PowerXL™
DE1 Variable Speed Starter

www.eaton.eu/de1

Number 1 in efficiency

The easiest way of variable motor speed

TRIP-FREE DESIGN
OUT-OF-THE BOX RUNNING



The new device category!
The PowerXL™ DE1
Variable Speed Starter







EATON
Powering Business Worldwide

The PowerXL™ DE1 Variable Speed Starter – one device, all the advantages

Ease of use and reliability or variable motor speed and improved energy efficiency? Why not both? Eaton's new device category is closing the gap between conventional motor starters and variable frequency drives. It combines all the benefits in one device: The new PowerXL™ DE1 variable speed starter, now available in version DE11 for machine building applications as well.

Energy efficiency has never been simpler!

Perfectly equipped for the new ErP Directive

To achieve the energy efficiency required by the ErP Directive, applications with simple functionality such as pumps and fans are facing increased demands for drive technology with variable motor speed. Variable frequency drives are designed for more complex applications and as such require a greater level of expert knowledge. The new PowerXL™ DE1 Variable Speed Starter takes a different approach. It helps users to achieve the required energy efficiency levels for the application at hand by adjusting the motor speed – all without making mounting or commissioning more complex than for a conventional motor starter.

Try out our **"Energy Savings Estimator"** to see how much you can cut your costs and energy consumption with the DE1 Variable Speed Starter. The free software tool is available at **www.eaton.eu/selectiontools**

The new DE11 version for machine building applications with expanded features:
- CANopen onboard
- Plug-in control signal terminals
- Configurable relay output

So simple:
- Out-of-the-box commissioning without parameterization
- Trip-free design ensures maximum machine availability
- As easy to install and use as a motor starter
- No special drives, engineering skills or knowledge required

So variable:
- Variable motor speed
- Parameters can be optionally configured using plug-in configuration module
- Optional use of the PowerXL drivesConnect software
- Optional communication via SmartWire-DT and other accessories
- DE11 version with CANopen onboard



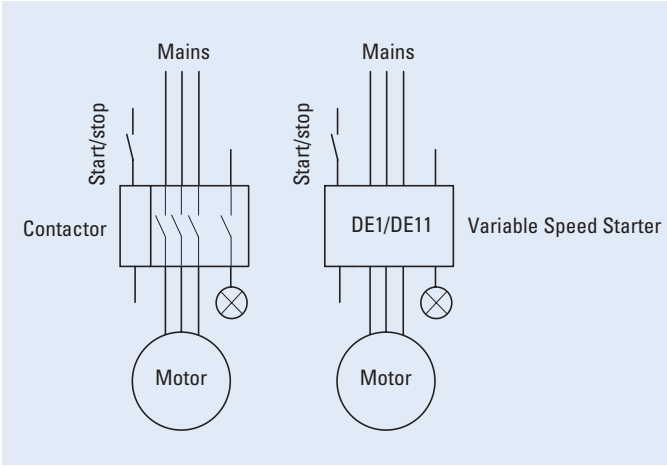
DE1 and DE11 (CANopen) variable speed starters from 0.25 to 7.5 kW

Why use a variable speed starter? What adv

Variable speed starters are a new device category that is positioned between conventional motor starters and compact variable frequency drives. This enables them to combine the advantages of three different device categories at the same time: motor starters, soft starters, and variable frequency drives.

Advantages:
- Same ease of use as a motor starter.
- Starting current reduced to rated operational current at full torque from the start.
- Variable motor speed.
- Integrated motor protection.

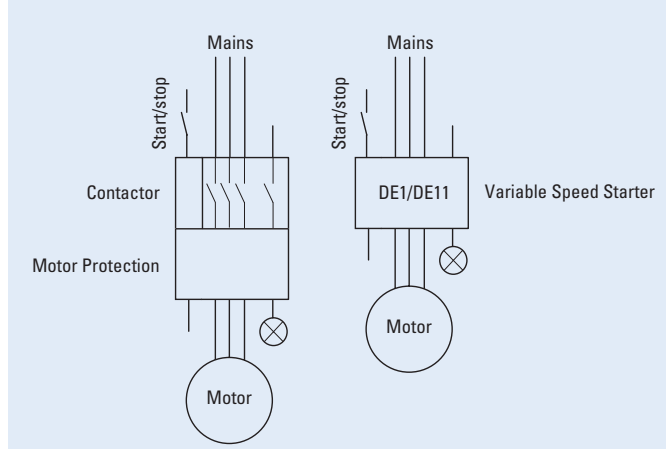
1 to 1 replacement for contactors



- 1 to 1 switch from contactor to DE1 without parameter configuration
- Same low wiring complexity

Plus
- Variable motor speed
- Fixed motor speed at starting current = rated operational current
- No control voltage circuit required (already integrated into DE1)

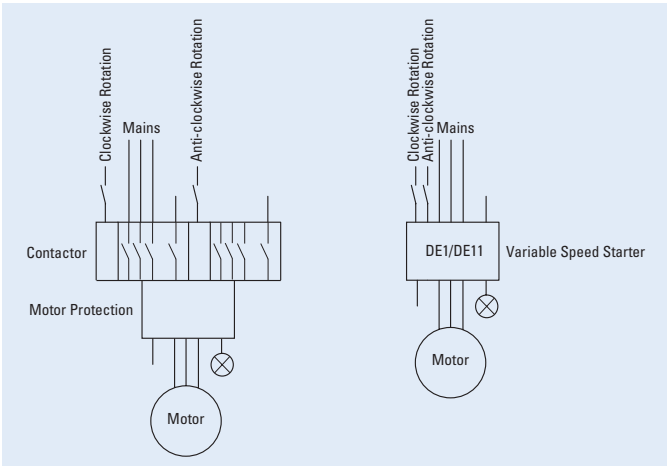
1 to 1 replacement for motor starters/soft starters



- 1 to 1 switch from motor starter to DE1 without parameter configuration
- Same low wiring complexity

Plus
- Variable motor speed
- Fixed motor speed at starting current = rated operational current
- No control voltage circuit required (already integrated into DE1)
- No separate motor protection required (motor protection integrated into DE1)

1 to 1 replacement for reversing starters/soft starters

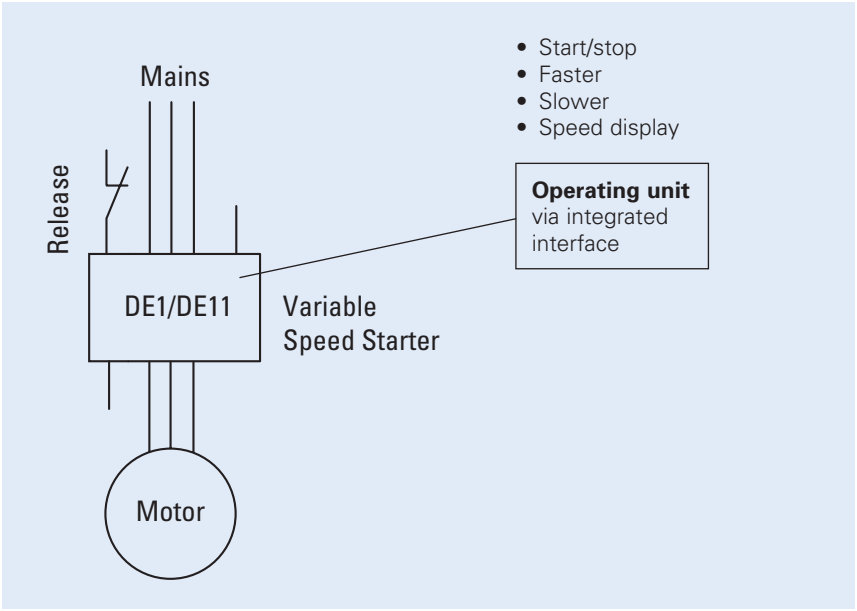


- 1 to 1 switch from reversing starter to DE1 without parameter configuration
- Same low wiring complexity

Plus
- Variable motor speed
- Fixed motor speed at starting current = rated operational current
- No control voltage circuit required (already integrated into DE1)
- No separate motor protection required (motor protection integrated into DE1)
- No reversing contactor required (significantly smaller size in terms of width)

antages do variable speed starters have?

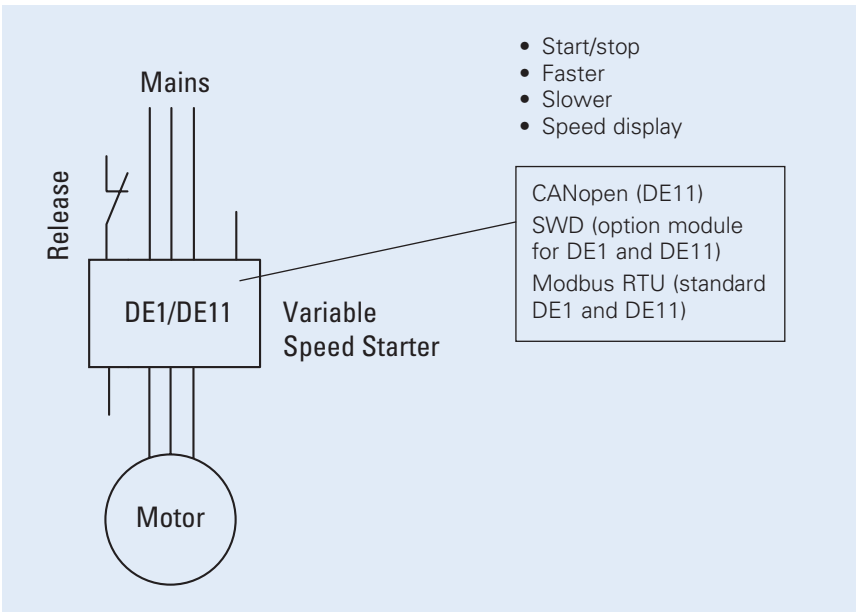
1 to 1 replacement for contactors, motor starters, reversing starters, and soft starters while eliminating the need for control wiring with a control unit



- No control wiring required
- Complete control via control unit (control panel installation)

Plus
- Variable motor speed
- Fixed motor speed at starting current = rated operational current
- No control voltage circuit required (already integrated into DE1)
- No separate motor protection required
- (motor protection integrated into DE1)
- No reversing contactor required (significantly smaller size in terms of width)

1 to 1 replacement for contactors, motor starters, and reversing starters while eliminating the need for control wiring with a fieldbus connection



- No control wiring required
- Complete control via control unit (control panel installation)

Plus
- Variable motor speed
- Fixed motor speed at starting current = rated operational current
- No control voltage circuit required (already integrated into DE1)
- No separate motor protection required (motor protection integrated into DE1)
- No reversing contactor required (significantly smaller size in terms of width)

Trip-free design ensures maximum machine availability

No switch-off in borderline situations

Overload, overcurrent, overtemperature or energy recovery – in real life there are always situations that can lead into a trip of the drive system or application. The new DE1 Variable Speed Starter features a trip-free design that automatically prevents tripping in borderline situations. Following features guarantee a maximum of machine availability:

Auto-Reset, e.g. in case of overload
Various application-related faults such as overcurrent at blocked rotor or frequent motor starts are protected by the Variable Speed Starter. After a relevant trip the DE1 will optionally restart up to 9 times automatically and without any manual operation.

DC regulation in the event of imbalance
Automatic brake ramp extension at high inertia and output frequency boost in case of imbalance within the application to prevent an overvoltage trip.

DC braking, e.g. for wind tunnel applications
A temporary output of DC voltage will brake the motor before starting (protection against overcurrent trips on passively driven motors, such as on the wind tunnel on ventilation systems) and stopping.

PWM regulation, e.g. in case of high ambient temperatures
Automatic reduction of the PWM frequency (switching frequency) in case of high load and/or high ambient temperatures.

Extensive motor protection
The DE1 Variable Speed Starter offers internal motor protection plus direct thermistor motor protection and short-circuit protection.

60 °C without derating
Ambient temperature 60 °C do not require derating (for details see chart on page 8)

Commissioning

As easy to use as a motor starter

No special knowledge of drives is required for the new DE1 Variable Speed Starter – either for installation or commissioning. The compact Variable Speed Starter is as easy and convenient to use as a conventional motor starter.

The device is unpacked and simply wired like a motor starter – that's it. The DE1 Variable Speed Starter is ready to go. It couldn't be easier! In addition, the "out-of-the-box comissioning" reduces the chances of installation faults to a minimum and at the same time it makes installation faster and more cost-efficient!



Snap the Variable Speed Starter on the DIN-Rail.



Connect mains and motor cables.



Wire control terminals.



Switch on and the motor runs with its speed controlled.

The new PowerXL™ DE1 Variable Speed Starter

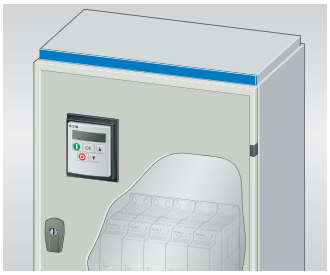
Parameterization by screwdriver

DXE-EXT-SET (plug-in configuration module)

Beyond the out-of-the-box commissioning that eliminates the need for parameterization, the user also has the option of using the plug-in DXE-EXT-SET configuration module to adjust the default settings of key parameters such as ramp time, motor protection and control terminal function to fit the current application. All that is needed is a screwdriver.

Furthermore the DE1 naturally also offers the opportunity to carry out the parameterization using the external remote device with LED display, which is part of the PowerXL product portfolio. Furthermore, the drivesConnect software also keeps the new Variable Speed Starter easy to use, just like it does for the entire PowerXL family. The software allows DE1 users the parameterization or readout via laptop, and to copy parameters from one drive to another with the parameter copy stick.







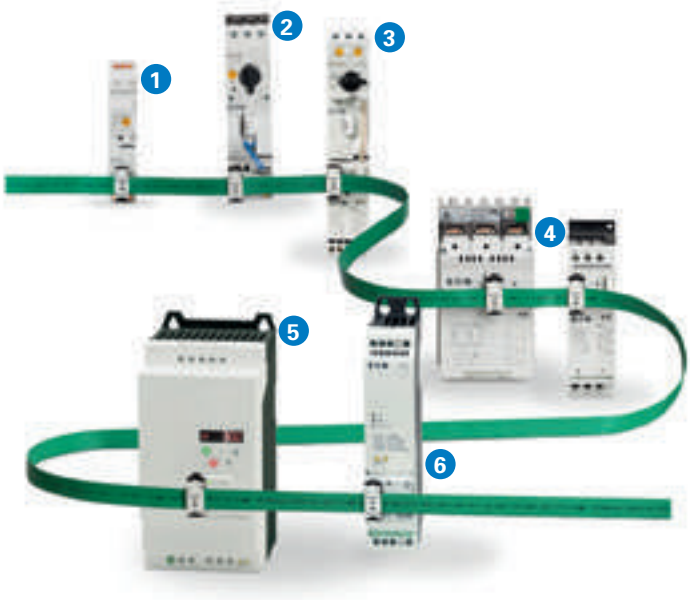


Your Connection to the Future

Integration into the innovative SmartWire-DT communication system

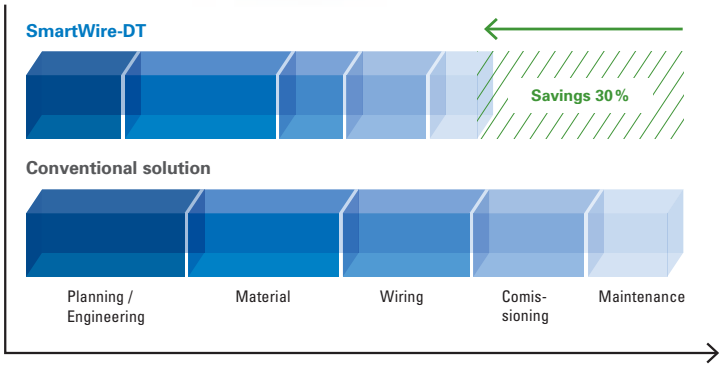
The DE1 has an optional Modbus interface and can communicate to Eaton's innovate SmartWire-DT communication system. For you, that means efficiency at all levels.

1. EMS Electronic motor starter
2. PKZ Motor-protective circuit-breaker
3. PKE Motor-protective circuit-breaker
4. DS7 Soft starter
5. PowerXL™ DC1 Variable frequency drive
6. PowerXL™ DE1 Variable Speed Starter



Cost reduction with SmartWire-DT

Rely on technology that makes complicated mechanical engineering processes simple: The intelligent SmartWire-DT system shifts the I/O level to the bus subscriber. SmartWire-DT allows for simple and straightforward structures that can be configured quickly while eliminating the I/O level on PLCs. The data transparency achieved this way makes diagnostics and maintenance simpler, cutting the time and resources spent on wiring, testing and commissioning by up to 85 %.



Saving time and costs

The new PowerXL DE1 Variable Speed Starter compared to conventional variable frequency drives



Comparison 1: Standard wiring via terminals
Time required to parameterize the DE1 Variable Speed Starter vs. a standard commercial variable frequency drive (e.g. motor potentiometer function)





Comparison 2: Integration of DE1 into SmartWire-DT vs. standard wiring
Time required for integration of DE1 into SmartWire-DT vs. standard wiring into standard commercial variable frequency drive



DE1 Variable Speed Starter Variable frequency drive

So simple, so clever

Ideally suited for applications with limited functionality yet needing variable motor speed

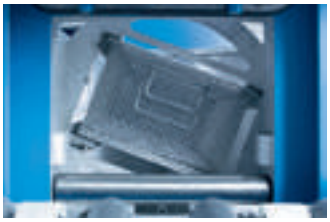
The ErP Directive and the increasing levels of automation in machines are pushing the need for variable frequency drives even for simple applications. The DE1 Variable Speed Starter is the ideal solution in all cases where a variable motor speed is required but where a variable frequency drive would be too complex and its expansive functionality would be definitely oversized.

It is ideally suited even for fixed speed applications:

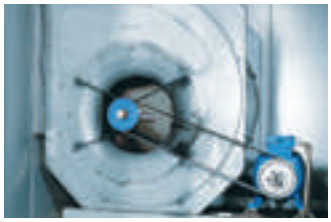
- reduced starting current at full torque
- for constant speed motors, where the required frequency does not correspond to the line frequency (e.g. high speed motors)
- no thermal overload at a high frequency of starts



Applications in which a direct start is unacceptable for mechanical reasons or due to the overly high start-up current, which, however, do not permit a reduced starting torque.



Applications in which the motors have a constant speed, but in which the frequency does not correspond to the line frequency (such as motors at 18,000 rpm).



Applications in which a motor starter is currently being used but which will need a variable motor speed going forward to comply with the EU standards.



Applications in which a simple variable frequency drive has been used to date, but for which the functionality of that drive is too complex.

Overview of advantages and specifications

Ordering information variable speed starter DE1

Input voltage [V]	Motor [kW]	Motor [HP]	Input phases	Output voltage	Output phases	Output current [A]	Degree of protection	Size	Part no. selection with EMC filter	Article no.	Part no. selection without EMC filter	Article no.
220–240	0.25	0.30	1	220–240	3	1.4	IP20_x	1	**DE1-121D4FN-N20N***	174327	**DE1-121D4NN-N20N***	177359
	0.37	0.5	1	220–240	3	2.3	IP20_x	1	**DE1-122D3FN-N20N***	174328	**DE1-122D3NN-N20N***	177360
	0.55	0.5	1	220–240	3	2.7	IP20_x	1	**DE1-122D7FN-N20N**	174329	**DE1-122D7NN-N20N**	177361
	0.75	0.75	1	220–240	3	4.3	IP20_x	1	**DE1-124D3FN-N20N**	174330	**DE1-124D3NN-N20N**	177362
	1.50	2	1	220–240	3	7.0	IP20_x	1	**DE1-127D0FN-N20N**	174331	**DE1-127D0NN-N20N**	177363
	2.20	3	1	220–240	3	9.6	IP20_x	2	**DE1-129D6FN-N20N**	174332	**DE1-129D6NN-N20N**	177364
400–480	0.37	0.5	3	400–480	3	1.3	IP20_x	1	**DE1-341D3FN-N20N**	174333	**DE1-341D3NN-N20N**	177365
	0.75	1	3	400–480	3	2.1	IP20_x	1	**DE1-342D1FN-N20N**	174334	**DE1-342D1NN-N20N**	177366
	1.50	2	3	400–480	3	3.6	IP20_x	1	**DE1-343D6FN-N20N**	174335	**DE1-343D6NN-N20N**	177367
	2.20	3	3	400–480	3	5.0	IP20_x	2	**DE1-345D0FN-N20N**	174336	**DE1-345D0NN-N20N**	177368
	3.00	3	3	400–480	3	6.6	IP20_x	2	**DE1-346D6FN-N20N**	174337	**DE1-346D6NN-N20N**	177369
	4.00	5	3	400–480	3	8.5	IP20_x	2	**DE1-348D5FN-N20N**	174338	**DE1-348D5NN-N20N**	177370
	5.50	7.5	3	400–480	3	11.3	IP20_x	2	**DE1-34011FN-N20N**	174339	**DE1-34011NN-N20N**	177371
	7.50	10	3	400–480	3	16.0	IP20_x	2	**DE1-34016FN-N20N****	174340	**DE1-34016NN-N20N****	177372

* no horizontal installation
** >50°C derating

Ordering information variable speed starter DE11

Input voltage [V]	Motor [kW]	Motor [HP]	Input phases	Output voltage	Output phases	Output current [A]	Degree of protection	Size	Part no. selection with EMC filter	Article no.	Part no. selection without EMC filter	Article no.
220–240	0,25	0,3	1	220–240	3	1,4	IP20	1	**DE11-121D4FN-N20N***	180650	**DE11-121D4NN-N20N***	180656
	0,37	0,5	1	220–240	3	2,3	IP20	1	**DE11-122D3FN-N20N***	180651	**DE11-122D3NN-N20N***	180657
	0,55	0,5	1	220–240	3	2,7	IP20	1	**DE11-122D7FN-N20N**	180652	**DE11-122D7NN-N20N**	180658
	0,75	0,75	1	220–240	3	4,3	IP20	1	**DE11-124D3FN-N20N**	180653	**DE11-124D3NN-N20N**	180659
	1,50	2	1	220–240	3	7,0	IP20	1	**DE11-127D0FN-N20N**	180654	**DE11-127D0NN-N20N**	180660
	2,20	3	1	220–240	3	9,6	IP20	2	**DE11-129D6FN-N20N**	180655	**DE11-129D6NN-N20N**	180661
400–480	0,37	0,5	3	400–480	3	1,3	IP20	1	**DE11-341D3FN-N20N**	180662	**DE11-341D3NN-N20N**	180670
	0,75	1	3	400–480	3	2,1	IP20	1	**DE11-342D1FN-N20N**	180663	**DE11-342D1NN-N20N**	180671
	1,50	2	3	400–480	3	3,6	IP20	1	**DE11-343D6FN-N20N**	180664	**DE11-343D6NN-N20N**	180672
	2,20	3	3	400–480	3	5,0	IP20	2	**DE11-345D0FN-N20N**	180665	**DE11-345D0NN-N20N**	180673
	3,00	3	3	400–480	3	6,6	IP20	2	**DE11-346D6FN-N20N**	180666	**DE11-346D6NN-N20N**	180674
	4,00	5	3	400–480	3	8,5	IP20	2	**DE11-348D5FN-N20N**	180667	**DE11-348D5NN-N20N**	180675
	5,50	7,5	3	400–480	3	11,3	IP20	2	**DE11-34011FN-N20N**	180668	**DE11-34011NN-N20N**	180676
	7,50	10	3	400–480	3	16,0	IP20	2	**DE11-34016FN-N20N****	180669	**DE11-34016NN-N20N****	180677

* no horizontal installation
** >50°C derating

Technical Data

Supply voltage	1 AC 230 V / 3 AC 400/480 V
Line frequency	50/60 Hz ± 10 %
Overload	150 %
Output frequency	0…300 Hz
Switching frequency	1~: 4/8/12/16/24/32 kHz 3~: 10/12/14/16/18/20kHz
Mounting	DIN, mounting plate, side-by-side horizontal (90°)*
EMC	C1 5m**, C2 10m, C3 25m
Leakage current	< 3.5 mA AC / 10 mA DC
Short-circuit resistence	Yes
Altitude	2000 m (derating above 1000 m)
Ambient temperature	60 °C (For details see table on page 8)
Enclosure	IP 20 / NEMA 0
International standards	

Relay outputs	1 Configurable in DE11
Voltage	230 V AC / 30 V DC
Current AC1 / DC1	6A/5A
Number of input terminals	4
Analog input	
Resolution	12-bit
Voltage	0–10 V, (0) 4–20 mA
Energy consumption at 10 V	0.12 mA
Digital input	
High level	9…30 V
Energy consumption at 10/24 V	1.15/3 mA
Maximum load for the internal 10-V power supply	20 mA

*) Details see table on page 8

**) Only DE1-12.. and conducted emission only.

Accessory Articles

PowerXL™ selection aid

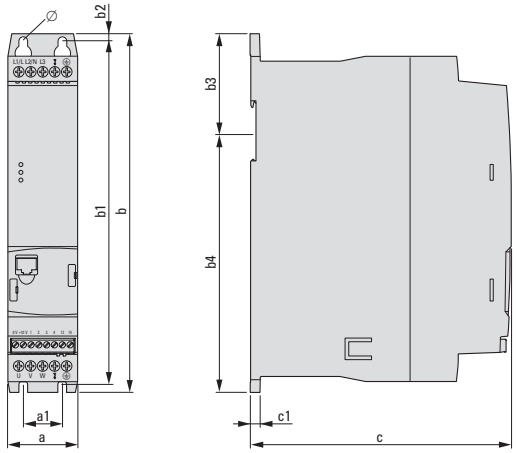
This selection aid can be used to quickly select the drive required for your application and the corresponding switchgear, protective devices, chokes, and filters. Visit our Online catalog http://eaton.eu/ecat

Description	Part no.	Article no.
DE1 parameterization module	**DXE-EXT-SET**	174621

Description	Part no.	Article no.
Parameter copy stick	**DX-COM-STICK2**	186947

Description	Part no.	Article no.
Remote display	**DX-KEY-LED2**	186946

Dimensions



[mm (in)]

	a	a1	b	b1	b2	b3	b4	c	c1	Ø1	Ø2	kg (lbs)
FS1	45 (1.77)	25 (0.98)	230 (9.06)	220 (8.88)	5 (0.2)	64 (2.52)	166 (6.54)	168 (6.61)	6.5 (0.26)	5.1 (0.2)	10 (0.39)	1.04 (2.29)
FS2	90 (3.54)	50 (1.97)	230 (9.06)	220 (8.66)	5 (0.2)	64 (2.52)	166 (6.54)	168 (6.61)	6.5 (0.26)	5.1 (0.2)	10 (0.39)	1.68 (3.7)

At Eaton, we're energized by the challenge of powering a world that demands more. With over 100 years experience in electrical power management, we have the expertise to see beyond today. From groundbreaking products to turnkey design and engineering services, critical industries around the globe count on Eaton.

We power businesses with reliable, efficient and safe electrical power management solutions. Combined with our personal service, support and bold thinking, we are answering tomorrow's needs today. Follow the charge with Eaton. Visit **eaton.eu.**

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