

# **Compumotor 6K Controller Family EMC Installation Guide**

**Compumotor Division**  
**Parker Hannifin Corporation**  
p/n 88-020118-01A October 2001



**\*\*\* IMPORTANT NOTE – The specific measures outlined in this document do NOT guarantee CE EMC compliance as would a CE EMC–marked product, either for noise emission or susceptibility. This document only provides installation guidelines that serve to a) reduce the susceptibility of the product to electrical noise and b) minimize the radiated emissions from the product such that it might approach acceptable CE EMC compliance levels. Actual EMC compliance is always fully dependent on the effectiveness of the installation. \*\*\***

Existing products that were not designed originally for EMC compliance will require specific measures to be taken during installation. These measures vary according to the type of product. The ultimate responsibility for ensuring that the EMC requirements are met rests with the systems builder.

It is important to remember that for specific installations, the full protection requirements of the EMC Directive 89/336/EEC need to be met before the system is put into service. This must be verified either by inspection or by testing. The following EMC installation instructions 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 should be stressed that although these recommendations are based on expertise acquired during in-house EMC tests carried out on this product, it is impossible for Compumotor to guarantee the compliance of any particular installation. This will be strongly influenced by the physical and electrical details of the installation and the performance of other system components. Nevertheless, it is important to follow **all** the installation instructions if an adequate level of compliance is to be achieved.

## **PARKER HANNIFIN - COMPUMOTOR DIVISION**

*These installation instructions are intended to allow the 6K controller and ancillaries to be used in a configuration that meets the requirements of the European EMC directive through implementation of the measures listed below. There is no requirement to comply with the Low-Voltage Directive (LVD) since the 6K controller operates at 24V DC.*

*It is recommended that EMC installation of the 6K controller should be performed only by those equipment suppliers, customers, or users who - separately or jointly - have technical competence in the EMC requirements of drive applications.*

NOTE - For legal reasons, customers should first verify all essential EMC protection requirements through selection of the proper emission class, measurement of the installation environment, and review of technical specifications pertaining to their specific application.

### ***General***

Before proceeding with any system installation, verify that *ALL* grounding points are at the same reference voltage potential. If different components of the system are grounded to reference points with varying voltage potentials, the system will have an unreliable ground reference, and further noise immunity efforts will be rendered useless. Attempt to tie as many system components as possible to the same ground reference point (i.e., a star grounding technique). If a star grounding scheme is not possible, use as few grounding points as possible in the installation, while making a concerted effort to minimize the distance between these different grounding locations. This will reduce the potential for ground loops.

Plan power cable routing prior to installing the system. Make sure that high voltage, high frequency cables - such as AC input voltage supply cables, drive power cables and motor power cables – are routed away from the 6K and EVM32 products.

To pass emission requirements, the controller system should be placed and used in a screened enclosure with a minimum screening effectiveness of 5dB. Standard steel equipment cabinets will normally meet this requirement.

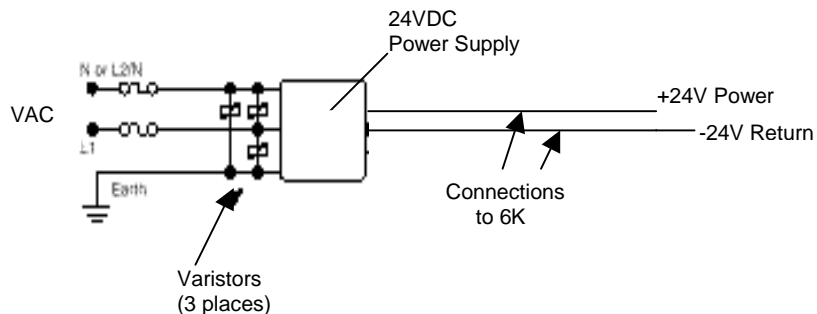
### Power Supply

We recommend using a 24VDC-power supply that carries the required CE certification to independently meet the EMC directive requirements. The 6K has been tested using the **Compumotor PS-60W** (a.k.a. "Countant Lambda") 24VDC, 2.5A power supply to provide logic and supply voltage to the 6K and EVM32 I/O module. This power supply is designed to filter out stray electrical noise that may attempt to enter the components via the voltage-input lines.

Additionally, input varistors should be placed on the voltage-input lines entering the power supply at the supply module's AC input screw terminals. One varistor each should be placed across each of the following pairs of AC input lines:

- Line (L1) leg to Neutral (L2) leg
- Neutral (L2) leg to Earth leg
- Line (L1) leg to Earth leg

The varistor network, as depicted in the following Diagram 1, allows the installation to meet the requirements of the Mains Surge Test (EN61000-4-5). Each varistor must be rated higher than the input AC voltage being supplied to the power supply. For installations using 120VAC input, type **V175LA20** varistors are recommended; for installations using 240VAC input, type **V275LA20** varistors are recommended.



### 24V power

The +24V power wire and 24V return wire from the power supply to the 6K - or any other component powered by the 24V supply - should be in the form of a *twisted pair*, from the terminal connections on the power supply to the 24VDC terminal connections at the 6K and EVM32. Ideally, this twisted wire pair should be housed in a braided-shield cable, and each end of this cable should be P-clipped to the back-plane by exposing the shield braid at the point where the cable will be tied to reference ground. The P-clip should be grounded as close to the power supply as possible, and similarly, as close as possible to the powered components at the other end of the cable.

### 24V power (continued)

If a braided-shield power cable cannot be used, then individual +24V and 24V return wires should be wrapped to form a *twisted pair* - a minimum of **three full twists per 1 inch of wire** is recommended. Regardless of whether a braided shield cable or twisted individual wires are used, the overall wire length between the power supply and any components should be as short as possible.

### 6K I/O and serial cables

P-Clip the EVM32's Serial I/O cable at *both the 6K and EVM32 end*. An appropriate section of the plastic jacket surrounding the I/O cable should be stripped to expose the braided wire shield. This removed section of cable jacket should be slightly larger than the width of the P-clip being used. Additionally, this jacket section should be removed as close to each cable end as possible, while still ensuring an adequate length of cable from the cable end so that the cable can be P-clipped solidly to the ground reference. This ground reference is typically the back-plane to which all system components are mounted. The P-clips that tie the exposed wire shield area of the cable to the back-plane should be mounted as close to each component as possible, and - in the event that no reliable back-plane grounding point is available - the P-clipped cable should be secured to some other solid ground reference point. A recommended cable for the EVM32 serial connection is:

- Compumotor™ part number **71-016949-02** (2' cable length)

All other cables entering or leaving the 6K controller — drive cables, encoder feedback cables and onboard I/O cables - should be braided-shield cables and P-clipped at both ends, in the same manner as described above for the 6K-to-EVM32 cable. Again, braided-shield Compumotor™ cables are recommended as follows:

- Step/Direction cable for stepper drives:  
Part number **71-016137-10** (10' length)
- ±10V Analog cable for servo drives:  
Part number **71-017003-10** (10' length)

The unscreened section of any cable or wire connected to the EVM32 should be kept as short as possible. Ideally, the unscreened length should be no greater than 3 inches.

### **EVM32 Cover / Gaskets**

Recent EVM32 modules will have been supplied with nickel-Poron™ D-shell gaskets. Before connecting the EVM32 module into the system, check that the gaskets are in place around each of the two 15-pin D-shell connectors prior to the placing the metal cover onto the EVM base. The cover should then be installed and *screwed down securely* using the thumbscrews on the EVM base.

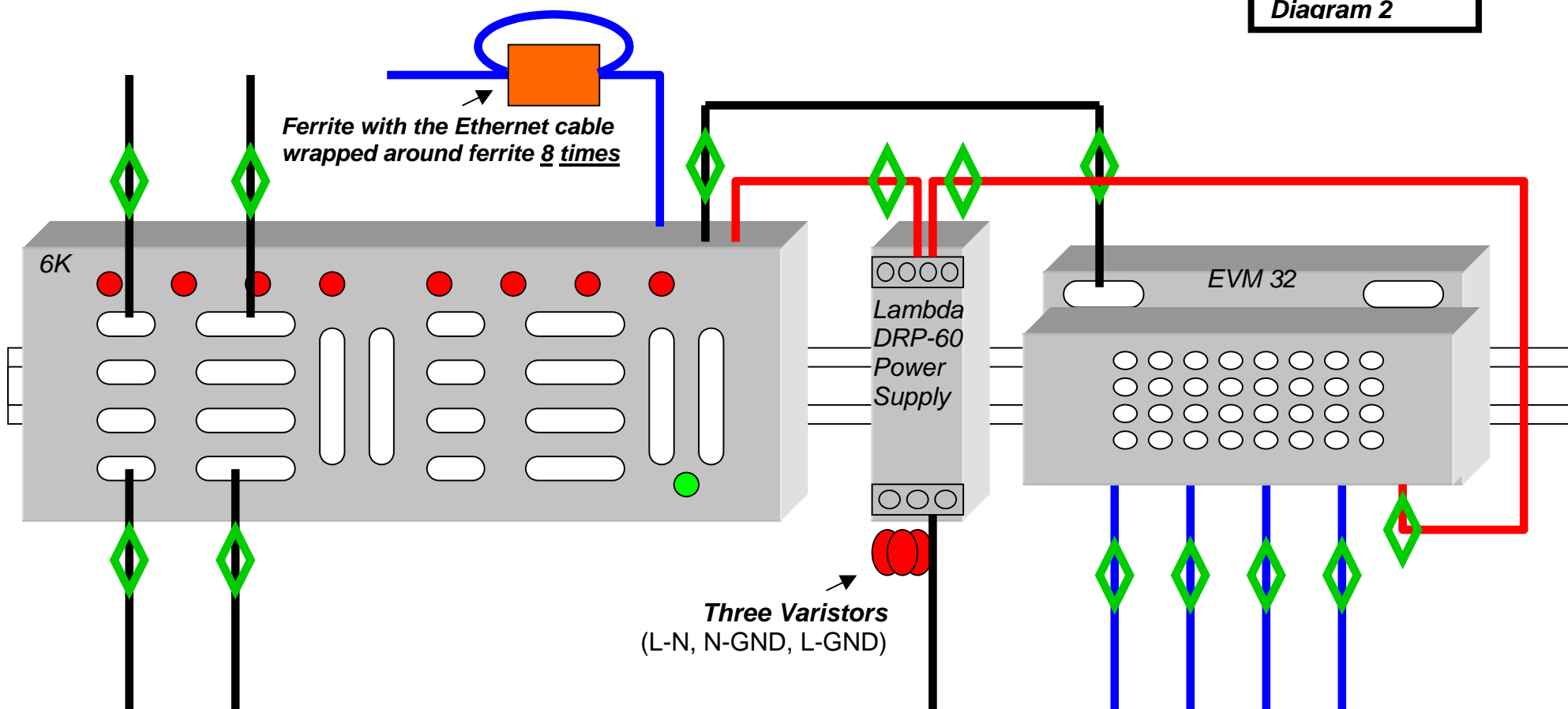
An EMC gasket kit for the 6K controller is also available as a custom option, which provides additional noise emission protection. Please contact the Applications Department for details.


### **Ethernet Cable**

If Ethernet communication is to be used, incorporate a ferrite ring core adjacent to the Ethernet connector on the 6K controller. Wrap the Ethernet cable through and round the ferrite ring 8 times, as shown on the following page in Figure 2.

A suitable ring core to use is Philips part number **4330-030-35522 - TL42/26/13-3C90**.

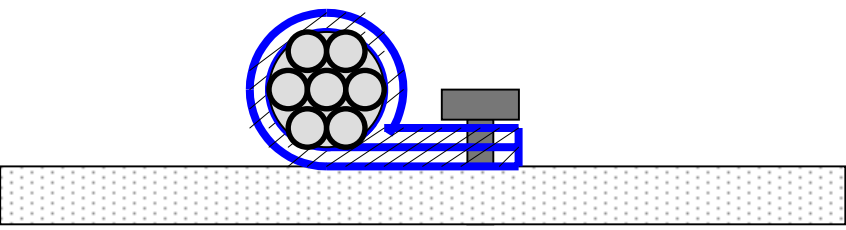
**Diagram 2**



 All diamonds represent recommended P-clip grounding locations

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The following is a Side View of a P-clip being used on cables entering and exiting the 6K (with the exception of the Ethernet cable). The **dotted area** in the Side View is the ground plane the P-clip will mount to. The area in **light grey** shows a cross section of the wire braid cable. The **hatched section** represents the actual P-clip, and the **dark grey** object represents the mounting screw.



NOTE: All cables used in the installation of the 6K should be of high quality braided-wire shield, and should be 360 degree bonded at the cable ends.