power (CHP) applications, we are confident we are able to provide **STAMFORD** and **AvK** products to meet the highest operating efficiencies.

Almost any facility with a requirement for both electric and thermal energy can reap the benefits of utilising cogeneration, feeding thermal energy back into the power generation process that would otherwise be wasted. With flexible and responsive heat supplies, the thermal energy captured can be easily stored and delivered later to match demand.

Our alternators for CHP applications can be fitted with Power Factor Controllers which enable grid operation, to control and monitor operating power factor, whilst running in parallel with a mains supply. Low maintenance and high build quality ensures a long life span, making **STAMFORD | AvK** the perfect choice.



Case Study

Erneuerbare Energien GmbH & Co

Where:
Rodewald, Germany

Specified:
4 x **STAMFORD** HC4

Purpose:
Installation of Grid Connected Biogas fuelled CHP plant, in addition to heating SCHNELL Motoren AG building and nearby commercial greenhouse.
The generator sets reach industry leading energy efficiencies of 47%, providing a maximum return on investment, expected within eight years



Technical Considerations

- What is the application?
- Load size and type
- What frequency and voltage will it be operating at?
- What is the duty cycle?
- Will it be connected to the grid?
- What type of environment will it be operating in?
- What method of cooling, if any, should be specified?

For technical assistance, please contact:

applications@cummins.com

Grid Code Compliance

As the industry's technology leader, we have invested several years into researching and developing Grid Code solutions, committing substantial resources to ensure our customers can supply Grid Code compliant generator sets.

Growing environmental concerns are driving a significant change towards distributed power generation from smaller facilities at a localised level, as well as an increase in the use of renewable sources. Distributed power units benefit from a relatively fast installation cycle, enabling quick delivery of grid support.

Grid Codes are being introduced in part, to prevent the system from potential mass drop-off events due to self-protection using distributed source installations. Generator sets will be expected to stay connected regardless of any short term power disturbance.

The alternator must be capable of 'riding through' severe transient events without any damage or deterioration in performance.



Case Study

King's Cross Development

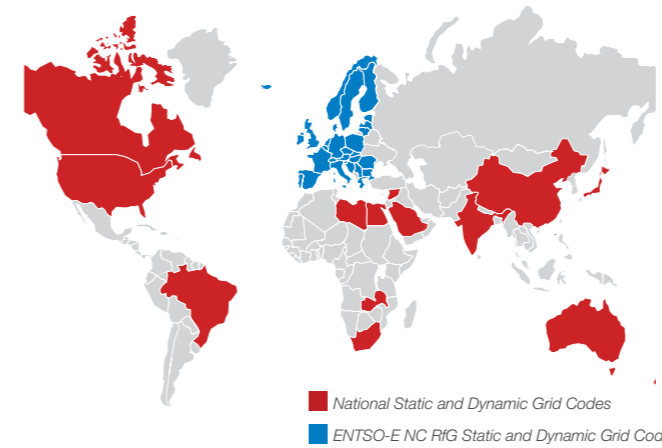
Where:
London

Specified:
1 x AvK DIG 130

Purpose:
2 MW cogeneration generator set connected to the grid is powered by an AvK DIG 130 alternator, providing heat and power to the new development in King's Cross, Central London.

Global Grid Support

With our advanced expertise, **STAMFORD | AvK** can help enable your generator sets to become Grid Code compliant, wherever you are in the world.



Technical Considerations

- Which country will the generator set be operating in?
- What is the Grid Code regulation?
- What is the operating voltage?
- What is the operating frequency?
- What are the power requirements?
- What method of cooling, if any, should be specified?

For technical assistance, please contact:
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Product Features

Protection and Insulation

STAMFORD low and medium voltage (LV/MV) alternators are equipped with open drip-proof enclosure protection according to IP23 as standard insulation, with options up to IP44.

STAMFORD P80 and standard **AvK** windings conform to Class H (LV) and Class F (HV) thermal insulation.

Cooling

A variety of cooling systems are available to allow optimum choice for operating and environmental conditions.

For **AvK** products of IP44 and above, cooling options include top-mounted air-to-air (IC611 and IC616) or air-to-water (IC81W) heat exchangers. Optional air inlet/outlet filters can be supplied for certain models.

Bearings

AvK products can be equipped with anti-friction or sleeve bearings subject to load, speed and application.

Sleeve bearings can be used for high running time operation, and are split type to enable easy access for maintenance.

Subject to frame size, speed, ambient temperature and inclination they may be auto-cooled, water-cooled, self-lubricated or force-lubricated.

Alternator Protection

STAMFORD | **AvK** alternators are available fully assembled with bearing and stator winding resistance temperature detectors (RTDs) for protection against thermal overload.

Rotor Construction

STAMFORD | **AvK** alternators have salient pole rotor construction, which when combined with a specially designed fan, ensure optimum air flow to maximise cooling.

Stator Construction

Stator core assembly uses laminated steel which reduces magnetic losses, thus improving product efficiency.

Vacuum Pressure Impregnation

From the **STAMFORD** HC4 and above, vacuum pressure impregnation (VPI) can be used.

Epoxy Resin and Resin Rich can be used on high voltage alternators in the VPI process, with both systems promising increased machine life, enhanced dimensional and mechanical stability, as well as superior resistance against chemicals and moisture.

Windings

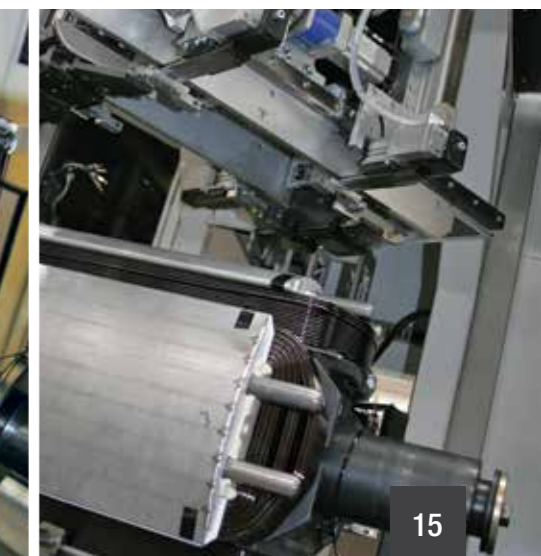
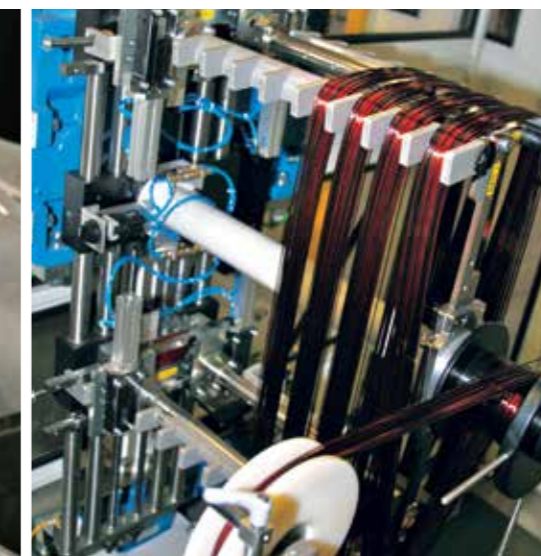
Across the **STAMFORD** and **AvK** brands, you can choose between wire wound and bar wound alternators depending on the requirements of the application.

Automatic Voltage Regulator

A variety of analogue and digital Automatic Voltage Regulators (AVRs) designed to achieve maximum performance are available to meet your application requirements.

Typical AVR features include:

- Voltage regulation in island mode (+/-0.5%)
- Reactive load sharing by static droop or cross-current operation
- Fast PID response for high-class regulation characteristic current compensation
- U/f-characteristic for applications with:
 - Floating frequency
 - under/over-excitation protection
 - Excitation fault monitoring



Global Services

Global Customer Service

- 24/7 response to service emergencies
- Commissioning of alternators on-site
- On-site bearing maintenance and bearing condition monitoring
- On-site insulation integrity checks
- AVR and accessories set up on site
- Trained engineers available locally, speaking local language
- Extensive aftermarket distribution for **STAMFORD** and **AvK** genuine parts.

Technical Support and After Sales Service

From support in pre-sales application specifications, all the way through to engineers servicing your **STAMFORD** and **AvK** alternators, we're there for you, with pride in over 100 years of support we've delivered globally for our customers.

Our engineers are experienced professionals trained in electrical, electronic and mechanical skills. They in turn are surrounded by a worldwide spares and service network.

Our goal is to make your life simpler – using our unrivalled experience to provide solutions to your challenges. You can depend on our trained Customer Engineers to offer the additional resources, support and expertise to add value to your application demands.

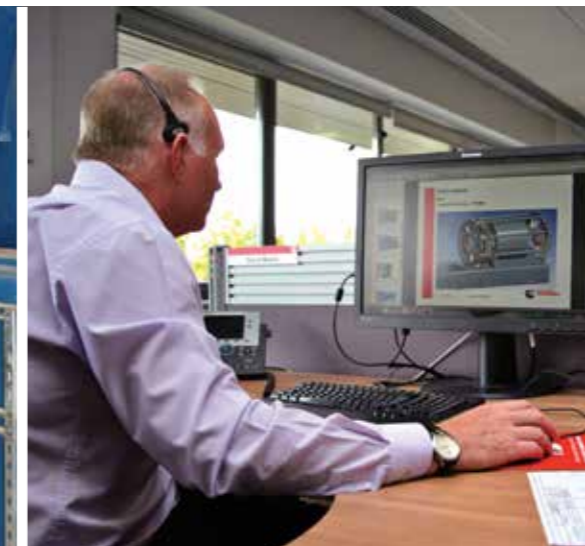
Product Training

Product familiarity will ensure maximum productivity and optimum use of the alternator. Our Customer Support department offers product training courses for engineers, operators, service and support staff. Each course is tailored to suit the needs of the customer, the generator set builder and the end-user.

Product familiarisation courses with a choice of training modules are available, including: alternator control systems, applications, trouble-shooting, maintenance or other specific requirements.

Vibration Analysis

Alternators coupled to reciprocating engines are exposed to engine induced vibrations. We use design tools to analyse the impact of linear and torsional vibrations, and work with the engine or generator set builder to validate designs as well as to solve end-user vibration issues. This technology is key in enabling customers to improve the performance and reliability of new and current product designs.



Our Promise

At Cummins Generator Technologies, it's how we engage our customers every day that sets us apart. The unique combination of knowledge, dependability and innovation we bring to each customer relationship turns everyday service into excellent customer support. As a result, we help our customers operate with greater efficiency, making it possible for them to compete more successfully throughout the world.

There for you™



One Global Standard

Our alternators are designed for a variety of prime power applications, but the common factor is that Cummins Generator Technologies work to a single standard for both products and services no matter where you are in the world.

We work to One Global Standard, so each of our manufacturing plants build products to the same exacting quality that has come to distinguish our alternators in the industry.

We have made multi-million dollar investments to our alternator manufacturing plants for capacity expansion, advanced testing facilities and a level of automation that enables us to reduce lead times for our customers.

All of our plants utilise the same sophisticated manufacturing technologies, advanced systems, common practices and rigorous testing techniques to ensure your prime power **STAMFORD** and **AvK** alternators are built to last.





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news.stamford-avk.com

For Applications Support:
applications@cummins.com

For Customer Service:
service-engineers@cumminsgeneratortechnologies.com

For general enquiries:
info@cumminsgeneratortechnologies.com

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