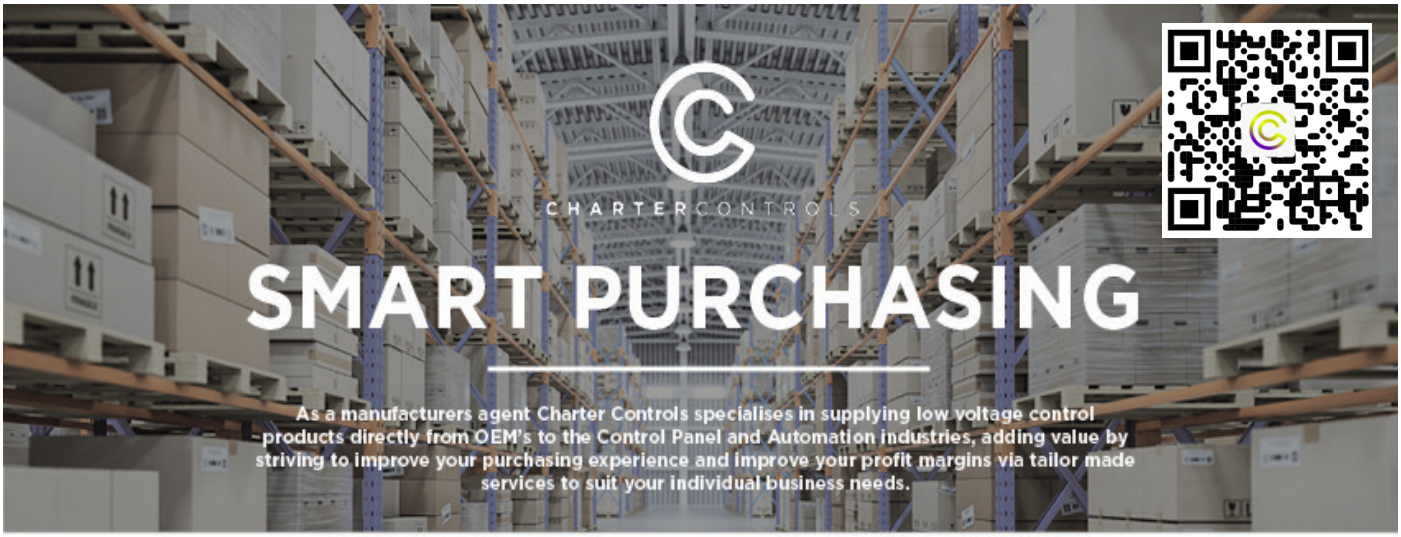

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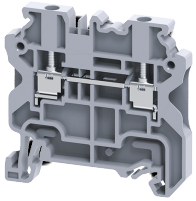
Air Conditioners



Terminal Blocks

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- Thermal Management
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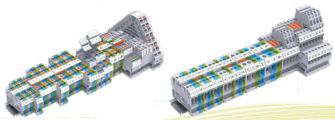
- Power Supplies
- PLC's, HMI's & Smart Relays
- Door Gear, Meters & Energy Management
- Motor Load Monitors
- Terminal Blocks







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- Rotary Switches
- LED Indicators
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- Time Delay Relays

- Time Switches
- Counters

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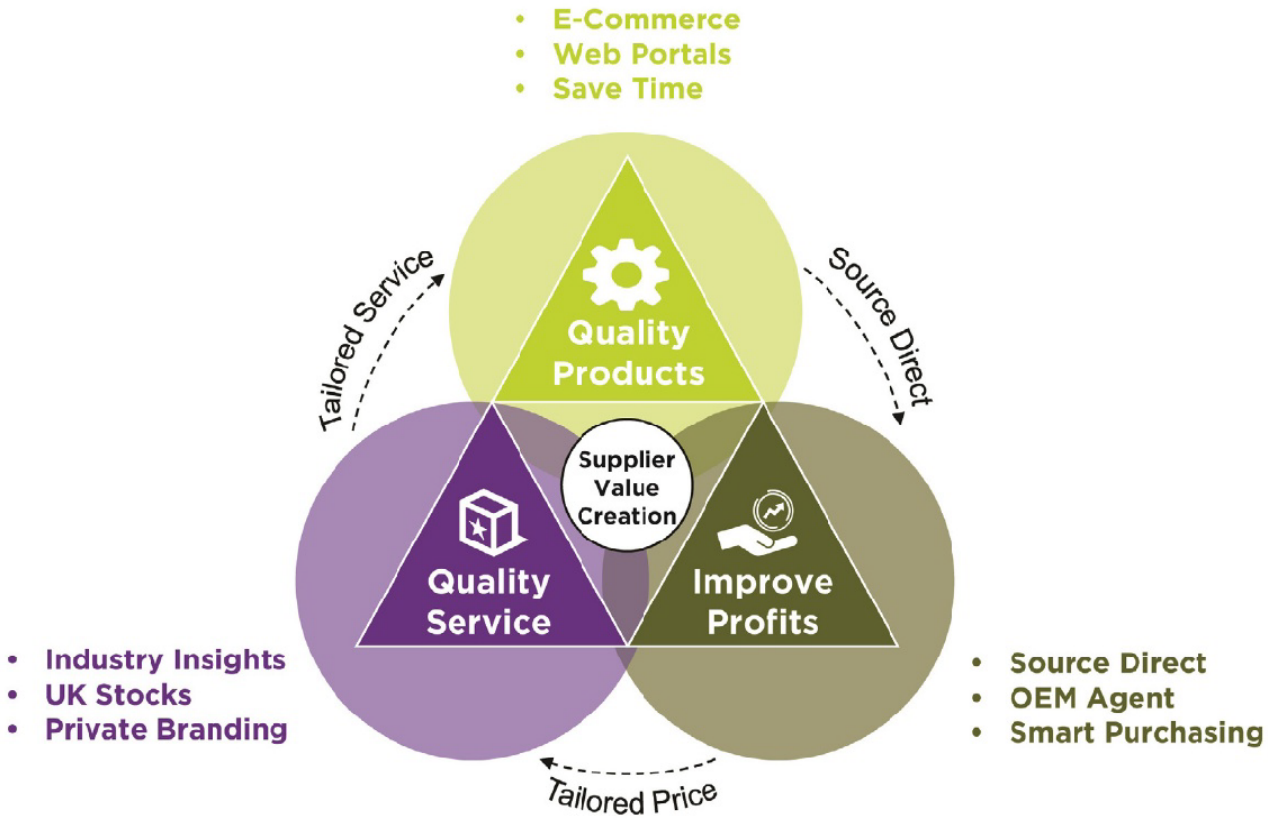
- Temperature Controllers

- Terminal Blocks



Creating and optimising supplier value

Amir Sami | Charter Controls

Are you prepared for challenging times? How do you minimise the disastrous effects on your business? Further how do you compete in a thriving industry and form strategic partnerships? While customers select suppliers in their own unique ways, supplier value creation and all activities leading to value creation are becoming more and more vital.

> **"This 'perfect storm' of events has resulted in substantial and continuous price hikes on products and shipping services worldwide."**

Despite controllable and uncontrollable variables, customers in a B2B environment would ideally expect their suppliers to be able to offer value to all levels of their business, directly and/or indirectly. This would include the leveraging of technology for an autonomous but simple purchasing experience, with the ability to offer information clarity and availability of relevant data where required. More recently, there has been an emphasis on logistics, encapsulating service quality, costs and time.

UK control panel builders, like many other businesses, have endured some difficult times during the past few years. This is due, to a large extent, to the pandemic, chip shortages and current geopolitical issues, not to mention

effects of Brexit, and the weakness of sterling. This 'perfect storm' of events has resulted in substantial and continuous price hikes on products and shipping services worldwide.

> **"There must be an emphasis on keeping up to date, as well as continuously seeking ways to improve customer interaction and the purchasing experience, including making use of appropriate technological advancements."**

On top of this, customers are still faced with major delays in manufacturing and backlogs, causing delays in project completion, thus making UK panel builders potentially less competitive, and more susceptible to project price sensitivity and margin erosion. Considerable amounts of time and manpower are also wasted on procurement activities, while businesses struggle to find the time to focus on their core operations.

Smarter purchasing?

Many quick-thinking engineers and procurement teams have embarked on the search for alternatives, offering their customers the next available products that meet all necessary certifications, technical and quality requirements.

As a result, many smaller component suppliers have been able to showcase their products' capability and quality at a fair and justifiable price, winning customers' trust, and enabling them in turn not only to deliver to their customers on time, but also to compete and improve their profit margins.

A prime example of this evolution is Unipower UK Ltd, T/A Charter Controls, a family-run business established in 1992 that is helping its customers during these difficult times. For many years, Charter Controls has been a global sourcing agent to high-value service providers and distributors, as well as supplying directly to panel builders, importing control panel products from OEMs who manufacture for larger established brands across the globe.

Due to the company's ethos of "working for our customers", it has managed to establish many strategic partnerships, securing year-on-year growth. In particular, as an appointed manufacturers' agent, Charter Controls has been able to differentiate itself uniquely, by offering control panel components at competitive prices, and enabling UK panel builders to reduce their product purchasing costs and eliminate long delays in project completion.

Wide scope value

Undoubtedly, value-added products and value-added services go hand in hand, and should be considered as being just as important as each other in a B2B environment. Indeed, it is Charter Controls' belief that, as a supplier, there must be an emphasis on keeping up to date, as well as continuously seeking ways to improve customer interaction and the purchasing experience, including making use of appropriate technological advancements.

These include: delivering commercial insights; reducing time-consuming purchase-to-pay procedures; accessing technical data and CAD files; as well as simplifying the process. This core value of value-added services has been at the forefront of Charter Controls' management strategy in recent years; it is a key driver behind significant investments into an all-new website with customer-specific web portals, and state-of-the-art sales, purchasing and stock-management software.

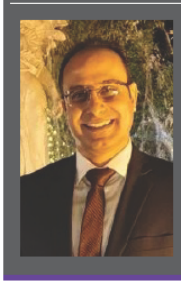
The software checks stocks to ensure the availability of products, provides a simplified way to access account purchase history, and includes the ability to make a purchase online at agreed discount structures. The objective of this investment is to widen the value-add to as many departments as possible within a customer's business, i.e. accounts, purchasing, design and engineering, etc.

The most valuable asset to any business is its employees. Making the most efficient use of their time will equal pounds in profits. As a direct result of these strategies, Charter Controls' customers are left with one pleasant dilemma: where to invest the time and money saved within their businesses!

www.charter-controls.com

> **"Many smaller component suppliers have been able to showcase their products' capability and quality at a fair and justifiable price, winning customers' trust, and enabling them in turn not only to deliver to their customers on time, but also compete and improve their profit margins."**

About the author:



Amir Sami is the Business Development Manager at Unipower UK Ltd (trading as Charter Controls). He has an MBA and BEng (Hons) in Electronic Engineering.

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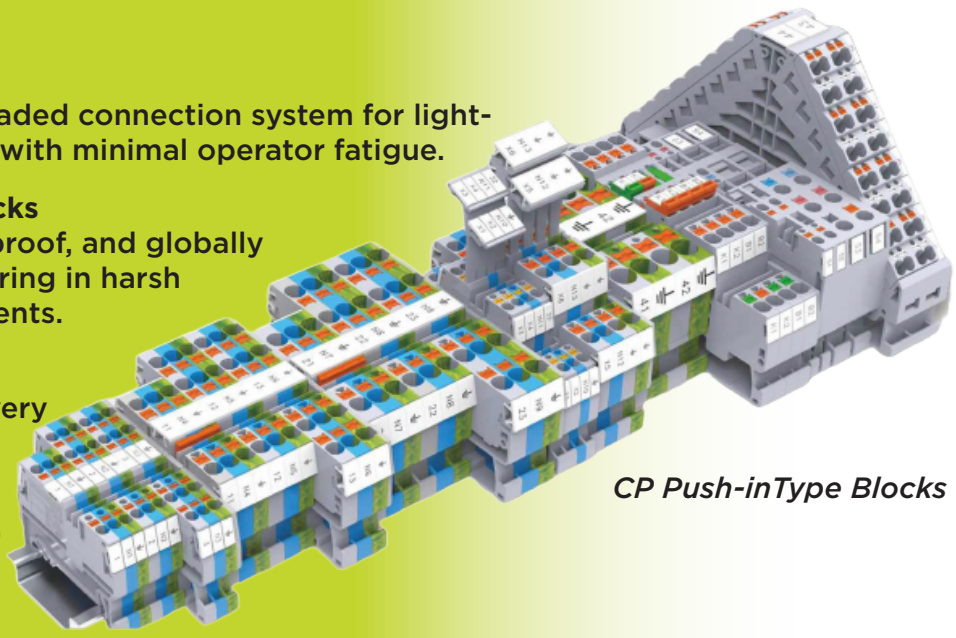
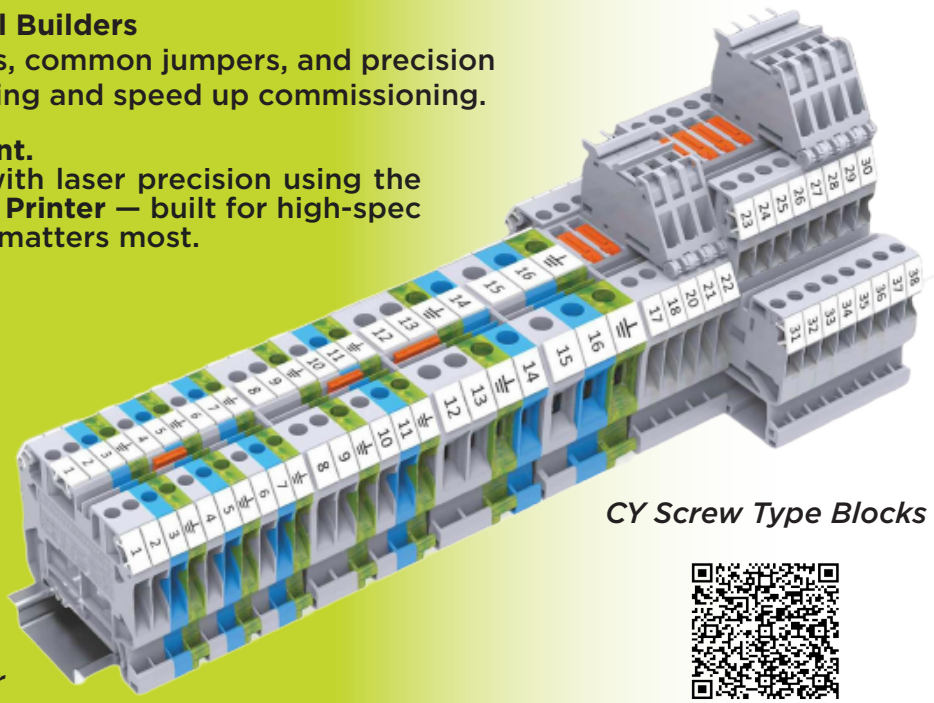


CP Push-inType Blocks



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Description	Part No.
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How data-driven technologies are shaping industry manufacturing standards

Amir Sami | Charter Controls

In today's rapidly evolving industrial landscape, the shift towards data-driven manufacturing is not just a trend but a crucial strategy for staying competitive. The integration of real-time data collection, proactive maintenance, and strategic planning into manufacturing processes is transforming how industries operate, enhancing efficiency and reducing downtime.

The role of real-time monitoring and control

Real-time monitoring and control are at the heart of modern manufacturing. By continuously collecting and analysing data from machine components via sensors, solutions such as the WECON V-BOX, supported by V-NET technology, ensure that machinery operates within optimal parameters.

This constant vigilance helps in identifying and correcting deviations immediately, which not only prevents equipment damage, but also ensures consistent product quality. For instance, monitoring critical parameters such as temperature, pressure, and speed enables the detection of anomalies, automatic adjustment of processes, or alerting of operators.

This capability supports proactive maintenance and prevents costly downtime, making it an indispensable tool in the manufacturing toolkit.

Enhancing process automation

Automation is a key benefit of intelligent monitoring and control systems, such as the WECON V-BOX, available ex-stock from Charter Controls, allowing for seamless control of machinery through programmable logic. This automation extends from simple tasks, such as

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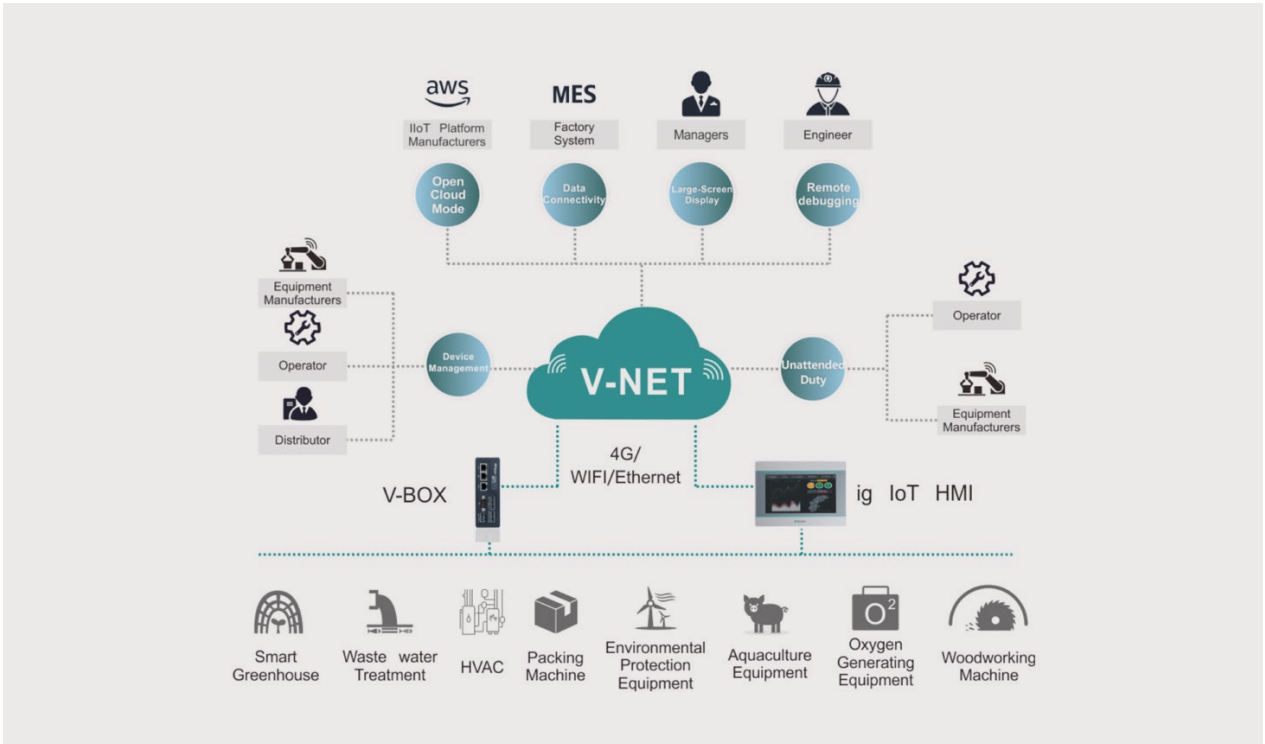

> **“Monitoring critical parameters such as temperature, pressure, and speed enables the detection of anomalies, automatic adjustment of processes, or alerting of operators. This capability not only supports proactive maintenance, but also prevents costly downtime, making it an indispensable tool in the manufacturing toolkit.”**

starting and stopping machines, to more complex adjustments like modifying operational speeds and switching between modes – all without human intervention. The result is a significant increase in efficiency, reduction of human error, and lower operational costs, culminating in higher production throughput and improved quality control.

Driving efficiency and energy savings

Energy consumption is a major cost factor in manufacturing. Optimising machine operations and energy usage ensures that machines run only as needed, and always at peak efficiency. This not only helps in cutting down energy costs, but also contributes to sustainability goals, a growing concern in modern manufacturing environments.

Remote management and predictive maintenance

The flexibility of monitoring/control systems may be further enhanced by V-NET, which facilitates remote management and diagnostics. This setup allows operators to monitor and control machinery from central locations or remotely, reducing the need for on-site personnel and enabling quick responses to any arising issues. Moreover, predictive maintenance capabilities allow for the analysis of operational data to forecast potential failures before they occur. This proactive approach minimises unexpected downtime, extends machine lifespan, and optimises overall machine performance.

In many cases, the latest monitoring/control systems may be accessed via iOS or Android apps. Different models are available, from small to large, capable of connecting through 4G, Ethernet, or WiFi, making them cost-efficient.

Scalability, compliance, and reporting

As manufacturing demands grow and technologies evolve, a monitoring/control system that’s designed with modularity and scalability in mind can prove invaluable. This flexibility allows manufacturers to expand or modify their systems without extensive overhauls, providing a future-proof solution to technological advancements. Additionally, such systems can simplify compliance and reporting, automating the collection and documentation of operational data to meet industry regulations and standards.

Return on investment

Implementing intelligent monitoring/control systems, such as the WECON V-BOX and V-NET systems, represents a smart and future-proof investment in technology. However, the return on this investment is quickly realised through enhanced diagnostic capabilities, reduced downtime, energy savings, and improved overall efficiency. The data-driven approach not only streamlines maintenance operations but also provides strategic insights that can lead to better decision-making and increased productivity.

> **“As manufacturing demands grow and technologies evolve, a monitoring/control system that’s designed with modularity and scalability in mind can prove invaluable. This flexibility allows manufacturers to expand or modify their systems without extensive overhauls, providing a future-proof solution to technological advancements.”**

Conclusion

In conclusion, as the industry moves towards more integrated and intelligent manufacturing systems, technologies like WECON V-BOX and V-NET increasingly stand out as essential tools. They not only meet the current demands of data-driven manufacturing, but also anticipate future needs, ensuring that businesses remain at the forefront of industry developments. Embracing these technologies means not just keeping up with the times, but setting the pace for innovation in manufacturing.

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About the author:

Amir Sami is Director of Sales at Unipower UK Ltd (trading as Charter Controls). He has an MBA, and BEng (Hons) in Electronic Engineering.

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WECON
Programmable Logic Controllers (PLCs)

by Amir Sami, MBA | BEng (Hons) | Sales Director of Charter Controls

Introduction to Wecon and its PLC Development

Wecon is a manufacturing company that specialises in the development and manufacturing of industrial automation products, with a strong focus on Programmable Logic Controllers (PLCs). Founded in 2011, Wecon has grown to become a key player in the automation industry, providing reliable, cost-effective solutions for various industrial sectors.

Wecon's Focus on PLC Development:

Product Range:

Wecon offers a wide range of PLCs, catering to small and medium-sized industrial control systems. Their PLCs are designed to meet different needs, from basic automation tasks to more advanced motion control applications.

Technological Advancements:

Wecon continuously develops its PLC technology to keep up with industry demands. Their product lines, such as the LX series (LX3V, LX5S and LX5V), demonstrate advancements in processing speed, memory capacity, and communication capabilities.

User-Friendly Design:

A key goal of Wecon's PLC development is to provide user-friendly solutions. Their products are designed to be easy to program and configure, making them accessible even to users with limited technical knowledge.

Industrial Applications:

Wecon's PLCs are used across various industries, including manufacturing, energy, and transportation, providing efficient control over production processes and machinery.

LX5S Series:

- High-performance small PLC, derived from the LX3V, but with much-improved specifications.
- Key Features:
    - Pulse input/output supports high-speed operation with precise control.
    - High execution speed: 0.03-0.08μs, supporting up to 100 high-speed counter interrupts.
    - Functions like E-CAM, electronic gear, and efficient PID and CCPID self-tuning are available.
    - Supports LX3V series expansion modules.
    - Communication & Power: RS485, USB for program download, AC/DC power options.
    - Available in models with different I/O configurations (e.g., 08/06, 12/08, 16/16, etc.).

LX5V Series:

- This is the flagship small PLC from Wecon, boasting superior performance over the LX3V.
- Key Features:
    - Fast execution speed: 0.01-0.03μs.
    - Supports advanced motion control with up to 8 high-speed pulse outputs.
    - High memory capacity (512KB) for large programs and 100 high-speed counting interrupts.
    - Ethernet support along with other communication ports (RS422/485).
    - Available in several I/O configurations similar to LX5S.

Deep Dive Wecon PLC's

1. LX3V Series

Overview:

The LX3V series is part of Wecon's classic PLC range, designed for small and medium-sized control systems. It is a reliable, cost-effective choice that offers basic functions suitable for various industrial automation tasks.

Key Features:

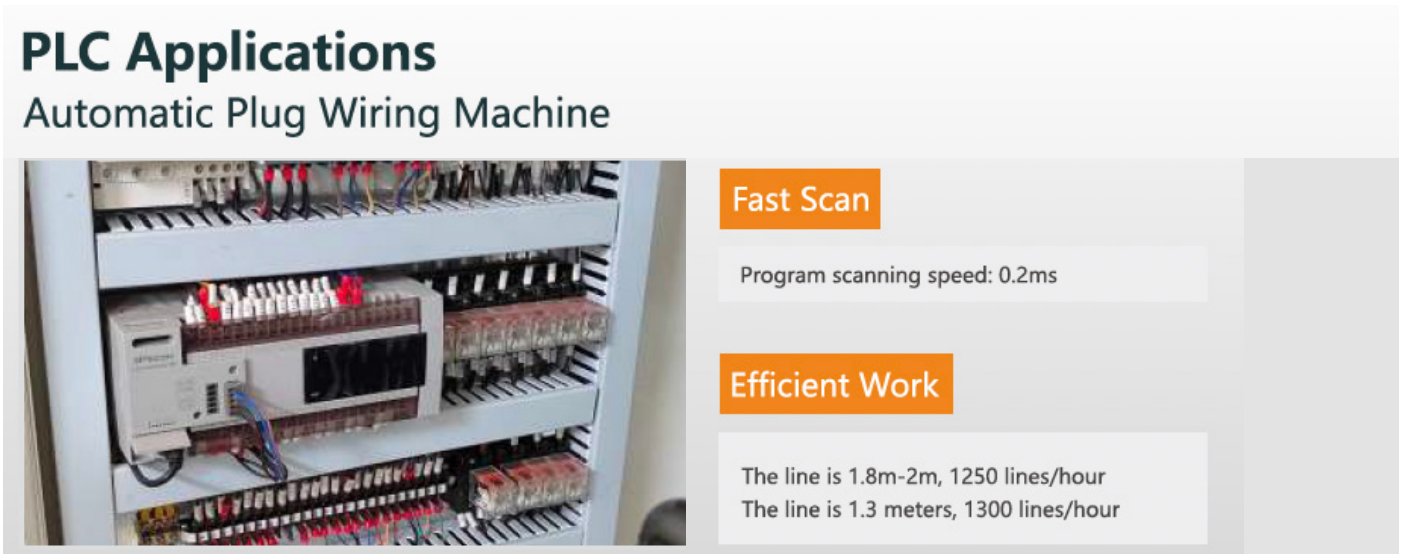
- I/O Capacity: Supports up to 256 I/O points.
- Basic Instructions: Supports 27 basic instructions and 138 applied instructions.
- Memory: Step memory ranges between 16K and 64K, depending on the model.
- High-Speed Inputs/Outputs: Offers up to 2 channels of 200KHz high-speed pulse output and 2 channels of 200KHz high-speed input, allowing for motion control tasks.
- Communication: Supports multiple communication protocols, including RS422/RS485 (COM1) and RS485 (COM2).
- Ladder Programming: Simple to program using ladder logic, suitable for beginners.

Applications:

- Manufacturing: Ideal for small manufacturing automation tasks.
- Packaging Systems: Suitable for controlling conveyors, sorting machines, and packaging equipment.
- General Process Control: Reliable for standard automation tasks where high precision or high-speed operation isn't critical.

Why Useful:

The LX3V series is known for its reliability and cost-effectiveness, making it a great choice for users with basic automation needs. Its high-speed input/output capability allows for handling some motion control tasks without needing a more advanced system.



2. LX5S Series

Overview:

The LX5S series is a high-performance small PLC that offers a significant performance improvement over the LX3V series. It's designed for applications that require precise control and faster processing.

Key Features:

- Execution Speed: Supports 0.03-0.08μs execution time for basic instructions, making it much faster than the LX3V.
- High-Speed Pulse Output/Input: Supports up to 2 channels of 200KHz high-speed pulse output and 6 channels of 150KHz high-speed input, allowing for more precise motion control.
- Interrupt Handling: Supports up to 100 high-speed counter interrupts and 100us high-speed timer interrupts, which is ideal for applications that need fast responses.
- PID Control: Includes efficient and stable PID and CCPID self-tuning for controlling continuous processes.
- Communication & Expansion: Compatible with RS485, RS422, and supports LX3V series expansion modules and BD boards for added flexibility.

Applications:

- Precise Motion Control: Ideal for controlling servo motors, stepper motors, and other equipment requiring high-speed and precise movement.
- Industrial Automation: Suitable for automated production lines where speed and accuracy are essential.
- Food Processing Equipment: Well-suited for tasks requiring PID control for temperature or pressure regulation.

Why Useful:

The LX5S series offers high-speed processing and precise control features that are important for applications where timing and accuracy are crucial. It's an affordable option for those who need better performance than the LX3V without the high cost of the LX5V series.

3. LX5V Series

Overview:

The LX5V series is Wecon's flagship small PLC, offering superior performance and advanced features for more complex automation systems. It's designed for high-end applications that require robust motion control and fast execution.

Key Features:

- Execution Speed: One of the fastest small PLCs available, with an execution speed of 0.01-0.03μs.
- Memory Capacity: Supports up to 48,000 program steps, providing more space for complex logic and control systems.
- High-Speed Motion Control: Handles up to 8 channels of high-speed pulse output and 8 channels of 150KHz input.
- Ethernet Support: Features built-in Ethernet, allowing for easier integration into modern industrial networks.
- Advanced Motion Control: Supports features like E-CAM and electronic gearing, making it ideal for controlling multi-axis motion systems.
- Flexible Communication: Supports RS422, RS485, and Ethernet (optional) for communication with other devices and systems.

Applications:

- Robotics and CNC: Excellent for controlling multi-axis robotic systems and CNC machines, where high-speed and precise movements are essential.
- Packaging and Material Handling: Ideal for complex conveyor systems and packaging lines that require high-speed coordination of multiple processes.
- Automotive Manufacturing: Can be used to control welding, painting, and assembly processes in automotive plants.

Why Useful:

The LX5V series is the top choice for applications that require high precision, speed, and memory capacity. Its ability to handle complex motion control tasks makes it the go-to solution for industries like automotive, robotics, and high-end manufacturing.

Part Numbers:

- LX5V-1412MT-AN/DN: 14 DI / 12 DO, transistor output.
- LX5V-1616MT-AN/DN: 16 DI / 16 DO, transistor output.
- LX5V-2416MT-AN/DN: 24 DI / 16 DO, transistor output.

Conclusion:

Each Wecon PLC model series is tailored to meet different levels of industrial automation needs:

- LX3V: For simple, cost-effective automation tasks.
- LX5S: For fast, precise control at a budget-friendly price.
- LX5V: High-performance small PLC for complex motion control and networking.

These models offer flexibility across a range of applications, from simple tasks to advanced robotics, making Wecon PLCs suitable for a wide range of industries.

Wecon Comparison with Mitsubishi, Schneider, Siemens and Allen Bradley

1. LX3V Series:

Comparable to:

- Mitsubishi FX3U/FX5U: Both series offer basic automation capabilities with I/O flexibility, and are designed for smaller automation tasks.
- Siemens S7-1200: The S7-1200 is also focused on small-scale automation and supports basic communication protocols, making it a direct competitor to the LX3V.
- Schneider Modicon M221: This series is used for compact machines and offers good expandability, like the LX3V.
- Allen-Bradley Micro820: Allen-Bradley's Micro820 fits into the same category of small, flexible PLCs for smaller automation tasks.

Use Cases:

The LX3V and its competitors are used for tasks like basic process control, machine automation, and packaging systems.

2. LX5S Series:

Comparable to:

- Mitsubishi FX5U: The LX5S offers improved processing speeds and motion control, much like the Mitsubishi FX5U, which also focuses on high-speed applications with expanded memory.
- Siemens S7-1200: While Siemens' S7-1200 series covers both basic and more advanced functions, the LX5S matches in terms of execution speed and flexibility for high-speed tasks.
- Schneider Modicon M241: Schneider's M241 has similar capabilities in terms of motion control and high-speed pulse input/output, making it comparable to the LX5S.

- Allen-Bradley Micro850: The Micro850 supports more complex applications than the Micro820 and aligns with the LX5S for small but performance-critical automation.

Use Cases:

The LX5S is ideal for applications requiring faster execution times and high-speed pulse control, such as packaging lines, conveyor systems, and machine automation.

3. LX5V Series:

Comparable to:

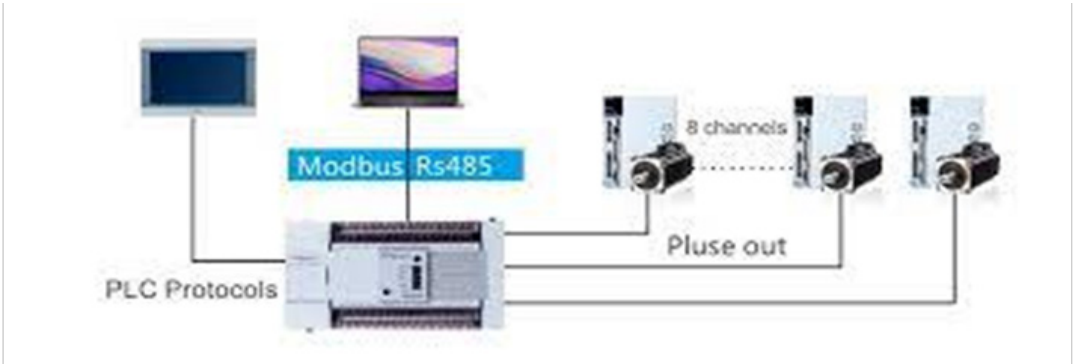
- Mitsubishi Q Series (Q03UDE): The Mitsubishi Q series is used in high-end, high-speed automation, with advanced motion control and communication capabilities, much like the LX5V.
- Siemens S7-1500: The S7-1500 is a high-end model for complex tasks requiring speed and memory, which matches the LX5V in terms of high-speed processing and motion control.
- Schneider Modicon M251: Schneider's M251 offers flexibility for larger systems, supporting Ethernet and multiple communication protocols like the LX5V.
- Allen-Bradley CompactLogix (1769-L33ER): The CompactLogix family, particularly the L33ER, is focused on handling large programs and high-speed motion control, making it comparable to the LX5V.

Use Cases:

The LX5V is suitable for high-speed multi-axis motion control, making it perfect for applications in automotive assembly, robotics, and complex CNC machines.

Conclusion:

Wecon's PLCs, especially the LX5V series, offer strong alternatives to the Mitsubishi Q Series, Siemens S7-1500, Schneider Modicon M251 and the Allen-Bradley CompactLogix. The comparison shows that Wecon can effectively replace these high-end PLCs in many cases, particularly for cost-sensitive industries looking for robust automation solutions without sacrificing performance. However, the choice between brands depends heavily on system complexity, communication needs, and regional support for each platform.



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From concept to innovation: The journey of variable-frequency drives

Amir Sami | Charter Controls

An inverter also known as a variable-frequency drive (VFD) is a pivotal component in modern automation and energy systems, converting direct current (DC) into alternating current (AC).

This conversion is crucial for controlling the speed and torque of electric motors, offering significant benefits in energy savings, process control, and extending equipment lifespan.

VFDs have revolutionised the way in which industries control motors, leading to significant improvements in energy efficiency and operational flexibility. To understand the impact of modern VFDs, it is essential to take a step back and explore the history of these remarkable devices.

The birth of electric motors and the need for control

The story of VFDs begins in the late 19th century, with the invention of the electric motor. As industries began to adopt electric motors to replace steam engines and manual labour, the need for precise control of motor speed and torque became evident. Initially, motors were either on or off, offering little control over their operation. Engineers sought methods to regulate motor speed to match the demands of different processes, leading to the early development of mechanical and electrical control systems.

Early speed control methods

Prior to the introduction of VFDs, motor speed control was accomplished using a variety of methods, such as:

Mechanical systems: These included gears, belts, and pulley systems that could vary the speed mechanically. However, these systems were inefficient, bulky, and offered limited control.

DC motors: Direct current (DC) motors were easier to control in terms of speed, but they were expensive, required regular maintenance, and had limited power ratings.

Resistor-based systems: Another early method involved the use of resistors to control the amount of current reaching the motor. However, this method was highly inefficient, as excess energy was wasted as heat.

The emergence of variable-frequency drives

The true breakthrough came with the development of semiconductor technology in the mid-20th century. The invention of the thyristor, a type

> **“VFDs have revolutionised the way in which industries control motors, leading to significant improvements in energy efficiency and operational flexibility.”**

> **“The pandemic further emphasised the importance of energy efficiency, automation, and cost reduction key drivers in the VFD market. As businesses sought to enhance control, reduce energy consumption, and lower operational costs, the demand for VFD technologies gained renewed importance.”**

of semiconductor switch, enabled the creation of devices that could control the frequency and voltage supplied to an AC motor. This led to the birth of the first variable-frequency drives (VFDs).

VFDs work by converting the fixed-frequency and fixed-voltage power supply into a variable-frequency and variable-voltage output. By adjusting the frequency of the power supplied to the motor, VFDs can precisely control the motor’s speed and torque. This advancement not only improved energy efficiency but also extended the lifespan of motors, by reducing mechanical stress.

Evolution, and modern VFDs

As technology advanced, so did VFDs. The introduction of microprocessors and digital control systems in the 1980s and 1990s allowed for even more precise control and greater functionality. Modern VFDs are capable of dynamic speed adjustments, energy-saving features, and real-time monitoring, making them indispensable in a wide range of industrial applications.

Global and UK VFD market trends: Growth, challenges, and the path forward (2013-2030)

The VFD market, both in the UK and globally, is on a positive growth trajectory, driven by technological advancements and the ongoing need for energy efficiency. While there are challenges, particularly related to costs and economic fluctuations, the long-term outlook remains strong, with continued innovation and investment expected to support sustained growth in the sector.

The UK market for VFDs and related components experienced steady growth from 2012 to 2020, with sales of approximately £130 million by the end of 2020. This growth was driven by continuous product development, the transition from fixed-speed drives (FSDs) to VFDs, and a growing demand for energy-efficient and automated solutions. Key trends during this period included the rise of IoT integration, enhanced control and monitoring capabilities, and a focus on reducing energy consumption and total ownership costs.

However, the onset of COVID-19 in 2020 had a significant impact on the UK VFD market, as it did on many industries globally. The pandemic caused disruptions in supply chains, delays in manufacturing, and a slowdown in industrial and commercial activities, leading to a temporary dip in demand for VFDs and related components. Despite these challenges, the market began to recover as the UK emerged from the pandemic, with industrial activities resuming and businesses adapting to the new normal.

The pandemic further emphasised the importance of energy efficiency, automation, and cost reduction key drivers in the VFD market. As businesses sought to enhance control, reduce energy consumption, and lower operational costs, the demand for VFD technologies gained renewed importance. This focus supported the market's recovery, and contributed to continued growth. As of 2024, the UK VFD market remains robust, reflecting the sustained emphasis on innovation, efficiency, and adaptability in response to evolving industrial needs.

Globally, the VFD market was valued at US$25.92 billion in 2022, and is expected to grow at a compound annual growth rate (CAGR) of 5.6 percent from 2023 to 2030. The market's growth is being fuelled by the increasing adoption of connected devices across

various sectors, the demand for energy-efficient and adjustable speed drives, and significant investment in infrastructure, particularly in HVAC systems. Rapid industrialisation in developing countries and the growing need for energy management in various sectors further support this growth.

Key drivers and trends

Energy efficiency: Both the UK and global markets are driven by the need for energy-efficient solutions, with VFDs playing a crucial role in reducing energy consumption and meeting environmental regulations.

Technological advancements: Innovations in AI, IoT, and automation are propelling the demand for more sophisticated VFDs that offer enhanced control, monitoring, and scalability.

Market challenges: The global market faces challenges such as high initial costs, economic slowdowns, and supply chain disruptions, particularly highlighted during the COVID-19 pandemic. However, the market is expected to recover and grow as industrial activities rebound.

Veichi: A key VFD player

Veichi Electric Co., Ltd., which recently selected Unipower (UK) Ltd, T/A Charter Controls as its UK strategic import agents and stockist following a successful launch at the Drives and Controls Exhibition, includes VFDs within its industrial automation solutions portfolio.

In its early years, Veichi concentrated on developing basic VFDs that catered to simple motor control needs. These early models were reliable and cost-effective, gaining traction in the market due to their straightforward design and ease of use. Veichi's commitment to quality and robust performance quickly earned the company a reputation for producing durable and dependable VFDs.

As Veichi gained experience and customer feedback, it began to expand its product lineup, introducing more advanced VFDs with enhanced features. By incorporating the latest technological advancements in electronics and software, Veichi developed VFDs capable of more precise control, energy efficiency, and versatility. This period marked the introduction of VFDs with vector control technology, which allowed for more accurate motor control, especially in demanding applications.

The Veichi AC10, for example, is designed for straightforward and economical motor control, offering easy installation and operation. Suitable for applications requiring basic speed control, it delivers reliable performance in a compact and cost-effective package. The AC10 is particularly well-suited for general-purpose use in industries such as light manufacturing, textiles, and operations involving conveyors, fans, and pumps, where space and cost-efficiency are key considerations.

On the other hand, the Veichi AC310 caters to more complex and demanding industrial environments, providing enhanced functionality and flexibility, and featuring sophisticated vector control for both asynchronous and synchronous motors, along with multiple control modes and robust protection mechanisms. It is designed for high-demand applications in sectors like petrochemicals, power generation, and advanced manufacturing. The AC310 also supports Industry 4.0 integration, with capabilities such as motor parameter self-tuning and overexcitation braking, which contribute to improved operational efficiency, precision, and lower overall costs.

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About the author:

Amir Sami is the Business Development Manager at Unipower (UK) Ltd (trading as Charter Controls). He has an MBA, and BEng (Hons) in Electronic Engineering.

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Keeping your cool in control panel enclosures

Amir Sami | Charter Controls

Control panel designers are always juggling technical requirements for electrical control panels within financial constraints. On the one hand, there's the desire to select large control panels that maximise the arrangement of electrical equipment, and on the other, there's the necessity to adhere to strict cost constraints, which invariably necessitates compromises.

There's also the issue of potential space limitations within the facility, as well as the current environmental conditions. Having selected the most appropriate enclosure, one of the most challenging tasks to prolong the life and optimise performance of each item of electrical and electronic equipment within the control panel is to control the temperature within the enclosure, and guarantee that the heat dispersion inside the control panel keeps equipment temperatures within acceptable limits.

As internal and external heat are two variables that contribute to the issue of control panels overheating, the temperature inside control panels is proportional to the total heat produced and the efficiency of the enclosure cooling system.

Total internal heat generation can be calculated by determining all thermal losses of each piece of electrical/electronic equipment to be installed. The amount of heat dissipation by variable frequency drives (VFDs), and other items of electrical and electronic equipment, is proportional to their power consumption and efficiency. One of the most cost-effective solutions to this problem is to use filter fans of various sizes and airflow volumes to maintain the required temperature inside the panel.

> **"The temperature inside control panels is proportional to the total heat produced and the efficiency of the enclosure cooling system."**

Many fan manufacturers are capable of resolving the above issue. However, as we are all becoming more conscious about our carbon footprint and the need to reduce CO2 emissions, it is greatly beneficial both to panel manufacturers and to the environment to select the most value-added supplier of filter fans as a strategic partner. This not only reduces carbon footprint, but also overcomes financial constraints, and ensures that the most suitable and technically advanced fans are utilised.

Strategic partnerships

Trading in the UK and Ireland as Charter Controls, Unipower UK Ltd. partners with Linkwell Electric, an established OEM of fan, filter, heater and related solutions that enable customers to become more environmentally-friendly and keep components inside the panel cool enough to maximise life expectancy and optimise efficiency.

Many Charter Controls customers across the UK and Ireland are using Linkwell's LK32 series fan filters, for example. One company in particular, Saftronics, specifies and supplies control panels, power distribution and process control systems across a wide range of industries, and has highlighted how it has managed to overcome frequent issues by using some of the technical and value-added features offered by these fans. Notably, Saftronics' customers in the water industry are aiming to be leaders in net carbon zero emissions.

Stuart Jones and Paul Stead from the Saftronics engineering team have commented on how the unimpeded airflow volumes of up to 1,350m3/hr have enabled them to reduce the number of fans required, in turn reducing compartment size and freeing up extra space to install more equipment on the control panel door.

It has to be said that the other benefits of being able to use fewer fans include preventing multiple holes from being punched into the panel, thereby reducing wastage, saving design and manufacturing time, and hence reducing costs on multiple fronts, while also reducing control panel power consumption. All of these benefits lead the way in helping panel manufacturers and their customers to reduce carbon footprint, while aiming for the ultimate goal of sustainability and net zero carbon emissions.

> **“It is greatly beneficial both to panel manufacturers and the environment to select the most value-added supplier of filter fans as a strategic partner.”**

Reversed airflow

Winston Friskin and his team of electrical engineers at Galliford Try, another water industry control panel manufacturer, have also been making use of the reversed airflow capability of the Linkwell LK3243 model. Due to the large VFDs required to be installed in its panels, the reversed airflow feature of this particular model has enabled the air to be pulled out of the panel rather than in. Complementing the smaller fan integrated into the VFD that is pulling air out of the drive and into the panel, it makes sense also to install a fan to draw air out of the panel; this eliminates the possibility of any overheating that could result from impeding the airflow of the VFD's fan.

Galliford Try works within key industry standards, specifically IEC 60890 which defines the method of temperature rise calculation, and IEC 61439:1, for low voltage switchgear and control assemblies. The calculation also defines the requirement for an anti-condensation heater to be fitted within the control panel using the internal/external temperature data.

Another notable value-added feature offered by the LK32 series fans and filters is the illuminated-quick release latch for changing filters. The LED indicator integrated into the latch enables maintenance engineers to identify from a distance that the fan is powered and in operation, avoiding the need to get up close to the panel. Changing filters also saves maintenance engineers time, as it takes seconds with no tools required, and avoids possible damage to the fan.

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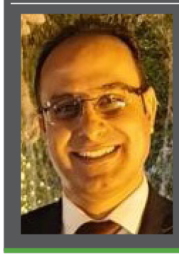
About the author:



Amir Sami is the Business Development Manager at Unipower UK Ltd (trading as Charter Controls). He has an MBA, and BEng (Hons) in Electronic Engineering.

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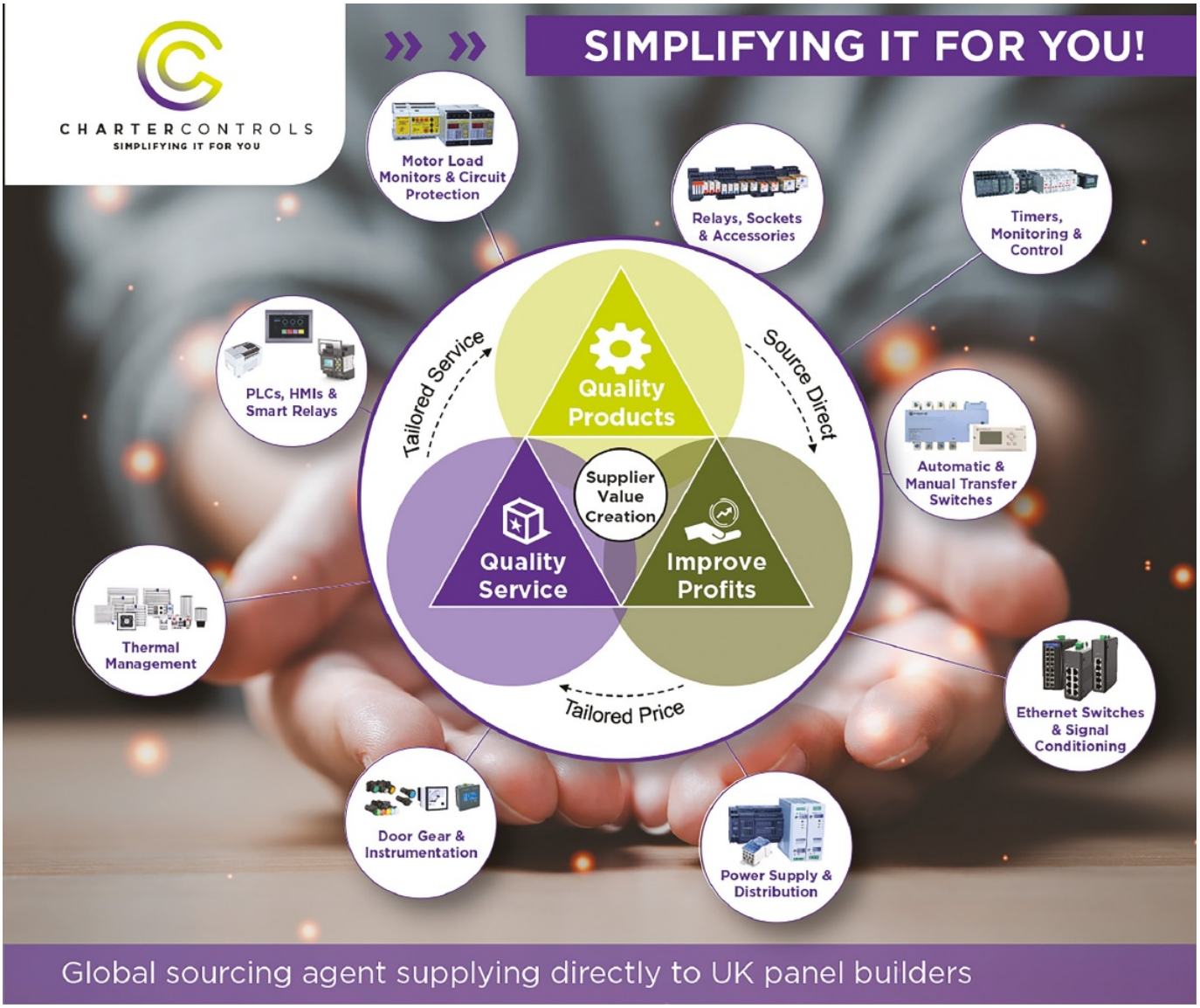

From dust protection to durability:
Decoding the art of enclosure climate control

Amir Sami | Charter Controls

Global warming is undeniable. The use of enclosure air conditioners is often a critical consideration for maintaining the optimal functioning and longevity of electrical components in a more challenging environment.

In this article, Amir Sami from Unipower UK Ltd T/A Charter Controls will delve into the reasons behind the need for enclosure air conditioning units, particularly focusing on the scenarios where traditional cooling methods like filter fans fall short.

In a previous PBSI article titled “Keeping your cool in control panel enclosures”, we already highlighted that electrical components within industrial settings generate heat during operation. In many cases, this heat, if not adequately managed, can lead to reduced efficiency, malfunction, or even premature failure of the components. This is particularly relevant in electrical enclosures, housing

> **“Unlike passive cooling methods, enclosure air conditioners actively lower the temperature inside the enclosure. This active cooling is essential in scenarios where internal heat generation is significant, surpassing what passive methods can handle.”**

> **“In cases where enclosures are small, or components are densely packed, the space for effective air circulation is limited, making enclosure air conditioners particularly beneficial, as they can manage the thermal environment efficiently, even in constrained spaces.”**

high-power industrial components or densely-packed electrical setups, where the heat generated can be substantial.

Traditional cooling methods, such as filter fans, provide passive cooling by facilitating air circulation. While effective in certain scenarios, they often lack the capacity to counteract the heat generated by high-power components, or in densely-packed enclosures. Filter fans also depend heavily on the ambient temperature; they are less effective if the external environment is already warm.

Unlike passive cooling methods, enclosure air conditioners actively lower the temperature inside the enclosure. This active cooling is essential in scenarios where internal heat generation is significant, surpassing what passive methods can handle.

Enclosure air conditioners maintain a more consistent internal temperature. This control is crucial for sensitive electronic components that require a stable operating environment for optimal performance and reduced risk of overheating.

In cases where enclosures are small, or components are densely packed, the space for effective air circulation is limited, making enclosure air conditioners particularly beneficial, as they can manage the thermal environment efficiently, even in constrained spaces.

Enclosure air conditioners, especially those with robust designs like those offered by Cooltech, are built to last. The use of materials like copper in heat exchangers and condensers, plus thicker galvanised plates, ensures a longer service life and better heat conduction and dissipation.

Cooltech air conditioners are designed to withstand various industrial environments, including harsh outdoor conditions. They provide reliable cooling, even in the face of environmental challenges like dust, moisture, and corrosive elements.

Enclosure air conditioning essentials: A practical selection guide

When selecting enclosure air conditioners for industrial applications, certain features are essential to ensure that they meet your project requirements efficiently and reliably.

For indoor applications, it is crucial to choose units with an IP54 rating, which offers sufficient protection against harmful dust and water splashes. This level of protection is vital for maintaining the integrity of the internal components in various industrial environments. In terms of durability and longevity, air conditioners that are capable of operating continuously for five to 10 years are desirable, as they indicate robust construction and reliable performance over time.

Another important feature is the inclusion of comprehensive alarm functions, which enhance safety and operational awareness, by alerting to any critical issues that may arise. The use of eco-friendly refrigerant, particularly R134a, is also a key consideration, aligning with modern environmental standards and ROHS requirements.

Additionally, features like Modbus support over RS485 are significant for enabling easy remote monitoring and management, adding a layer of convenience and control to the operation of these units.

For outdoor applications, the requirements for enclosure air conditioners differ slightly.

In these settings, an IP56 rating becomes critical, providing enhanced protection against harmful dust and liquid ingress and external elements, ensuring the unit's functionality in tougher outdoor environments. A longer service life, preferably up to 10 years under laboratory conditions, is indicative of an air conditioner's ability to withstand the rigours of outdoor use. Similar to indoor units, having multiple alarm outputs is essential for safety, and the use of eco-friendly R134a refrigerant is crucial for environmental compliance.

Enclosure air conditioners emerge as a pivotal solution in industrial settings for effective thermal management. Their ability to provide active cooling, maintain a controlled environment, and adapt to challenging conditions makes them a superior choice over traditional cooling methods in many scenarios. For specific requirements and solutions, please contact Charter Controls team, the strategic partner for Cooltech in the UK and Ireland, who can offer advice and support, ensuring that the cooling solutions align with the technical and operational needs of diverse industrial applications, while ensuring added value through tailored commercial industry insights.

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Amir Sami is the Business Development Manager at Unipower UK Ltd (trading as Charter Controls). He has an MBA, and BEng (Hons) in Electronic Engineering.

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Protect your machinery by monitoring motor loads

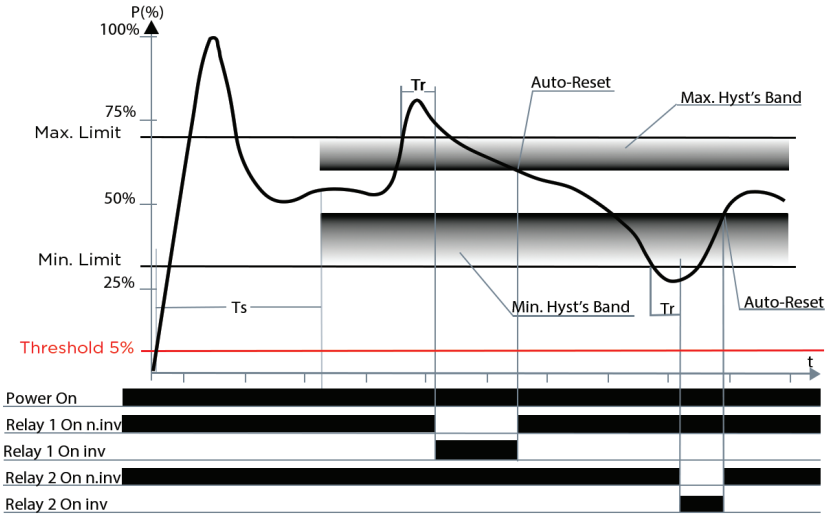
Technologies such as overload devices, and motor management and control systems, can protect motors effectively, but may not safeguard the machinery that they are driving. Amir Sami, business development manager at Charter Controls, looks at how to prevent costly damage and downtime to machinery by monitoring the power consumed by the motor.

There are a variety of issues that can cause inefficiencies and defects in production processes. Equipment failures, set-ups and adjustments, idling, minor stops, running at reduced speeds, and process defects can all affect yield and increase costs. One way to avoid such issues is to protect motor-driven machines effectively.

These machines are often critical components in manufacturing processes and can be expensive to replace if they fail. It is essential to take steps to protect them against damage. There are several ways to do this, including installing overload protection devices, ensuring effective lubrication and maintenance, and monitoring the machines for signs of wear or damage.

By taking such precautions, manufacturers can help to ensure the reliability and longevity of their equipment and to minimise the risks of process defects and reduced yields.

Continuing to operate motor-driven machines during abnormal conditions caused by jams or blockages can cause irreparable damage, not only to the motor but also to the machinery. In the past, the extent of damage to machines has been understated compared to the damage to the motor. Overload systems, and motor management and control devices, can protect motors, but what is protecting the machine itself?



By measuring when power exceeds a 5% threshold, a start-up surge timer can be used to mask when a motor's start in-rush current begins. Unipower's HPL500 digital power monitor is triggered in this way, rather than by power on, and can be connected before or after the motor contactor. The graph shows the protection logic.

Digital load monitors with an analogue load transducer. Such devices can help to protect motor-driven machinery from damage.

In pump installations for example, when there's suction loss or a jam long before the thermal overloads trip, serious damage can be done to the machine as well as the motor. Any abnormal operating conditions can have a detrimental effect on the life of the system. Dry pump, dead head, jammed impellers and even premature bearing wear can all lead to motor and pump failures.

To cut upfront costs, motor-driven systems are often installed without any means to monitor their operation. As a result, frequent inspections of the motor and the machine are necessary.

If an unexpected failure occurs, it can mean irreparable damage to a machine and possibly its motor. But such issues can be eliminated by using simple, but effective, monitoring and control techniques. Adding a small cost to the installation will pay for itself several times over the first time a fault is detected and damage to the machine or motor is avoided.

Imbalances

To analyse a motor's health, you need to consider all aspects that can affect it under normal operational conditions. Incoming power quality is one area that is often overlooked – correct, safe operation of motors depends on the power conditions. As voltage levels vary during the day there can be imbalances. Raising voltage levels to reduce the current and achieve a motor's nameplate ratings can cause excessive heat, degrading the insulation. Harmonic distortion also affects the power quality, much of which is caused by variable-speed drives (VSDs) and other nearby installations that go undetected most of the time.

Typically, a motor will draw six to ten times its rated current levels during start-up. Hot starts are more detrimental to the windings,

because the excessive heat can degrade the insulation. If you examine the voltage, current and torque levels when a motor starts, you can see the levels of stress it is experiencing. As a result, motors often fail during start-ups.

When loads and power conditions are fluctuating – typically at start-up – rotors can experience tremendous stresses. Monitoring these conditions is vital to determining the motor's ability to continue operating. Cracked or broken rotor bars can cause dramatic increases in thermal stress, affecting efficiency.

Parameters that can help to deduce a motor's health include its load, % load, horsepower demand, kilowatt usage, and power factor. If motors are forced to meet load demands above their capacity, their windings can run at unsafe temperatures, even if the current is at nameplate values. A motor running above its nameplate power rating can also suffer from higher torque demands, putting stress on the rotor.

Motors are often oversized and sometimes undersized: both of these have cost implications. Oversized motors can result in higher initial costs, energy consumption and repair costs. Undersized motors perform poorly, suffer from higher losses, and can fail prematurely. Some of these problems can be detected and corrected quickly by using digital motor load monitors (see right). ■

Measure power, not current

Digital load monitors measure the load on the motor electronically. They can replace mechanical forms of protection such as friction clutches, ball detent clutches, shear pins and tacho controllers.

The motor acts as a sensor to detect the state of the equipment being driven. The main aim is to protect the machine from damage, but it can also protect the motor. In abnormal running conditions, load monitors can measure the load being drawn by a motor and compare it to normal values.

The most common use for such monitors is to detect when a pump is running dry. Many pumps cannot be allowed to dry-run, especially if they are pumping hazardous chemicals. In the water industry, dry running and dead heading due to a shut discharge can also result in abnormal motor loads.

Many monitors operate by measuring currents. But this can be a problem if the motor is oversized. In such cases, the motor will never reach its rated load because it is too big for the job and will operate where current is a flat line. Current cannot therefore be measured to assess variations in the work done by the motor.

Phase angle detection used to be one way to get around this, but with advances in technology and the higher efficiency of newer motors, this technique is no longer a reliable way of measuring the work done by the motor.

The only electrical measurement of work that is linear with and proportional to load is power. Power consumption to be used to measure torque indirectly. This measurement needs to be fast and accurate, reaction times must be short, and measurements must be valid for non-sine-shaped currents – for example from frequency inverters generating high, short current peaks (with crest factors of up to 10).

One manufacturer offering digital load monitors capable of calculating power in this way is the Danish company Unipower, whose monitors have been used in motor-driven applications for more than 20 years. They are available in the UK from Unipower UK, trading as Charter Controls.

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DC Power Supply Units

- Available in 24Vdc from 12w - 60w
- Excellent load & line regulation
- High noise immunity & low ripple
- No load power consumption of less than 0.5W
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- High efficiency of operation
- Suitable for temperatures upto 55°C
- Peak power capacity
- Compact design with DIN mounting

GIC

PAIRUI

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- 100% Full load burn-in test
- Cooling by free air convection
- Protection against short circuit, over voltage, over current and over temperature
- LED indicator for DC power ON and DC low voltage

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EYC DPT02 Digital Universal Input Signal Converters

- Versatile Input and Output Options: Supports a wide range of input types including DC current and DC voltage, with multiple output options such as analog, RS-485, and relay
- User-Friendly Interface: Features a local display with a high-visibility red LED panel and easy keypad programming for signal output and scaling
- High Accuracy and Stability: Offers precise measurements with an accuracy of 0.2% F.S. ± 1 digital, ensuring reliable performance
- Robust Design: Built with a fire-proof and moisture-proof case, suitable for harsh environments, and designed for DIN rail installation

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Linkwell Modular Distribution Blocks

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- Tinned Copper for high conductivity
- Clip on DIN rail or screw mounting
- Universal Joints and Lugs available
- Competitive pricing & High UK stocks

PRICE DROP!

GIC DIGITAL & MECHANICAL TIMERS

- Precision Timing and Counting: Designed to provide accurate timing and counting functions.
- Wide Voltage Range: They support various supply voltages, ensuring compatibility with different installation requirements
- Ease of Integration: With standard mounting options they can be easily integrated into existing systems.
- Durability: Built to withstand industrial environments.
- Compact Design: installation in space-constrained areas without compromising functionality.

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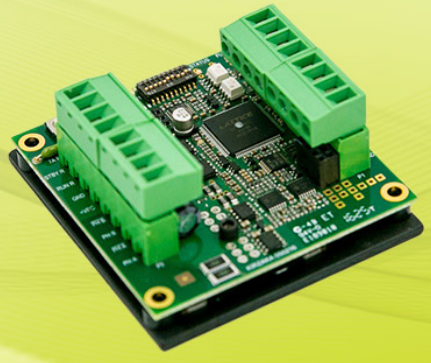
GR214V-V High Resolution Stepper Drive



- High Resolution: It supports up to 256 microsteps per full step, resulting in smooth and precise motion control.
- High Power Output: Capable of driving motors up to 80VDC and 7A, making it suitable for demanding applications.
- Raptor Power Package: This technology ensures efficient operation and reduces heat dissipation, leading to a cooler and more reliable drive.
- Advanced Damping Algorithms: These algorithms minimize vibrations and resonance, resulting in smoother and quieter operation.
- Robust Protection Circuitry: The GR214V-V is protected against various potential issues, including short circuits, overvoltage, and overcurrent.

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Shenler Electric

Industrial Relays

Selecting the right industrial relays is critical to ensuring the efficiency and safety of various industrial operations. Relays play a vital role as the vital link between low-power control systems and high-power applications.

At the heart of a relay are electromechanical switches, which are often used in environments where low-power control signals are used to control high-power or high-voltage circuits.

Their wide range of applications includes industrial automation, control systems, automotive systems, telecommunications, and more.

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Shenler Electric

- Long service life: work continuously without interruption for 5 to 10 years
- Eco-friendly refrigerant: R134a
- Modbus supported and RS485 terminal for easy remote monitoring
- 8 Different Alarm Functions
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- IP54 and IP56 available
- CE and UKCA standard

- Easy Connect with the ST01CC Bus Jumper Bar

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Temperature Controllers

Product Selection Chart - Temperature Controllers

Cat. No.	Flush Mount 96x96 mm	Dual Acting PID	Single Acting PID	PID ON/ OFF	Universal Sensor Input	Timer functio-nality	J,K and PT100 Sensor	Analog Input (0-5 V, 1-5 V 0-10 V / 4-20 mA)	Configurable Set Points			Output Configuration						RS 485 Comm.
									4	2	1	1 C/O	1 SPST	2 SPST	3 SPST	SSR output (12 VDC, 24 mA)	Analog output (0 -10 VDC / 4 - 20 mA)	
151F43B	●	●			●			●	●					●		●		
151G43B	●	●			●			●	●				●			●	●	
151H43B	●	●			●			●	●					●			●	
151J43B	●	●			●			●	●						●			
151F43B1	●	●			●			●	●					●		●		●
151G43B1	●	●			●			●	●				●			●	●	●
151H43B1	●	●			●			●	●					●			●	●
151J43B1	●	●			●			●	●						●			●
151F42B	●		●		●	●		●		●				●		●		
151G42B	●		●		●	●		●		●			●			●	●	
151H42B	●		●		●	●		●		●				●			●	
151J42B	●		●		●	●		●		●					●			
151K42B	●		●		●	●		●		●		●				●		
151L42B	●		●			●	●			●		●	●			●		

Voltage Monitoring

Product Selection Chart: Voltage Monitoring

Cat. No.	3-Phase 3-Wire	3-Phase 4-Wire	1 - Phase	Under Voltage Protection	Over Voltage Protection	Phase Loss Protection	Phase Sequence Protection	Phase Asymmetry Monitoring	Settable ON Delay	Settable OFF Delay	1 C/O Relay Output	2 C/O Relay Output	Neutral Loss Protection	115 VAC	208 to 480 VAC	240 VAC	415 VAC
MAG03D0424 MAG03D0425 MAG03D0426	●	●	●	●	●	●	●	●	●	●	●				●		
MN21D5	●					●					●				●		
MK21D5	●					●	●				●				●		
MC21D5	●					●	●	●			●				●		
MA21DN	●					●	●	●		●	●				●		
MD21DF	●			●	●	●	●			●	●				●		
MG21DH	●			●	●	●	●	●	●		●				●		
MG21DF	●			●	●	●	●	●		●	●				●		
MOF1D51	●					●		●			●				●		
MAE03D0200			●	●	●				●	●	●			●		●	
MA51BC	●					●	●	●			●						●
MA51BK	●					●	●	●			●						●
MC21B5	●					●	●	●				●					●
MD71BH		●	●	●	●	●			●		●					●	
MD71BF		●	●	●	●	●				●	●					●	
MD71B9		●	●	●	●	●		●	●		●					●	
MG73BH		●	●	●	●	●	●	●	●			●				●	
MG73BF		●	●	●	●	●	●	●		●		●				●	
MG73BR		●	●	●	●	●	●	●		●		●				●	
MG73B9		●	●	●	●	●	●	●	●			●				●	
MAC04D0100		●		●	●	●	●	●				●	●				●
MG53BH	●			●	●	●	●	●	●			●					●
MG53BF	●			●	●	●	●	●		●		●					●
MG53BT	●			●	●	●	●	●		●		●					●
MG53BQ	●			●	●	●		●		●		●					●
MG53BI	●			●	●	●	●	●				●					●
MG53BO	●			●	●	●	●	●				●					●
MB53BM	●			●	●	●	●	●	●	●		●					●

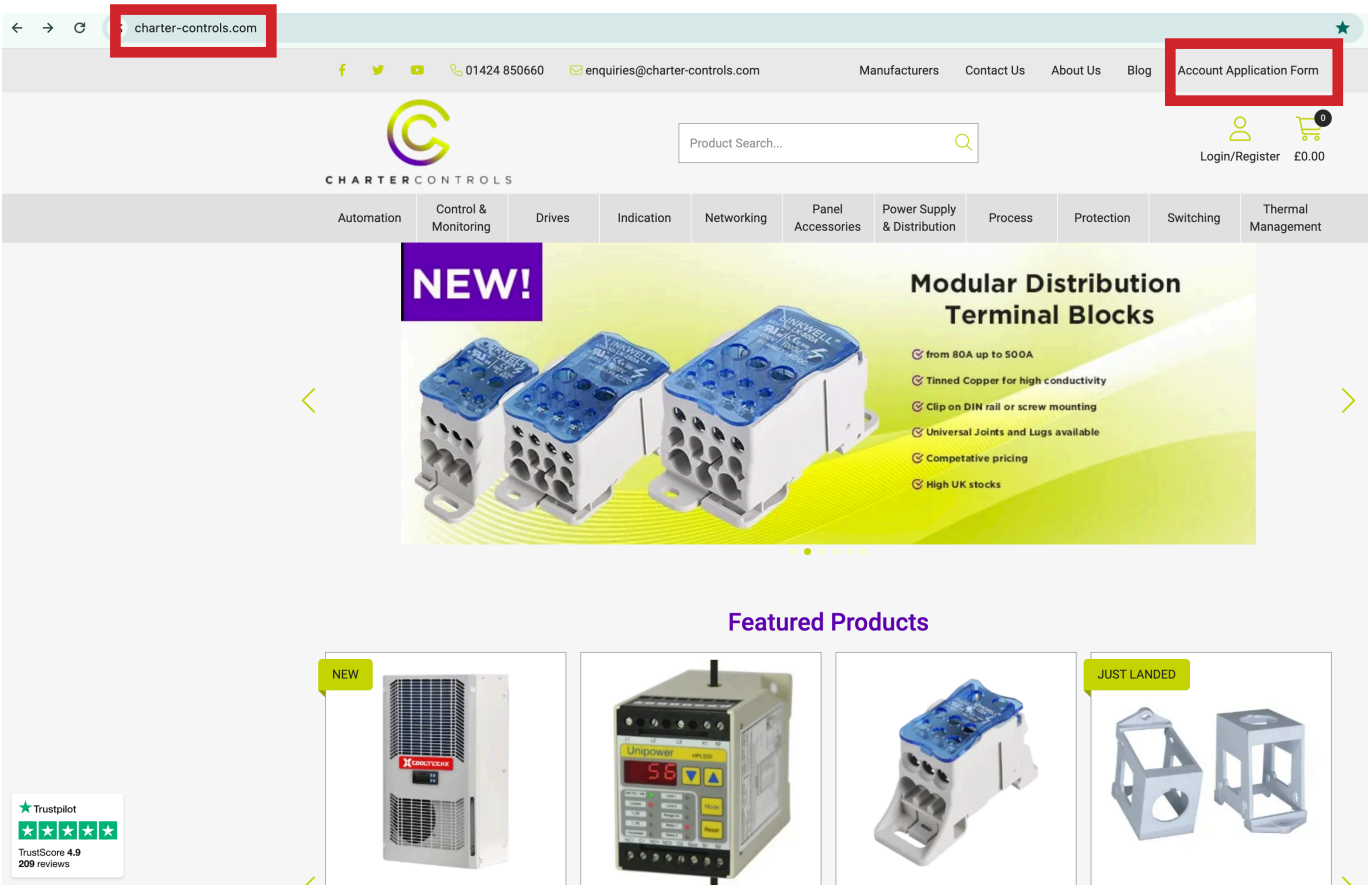
Note: The product can be made available in 120 VAC, 220 VAC, 230 VAC and 400 VAC.

Timers

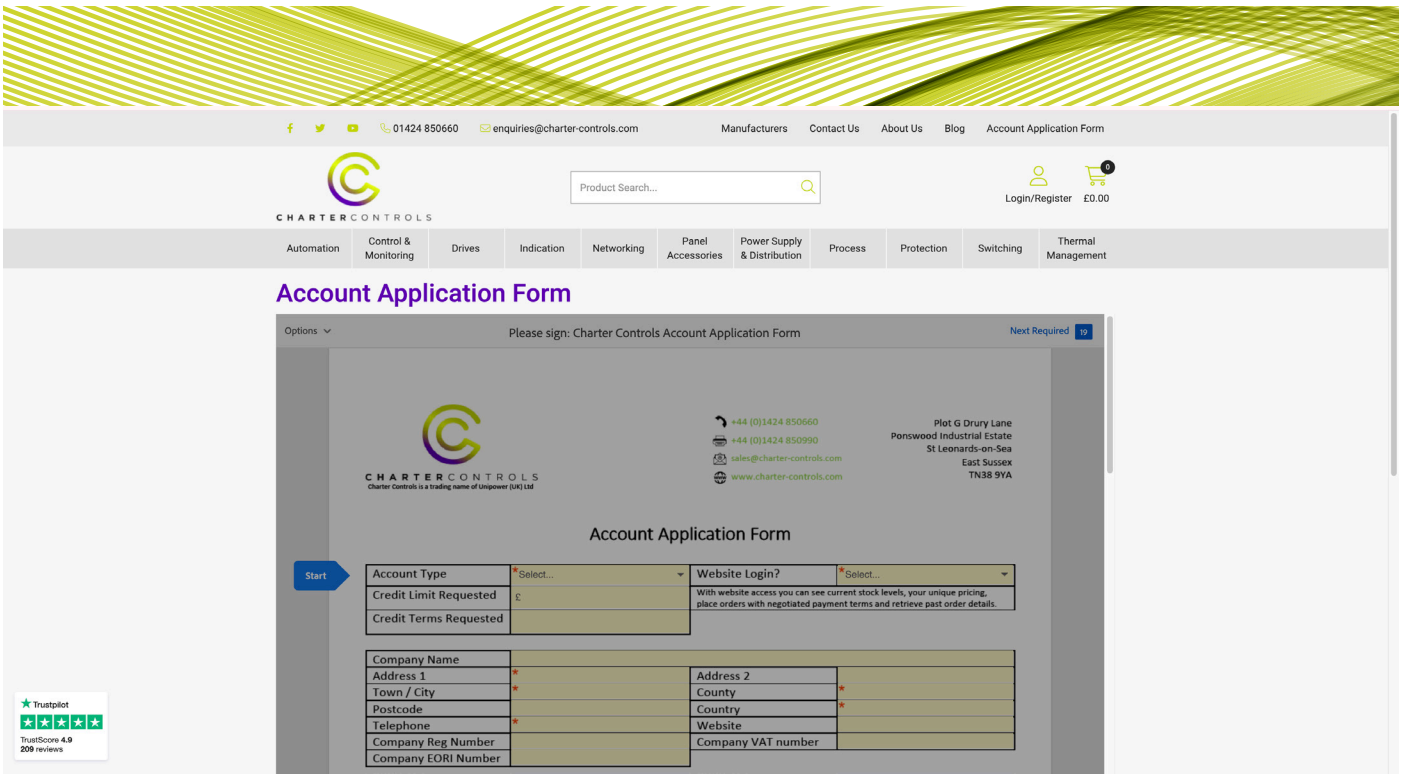
Product Selection Chart : Timers

Cat. No.	Supply Voltage						Timing Range								Signal		Relay Output			Function						
	12 to 240 VAC / DC	24 to 240 VAC / DC	240 to 415 VAC	240 VAC or 24 VAC / DC	240 VAC	110 to 240 VAC	3 sec to 120 sec	0.6 Sec to 600 sec	0.1 sec to 10 hrs	0.3 sec to 30 hrs	0.1 sec to 100 hrs	0.1 sec to 999 hrs	0.1 sec to 120 days	0.1 sec to 999 days	Potential Signal	Potential Free Signal	1 C/O	2 C/O	2 NO	ON Delay	Asymmetrical ON/OFF Delay	True OFF Delay	Star Delta	Multi-Function	Forward Reverse
12ODT4				●						●							●			●					
12WDTC				●							●						●			●					
1CMDT0	●										●				●		●							●	
1CJDT0	●										●						●				●				
12SDT0					●		●												●				●		
2AODT5		●							●									●		●					
2ASDT0		●					●												●				●		
2BSDT0			●				●												●				●		
2A8DT6		●											●		●			●						●	
2A5DT5		●							●									●						●	
2B5DT5			●						●									●						●	
2ANDT0		●							●							●	●							●	
2AADT5		●							●									●			●				
23GDT0		●						●										●				●			
V0DDTS		●										●			●		●							●	
V0DDTD		●										●			●				●					●	
V0DDTS1		●										●			●		●							●	
V0DDTD1		●										●			●				●					●	
V7DFTS3						●								●	●			●						●	
V7DDSS3						●								●	●			●						●	
DT124S						●						●				●		●						●	
DT125S						●						●				●		●							●

Easy Sign-Up to Our New Website



Go to www.charter-controls.com and click on “Account Application Form” in the upper-right hand corner of the screen to apply for either a Credit or Proforma Account.



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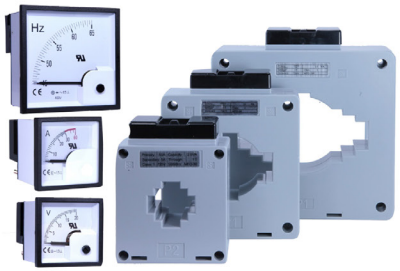
As a manufacturers agent Charter Controls specialises in supplying low voltage control products directly from OEM's to the Control Panel and Automation industries, adding value by striving to improve your purchasing experience and improving your profit margins via tailor made services to suit your individual business needs.



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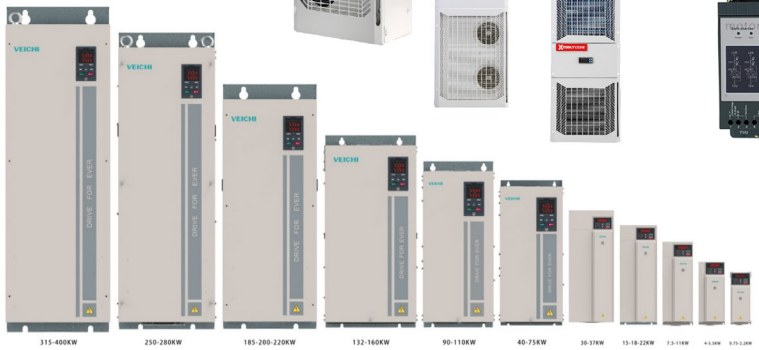

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