



Automation for a Changing World

High Frequency Motor Drive C2000-HS Series



www.deltaww.com

 **DELTA**
Smarter. Greener. Together.

High Frequency Motor Drive C2000-HS Series

Prime product for High-speed Fluid Applications

High-speed centrifugation is widely applied to fluid-mechanical devices to increase efficiency and save both time and equipment cost. During operation, a fluid-mechanical device rotates at high speed to gain a faster flow rate, and the frequency increases as the motor rotation speed increases.

With years of experience in motor drive and control, Delta introduces the High Frequency Motor Drive C2000-HS Series with outstanding performance (output frequency up to 1,500 Hz) and energy-efficient features to fulfill the demand for high speed motor control. The C2000-HS Series is the best choice for your fluid mechanical devices.



Applications

- HVAC Systems - Chiller Units



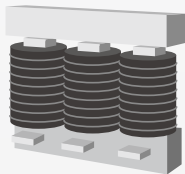
- Sewage Treatment Plants - Centrifugal Turbo Blowers



- Power Plants - Micro Gas Turbine Generators



Features



Output Reactor



Supports all kinds of motors:



SPM
(surface permanent magnet) motor



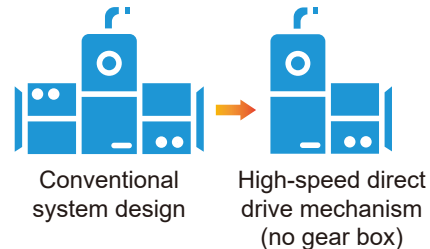
IPM
(interior permanent magnet) motor



IM
(induction) motor

High-speed Operation

- Enhanced performance and control: max. operating frequency up to 1,500 Hz
- Direct drive mechanism: reduced system size, higher efficiency and lower cost



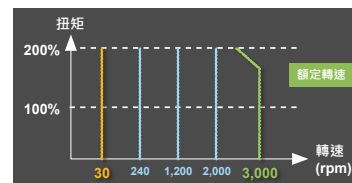
Compact Design

- No need to adopt a drive of higher power range when matching with a high-capacity motor
- Reduces the installation space



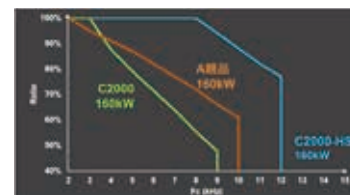
Sensorless Motor Control Technology

- Built-in motor ID parameters for sensorless control with steadier output speed and optimized dynamic response
- With FOC sensorless control, the speed control precision reaches 1:100



New IGBT Technology

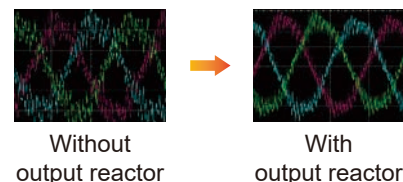
- Maintains high motor drive efficiency of up to 98.4 % while running at a high carrier frequency
- Substantially reduces the derating limit of the output current.



* Refer to Delta's official documentation for the actual test results.

Output Reactor

- Suppresses current ripples on the high-speed motor
- Reduces the chance of motor temperature rise



* Contact Delta for model selection and installation.

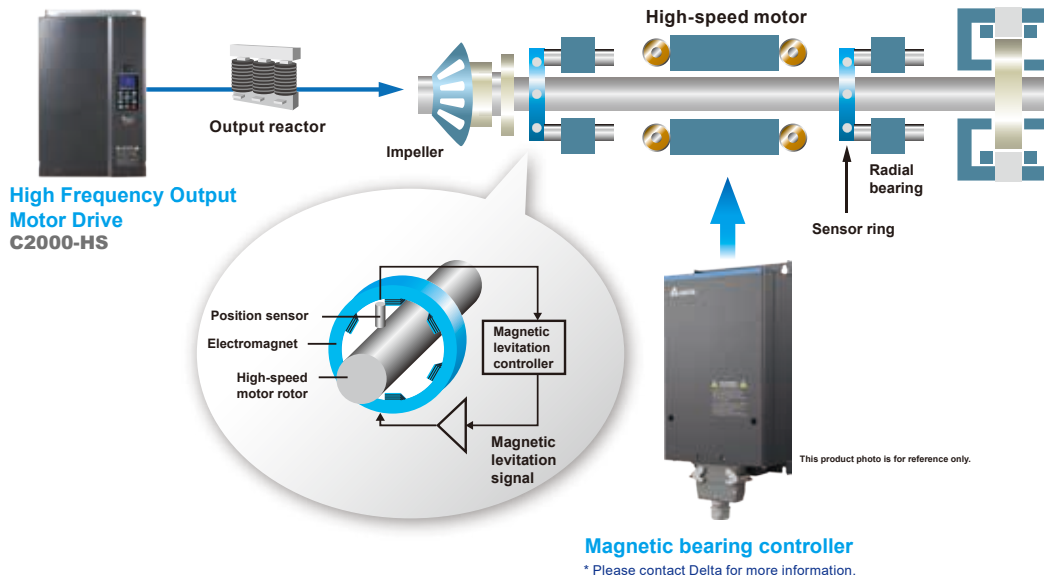
Built-in DC Reactor

- Suppresses high harmonics
- Compliant with EN61000-3-12



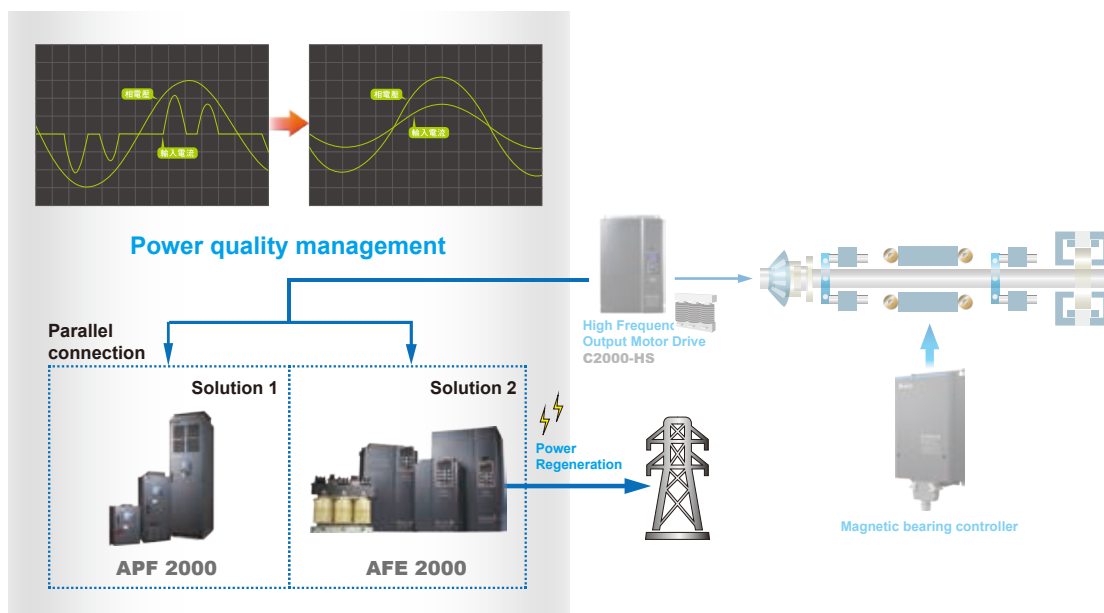
Best Solution for a Electronically Controlled High-speed Motor

- Magnetic bearing controller: The high-speed motor uses non-contact bearing instead of a conventional one to reduce damage during operation. This saves maintenance cost by eliminating the need of cleaning the copper pipes of the fluid machinery, the effort for cooling oil circuit maintenance, and the oil quality verification process
- Output reactor: Suppresses the current ripples on the high-speed motor and the increasing heat of the motor rotor

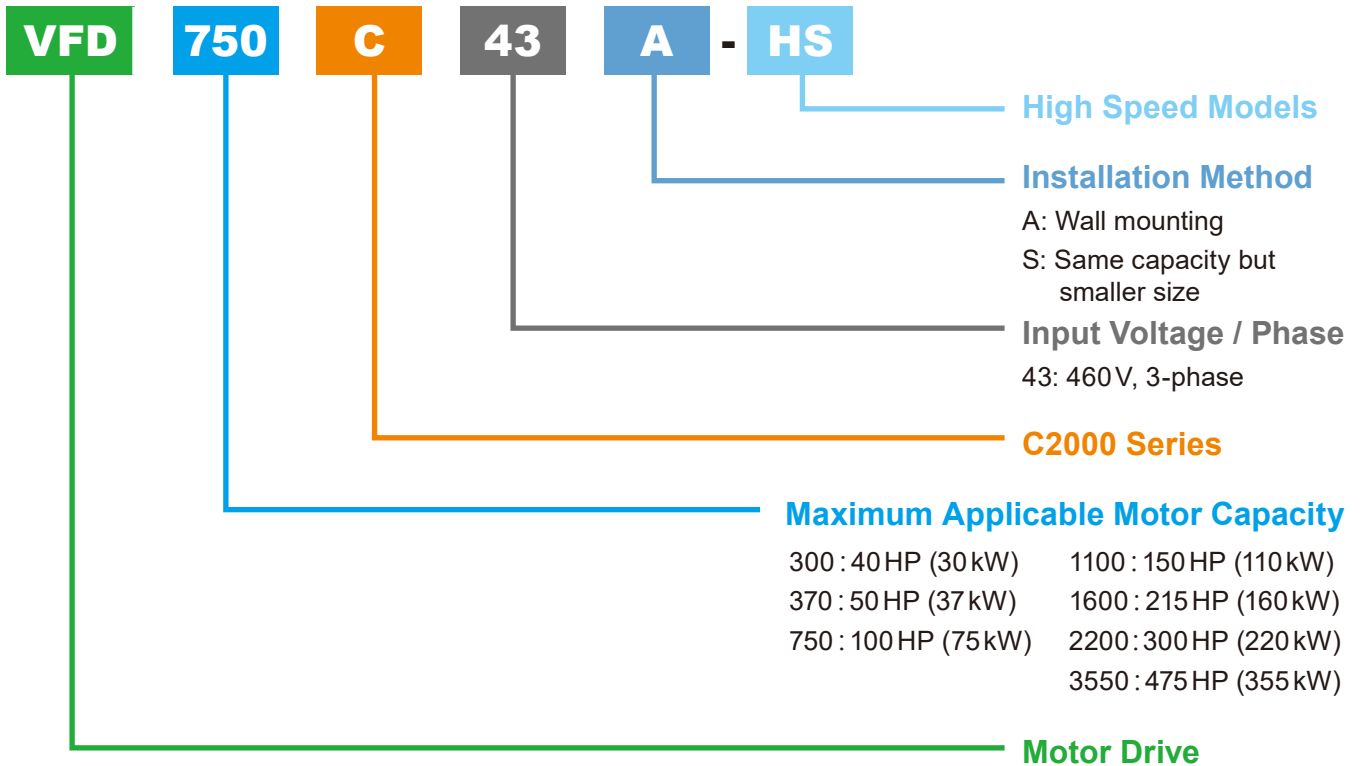


Total Power Quality Management Solution

- Works with Delta's power quality management products for power regeneration during motor operation, and the generated power is transmitted to the mains via a parallel connection
- Reduces the harmonic distortion at the power input side by raising the power factor to 0.95~0.99
- Compliant with IEEE 519 standard to decrease electricity cost



Model Name



Product Specifications


Frame		D0		D	E	F	G	H	
Model VFD-__-C43x-HS		300	370	750	1,100	1,600	2,200	3,550	
Output Rating	Normal Load	Rated Output Capacity (kVA)	48	58	120	175	247	367	544
		Rated Output Current (A)	60	73	150	220	310	460	683
		Applicable Motor Output (kW)	30	37	75	110	160	220	355
		Applicable Motor Output (HP)	40	50	100	150	215	300	475
		Max. Output Frequency (IM)	1,500Hz				1,200Hz	1,000Hz	900Hz
		Carrier Frequency (kHz)	2~15 (Default 10)		2~15 (Default 8)	2~12 (Default 8)	2~10 (Default 6)	2~9 (Default 6)	
Input Rating	Input Current (A)	63	74	157	207	300	400	625	
	Rated Voltage / Frequency	3-phase AC 380V~480V (-15%~+10%), 50/60Hz							
	Operating Voltage Range	323~528V _{AC}							
	Frequency Tolerance	47~63Hz							
Efficiency (%)		96.5	96.8	97.8	97.5	97.7	97.1	98.4	
Power Factor		> 0.98							
Net Weight		38kg	40kg	66kg	88kg	138kg	228kg		
Cooling Method		Fan Cooling							
Braking Chopper		Optional							
DC Reactor		Built-in, EN61000-3-12 compliant							

**45 kW, 55 kW, and 90 kW models are coming soon.

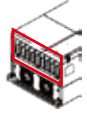
Control Features

VFD- _ _ _ C43x-HS				
Control Method	PM/IM open loop control			
Starting Torque	IM: Reach up to 150% at 1/50 rated rotor speed PM: Reach up to 150% at 1/100 rated rotor speed			
V/F Curve	4-point adjustable V/F curve and square curve			
Speed Response Ability	Open loop: 5 Hz Closed loop: Max. 40 Hz for IM; max. 100 Hz for PM			
Torque Limit	Normal duty: a maximum of 160% torque current			
Torque Accuracy	±5%			
Frequency Output Accuracy	Digital command: ±0.01%, -10°C ~ +40°C; Analog command: ±0.1%, 25 ± 10°C			
Output Frequency Resolution	Digital command: 0.1 Hz, Analog command: 0.05% max. output frequency (Pr. 01-00), 11bit			
Overload Tolerance	120% of rated current: 1 minute for every 5 minutes 160% of rated current: 3 seconds for every 30 seconds			
Frequency Setting Signal	-10 ~ +10 V, 0 ~ +10 V, 4 ~ 20 mA, 0 ~ 20 mA, Pulse input			
Acceleration/Deceleration Time	0.00 ~ 600.00 / 0.0 ~ 6000.0 seconds			
Main Control Functions	Feed forward control	Restart after instantaneous power failure	Speed search	Over-torque detection
	Torque limit	16-step speed (Max.)	Accel./decel. time switch	S-curve accel./decel.
	3-wire sequence	Auto-tuning (rotational, stationary)	Dwell	Slip compensation
	Torque compensation	JOG frequency	Frequency upper/lower limit settings	DC injection braking at start/stop
	High slip braking	PID control (with sleep function)	Energy saving control	Parameter copy
	Modbus communication (RS-485 RJ45, max. 115.2 Kbps)			Fault restart
Fan Control	PWM Control			

Protection Features

VFD- _ _ _ C43x-HS	
Motor Protection	Electronic thermal relay protection
Over-current Protection	Over-current protection for 240% rated current Current clamp: 170 ~ 175%
Over-voltage Protection	Drive stops running when DC-BUS voltage exceeds 820 V
Over-temperature Protection	Built-in temperature sensor
Stall Prevention	Stall prevention during acceleration, deceleration and running independently
Restart after Instantaneous Power Failure	Parameter setting up to 20 seconds
Grounding Leakage Current Protection	Leakage current is higher than 50% of rated current of the AC motor drive
Short-circuit Current Rating (SCCR)	Per UL 508C, the drive is suitable for use on a circuit capable of delivering no more than 100 kA symmetrical amperes (rms) when protected by fuses given in the fuse table
Certifications	GB/T12668-2 UL508c 

Specifications for Operating Temperature and Protection Level

Model	Frame	Top Cover	Conduit Box	Protection Level	Operating Temperature
VFD-___ C43 x-HS	D0 ~ H	N/A	No	IP00 	-10~50°C
Conduit Box Installed	D0 ~ H	N/A	Standard	IP20/NEMA1	-10~40°C

Protection Level	Operating Environment
UL Open Type / IP20 (Without conduit box)	Ambient temperature -10°C ~ +50°C: Running at the rated current Ambient temperature exceeds +50°C: Decrease 2% of the rated current for every 1°C increase Max. operating temperature: 60°C
UL Type1 / NEMA1 (Conduit box installed)	Ambient temperature -10°C ~ +40°C: Running at the rated current Ambient temperature exceeds +40°C: Decrease 2% of the rated current for every 1°C increase Max. operating temperature: 60°C
High Altitude	Altitude 0 ~ 1,000 m: Follow normal operation restriction Altitude 1,000 ~ 2,000 m: Decrease 1% of rated current, or lower 0.5°C of temperature for every 100 m increase in altitude Altitude over 2,000 m: Contact Delta for more information * Corner-grounded systems should be used below 2,000 m

Ordering Information

Power Range (kW)	Frame	IP00 (Without Conduit Box)	Dimensions (H x W x D, mm)
30	D0	VFD300C43S-HS	500 x 280 x 255
37	D0	VFD370C43S-HS	500 x 280 x 255
75	D	VFD750C43A-HS	550 x 330 x 275
110	E	VFD1100C43A-HS	589 x 370 x 300
160	F	VFD1600C43A-HS	800 x 420 x 300
220	G	VFD2200C43A-HS	1,000 x 500 x 397
355	H	VFD3550C43A-HS	1,435 x 700 x 398



Smarter. Greener. Together.

Industrial Automation Headquarters

Delta Electronics, Inc.

Taoyuan Technology Center
No.18, Xinglong Rd., Taoyuan District,
Taoyuan City 33068, Taiwan
TEL: 886-3-362-6301 / FAX: 886-3-371-6301

Asia

Delta Electronics (Shanghai) Co., Ltd.

No.182 Minyu Rd., Pudong Shanghai, P.R.C.
Post code : 201209
TEL: 86-21-6872-3988 / FAX: 86-21-6872-3996
Customer Service: 400-820-9595

Delta Electronics (Japan), Inc.

Tokyo Office
Industrial Automation Sales Department
2-1-14 Shibadaimon, Minato-ku
Tokyo, Japan 105-0012
TEL: 81-3-5733-1155 / FAX: 81-3-5733-1255

Delta Electronics (Korea), Inc.

Seoul Office
1511, 219, Gasan Digital 1-Ro., Geumcheon-gu,
Seoul, 08501 South Korea
TEL: 82-2-515-5305 / FAX: 82-2-515-5302

Delta Energy Systems (Singapore) Pte Ltd.

4 Kaki Bukit Avenue 1, #05-04, Singapore 417939
TEL: 65-6747-5155 / FAX: 65-6744-9228

Delta Electronics (India) Pvt. Ltd.

Plot No.43, Sector 35, HSIIDC Gurgaon,
PIN 122001, Haryana, India
TEL: 91-124-4874900 / FAX : 91-124-4874945

Delta Electronics (Thailand) PCL.

909 Soi 9, Moo 4, Bangpoo Industrial Estate (E.P.Z),
Pattana 1 Rd., T.Phraksa, A.Muang,
Samutprakarn 10280, Thailand
TEL: 66-2709-2800 / FAX : 662-709-2827

Delta Electronics (Australia) Pty Ltd.

Unit 20-21/45 Normanby Rd., Notting Hill Vic 3168, Australia
TEL: 61-3-9543-3720

Americas

Delta Electronics (Americas) Ltd.

Raleigh Office
P.O. Box 12173, 5101 Davis Drive,
Research Triangle Park, NC 27709, U.S.A.
TEL: 1-919-767-3813 / FAX: 1-919-767-3969

Delta Electronics Brazil

São Paulo Sales Office
Rua Itapeva, 26 - 3º, andar Edifício Itapeva,
One - Bela Vista 01332-000 - São Paulo - SP - Brazil
TEL: 55-12-3932-2300 / FAX: 55-12-3932-237

Delta Electronics International Mexico S.A. de C.V.

Mexico Office
Gustavo Baz No. 309 Edificio E PB 103
Colonia La Loma, CP 54060
Tlalnepantla, Estado de México
TEL: 52-55-3603-9200

EMEA

Headquarters: Delta Electronics (Netherlands) B.V.

Sales: Sales.IA.EMEA@deltaww.com
Marketing: Marketing.IA.EMEA@deltaww.com
Technical Support: iatechnicalsupport@deltaww.com
Customer Support: Customer-Support@deltaww.com
Service: Service.IA.emea@deltaww.com
TEL: 31(0)40 800 3900

BENELUX: Delta Electronics (Netherlands) B.V.

De Witbogt 20, 5652 AG Eindhoven, The Netherlands
Mail: Sales.IA.Benelux@deltaww.com
TEL: 31(0)40 800 3900

DACH: Delta Electronics (Netherlands) B.V.

Coesterweg 45, D-59494 Soest, Germany
Mail: Sales.IA.DACH@deltaww.com
TEL: 49(0)2921 987 0

France: Delta Electronics (France) S.A.

ZI du bois Challand 2, 15 rue des Pyrénées,
Lisses, 91090 Evry Cedex, France
Mail: Sales.IA.FR@deltaww.com
TEL: 33(0)1 69 77 82 60

Iberia: Delta Electronics Solutions (Spain) S.L.U

Ctra. De Villaverde a Vallecas, 265 1º Dcha Ed.
Hormigueras – P.I. de Vallecas 28031 Madrid
TEL: 34(0)91 223 74 20

Carrer Llacuna 166, 08018 Barcelona, Spain

Mail: Sales.IA.Iberia@deltaww.com

Italy: Delta Electronics (Italy) S.r.l.

Via Meda 2-22060 Novedrate(CO)
Piazza Grazioli 18 00186 Roma Italy
Mail: Sales.IA.Italy@deltaww.com
TEL: 39 039 8900365

Russia: Delta Energy System LLC

Vereyskaya Plaza II, office 112 Vereyskaya str.
17 121357 Moscow Russia
Mail: Sales.IA.RU@deltaww.com
TEL: 7 495 644 3240

Turkey: Delta Greentech Elektronik San. Ltd. Sti. (Turkey)

Şerifaii Mah. Hendem Cad. Kule Sok. No:16-A
34775 Ümraniye – İstanbul
Mail: Sales.IA.Turkey@deltaww.com
TEL: 90 216 499 9910

GCC: Delta Energy Systems AG (Dubai BR)

P.O. Box 185668, Gate 7, 3rd Floor, Hamarain Centre
Dubai, United Arab Emirates
Mail: Sales.IA.MEA@deltaww.com
TEL: 971(0)4 2690148

Egypt + North Africa: Delta Electronics

Unit 318, 3rd Floor, Trivium Business Complex, North 90 street,
New Cairo, Cairo, Egypt
Mail: Sales.IA.MEA@deltaww.com