Quick Start Guide

Effective February 2015
New Information

CONTENTS

Powering Business Worldwide

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Web Site Address

http://www.eaton.com/drives

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Drives Technical Resource Center

Call the low voltage Eaton Drives Technical Support Center should you need assistance with commissioning, trouble-shooting, parts identifications, or warranty issues.
Voice: 877-ETN-CARE (386-2273), Option 2, Option 6, Option 3 (8:00 a.m.–5:00 p.m. CST)
e-mail: TRCDrivesTechSupport@Eaton.com

Danger!
Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that devices cannot be accidentally retriggered
- Verify isolation from the supply
- Ground and short-circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (IL) of the device concerned.
- Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- The functional earth (FE) must be connected to the protective earth (PE) or to the potential equalizing. The system installer is responsible for implementing this connection.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a cable or wire breakage on the signal side does not result in undefined states in the automation device.
- Ensure a reliable electrical isolation of the low voltage for the 24 V supply. Only use power supply units complying with IEC 60364-4-41 or HD 384.4.41 S2 (VDE 0100 part 410).
- Deviations of the mains voltage from the nominal value must not exceed the tolerance limits given in the technical data, otherwise this may cause malfunction and dangerous operation.
- Emergency-Stop devices complying with IEC/EN 60204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency switching off devices must not cause restart.
- Built-in devices for enclosures or cabinets must only be run and operated in an installed state, desk-top devices or portable devices only when the housing is closed.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency switching off devices should be implemented.
- Wherever faults in the automation system may cause damage to persons or property, external measures must be implemented to ensure a safe operating state in the event of a fault or malfunction (for example, by means of separate limit switches, mechanical interlocks, etc.).
- During operation, and depending on their degree of protection, variable frequency drives may have live, uninsulated, moving, and/or rotating parts, as well as hot surfaces.
- The impermissible removal of the required cover, improper installation or incorrect operation of the motor or variable frequency drive can cause the failure of the device and serious injury and/or material damage.
- Comply with all applicable national accident prevention regulations (e.g. B. BGV 4) when working with energized variable frequency drives.
- The electrical installation must be carried out in accordance with the relevant regulations (e.g. with regard to cable cross sections, fuses, PE).
- All transport, installation, commissioning and maintenance work must only be carried out by trained personnel (observe IEC 60364, HD 384 or DIN VDE 0100 and national accident prevention regulations).
- If applicable, systems in which variable frequency drives are installed must be equipped with additional monitoring and protective devices in accordance with the applicable safety regulations, e.g., the German Equipment and Product Safety Act, accident prevention regulations, etc. Making changes to the variable frequency drives by using the operating software is allowed.
- Keep all covers and doors closed during operation.
- When designing the machine, the user must incorporate mechanisms and measures that limit the consequences of a drive controller malfunction or failure (an increase in motor speed or the motor's sudden stop) so as to prevent hazards to people and property, e.g.:
  - Additional stand-alone devices for monitoring parameters that are relevant to safety (speed, travel, end positions, etc.)
  - Electrical and non-electrical safety devices (interlocks or mechanical locks) for mechanisms that protect the entire system.
  - Due to the possibility of there being capacitors that are still holding a charge, do not touch live device parts or terminals immediately after disconnecting the variable frequency drives from the supply voltage. Heed the corresponding labels on the variable frequency drives.

Step 1—PowerXL DE1 Series Overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations, and the DE1 Series catalog numbering system.

How to Use This Manual

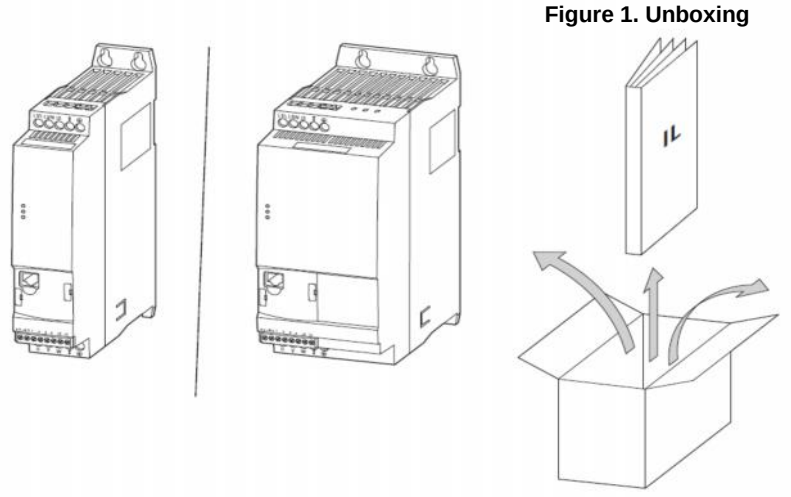
The purpose of this manual is to provide you with information necessary to install, initial wiring, start up, troubleshoot, and maintain the Eaton DE1 Series. To provide for safe installation and operation of the equipment read the safety guidelines at the beginning of this manual and follow the procedures outlined in the following chapters before connecting power to the DE1 Series VSS. Keep this operating manual handy and distribute to all users, technicians, and maintenance personnel for reference. If you need a full operational user manual please visit the Eaton website to obtain and download the full DE1 User Manual MN040011EN.

Receiving and Inspection

The DE1 Series VSS has met a stringent series of factory quality requirements before shipment. It is possible that packaging or equipment damage may have occurred during shipment. The DE1 series VSS is carefully packed and prepared for shipment. The devices should be shipped only in their original packaging with suitable packing materials. Please take note of the labels and instructions on the packaging as well as those used for unpacking. After receiving your DE1 Series VSS please check for the following:

- Before opening the package check the label info and make sure that you have received the correct DE1 VSS.
- Open the package with adequate tools and inspect the contents immediately after receipt in order to ensure that they are complete and undamaged.
- The packaging must contain the following parts:
  - A DE1 Variable Speed Starter
  - An Instructional Leaflet IL040005ZU

Figure 1. Unboxing



Rating Label

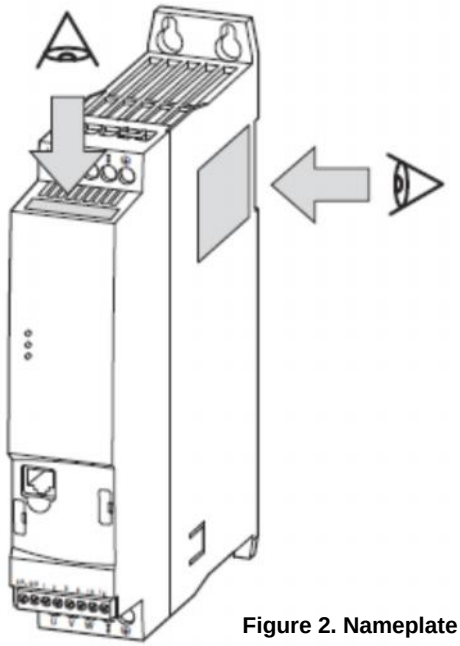


Figure 2. Nameplate View

The DE1 has device specific rated operation data and is listed on the nameplate on the right side of the device.

The nameplate on top (Figure 4) is a simplified version that can be used to clearly identify the device if the main nameplate (Figure 3) is blocked by other devices.

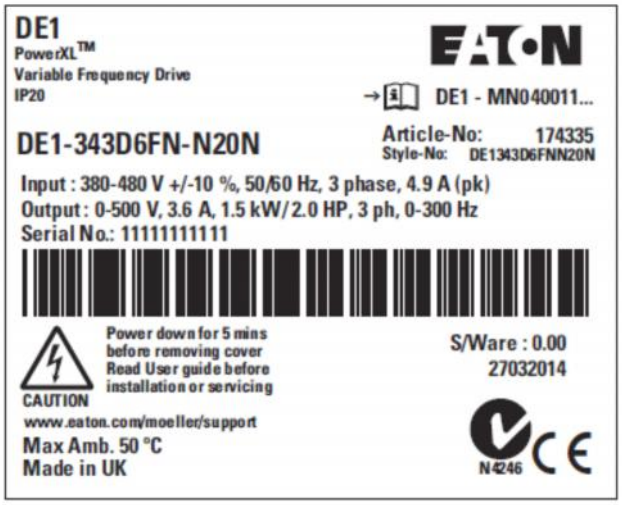


Figure 3. Nameplate A (Side Label)

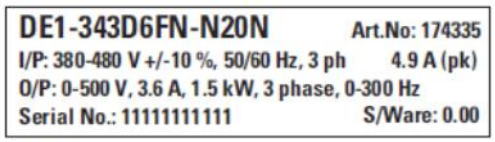


Figure 4. Nameplate B (Top Label)

Rating Label Description

Table 1. Label Description

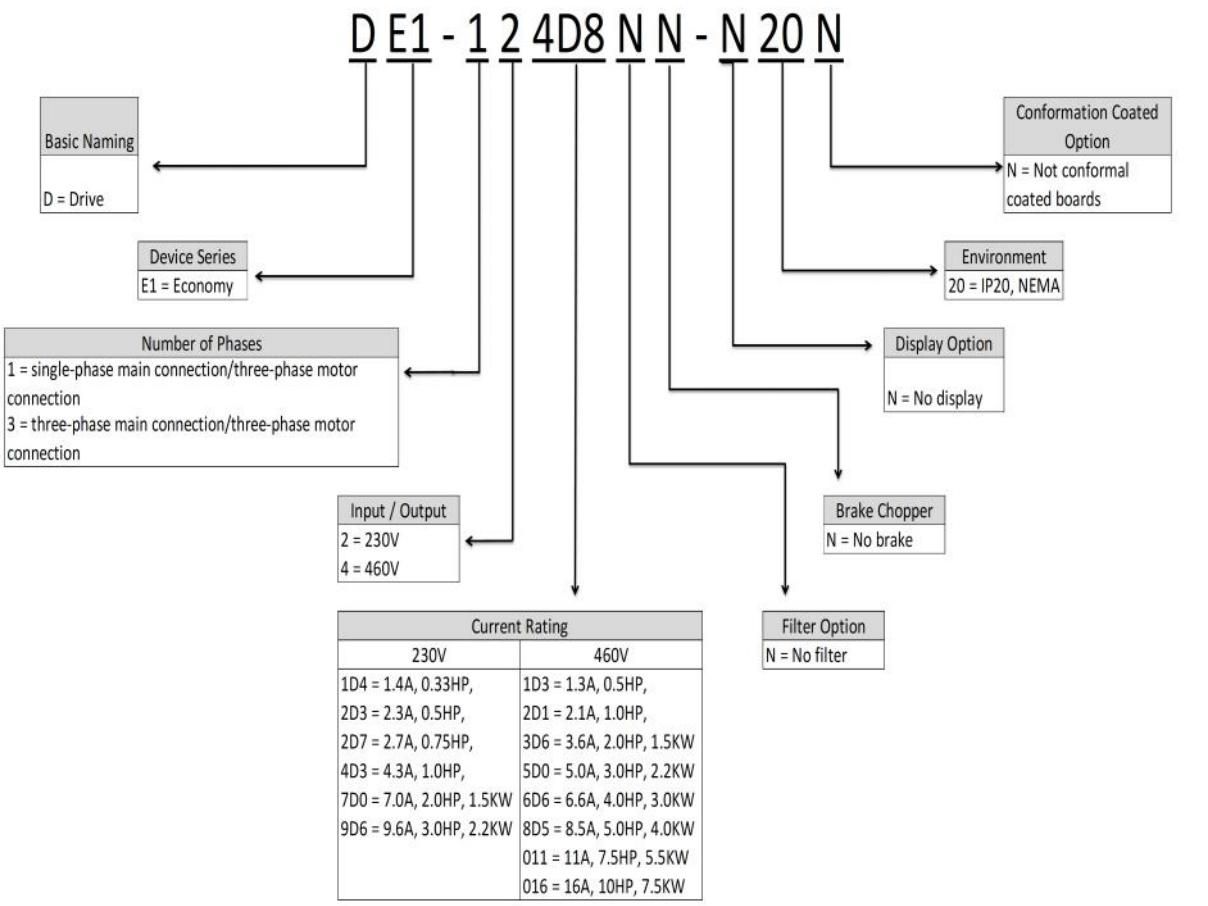
Inscription	Meaning
DE1-343D6FN-N20N	Part no.: DE1 = DE1 variable speed starter 3 = Three-phase mains connection / three-phase motor connection 4 = 400 V mains voltage category 3D6 = Rated operational current (3-decimal point-6, output current) F = integrated RFI filter N = No internal brake chopper N = No display (keypad) 20 = IP20 degree of protection N = basic device
Article-No: Style-No:	174335 = Article no. for variable speed starter DE1-343D6FN-N20N DE1343D6FNN20N = Article no./order designation in the USA
I/P (Input):	Rated operational data of mains connection 380 - 480 V ±10 % (three-phase alternating voltage) 50 - 60 Hz (mains frequency) 3 phase, 4.9 A (Input phase current)
O/P (Output):	Load side (motor) rated operational data: 0 - 500 V (three-phase alternating voltage) 3.6 A (output phase current) 1.5 kW / 2 hp (rated motor output) 3-phase, 0 - 300 Hz
Serial No.:	Serial number
	DE1 variable speed starters are electrical equipment. Read the manual (in this case MN040011EN) before making any electrical connections and commissioning.
Variable Frequency Drive	Variable speed starter with variable output frequency (VSS)
IP20	Degree of protection of the enclosure: IP20
Software:	0.00, software version
Max amb. 50 °C	Maximum permissible ambient air temperature: 50 °C (without derating/output reduction)
27032014	Manufacturing date: 27.03.2014

Catalog Designation

The catalog number selection/part number for DE1 VSS is subdivided into three groups.

Series – Power Section – Model – (Versions)

The following figure shows this in greater detail:



Step 2 – Dimensions and Power Wiring

Dimensions

Figure 6. DE1 Dimension View

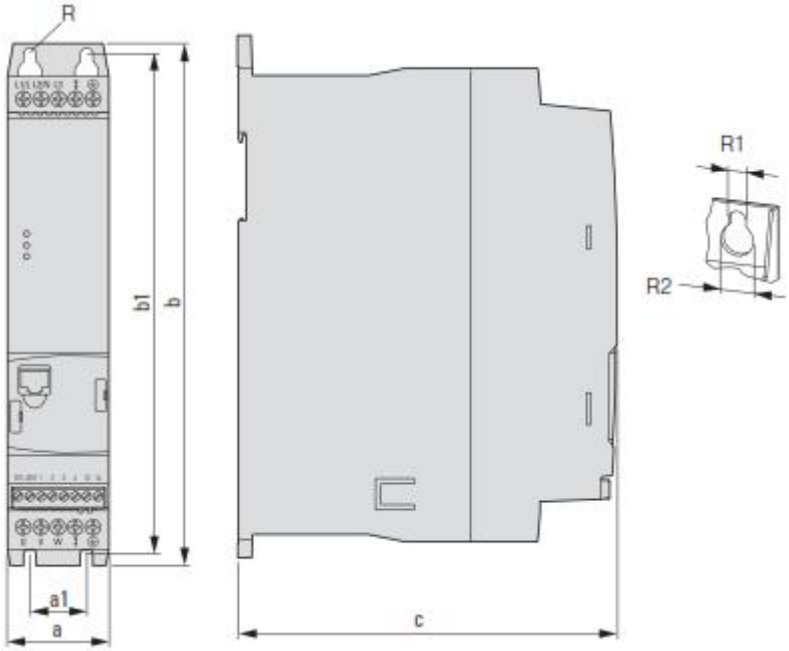


Table 2. DE1 Dimensions

Series	Frame Size	a [in] (mm)	a1 [in] (mm)	b [in] (mm)	b1 [in] (mm)	c [in] (mm)	R1 [in] (mm)	R2 [in] (mm)
DE1	FS1	1.77	0.98	9.06	8.66	6.61	0.2	0.39
		(45)	(25)	(230)	(220)	(168)	(5.1)	(10)
DE1	FS2	3.54	1.97	9.06	8.66	6.61	0.2	0.39
		(90)	(50)	(230)	(220)	(168)	(5.1)	(10)

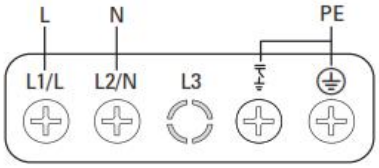
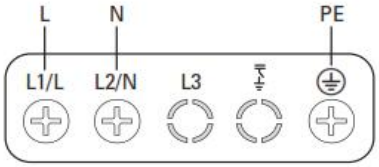
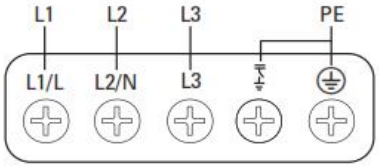
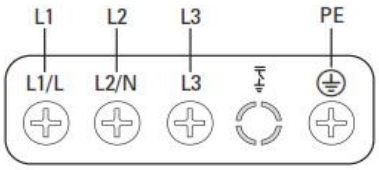
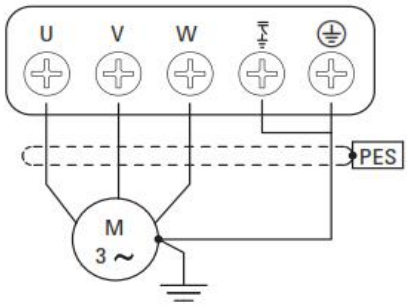
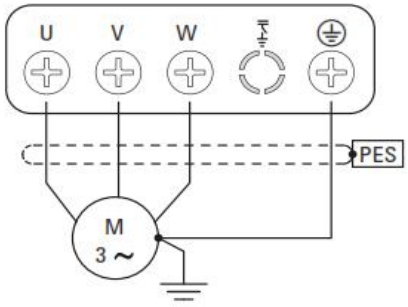
Power Wiring

Table 3. Power Wire Sizing

Series	Frame Size	Line & Motor [AWG] (mm^2)	Ground [AWG]	Torque [in-lb] (Nm)
DE1	FS1 & FS2	18-6	18-6	15.05
		1-6	1-6	(1.7)

Power Connection Examples

Figure 7. Power Connections

connection terminals	Description
	DE1-12…FN-… with single-phase supply voltage (230 V, 240 V) **with** built-in radio interference suppression filter
	DE1-12…NN-… with single-phase supply voltage (230 V, 240 V) **with no** internal radio interference suppression filter
	DE1-34…FN-… with three-phase supply voltage (400 V, 480 V) **with** built-in radio interference suppression filter
	DE1-34…NN-… with three-phase supply voltage (400 V, 480 V) **with no** internal radio interference suppression filter
	Three-phase motor connection for three-phase motors: • DE1-12…FN-… (230 V) • DE1-34…FN-… (400 V/460 V) **with** built-in radio interference suppression filter
	Three-phase motor connection for three-phase motors: • DE1-12…NN-… (230 V) • DE1-34…NN-… (400 V/460 V) **without** built-in radio interference suppression filter

Step 3 – Control Wiring

Figure 8. Control Terminal Layout

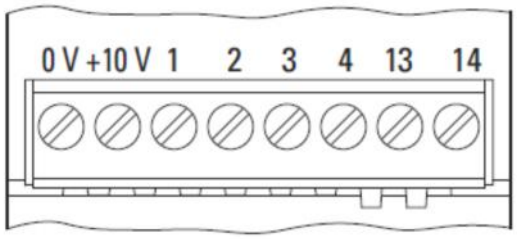


Figure 9. Control Terminal Functions

Designation	Function	Notes
0 V	Reference potential (GND)	• For the internal control voltage (10 V) • For external control voltages (10 V/24 V) • For control inputs 1 - 4
+10 V	+10 VDC voltage output, max. 20 mA	Internal control voltage +10 V output for the DE1 device's digital and analog control inputs (terminals 1 -4)
1	DI1, digital input 1	• Level for high signal: +9 - 30 V • Input current: 1.15/3 mA (10/24 V) • Default setting: FWD (enable signal for clockwise rotating field) • configurable
2	DI2, digital input 2	• Level for high signal: +9 - 30 V • Input current: 1.15/3 mA (10/24 V) • Default setting: REV (enable signal for counterclockwise rotating field) • configurable
3	DI3, Digital input 3	• Level for high signal: +9 - 30 V • Input current: 1.15/3 mA (10 V/24 V) • Default settings: FF1 (fixed frequency 20 Hz) • configurable
4	AI1, analog input 1	• Analog signal: 0 - +10 V • Input current: 0.12 mA • Resolution: 12 Bit • Default setting[1]) f-REF: 0 - f-max (50/60 Hz)
	DI4, digital input 4	• Level for high signal: +9 - 30 V • Input current: 1.15/3 mA (10/24 V) • configurable
13	Relay contact	• Potential-free relay contact (N/O), RUN • 230 V AC/30 V DC • Max. load current: 6 A (AC-1) / 5 A (DC-1)
14	Relay contact	

Note: The configurable inputs are only configurable by using the Extension Parameter Set Module (Part: DXE-EXT-SET), the Remote Keypad LED (Part: DX-KEY-LED), or the PC DrivesConnect software tool through a connection via the PowerXL Micro-Drive RJ45 to USB PC Cable (Part: DX-CBL-PC-3M0). These would need to be ordered in addition to the DE1 VSS as these are optional accessories. For the configurable mode of operations and setup of the accessories please see the DE1 User Manual MN040011EN.

Figure 10. Default Wiring (without internal suppression filter)

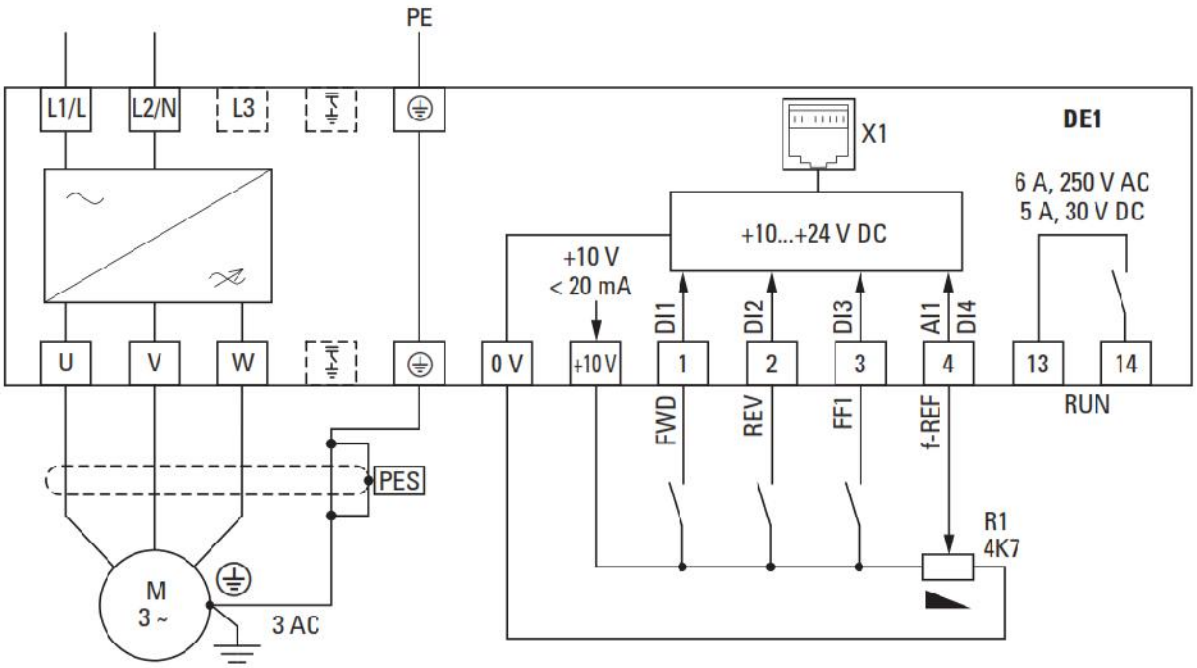
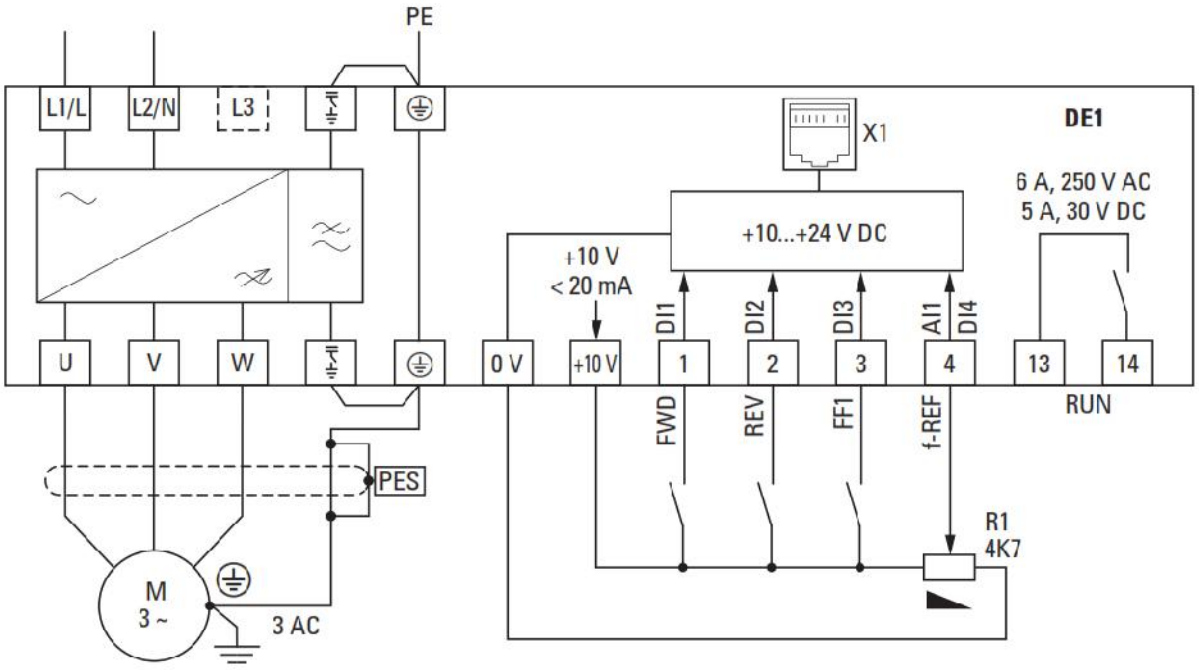


Figure 11. Default Wiring (with internal suppression filter)



Step 4 – LED Light Indicators and Faults

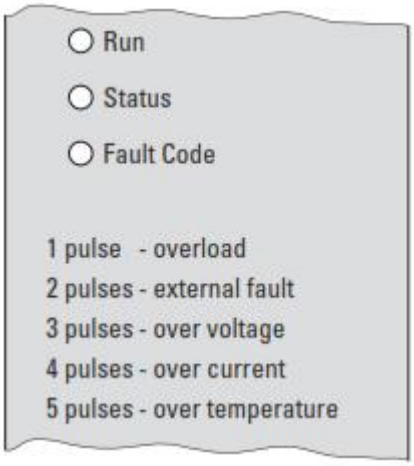


Figure 12. LED Status Light Layout

The **Run**, **Status**, and **Fault Code** LEDs will behave as follows:

Run LED – Operation Signal (GREEN):

- Flashes every 2 seconds when the main voltage is applied, there is no enable input signal present at DI1 or DI2, and there are no active fault messages
- Solid/continuous when the device is running and there is an input enable (start) signal on DI1 or DI2
- No illumination when the main power is removed or there is an internal device fault

Status LED – Status Message (RED):

- Flashes with the Fault Code LED when there is an undervoltage condition
- Solid/continuous illumination with **Fault Code** LED in the event of an internal communication fault (DE1 malfunctioning)

Fault Code LED – Fault Signal (RED/YELLOW):

- Cyclical Red flashing/pulse sequence with 2 second pauses observe Table 4
- Flashes Red with the **Status** LED when there is an undervoltage condition
- Solid/continuous Red illumination with **Status** LED in the event of an internal communication fault (DE1 malfunctioning)
- Solid/continuous Yellow when DE1 VSS DC braking is active

Table 4. Fault Code LED fault messages

Fault code	Flashing frequency: 2 Hz (followed by a 2-second pause)	Meaning
1 pulse - overload	1 x	Thermal motor overload
2 pulses - external fault	2 x	External fault message
3 pulses - over voltage	3 x	Overvoltage
4 pulses - over current	4 x	Overcurrent
5 pulses - over temperature	5 x	Overtemperature
	6 x	Fault in power section
	7 x	Communication fault
	8 x	Default parameter setting
	9 x	DC residual ripple
	10 x	Live zero error
	11 x	Under-temperature
	12 x	Thermistor fault
	13 x	Data error

If the DE1 VSS has an internal communication fault (CPU fault), the green **Run** LED will turn off and the **Status** and **Fault Code** LEDs will both illuminate to a solid/continuous red status.

NOTE: If this occurs the DE1 is faulty and will need to be replaced.

Fault Messages can be reset by:

- Switching off the main voltage supply and switching it back on (cycling power)
- Switching off (removing) the input enable signal (DI1 or DI2) and switching it back on

Additional Help

In the US or Canada: please contact the Technical Resource Center at 1-877-ETN-CARE or 1-877-326-2273.

All other supporting documentation is located on the Eaton web site at www.eaton.com

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