

APPENDIX B

# LVD and EMC Installation Guide

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## IN THIS APPENDIX

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- LVD Installation Instructions
  - EMC Installation Instructions
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## GENERAL INSTRUCTIONS

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When installed according to the instructions in this user guide and this appendix, the ZETA4-240 Drive will comply with requirements set forth by the European Union with regard to product safety (Low Voltage Directive, 73/23/EEC) and electromagnetic compatibility (EMC, 89/336/EEC).

Two kits are available from Compumotor to facilitate installation:

- **C10 Cable Kit** – Includes motor cable and associated hardware. Allows the use of CE marked (LVD) step motors with 1/2" NPT or PG11 cable entry with the ZETA4-240
- **EMC Kit** – Includes mains (AC line) filter and EMC indexer-to-drive cable (Compumotor standard pinout 15M-to-25M pin D-shell)

In this appendix, we assume you are using a Compumotor R Series motor, C10 Cable Kit, and EMC Kit. When installed with these options, the ZETA4-240 Drive has been demonstrated to meet Electromagnetic Compatibility Standard and the Low Voltage Directive requirements.

When properly installed, the ZETA4-240 Drive is *not required* to be mounted within a screened enclosure (cabinet) to achieve compliance. The ultimate responsibility for ensuring that the EMC requirements are met rests with the systems builder.

If you use non-Compumotor equipment, see Compumotor's *EMC Installation Guide* for additional instructions on meeting EMC requirements.

## LOW VOLTAGE DIRECTIVE (LVD) INSTALLATION INSTRUCTIONS

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For more information about LVD, see 73/23/EEC and 93/68/EEC, published by the European Economic Community (EEC).

### ENVIRONMENTAL CONDITIONS

#### POLLUTION DEGREE

The ZETA4-240 Drive is designed for pollution degree 2.

#### INSTALLATION CATEGORY

The ZETA4-240 Drive is designed for installation category II.

### ELECTRICAL

#### CONNECTING AND DISCONNECTING POWER

The ZETA4-240 accepts mains input voltage from 95 – 264VAC, at 47-63 Hz. Maximum power consumption is shown in *Chapter 2, Installation*, under *Connect AC Power*.

The ZETA4-240 ships with a molded 3-conductor IEC plug. Wire this plug in accordance with local regulations.

The ZETA4-240 Drive's protective earth connection is provided through its AC power connector. You must reliably earth the ZETA4-240 Drive's protective earth connection.

The ZETA4-240 Drive's supply voltage is limited to 264VAC.

## CONNECTING THE PROTECTIVE CONDUCTOR TERMINAL TO EARTH

You must provide a connection from the ZETA4-240 Drive's protective conductor terminal to a reliable system earth point.

The protective conductor terminal is marked with a label on the product bearing the following symbol:



### *Protective Conductor Terminal Marking*

Follow these steps to connect the protective conductor terminal to earth:

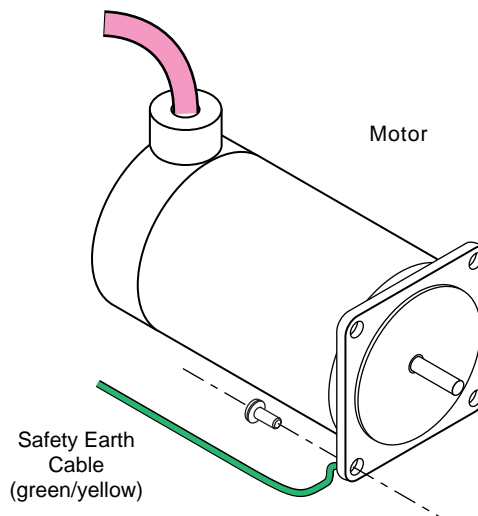
1. For compliance with LVD, you must use a VDE approved green/yellow protective conductor terminal wire to reliably earth the protective conductor terminal. Wire gauge must be no thinner than the current-carrying wire in the product's mains supply.
3. Resistance between the protective conductor terminal and earth must be no greater than 0.1 ohms. Use thicker gauge wire if the resistance is too high.

## PROVIDING A PROTECTIVE EARTH CONNECTION FOR MOTORS

You must provide a connection from the motor to a reliable protective earth. This connection provides a protective earth for the motor contact point. The motor's protective earth connection is important for safety reasons, and *must not be omitted*.

Compumotor's R Series motors with the C10 Cable option have a protective conductor in the removable cable. The ZETA4-240 grounds the motor through its motor connector.

If you use a motor without a protective conductor, make connections according to the following instructions and diagram:



### *Motor – Earth Connection*

1. Use a ring terminal with a star washer and mounting bolt to make good contact with the bare metal surface of the motor's mounting flange.
2. Use a VDE approved green/yellow protective conductor terminal wire to make the connection between the motor and earth. Wire gauge must be no thinner than the current carrying wire in the motor's power cable.
3. Resistance between the motor and earth must be no greater than 0.1 ohms. Use thicker gauge wire if the resistance is too high.

## EXTENDING MOTOR CABLES

Compumotor's C10 Motor Cable is 10 feet (3 m) long. Longer cable lengths are not available from Compumotor. If you extend the motor cable, follow the appropriate guidelines in the LVD regulations published by the EEC.

## THERMAL SAFETY

### THE MOTOR MAY BE HOT

The motor may reach high temperatures during normal operations, and may remain hot after power is removed.

## SONIC PRESSURE








### HIGH SOUND LEVEL

The sound level from some large frame step motors (NEMA 34, NEMA 42, and larger) may exceed 85 dBA. Actual sound level is application dependent, and varies with motor loads and mounting conditions. Measure the sound level in your application; if it exceeds 85 dBA, install the motor in an enclosure to provide sound baffling, or provide ear protection for personnel.

## TABLE OF GRAPHIC SYMBOLS AND WARNINGS

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The following symbols may appear in this user guide, and may be affixed to the products discussed in this user guide.

Symbol	Description
	Earth Terminal
	Protective Conductor Terminal
	Frame or Chassis Terminal
	Equipotentiality
	Caution, Risk of Electric Shock
	Caution, Refer to Accompanying Text
	Hot Surface

# EMC INSTALLATION INSTRUCTIONS

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## GENERAL PRODUCT PHILOSOPHY

Meeting requirements for electromagnetic compatibility (EMC) compliance requires specific measures to be taken during installation of the ZETA4-240 Drive. The ultimate responsibility for ensuring that the EMC requirements are met rests with the systems builder.

For specific installations, the full protection requirements of the EMC Directive 89/336/EEC must be met before the system is put into service. This must be verified either by inspection or by testing. The following EMC installation recommendations are intended to assist in ensuring that the requirements of the EMC directive are met. It may be necessary to take additional measures in certain circumstances and at specific locations.

It is important to follow **all** the installation instructions to achieve an adequate level of compliance.

## SAFETY CONSIDERATIONS

These products are intended for installation according to the appropriate safety procedures including those laid down by the local supply authority regulations. The recommendations provided are based on the requirements of the Low Voltage Directive and specifically on EN60204. Safety must never be compromised for the purpose of achieving EMC compliance. In the event of a conflict occurring between the safety regulations and the following recommendations, **the safety regulations always take precedence.**

## ZETA4-240 INSTRUCTIONS

We assume you are using:

- Compumotor R Series Motor
- C10 Cable Kit (provides motor cable, gland, R-clamp with screw)
- EMC Kit (provides AC mains filter, EMC indexer cable)

If you use non-Compumotor parts for your installation, see Compumotor's *EMC Installation Guide* for additional instructions on meeting EMC requirements.

### MOUNTING

The ZETA4-240 Drive must be mounted to a conductive, earthed panel. Before mounting the drive, ensure that the mounting location is flat and free from paint or other nonconductive surface coatings. If necessary, remove paint from the mounting surface. This should guarantee a good high-frequency connection between the drive case and the mounting surface. After mounting the unit use petroleum jelly on the exposed metal to minimize the risk of future corrosion.

## FILTERING THE AC MAINS

In most installations, the AC mains will require fitting of a mains filter. Recommended filters for use with the ZETA4-240 Drive are

### Recommended AC Input Filter:

CORCOM part number <b>10EP1</b>	SCHAFFNER part number <b>FN2070-10-06</b>
Corcom World Headquarters	Schaffner EMC Inc.
Phone: 847-680-7400	Phone: 201-379-7778
Fax: 847-680-8169	Fax: 201-379-1151

You will need one of these filters for each drive. Compumotor's EMC Kit includes a suitable AC mains filter.

Mount the filter as close as possible to the drive's AC input connector (see the figure *EMC Compliant Installation* at the end of this section). Ensure that there is no paint on the mounting panel under the filter—a large-area conductive contact between the filter and the panel is vital.

Connect the incoming AC supply cable to the push-on terminals on the filter, with the earth lead connected to a local earth stud, bus bar or metal backplane. Route the supply cable so that it runs close to the walls of the enclosure. Connect the earth terminal on the filter case to the earth stud.

Route these wires away from motor cables and other high current cabling, while keeping their length as short as possible.

## MOTOR CONNECTIONS – R SERIES MOTOR WITH C10 OPTION

The C10 option for Compumotor's R Series motors includes a removable braided cable and all necessary hardware for making an EMC compliant installation. Instructions for attaching the cable follow.

The C10 Motor Cable is 10 feet (3 m) long. Longer cable lengths are not available from Compumotor. If you extend the motor cable, follow the appropriate guidelines in the LVD regulations published by the EEC.

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### CAUTION

At no time during the following procedure should the motor cable be allowed to twist within the gland assembly. This can damage the cable and greatly reduce its life.

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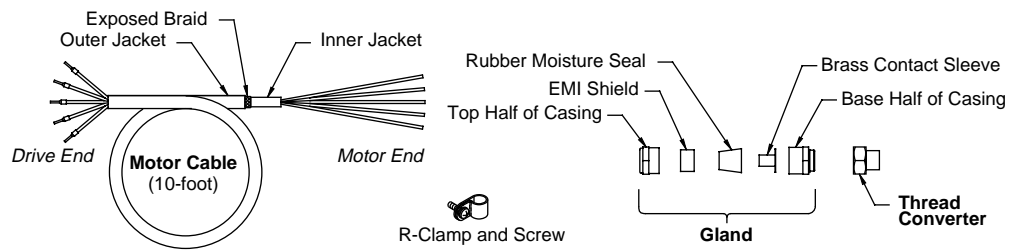
### Procedure for Attaching C10 Cable to R Series Motor and ZETA4-240 Drive

#### 1. Inventory (ship kit contents are listed below and shown in next drawing)

- Thread converter
- Gland assembly (5 pieces)
- Motor cable, 10 ft. (3 m)
- R-Clamp with 6-32 x 1/2 inch screw

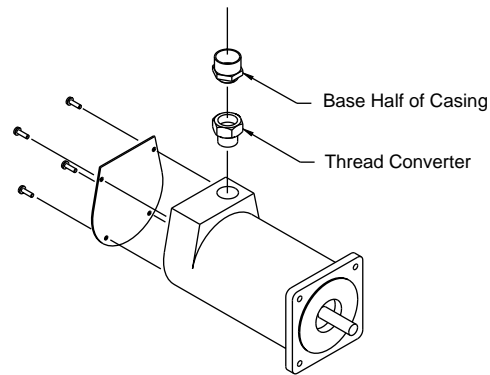
#### Required Assembly Hardware:

- Phillips screwdriver #2
- Wire strippers
- Standard slotted screwdriver, approximately 0.25 in (6 mm)
- Crimp-on ring terminals sized for 18AWG (0.75 mm) wire:
  - 9 required for series wiring
  - 13 required for parallel wiring
- 18AWG (0.75 mm) wire jumpers 4 in (100 mm) long:
  - 2 required for series wiring
  - 4 required for parallel wiring
- Crimp tool
- Open end 15/16-inch wrench



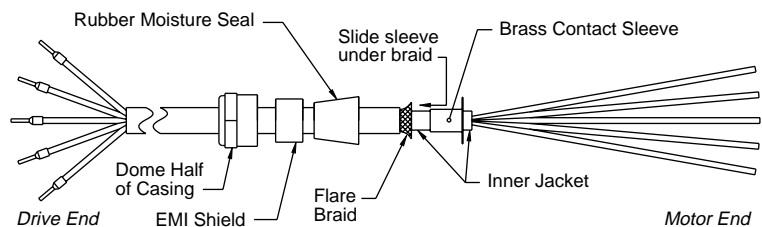
## 2. Install Thread Converter and Casing Base

- A. Remove and discard the motor's plastic thread insert (CCW rotation)
- B. Remove endbell cover plate from the rear of the motor.
- C. Insert the thread converter into the motor rear endbell, and tighten. The NPT thread is designed for compression fit into the motor body and therefore will not bottom out.
- D. Insert the base half of the outer casing into the thread converter and tighten securely.



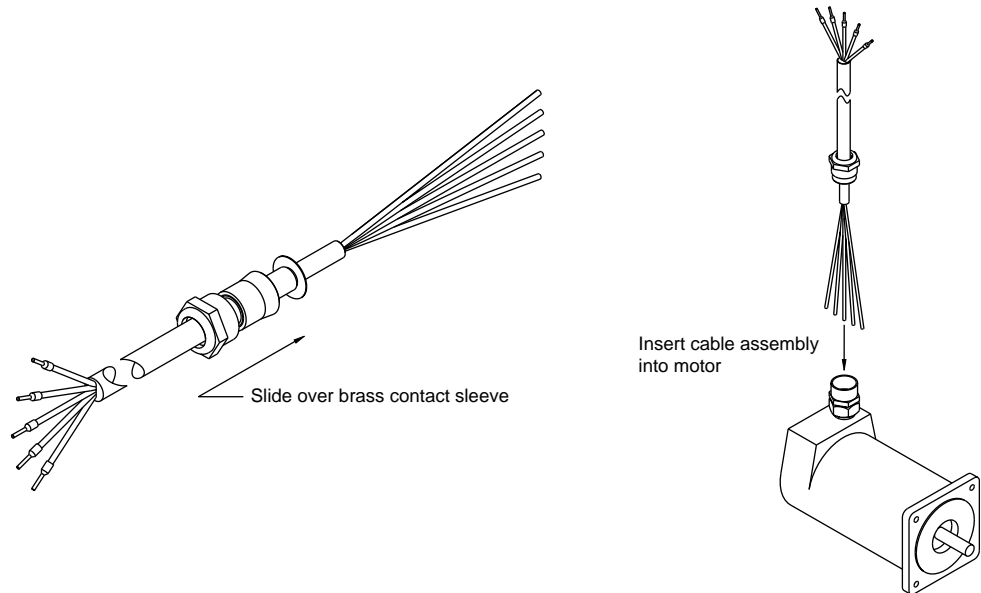
## 3. Arrange Components on Cable

- A. From the motor end of the cable, first slide on the dome casing half, then the EMI shield, and finally the rubber moisture seal. The EMI shield is installed blunt end first. The tapered end of the EMI shield fits over the tapered end of the rubber moisture seal.
- B. **The next step is critical and if not done properly will impair the EMC performance of the system:**  
 With a finger tip, flare the braid away from the inner jacket of the cable (all the way around). This will allow the braid to relax, and eases insertion of the brass sleeve.
- C. Carefully slide the brass sleeve as far under the exposed braid as possible. The sleeve must not cause the braid to bunch up or slide up under the outer jacket. The sleeve flange should butt up against the inner jacket of the cable.



#### 4. Assemble Components on Cable

- A. Slide the rubber moisture seal up to the flange of the brass sleeve.
- B. Slide the EMI shield onto the rubber moisture seal.
- C. Slide the dome half of the outer casing over the EMI shield



#### 5. Insert Cable Assembly into Motor

Insert the assembly into the prepared motor and screw the dome half to the base half of the outer casing until snug. **Do not twist the cable.**

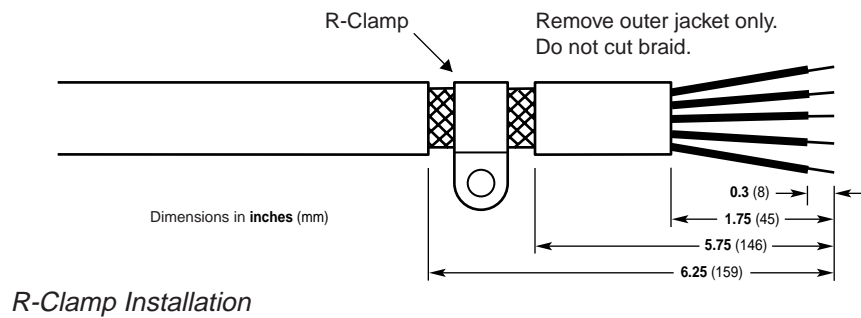
#### 6. Wire Motor for Series or Parallel Operation.

Wire the motor as instructed in *Chapter 2*, in the section *Choose Series or Parallel Motor Wiring*. Install the end bell cover plate onto the rear of the motor.

#### 7. Connect the Cable to the ZETA4-240 Drive

At the drive end of the motor cable, expose a short length of braiding and anchor the cable to the ZETA4-240 Drive with the R-clamp and screw included in the C10 Cable Kit. Avoid looping the motor cable. The motor cable should be kept away from I/O cables carrying control signals.

The next figure shows dimensions for your cable preparation.





## INDEXER CONNECTIONS

Compumotor's EMC Kit includes an EMC version of the indexer-to-drive cable, with Compumotor's standard 15M-to-25M pin D-shell connectors. This cable has a 360° braided shield, and twisted pair wires. Plug the cable into the ZETA4-240 Drive and your Compumotor indexer.

## INSTALLATION DRAWING

The next drawing shows a typical EMC compliant installation.

