# Copeland Scroll™ CSD100 Variable Speed Drive

## with CoreSense™ technology

- Reduce design time
- Reduce test & development time
- Improved quality & reduced risk
- Single point of responsibility
- Achieve maximum performance & efficiency

15 to 20hp | 11 to 15kW
200V | 400V | 575V

EMERSON™
Climate Technologies

# New Variable Speed Compressor Maximizes Energy Efficiency

Air conditioning OEM's need to ensure that new chiller and rooftop designs comply with emerging part load efficiency legislation such as ISEER and ESEER. Emerson's new Copeland Scroll™ Commercial Scroll Drive compressor drive package delivers performance that meets and exceeds expected legislative limits.

Controlling these devices efficiently can lead to big energy savings while optimizing comfort level control. The Copeland Scroll variable speed package comprises a permanent-magnet compressor and the CSD100, Emerson's leading-edge variable speed AC motor drive. This pre-engineered, high SEER rating package gives OEMs a single-source supplier, one-stop accountability and faster time-to-market.

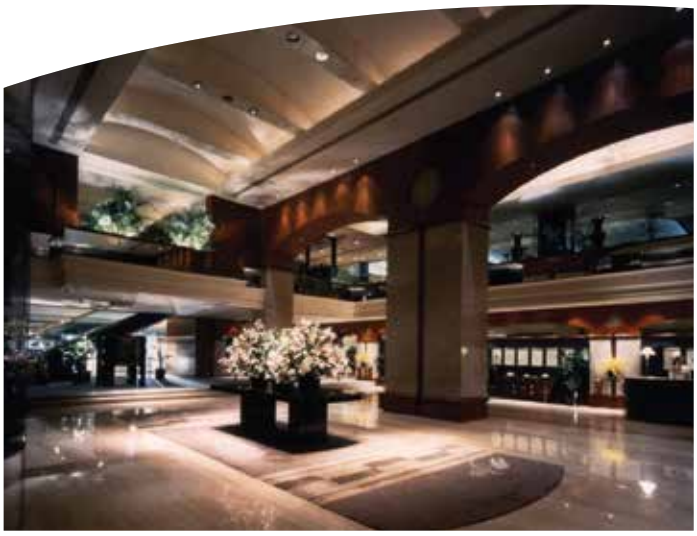
## High efficiency operation

Compressors are most efficient when running across-the-line at 100% output. However, during part load demand, the most efficient use of energy is to modulate the speed of the compressor. The Emerson compressor solution adjusts motor speed at a controlled rate by varying the frequency and/or speed of the compressor motor allowing it to match loads rather than turning the motor on and off.

The compressor package provides best-in-class operating efficiency and allows for a wide range of modulation from 1,000 to 7,200 RPM (17 to 120 Hz). The CSD100 drive operates the compressor at higher frequencies (hence higher speeds) to allow for higher capacity than would be achieved by a constant-speed compressor running at 60/50 Hz.

A single variable speed compressor can replace multiple compressors that are staged on and off to achieve complete capacity control improving overall operating efficiencies.

The compressor can also act as a trim compressor in multi-compressor applications by adjusting output to meet varying loads. The CSD100's optional PLC functionality or separate control can then bring the other constant speed compressors online to meet demands beyond its capacity. When the additional compressor comes online, the trim compressor would reduce speed to meet the reduced demand. This speed reduction and the reduction in system pressure combine to deliver energy savings as high as 60%.



## About the CSD100 Drive

Emerson's unique motor control algorithms combined with the latest microprocessor technology ensure that CSD100 drives offer the highest efficiency and reliability for controlling energy saving permanent magnet motors. With over 30 patents pending, CSD100 drives are a global achievement combining Emerson's worldwide Engineering & Design resources and product testing processes.

# Reduced design time, cost and risk

### Key compressor drive features:

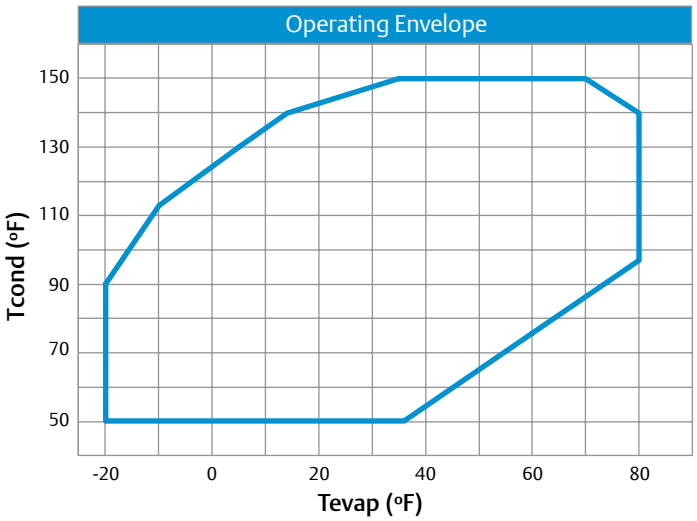
- Designed to deliver optimum efficiency and reliability while reducing design time
- Built in Coresense™ compressor protections
  - Tuned/optimized motor control algorithm eliminates need to enter motor data during setup
  - Motor Protection reduces risk of overload and short circuit
  - Locked rotor protection protects motor in the event the motor is prevented from rotating
  - Lost rotor prevention maintains synchronization between motor and drive
  - Scroll temperature protection
  - Reverse run prevention ensures correct rotation, even with miswired compressor connections
  - Compressor missing phase protects system in the event of a missing compressor input phase
  - Anti-short cycling prevents short compressor cycles due to control limits being set too tight
  - Envelope control maintains compressor operation within the specified envelope
  - Start/Shutdown procedures to provide proper lubrication; drive controls compressor start-up/shut-down
  - Automatic drive speed reduction avoids nuisance trips and keeps the motor running
  - Both compressor and drive are jointly UL approved for reduced design time, cost, and speed to market
- Frequency avoidance to eliminate speeds that create resonance
- Reduced design time and cost
  - High drive operating temperature up to 140°F (60°C).
  - Integrated crankcase heater eliminates external heater by using motor stator
  - Class leading compact dimensions

### Compressor specifications

| Compressor Model | ZPV0631E-4E9-XXX | ZPV0961E-4E9-XXX |
|---|---|---|
| Displacement | 63cc | 96cc |
| Speed Range | 1,000 - 7,200 RPM | 1,000 - 7,200 RPM |
| Voltage Range | 380-575V | 380-575V |

| Drive Model | CSD100 | CSD100 | Coming Soon 2015 |
|---|---|---|---|
| Drive Size | 11kW | 15kW | |

| Performance | | | Coming Soon 2015 |
|---|---|---|---|
| Condition (Evap/Cond) | 50/120 | 45/130 | |
| RPM | 5,400 | 5,400 | |
| Capacity (BTU/Hr) | 127,000 | 108,000 | |
| EER / IEER | 13.8/25.4 | 10.5/25.4 | |
| Sound (dBA) | 81 | 78 | |



# CSD100 AC Variable Speed Drive Features & Specifications

## Key Drive features:

- Low losses – up to 98% efficient
- EN ISO 13849-1 Cat. 3 STO; high pressure shutdown
- Built-in choke and EMC filter
- RS-485 communications standard
- Option module slots for additional I/O or fieldbus communications
- Optional LCD keypad
- Smartcard/SD card slot for parameter storage/backup/restore
- Variable speed cooling fan
- Conformal coating on all PCBs
- Aluminum chassis for easy through hole mounting enables location of heatsink to be design consideration

## Environmental compliance

- IP65 / NEMA4 / NEMA 12 / UL TYPE 12 rating is achieved on the rear of the drive when the Throughhole IP65 Kit is used
- Ambient temperature: 4 °F to 140 °F (consult User Guide)
- Storage temperature: 40 °F to 158 °F
- Humidity 95 % maximum (non-condensing) at 104 °F
- Altitude: 0 to 3000m, derate 1 % per 100 m between 1000 m and 3000 m
- Random vibration: Tested in accordance with IEC 60068-2-64
- Mechanical shock: Tested in accordance with IEC 60068-2-29
- RoHS
- REACH

## Electrical conformity

- IP20 / NEMA1 / UL TYPE 1*
  - *UL open class as standard, additional UL Type 1 conduit kit needed to achieve Type 1
- Electromagnetic Immunity complies with EN 61800-3 and EN 61000-6-2
- With onboard EMC filter, complies with EN 61800-3 (Category C3)
- EN 61800-3 (Category C1) with optional footprint EMC filter
- IEC 60146-1-1 Supply conditions
- IEC 61800-5-1 (Electrical Safety)
- IEC 61131-2 I/O
- Safe Torque Off, independently assessed by TÜV to IEC 61800-5-2 SIL 3 and EN ISO 13849-1 PL. Corresponds to an uncontrolled stop in accordance with stop category 0 of IEC 60204-1
- UL 508C (Electrical Safety)
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- UL 60730
- C Tick

## Dimensions & Weight

| Frame Size | Dimensions (H x W x D) | | Weight | |
|---|---|---|---|---|
| | (mm) | (in) | (kg) | (lb) |
| 4 | 379 x 124 x 200 | 14.9 x 4.9 x 7.9 | 6.5 | 14.3 |
| 5 | 379 x 143 x 202 | 14.9 x 5.6 x 7.9 | 7.4 | 16.3 |
| 6 | 379 x 210 x 227 | 14.9 x 8.3 x 7.9 | 14 | 30.9 |

## EMC Filter Reference

| Frame Size | Rating | Part Number |
|---|---|---|
| 4 | 200V | 4200-0272 |
| | 400V | 4200-0252 |
| 5 | 200V | 4200-0312 |
| | 400V | 4200-0402 |
| | 575V | 4200-0122 |
| 6 | 200V | 4200-2300 |
| | 400V | 4200-4800 |
| | 575V | 4200-3690 |

## Model Reference & Ratings

| Rating | Model | Frame Size | Max. Continuous Current at: | Motor Shaft Power | |
|---|---|---|---|---|---|
| | | | 40 °C* | kW | (hp) |
| 200/240V ±10% | CSD100-062 00500 A | 6 | 50 | 11 | 15 |
| | CSD100-062 00580 A | 6 | 58 | 15 | 20 |
| 380/480V ±10% | CSD100-044 00240 A | 4 | 24 | 11 | 15 |
| | CSD100-054 00300 A | 5 | 30 | 15 | 20 |
| 500/575V ±10% | CSD100-065 00170 A | 6 | 17 | 11 | 15 |
| | CSD100-065 00220 A | 6 | 22 | 15 | 20 |

*For ratings at 60 °C (140 °F), see User Guide.

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