Green Power Series
Variable frequency drives, variable energy converters, soft starters, motors and remote solar supplied systems
Contents

Introduction 01

Flexible Solutions 01

The Green Power Series products 02

MEDIUM VOLTAGE

MVC 5100 – Green Solutions MV Drive 03

MVC 8000 – Green High Power MV Drive 04

MVC Multi Level Green Power Drives 05
– Working principles & features

Simple installation lower cost solution 06

MFS – Multi Frequency Starters 07

LOW VOLTAGE

LFS Range – Low Voltage Soft Starter for efficient motor operation 08

Solar Power Packages – For remote or grid applications 09

Wind & wave turbine support packages 09

LVC 300 – Low voltage drive for energy efficient pumps and fans 10

High & low voltage motors 12

PLC & SCADA packages 13
Severn Drives & Energy

Severn Drives & Energy aim to deliver products to support industries’ energy requirements and provide solutions to overcome the current challenges they face.

With our range of products we deliver the capability of efficient energy use and distribution for manufacturing processes, energy providers and networks, all in an economically and environmentally friendly package.

We are specialists in developing products to support the renewable energy industry requirements and provide solutions to satisfy current challenges within the industry, a key focus of Severn Drives and Energy. We aim to continue to develop our current innovative product range in line with our customers’ future requirements.

Flexible Solutions

Severn Drives & Energy can provide solutions drawing on the entire product range of the Severn Glocon Group.
The Green Power Series of medium and low voltage starters, drives and energy converters represent a step change in motor starting and control technology.

**MFS Multiple Frequency Starters**
Offer unique voltage and step frequency soft starting, allowing for the controlled start of motors under light, medium and heavy loading.

**MVC Green Power Drives**
Advanced low harmonic, asymmetric voltage configured medium voltage drives with modular design and simple configuration.

**MVC Renewable Converters**
Advanced features such as direct, medium or low voltage input options from tidal turbines or wave generators and direct output at up to 33kV, for connection to the grid without the need for additional step up transformers.

**Solar Power Packages**
Remote and grid connected solutions with high quality components, lower cost of ownership through easy to service modular design. Simpler installation, usually without the need for additional transformers and filters are part of this green product’s credentials.

**LVC Low Voltage Variable Frequency Drives**
An energy efficient and reliable compact range of drives dedicated to general applications including pumping and HVAC.

**LFS Low Frequency Soft Starters**
One of the finest energy saving soft starters in the world, with a wide range of adjustable features that allow you to start even the most awkward load with ease, giving you ultimate flexibility.

**Low voltage and medium voltage induction motors**
A comprehensive range of efficient and safe induction motors to suit many applications.
The MVC 5100 provides speed and / or torque control for motor driven applications in the medium and high power range from 200kW to 14MW at motor voltages from 3.0kV to 13.8kV.

It is available with air cooling in the lower power range and with optional water cooling in the medium to high power range. MVC 5100 drives are also available mounted within a customised container, with self-contained sealed cooling systems, providing the highest IP Class ratings for hostile environments as well as providing greater convenience and ease of installation and commissioning.

The MVC 5100 family of drives is therefore particularly suitable to retrofit applications as well as applications requiring long cables to the motor. The medium voltage output is achieved directly without the need for an output transformer, particularly important in order to achieve high motor torque at very low speeds.

✔ Display and recording of operating data
✔ Self-diagnosis
✔ Complete protection system
✔ Closed loop control
✔ Flying start
✔ Dual-route control power supply
✔ High power factor
✔ Sensorless vector control
✔ Vector control for synchronous motors
✔ Synchronized bypass grid connection
✔ Master-slave control
✔ Energy feedback
✔ Low noise
✔ Multi-language HMI

Information on the full MVC 5100 range is available in our technical brochure, please contact us direct.
Utilising the latest generation of IEGT devices, the MVC 8000 delivers refined and controlled power from 20MW to 60MW in a variety of voltages.

Delivering green multi-level low harmonic power to applications is the MVC 8000 Green High Power MV Drives core competence.

Designed with the Severn Drives & Energy ethos of high reliability and low maintenance, the true cost of ownership of this drive places it as the best price, performance ratio drive in its class.
MVC Multi Level Green Power Drives

Working principles

The Severn Drives and Energy MVC is a medium voltage multi-level converter constructed by the cascade connection of single phase H-bridged inverters in series to achieve the required medium voltage output.

Each single phase inverter receives input DC power from its own isolated 3-phase rectifier, itself fed from a separate transformer secondary. Each rectifier and associated inverter is assembled into an identical power module.

The input transformer is an integral part of the MVC cabinet with multiple isolated secondary windings to supply the power modules.

Each transformer secondary is wound with a different phase displacement angle in order to achieve an effective high pulse number rectifier, resulting in a significant reduction of input current harmonic distortion.

Features

- Multi-level PWM voltage-source inverter
- Output voltage range 3.3kV – 13.8kV achieved without output transformer
- Can be used with asynchronous / synchronous motors and generators
- Output filter not required – may be used as retrofit with old motors
- No additional motor heating caused by drive
- No significant induced motor torque pulsations
- Can be used with long motor cable lengths, usually without need for output filter
- Integrated isolation transformer – no common-mode voltage stress impressed on to motor
- Supply-side harmonic filters and power factor correction not required
- Uses flux vector control technology, open or closed loop
- Reduced stray bearing current helps prevent premature bearing failure
Simple installation lower cost solution

Conventional method

1. External isolation / step down transformer required to reduce common mode voltage motor stress and reduction to motor voltage. 
   **Not required for MVC Green Power Drives due to integrated phase shifting technology.**

2. Input Bridge to reduce harmonic disturbances to factory supply. 
   **Not required for MVC Green Power drives due to low harmonic topology**
   • 3.3kV motor output = 18 pulse
   • 6.6kV motor output = 36 pulse
   Higher voltages can give higher pulse equivalence.

Green Power Series method

1. 13.8kV
2. DRIVE
3. Output filter to correct poor voltage waveform and high dv/dt and long cable lengths. 
   **Usually not required for MVC Green Power Drives due to multi level output (PWMS)**
   7 level for 3.3kV and 13 level for 6.6kV.

4. Output filter to correct poor current waveform and high dv/dt and long cable lengths. 
   **Usually not required for MVC Green Power Drives due to multi level output (PWMS)**
   7 level for 3.3kV and 13 level for 6.6kV.

5. Motor 
   **Due to the integrated phase shifting technology of MVC Green Power Drives the input voltage to the drive and the voltage to the motor can be different (asymmetrical), eliminating the need for step down transformers converter.**
The MFS Multi Frequency Starters use advanced motor control technology to soft start and stop medium voltage motors under load.

A provision for rotating larger motors on a timed basis to prevent the motor shaft distorting under the effects of gravity is also available.

The MFS series product is developed based on a cycle-skip control method and variable frequency technique. The MFS control system generates six periodic triggering signals. At a certain frequency, the five anti-parallel connected power stacks are conducted one by one to follow the preset control strategy to apply a certain voltage and frequency to the motor. The motor is smoothly started from 1/4fe to 1fe and accelerates to the rated speed. 2-step operation is suitable for heavy load starting.

The MFS reduces water hammer, site voltage fluctuations and energy consumption. Because of its multiple frequency operation, applications which would normally have proved difficult with a soft starter can now be easily solved, including motors with moderate or heavy loading at start.

The MFS series provides a flexible, adaptable, process enhancing and cost effective product to satisfy all your soft starter requirements.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>POWER RANGE</th>
<th>VOLTAGE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFS Extended Type MV Soft Starter</td>
<td>100kW – 5000kW</td>
<td>3kV – 13.8kV</td>
</tr>
<tr>
<td>MFS High Power Type MV Soft Starter</td>
<td>4000kW – 0000kW (6kV)</td>
<td>6kV – 13.8kV</td>
</tr>
<tr>
<td></td>
<td>5000kW – 0000kW (10kV)</td>
<td></td>
</tr>
</tbody>
</table>

Information on our full MFS range is available in our technical brochure, please contact us direct.
Low Voltage Soft Starters for efficient motor operation

The LFS 100 is one of the finest energy saving soft-starters in the world with a wide range of adjustable features that allow you to start even the most awkward load with ease.

Fully adjustable ramp times from 0-255 seconds give you ultimate flexibility. For high inertia loads, current limit will provide you with a reduced current start. A kick start facility will help you to get things moving on loads with high static friction.

The variable range of operation
3kW–630kW  4HP–840HP  200V–690V  Single & 3 Phase Input

Soft start energy saving motor control systems

For Soft Starting

Using the LFS 100 as a soft starter will put you back in control by

☑ Significantly increasing the life of your contactors and drive train components
☑ Preventing dips in supply when starting larger motors
☑ Increasing productivity by allowing you to attach more equipment to a single supply
☑ Allowing you to switch your motors on and off at any time because of reduced starting current
☑ Reducing the worrying threat of peak demand penalties when starting

For controlled stopping

Through controlled deceleration, the LFS 100 Soft Stop

☑ Provides an effective solution to minimise water hammer
☑ Reduces the probability of damage to pipe systems
☑ Provides safe, cost effective plug braking

The LFS 100

Works hard on your behalf

☑ Assessing the load of the motor every cycle of the supply
☑ Preventing the motor from stalling by monitoring the motor flux
☑ Provides safe, cost effective plug braking
☑ Giving you motor intelligence
Severn Drives & Energy provide a specialist and bespoke solar package solution, designed and built to fully satisfy our customers’ specific requirements.

We also provide solutions for existing AC and DC pump and valve systems. Non-accessibility to local grid power has been one of the commercial challenges of projects located in desert and remote locations.

**Severn Drives & Energy have a solar and / or wind turbine powered solution for these applications which include**

- Remote pipelines (block / isolation and control valves)
- Remote location water treatment plants
- Remote process plants
- Replacement of costly diesel generators

**Features**

- Direct interface with small and large photovoltaic arrays
- Fully programmable system
- Compliance to regulatory standards (CE / UL approved)
- Remote monitoring and diagnostic feature (optional)

**WIND & WAVE TURBINE SUPPORT PACKAGES**

Severn Drives & Energy offer a range of products specifically designed to support the wind and wave renewable energy industry:

- Static VAr generators from 3.3kv 200MVar to 33kv 640MVar for windfarms and other generating stations such as wave and tidal
- Regenerative drives for use with both wave and tidal generators, ranging from 3.3kv 200kw to 33kv 5MW or larger
- Containerised or stand-alone Statcoms or Regenerative drives
- Liquid or air-cooled options
- Marinised for use in coastal applications

**Control and electrical systems**

Working closely with our sister company Severn Subsea Technologies we have the unique understanding in the challenges faced in the design and build of telemetry and control systems for wind, wave and tidal applications such as wave energy converters. We understand the requirements of the design and build that must withstand the harsh marine environment, deal with the pressures and temperatures involved and can function with a limited power budget.
This is a compact and robust range of drives dedicated to pump control
0.37kW–250kW / 0.5HP–350HP   110–600V Single & 3 Phase Input

The range is designed to deliver
- **Total control** – A single ‘master’ drive acts to control and monitor system operation
- **Flexible solution** – Can operate up to five pumps in any configuration
- **Consistent flow** – Maintains the required pressure and flow levels regardless of how many pumps are required
- **Reduces downtime** – Continues to operate whilst maintenance is being carried out on any one pump

**Saving energy / reducing CO₂**
With large scale increases in global energy costs and the introduction of taxes and legislation relating to the industrial production of CO₂ gases, the need to reduce energy consumption and save money has never been greater. The LVC 300 can be used with environmental sensors to reduce pump speed in pumping applications, without compromising the required output of the system.

**Easy installation**
Compact and modern design utilising the latest available technology, have accumulated in a robust drive with small dimensions and innovative mounting and cabling features.

**Motor flexibility**
Ability to connect and control different types of motors, including standard AC induction, permanent magnet AC, brushless DC and synchronous reluctance motors.

**Simple set-up & rapid commissioning**
The LVC 300 was developed from concept for ease of use. A handful of parameters configure the drive for basic pump applications. A short, concise product data means the drive is running in seconds. Advanced powerful functionality is equally easily accessible.

**Imaginative enclosure design**
With a selection of IP20, IP55 and IP66 enclosures, the LVC 300 is well suited to harsh environments, or where cabinet and cabling costs need to be reduced.

**Advanced pump control functions**
The key pump control functionality required for your application is inbuilt into the LVC 300 and packaged to be both quick and simple to activate. Added to this is the drive’s own PLC programming flexibility that makes the drive’s functionality virtually limitless.

**Options for flexibility**
The LVC 300 combines both peripheral and factory built options to ensure you get the right drive, scaled to suit your application. With inbuilt BACnet and Modbus, and a host of communication options, the LVC 300 can integrate easily into your industrial network of choice, including DeviceNet, PROFINET, EtherCAT and more.
Noise reduction

Quiet motor operation
- ✔ High switching frequency selection (up to 32kHz) ensures motor noise is minimised.

Quiet system mechanics
- ✔ Simple skip frequency selection avoids stresses and noise, caused by mechanical resonance in pipework.

Quiet drive operation
- ✔ Temperature controlled cooling fans ensure quiet operation in periods of reduced load.

Noise reduction through speed control
- ✔ Optimising motor speed gives significant energy savings and reduces motor noise.

Integrated cable management
- Multi Language OLED Display
- Hand / Auto Keypad
- Pluggable terminals
- Long Life, Dual Ball Bearing Fans
- Integrated cable management
- IP55 / NEMA 12
- Maintenance interval timer & service indication
- Enclosure Options with integral isolator
- Bluetooth link & commissioning
- Internal EMC Filter
- Multiple Pump Control

Green Power Series 11
High voltage motors

High voltage A / A three phase induction motors

<table>
<thead>
<tr>
<th>CAST IRON FRAME</th>
<th>MODULAR ALUMINIUM FRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Outputs ranging from 160kW to 3MW</td>
<td>✓ Outputs ranging from 250 kW to 25 MW and up to 15KV</td>
</tr>
<tr>
<td>✓ Frame sizes ranging from 315 to 710L</td>
<td>✓ Frame sizes ranging from 355 to 1400L</td>
</tr>
<tr>
<td>✓ Speeds ranging from 2 pole to 8 pole</td>
<td>✓ Standard and low starting current – as low as 3x</td>
</tr>
<tr>
<td>✓ Ingress of Protection in IP55, IP56, and IP65</td>
<td>✓ Speeds ranging from 2 pole to 18 pole</td>
</tr>
</tbody>
</table>

High voltage power supply: 3.3KV, 4.16KV, 6.6KV, 11KV & 13.8KV

Low voltage motors

IE2 low voltage A/C three phase induction IEC standard motors

<table>
<thead>
<tr>
<th>CAST IRON FRAME</th>
<th>ALUMINIUM FRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Outputs ranging from 0.75kW to 400kW</td>
<td>✓ Outputs ranging from 0.07kW to 900kW</td>
</tr>
<tr>
<td>✓ Frame sizes ranging from 80 to 355L</td>
<td>✓ Frame sizes ranging from 63 to 450L</td>
</tr>
</tbody>
</table>

IE3 low voltage A/C three phase induction IEC standard motors

<table>
<thead>
<tr>
<th>CAST IRON FRAME</th>
<th>ALUMINIUM FRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Outputs ranging from 0.75kW to 400kW</td>
<td>✓ Outputs ranging from 0.07kW to 22kW</td>
</tr>
<tr>
<td>✓ Frame sizes ranging from 80 to 355L</td>
<td>✓ Frame sizes ranging from 63 to 180L</td>
</tr>
</tbody>
</table>

Low voltage A/C three phase induction IEC high output motors

<table>
<thead>
<tr>
<th>CAST IRON FRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Outputs ranging from 160kW to 3MW</td>
</tr>
<tr>
<td>✓ Frame sizes ranging from 315 to 710L</td>
</tr>
<tr>
<td>✓ Speeds ranging from 2 pole to 8 pole</td>
</tr>
<tr>
<td>✓ Ingress of Protection in IP55, IP56 and IP65</td>
</tr>
</tbody>
</table>

Low voltage A/C three phase induction IEC brake motors

<table>
<thead>
<tr>
<th>CAST IRON FRAME</th>
<th>ALUMINIUM FRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Outputs ranging from 0.75kW to 400kW</td>
<td>✓ Outputs ranging from 0.07kW to 22kW</td>
</tr>
<tr>
<td>✓ Frame sizes ranging from 80 to 355L</td>
<td>✓ Frame sizes ranging from 63 to 180L</td>
</tr>
</tbody>
</table>
Low voltage A/C single phase induction IEC brake motors

**ALUMINIUM FRAME**
- Outputs ranging from 0.09kW to 3kW
- Frame sizes ranging from 80 to 355L

Low voltage power supply: 230V, 380V, 400V, 415V & 690V

Additional motors available
- ✔ Hazardous area low voltage and medium voltage motors
- ✔ NEMA and geared motors
- ✔ Asynchronous slip ring induction and synchronous motors

**PLC & SCADA packages**
We have the ability to deliver bespoke PLC and SCADA packages for process control in many applications. There is also the in Group capability to design and build bespoke SCADA and telemetry systems for wind, wave and tidal applications.