

Everything on board

PowerXL DG1 variable frequency drives



Powering Business Worldwide

Eaton – your partner for drive technology

Whether it's starting the motor of a basic machine or implementing speed control for a complex application – Eaton has the right drive technology in store for you. The comprehensive PowerXL™ product portfolio has been designed for energy-efficient operation across a broad range of applications.



DB1 Cold Plate drives

The PowerXL DB1 brings together all the features of the established DC1 series while conforming to the smallest IEC-compatible size. Thanks to the cold plate technology, this powerful device is the ideal solution for customers who want to integrate variable frequency drives into existing systems that lack the space for heat sinks or proper ventilation.



DE1/11 variable speed starters

The frequency-controlled DE1/11 variable speed starters combine easy handling with maximum reliability. With variable motor speed in both DOL and reversing start mode, the DE1/11 devices close the gap between conventional motor starters and variable frequency drives.



DC1 variable frequency drives

With their compact design and IP20 and IP66 degrees of protection, the DC1 drives are tailor-made for simple applications involving pumps, fans, or material handling systems. With their quick and easy commissioning, they generate significant cost savings, even in high-efficiency (IE3/IE4) motors.



DA1 variable frequency drives

Even in demanding applications, the DA1 drives stand out for their high starting torque in the powerful vector mode, and for their safe operating states with STO functionality. Thanks to the comprehensive communication protocols and the option of implementing customer-specific modifications via the integrated function block editor, the DA1 drives provide maximum versatility for the machine building industry.



DG1 variable frequency drives

The DG1 series is the next generation of the PowerXL family. The DG1 features a patented energy-saving algorithm, high short-circuit ratings and a sturdy design, which together ensure maximum efficiency, safety, and reliability. The DG1 series is particularly suitable for demanding applications, thanks to its versatility regarding control, communications and installation inside the control panel itself.



9000X variable frequency drives

The 9000X variable frequency drives are the perfect fit for more sophisticated applications. They consist of two separate series: the standard SVX drives are suitable for both simple and complex motor control tasks in industrial machine applications, while the multi-purpose SPX drives are ideal in more demanding environments where greater power and performance are required.

Application	PowerXL					9000X			
	DB1	DE1	DC1	DA1	DG1	SVX	SPX	LCX	SPI/SPA
Single-phase supply	✓	✓	✓	✓	✓	–	–	–	–
Single-phase AC motors	–	–	115/230 V	–	–	–	–	–	–
Performance range: 230 V [kW]	1.5	2.2	11	75	90	90	90	–	–
400 V [kW]	4	7.5	22	250	630	160	1,100	2,150	1,500
575 V [kW]	–	–	–	90	630	132	1,800	2,300	1,800
690 V [kW]	–	–	–	–	–	200	2,000	2,800	2,000
OEM drive	•	•	•	•	•				
Cold Plate	•								
HVAC			•		•				
Universal drive					•	•			
High-performance drive				•			•	•	•
Water cooling								•	
Regenerative									•

The future, now

The challenges faced by the machine building industry are becoming more complex every day. For many companies, maintaining their competitive edge is increasingly a question of anticipating the needs of their customers and equipping their machines and systems with future-proof technology. This is where Eaton comes in. With its global experience and unmatched know-how, Eaton is ideally positioned to provide its customers with products and services that are perfectly matched to their needs regardless of whether they are looking for powerful individual components, efficient all-in-one systems, or comprehensive service offerings.

A focus on drive technology

With its Moeller series of products, Eaton has for many years been a trusted partner of the machine building industry. Products such as the PKZ, DIL and RMO-Titan series prove the point. Another one of Eaton's core areas of strength is drive technology, and we are constantly expanding our portfolio with innovative, new products. When it comes to developing these products, our main aim is always to help you increase the efficiency of your systems and processes.

SmartWire-DT for drive products

Our intelligent SmartWire-DT connection and communication system has been a success across a wide range of industries and applications, given its capacity to identify and optimize work processes in machine and panel building. From motor starters through soft starters all the way to variable frequency drives we offer a comprehensive portfolio of SmartWire-DT-compatible devices that continues to grow every day.



Eaton manufactures products for the machine building industry worldwide.



Thanks to our presence in more than 150 countries, we are able to support our customers around the world: www.eaton.eu/electrical/customersupport



CAD data for our products is available at www.eaton.eu/cad

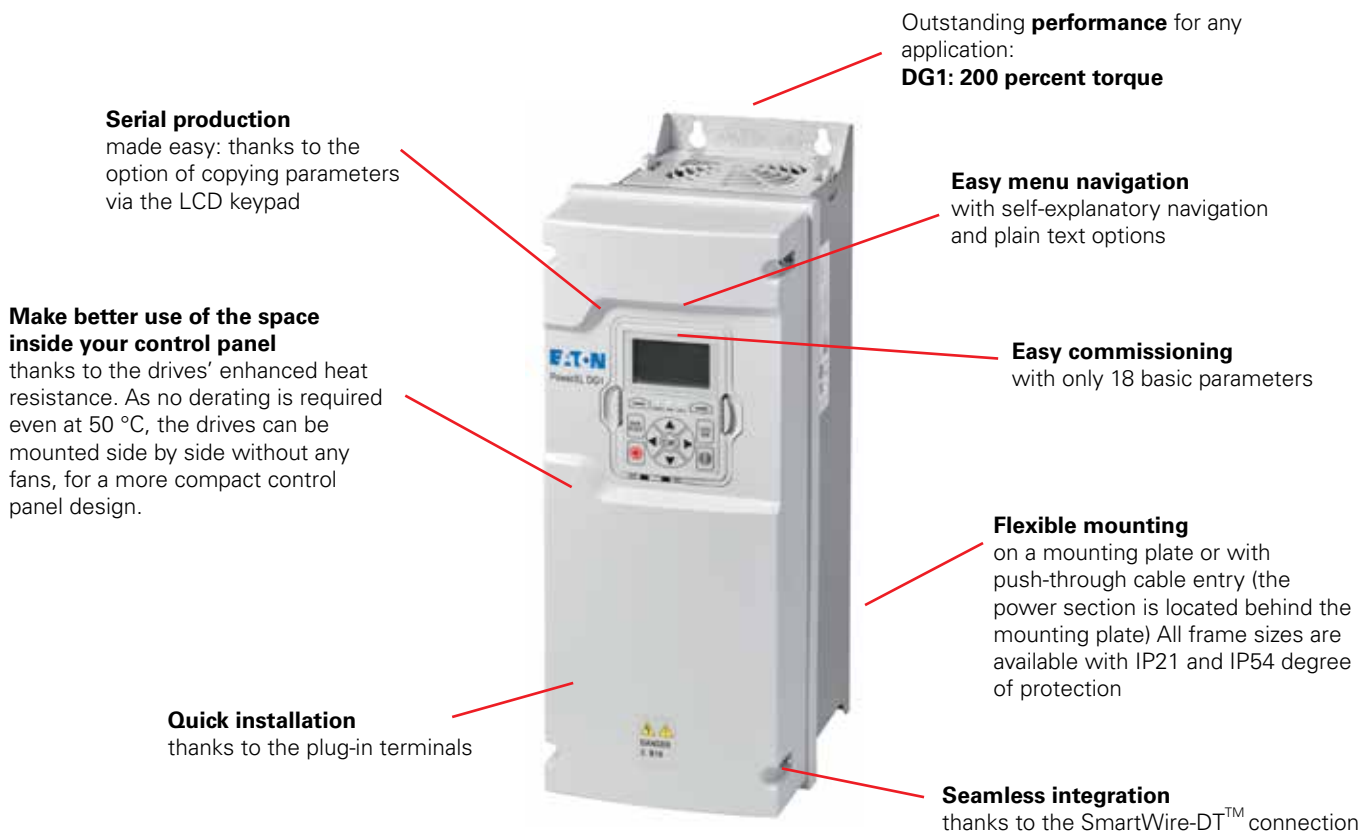


Are you interested? Then request our new drives catalog today, by sending an email to: Antriebstechnik@eaton.com



PowerXL – sturdy on the outside, efficient on the inside

The latest addition to the PowerXL family is the DG1 series of general purpose drives, which are characterized by their sturdy design and ease of use. Specially designed for use in pumps, fans and belt conveyors, and in machine building applications more generally, the DG1 drives complete Eaton's product offering in this area. As a result, our customers can always count on us to provide the right product, for both simple and complex applications for serial production in machine building and beyond.



Internal DC link choke (frame size 1 and up)

Top performance in a compact design

The DC link chokes offer significant advantages over conventional mains chokes. Not only do they significantly reduce voltage losses, they also offer improved suppression of mains harmonics especially as regards the third, fifth and seventh harmonics.

And thanks to their compact size, the DC link chokes are also smaller than conventional mains chokes and can thus be integrated directly inside the drives.

Unrivalled THDi numbers in unfiltered solutions

The DG1 drives with internal DC link choke offer unmatched performance across the harmonic spectrum. More specifically, they are able to keep the peak THDi down to 30 percent a rate that can only be exceeded by means of active front-end solutions, which are significantly more expensive, and the use of special external filters. In addition, this low THDi value will also result in a significantly longer service life for both the drive and your motor.



Flange mounting kit for separating the power section and the control section, to reduce the power losses inside the cabinet.

Superior technology

The drive technology used in pumps, fans, conveyor belts or compressors is of crucial importance, both for the machine building sector and for the material handling and building services industries. In this regard, ease of use and energy efficiency are important considerations. That is why we have developed the PowerXL DG1 drives specifically for this type of application, while also equipping them with a sturdy design, high availability and versatile functionality.

Sturdy design

The drives offer enhanced heat resistance and are able to deliver full performance at ambient temperatures of up to 50 °C (IP21 and IP54). Moreover, their 100 kA short-circuit-proof output is best in class on the market, while the especially durable fans and the flexibly adjustable fan controller contribute to increased reliability. The sturdy design of the drives is also evident in their degree of protection: The DG1 models with an output range of up to 160 kW are available with IP20 degree of protection, alongside IP21 and IP54. The devices with a performance range between 200 kW and 630 kW are available with IP00 degree of protection, and are therefore suitable for installation in control cabinets, for example.

A technology that makes your work easier

Thanks to the self-explanatory type codes, auto-tune functions and the convenient parameter configuration (with only 18 basic parameters), commissioning the PowerXL drives is quick and easy, which keeps the costs associated with planning, installation and technical support to a minimum. The drives can be programmed via the keypad and the multi-language LCD display, or via a PC. In addition, the operating panel can also be used to quickly copy the parameter configurations to other devices.

Push-through mounting Effectively prevents heat loss inside the control panel

The push-through mounting frame makes it possible to place the power section behind the mounting plate. Mounting frames are available for all frame sizes and degrees of protection. In addition, the push-through technology (IP54) makes it possible to conduct the heat loss away from the drives by means of a separate cooling air duct, or out of the control cabinet, as required. This not only saves space, but also eliminates the costs associated with any separate cooling equipment.

Sturdy in hostile environments: IP54 degree of protection, enhanced PCB protection

The DG1 drives offer enhanced PCB protection, enabling them to withstand high humidity as well as corrosive ambient air. And thanks to their high degree of protection (IP54) they can be used even in places where no control panels are available.

Parameter configuration made simple

The drive parameters can be quickly and easily configured using the integrated LCD display. In fact, only 18 basic parameters have to be configured, including the motor's rated specifications, such as the voltage, current, and frequency, as well as the basic application settings, and the drive is ready to go. In addition, the language of the user interface can also be adjusted, thereby eliminating the need for time-consuming searches in the manual. Once the parameters have been set, the application is up and running right away.



The DG1 drives have an integrated STO function to ensure safe shutdown in case of emergencies. To ensure easy identification of the STO terminals, they are color-coded in yellow (in line with the applicable safety standards) and are arranged separately from the normal control terminals.



The removable control terminals make it easier to install and replace the drives.



Up to 63 drives can be accessed via the integrated Modbus connection. By means of HMI and TCP interfaces, an almost unlimited number of devices can be connected. EtherNet/IP and Modbus TCP are available as standard.

DG1 – a multi-purpose drive for demanding applications

The DG1 drives are the perfect match for demanding, speed- and torque-dependent applications. They stand out for their high performance range (up to 630 kW), compact dimensions and high level of functionality. To help you adapt the drives to your application, they have been equipped with a dual rating: 150 percent overload for machine applications, and 110 percent for pumps and fans. If an application only requires an overload of 110 percent, a DG1 originally sized for an overcurrent of 150 percent can also be used to drive a motor with the next higher rating.



The coating on the PCBs offers effective protection against dust, so that the devices can also be used to drive cement vibrating screens, for example.

The cold-weather function ensures safe operation in cold environments, for example in stone crusher applications.

The sturdy design of the DG1 drive also allows it to be used underground.



Prepared for all eventualities

Users can choose between four standard applications with tailor-made configurations. This makes it possible to optimally configure the drive in line with the requirements at hand; parameters and functions that are not required can simply be hidden.

Ready straight out of the box

The initial commissioning process will start automatically the moment the drive is switched on for the first time. During this process, you will be asked for basic information about the application, such as the ramp times, motor specifications, the application type, the menu language, and the local time. The queried data are the same as for any other PowerXL variable frequency drive.

Extensive features

The DG1 series is suitable for virtually any application; it supports the Modbus RTU, Modbus TCP, EtherNet/IP and BACnet MS/TP protocols as standard and features an integrated EMC filter (C2 for public mains), a braking transistor, and a high output range up to 630 kW.

The following standard applications are already pre-programmed:

- standard
- multi-pump
- multi-PID
- multi-purpose

The drives can be operated either with sensorless vector control (SVC) or with V/f control. Depending on the drive type being used, both operating modes will support rated overload operation at 150 percent or 110 percent.

Real-time clock, timer and calendar functions

The DG1 drives feature an integrated real-time clock. This clock is backed by a battery and will add an accurate timestamp to any fault message. It can also perform time-controlled actions via additional timer and calendar functions without the need for a higher-level controller or manual intervention by a technician.

Powerful performance even at extreme overloads

The overload range is one of the unique strengths of the DG1 drives. With sensorless vector control (SLV), the torque can be briefly increased to up to 200 percent, which makes the DG1 the ideal choice for applications with extreme overload requirements.

Ready to connect thanks to the EMC filter

All DG1 drives feature an integrated category C2 EMC filter for public mains connection, in accordance with IEC/EN 61800-3. This eliminates the need for external components with additional wiring, thereby saving additional space inside the control panel.

No derating up to 50 °C

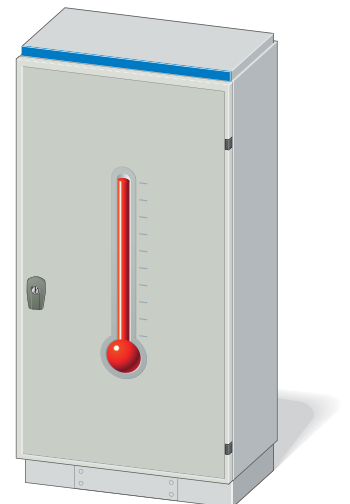
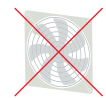
All DG1 drives with IP21 or IP54 degree of protection can be operated at ambient temperatures of up to 50 °C without derating (i.e. they can run at their full rated current). If the temperature is not expected to exceed this level, machine and system manufacturers can thus achieve significant cost savings: there is no need for additional ventilation systems, and the option of side-by-side mounting makes it possible to take full advantage of the space inside the control panel. This in turn facilitates further savings by reducing the overall size of the control panel.



Modules for all common fieldbus types are available.



The DG1 drives come with a high-resolution LCD display and multi-language menu navigation as standard



Power management

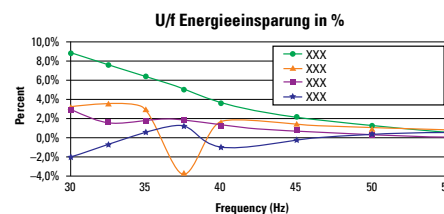


Energy saving functionality

The energy management feature minimizes energy losses by using a patented method for dynamic V/f curve adjustment to optimize efficiency. Compared to other out-of-the-box solutions, this makes it possible to realize cost savings of between 2 percent and 10 percent.

Energy cost calculator

The integrated energy cost calculator provides a direct comparison to conventional contactor control systems. Once the local utility company's energy prices are entered into the system, the calculator will immediately display the amount of money that has been saved by using the DG1 on a daily, weekly, monthly and annual basis. As a result, you will be able to keep your operating costs (OPEX) under control at all times.



PID controller

Integrated cascade control

Each DG1 drive has two versatile PID controllers with comprehensive configuration options, which can also be connected in a cascade control arrangement. The setpoints, process values and feedback can all be changed during operation, as required by the application, thereby enabling you to maximize productivity and product quality without the need for any additional external controllers.

Process variable indication

The process variable display allows data such as pressure, flow rate, production speed or any other process variable to be displayed directly, beyond mere percentage values and frequencies. This eliminates the complicated and error-prone process of converting technical variables such as frequencies into application-relevant values.

Automatic sleep mode

If a pump's pressure falls below a certain pre-defined threshold, it can automatically be switched to sleep mode. This ensures that the pump will not run without pumping any fluid, thereby reducing wear and lowering energy and other costs.

Fans and pumps

Multi-pump drives

Various modes are available for controlling and regulating multi-pump systems in water/wastewater applications. The DG1 drives use the integrated PID controllers to set up fill level or pressure controls, thereby eliminating the need for any external controllers. In this context, the DG1 drives can control one or more master drives or backup drives, as necessary, while the real-time clock makes it possible to use an alternating pump control scheme for all pumps. This versatility not only reduces the equipment costs, but also maximizes system availability and efficiency.

Cold weather mode

The DG1 drives are also suitable for use in extreme environmental conditions. In addition to their heat resistance up to 50 °C, they also come with a dedicated cold weather mode that allows them to operate at temperatures as low as -30 °C without any external heating systems. In short, the DG1 drives are the perfect choice for outdoor applications at extremely low temperatures.

Scheduled cleaning function

The integrated cleaning function has been specially developed for use in pump applications. It automatically removes dirt and any other particles from inside the pump, to prevent these from obstructing the pump's normal operation. The cleaning function can also be activated automatically at certain intervals via the integrated real-time clock, thereby reducing manual maintenance and increasing system availability.

Fire mode

For fire protection purposes in buildings or in sensitive environments such as tunnels, the DG1 drives can be operated in the so-called fire mode. When this mode is enabled, the internal protective functions that would normally cause the device to shut down will be disabled to ensure the continued operation of fire pumps and smoke ventilation systems. In addition, the fire mode comes with comprehensive configuration options, including fixed setpoints, switchable setpoint inputs, and fail-safe activation.

Manual/automatic operation

Operators can switch between manual and automatic modes by means of control commands or with the keypad, thus enabling them to intervene in the control system at any time.



Connections made easy

Includes control terminals for all analog and digital connections

The DG1 drives' basic features include a comprehensive range of analog and digital input/outputs, with the following as standard:

- 2 analog inputs
- 2 analog outputs
- 8 digital inputs
- 1 digital output
- 3 relays (2 of them changeover relays)
- Safe Torque Off

The Safe Torque Off (STO) function is the most essential integrated safety function of the DG1 drives. It ensures that the motor remains torque-free if necessary and also prevents accidental starting, which makes it possible to implement the EU Machinery Directive in a cost-effective manner.



Two slots for inputs/outputs and communications expansion. All options can be combined as required.

Expandable in line with your needs

Two expansion slots

Should the standard input/output options prove insufficient (as may be the case in multi-pump applications, for example), two expansion slots are available that can be used for virtually any task. This not only includes analog and digital inputs and outputs, but also various communication modules:

- 3 relays
- 3 DI, 3 DO, 1 thermistor
- 1 analog input, 2 analog outputs
- 3 PT100

- 6 digital inputs for 240 V
- Profibus
- CANopen
- DeviceNet

Thanks to the comprehensive range of available expansions, the configuration of the higher-level controllers can often be leaner and simpler than would otherwise be the case. This not only saves costs, but also makes every part of the system more manageable and easier to handle. The result? A PLC program that is leaner and less complex.



Communicate like never before

Comprehensive on-board interfaces and protocols

The constantly growing demands on the communications capacity of their products pose a great challenge for machine builders and system integrators today. This is why the DG1 series supports the Modbus RTU, Modbus TCP, EtherNet/IP and BACnet MS/TP protocols as standard. As a result, the drives can be networked straight away without the need for any additional hardware, which ensures their smooth

integration into existing communication networks.

Optional modules for adding PROFIBUS, DeviceNet (for the American market), WLAN or GSM capabilities are also available.

The optional SmartWire-DT module makes it possible to connect the drives to our intelligent wiring and communication system, even in IP54 environments.



Standard on-board support for numerous communication protocols

Motor and system protection

Flying start

The integrated motor pick-up control function enables the drive to “catch” a spinning motor that was activated by a load before the drive itself was up and running. This so-called flying start catches the motor at its current speed and then guides it to the setpoint, thereby also reducing downtime.

Skipping of frequencies

In order to avoid mechanical resonance during operation, it is possible to define up to three frequency bands in which continuous operation is not permitted. This protects the mechanics and also keeps maintenance to a minimum.

Motor identification run

Modern sensorless vector control requires a greater amount of information than that generally provided on the rating plate. This is why DG1 drives have been equipped with an identification run function that makes it possible to gather the missing information from the rating plate, conveniently and without damaging the system.

Electronic motor overload protection

The motor protection function thermally monitors the motors in order to protect it against overloads. By changing only one parameter, this protection can be extended from CLASS 5 to higher trip classes such as CLASS 40. As a result, no external motor protection relays are necessary.

In addition, it is also possible to limit the motor current and to initiate further actions including a shutdown, if necessary should any pre-defined thresholds be exceeded.

Stall protection

In the event of overload, the motor will stall, resulting in a dramatic drop in speed that may cause a complete standstill. The DG1 drives are designed to detect when an overload is imminent, and will initiate automatic countermeasures in order to keep the motor and the application at large safely under control.

Password protection

If one of the more than 700 adjustable parameters was changed by accident, it can be tedious to identify the culprit without the aid of a PC. To prevent this, the drive parameters can be protected against accidental and unauthorized access by means of a password. More specifically, operators will still be able to see the settings, but they will not be able to change them without the password, thereby maximizing the operational reliability of the drives.

Brake chopper

Should it become necessary to decelerate a higher inertia, or if the load supplies too much regenerative energy, the drive speed can be adjusted and returned to the setpoint by means of a braking chopper and an external braking resistor. The guidelines for certain applications require the motor to be stopped for specific, usually very brief periods, in which case a braking chopper is the ideal solution. Frame sizes 1 to 3 come with a braking chopper as standard, while it is optionally available for the larger frame sizes.

Flux brake

One alternative to brake choppers is the use of a flux brake. This brakes the motor electrically by means of its own magnetic field, so that the braking force will also be conducted through the motor.



Thanks to the built-in STO (Safe Torque Off) function, no mains contactor is necessary.



The fans can be easily replaced without any separate tools up to frame size 3.



Only a few parameters are required to set up the motor and the protective functions.



Six rubber seals ensure flexible installation and control with IP54 protection.

Operation made easy

Fixed frequencies

If operation at a specific speed is required, up to eight fixed frequencies can be set. These can then be selected via the drives' digital inputs. This will prevent any temperature-induced deviations that may otherwise occur when using a setpoint potentiometer.

Switchable ramp times

There are a number of processes that require more than one ramp time. One such example are belt conveyors in distribution centers, which need to be decelerated as quickly as possible ahead of the sorters in order to transfer the load smoothly to the next belt. To ensure the smoothest transition possible, the DG1

drives feature two switchable ramps that can be individually configured as S ramps. This is also important in elevator and escalator applications, for instance.

Multi-motor applications

Even load distribution

If an application is driven by multiple mechanically coupled motors, it is imperative for the load to be distributed evenly among them. To this end, the DG1 drives provide a torque setpoint, while the master drive supplies the actual torque value for the slaves. This is an important advantage, as it eliminates the need for any complex, external control systems.

Equal speed

If several motors are to run at the same speed (indirectly coupled motors), it is not enough to specify the same speed setpoint for all of them, as deviations will always occur due to the differences in speed and load. The DG1 drives offer a corrective function for counteracting both types of errors, thereby ensuring synchronous speed in a controlled and stable manner.

Great at monitoring

Everything under control

The DG1 drives have been equipped with 27 programmable values for monitoring your application. If one of the programmed thresholds is exceeded, the drives will respond accordingly, either by activating the corresponding function or by transmitting a signal to the higher-level PLC. This can be done either via the relay output or via communications signals, as required.

Ready for any type of fault

Custom responses can be programmed for virtually any fault detected by the DG1 drives. These responses include simple warnings, the instruction to ignore the fault, or the option of a complete shutdown in response to a specific error. In this way, specific characteristics of the application at hand or certain ambient conditions can also be taken into account individually.

Application-specific faults

The DG1 drives can be configured for up to three external faults. In order to make sure that these faults do not remain "faceless" and impossible to decipher, 12 different error message texts can currently be configured. The operator can thus determine instantly which type of error is present.

Fault log

Whenever a shutdown occurs, it is crucial to know when and why it happened. This is where the fault log comes in. The log not only provides all the relevant information; to speed up the diagnostics and to reduce downtime, the fault memory can also be read out remotely by the maintenance staff.

Automatic restart

The automatic restart function makes it possible to minimize downtime by eliminating the need for a complete shutdown every time a fault occurs. If this function is activated, the DG1 drive will attempt to reset the fault and will restart automatically at pre-defined intervals. Individual default options can be programmed for almost any type of fault, and these scenarios will determine how often the drive will attempt to restart. In many cases, it is thus possible to avoid a costly maintenance intervention.

Drives that speak your language

Multi-language capability as standard

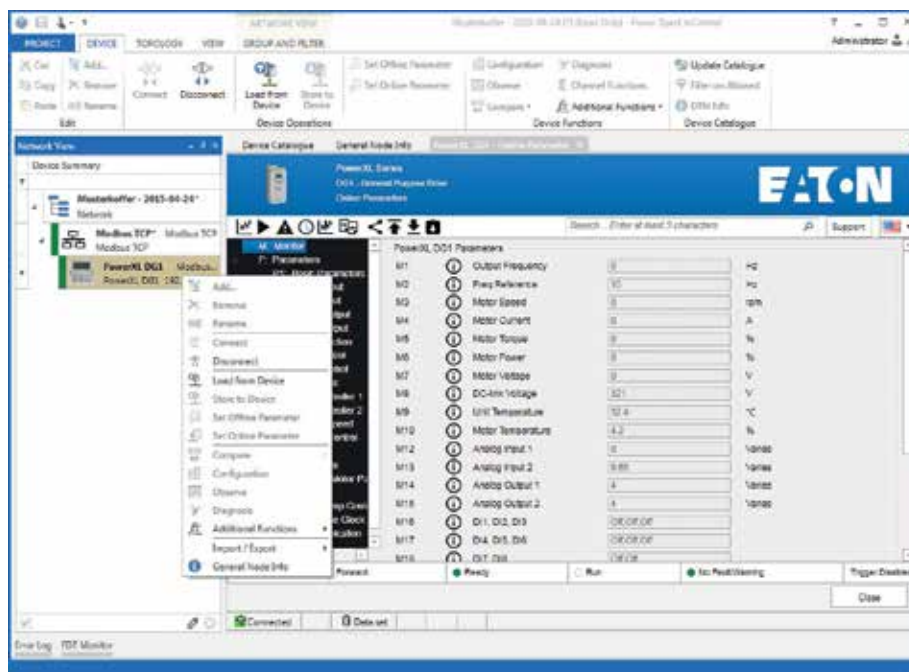
In addition to English as the base language, you can add two additional languages to each application. At the moment, 13 languages are available. For better comprehension, all parameters, settings and menus are displayed using plain text.

The following languages are available:

- English
- French
- Portuguese
- Polish
- Czech
- Ukrainian
- Chinese
- German
- Spanish
- Italian
- Romanian
- Russian
- Turkish

Power Xpert inControl – configuration made easy with Eaton’s dedicated platform

The Power Xpert inControl software is a powerful commissioning tool for the PowerXL family. In addition to its parameter configuration and diagnostic functionalities, it can be used to configure and view the DG1 drives’ integrated oscilloscope. This makes it possible to obtain plots for up to eight channels simultaneously using 10-ms intervals. Furthermore, the Power Xpert inControl platform not only serves the DG1 drives, but will also be used for all future communications-enabled devices from Eaton.



Serial or Ethernet connection

The DG1 drives can be connected to a computer either by means of a serial RS-485 connection or via Ethernet. Hardware ports for both options are available on the DG1 drives, while the Power Xpert inControl software provides the necessary drivers. In other words, the choice is up to you.

Configuration

Online and offline

The integrated configuration interface is both intuitive and easy to use. The drives can be configured online and offline by means of the editor. The online mode also makes it possible to use monitor values for diagnostic purposes.



Integrated oscilloscope

Faster analytics with 10-ms intervals

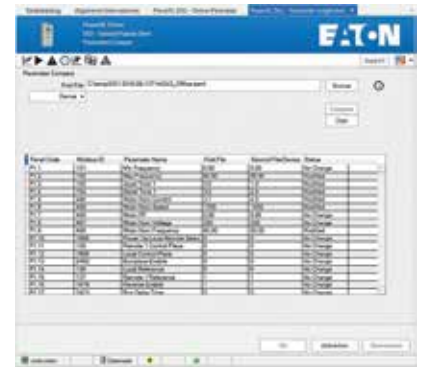
If used in conjunction with Power Xpert inControl, the DG1 drives can plot up to 8 signals at the same time. As serial computer connections are generally the norm, however, the data can only be retrieved for relatively large time intervals. To compensate for this, the DG1 drives also feature an integrated 8-channel oscilloscope. This also make it possible to analyze faster processes with recordings at increments of 10 ms. To this end, the Power Xpert inControl software offers comprehensive options for configuring the oscilloscope and selecting the trigger signals.



Comparing and documenting data sets

Online and offline

By means of the comparison function, the DG1 drives can quickly compare their parameters to a second data set. The data can then be easily entered into a spreadsheet program and filtered for the changed/diverging parameters regardless of whether the comparison data comes from another device in the system or from a stored or standard data set. This ensures that all changes are reliably documented without the need to go through them one parameter at a time.



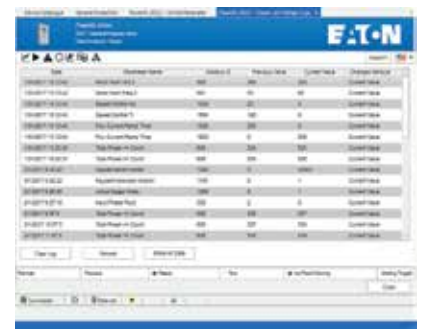
Parameter	Value 1	Value 2	Status
1-0001-01-01	100	100	OK
1-0001-01-02	100	100	OK
1-0001-01-03	100	100	OK
1-0001-01-04	100	100	OK
1-0001-01-05	100	100	OK
1-0001-01-06	100	100	OK
1-0001-01-07	100	100	OK
1-0001-01-08	100	100	OK
1-0001-01-09	100	100	OK
1-0001-01-10	100	100	OK
1-0001-01-11	100	100	OK
1-0001-01-12	100	100	OK
1-0001-01-13	100	100	OK
1-0001-01-14	100	100	OK
1-0001-01-15	100	100	OK
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1-0001-01-57	100	100	OK
1-0001-01-58	100	100	OK
1-0001-01-59	100	100	OK
1-0001-01-60	100	100	OK
1-0001-01-61	100	100	OK
1-0001-01-62	100	100	OK
1-0001-01-63	100	100	OK

A long memory

Track changes easily

Did you make any changes by mistake? Or do you need to figure out why your drive won't start all of a sudden?

This is where the long memory of the DG1 drives comes in handy: it stores the last 100 parameter changes, including the time stamps. The Power Xpert inControl software can read and display these changes, making it easy to undo any unwanted changes.



Time	Parameter Name	Old Value	New Value	Unit	Comment
2023-10-27 10:00:00	1-0001-01-01	100	100	Hz	Control Mode
2023-10-27 10:00:01	1-0001-01-02	100	100	Hz	Control Mode
2023-10-27 10:00:02	1-0001-01-03	100	100	Hz	Control Mode
2023-10-27 10:00:03	1-0001-01-04	100	100	Hz	Control Mode
2023-10-27 10:00:04	1-0001-01-05	100	100	Hz	Control Mode
2023-10-27 10:00:05	1-0001-01-06	100	100	Hz	Control Mode
2023-10-27 10:00:06	1-0001-01-07	100	100	Hz	Control Mode
2023-10-27 10:00:07	1-0001-01-08	100	100	Hz	Control Mode
2023-10-27 10:00:08	1-0001-01-09	100	100	Hz	Control Mode
2023-10-27 10:00:09	1-0001-01-10	100	100	Hz	Control Mode
2023-10-27 10:00:10	1-0001-01-11	100	100	Hz	Control Mode
2023-10-27 10:00:11	1-0001-01-12	100	100	Hz	Control Mode
2023-10-27 10:00:12	1-0001-01-13	100	100	Hz	Control Mode
2023-10-27 10:00:13	1-0001-01-14	100	100	Hz	Control Mode
2023-10-27 10:00:14	1-0001-01-15	100	100	Hz	Control Mode
2023-10-27 10:00:15	1-0001-01-16	100	100	Hz	Control Mode
2023-10-27 10:00:16	1-0001-01-17	100	100	Hz	Control Mode
2023-10-27 10:00:17	1-0001-01-18	100	100	Hz	Control Mode
2023-10-27 10:00:18	1-0001-01-19	100	100	Hz	Control Mode
2023-10-27 10:00:19	1-0001-01-20	100	100	Hz	Control Mode
2023-10-27 10:00:20	1-0001-01-21	100	100	Hz	Control Mode
2023-10-27 10:00:21	1-0001-01-22	100	100	Hz	Control Mode
2023-10-27 10:00:22	1-0001-01-23	100	100	Hz	Control Mode
2023-10-27 10:00:23	1-0001-01-24	100	100	Hz	Control Mode
2023-10-27 10:00:24	1-0001-01-25	100	100	Hz	Control Mode
2023-10-27 10:00:25	1-0001-01-26	100	100	Hz	Control Mode
2023-10-27 10:00:26	1-0001-01-27	100	100	Hz	Control Mode
2023-10-27 10:00:27	1-0001-01-28	100	100	Hz	Control Mode
2023-10-27 10:00:28	1-0001-01-29	100	100	Hz	Control Mode
2023-10-27 10:00:29	1-0001-01-30	100	100	Hz	Control Mode
2023-10-27 10:00:30	1-0001-01-31	100	100	Hz	Control Mode
2023-10-27 10:00:31	1-0001-01-32	100	100	Hz	Control Mode
2023-10-27 10:00:32	1-0001-01-33	100	100	Hz	Control Mode
2023-10-27 10:00:33	1-0001-01-34	100	100	Hz	Control Mode
2023-10-27 10:00:34	1-0001-01-35	100	100	Hz	Control Mode
2023-10-27 10:00:35	1-0001-01-36	100	100	Hz	Control Mode
2023-10-27 10:00:36	1-0001-01-37	100	100	Hz	Control Mode
2023-10-27 10:00:37	1-0001-01-38	100	100	Hz	Control Mode
2023-10-27 10:00:38	1-0001-01-39	100	100	Hz	Control Mode
2023-10-27 10:00:39	1-0001-01-40	100	100	Hz	Control Mode
2023-10-27 10:00:40	1-0001-01-41	100	100	Hz	Control Mode
2023-10-27 10:00:41	1-0001-01-42	100	100	Hz	Control Mode
2023-10-27 10:00:42	1-0001-01-43	100	100	Hz	Control Mode
2023-10-27 10:00:43	1-0001-01-44	100	100	Hz	Control Mode
2023-10-27 10:00:44	1-0001-01-45	100	100	Hz	Control Mode
2023-10-27 10:00:45	1-0001-01-46	100	100	Hz	Control Mode
2023-10-27 10:00:46	1-0001-01-47	100	100	Hz	Control Mode
2023-10-27 10:00:47	1-0001-01-48	100	100	Hz	Control Mode
2023-10-27 10:00:48	1-0001-01-49	100	100	Hz	Control Mode
2023-10-27 10:00:49	1-0001-01-50	100	100	Hz	Control Mode
2023-10-27 10:00:50	1-0001-01-51	100	100	Hz	Control Mode
2023-10-27 10:00:51	1-0001-01-52	100	100	Hz	Control Mode
2023-10-27 10:00:52	1-0001-01-53	100	100	Hz	Control Mode
2023-10-27 10:00:53	1-0001-01-54	100	100	Hz	Control Mode
2023-10-27 10:00:54	1-0001-01-55	100	100	Hz	Control Mode
2023-10-27 10:00:55	1-0001-01-56	100	100	Hz	Control Mode
2023-10-27 10:00:56	1-0001-01-57	100	100	Hz	Control Mode
2023-10-27 10:00:57	1-0001-01-58	100	100	Hz	Control Mode
2023-10-27 10:00:58	1-0001-01-59	100	100	Hz	Control Mode
2023-10-27 10:00:59	1-0001-01-60	100	100	Hz	Control Mode
2023-10-27 10:01:00	1-0001-01-61	100	100	Hz	Control Mode
2023-10-27 10:01:01	1-0001-01-62	100	100	Hz	Control Mode
2023-10-27 10:01:02	1-0001-01-63	100	100	Hz	Control Mode

PC connection

Cable (Modbus RTU):

If a wired USB connection is used, up to 63 drives can be connected to a PC via Modbus RTU. Their parameters can then be conveniently configured using the software tool.

Cable (Modbus TCP):

If a wired Ethernet connection is used, virtually any number of drives can be connected to a PC via Modbus RTU. Their parameters can then be conveniently configured using the software tool.

Wireless via WLAN:

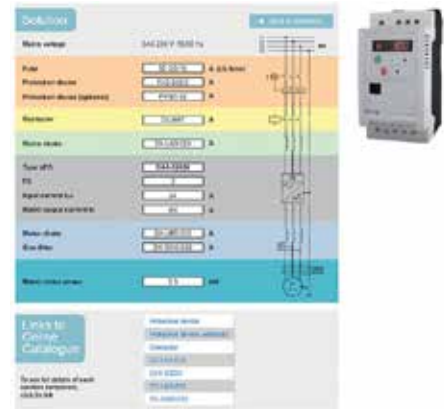
The optionally available EL-245U-E-G1-EU WLAN module can be used to integrate the DG1 drives into industrial wireless networks (the module itself is connected to the drive via Ethernet). Even with this type of connection, the Power Xpert inControl software will function as if it were directly connected to the corresponding DG1 drive, and the remote diagnostics will also work seamlessly.

Selection aid

Project planning made simple

The electronic selection aid makes project planning more efficient, allowing you to quickly select the right drive for your application, alongside the associated switchgear, protective elements, chokes and filters. In each case, the corresponding article number will also be displayed.

www.eaton.eu/selectiontools



Harmonics calculator

Effects on the power grid

The Harmonics Estimator can be used to calculate the effects of the system's harmonics on the power grid. The tool makes it possible to map the entire system, from the supply transformer all the way to the connected drives, in order to generate a comprehensive report.

<http://electricalsector.eaton.com/forms/HarmonicsCalculator>



Measure your energy savings

The Energy Savings Estimator can calculate the estimated energy requirements with the help of just a few pieces of information pertaining to the motor data, load profile and operating hours.

The following savings are displayed:

- the energy savings
- the CO₂ reduction
- the cost savings

In addition, the energy savings report offers a selection of various visualization options, including diagrams.

www.eaton.eu/EnergySavingsEstimator



Sample applications

The following pages contain examples of how the DG1 drives can be used to support selected applications. While this is only a small selection of the many possible applications, it provides a general overview of the versatility of the DG1 drives.

Featured applications:

- booster pumps
- chiller compressors
- fire pumps
- conveyor belts
- cement-vibrating screens
- screw conveyors (for biogas plants)
- underground mining applications
- pumpjacks
- fans



Reducing the costs of running booster pumps

Thanks to their dual rating, the DG1 drives can optimally adapt to booster pump applications: 150 percent overload for machine applications, and 110 percent for pumps and fans. If the application only requires an overload of 110 percent, a DG1 drive originally designed for a 150 percent overload can also be used to drive a motor with the next higher motor rating.

A highly reliable system

Automatic restart – this feature automatically brings critical pumps back online after a power failure in order to minimize downtime and any potential system faults.

Cleaning function – the real-time clock can be used to schedule automatic pump cleaning routines in order to prevent sediment build-up and clogging.

Water hammer reduction – the DG1 drives offer protection against unwanted water hammer and cavitation by means of pressure control and smooth ramp times.

Cold weather mode – this mode makes it possible to run a pumping station even if the temperature inside the control room is extremely low, and this without the need for any external heating.

Energy savings in pump applications

Active energy control – the energy-saving feature optimizes efficiency and reduces power losses by dynamically adjusting the V/f curve to maintain the required pump output.

Sleep mode – this mode will cause the pump to stop rotating if the pressure falls below a certain threshold and it no longer pumps any fluid. By automatically stopping the pump, the sleep mode reduces wear, energy consumption and the associated costs of both.

Single-phase supply – this mode makes it possible to use the DG1 drives to their full advantage even under single-phase conditions (requires derating).

Pump protection features

Password protection – once this feature has been activated, no changes can be made to the configuration without the password. This is an absolute must for all safety-related applications.

Skipping of frequency ranges – this feature reduces pump vibrations and noise by preventing operation at resonance-causing speeds.

Stall protection – this feature will stop the motor and the pump if the pressure rises sharply, for instance due to the closing of a downstream valve.

Improved troubleshooting – the error log records the last 8 errors, together with a time stamp in real time and the exact system conditions at the time of the fault. This simplifies the fault diagnostics and reduces maintenance and downtime.

Advanced pump control

Multi-pump control – this feature facilitates precise flow control over a wide control range by bringing additional pumps online as needed, and by alternating the pumps to ensure equal run times across the system.

Dual PID control loops – with the two integrated PID loops, you can control your pump system while eliminating the need for any external control systems.

Motor identification run – this feature automatically determines the parameters required for maximizing motor performance and efficiency in the framework of the current pump configuration.

Flying start – this feature makes it possible to start a spinning pump in either direction to reduce the mechanical stress on the impellers.

Management and communications

Display of the process variables in the PID controller – this feature simplifies handling by allowing operators to monitor the flow rates of a specific pump via the motor menu.

Communications – the best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network within a given facility.

Expandable inputs/outputs – the integrated inputs/outputs can be expanded by means of multiple expansion modules to facilitate the direct wiring of all pump control, monitoring and status signals inside the drive.

Energy Savings Estimator – this tool calculates the real-time energy costs and savings in comparison to a DOL starter.

Track changes – the internal log supports troubleshooting and maintenance work, thereby minimizing downtime and simplifying diagnostics if the parameters were changed accidentally.

Pumps & compressors



Cooling compressors

When driving cooling compressors, DG1 drives with 110 overload capacity should be used. Sensorless vector control (SVC) can be used as an alternative to V/f control, which, together with the energy-saving function, will yield optimum results for this type of application.

Advanced compressor control

Commissioning made easy with the startup wizard – the DG1 drives are operational after just a few data entries and can usually be used right away without any additional configuration, which saves both time and money.

PID controller – the internal PID controller makes it possible to maintain constant pressure in the system by continuously controlling the speed based on real-time data.

Display of the process variables in the PID controller – this feature simplifies handling by allowing operators to monitor the flow rates of a specific compressor via the motor menu.

Maximum performance and system efficiency

Energy saving function – the patented energy-saving feature optimizes efficiency and reduces power losses by dynamically adjusting the V/f curve. Conventional static approaches are inadequate for this type of application, as any load fluctuations would immediately have adverse effects on speed stability.

Smooth start – the control algorithms, in conjunction with the motor identification function, allow for perfectly smooth starts. This protects the mechanical components, effectively prevents inrush current peaks, and reduces consumption at peak load rates.

Variable speed – this feature allows for adjustments when demand is low, thereby lowering energy costs and improving the overall efficiency of the system.

Comprehensive inputs/outputs – 8DI, 1DO, 2AI, 2AO and 3RO are standard, each programmable with numerous functions. This ensures that the application can be controlled with maximum flexibility while reducing the costs associated with wiring and external controllers.

Reliable and easy to maintain

Resistant to dust and corrosive gases – the PCBs inside the DG1 drives feature a protective coating that makes them especially resistant to dust and corrosive gases. The dust generated during operation thus no longer has to be counteracted by means of expensive, protected enclosures.

Improved troubleshooting – the error log records the last 8 errors, together with a time stamp in real time and the exact system conditions at the time of the fault. This simplifies the fault diagnostics and reduces maintenance and downtime.

Modular design – the modular design makes it possible to quickly replace any components in the event of malfunctions, thereby minimizing downtime.

Management and communications

Communications – the best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network within a given facility.

Always safe – the STO inputs, which are color-coded in safety yellow, simplify the integration of the drives in line with the EU Machinery Directive.

In the event of unintentional blockages, for example if a coolant line is crushed or a distribution valve fails, the system must be switched off safely to prevent the coolant lines from bursting.



Individual configuration of fire pumps

Fire pumps come with special requirements. Ideally, these pumps should never have to be used, but in the event of an emergency, they must be able to operate beyond their load limit. Sturdiness, resilience and the prevention of undesired shutdowns are therefore the top priorities in this regard.

System control

Skipping of frequency ranges – this feature reduces vibrations and noise by preventing operation at resonance-causing speeds.

Password protection – once this feature has been activated, no changes can be made to the configuration without the password.

Track changes – the internal log supports troubleshooting and maintenance work, thereby minimizing downtime and simplifying diagnostics if the parameters were changed accidentally.

Flying start – this feature makes it possible to start a spinning pump in either direction to reduce the mechanical stress on the impellers.

Motor control center

Fire mode – the DG1 drives can be used to operate fire pumps and smoke ventilation systems in building infrastructure and tunnel applications. If this mode is enabled, faults will not result in a shutdown. In addition, a fixed operating direction can be specified. The DG1 drives will run as long as necessary, even beyond their normal load limits.

Fire mode test – in order to ensure that the system can be tested under safe conditions, the DG1 drives can be tested in fire mode, during which the controller will respond as it would during an emergency while all the protective functions remain enabled.

Highly reliable

Deliberately sturdy

All DG1 drives will perform at their full rating at ambient temperatures of up to 50 °C (IP21 and IP54), with an output that is short-circuit-proof up to 100 kA – this is what we call best-in-class.

Particularly durable fans and a flexibly adjustable fan controller contribute to increased reliability. The sturdy design of the drives is also evident in their degree of protection: The DG1 models with an output range of up to 160 kW are available with IP20 degree of protection, alongside IP21 and IP54. The models with a performance range between 200 kW and 630 kW are available with IP00 degree of protection.

The sturdy metal enclosures of the power sections and the drives at large are designed to continue working even when subjected to extreme loads. To identify and eliminate any potential weak spots, we conducted numerous tests that went far beyond the permissible environmental and operating conditions.

Management and communications

Expandable inputs/outputs – the integrated inputs/outputs can be expanded by means of multiple expansion modules to facilitate the direct wiring of all pump control, monitoring and status signals inside the drive.

Communications – the best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network within a given facility.

Material handling



Safe transport on conveyor belts

When it comes to ensuring that conveyor belts run optimally, sensorless vector control is the technology of choice, as it is able to maintain constant speeds even in the presence of load fluctuations. Since overloads may occur during operation, a design with 150 percent overload and a linear characteristic curve is ideal for this type of application.

Conveyor belt motor control

200 percent torque at start – this feature provides additional torque for starting fully loaded systems, as well as systems with an incline.

IP54 – this degree of protection allows for a distributed design that makes for a more modular and easily expandable system, as well as saving space inside the control panel.

Speed and torque control – this feature uses the parameters from the motor identification run to ensure precise control when starting and stopping different loads.

STO inputs – color-coded in safety yellow, these inputs simplify the integration of the drives in line with the EU Machinery Directive.

DC braking – this feature will bring large flywheels to a standstill even without any external braking resistors.

Skipping of frequency ranges – this feature reduces vibrations and noise by preventing operation of the conveyor belt at resonance-causing speeds.

Even load distribution – if more than one motor is being used to drive a conveyor belt, the master drive will operate in a speed-controlled manner, while the slave(s) will be run either by using a torque setpoint from the master, or by means of droop speed control.

System control

Joystick operation – the joystick allows for the manual moving of the conveyed material to a (starting) position.

Timer – the timer enables operations with delayed start/stop function, as well as scheduled relay functions.

Improved troubleshooting – the error log records the last 8 errors, together with a time stamp in real time and the exact system conditions at the time of the fault. This simplifies the fault diagnostics and reduces maintenance and downtime.

FTT (function to terminal) logic for inputs – this feature makes it possible to assign multiple functions to the same input, thus reducing I/O complexity.

Eight fixed frequencies – by means of the digital inputs, the system will operate at pre-defined speeds to ensure that everything runs like clockwork.

Controlled acceleration and deceleration – this limits the stress on the mechanical components, especially on the S ramp, thereby reducing wear and extending the service intervals.

A second set of ramp parameters is available, so that loads can be transferred as smoothly as possible from a sorter or guide board to the next belt. System protection

Load drop monitoring feature – this feature immediately detects if the load drops unexpectedly, for example due to a broken conveyor chain, and will safely shutdown the system to prevent any further damage.

Stall protection – in the case of a material overload or a jammed conveyor, this feature will react more quickly than conventional overcurrent protection.

Management and communications

Expandable inputs/outputs – the integrated inputs/outputs can be expanded by means of multiple expansion modules to facilitate the direct wiring of all control, monitoring and status signals inside the drive.

Communications – the best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network within a given facility.

SmartWire-DT integration – this makes it possible to integrate virtually any number of modules via SmartWire-DT gateways, as each gateway requires only one single address.

Material handling



Good vibrations

Cement vibrators are permanently exposed to dust. Moreover, due to eccentric loading, extreme current fluctuations are to be expected at all times, necessitating the use of a DC link for compensation purposes.

Motor control center

200 percent peak torque – apart from the fact that the DG1 drives can operate at 150 percent overload for 60 seconds every 10 minutes, they can also withstand peak torques of 200 percent for two out of every 20 seconds during critical situations. In this way, even the toughest overload requirements can be met. And in the event that even this elevated torque rating proves insufficient, the DG1 drives will initiate a shutdown with an error message to protect the motor against damage.

DC link capacity – depending on the application at hand, eccentric loading is generally characterized by a strong oscillation between power consumption and power generation.

With the DG1 drives, oversizing, regenerative devices, and external DC link capacitors are a thing of the past, which makes them extremely compact and cost-effective.

System control

Cold weather mode – this mode makes it possible to run the application even if the temperature inside the control room is extremely low, and this without the need for any external heating.

Automatic restart – this feature automatically brings the application back online after a power failure in order to minimize downtime and any potential system faults.

Skipping of frequency ranges – this reduces fan vibrations and noise by preventing operation at resonance-causing speeds.

Management and communications

Communications – the best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network within a given facility.

SmartWire-DT integration – this makes it possible to integrate virtually any number of modules via SmartWire-DT gateways, as each gateway requires only one single address.

Highly reliable

Deliberately sturdy

All DG1 drives will perform at their full rating at ambient temperatures of up to 50 °C (IP21 and IP54), with an output that is short-circuit-proof up to 100 kA – this is what we call best-in-class.

Particularly durable fans and a flexibly adjustable fan controller contribute to increased reliability. The sturdy design of the drives is also evident in their degree of protection: The DG1 models with an output range of up to 160 kW are available with IP20 degree of protection, alongside IP21 and IP54. The models with a performance range between 200 kW and 630 kW are available with IP00 degree of protection.

The sturdy metal enclosures of the power sections and the drives at large are designed to continue working even when subjected to extreme loads. To identify and eliminate any potential weak spots, we conducted numerous tests that went far beyond the permissible environmental and operating conditions.

Resistant to dust and corrosive gases – the PCBs inside the DG1 drives feature a protective coating that makes them especially resistant to dust and corrosive gases. The dust generated during operation thus no longer has to be counteracted by means of expensive, protected enclosures.

System protection

Electronic motor overload protection – given the high demands placed on the drives by the application and the environmental conditions, it is indispensable to have the right motor protection in place to effectively prevent motor damage. To this end, the motor protection feature of the DG1 drives can be programmed as required.

Stall protection – this feature responds more quickly than conventional overcurrent protection, for example when material gets jammed. This enhances the overall protection of the system.



Screw conveyors – a powerful option

Extruders and screw conveyors require larger torques than most other applications. And when a machine operates at low temperatures or the material to be conveyed becomes compacted, extreme overloads are likely to occur. The sensorless vector control (SVC) function of the DG1 drives offers up to 200 percent torque for short periods of time, which makes them ideal for applications with extreme overload requirements.

Motor control center

200 percent peak torque – apart from the fact that the DG1 drives can operate at 150 percent overload for 60 seconds every 10 minutes, they are also equipped for peak torques of 200 percent for two out of every 20 seconds during critical situations. In this way, even the toughest overload requirements can be met. And in the event that even this elevated torque rating proves insufficient, the DG1 drives will initiate a shutdown with an error message to protect the motor against damage.

Motor identification run – this feature automatically determines the parameters required for maximizing motor performance and efficiency in the framework of the current motor configuration.

Extruder protection functions

Stall protection – this feature is able to respond more quickly than conventional overcurrent protection, for example when material gets jammed. This enhances the overall protection of the system.

Electronic motor overload protection – given the high demands placed on the drives by the application and the environmental conditions, it is indispensable to have the right motor protection in place to effectively prevent motor damage. To this end, the motor protection feature of the DG1 drives can be programmed as required.

System safety

STO inputs – color-coded in safety yellow, these inputs simplify the integration of the drives in line with the EU Machinery Directive.

Biogas plants are subject to stringent safety requirements. For example, emergency shutdowns are required in the following situations:

- if the gas pressure falls below a certain minimum
- if the maximum permissible gas pressure is exceeded
- if an emergency-stop button is activated
- if the control power fails
- if a gas detection or fire alarm system is triggered
- if the temperature monitoring systems are triggered (for ambient air, coolant, etc.)
- if the ventilation system fails
- if the speed limit is exceeded

With the Safe Torque Off function (STO input), a shutdown in each of these cases is possible without the need for any additional equipment.

Automatic restart – this feature automatically brings the application back online after a power failure in order to minimize downtime and any potential system faults.



No need to worry about dust when working underground

Underground applications come with additional requirements. For one, dust in the air makes it more difficult for the electronics to work properly. In this tough environment, a sturdy design and powerful torque capabilities are therefore required. The sensorless vector control (SLV) function responds to this need by providing up to 200 percent torque for short intervals. This high torque, together with the protective PCB coating, makes the DG1 drives the perfect fit for underground applications.

Motor control center

200 percent peak torque – apart from the fact that the DG1 drives can operate at 150 percent overload for 60 seconds every 10 minutes, they are also equipped for peak torques of 200 percent for two out of every 20 seconds during critical situations. In this way, even the toughest overload requirements can be met. And in the event that even this elevated torque rating proves insufficient, the DG1 drives will initiate a shutdown with an error message to protect the motor against damage.

Motor identification run – this feature automatically determines the parameters required for maximizing motor performance and efficiency in the framework of the current pump configuration.

System control

Temperatures of up to 50 °C pose no problem – all DG1 drives are fully operational at ambient temperatures of up to 50 °C without derating; with derating, the ambient temperature range can be further extended to 60 °C.

Even in unusually hot environments, the DG1 drives can be installed side by side or in small control cabinets to save space.

Password protection – once this feature has been activated, no changes can be made to the configuration without the password.

Expandable inputs/outputs – the integrated inputs/outputs can be expanded by means of multiple expansion modules to facilitate the direct wiring of all control, monitoring and status signals inside the drive.

Highly reliable

Deliberately sturdy – all DG1 drives will perform at their full rating at ambient temperatures of up to 50 °C (IP21 and IP54), and with an output that is short-circuit-proof up to 100 kA – this is what we call best-in-class.

Particularly durable fans and a flexibly adjustable fan controller contribute to increased reliability. The sturdy design of the drives is also evident in their degree of protection: The DG1 models with an output range of up to 160 kW are available with IP20 degree of protection, alongside IP21 and IP54. The models with a performance range between 200 kW and 630 kW are available with IP00 degree of protection.

The sturdy metal enclosures of the power sections and the drives at large are designed to continue working even when subjected to extreme loads. To identify and eliminate any potential weak spots, we conducted numerous tests that went far beyond the permissible environmental and operating conditions.

In other words, the DG1 drives are the safe choice when it comes to underground work.

Resistant to dust and corrosive gases – the PCBs inside the DG1 drives feature a protective coating that makes them especially resistant to dust and corrosive gases. The dust generated during operation thus no longer has to be counteracted by means of expensive, protected enclosures.

Should an explosion-proof design be required, Eaton can also support you with the right solution.

Protective functions

Electronic motor overload protection – given the high demands placed on the drives by the application and the environmental conditions, it is indispensable to have the right motor protection in place to effectively prevent motor damage. To this end, the motor protection feature of the DG1 drives can be programmed as required. This makes it possible to avoid underground repairs, which are often time-consuming and result in more prolonged downtime than would be the case above ground.

Skipping of frequency ranges – this reduces fan vibrations and noise by preventing operation at resonance-causing speeds.



Drive pumpjacks anywhere

The DG1 drives speak your language. Their multi-language capabilities enable users worldwide to operate the system in their own language, thereby reducing the potential for language-related errors.

System control

Always in your language – in addition to English as the base language, you can add two additional languages to each application. At the moment, 13 languages are available.

Automatic restart – this feature automatically brings critical pumps back online after a power failure in order to minimize downtime and any potential system faults.

Highly reliable

DC link capacity – depending on the application at hand, eccentric loading is generally characterized by a strong oscillation between power consumption and power generation.

With the DG1 drives, oversizing, regenerative devices, and external DC link capacitors are a thing of the past, which makes them extremely compact and cost-effective.

Cold weather mode – this mode makes it possible to run a pumping station even if the temperature inside the control room is extremely low, and this without the need for any external heating.

System safety

Electronic motor overload protection – given the high demands placed on the drives by the application and the environmental conditions, it is indispensable to have the right motor protection in place to effectively prevent any motor damage. To this end, the motor protection feature of the DG1 drives can be programmed as required.

Management and communications

Application-specific faults – the DG1 can assign an individual message to three external errors, for example "pump rod breakage". This makes it possible to quickly and efficiently determine the cause of any shutdown.

All values at a glance – the DG1 drives have been equipped with 27 programmable values for monitoring your application. Individual responses can be defined for each of these values, making external sensors obsolete.

Communications – the best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network within a given facility.



Energy-efficient fans

While machine applications need to be planned with overloads of 150 percent in mind, 110 percent are more than adequate for fan applications. This means that a DG1 drive with a lower motor rating can be used, thereby reducing the acquisition cost.

Energy-efficient fans

Energy-saving feature– In fan applications, energy savings are usually one of the top requirements. The integrated energy-saving feature ensures that the DG1 drives meet this need and that any unnecessary partial load losses are kept to a minimum.

The energy-saving feature optimizes efficiency and reduces power losses by dynamically adjusting the V/f curve. Conventional static approaches are inadequate for this type of application, as any load fluctuations would immediately have adverse effects on speed stability.

The integrated energy-saving feature reduces losses by 2 to 10 percent in comparison with most standard configurations.

Energy savings calculator – The integrated energy savings calculator offers a direct comparison with conventional control systems (DOL). It immediately indicates how much money was saved by using the DG1 drive instead of a DOL starter, as well as the total costs incurred by running the drive.

System protection

Belt monitoring feature – The underload detection feature makes it possible to react appropriately should a fan belt break. While a broken belt will cause a machine to stop functioning normally, the motor will still run at maximum speed. The DG1 drives will detect this situation and safely shut down the motor, thus preventing any unnecessary wear.

Electronic motor overload protection – Given the high demands placed on the drives by the application and the environmental conditions, it is indispensable to have the right motor protection in place to effectively prevent any motor damage. To this end, the motor protection feature of the DG1 drives can be programmed as required.

Skip frequency ranges – Reduce fan vibrations and noise by preventing operation at resonance-causing speeds.

System controls

Manual/automatic operation – Operators can switch between manual and automatic modes by means of control commands or via the keypad, allowing them to intervene in the control system at any time.

Automatic restart – Minor power failures or voltage drops do not require the fan to be switched off. The automatic restart feature will bring the fan back online in order to reduce downtime and any potential system errors.

Flying start – This feature ensures that the drive will smoothly catch the spinning motor, regardless of the direction of rotation, in order to reduce the mechanical stress on the blower wheel.

Display of the process variables in the PID controller – This feature simplifies handling by allowing operators to monitor the flow rates of a specific pump via the motor menu.

Sleep mode – Prevents any unproductive fan rotation. The automatic sleep mode reduces energy consumption, wear, and running costs.

Management and communications

Communications – The best-in-class on-board connectivity options include EtherNet/IP, Modbus TCP, Modbus RTU, CANopen, BACnet MS/TP as standard. Additional modules for Profibus, CANopen and DeviceNet can be added for easy integration of the drives into any network.

Comprehensive on-board I/O – Featuring 8 DIs, 1 DO, 2 AIs, 2 AOs, and 3 ROs, each programmable with numerous functions. This provides maximum flexibility for controlling the application at hand, while simultaneously reducing the costs associated with external controllers.

SmartWire-DT integration – This makes it possible to integrate virtually any number of modules via SmartWire-DT gateways, as each gateway requires only one single address.

The Energy Savings Estimator tool for PC – This tool allows you to estimate your cost savings in advance.

The Harmonics Estimator tool for PC – This tool enables you to calculate the harmonic load on the supply network.

Power spectrum

- Control methods: voltage/frequency (U/f) control and sensorless vector control (SLV)
- With or without internal brake chopper (BU)

150% OL		110% OL			Size	IP00 with BU	IP00 without BU	IP20 with BU	Part no.			
P _h [kW]	P _h [HP]	I _h	P _r [kW]	P _r [HP]					I _L	IP21 with BU	IP21 without BU	IP54 with BU
208 - 240 V												
0.75	0.75	3.7	1.1	1	4.8	0		DG1-323D7EB-C20C				
1.1	1	4.8	1.5	1.5	6.6	0		DG1-324D8EB-C20C				
1.5	1.5	6.6	1.5	2	7.8	0		DG1-326D6EB-C20C				
0.75	0.75	3.7	1.1	1	4.8	1			DG1-323D7FB-C21C		DG1-323D7FB-C54C	
1.1	1	4.8	1.5	1.5	6.6	1			DG1-324D8FB-C21C		DG1-324D8FB-C54C	
1.5	1.5	6.6	1.5	2	7.8	1			DG1-326D6FB-C21C		DG1-326D6FB-C54C	
1.5	2	7.8	2.2	3	11	1			DG1-327D8FB-C21C		DG1-327D8FB-C54C	
2.2	3	11	3	3	12.5	1			DG1-32011FB-C21C		DG1-32011FB-C54C	
3	3	12.5	4	5	17.5	2			DG1-32012FB-C21C		DG1-32012FB-C54C	
4	5	17.5	5.5	7.5	25	2			DG1-32017FB-C21C		DG1-32017FB-C54C	
5.5	7.5	25	7.5	10	31	2			DG1-32025FB-C21C		DG1-32025FB-C54C	
7.5	10	31	11	15	48	3			DG1-32031FB-C21C		DG1-32031FB-C54C	
11	15	48	15	20	61	3			DG1-32048FB-C21C		DG1-32048FB-C54C	
15	20	61	22	25	75	4			DG1-32061FB-C21C	DG1-32061FN-C21C	DG1-32061FB-C54C	DG1-32061FN-C54C
22	25	75	22	30	88	4			DG1-32075FB-C21C	DG1-32075FN-C21C	DG1-32075FB-C54C	DG1-32075FN-C54C
22	30	88	30	40	114	4			DG1-32088FB-C21C	DG1-32088FN-C21C	DG1-32088FB-C54C	DG1-32088FN-C54C
30	40	114	45	50	143	5			DG1-32114FB-C21C	DG1-32114FN-C21C	DG1-32114FB-C54C	DG1-32114FN-C54C
45	50	143	45	60	170	5			DG1-32143FB-C21C	DG1-32143FN-C21C	DG1-32143FB-C54C	DG1-32143FN-C54C
45	60	170	55	75	211	5			DG1-32170FB-C21C	DG1-32170FN-C21C	DG1-32170FB-C54C	DG1-32170FN-C54C
55	75	211	75	100	261	6			DG1-32211FB-C21C	DG1-32211FN-C21C	DG1-32211FB-C54C	DG1-32211FN-C54C
75	75	248	90	100	312	6			DG1-32248FB-C21C	DG1-32248FN-C21C	DG1-32248FB-C54C	DG1-32248FN-C54C

380 - 500 V												
0.75	1	2.2	1.1	1.5	3.3	0		DG1-342D2EB-C20C				
1.1	1.5	3.3	1.5	2	4.3	0		DG1-343D3EB-C20C				
1.5	2	4.3	2.2	3	5.6	0		DG1-344D3EB-C20C				
2.2	3	5.6	3	3	7.6	0		DG1-345D6EB-C20C				
0.75	1	2.2	1.1	1.5	3.3	1			DG1-342D2FB-C21C		DG1-342D2FB-C54C	
1.1	1.5	3.3	1.5	2	4.3	1			DG1-343D3FB-C21C		DG1-343D3FB-C54C	
1.5	2	4.3	2.2	3	5.6	1			DG1-344D3FB-C21C		DG1-344D3FB-C54C	
2.2	3	5.6	3	3	7.6	1			DG1-345D6FB-C21C		DG1-345D6FB-C54C	
3	3	7.6	4	5	9	1			DG1-347D6FB-C21C		DG1-347D6FB-C54C	
4	5	9	5.5	7.5	12	1			DG1-349D0FB-C21C		DG1-349D0FB-C54C	
5.5	7.5	12	7.5	10	16	2			DG1-34012FB-C21C		DG1-34012FB-C54C	
7.5	10	16	11	15	23	2			DG1-34016FB-C21C		DG1-34016FB-C54C	
11	15	23	15	20	31	2			DG1-34023FB-C21C		DG1-34023FB-C54C	
15	20	31	18.5	25	38	3			DG1-34031FB-C21C		DG1-34031FB-C54C	
18.5	25	38	22	30	46	3			DG1-34038FB-C21C		DG1-34038FB-C54C	
22	30	46	30	40	61	3			DG1-34046FB-C21C		DG1-34046FB-C54C	
30	40	61	37	50	72	4			DG1-34061FB-C21C	DG1-34061FN-C21C	DG1-34061FB-C54C	DG1-34061FN-C54C
37	50	72	45	60	87	4			DG1-34072FB-C21C	DG1-34072FN-C21C	DG1-34072FB-C54C	DG1-34072FN-C54C
45	60	87	55	75	105	4			DG1-34087FB-C21C	DG1-34087FN-C21C	DG1-34087FB-C54C	DG1-34087FN-C54C
55	75	105	75	100	140	5			DG1-34105FB-C21C	DG1-34105FN-C21C	DG1-34105FB-C54C	DG1-34105FN-C54C
75	100	140	90	125	170	5			DG1-34140FB-C21C	DG1-34140FN-C21C	DG1-34140FB-C54C	DG1-34140FN-C54C
90	125	170	110	150	205	5			DG1-34170FB-C21C	DG1-34170FN-C21C	DG1-34170FB-C54C	DG1-34170FN-C54C
110	150	205	132	200	261	6			DG1-34205FB-C21C	DG1-34205FN-C21C	DG1-34205FB-C54C	DG1-34205FN-C54C
132	200	245	160	250	310	6			DG1-34245FB-C21C	DG1-34245FN-C21C	DG1-34245FB-C54C	DG1-34245FN-C54C
160	250	310	200	300	385	7	DG1-34310FB-C00C	DG1-34310FN-C00C				
200	300	385	250	350	460	7	DG1-34385FB-C00C	DG1-34385FN-C00C				
250	350	460	250	450	520	7	DG1-34460FB-C00C	DG1-34460FN-C00C				
250	450	520	315	500	590	7	DG1-34520FB-C00C	DG1-34520FN-C00C				
315	500	590	355	500	650	8	DG1-34590FB-C00C	DG1-34590FN-C00C				
355	500	650	400	600	730	8	DG1-34650FB-C00C	DG1-34650FN-C00C				
400	600	730	450	600	820	8	DG1-34730FB-C00C	DG1-34730FN-C00C				
450	600	820	500	750	920	8	DG1-34820FB-C00C	DG1-34820FN-C00C				
500	750	920	560	750	1010	8	DG1-34920FB-C00C	DG1-34920FN-C00C				
560	850	1040	630	850	1180	8	DG1-341K0FB-C00C	DG1-341K0FN-C00C				

150% OL			110% OL			Size	Part no.					
P _H [kW]	P _H [HP]	I _H	P _L [kW]	P _L [HP]	I _L		IP00 with BU	IP00 without BU	IP20 with BU	IP21 with BU	IP21 without BU	IP54 with BU
525 - 600 V												
1.5	2	3.3	2.2	3	4.5	1			DG1-353D3FB-C21C		DG1-353D3FB-C54C	
2.2	3	4.5	4	5	7.5	1			DG1-354D5FB-C21C		DG1-354D5FB-C54C	
4	5	7.5	5.5	7.5	10	1			DG1-357D5FB-C21C		DG1-357D5FB-C54C	
5.5	7.5	10	7.5	10	13.5	2			DG1-35010FB-C21C		DG1-35010FB-C54C	
7.5	10	13.5	11	15	18	2			DG1-35013FB-C21C		DG1-35013FB-C54C	
11	15	18	11	15	22	2			DG1-35018FB-C21C		DG1-35018FB-C54C	
11	15	22	15	20	27	3			DG1-35022FB-C21C		DG1-35022FB-C54C	
15	20	27	22	30	34	3			DG1-35027FB-C21C		DG1-35027FB-C54C	
22	30	34	22	30	41	3			DG1-35034FB-C21C		DG1-35034FB-C54C	
22	30	41	30	40	52	4			DG1-35041FB-C21C	DG1-35041FN-C21C	DG1-35041FB-C54C	DG1-35041FN-C54C
30	40	52	37	50	62	4			DG1-35052FB-C21C	DG1-35052FN-C21C	DG1-35052FB-C54C	DG1-35052FN-C54C
37	50	62	55	75	80	4			DG1-35062FB-C21C	DG1-35062FN-C21C	DG1-35062FB-C54C	DG1-35062FN-C54C
55	75	80	55	100	100	5			DG1-35080FB-C21C	DG1-35080FN-C21C	DG1-35080FB-C54C	DG1-35080FN-C54C
55	100	100	75	100	125	5			DG1-35100FB-C21C	DG1-35100FN-C21C	DG1-35100FB-C54C	DG1-35100FN-C54C
75	100	125	90	125	144	5			DG1-35125FB-C21C	DG1-35125FN-C21C	DG1-35125FB-C54C	DG1-35125FN-C54C
90	125	144	132	200	208	6			DG1-35144FB-C21C	DG1-35144FN-C21C	DG1-35144FB-C54C	DG1-35144FN-C54C
132	200	208	160	250	250	6			DG1-35208FB-C21C	DG1-35208FN-C21C	DG1-35208FB-C54C	DG1-35208FN-C54C
160	250	261	200	300	325	7	DG1-35261FB-C00C	DG1-35261FN-C00C				
200	300	325	250	400	385	7	DG1-35325FB-C00C	DG1-35325FN-C00C				
250	400	385	250	450	416	7	DG1-35385FB-C00C	DG1-35385FN-C00C				
250	450	416	315	450	460	8	DG1-35416FB-C00C	DG1-35416FN-C00C				
315	450	460	355	500	520	8	DG1-35460FB-C00C	DG1-35460FN-C00C				
355	500	520	400	600	590	8	DG1-35520FB-C00C	DG1-35520FN-C00C				
400	600	590	450	650	650	8	DG1-35590FB-C00C	DG1-35590FN-C00C				
450	650	650	500	700	750	8	DG1-35650FB-C00C	DG1-35650FN-C00C				
450	650	650	560	800	820	8	DG1-35820FB-C00C	DG1-35820FN-C00C				

Size	H x W x D [mm]	Weight [kg]	
0	269 x 126 x 173	2.2	
1	327 x 152 x 200	7	
2	419 x 169 x 244	12	
3	558 x 200 x 252	23	
4	630 x 243 x 290	35	
5	888 x 290 x 344	64	
6	1,035 x 486 x 371	113	
7	without BU with BU	980 x 506 x 561 1,538 x 506 x 561	205 410
8	without BU with BU	980 x 1,037 x 561 1,538 x 1,037 x 561	410 820

Description	Length	Article
Programming cable RJ45/USB	3 m	DXG-CBL-PCCABLE

For additional technical data and further information, please visit our website:

www.eaton.eu/DG1

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Eaton Industries GmbH
Hein-Moeller-Str. 7-11
D-53115 Bonn / Germany

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