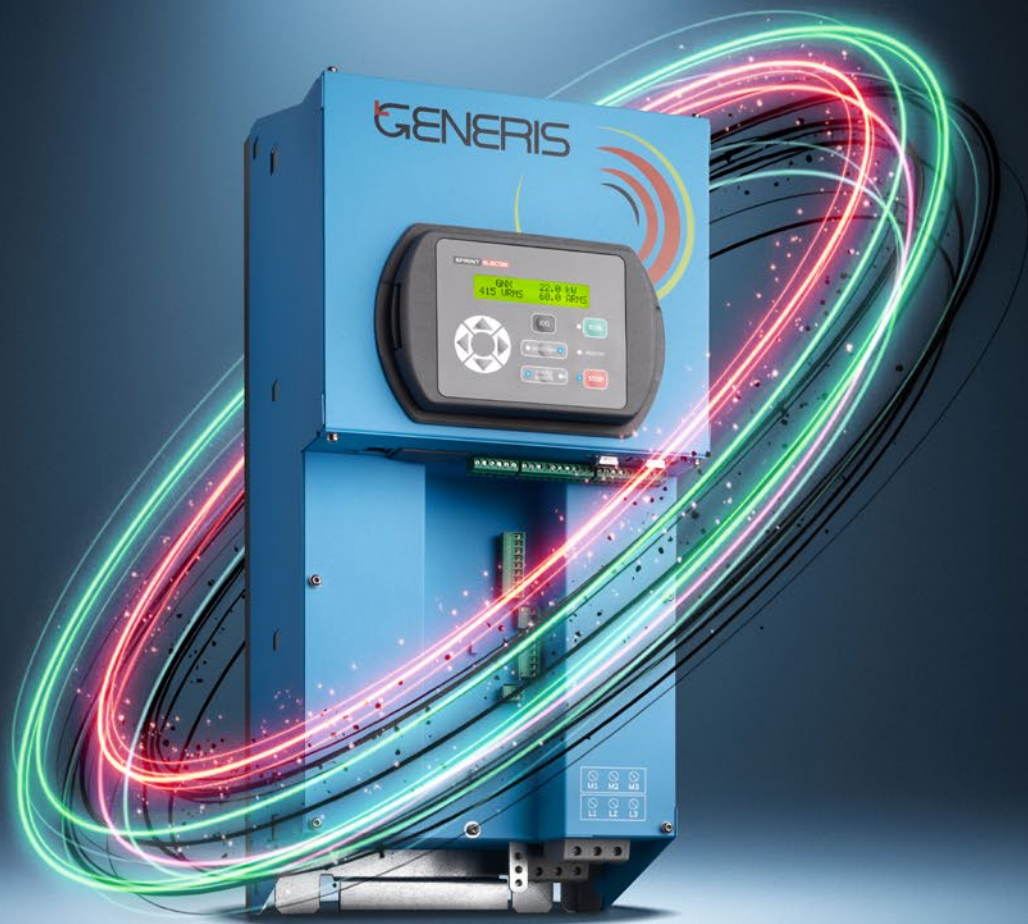


**SPRINT** **ELECTRIC**



**GENERIS**

**Ultra-low harmonics  
& fully regenerative AC drive**

## AC Drive Energy Regeneration

# THE NEW BENCHMARK FOR AC MOTOR CONTROL

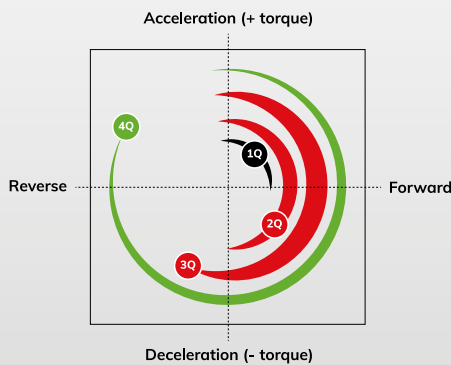
High performance motor control and energy regeneration  
using single stage power conversion

### Advanced motor control and energy regeneration

#### 4 quadrant control as standard

Generis delivers high performance AC electric motor control with the ability to return energy generated by the electric motor back to the supply.

It reliably delivers dynamic energy savings, avoiding the need to waste energy through dissipation in brake resistors.



## Efficiency

### Unique patented switching technology

No DC link circuit & No electrolytic capacitors

High efficiency

Maximum energy saving

Full torque at zero speed

## Reliability

### No electrolytic capacitors

Long lifetime

Less maintenance

Reduced cost of ownership

## Power quality

### Converts AC input direct to variable AC output

Unity power factor of 0.99

Ultra-low THD (Total Harmonic Distortion) on input current <4%

No DC link circuit & No electrolytic capacitors

### Single stage power conversion

Generis provides a single power conversion stage, delivering AC power input direct to the motor as variable AC power supply, with no intermediate DC link. This maximises energy savings and minimises losses.

*The Generis difference explained – see page 7*

### Ultra-low THD (Total Harmonic Distortion) on input current

Reduces heating in cables, switchgear and transformers.

### Near unity power factor operation

Input current stays in-phase with input voltage. This minimises current drawn from supply for a given output power, allowing smaller supply cables to be used and reducing the cost of ownership.

### Continuous operation at zero speed

No need to de-rate converter for continuous operation at zero speed and full torque.

*Low speed performance maximised*

Due to balanced loading of the devices at low speed (down to zero speed) there is no unbalanced load on any of the switching circuit.

*No mechanical brake required*

### Three-level voltage output waveform

At any instant, the output voltage is equal to one of the three input voltages. In an indirect converter it is one of two levels. Lower dv/dt gives reduced EMI (smaller filter) and allows for longer cable runs to the motor.

### No electrolytic capacitors

Generis has no intermediate DC link or electrolytic smoothing capacitors. This means high reliability and long lifetime as there are no components that wear out over time.

### Industry 4.0 connectivity

On-board server for set up and data streaming

Generis Analytics for advanced reporting and analysis



**Advanced control  
of all motor types**



**Continuous operation  
at 0 speed**

No derating required and  
no mechanical brake



**Fast payback**

On constant and  
variable torque profiles



**Compact design**

50% less volume than  
equivalent competitors



**Safe torque off  
(STO)**

# PRODUCT SPECIFICATION



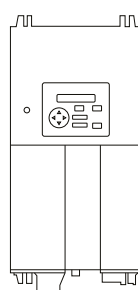
GENERIS Dimensions		
Size	Frame 1	Frame 2
Motor Power Rating	22 kW	55kW
Width (W)	264 mm	264 mm
Height (H)	576 mm	578 mm
Depth (D)	234 mm	289 mm
Weight	22 kg	25 kg



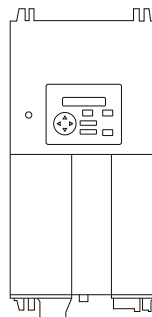
Size 1 - 22kW



Size 2 - 55kW



Size 3 - 90kW

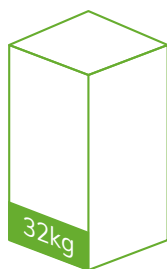


Size 4 - 200kW

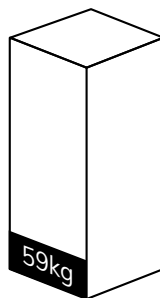
## Market leading power density



GENERIS 22kW



**Competitor A**  
Generis is half the volume and 40% lighter.

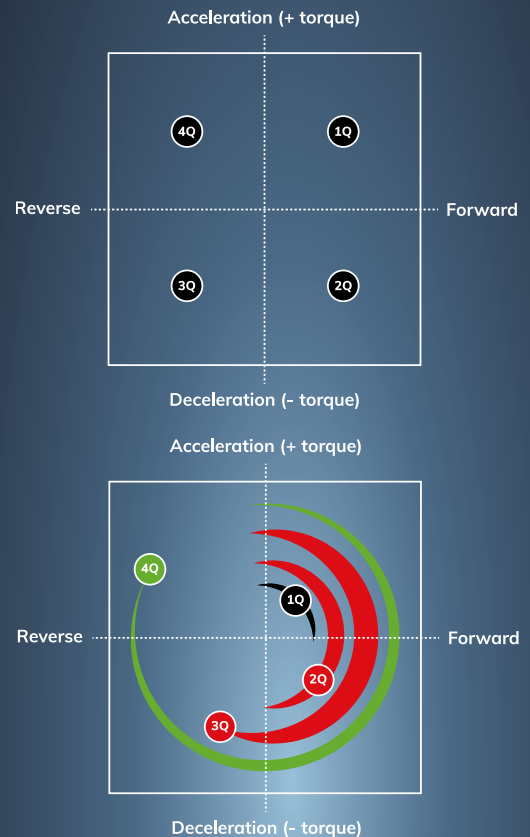


**Competitor B**  
Generis is half the volume and 64% lighter.

## Generis features include:

- Auxiliary power input
- Single or dual encoder
- Fieldbus support
- Removable operator station
- 40 character two line text display
- Multiple motor types supported
- Configurable application blocks
- Comprehensive set of user I/O
- Safe Torque Off

## 4 quadrant control with AC regeneration drive



## What are the four quadrants?

If a motor is connected to a load then it can be driven (or accelerated) in a forward direction. This is quadrant 1. If the load is then slowed down or braked in this direction (decelerated) then this is quadrant 2. If the motor is decelerated or braked past zero speed and into reverse then this is quadrant 3. Finally, if the motor is accelerated in reverse then this is quadrant 4.

Generis achieves high performance 4 quadrant control with simplified mechanics and a unique, patented switching technology. This eliminates the need for the advanced electronics, DC links and electrolytic capacitors previously required to create an AC drive that could control all 4 quadrants, often called Active Front End drives.

Generis is the advanced motor control that delivers a more reliable, efficient and compact solution to 4 quadrant control of an AC motor. It does this whilst delivering unity power factor, minimal harmonic distortion to input current and full torque at any speed.



## Ratings

### Power configuration

- Four quadrant regenerative
- 380 – 500Vac, three-phase, 50/60Hz
- Auxiliary 24VDC input (optional)
- Internal EMC filter

### Environment

- Ambient 0–50°C (derate above 40°C)
- Storage -25 to +55°C

### Power rating

- 7.5, 11, 15, 18.5, 22kW

### Current rating

- Normal duty: 18, 26, 35, 44, 52A; 110% overload for 30 seconds
- Heavy duty: 15, 22, 30, 37, 44A; 150% overload for 30 seconds

### Output voltage/frequency

- $V_{out} = \leq 0.86 V_{in}$
- $f_{max} = 200\text{Hz}$

### Speed / Accuracy

- 2% in Open-loop V/f
- 0.02% in closed-loop vector

### Enclosure

- IP20
- Air-cooled with temperature controlled fans
- Keyhole slot mounting
- Two-part control connections

### Operator station

- Chassis or panel-mounting
- 2 x 20-character backlit LCD
- Four key menu navigation
- Local/remote modes
- Dedicated Run/Jog/Stop keys
- Direction and health indications

## Standards

- EN 61800-5-1:2007 (CE - Low Voltage Directive)
- EN 61800-3:2017 (CE- EMC)

## Protection

- Thermal fold-back
- Instantaneous over-current
- Motor over-temperature
- Heatsink over-temperature
- Mains supply loss
- Mains synchronisation loss
- Stall protection
- Standstill logic
- Fan fail
- Digital/analogue output short-circuit
- Digital/analogue input over-voltage (to 30VDC)

### Analogue inputs

- 3 x  $\pm 10\text{V}$  configurable reference supplies (10mA maximum)
- 1 x 4/20mA or  $\pm 10\text{V}$  configurable reference

### Analogue outputs

- $\pm 10\text{V}$  range
- Two configurable

### Digital inputs

- 24V logic
- Current sinking
- Four dedicated: Run, Stop, Jog, Coast Stop
- Four configurable
- Seven configurable
- One configurable Coast Stop
- Dedicated coast stop

### Digital outputs

- 24V logic
- Current sourcing (400mA maximum)
- Five configurable

### Relay outputs

- 240VAC volt-free contacts
- Two configurable

### Encoder inputs

- Single or dual incremental encoder inputs
- A, B and Marker
- Differential or single-ended
- 5, 12 or 24V (software selectable)
- Single / dual incremental encoder inputs

### Motor temperature

- 1x PT100 input
- External sensor required

### Secure Drive Disable

- 2 x 24V input channels
- 1 x status output

## Software functions

### Motor control

- Open-loop V/f and closed-loop vector modes
- Induction and permanent magnet motors
- Torque and speed control
- Constant torque and constant power modes
- Current loop autotune

### Application functions

- Linear or S-ramp
- Brake control
- Jog/Crawl/Slack
- 2 x PID's
- 4 x summer blocks
- 4 x filter blocks
- 10 x comparators
- 10 x changeover switches
- Latch
- 4 x Batch counters
- 10 x Interval timer
- 40 x Maths function blocks
- 40 x Logic function blocks

### Diagnostics

- Motor current/voltage/speed/power
- AC supply voltage/frequency
- Heatsink temperature
- Motor temperature (external sensor required)
- User input voltages
- Run and powered hours

## Interfaces

### Communications

- USB-C
- Ethernet
- Modbus (through operator station port)
- CompactCom M40 Fieldbus options including PROFIBUS, PROFINET, EtherNet/IP, DeviceNet, EtherCAT, Modbus, CAN/CANopen & all major industrial networks

### Programming

- Embedded webserver
- Configuration with standard web browser (Chrome, Firefox, Edge)
- Graphical programming
- drive.web option for distributed control
- Remote connection over the internet

# CONNECTIVITY

On-board webserver facilitates easy set up with no internet connection or software downloads required. Industry 4.0 connectivity is provided for remote commissioning, fault finding and firmware updates. The optional data streaming service to Generis Analytics facilitates cloud based monitoring, process optimisation and preventative maintenance.



## GENERIS ANALYTICS



### Generis Configuration

Only requires a web browser for web pages served up by the on-board Generis webserver.

No software download required and no internet connection necessary.

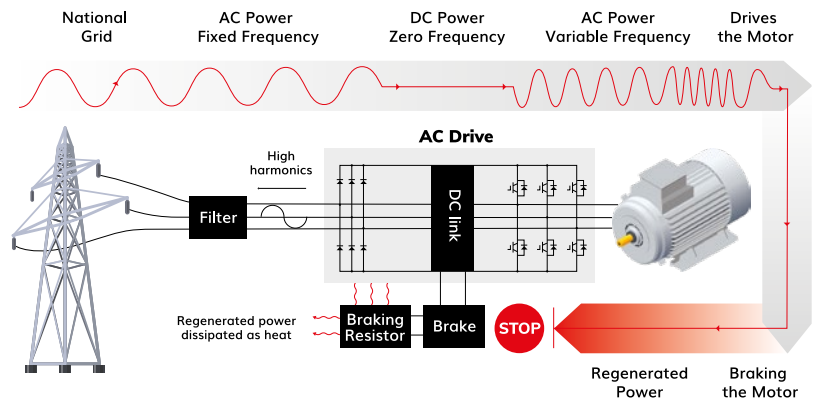
### Data Collection

- Drive/motor temperature
- Supply frequency
- Motor speed
- Supply voltage
- Feedback optics

# GENERIS VS AC DRIVES

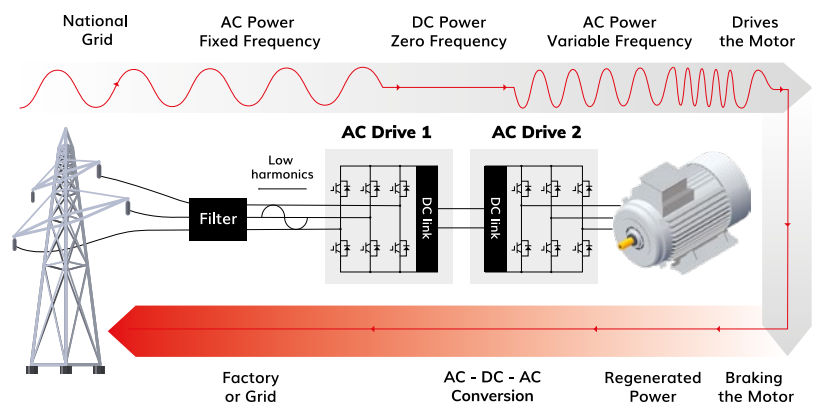
## How a standard AC drive works

AC current input supply has to be converted to DC in order to output a variable AC supply to the motor (the load). When the motor is braked, the energy generated by the motor has to be dissipated through braking resistors as heat. This wastes the energy created by the motor; requires extra hardware costs to handle energy from the motor; and requires design and installation measures to protect electronics from the heat created.



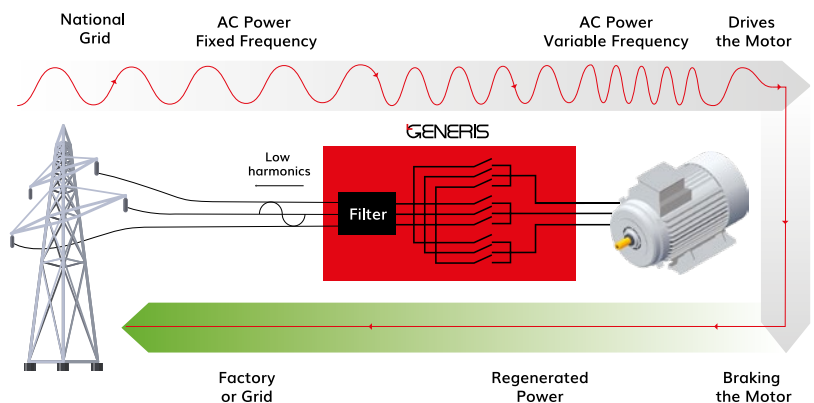
## To regenerate energy, two standard AC drives are required

Often referred to as Active Front End (AFE) drives, this requires two AC drives to be placed back-to-back. Energy can then flow both ways – from the input supply to the motor and regenerated energy from the motor back to the supply grid. This solution is not only costly. It uses electrolytic capacitors where lifetime is halved for every 10°C rise in temperature.



## Generis regenerates energy as standard

Generis uses a unique, patented switching technology to deliver a single power stage, with no DC link required. This means AC supply input goes direct to AC variable supply output to the motor and regenerated energy from the motor can be passed direct back to the supply. This direct energy conversion delivers unity power factor and low total harmonic distortion. The simplified mechanics of Generis with solid state electronics also means improved reliability and longer operating lifetimes.





# WORLD CLASS AC & DC DRIVES

Sprint Electric design and manufacture a wide range of AC & DC drives covering single phase and three phase, regenerative and non-regenerative applications.

Our UK manufacturing facility is supported by a global network of distributors in 40 countries.

## APPLICATIONS FOR GENERIS

Artificial lifts  
Centrifuges  
Cranes  
Elevators  
Energy generation / transfer & recovery  
Escalators  
Flywheels  
Hydrokinetic (tidal / bi-directional) river flow  
Low harmonic or regen fans  
Low harmonic or regen pumps  
Material handling equipment  
Process control  
Pumped hydro  
Wind turbines  
Winding / Unwinding

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