SC9000 EP

Adjustable frequency drive for the water/wastewater industry









SC9000 EP medium voltage adjustable frequency drive

Part of Eaton's integrated control gear with Ampgard main breaker and Ampgard motor control center

SC9000 EP

Adjustable frequency drive for the water/wastewater industry

Eaton's highly reliable and award-winning medium voltage drives provide up to 6000 horsepower, and incorporate safety and protections in a compact footprint. The encapsulated powerpole inverter enables the Eaton solution to withstand harsh environmental conditions in industrial environments. SC9000 EP drives incorporate a three-level neutral point clamped (NPC) inverter topology, which reduces the number of power switching devices in the inverter and improves reliability. Eaton's medium voltage adjustable frequency drive is also designed to help customers reduce costs, beyond driving energy efficiencies that lower utility bills, and the industry-leading drive technology enables synchronous transfer, which allows customers to use a single drive to control the power to multiple motors and reduce equipment costs.



SC9000 EP Frame C Up to 3000 hp at 4160 V, 131 inches W x 50 inches D x 92 inches H

300–2500 hp VT at 2400 V 300–4000 hp VT at 3300 V 300–6000 hp VT at 4160 V Sync transfer control Sync motor control High voltage primary

SC9000 EP double-bus design for synchronous transfer control was first to market. Do not be misled by "cable copycats"

SC9000 EP double-bus design

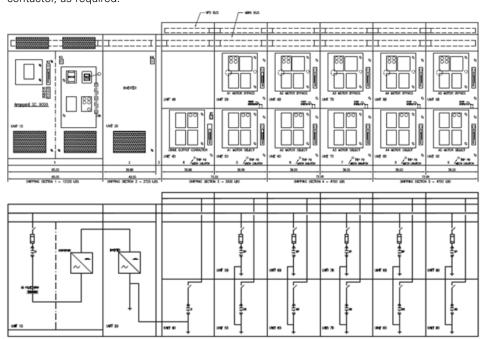
With the SC9000 EP AFD double-bus, a second 1000 A AFD bus is located above the main bus, adding only 8-inches of additional height to the system.

The SC9000 EP double-bus enables close-coupling of a drive output contactor and multiple motor bypass and motor select contactors under a common bus alignment.

SC9000 EP integrated control gear synchronous transfer control design gives Eaton's customers the benefit of a compact and reliable system:

- Close-coupling of SC9000 EP and motor select contactors eliminates the many cable connections required for typical synchronous transfer systems—an ideal solution for electrical houses and smaller control rooms
- Double-bus configuration with paired motor bypass starter and motor select contactor provides a single location for landing motor leads, optimizing system configuration and connections

The SC9000 EP double-bus is integrated with a 36-inch wide drive output contactor (optional) and 36-inch wide motor bypass starters and motor select contactors structure that can be equipped with a 400 A or 800 A contactor, as required. A 400 A motor bypass starter and a 400 A motor select contactor can be double-stacked in a single, 36-inch wide cabinet for motor systems up to 3000 hp. 800 A motor bypass starter and motor select contactor assemblies require two 36-inch wide structures for a total width of 72-inches per motor.



SC9000 EP synchronous transfer contactor assemblies



Drive output contactor

400 A motor bypass starter and motor select contactor assembly

Contactor rating	Maximum motor hp	Cabinet dimensions for motor bypass and motor select contactor assembly (inches)	Short-circuit rating
400 A	3000	36 W x 92 H x 30 D	8500 A
800 A	6000	72 W x 92 H x 30 D	12,500 A

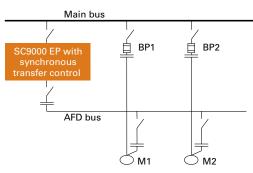
Medium voltage integrated control gear adjustable frequency drive double-bus design

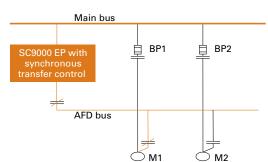


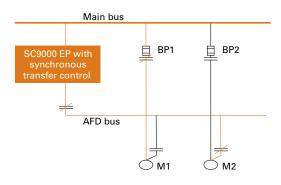
Synchronous transfer systems help power generating facilities maximize the capital efficiency of their systems by controlling multiple motors with one adjustable frequency drive.

Most manufacturers synchronous transfer control systems have multiple drive output and motor select contactors that are interconnected typically via cables to allow the AFD to manage multiple motors.

With the SC9000 EP and Eaton's integrated medium voltage control gear design; the double bus design, drive output, and motor select contactors are all close-coupled under a common bus with no cables, providing a more compact design and superior performance.







The synchronous transfer control device is designed to match the output voltage, frequency, and phase of the SC9000 EP to the incoming utility.

By matching these parameters, the drive system can transfer a motor from the SC9000 EP to the utility without disturbance.

The SC9000 EP and control systems are programmed to start or stop a single motor, as well as sync to other motors as needed.

Upon system startup, the SC9000 EP and AFD bus are energized.

The synchronous transfer control closes the drive output and the designated motor select contactor, and starts the SC9000 EP allowing power to be directed to the desired motor (M1) for operation.

The designated motor can now operate at adjustable speed as needed.

When an additional motor is required, the PLC will send a command to the SC9000 EP to sync with the new motor (M2).

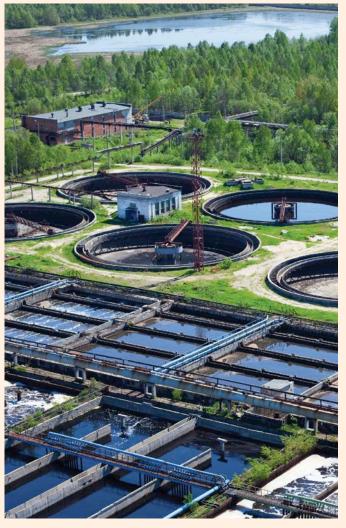
The SC9000 EP adjusts its output to match the utility line voltage, frequency, and phase angle. Once the drive output and line are synchronized, the system will transfer the motor from the drive output to the utility by opening the motor select contactor (M1) and closing the motor bypass contactor (BP1).

Once synchronization is locked, the adjacent motor select contactor (M2) is closed, and the SC9000 EP can now operate the additional motors at adjustable speed as needed.

SC9000 EP

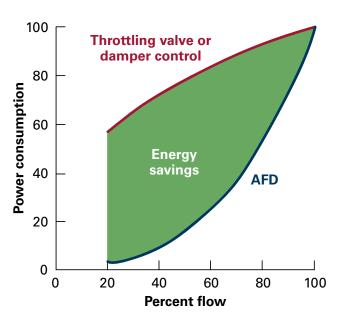
For all of your industrial applications





Affinity laws for pumps and fans

- · Flow rate varies directly with the ratio of the speeds
- Pressure varies with the square of the ratio of the speeds
- Horsepower varies with the cube of the ratio of the speeds



With an AFD, running a motor at 50% speed requires only 12.5% horsepower.

Efficiency, power fac	ctor and harmo	nics typical dat	a
Speed: 50%	Load (%)		
	50	75	100
Input PF (1)	0.96	0.98	0.98
Input THD (V)	3.13	3.64	3.43
Input THD (I)	7.59	6.40	6.73
Efficiency (%)	0.94	0.96	0.96
Speed: 75%	Load (%)		
	50	75	100
Input PF (1)	0.98	0.99	0.99
Input THD (V)	1.34	2.32	3.15
Input THD (I)	6.76	4.44	3.85
Efficiency (%)	0.97	0.97	0.97
Speed: 100%	Load (%)		
	50	75	100
Input PF (1)	0.98	0.99	0.99
Input THD (V)	2.16	2.20	2.30
Input THD (I)	5.95	4.38	3.13
Efficiency (%)	0.97	0.97	0.97

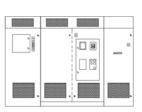
SC9000 EP—a small package with a lot of power

Drive rating (A) 38 44 51 57 63 76 89 101 114 124 132 155 1160 drive output (IVA) 274 317 367 411 454 548 641 728 821 893 954 1117 vominal hp 4160 V 300 350 400 450 558 641 728 821 893 954 1177 vominal hp 4160 V 300 350 400 450 568 630 680 700 800 900 1000 1150 1250 rame size Fame A Fame B Fame B Fame B Fame B 588 620 682 731 744 1160 drive output (VA) 1340 1564 1787 2210 2260 2500 3000 370 400 450 500 500 575 600 600 500 500 500 500 500 500 500 500 500 500 500 500 500 500 500 500 500 500 <th>Power specifications</th> <th></th>	Power specifications													
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Drive rating (A) 48 56 64 72 80 96 112 128 144 160 200 240 3300 drive output (kVA) 274 320 366 412 457 549 640 732 823 915 1143 1372 Nominal hp 3300 V 300 350 400 450 500 600 700 800 900 1000 1250 1500 rame size Frame A Frame A Frame B Frame D Frame B Frame D	Frame size	Frame B			Frame (2		Frame D			Frame E			
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Frame size Frame A Frame B /oltage class 2400 504 561 Drive rating (A) 279 335 390 448 504 561 2400 drive output (kVA) 1160 1393 1621 1862 2095 2332 Nominal hp 2400 V 1250 1500 1750 2000 2250 2500	2400 drive output (kVA)	287	333	378	428	474	557	648	740	836	927			
Voltage class 2400 Drive rating (A) 279 335 390 448 504 561 2400 drive output (kVA) 1160 1393 1621 1862 2095 2332 Nominal hp 2400 V 1250 1500 1750 2000 2250 2500	Nominal hp 2400 V	300	350	400	450	500	600	700	800	900	1000			
Drive rating (A) 279 335 390 448 504 561 2400 drive output (kVA) 1160 1393 1621 1862 2095 2332 Nominal hp 2400 V 1250 1500 1750 2000 2250 2500	Frame size	Frame A					Frame B							
2400 drive output (kVA) 1160 1393 1621 1862 2095 2332 Nominal hp 2400 V 1250 1500 1750 2000 2250 2500	Voltage class	2400												
Nominal hp 2400 V 1250 1500 1750 2000 2250 2500	Drive rating (A)	279	335	390	448	504	561							
	2400 drive output (kVA)	1160	1393	1621	1862	2095	2332							
rame size Frame C Frame D	Nominal hp 2400 V	1250	1500	1750	2000	2250	2500							
	Frame size	Frame C			Frame [)								

Note: Typical for a four-pole motor.



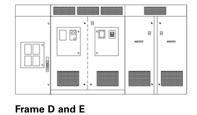




Frame C

4160

620-744



5000-6000

Frame A

Frame B

Frame A						
Output	Motor		Cabinet	size (inch	es)	Redundant blower
voltage	FLA	hp	Width	Height	Depth	Height
2400	67–112	300-500	65	92	50	18.5
3300 3	48–112	300-700	65	92	50	18.5
4160	37–132	300-1150 🗨	65	92	50	18.5

Frame	в

Output	Motor		Cabinet	Redundant blower		
voltage	FLA	hp	Width	Height	Depth	Height
2400	134–223	600-1000	95	92	50	20.1
3300 3	128–240	800-1500	95	92	50	20.1
4160	124–248	1000-2000	95	92	50	20.1

1000 hp and higher in Frame 'A' require second blower. Redundant cooling option is not available at these higher hp ratings.

4160 V, 2750 hp and 3000 hp require 137-inch width and additional blowers. Redundant cooling option is not available at these higher hp ratings.

A 0000 1/ 50 11	
3300 V, 50 Hz.	
-	

Frame DS with single inverter.

Output	Motor		Cabinet	size (inch	es)	Redundant blower
voltage	FLA	hp	Width	Height	Depth	Height
2400	279–390	1250-1750	131	92	50	12.1
3300 🚳	280–320	1750-2000	131	92	50	12.1
4160	279–372	2250-3000	131 🛛	92	50	12.1
Frame D	and E					
		Cabinet size (inches)				
Output	Motor		Cabinet	t size (incl	nes)	Redundant blower
Output voltage	Motor FLA	hp	Cabinet Width	t size (incl Height	nes) Depth	nouunuuni
		hp 2000–2500				blower
voltage	FLA		Width	Height	Depth	blower Height
voltage 2400	FLA 446–558	2000–2500	Width 198	Height 92	Depth 50	blower Height 12.1

222

50

12.1

92

Solutions that deliver

- Highly reliable and improved uptime with modular powerpole inverter
- · Integrated control gear eliminates cables, reduces costs and simplifies installation
- · High energy density in compact footprint
- Generate substantial energy savings





SC9000 EP Frame C+ Up to 3000 hp at 4160 V

Eaton low voltage adjustable frequency drives

Superior service

While Eaton offers products and solutions to meet your most critical electrical power management challenges, we also have one of the largest and most experienced team of power system engineers in the industry. Eaton's Electrical Engineering Services & Systems focuses on understanding your business requirements and optimizing your power system. We not only offer startup, acceptance testing and commissioning services, but our engineers and consultants can help diagnose problems, identify ways to improve performance or transform concepts into flexible, practical solutions that can improve productivity and use of capital. We can help keep your power system safe, efficient, reliable and up to date.

For more information on Eaton adjustable frequency drives: Eaton.com/SC9000 Eaton.com/LVDrives 1-877-ETN-CARE, option 2, then option 7



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