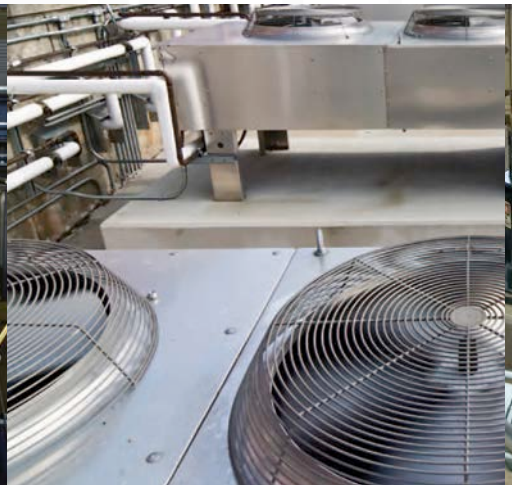
Variable frequency drive
Product overview

One source for engineering, manufacturing and support



Powering Business Worldwide

Drive		Applications	Description	Offering/range		Benefits	Acceptance	Communication options	Cross-reference	Enclosure
DE1		• Variable speed starter	The DE1 variable speed starter (VSS) is designed for customers who have basic applications but still require variable frequency and advanced motor protection. With industry-leading ease of use and a narrow, compact housing, the DE1 allows customers to simplify their design and reduce installation time.	**Single-phase to three-phase** 230 V to 3 hp	**Three-phase to three-phase** 480 V to 10 hp	**Ease of use**: Copy/paste tool, programmable multi-function inputs, configuration module for quick programming **Space-saving design**: DIN rail mountable, side-by-side mounting, numerous orientations, small footprint **Efficiency**: Temperature controlled fan **Rugged and reliable**: High overload rating (CT), ambient temperature –10 °C to +60 °C without derating, harmonics mitigating design	UL c UL CE IEC RoHS COMPLIANT	• Modbus RTU • SmartWire-DT	• ABB (ACS Series 55) • Lenze / AC Tech (8400 Series) • Schneider/Square D (Altivar Series 12) • Yaskawa J1000 • Siemens G110	• Open IP20
DC1		• General-purpose microdrive • Machinery OEM drive	The DC1 VFD is a compact VFD with only 14 basic parameters, SmartWire-DT™ connectivity and outstanding ease of mounting and installation. The DC1 is perfect for quick commissioning and is ideal for panel builders. This drive supports single-phase motor applications, and an IP66 offering provides unique mounting with integrated disconnect and cover controls.	**Single-phase to single-phase** 115 V to 0.75 hp 230 V to 1.5 hp **Single-phase to three-phase** 115 V to 1.5 hp 230 V to 5 hp	**Three-phase to three-phase** 230 V to 5 hp 480 V to 15 hp	**Ease of use**: Only 14 standard parameters for startup—quick commissioning, parameter copy function from drive to drive and PC connectivity via COM-STICK, integrated info card **Space-saving design**: DIN rail mountable, side-by-side mounting, contactor style wiring **Efficiency**: Temperature controlled fan **Rugged and reliable**: Ambient temperature –10 °C to +50 °C without any derating, high protection degree classes: IP66 for decentralized applications	UL c UL CE RoHS COMPLIANT	• Modbus RTU • CANopen® • SmartWire™	• ABB (ACS 55, 150) • Danfoss (Micro Drive, VLT 2800) • Hitachi (WJ200) • Yaskawa (J1000, V1000) • Lenze (SMD, 8400 BaseLine/StateLine) • Siemens (Micromaster 420, G110, Sinamics G120C) • WEG (CFW-10, CFW-08, CFW-09)	• Open IP20, IP66
DA1		• High-performance microdrive • Machinery OEM drive	The DA1 VFD is the perfect match for demanding OEM applications. High-performance processor, safe torque off, multiple fieldbus protocols including SmartWire-DT, sensorless vector control and the possibility to operate permanent magnet motors are sure to leave a lasting impression. The DA1 includes an IP66 offering as well.	**Single-phase to three-phase** 230 V to 3 hp	**Three-phase to three-phase** 230 V to 7.5 hp 480 V to 15 hp 600 V to 20 hp	**Ease of use**: Only 14 standard parameters for startup—quick commissioning, parameter copy function from drive to drive and PC connectivity via COM-STICK, integrated info card **Space-saving design**: DIN rail mountable, side-by-side mounting, contactor style wiring **Efficiency**: Temperature controlled fan **Rugged and reliable**: Ambient temperature –10 °C to +50 °C without any derating, high protection degree classes: IP66 for decentralized applications, Safe Torque Off, standard brake chopper circuit and RFI	UL c UL CE RoHS COMPLIANT	• DC1 Communications+ • BACnet/IP® • PROFIBUS DP • DeviceNet • EtherNet/IP • ProfiNet • EtherCAT	• ABB (ACS 150, 355, 550) • Danfoss (Micro Drive, VLT 2800) • Yaskawa (J1000, V1000) • Schneider (ATV 312, 32) • Siemens (Micromaster 420, G110, Sinamics G120C) • Rockwell/Allen-Bradley (PowerFlex Series 4, 40, 525)	• Open IP20, IP66
H-Max		• HVAC drive	The H-Max™ VFD is specifically designed to meet the needs of the HVAC industry by offering leading HVAC software and hardware features. With an industry-leading energy efficiency algorithm, high short-circuit current rating and robust design, H-Max offers customers increased efficiency, safety and reliability in both an open and enclosed product.	—	**Three-phase to three-phase** 230 V to 125 hp 480 V to 250 hp	**Ease of use**: Startup Wizard, graphic display and keypad, menu-based navigation, copy/paste tool, local/remote button, programmable multi-function I/O, built-in communication protocols (BACnet, Modbus®, N2) **Space-saving design**: Narrow enclosure, built-in electronic bypass, open NEMA 12 option **Efficiency**: "Active Energy Control," offering 2–10% energy savings over competition **Rugged and reliable**: 5% DC choke with MOV protection, conformal coated circuit boards, EMC filters	UL c UL CE OSHPD	• Modbus RTU/TCP • BACnet MS/IP • LonWorks®	• ABB (ACH550) • Danfoss (FC-102) • Yaskawa (V1000) • Siemens (BT300) • Vacon (100 HVAC)	• Open IP21, IP54 • Open NEMA 1, 12 • Enclosed NEMA 1, 12, 3R • IntelliDisconnect (breaker included) • IntelliPass (bypass included)
DG1		• General-purpose drive	The DG1 general-purpose drives are part of the Eaton next-generation PowerXL™ series of variable frequency drives specifically engineered for today's more demanding commercial and industrial applications. With an industry-leading energy-efficiency algorithm, high short-circuit current rating and robust design, the DG1 offers customers increased efficiency, safety and reliability in both an open and enclosed product.	**Single-phase to three-phase** 230 V to 40 hp 480 V to 60 hp	**Three-phase to three-phase** 230 V to 125 hp 480 V to 250 hp 575 V to 250 hp	**Ease of use**: Startup Wizard, four built-in applications, real time clock, on-board communications, modular design, full text display, keypad copy/paste functionality **Space-saving design**: Compact design, open NEMA 12 option, on-board I/O expansion provisions **Efficiency**: Built-in 5% DC Link Choke with input surge protection and EMC Category C2 standard **Rugged and reliable**: High overload (CT) and low overload (VT) rated, robust time-proven design, durable metal power section, brake chopper circuit, temperature deratings up to 60 °C	UL c UL CE IEC RoHS COMPLIANT	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • BACnet MS/TP	• ABB (ACS310, ACS550) • GE (AF-650) • Rockwell/Allen-Bradley (PowerFlex 70, 753) • Schneider/Square D (Altivar 61, 71) • Siemens (Sinamics G120) • Vacon (NXS) • Yaskawa (P1000, A1000)	• Open IP21, IP54 • Open NEMA 1, 12 • Enclosed NEMA 1, 12, 3R, 7 • Consult Eaton for NEMA 4X
SVX/SPX		• General-purpose drive • High-performance drive	The SVX VFD is a general-purpose, compact, modular solution for variable speed applications and offers a variety of features and application capabilities. If high performance is critical to a customer's application, the SPX VFD is the ideal choice. They are equipped with high processing power, capable of closed loop feedback, safe torque off, permanent magnet motor operation and very precise motor control.	**Single-phase to three-phase** 230 V to 40 hp 480 V to 60 hp	**Three-phase to three-phase** 230 V to 125 hp 480 V to 2200 hp 575 V to 2300 hp	**Ease of use**: Startup Wizard, seven built-in applications, customizable software, advanced capabilities and inputs, local/remote button, modular design, text display **Space-saving design**: Compact design, open NEMA 12 option, on-board I/O expansion provisions **Efficiency**: Built-in 3% line reactor and EMI RFI filter H standard, increased microprocessing power **Rugged and reliable**: High overload (CT) and low overload (VT) rated, robust time-proven design, durable metal power section, brake chopper circuit	UL c UL CE IEC	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• ABB (ACS880) • Rockwell/Allen-Bradley (PowerFlex 700, 755) • Schneider/Square D (Altivar 71) • Siemens (Sinamics G130, G180, S120) • Vacon (NXS) • Yaskawa (A1000)	• Open IP20, IP21, IP54 • Open NEMA 1, 12 • Enclosed NEMA 1, 12, 3R • AGSVX (agriculture config) • Consult Eaton for NEMA 4X
LCX		• Liquid cooled drive	The LCX VFD is well suited for locations when air-cooling would be difficult or expensive or when space is at a premium. These extremely compact drives are suitable for ships, mines and heavy industry.	—	**Three-phase to three-phase** 480 V to 3200 hp 575 V to 2800 hp	**Ease of use**: Startup Wizard, customizable software, advanced capabilities and inputs, local/remote button, modular design, text display **Space-saving design**: Compact space-saving design especially beneficial for NEMA 4X applications **Efficiency**: Advanced low heat transfer cooling system, increased microprocessing power **Rugged and reliable**: Same reliable control module and operating system as SPX	UL c UL CE IEC	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• ABB (ACS800-07LC) • Rockwell/Allen-Bradley (PowerFlex 700L) • Schneider/Square D (Altivar 61Q) • Siemens (Sinamics G150) • Vacon (NXL)	• Open IP00
SPI/SPA		• Common DC bus drive • Active front end drive • Regenerative drive	Eaton offers a comprehensive range of common DC bus VFD products. This includes a number of front-end units and inverter units in the entire power range. Common DC bus drives are used in a multitude of applications and combinations. Drives that are braking can transfer the energy directly to the drives in a motoring mode.	—	**Three-phase to three-phase** 480 V to 2400 hp 575 V to 2200 hp	**Ease of use**: Startup Wizard, customizable software, advanced capabilities and inputs, local/remote button, modular design, text display **Space-saving design**: Compact modular expandable design **Efficiency**: Bidirectional/regenerative energy savings capabilities **Rugged and reliable**: Same reliable control module and operating system as SPX, shared components for inverter and active front end for reduced spare	UL c UL CE IEC	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• ABB (ACS880-14) • Emerson (Unidrive SP) • Rockwell/Allen-Bradley (PowerFlex 20, 700AFE) • Schneider/Square D (Altivar ATV32, LXM32) • Siemens (Sinamics S120) • Vacon (NXP) • Yaskawa (F7)	• Open IP00, IP21 • Open NEMA 1
CPX		• 18-pulse drive	The CPX VFD uses advanced 18-pulse clean power technology that significantly reduces line harmonics at the drive input terminals and is designed to exceed IEEE 519-1992 requirements. Delivering true power factor and reducing harmonic distortion prevents upstream transformer overheating and overloading of breakers and feeders, enabling the application of variable frequency drives on generators and other high-impedance power systems.	—	**Three-phase to three-phase** 230 V to 200 hp 480 V to 800 hp 575 V to 800 hp (Consult Eaton for larger hp)	**Ease of use**: Uses the core SVX/SPX drive platform; therefore, sharing many of the drive-related characteristics of the component drive including Startup Wizard and built-in applications **Space-saving design**: Designed and engineered to optimize space, including flange mounting the drive with the heat sink external to the enclosure. Smallest footprint in the industry **Efficiency**: Designed and tested to provide maximum efficiency through best-in-class components **Rugged and reliable**: Proven design built on 10+ years of experience in 18-pulse engineering	UL	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• ABB • Rockwell/Allen-Bradley • Schneider/Square D • Yaskawa	• Enclosed NEMA 1, 12, 3R • Consult Eaton for NEMA 4X
EGF/CFX		• Passive filtered drive	The EGF and CFX drives use a tuned passive filter to significantly reduce the line harmonics generated by a standard 6-pulse drive. Designed for small to mid-sized drive applications, the EGF and CFX, in conjunction with the CPX, offers the user a tiered approach to harmonic mitigation.	—	**Three-phase to three-phase** 230 V to 100 hp 480 V to 400 hp 575 V to 400 hp	**Ease of use**: Uses the core DG1 and SVX drive platforms, Startup Wizard, built-in applications **Space-saving design**: Designed and engineered to optimize space including flange mounting the drive with the heat sink external to the enclosure. Smallest footprint in the industry **Efficiency**: Designed and tested to provide maximum efficiency through best-in-class components **Rugged and reliable**: Tested and proven solution built to meeting commercial and industrial applications. Engineered solutions to further protect filter and drive available	UL	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• ABB • Rockwell/Allen-Bradley • Schneider/Square D • Yaskawa	• Enclosed NEMA 1, 12, 3R • Consult Eaton for NEMA 4X
RGX		• Active front end drive • Regenerative drive	The Eaton RGX is specifically designed to meet regenerative and/or low harmonic needs through the use of an active, bidirectional power converter on the front end of a common DC bus drive. The RGX provides dynamic performance for great motor handling, eliminating the need for an external resistor or mechanical braking, thus simplifying system design. It also delivers superior reliability, reducing total current distortion to 2–3%. The active front end design offers great energy savings and design compatibility for a wide range of applications.	—	**Three-phase to three-phase** 480 V to 800 hp 575 V to 650 hp	**Ease of use**: Uses the core SPA/SPI drive platform; therefore, sharing many of the drive-related characteristics of the component drive including Startup Wizard and built-in applications **Space-saving design**: The RGX is an all-in-one package that includes circuit protection, LCL filtering, and AFE drive in a single enclosure **Efficiency**: Exceptional energy savings is achieved through the use of regenerative braking **Rugged and reliable**: Same reliable control module and operating system as SPX, shared components for inverter and active front end for reduced spare parts	UL	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• ABB • Rockwell/Allen-Bradley • Yaskawa	• Enclosed NEMA 1
SC 9000		• Medium-voltage drive	The Ampgard® SC 9000™ medium-voltage VFD combines innovative technology with the reliable design and construction of Eaton Ampgard products. Designed for use with induction or synchronous motors, the Ampgard SC 9000 delivers maximum benefits while being the smallest medium-voltage drive in the industry.	—	**Three-phase to three-phase** 2400 to 4160 V Up to 6000 hp	**Ease of use**: Drive can be integrated into Ampgard motor control products lineup connected by common bus, common control board and keypad with low voltage product offering **Space-saving design**: Smallest footprint in the industry, common bus connection to other motor control products for ease of installation **Efficiency**: Integrated 24-pulse converter, three-level inverter topology **Rugged and reliable**: Full load burn-in testing completed on every drive, time-proven Ampgard motor control assembly design, encapsulated drawout inverted to reduce risk of environmental contamination	UL	• EtherNet/IP • Modbus RTU/TCP • PROFIBUS DP • DeviceNet • CANopen • LonWorks	• Siemens (ROBICON Perfect Harmony™) • Rockwell/Allen-Bradley (PowerFlex 7000) • Toshiba (T300MVi) • ABB (ACS 1000)	• Enclosed NEMA 1

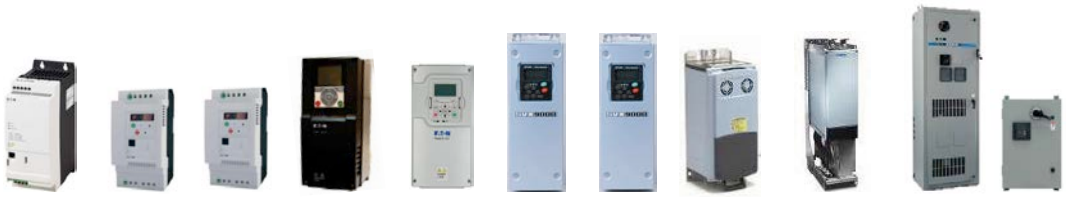
A drive for any application

Your application might call for an ultra-compact solution, clean power or future configurability.

Whether it is a standard product from the catalog or a custom-enclosed variable frequency drive (VFD) solution, Eaton delivers. Eaton drives are designed for industrial, HVAC, water/wastewater treatment, machinery OEM and other application demands.

Whether designing a new industrial complex, renovating an existing structure or developing a new machine, Eaton has the right product for your application.

Product selection matrix



Application	DE1	DC1	DA1	H-Max	DG1	SVX	SPX	LCX	SPI/SPA	CPX	CFX
Single-phase input	Yes	Yes	Yes	—	Yes	Yes	Yes	—	—	—	—
Maximum 230 V hp	3	5	7.5	125	125	125	125	—	—	200	100
Maximum 480 V hp	10	15	15	250	250	250	2200	3200	2400	800	400
Maximum 575 V hp	—	—	20	—	250	200	2300	2800	2200	800	400
OEM drives	●	●	●		●						
HVAC drives		●		●■							
General purpose					●■	●■					
High performance			●				●■	●▲	●▲	■	■
Harmonic mitigating										■	■

● = Open drive standard

■ = Enclosed drive standard

▲ = Enclosed—consult Enclosed Drives Plant (Watertown, WI)

Selection considerations

- *What is your system application?*
- *Is your load constant torque or variable torque?*
- *What are your voltage and hp requirements?*
- *What is the motor Full Load Amps (FLA)?*
- *Do you need an open or enclosed product?*
- *What NEMA enclosure rating do you need?*
- *Do you need a main breaker or a bypass?*
- *Do you need any accessories or communication cards?*

EatonCare Technical Resource Center (TRC)—low-voltage variable frequency drives support

24/7 phone support

- 1-877-386-2273 option 2, option 6
  - Option 1: Pre-sale application support, new or aftermarket part number identification
  - Option 2: Network and communication questions
  - Option 3: Startup or programming questions
  - Option 4: Troubleshooting assistance
- Email
  - Technical support: TRCDrivesTechSupport@Eaton.com
  - Pre-sale support: PresaleVFD@Eaton.com
  - Aftermarket: VFDAftermarketEG@Eatoncom

Startup and service

Startup and service support can be provided by Eaton's Electrical Engineering Services & Systems (EESS) or an Eaton certified independent service provider (ISP).

www.eaton.com/vfdaftermarket

- To contact EESS: Use the Locate an Eaton Engineering Office tool on the right-hand side of the screen
- To contact an ISP: Select the ISP nearest you using the list of independent service providers found on the Documentation tab, under Service and Startup

Online resources

Resource	Website
Eaton drives	Eaton.com/Drives
Eaton engineer services	Eaton.com/EESS
Eaton systems integrators	Eaton.com/SI
Eaton CAD drawings	Eaton.com/Drawings
Eaton software downloads	Eaton.com/Software
Eaton Europe	Eaton.eu/Electrical
Eaton Asia	Eaton.com.cn

PC software

Software
9000XDrive and 9000XLoad—Used with SVX, SPX, LCX, SPI, SPA and all enclosed drives using these units
MaxConnect and MaxLoader—Used with H-Max
DrivesConnect—Used with DE1, DC1 and DA1
Power Xpert *in*Control—Used with PowerXL DG1

Notes:

Download at Eaton.com/software → Adjustable Frequency Drives.

Download at Eaton.com/drives → Software Downloads.

Online training

Eaton 101 Series—low-voltage motor control
http://www.eaton.com/Eaton/ProductsServices/Electrical/Support/Training/101BasicsSeries/index.html
H-Max VFD demo simulator—online H-Max demo simulation
Online H-Max training simulator that reviews the keypad, display, menu navigation, basic parameter changes and the operation of the demo cases (www.eaton.com/h-max)
PowerXL DG1 VFD demo simulator—online DG1 demo simulation
Online PowerXL DG1 training simulator that reviews the keypad, display, menu navigation, basic parameter changes and the operation of the demo cases (www.eaton.com/DG1)

Classroom training

Certification and service training
Commissioner certification training (SVX, SPX, H-Max, CPX, CFX)
Service provider training (SVX, SPX, CPX, CFX, HVX)

Note:

Eaton.com/drives → Aftermarket → Training and Tools.

Calculators

Harmonics estimator—estimate total harmonic distortion (THD) of system
By having the transformer information and the one-line diagrams, a harmonics analysis can be quickly put together to ensure that the system will meet requirements set by IEEE 519. Drive configurations can quickly be changed, allowing engineers to provide the most cost-effective solution (www.eaton.com/drives → Software Downloads → Register for Harmonics Calculator)
Energy savings estimator—estimate ROI for system
The program creates an energy savings estimation report that details yearly energy savings, reduction in CO_2 emissions and estimated payback time by analyzing system configuration, total installation costs and duty cycle (www.eaton.com/drives → Software Downloads → Register for Energy Savings Estimator)

Continue to learn more about Eaton drives, enclosed VFD offering and services.

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