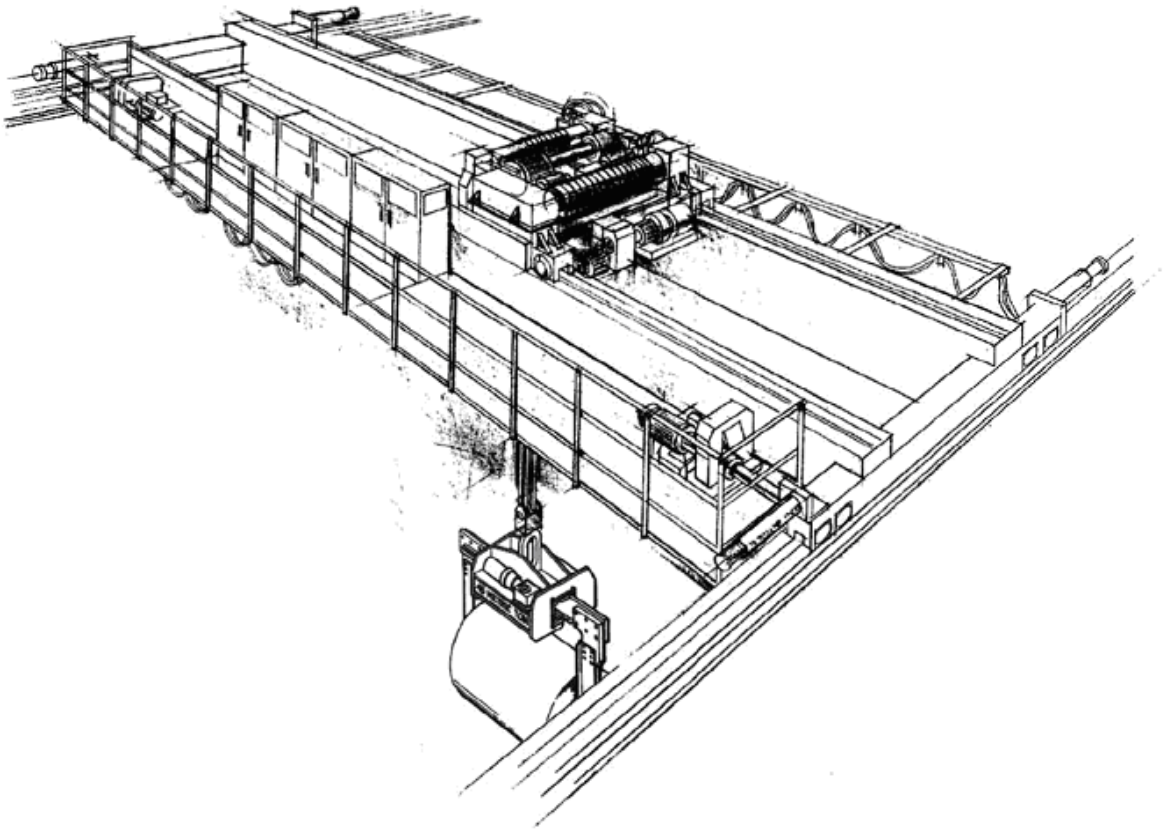

Impulse•G+/VG+ Series 3 Safe-Off

Instruction Manual

MAGNETEK
MATERIAL HANDLING

Software #8001.x January 2011
Part Number: 140-10305
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Addendum to G+ Series 3 (140-10258)
and VG+ Series 3 (140-10257) manuals.

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PRODUCT MANUAL SAFETY INFORMATION

Magnetek, Inc. (Magnetek) offers a broad range of radio remote control products, control products and adjustable frequency drives, and industrial braking systems for overhead material handling applications. This manual has been prepared by Magnetek to provide information and recommendations for the installation, use, operation and service of Magnetek's material handling products and systems (Magnetek Products). Anyone who uses, operates, maintains, services, installs or owns Magnetek Products should know, understand and follow our instructions and safety recommendations in this manual for Magnetek Products.

The recommendations in this manual do not take precedence over any of the following requirements relating to cranes, hoists and lifting devices:

- Instructions, manuals, and safety warnings of the manufacturers of the equipment where the system is used,
- Plant safety rules and procedures of the employers and the owners of facilities where the Magnetek Products are being used,
- Regulations issued by the Occupational Health and Safety Administration (OSHA),
- Applicable local, state or federal codes, ordinances, standards and requirements, or
- Safety standards and practices for the overhead material handling industry.

This manual does not include or address the specific instructions and safety warnings of these manufacturers or any of the other requirements listed above. It is the responsibility of the owners, users and operators of the Magnetek Products to know, understand and follow all of these requirements. It is the responsibility of the owner of the Magnetek Products to make its employees aware of all of the above listed requirements and to make certain that all operators are properly trained. **No one should use Magnetek Products prior to becoming familiar with and being trained in these requirements.**

WARRANTY INFORMATION

FOR INFORMATION ON MAGNETEK'S PRODUCT WARRANTIES BY PRODUCT TYPE, PLEASE VISIT WWW.MAGNETEKMH.COM.

DANGER, *WARNING*, *CAUTION*, and *NOTE* Statements

DANGER, WARNING, CAUTION, and *Note* statements may be used in this manual to emphasize important and critical information. You must read these statements to help ensure safety and to prevent product damage.

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices.

***NOTE**: A NOTE statement is used to notify of installation, operation, programming, or maintenance information that is important, but not hazard-related.*

WARNING

Improper programming of a drive can lead to unexpected, undesirable, or unsafe operation or performance of the drive.

Disclaimer of Warranty

Magnetek, hereafter referred to as Company, assumes no responsibility for improper programming of a drive by untrained personnel. A drive should only be programmed by a trained technician who has read and understands the contents of this manual. Improper programming of a drive can lead to unexpected, undesirable, or unsafe operation or performance of the drive. This may result in damage to equipment or personal injury. Company shall not be liable for economic loss, property damage, or other consequential damages or physical injury sustained by the purchaser or by any third party as a result of such programming. Company neither assumes nor authorizes any other person to assume for Company any other liability in connection with the sale or use of this product.

Table of Contents

Introduction to Safe-Off

The Safe-Off option, when used with other safety components, provides protection according to **EN954-1 Category 3** for safe stop and protection against restart. An Impulse•G+/VG+ Series 3 drive equipped with the Safe-Off option is just one component in a safety control system. To ensure that the Safe-Off function appropriately fulfills the safety requirements of the application, a thorough risk assessment shall be done according to **ISO12100** for the whole safety system at the final installation. All components in the system must be appropriately selected and applied to achieve the desired safeguarding.

The Safe-Off function performs a safe stop according to **EN60204-1 Stop Category 0** referred to as “uncontrolled stop by power removal” or “coast to stop.” Safe-Off is certified to meet the requirements of **EN954-1, Safety Category 3**. The Safe-Off function is implemented totally in hardware on the Impulse•G+/VG+ Series 3 control and interface board.

Safe-Off disables the motor, not the drive controller. Power to the control board and display is maintained so all parameters, monitors and fault data may be read and observed. Also, all communications stay active.

The Safe-Off function uses two independent hardware channels to redundantly block the driver signals to the output devices (IGBTs) so the motor is disabled and operation prevented. Redundancy ensures that a single fault in any of the parts involved in Safe-Off does not lead to a loss of the safety function.

Safe-Off is completely electronic; no mechanical moving parts (relays) are involved in the Safe-Off circuitry. Safe-Off is suitable in applications classified as “medium risk” where coasting to a stop is the appropriate response to a fault condition.

Safe-Off prevents the motor from moving; the Safe-Off option does **not** serve as a motor disconnecting means (NEC Article 430 Part IX) and does **not** provide electrical shock safety. It is only suitable for preventing motor operation when people are working near parts of a machine affected by the drive system.

The Safe-Off option should **not** be used as the normal means to start and stop the drive.

***NOTE**: The Safe-Off interface board is ONLY available in 24 VDC.*

Configuring Safe-Off

Safe-Off requires a special control board and interface board which replace the standard control and interface boards. The only significant difference between the boards is the additional BB, BB1 and SN terminals. The standard drive performance and function is not affected by Safe-Off.

The BB and BB1 terminals run off the same 24VDC supply as the S1 ~ S8 terminals. However, BB and BB1 do not require the drive's processor to function. They are connected to hardware buffers that block the gate drive signals from the processor to the IGBTs. A feedback circuit to the processor is used to indicate an External Base-Block fault to notify the operator.

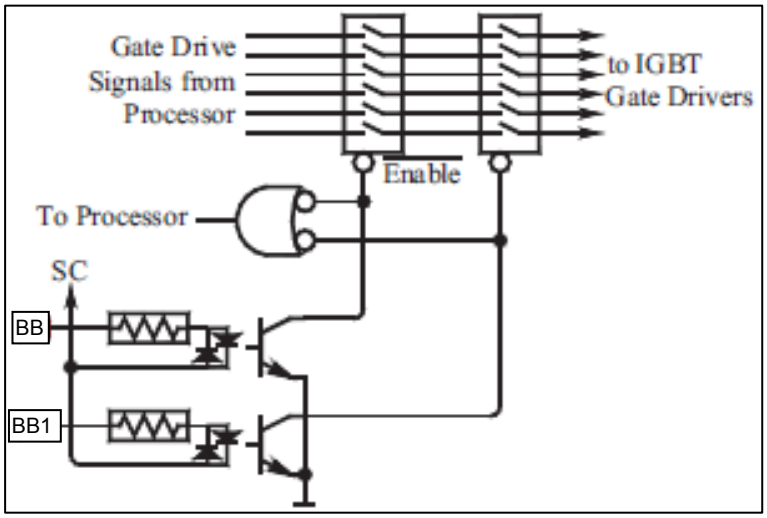


Figure 1: Safe-Off Circuitry

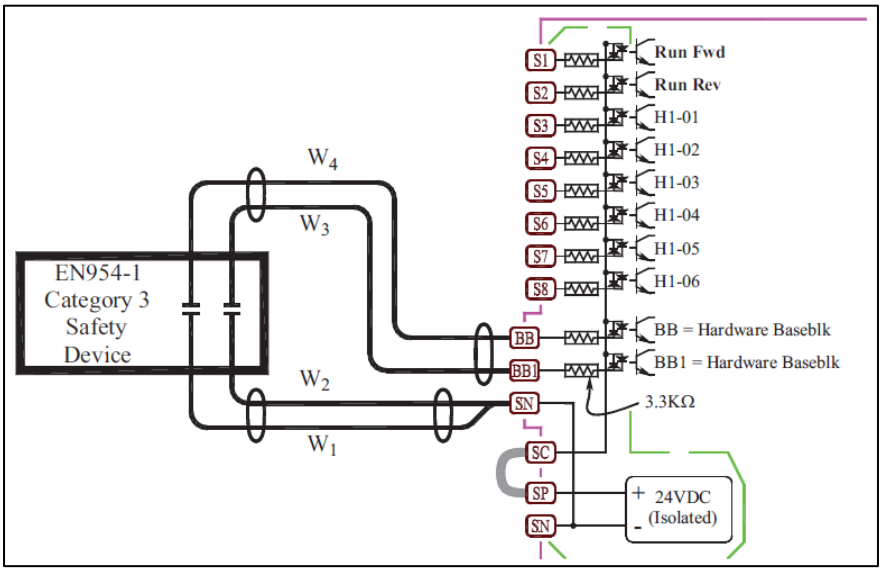


Figure 2: Normal Connection to EN954-1 Category 3 Safety Device

If two separate signal lines from the safety device to inputs BB and BB1 are used as shown on the previous page (**Figure 1: Safe-Off Circuitry**), the drive does not need to be installed in an IP54 enclosure. If only one signal line from the safety device to the drive is used, and BB and BB1 are linked at the drive, then the drive must be installed in an enclosure with a protection degree of at least IP54 in order to maintain EN954-1, Safety Category 3 compliance.

If the safety device and the drive are installed in separate cabinets, the Safe-Off wires must be installed in a short-circuit-proof manner.

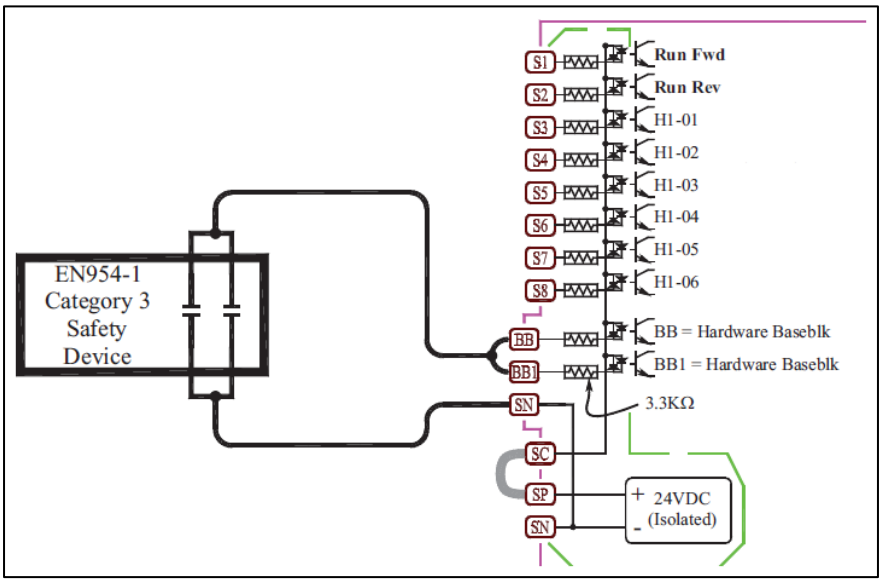


Figure 3: Connection in IP54 Enclosure

The Safe-Off function does not cut the power supply to the drive and does not provide electrical isolation to the motor. The drive must be disconnected from the power mains before any installation or maintenance work is done. Always use “lock-out, tag-out” or similar approved safety protocol when servicing equipment.

Risk Assessment Required

To assure that the Safe-Off function appropriately fulfills the safety requirements of the application, a thorough risk assessment shall be done according to **ISO12100** for the whole safety system at the final installation.

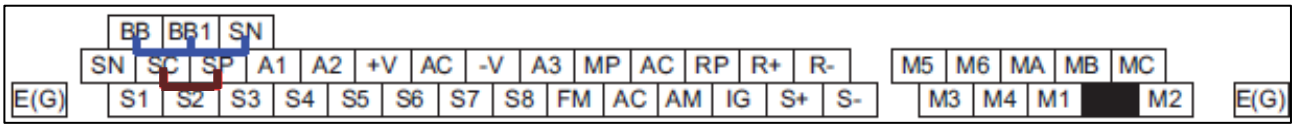
Safety Function Inspection

Check the safety function during periodic maintenance by hitting the STOP switch or tripping the appropriate safety interlock. Verify that the applicable motor stops and that the digital operator shows the “BB” indication on the display. If the motor does not stop or the “BB” indication does not appear, **discontinue using the drive at once**. Replace the Impulse•G+/VG+ Series 3 or its control board and do not resume operation until it is verified that the applicable motor stops and that the digital operator shows the “BB” indication on the display.

Safe-Off terminals

Safe-Off is configured at the factory prior to shipment. There are no parameters to set and it cannot be turned off in software. Safe-Off involves two digital inputs, BB and BB1, as well as the common on terminal SN. Breaking the connection between SN and either BB or BB1 will immediately disable the drive motor output. The terminals are physically wired to the drive's output devices (IGBTs). A run command from the drive software cannot star the motor, no matter how the drive is configured or commanded.

Figure 4: Safe-Off terminals (BB, BB1, SN)



Safe-Off Control Interface Board

Terminal	Signal Name	Signal Level	Suggested Wire Size (AWG)	Possible Wire Sizes (AWG)
BB	Hardware Baseblock	24VDC, 8mA photocoupler	18	Stranded wire: 26 to 14
BB1	Hardware Baseblock 1			
SN	Sequence input neutral			
SC	Sequence input common			

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

No. Z10 07 08 22733 014

Holder of Certificate: **Yaskawa Electric Corporation**
Inverter Plant
2-13-1 Nishimiyaichi
Yukuhashi, Fukuoka
824 JAPAN

Factory(ies): 63989, 42802, 51347

Certification Mark:

Product: **Static power converter**
AC Inverter

Model(s): **CIMR-F7*****-Spec ******
AC Inverter
with risk category 3 stop circuit
For nomenclature see attachment

Parameters:

Rated voltage:	200 to 240V3ac and 380 to 480V3ac
Rated current:	200V3ac: 457A 400V3ac: 743A
Rated frequency:	50 / 60 Hz
Protection class:	I
Over voltage category:	III

Remark:
When installing/inserting the equipment all requirements of the mentioned test standards must be fulfilled.

Tested according to:
EN 954-1:1996 cat. 3
EN 50178:1997
EN 61800-3:2004

The listed product was tested on a voluntary basis and complies with the relating standards or directives. The certification mark shown above can be affixed on the product. The certification mark must not be altered in any way. See also notes overleaf.

Test report no.: 717501106

Date, 2007-08-21

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TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstrasse 65 · 80339 München · Germany