



EMERSON[™]
Industrial Automation



Drives for OEM refrigeration equipment

Energy efficient solutions

0.25 kW to 132 kW
100V, 200V, 400V 690V



**CONTROL
TECHNIQUES**

www.controltechniques.com



Solutions for modern refrigeration equipment

Food and drink retailers, distributors and producers are increasing investment in modern refrigeration equipment to reduce energy costs and improve green credentials. OEM equipment manufacturers are therefore increasingly investing in the development of high efficiency product lines deploying the latest technologies available.

Emerson is a global leader in providing these technologies to OEMs. Sales in Emerson's Climate Technology business were nearly \$4bn in 2011 with refrigeration representing a significant part.

One key technology OEMs are increasingly deploying is variable speed drives. The motors that drive compressors, pumps and fans typically consume more than 98% of the electrical energy in the refrigeration system, the use of drives can save up to 30% energy.

Control Techniques is a world class manufacturer of variable speed drives and solutions. As part of Emerson, and working with other Emerson Climate businesses; we have the expertise to propose innovative, efficient and cost effective solutions to OEMs either together or individually.

Application knowledge and support globally

Control Techniques operate Drive Centers throughout the world. These provide world class local engineering and support resources from the project concept through to support of installed equipment.

Our engineers are solely focused on the application of variable speed drives. Our knowledge of applying drives to refrigeration equipment benefits from the knowledge and expertise gained through our interactions and successes with Emerson Climate Technologies businesses.

A legacy of innovation, performance and reliability

Founded in 1973 Control Techniques focuses only on variable speed drives and solutions. We have accomplished a long list of innovations on our way to becoming one of the world's leading drives manufacturers such as the world's first digital DC drive: Mentor, and pioneering integrated machine safety functions.

Other Emerson Climate Technologies businesses

Dixell is a world leader in electronic regulation and control components for refrigeration and air conditioning. Dixell has vast experience in designing controllers from very simple plug-in applications through to the most sophisticated multiplexed applications. Like Control Techniques', Dixell's products are supplied and supported globally.

Copeland is a world leader in compressors for HVAC and refrigeration equipment. Copeland Scroll™ and semi-hermetic compressors are available for all main refrigerants, with digital and variable speed modulation options and smart electronics. Emerson Climate Technologies is at the forefront of compression technology.





Benefits of using drives in refrigeration

Variable speed drives minimize energy consumption by matching motor speed to the required output of the system. They can replace traditional bypass (unloader) circuits where the compressor or pump motors would run at full speed continuously. Condenser fans are another perfect application for variable speed drives.

This energy saving effect is explained by the affinity laws which state that as the speed of motor is reduced, the energy consumed reduces by a cube of reduction. As an example; a fan operating at 50% speed will use only 12.5% of the power that it would normally consume at full speed, yet it will produce 50% air flow and 25% of the pressure of full speed operation.

When applied correctly variable speed drives deliver the best improvement to energy efficiency compared to other modulation technologies.

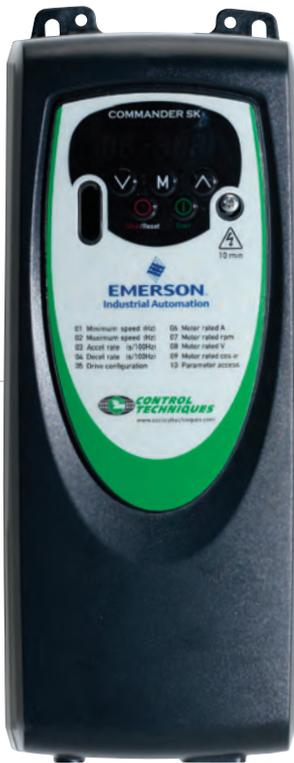
Other key benefits of using drives in refrigeration systems

- Continuous regulation allows an increase in the evaporation temperature against start/stop systems, allowing further energy savings
- The ability to reach the temperature set-point faster by improved control means systems run at maximum load for less time
- Higher cooling quality increases the shelf life of cooled goods
- Optimal starting performance increases the lifetime of mechanics
- Lower pressure differences reduce mechanical stress for valves and pipes
- Reduced starting currents help minimize the cost of the installation, e.g. smaller cables
- Lower noise by speed regulation and less start/stops.





Commander SK



As an example, logic can be created to prevent compressor short cycling or to prevent oil lubrication problems that may be caused by continuous low speed operation.

For systems employing multiple compressors the drive logic can be used to manage the switching on and off of each compressor and their rotation cycle to manage the run time of each.

Reduced production and support costs

Commander SK is extremely simple to use with the 10 most frequently used parameters written on the front of the drive.

Commander SK is primarily designed for OEM applications. It is simple to use, compact and economic, yet has functionality that can help reduce system costs or enable new functionality.

Reduced controller costs and design time

Simply inserting the LogicStick into the front of the drive adds onboard PLC capability. This PLC functionality can be used with the help of Control Techniques engineers to implement control and protection logic. This cost effective solution can replace the need for external controllers or can reduce their size.



Programming in serial production is simplified by the ability to download parameters to the drive using the SmartStick, while also reducing the possibility of programming errors. The SmartStick can also be used to program a drive with its original setup settings in the field.



Reduced integration complexity and cost

The compact Commander SK can be mounted conventionally or through panel mounted. Through panel mounting (possible on SK2 [5.5 kW] upwards) reduces enclosure temperatures by enabling the heatsink of the drive to be placed outside of the enclosure. This solution can improve the lifetime of other electronics inside the enclosure, reduces the size of the enclosure, and potentially eliminates the need for other heat mitigation solutions to be employed.



Leading reliability

Our variable speed drives have evolved from industrial automation applications, requiring the highest levels of reliability and performance in demanding application and difficult environmental conditions. The core technology from our industrial drives provides world class reliability in refrigeration systems.

Easy upgrade to existing refrigeration equipment

Variable speed drives can also be installed on existing refrigeration systems to save energy. Commander SK with LogicStick enables manufacturers to offer end users equipment upgrades without the cost of external controllers.

Other benefits

- Onboard serial port with Modbus RTU for connecting to higher level controllers, HMIs or PC tools for access to advanced features
- Click-in option modules for Ethernet and Fieldbus communications at a drive or system level
- Ability to design custom web pages using the SM-Ethernet module
- Real-time-clock option and additional I/O options available
- Commander SK allows the use of a contactor between the drive and the motor, which is required for safety in some applications

For more information on Commander SK and Control Techniques solutions for refrigeration contact your local drive centre



Commander SK and Copeland Stream semi-hermetic compressors

Stream is Copeland's new semi-hermetic range of compressors for large scale commercial refrigeration. Available in four and six cylinder versions Stream can be specified with Copeland's economic digital modulation or can be specified without for systems where variable speed drives are to be employed.

Copeland and Control Techniques have worked closely together on the development of Stream to simplify system design for OEMs. Extensive testing means optimized drive sizing and performance, while specific design guidance for the drive and compressor package will simplify the design and test process.

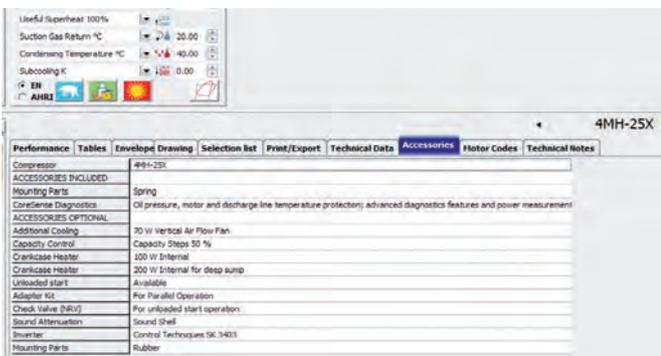
Fast system set-up

The drives can also be provided with a SmartStick to program the drive for the specific Stream compressor model to simplify the programming process.



Optimum drive sizing

Commander SK models are programmed in the Copeland Select sizing tool to ensure the optimum size of drive is selected.



CoreSense™ Diagnostics

Control Techniques have worked with Copeland to ensure that OEMs will be able to benefit from full CoreSense™ Diagnostics.

Innovative Emerson CoreSense technology provides service engineers with additional information for system diagnosis and optimization. System related problems can be diagnosed faster or even before they occur, giving the potential for reduced warranty and service costs for the OEM.

With active protection, advanced algorithms and features like fault history and LED indicators, CoreSense™ Diagnostics for Copeland compressors enables technicians to diagnose the past and recent state of the system.



CoreSense™ Diagnostics module

CoreSense™ Diagnostics features

- Basic Protection**
 Against motor overheat and insufficient oil protection
- Advanced Motor Protection**
 Against single phasing, locked rotor, voltage imbalance and protection of discharge temperature and low-voltage



- **Diagnostics**
Alarm history, compressor operating history, compressor running status information
- **Communication**
From the CoreSense to a pack controller using open Modbus protocol
- **Advanced features**
Power consumption measurement (voltage, current; power factor measurement), remote reset capability, crankcase heater control

What CoreSense™ Diagnostics means for you

- Improved compressor reliability and performance
- Easy preventive maintenance using the diagnostics features
- Avoidance of refrigeration system downtime and food loss
- Reduced applied system costs:
 - Factory installed devices: Oil protection sensor and the discharge temperature sensor are installed and connections are already made in the factory
 - Crankcase heater control is integrated in CoreSense
- Remote access to the compressor data, running status and possibility to reset alarms without visiting the installation site
- Multi-colour LEDs on the module help to find any compressor issue quickly
- Power consumption monitoring of the compressor to analyse the energy costs of the compressor

Commander SK, Copeland CoreSense and Dixell Controllers & Supervisors

Thanks to the integration between Dixell's IPRORACK rack unit controller, Commander SK and Copeland CoreSense OEMs are able to control and monitor system (Drive & Compressor) parameters and alarms both locally, using the controller's HMI, or remotely using the controller's internal web server.

Furthermore it is possible to connect the Dixell XWEB supervisor systems and Commander SK via RS485 to enable recording and remote access to drive data.



For more information on Stream with Commander SK contact your Copeland representative

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