2020 INSTALLATION MANUAL

Copeland commercial HVACR variable frequency drive – EVM series

COPELAND

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Safety precautions

⚠WARNING	ELECTRICAL SHOCK HAZARD Disconnect and lock out power before servicing. Discharge all capacitors before servicing. Use compressor with grounded system only. Molded electrical plug must be used when required. Refer to original equipment wiring diagrams. Electrical connections must be made by qualified electrical personnel. Failure to follow these warnings could result in serious personal injury.

Before performing the installation

- Disconnect the power supply of the device
- Ensure that devices cannot be accidentally restarted
- Verify isolation from the supply
- Earth and short circuit the device
- Cover or enclose any adjacent live components
- 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, PES) must be connected to the protective earth (PE) or the potential equalization. The system installer is responsible for implementing this connection
- Connecting cables and signal lines should be installed so that inductive or capacitive interference does 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 an open circuit on the signal side does not result in undefined states in the automation devices
- Ensure a reliable electrical isolation of the extra-low voltage of the 24 V supply. Only use power supply units complying with IEC 60364-4-41 (VDE 0100 Part 410) or HD384.4.41 S2
- Deviations of the input voltage from the rated value must not exceed the tolerance limits given in the specifications, 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-stop devices must not cause a restart
- 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-stop devices should be implemented
- Wherever faults in the automation system may cause injury or material damage, 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, and so on)
- Depending on their degree of protection, adjustable frequency drives may contain live bright metal parts, moving or rotating components, or hot surfaces during and immediately after operation
- Removal of the required covers, improper installation, or incorrect operation of motor or adjustable frequency drive may cause the failure of the device and may lead to serious injury or damage
- The electrical installation must be carried out in accordance with the relevant regulations (for example, with regard to cable cross sections, fuses, PE)
- Installations containing adjustable frequency drives must be provided with additional monitoring and protective devices in accordance with the applicable safety regulations. Modifications to the adjustable frequency drives using the operating software are permitted
- All covers and doors must be kept closed during operation
  - Never touch live parts or cable connections of the adjustable frequency drive after it has been disconnected from the power supply. Due to the charge in the capacitors, these parts may still be live after disconnection. Fit appropriate warning signs

Step 1—Copeland EVM overview

This chapter describes the purpose and contents of this manual, the receiving inspection recommendations and the Copeland EVM series open drive.

How to use this manual

The purpose of this manual is to provide you with information necessary to install, start up, and setup the Copeland EVM series variable speed drive (VSD). 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 Copeland series VSD. Keep this operating manual handy and distribute to all users, technicians and maintenance personnel for reference.

Receiving and inspection

The Copeland EVM series VSD has met a stringent series of factory quality requirements before shipment. It is possible that packaging or equipment damage may have occurred during shipment. After receiving your Copeland series VSD, please check for the following:

Check to make sure that the package includes the install manual, quick start guide, and accessory packet. The accessory packet includes:

- Rubber grommets
- Control cable grounding clamps
- Additional grounding screw

Inspect the unit to ensure it was not damaged during shipment.

Make sure that the part number indicated on the nameplate corresponds with the catalog number on your order.

If shipping damage has occurred, please contact and file a claim with the carrier involved immediately.

If the delivery does not correspond to your order, please contact your Copeland electrical representative.

Note: Do not destroy the packing. The template printed on the protective cardboard can be used for marking the mounting points of the Copeland VSD on the wall or in a cabinet.

Table 1. Common abbreviations

Abbreviation	Definition
CT	Constant torque with high overload rating (150%)
VT	Variable torque with low overload rating (110%)
I_H	High overload (150%)
I_L	Low overload (110%)
VFD	Variable frequency drive

Rating label/carton label

COPELAND

Cat. No.: EVM-3222D5-E20EFN			
Style No.: 3-5001-101A			
Copeland™ EVM VSD		Factory ID : Plant 11	
CT/VT		Input	Output
0.25HP/ 0.5HP (0.18KW/ 0.37KW)	U(V~)	200-240 3Ø	0~Vin 3Ø
	F(Hz)	50/60 Hz	0-400 Hz
	I (A)	2.1/3.3	1.6/2.5
Enclosure Rating		IP20 / UL Open Type IP20 / NEMA 1 / UL Type 1 with NEMA 1 kit installed	

User installation manual:2020ECT-36

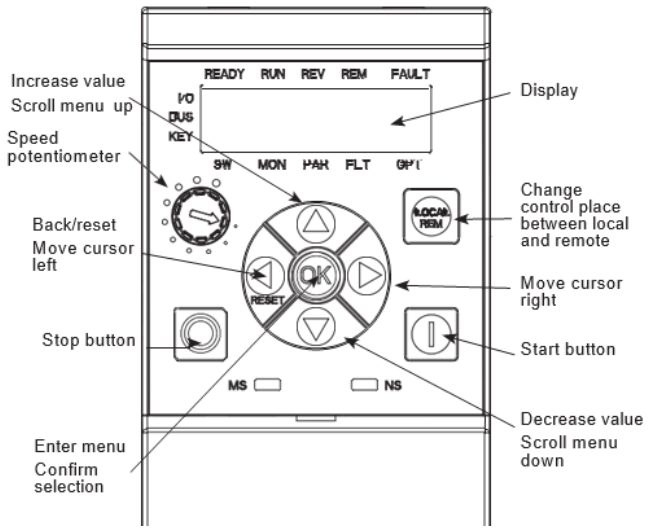
Serial No.: XX20J0001

Contains FCC ID: 2ADXE-HY-40R204PC

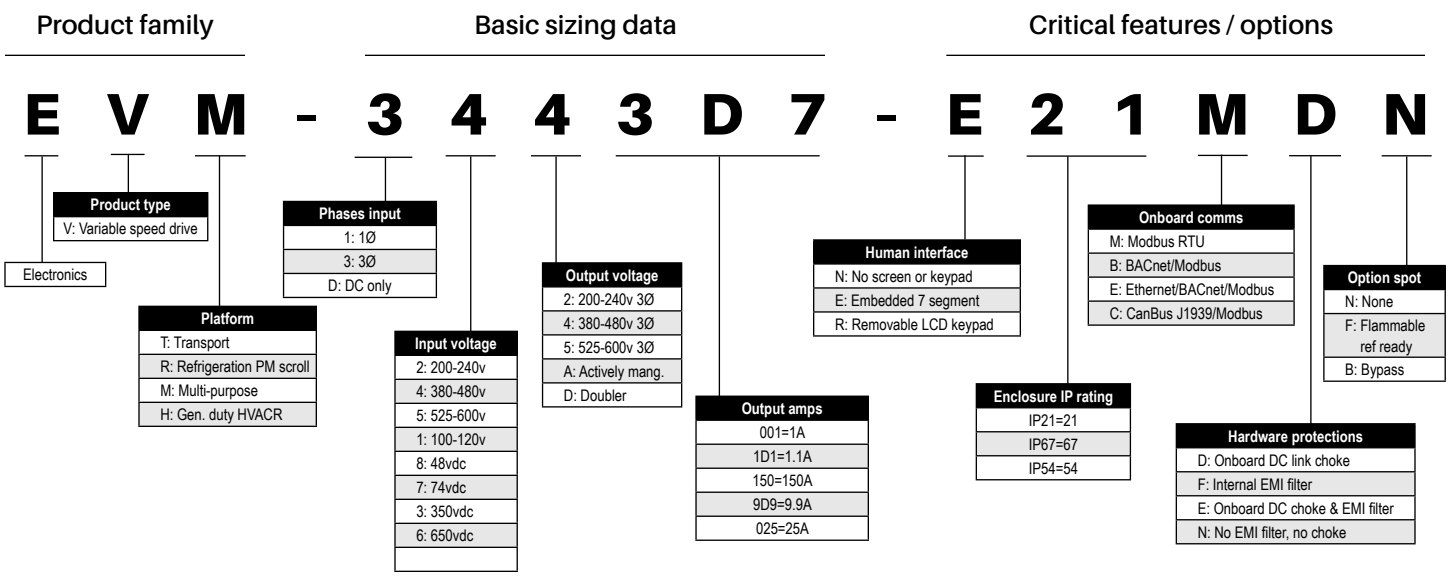
Field installed conductors must be copper rated at 75°C

20201015 Assembled in Dominican Republic

Keypad button overview



Nomenclature



Step 2—Copeland EVM drive installation

Dimensions and weights

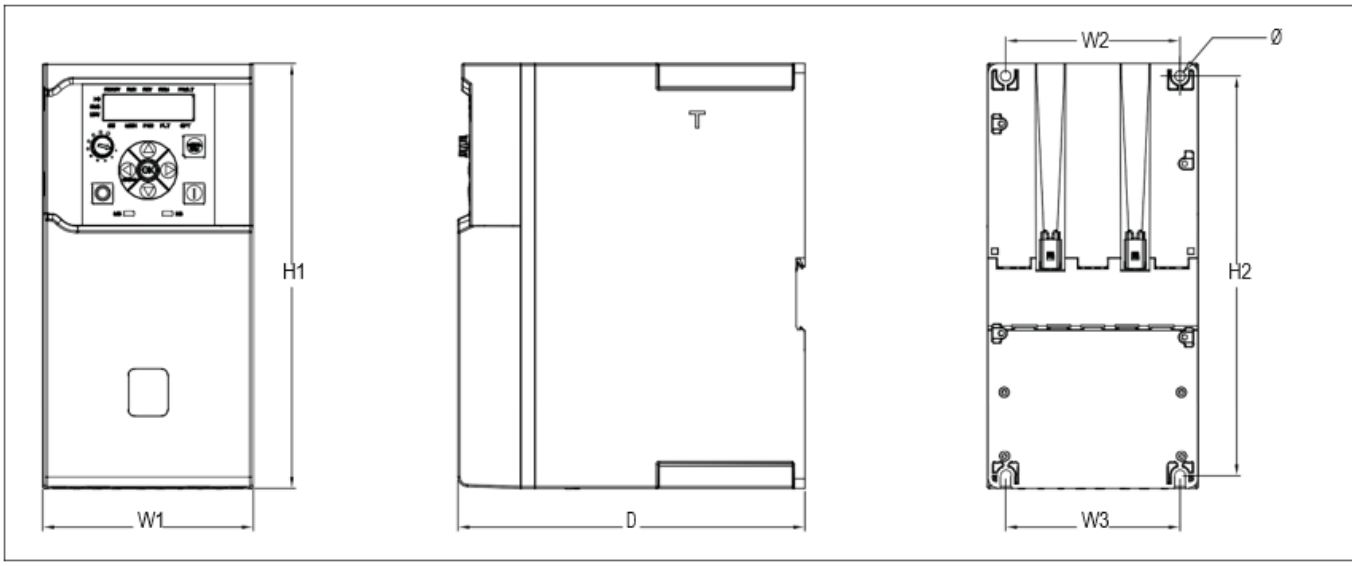


Table 1. Approximate dimensions in inches (mm)

Frame size	D	H1	H2	W1	W2	W3	Ø	Weight lb (kg)
FR1	7.09 (180)	5.98 (152)	5.51 (140)	2.83 (72)	2.26 (57.5)	2.26 (57.5)	0.20 (5.2)	2.6 (1.2)
FR2	7.09 (180)	8.66 (220)	8.15 (207)	4.29 (109)	3.56 (90.5)	3.56 (90.5)	0.22 (5.5)	5.7 (2.6)
FR3	7.09 (180)	10.24 (260)	9.72 (247)	5.12 (130)	4.57 (116)	4.57 (116)	0.22 (5.5)	8.2 (3.7)
FR4	7.68 (195)	11.81 (300)	11.06 (281)	7.24 (184)	6.3 (160)	6.3 (160)	0.24 (6)	13.9 (6.3)

Mounting

For mounting space guidelines, please follow the below diagram and table. Then, find the correct frame size mounting instructions.

- **For EVM drives utilizing an option card, allow 2.76in. (70mm) for dimension A for the option card enclosure.**
- The below guidelines apply unless testing has been completed to validate a design outside of these recommendations. This work must be done in collaboration with Copeland application engineering.

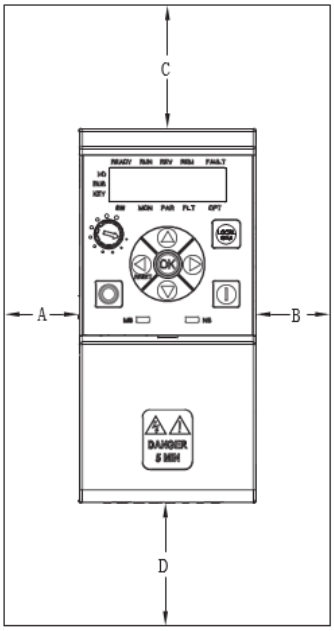


Table 2. Approximate space requirements in inches (mm)

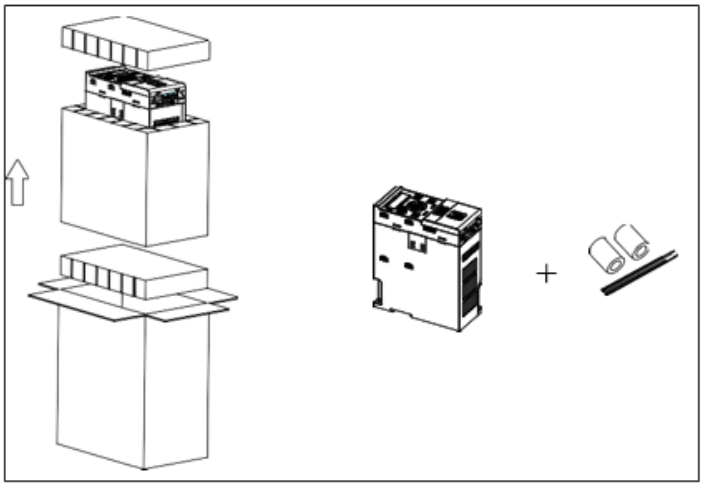
		Mounting clearance				Airflow
Input voltage	**Frame size**	**A in. (mm)**	**B in. (mm)**	**C in. (mm)**	**D in. (mm)**	**CFM (m3/h)**
100 vac to 120 vac, 50/60 Hz 1 phase	FR1	0	0	1.97 (50)	1.97 (50)	14.83 (25.2)
	FR2	0	0	1.97 (50)	1.97 (50)	24.72 (42)
200 vac to 240 vac, 50/60 Hz 1 phase	FR1	0	0	1.97 (50)	1.97 (50)	14.83 (25.2)
	FR2	0	0	1.97 (50)	1.97 (50)	24.72 (42)
	FR3	0	0	1.97 (50)	1.97 (50)	42.37 (72)
200 vac to 240 vac, 50/60 Hz 3 phase	FR1	0	0	1.97 (50)	1.97 (50)	14.83 (25.2)
	FR2	0	0	1.97 (50)	1.97 (50)	24.72 (42)
	FR3	0	0	1.97 (50)	1.97 (50)	42.37 (72)
	FR4	0	0	1.97 (50)	1.97 (50)	75.56 (128.4)
380 vac to 480 vac, 50/60 Hz 3 phase	FR1	0	0	1.97 (50)	1.97 (50)	14.83 (25.2)
	FR2	0	0	1.97 (50)	1.97 (50)	37.43 (63.6)
	FR3	0	0	1.97 (50)	1.97 (50)	58.61 (99.6)
	FR4	0	0	1.97 (50)	1.97 (50)	57.56 (97.8)
525 vac to 600 vac, 50/60 Hz 3 phase	FR2	0	0	1.97 (50)	1.97 (50)	37.43 (63.6)
	FR3	0	0	1.97 (50)	1.97 (50)	58.61 (99.6)
	FR4	0	0	1.97 (50)	1.97 (50)	57.56 (97.8)

Note: For EVM drives utilizing an option card, allow 2.76in. (70mm) for dimension A for the option card enclosure.

FR1 mounting instructions

Step 1

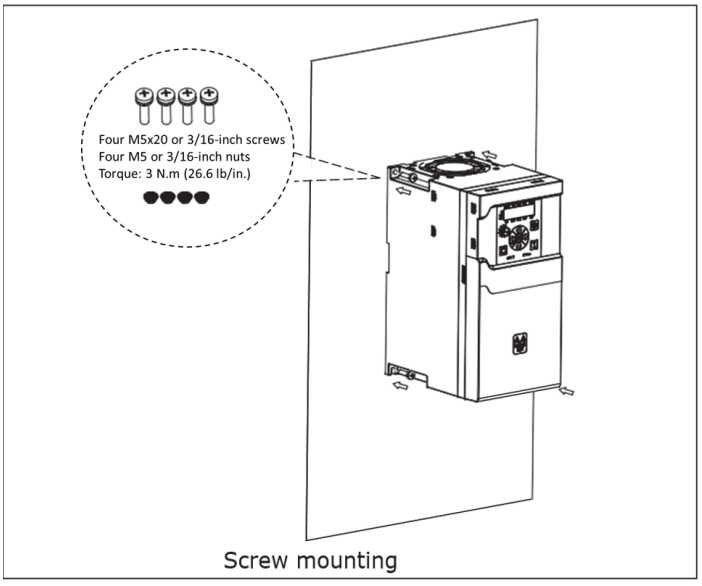
Lift the drive out from the carton and remove the packaging. The magnetic cores and cable ties are only included in EMI version drive.



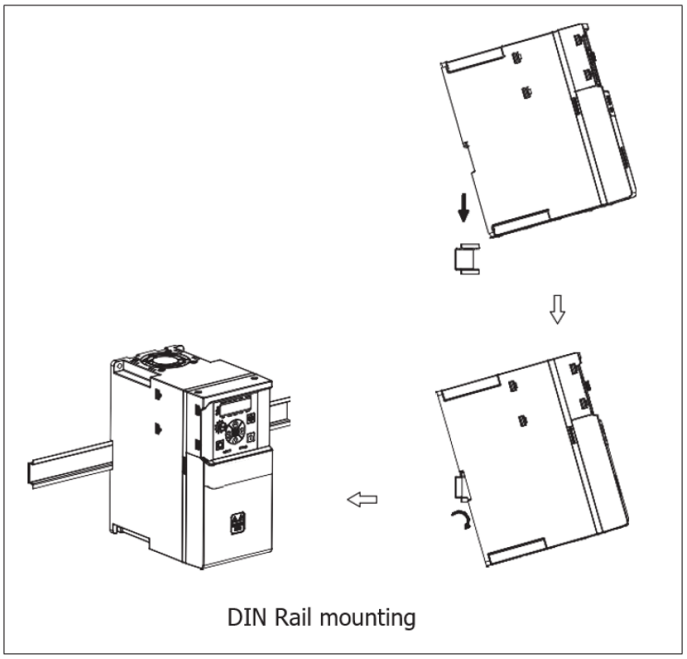
Step 2:

Screw mounting: Attach the drive to the mounting plate with two M5x20 (or 3/16 in.) screws and two M5 (or 3/16 in.) nuts. The opening dimension on the mounting plate should follow required dimension (refer to the dimension drawing in Table 1 of this document).

DIN rail mounting: Lift the drive at an angle about 30 degrees. Align the top hooks of drive DIN rail mounting slot with DIN rail top edge. Push down and rotate the drive to clip the bottom hooks on the bottom DIN rail edge.



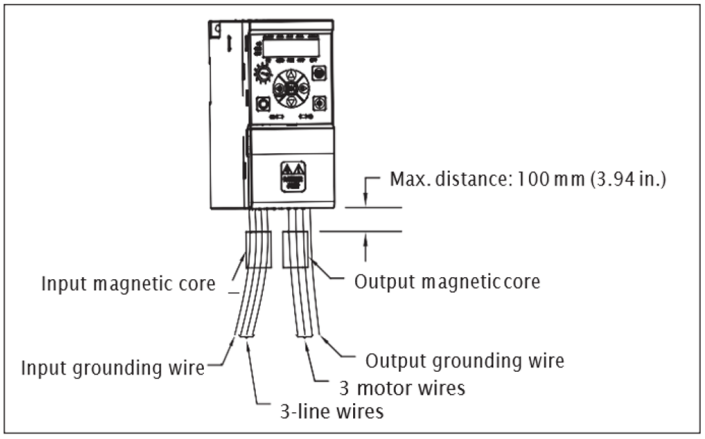
Screw mounting


DIN Rail mounting

Step 3: (EMI version only)

The input wires (including 3-line wires and 1 input grounding wire) should run through the input magnetic core before connecting to input terminal block and grounding hole. Use a cable tie to tie the input magnetic cores to the input wires. The output wires (only 3 motor wires) should run through the output magnetic core before connecting to output terminal block.

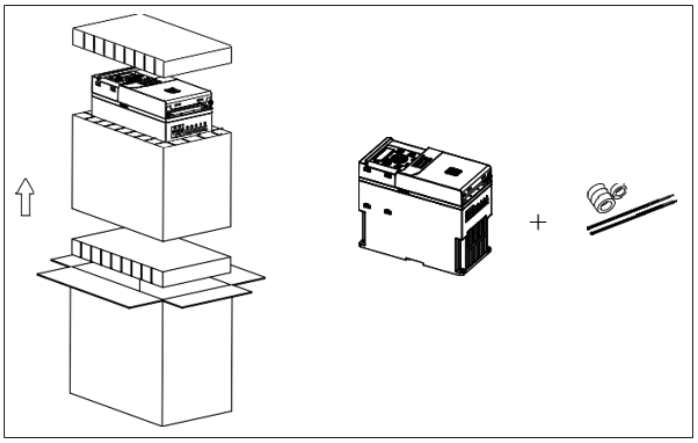
The output grounding wire should not run through the output magnetic core. Use a cable tie to tie the output magnetic cores to the output wires. The maximum distance between input/output magnetic cores top surface and drive bottom surface is 100 mm (3.94 in.). The input magnetic core and output magnetic or are the same for FR1.



FR2 mounting instructions

Step 1:

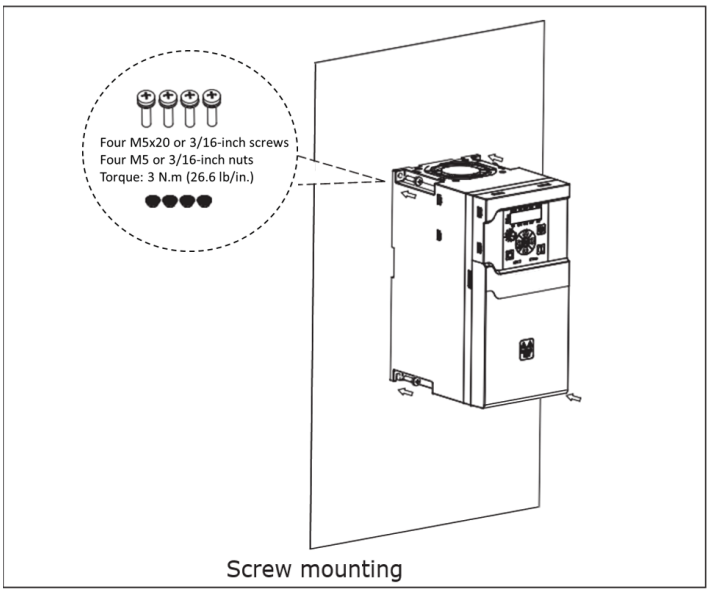
Lift the drive out from the carton, and remove the packaging. The magnetic cores and cable ties are only included in EMI version drive.



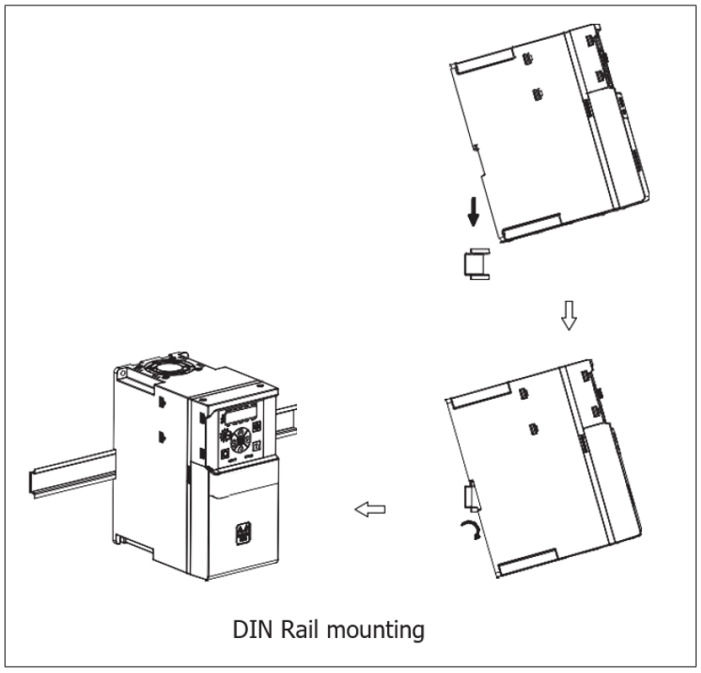
Step 2:

Screw mounting: Attach the drive to the mounting plate with four M5X20 (or 3/16 in.) screws and four M5 (or 3/16 in.) nuts. The opening dimension on the mounting plate should follow required dimension (refer to the dimensions in Table 1).

DIN Rail mounting: Lift the drive at an angle about 30 degrees. Align the top hooks of drive DIN rail mounting slot with DIN rail top edge. Push down and rotate the drive to clip the bottom hooks on the bottom DIN rail edge.



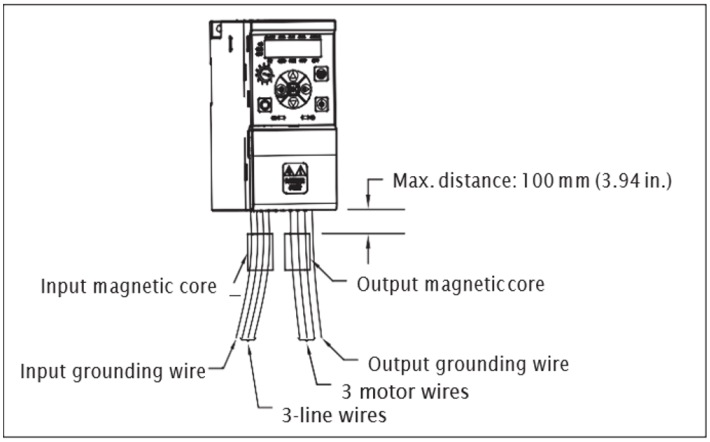
Screw mounting


DIN Rail mounting

Step 3: (EMI version only)

The input wires (including 3-line wires and 1 input grounding wire) should run through the input magnetic core before connecting to input terminal block and grounding hole. Use a cable tie to tie the input magnetic cores to the input wires. The output wires (only 3 motor wires) should run through the output magnetic core before connecting to output terminal block.

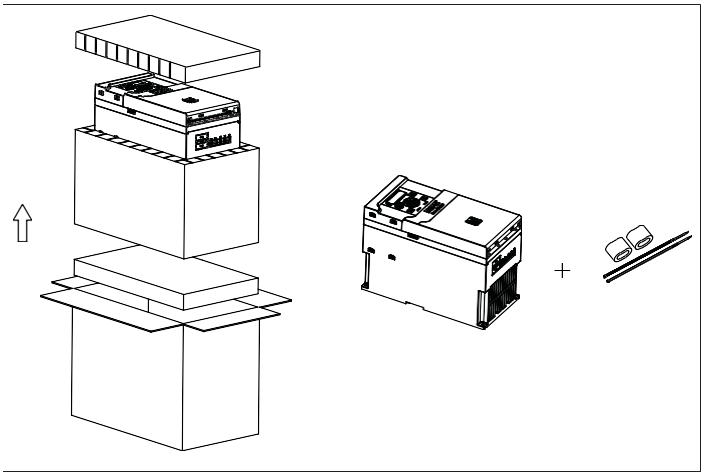
The output grounding wire should not run through the output magnetic core. Use a cable tie to tie the output magnetic cores to the output wires. The maximum distance between input / output magnetic cores top surface and drive bottom surface is 100 mm (3.94 in.). The height of input magnetic core is bigger than output magnetic core for 3 phase FR2 EMI version, but they are the same for 1 phase FR2 EMI version.



FR3 mounting instructions

Step 1:

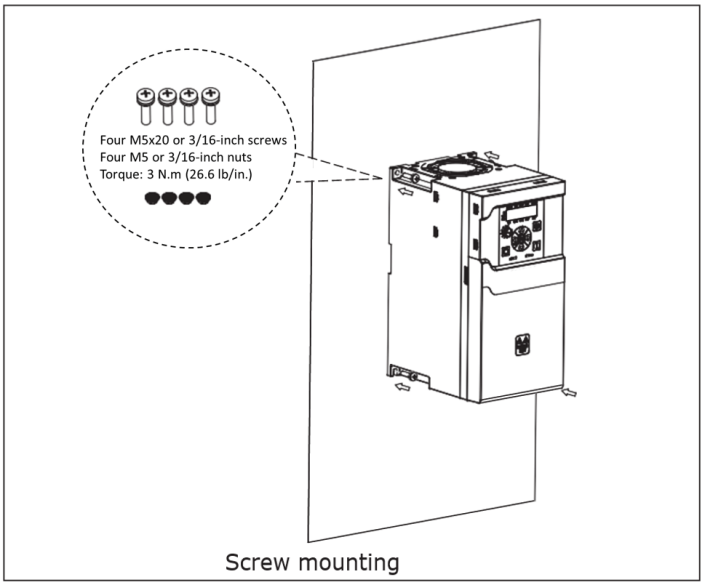
Lift the drive out from the carton, and remove the packaging. The magnetic cores and cable ties are only included in EMI version drive.



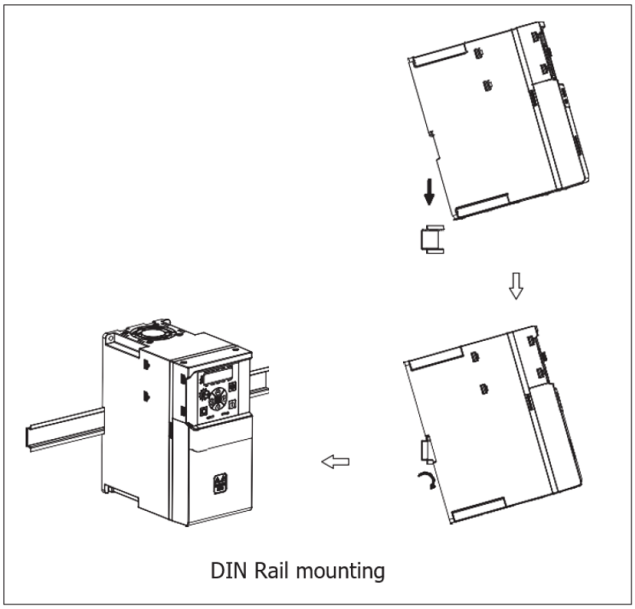
Step 2:

Screw mounting: Attach the drive to the mounting plate with four M5X20 (or 3/16 in.) screws and four M5 (or 3/16 in.) nuts. The opening dimension on the mounting plate should follow required dimension (refer to the dimension drawing in Table 1 of this document).

DIN rail mounting: Lift the drive at an angle about 30 degrees. Align the top hooks of drive DIN rail mounting slot with DIN rail top edge. Push down and rotate the drive to clip the bottom hooks on the bottom DIN rail edge



Screw mounting


DIN Rail mounting

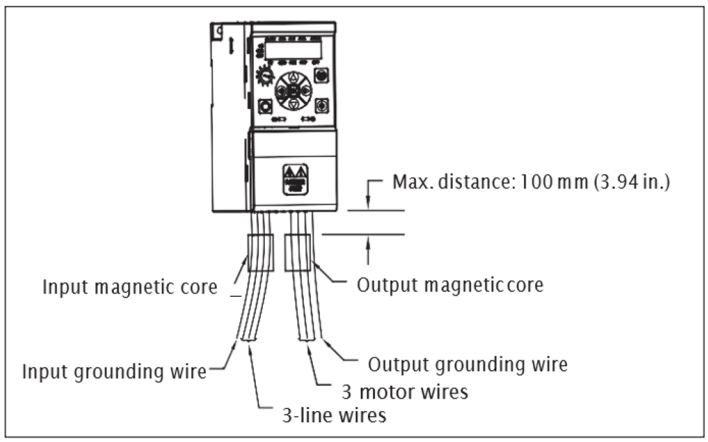
Step 3: (EMI version only)

The input wires (including three-line wires and one input grounding wire) should run through the input magnetic core before connecting to input terminal block and grounding hole. Use a cable tie to tie the input magnetic cores to the input wires.

For 3-phase FR3 EMI version, the output wires (only three motor wires) should run through the output magnetic core before connecting to output terminal block. The output grounding wire should not run through the output magnetic core. Use a cable tie to tie the output magnetic cores to the output wires. For 1-phase FR3 EMI version, there is no output magnetic core. The motor wires and output grounding wire can be connected to corresponding terminals directly.

The maximum distance between input / output magnetic cores top surface and drive bottom surface is 100 mm.

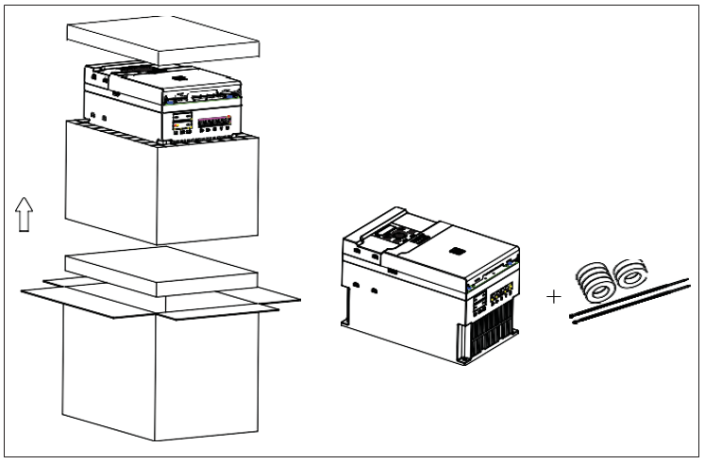
The input magnetic core and output magnetic core are the same for 3-phase FR3 EMI version.



FR4 mounting instructions

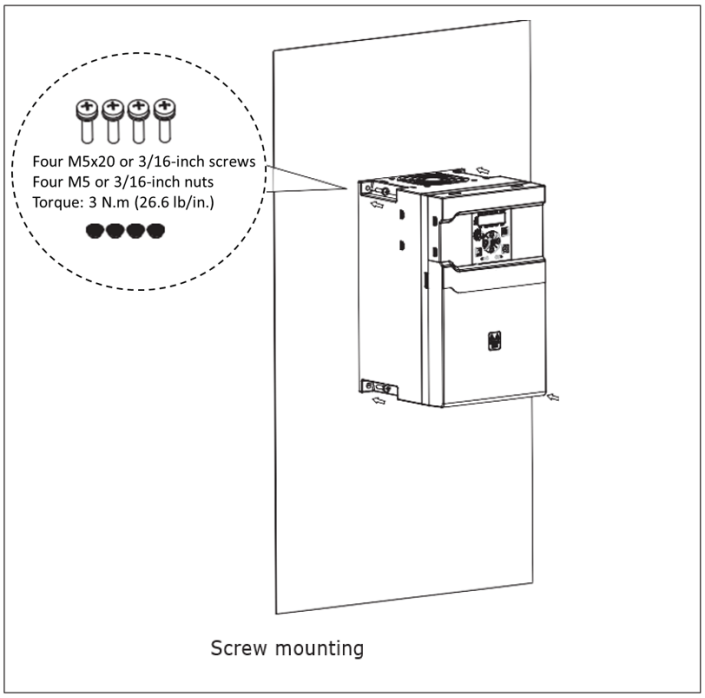
Step 1:

Lift the drive out from the carton, and remove the packaging. The magnetic cores and cable ties are only included in EMI version drive.



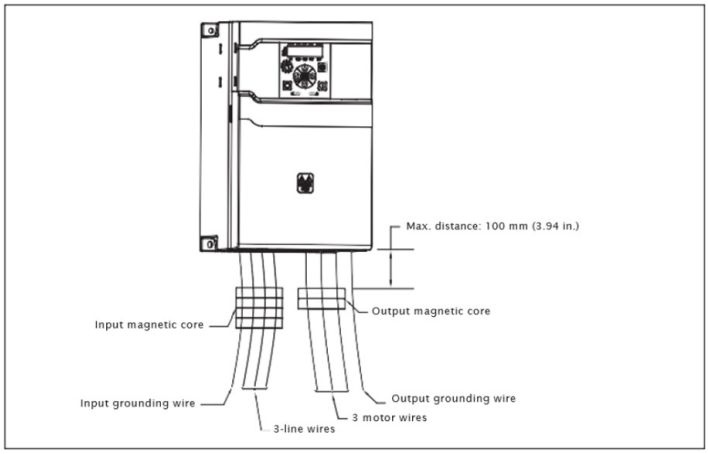
Step 2:

Screw mounting: Attach the drive to the mounting plate with four M5x20 (or 3/16 in.) screws and four M5 (or 3/16 in.) nuts. The opening dimension on the mounting plate should follow required dimension (refer to the dimension drawing in the instruction leaflet).



Step 3: (EMI version only)

The input wires (including 3-line wires and 1 input grounding wire) should run through the input magnetic core before connecting to input terminal block and grounding hole. Use a cable tie to tie the input magnetic cores to the input wires. The output wires (only 3 motor wires) should run through the output magnetic core before connecting to output terminal block. The output grounding wire should not run through the output magnetic core. Use a cable tie to tie the output magnetic cores to the output wires. The maximum distance between input / output magnetic cores top surface and drive bottom surface is 100 mm (3.94 in.). The height of input magnetic core is bigger than output magnetic core for FR4.



Mounting instruction for option cards

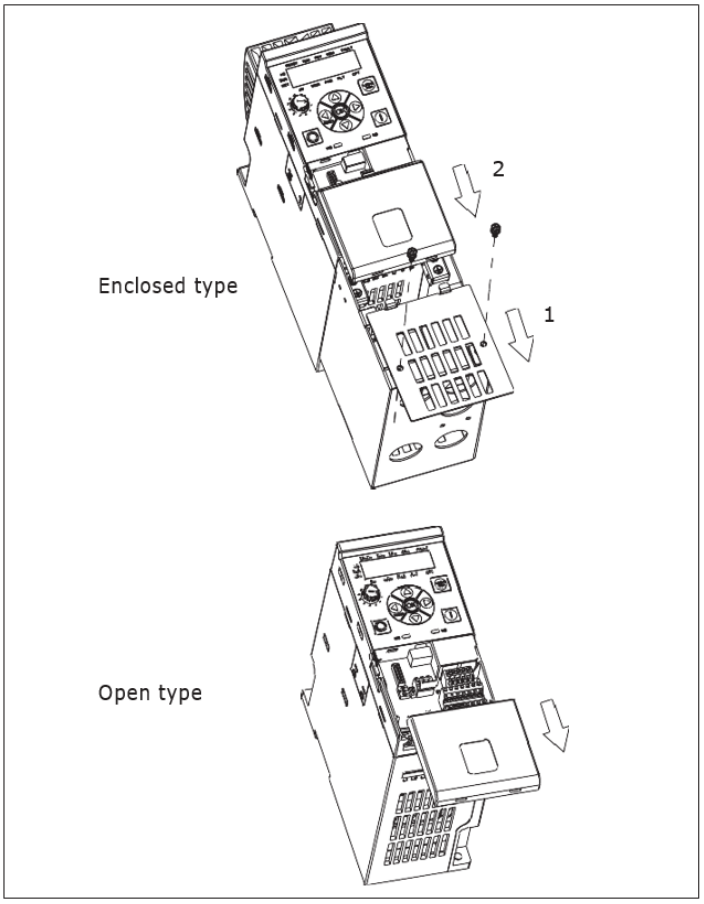
Step 1:

For enclosed type:

Remove the front cover (1) from NEMA 1 kit, then remove the terminal cover (2) from drive.

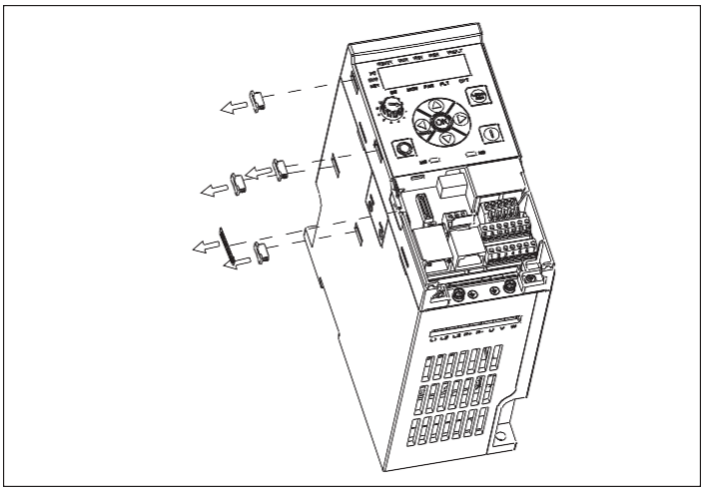
For open type:

Only remove the terminal cover.



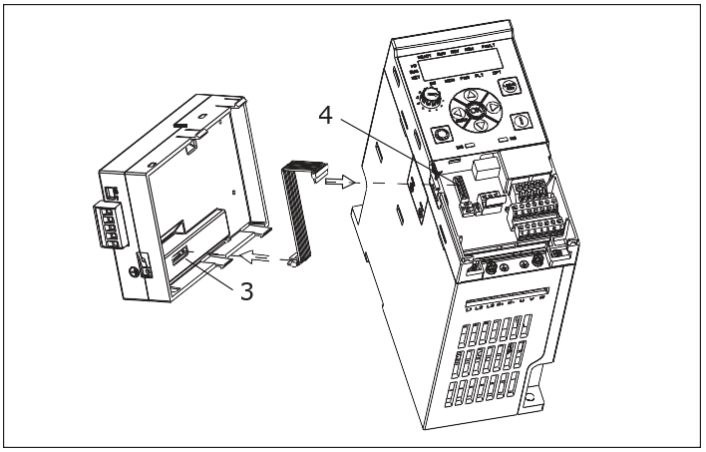
Step 2:

Remove the option card port label and four snap covers from the drive.



Step 3:

Connect the cable to option card connector (3) and MCU board connector (4).



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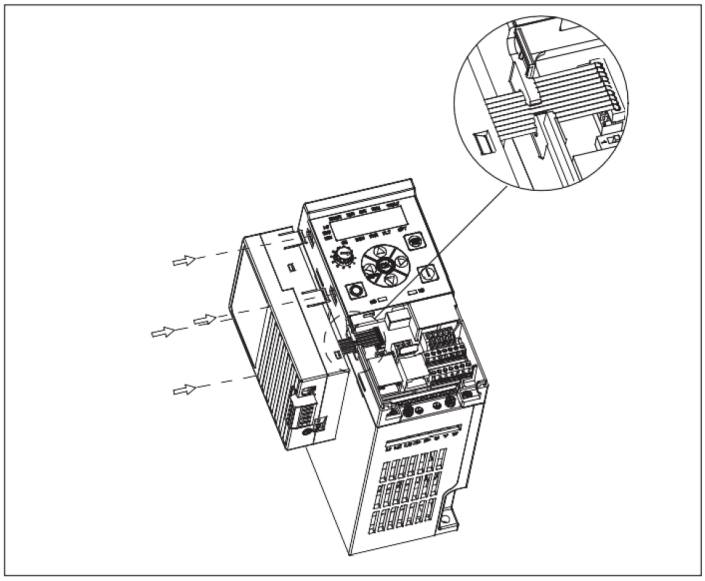
Step 4:

Clamp the cable with the optional card port. Mount the option card to the drive by inserting the four snaps into the slots on drive.



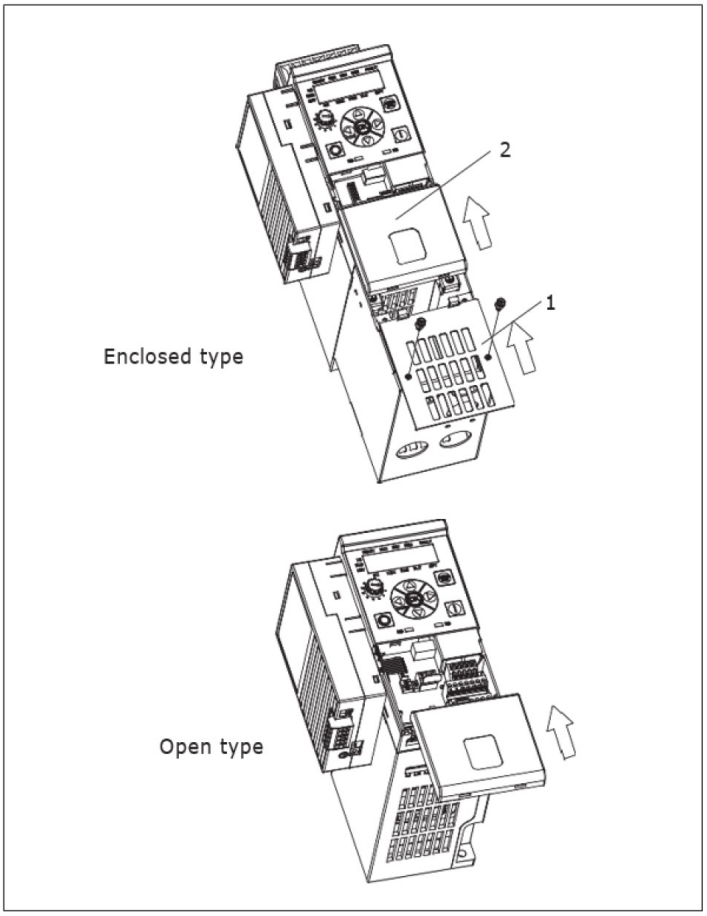
Step 5:

For enclosed type:

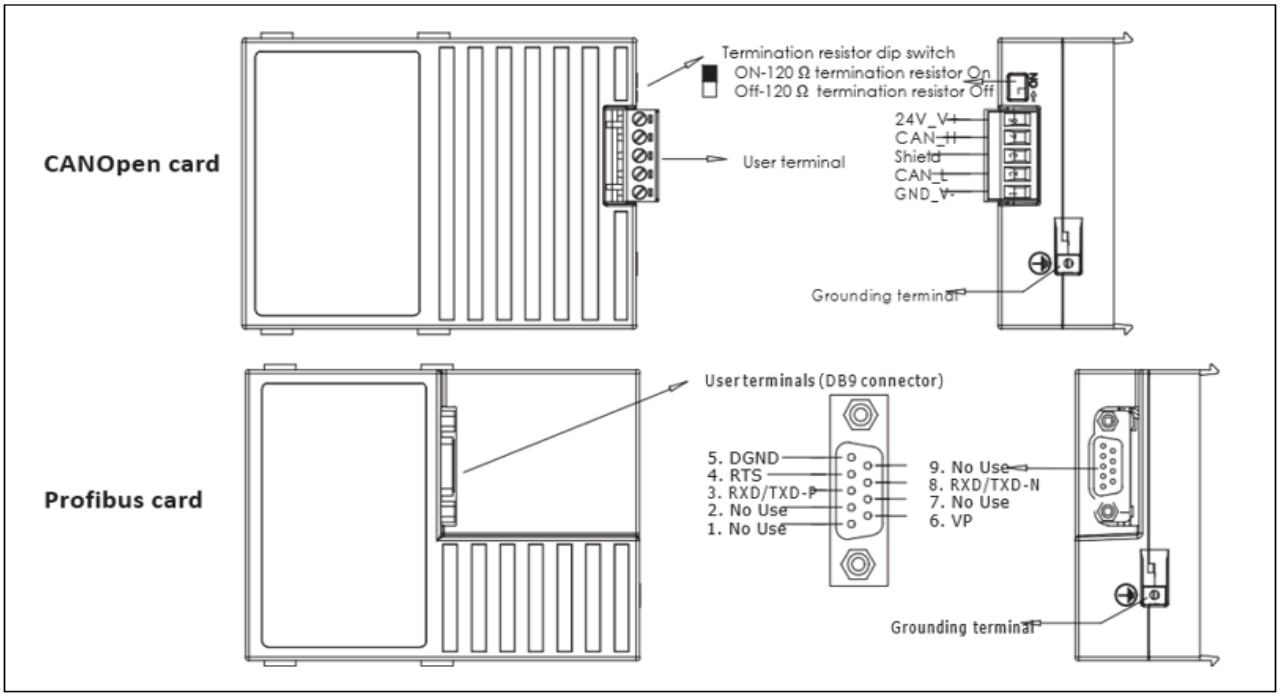
Install the terminal cover (1) to the drive, then install the front cover (2) to NEMA 1 kit.

For open type:

Only install the terminal cover to the drive.

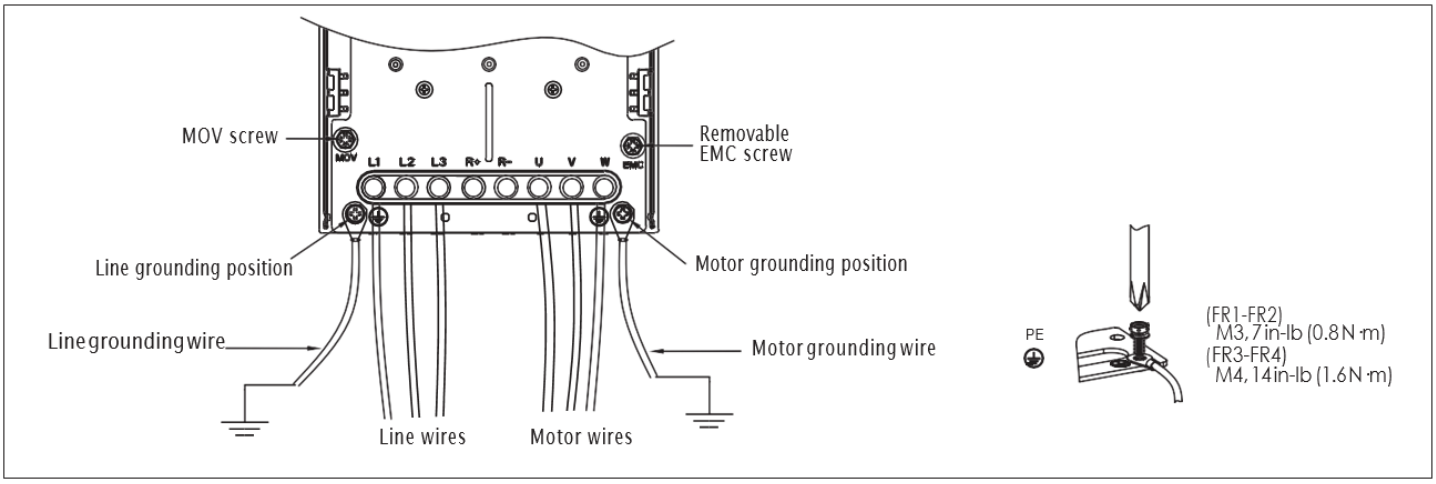


Option card wiring instruction



Ground wiring

en **Warning!** Connect only in voltage-free state!



Input power and motor cable stripping lengths

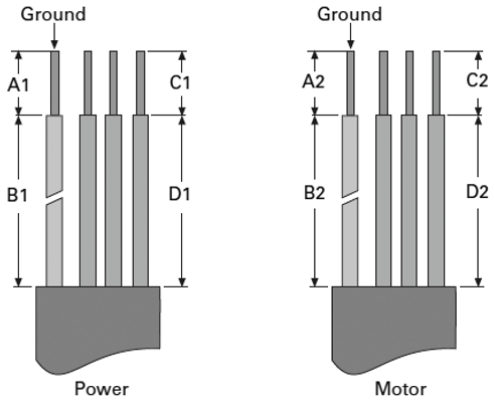


Table #. Stripping lengths

Frame size	Power wiring in inches (mm) A1	B1	C1	D1	Motor wiring in inches (mm) A2	B2	C2	D2
FR1	0.39 (10)	2.76 (70)	0.3 (10)	2.76 (70)	0.39 (10)	2.76 (70)	0.39 (10)	2.76 (70)
FR2	0. 47 (12)	2.76 (70)	0. 4 (12)	2.76 (70)	0.47 (12)	2.76 (70)	0. 47 (12)	2.76 (70)
FR3	0. 47 (12)	3.54 (90)	0.4 (12)	3.54 (90)	0.47 (12)	3.54 (90)	0.47 (12)	3.54 (90)
FR4	0. 79 (20)	4.53 (115)	0. 7 (20)	4.53 (115)	0. 79 (20)	4.53 (115)	0. 79 (20)	4.53 (115)

Power connection tightening torque

Size	Power wire in -lb (Nm)	Ground wire in -lb (Nm)	Control wire in -lb (Nm)
FR1	4.4 (0.5)	7.1 (0.8)	1.73 (0.2)
FR2	10.5 (1.2)	7.1 (0.8)	1.73 (0.2)
FR3	10.5 (1.2)	14.2 (1.6)	1.73 (0.2)
FR4	33 (3.73)	14.2 (1.6)	1.73 (0.2)

Notes:

- Strip the motor and power cables as shown above.
- Both UL and IEC tools may be used
- Applies to strained wire, solid wire, or ferrule installations

Circuit breaker sizing

The circuit breaker selected must be in accordance with the National Electric Code (NEC) requirements. The NEC determines that circuit breakers should handle 80% of their rated capacity for continuous loads and 100% for intermittent loads. NEC Articles 210.20, 215.3, and 430 address the NEC requirements in more detail. For safety reasons, it is recommended to assume all loads are continuous.

To explain the process for finding the minimum breaker size necessary, you do the following:

1. Find your total current load of the circuit (ex: 13.7).
2. Multiply your current load by 1.25 to find your minimum breaker size (ex: 13.7*1.25=17.125).
3. Find the correct breaker to match the size you found in #2. If it is not a standard size, per the NEC, you would select the next standard size up. For our example, we would select a 20A breaker.

Cable and fuse guidelines

North America cable fuse sizes

Input rating		UL application								
Input voltage	**Frame size**	**CT/IH current amps**	**VT/IL current amps**	**CT/IH current amps**	**VT/IL current amps**	**Recommended fuse (Max. rating) 100 kAIC③**	**NEC wire size line and motor AWG**	**NEC wire size ground AWG**	**Terminal size line and motor AWG**	**Terminal size ground AWG**
100 Vac to 120 Vac 50/60 Hz 1 phase	FR1	1.6	2.5	6.4	9.6					
		3	4.8	12	20					
	FR2	4.8	6.9	20	29					
		6.9	7.8	29	34.3					
200 Vac to 240 Vac 50/60 Hz 1 phase	FR1	1.6	2.5	3.2	5					
		3	4.8	6	9.6					
		4.8	7.8	10	16					
	FR2	7.8	11	16	23					
		11	17.5	23	35					
	FR3	17.5	25.3	39.6	49.6					
200 Vac to 240 Vac 50/60 Hz 3 phase	FR1	1.6	2.5	2.1	3.3	6	14	14	18-8	16-10
		3	4.8	3.9	5.8	15	14	14	18-8	16-10
		4.8	7.8	5.8	9.4	20	14	12	18-8	16-10
		7.8	11	9.4	13.2	30	12	10	18-8	16-10
	FR2	11	17.5	12.7	20.1	40	10	10	20-6	12-8
		17.5	25.3	20.1	29.1	60	8	10	20-6	12-8
	FR3	25.3	32.2	29.1	37	70	8	8	20-6	10-8
	FR4	32.2	48.3	35.4	53.1	100	4	8	20-2	8-6
		48.3	62.1	53.1	68.3	125	3	6	20-2	8-6
380 Vac to 480 Vac 50/60 Hz 3 phase	FR1	1.5	2.2	1.8	2.6	6	14	14	18-8	16-10
		2.2	4.3	2.6	5.2	10	14	14	18-8	16-10
		4.3	5.6	5.2	6.7	15	14	14	18-8	16-10
		5.6	7.6	6.7	9.1	30	14	10	18-8	16-10
	FR2	7.6	12	9.1	14.4	30	12	10	20-6	12-8
		12	16	14.4	19.2	40	10	10	20-6	12-8
		16	23	19.2	27.6	60	8	10	20-6	12-8
	FR3	23	31	26.5	35.7	70	8	8	20-6	10-8
	FR4	31	38	35.7	43.7	70	6	8	20-2	8-6
		38	46	43.7	52.9	80	4	8	20-2	8-6
525 Vac to 600 Vac 50/60 Hz 3 phase	FR2	1.7	2.7							
		2.7	4.5							
		4.5	7.5							
		7.5	10							
		10	13.5							
	FR3	13.5	18							
	FR4	18	22							
		22	27							

Notes:

- Line and motor cable size is selected according to UL 508C table 40.3 for copper conductor rated 75°C. Use only with copper wire rated 75°C here. Size requirements for other different wire types are defined in the National Electrical Code, ANSI/NFPA 70.
- Earthing conductor size is determined by the maximum overcurrent device rating used ahead of the drive according to UL 508C Table 6.4.
- If power cubes or bypass are used, a UL listed class RK5, J, T or equivalent fuse is recommended.

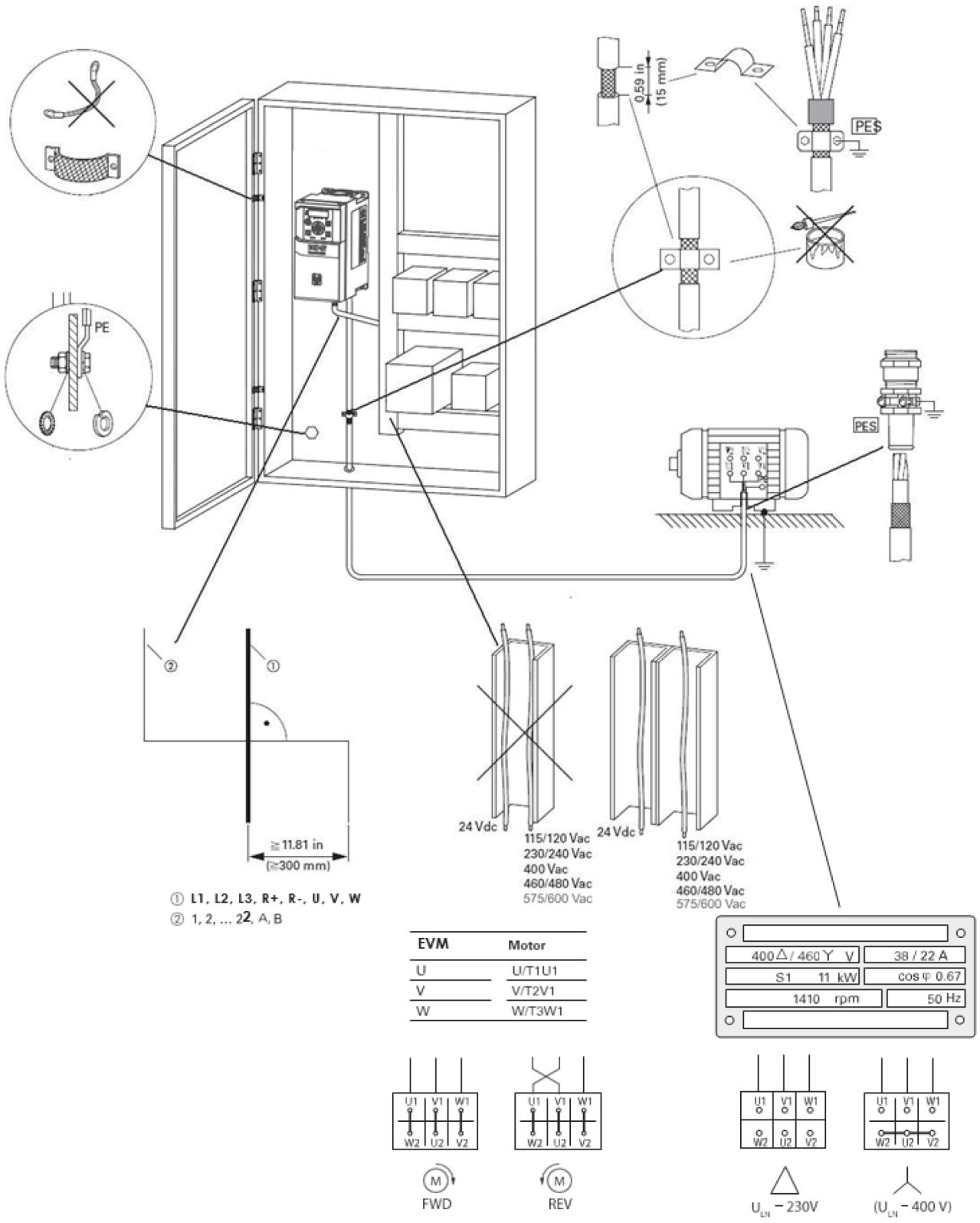
International cable fuse sizes

Input rating		IEC application							
Input voltage	**Frame size**	**CT/IH current amps**	**VT/IL current amps**	**CT/IH current amps**	**VT/IL current amps**	**Recommended fuse (Max. rating) 100 kAIC**	**IEC cable size Ground mm²**	**Terminal size Line and motor mm²**	**Terminal size Ground mm²**
100 Vac to 120 Vac 50/60 Hz 1 phase	FR1	1.6	2.5	6.4	9.6	30	2.5	0.2-6	TBD
		3	4.8	12	20	70	6	0.2-6	TBD
	FR2	4.8	6.9	20	29	90	10	0.5-16	TBD
		6.9	7.8	29	34.3	125	10	0.5-16	TBD
200 Vac to 240 Vac 50/60 Hz 1 phase	FR1	1.6	2.5	3.2	5	15	2.5	0.2-6	TBD
		3	4.8	6	9.6	30	2.5	0.2-6	TBD
		4.8	7.8	10	16	60	4	0.2-6	TBD
	FR2	7.8	11	16	23	80	6	0.5-16	TBD
		11	17.5	23	35	125	10	0.5-16	TBD
	FR3	17.5	25.3	39.6	49.6	200	16	0.5-16	TBD
200 Vac to 240 Vac 50/60 Hz 3 phase	FR1	1.6	2.5	2.1	3.3	6	2.5	0.2-6	1.5-6.0
		3	4.8	3.9	5.8	15	2.5	0.2-6	1.5-6.0
		4.8	7.8	5.8	9.4	20	2.5	0.2-6	1.5-6.0
		7.8	11	9.4	13.2	30	4	0.2-6	1.5-6.0
	FR2	11	17.5	12.7	20.1	40	6	0.5-16	4.0-10
		17.5	25.3	20.1	29.1	60	10	0.5-16	4.0-10
	FR3	25.3	32.2	29.1	37	70	10	0.5-16	6.0-10
	FR4	32.2	48.3	35.4	53.1	100	16	0.5-35	10-16
		48.3	62.1	53.1	68.3	125	16	0.5-35	10-16
380 Vac to 480 Vac 50/60 Hz 3 phase	FR1	1.5	2.2	1.8	2.6	6	2.5	0.2-6	1.5-6.0
		2.2	4.3	2.6	5.2	10	2.5	0.2-6	1.5-6.0
		4.3	5.6	5.2	6.7	15	2.5	0.2-6	1.5-6.0
		5.6	7.6	6.7	9.1	30	2.5	0.2-6	1.5-6.0
	FR2	7.6	12	9.1	14.4	30	4	0.5-16	4.0-10
		12	16	14.4	19.2	40	6	0.5-16	4.0-10
		16	23	19.2	27.6	60	10	0.5-16	4.0-10
	FR3	23	31	26.5	35.7	70	10	0.5-16	6.0-10
	FR4	31	38	35.7	43.7	70	16	0.5-35	10-16
		38	46	43.7	52.9	80	16	0.5-35	10-16
525 Vac to 600 Vac 50/60 Hz 3 phase	FR2	1.7	2.7						
		2.7	4.5						
		4.5	7.5						
		7.5	10						
		10	13.5						
	FR3	13.5	18						
	FR4	18	22						
		22	27						

Notes:

- Line and motor cable size is selected according to IEC 60364-5-52:2009 table B.52.4 for copper conductor with PVC insulation with a wiring condition of ambient temperature 30°C in air and an installation method of "B2" (cables in conduit and cable trunking systems). For other wiring conditions, please refer to the standard of IEC 60364-5-52:2009 for suitable cable sizes.
- Earthing conductor size is determined by the cross-sectional area of phase conductors according to IEC/EN 61800-5-1:2007 Table 5. So, if phase conductor size is changed, earthing conductor size should also be changed accordingly.
- If power cubes or bypass are used, a class gG/gL fuse is recommended.

Drive to motor connection panel mount

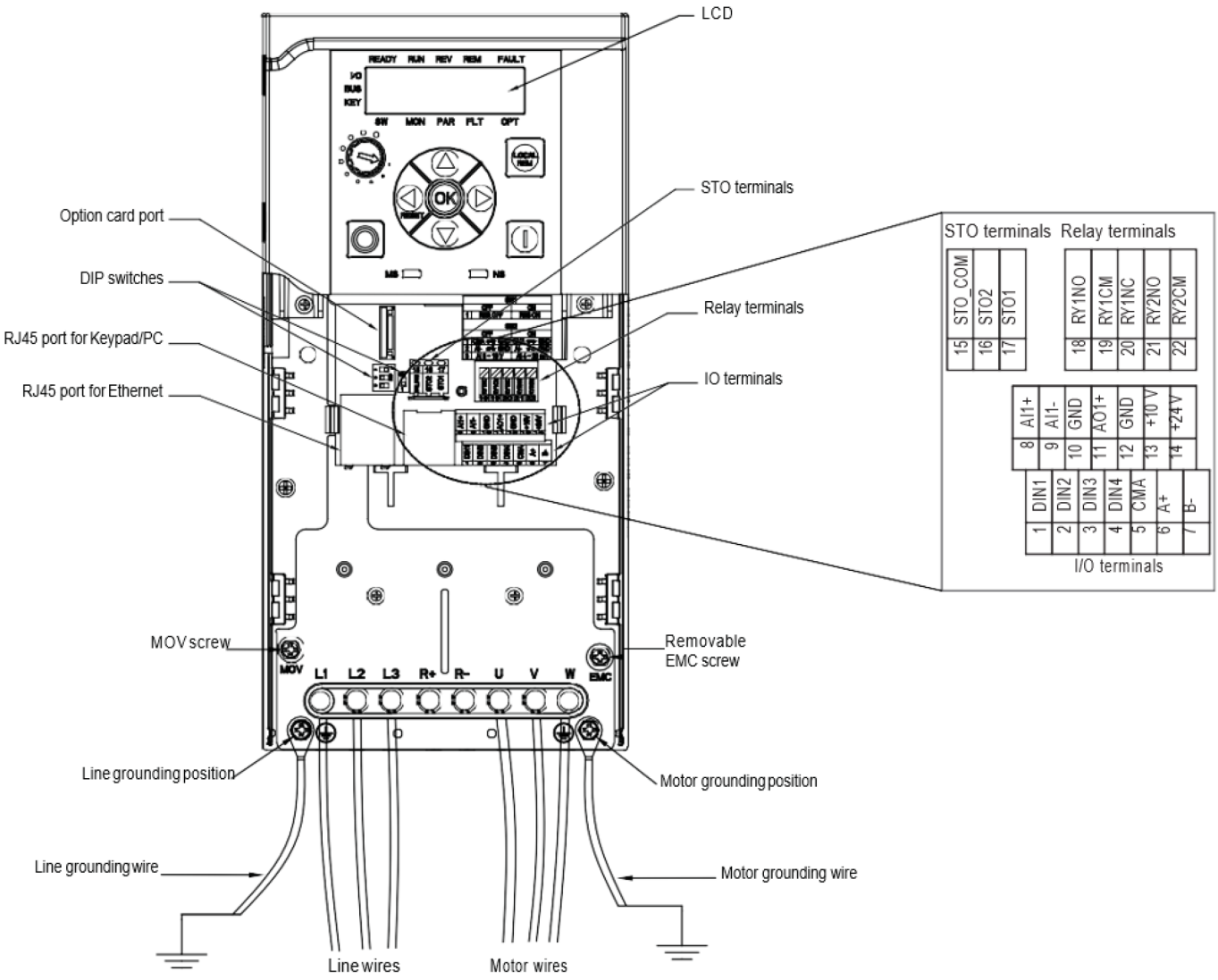


Verifying rotation

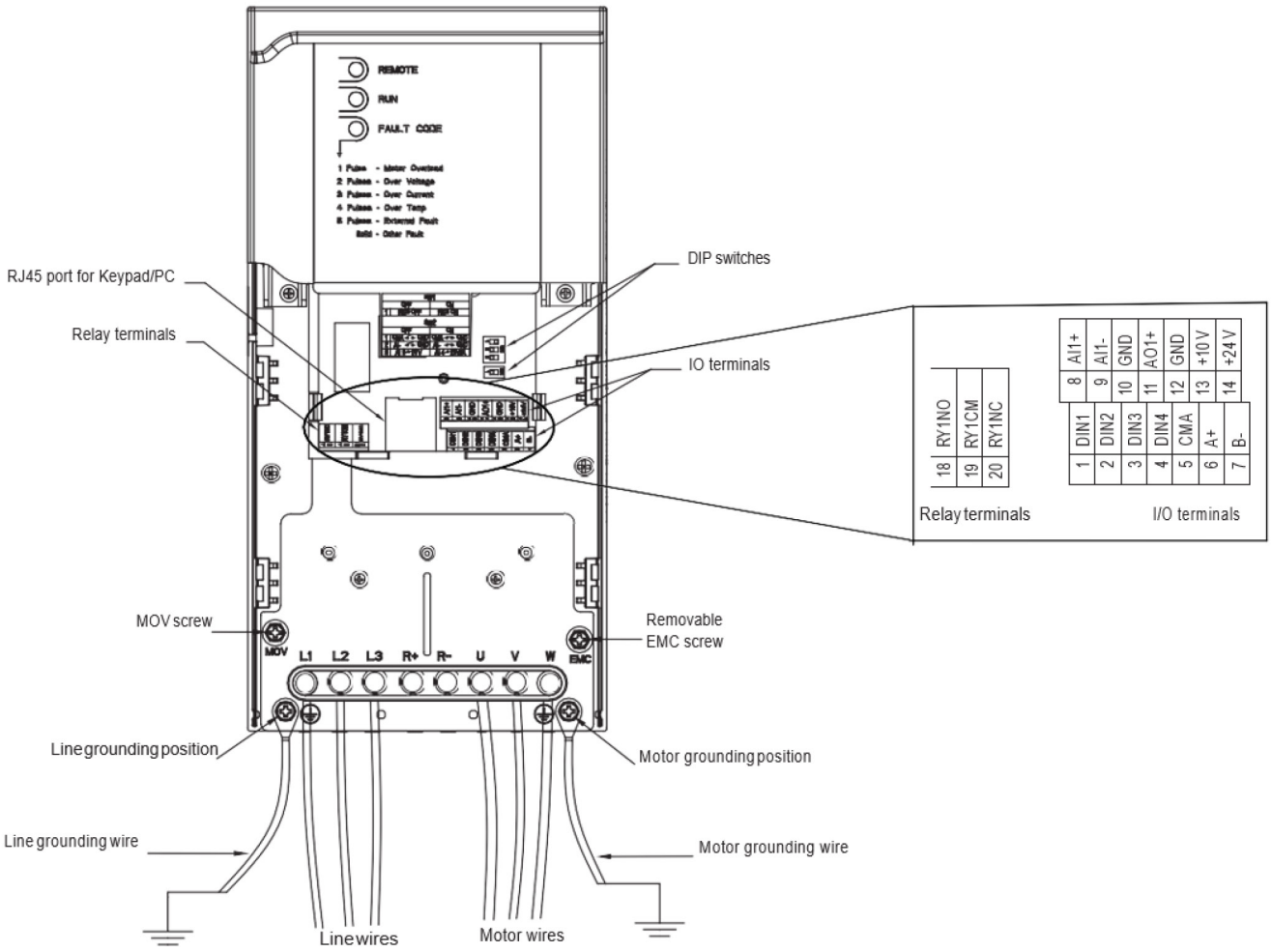
When starting the compressor up for the first time, verify it is running in the correct direction. For pumps or compressors, verify your discharge pressure starts to increase and your suction decreases. For fans, make sure it is blowing air in the correct direction. If it is running in reverse, please see the box in the above diagram.

Step 3—control board layouts

EVM Pro face plate

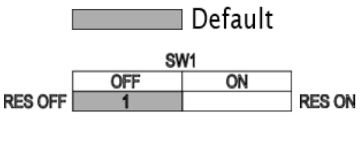


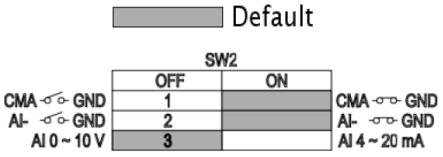
EVM face plate



Factory-set control terminal functions

I/O Connection





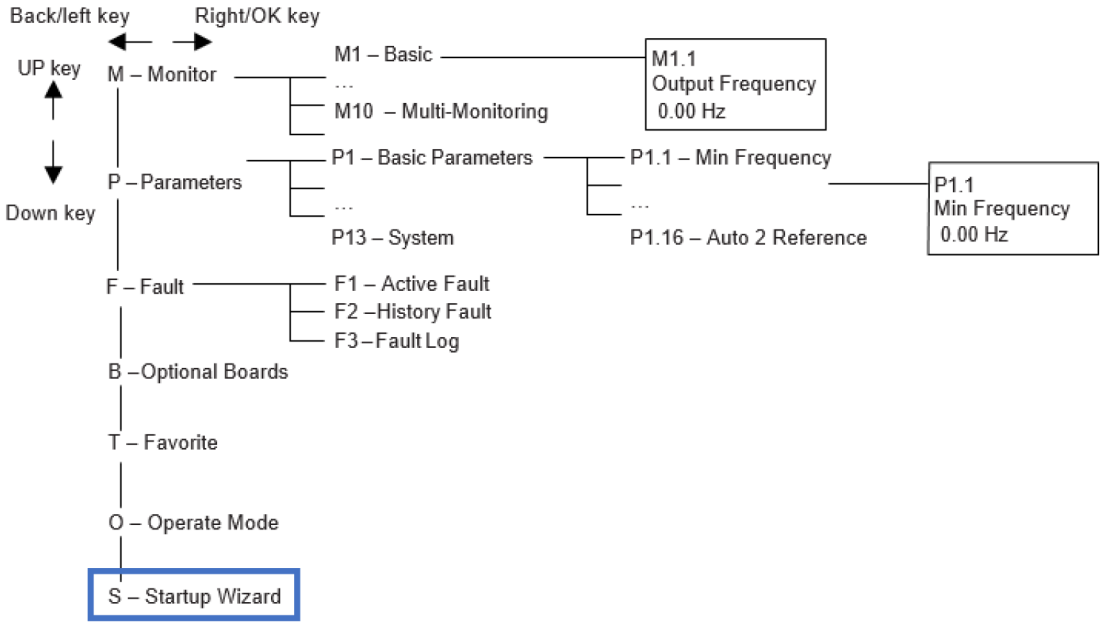
External wiring	Terminal	Short name	Name	Default setting	Description
	1	DI1	Digital input 1	Run forward	Starts the motor in the forward direction.
	2	DI2	Digital input 2	Run reverse	Start the motor in the reverse direction.
	3	DI3	Digital input 3	External fault	Triggers a fault in the drive.
	4	DI4	Digital input 4	Fault reset	Resets active faults in the drive.
	5	CMA	DI1 to DI4 common	Grounded	Allows for sourced input.
	6	A	RS-485 signal A	—	Fieldbus communication (Modbus RTU, BACNet).
	7	B	RS-485 signal B	—	Fieldbus communication (Modbus RTU, BACNet).
Res	8	AI1+ ①	Analog input 1	0 - 10 V	Voltage speed reference (programmable to 4 mA to 20 mA).
	9	AI1-	Analog input 1 ground	—	Analog input 1 common (ground).
	10	GND	I/O signal ground	—	I/O ground for reference and control.
	11	AO1+	Analog output 1	Output frequency	Shows output frequency to motor 0 - 60 Hz (4 mA to 20 mA).
	12	GND	I/O signal ground	—	I/O ground for reference and control.
	13	10 V	10 Vdc reference output	10.3 Vdc +/- 3%	10 Vdc reference voltage.
	14	24 V	24 Vdc control output	24 Vdc In/Out	Control voltage input/output (100 mA max.).
	15	STO_com	Safe torque common	—	Safe torque Off common.
	16	STO2	Safe torque Off 2	—	Safe torque Off 2 input.
	17	STO1	Safe torque Off 1	—	Safe torque Off 1 input.
	18	R1NO	Relay 1 normally open	Run	Changes state when the drive is in the run state.
	19	R1CM	Relay 1 common		
	20	R1NC	Relay 1 normally closed		
	21	R2NO	Relay 2 normally open	Fault	Changes state when the drive is in the fault state.
	22	R2CM	Relay 2 common		

Notes:

- The above wiring demonstrates a SINK configuration. It is important that CMA is wired to ground (as shown by dashed line). If a SOURCE configuration is desired, wire 24 V to CMA and close the inputs to ground. When using the +10 V for AI1, it is important to wire AI1- to ground (as shown by dashed line).
- AI1+ support 10 K potentiometer.

Step 4 —startup and setup of drive

Main menu navigation for startup



Startup Wizard

In the Startup Wizard, you will be prompted for essential information needed by the drive so that it can start controlling your process. In the wizard, you will need the following keypad buttons:

Up/Down buttons
Use these to change value

OK button
Confirm selection and enter into next question

Back/Reset button
If this was pressed at the first question, the Startup Wizard will be cancelled

Once you have connected power to your Copeland EVM frequency converter and the Startup Wizard is enabled, follow these instructions to easily set up your device.

Startup Wizard instructions

For any further explanations of the below items, please see Copeland AE bulletin AE-1456. Information for some items can be found in Copeland mobile or OPI for the specific compressor model. For general motors, on the nameplate.

Par.	Par. Name	Min Value	Max Value	Default	Description
P13.1.7	Par. Password PIN	0	9999	0	Set a password: By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9999. To deactivate the password, reset the parameter value to 0
P1.1	Minimum Freq	0.00 Hz	400 HZ	0.00 Hz	These define the frequency limits of the drive. These will limit other frequency parameter settings; preset speeds, jog speed, 4 mA fault preset speed, fire mode speed, and brake speed settings.
P1.2	Max Freq.	0.00 Hz	400.00 Hz	MaxFreqMFG	These define the frequency limits of the drive. The minimum frequency must be below the maximum frequency level. These will limit other frequency parameter settings; preset speeds, jog speed, 4 mA fault preset speed, fire mode speed, and brake speed settings.
P1.6	Motor Nominal Current	DriveNomCurrCT* 1/10A	DriveNomCurrCT* 2A	DriveNomCurrCT	Motor nominal nameplate full load current. Find this value on the rating plate of the motor.
P1.7	Motor Nominal Speed	300 RPM	20,000 RPM	MotorNomSpeedMFG	Motor nominal nameplate base speed. Find this value on the rating plate of the motor.
P1.8	Motor Power Factor	0.30	1.00	0.85	Motor nominal nameplate full load power factor. Find this value on the rating plate of the motor.
P1.9	Motor Nominal Voltage	180V	690V	487V	Motor nominal nameplate base voltage. Find this value on the rating plate of the motor.
P1.10	Motor Nominal Freq	8.00 Hz	400 Hz	MotorNomFreqMFG	Motor nominal nameplate base frequency. Find this value on the rating plate of the motor. This parameter sets the field weakening point (P8.4) to the same value.
P1.3	Accel. Time 1	0.10 s	3000.0 s	20.0 s	The time required for the output frequency to accelerate from zero frequency to maximum frequency (P1.2). When accelerating from different frequency levels, the acceleration time will be a fraction of the total ramp time.
P1.4	Decel. Time 1	0.10 s	3000.0 s	20.0 s	The time required for the output frequency to decelerate from maximum frequency (P1.2) to zero frequency. When decelerating from different frequency levels, the deceleration time will be a fraction of the total deceleration time.
P1.13	Remote Control Place	N.A	N.A	0	**0 = IO terminal; 1 = Fieldbus; or 3 = Keypad** Selects where the drive will look for the start command in the remote location: I/O terminals would be from the digital hard-wired inputs; fieldbus would be a communication bus; and keypad display will indicate what mode is selected
P1.14	Remote Ref.	N.A	N.A	0	**0 = AI; 1 = Drive reference pot; 2 = AI joystick; 3 = Motor pot; 4 = Maximum frequency; 5 = PI control output; 6 = Keypad; or 7 = Fieldbus reference.**
P13.5.3	Keypad Password PIN	0	9999	0	By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 9999. To deactivate the password, reset the parameter value to 0.
P11.6.1	Blue Tooth Enable	N.A	N.A	N.A	**0 = Disabled; or 1 = Enable.**

Now the Startup Wizard is done. It won't show again on the next power up. If you want to reset it, please set the Startup Wizard (P13.1.17) or select it from the main menu screen to enable and cycle the power to the drive.

About Copeland

Copeland is a global leader in sustainable heating, cooling, refrigeration and industrial solutions. We help commercial, industrial, refrigeration and residential customers reduce their carbon emissions and improve energy efficiency. We address issues like climate change, growing populations, electricity demands and complex global supply chains with innovations that advance the energy transition, accelerate the adoption of climate friendly low GWP (Global Warming Potential) and natural refrigerants, and safeguard the world's most critical goods through an efficient and sustainable cold chain. We have over 18,000 employees, with feet on the ground in 50 countries - a global presence that makes it possible to serve customers wherever they are in the world and meet challenges with scale and speed. Our industry-leading brands and diversified portfolio deliver innovation and technology proven in over 200 million installations worldwide. Together, we create sustainable solutions that improve lives and protect the planet today and for future generations. For more information, visit copeland.com.

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