16-Circuit Relay Output Block

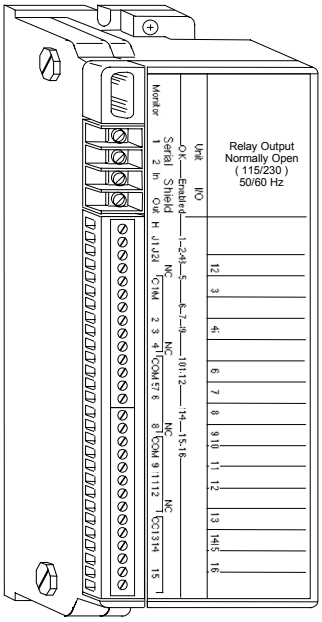
June 2002 GFK-0038E

Description

Relay Output blocks provide 16 output circuits in four independent groups of four relay-type outputs each. The block power may be either 115V or 230V AC. There are two types of Relay Output blocks:

- **Normally-Closed Relay Output Block** (IC66*BBR100), Normally-closed contacts
- **Normally-Open Relay Output Block** (IC66*BBR101), Normally-open contacts

Relay blocks are compatible with a wide range of low-power control and indicating devices such as relays, contactors, and lamps. Output devices may operate in the range of 5V to 250V AC or 5V to 220V DC, and switch up to 60 Watts or 125 VA.



Features

Each group of four outputs on a Relay Block can be powered by a separate AC or DC source. Group to group isolation is 1500 volts.

Block features include:

- Output powerup defaults
- Output Hold Last State or default
- CPU Redundancy type
- Bus Switching Module control

Using this Datasheet

This datasheet summarizes information about block installation, configuration, and diagnostics.

Your primary reference should be the *Discrete and Analog Blocks User's Manual*. It includes detailed instructions for block installation and configuration.

For additional information about systems and communications, including bus specifications, refer to the *I/O System and Communications Manual*.

Specifications

Catalog Number	
Output Block, Normally-Closed Relays	IC66*BBR100
Electronics Assembly	IC66*EBR100
Terminal Assembly	IC66*TBR100
Output Block, Normally-Open Relays	IC66*BBR101
Electronics Assembly	IC66*EBR101
Terminal Assembly	IC66*TBR101
Block Specifications	
Size (height x width x depth)	8.83" (22.44cm) x 3.34" (8.48cm) x 3.91" (9.93cm)
Weight	4 lbs. (1.8 kg)
LEDs (I/O Block)	Unit OK, I/O Enabled
LEDs (each circuit)	Individual relay coil state
Environmental Specifications	
Operating temperature	0° C to +60° C (+32° to +140° F)
Storage temperature	-40° to +100° C (-40° to +212° F)
Humidity	5% to 95% (non-condensing)
Vibration	5-10 Hz 0.2" (5.08mm) displacement, 10-200 Hz at 1G
Block Power Specifications	
Frequency	47-63 Hz
Operating voltage	(115VAC) 93 to 132VAC; (230VAC) 185 to 265VAC
Power requirement	87mA at 115 VAC
Power supply dropout time	1 cycle

Isolation	
All outputs to chassis ground	1500 VAC
Between output groups	1500 VAC
Power terminals to chassis ground	1700 VDC
Power terminals to outputs	1500 VAC
Comms terminals to power terminals	1700 VDC
Comms terminals to outputs	1500 VAC
Heat Dissipation	10.1 watts max. with 16 outputs on
Output Specifications	
Maximum Output current	2 Amps per circuit
Maximum switching power	60 Watts or 125 VA
Maximum inrush current	2 Amps per circuit
Output OFF leakage current	0.1 mA
Maximum switching frequency	20 cycles/minute (inductive loads)
Output turn-on delay (maximum)	5ms
Output voltage range	5V to 250V AC or 5V to 220V DC
Minimum recommended load	10mA
Relay Specifications	
Relay Type	Fixed coil moving armature
Initial Contact Resistance	100 milliohms, maximum

Typical Life:

Operating Voltage	*Maximum Current for Load* Type*			*Typical Life (operations)*
	Resistive	*Lamp*	*Solenoid*	
250VAC	0.5A	--	--	200,000
250VAC	--	0.1A	0.1A	100,000
125VAC	1.0A	0.2A	0.3A	100,000
220 VDC	0.3A	--	--	100,000
110 VDC	0.6A	--	--	100,000
30VDC	2.0A	--	--	500,000
30VDC	--	0.2A	0.3A	100,000
12VDC	--	0.3A	0.5A	100,000

Effect of Load on Operating Life

Operating Voltage	*Current in Load Type*			*Typical Life (operations)*
	Resistive	*Lamp*	*Solenoid*	
250VAC	0.1A -	--	--	1,500,000
125VAC	0.3A	--	--	1,000,000
30VDC	1.0A	--	--	2,000,000
12VDC	2.0A	--	--	1,000,000

* Lamp loads are defined as a X10 inrush with a power factor (PF) of 1.00; when turned OFF, they represent a PF of 1.00. Solenoids are defined as a X10 inrush with a PF of 0.65; when turned OFF, they represent a PF of 0.35.

Refer to GFK-0867 for product standards and general specifications.

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Compatibility

These blocks are compatible with a Hand-held Monitor identified by catalog number IC66*HHM501 only.

For an IC697 series PLC, the CPU and programming software must be version 2.0 or later. The Bus Controller must be IC697BEM731C or later.

For an IC600 series PLC, the CPU must be rev. 105 or later. For an IC600 "Plus" series PLC, rev. 110 or later is required. The programming software must be rel. 4.02 or later.

For an IC550 series PLC, the CPU must be rev. 3.0 or later. The programming software must be rel. 2.01 or later.

Installation Instructions

Carefully inspect all shipping containers for damage. If any equipment is damaged, notify the delivery service immediately. Save the damaged shipping container for inspection by the delivery service. After unpacking the equipment, record all serial numbers. Save the shipping containers and packing material in case it is necessary to transport or ship any part of the system.

Block Mounting

Genius I/O blocks are considered "open equipment" and therefore must be installed within a protective enclosure. They should be located in an area that is clean and free of airborne contaminants. There should be adequate cooling airflow.

The block can be mounted right side up, or upside down. Leave at least 2 inches of space between blocks. Mount the block by drilling two screw or bolt holes for 8-32 hardware. Position the block so that the notches in the upper and lower flanges line up with the mounting holes. Mount the block using 8-32 screws. Use star washers to provide ground integrity.

Grounding

The block's mounting screws must not be used as the only means of grounding the block. Connect the green ground screw on the block to a reliable ground system using a short wire lead, minimum size AWG #12 (avg 3.3mm^2 in cross-section).

Warning

If mounting screws do not make good ground connection and the ground screw is not connected to a reliable ground, the block is not grounded. Electrical shock hazard exists. Death or personal injury may result.

Block Wiring

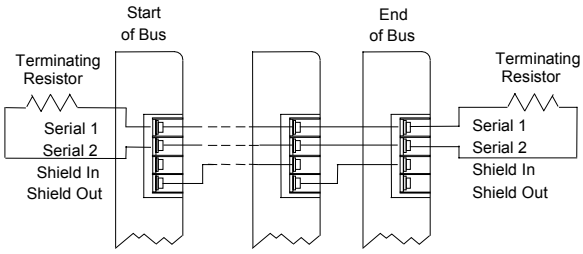
Do not overtorque the terminal screws. Recommended torque for all terminals is 6 in/lb (.678 N/M).

Serial Bus Wiring

Using one of the cable types recommended in the *System and Communications User's Manual* connect the serial bus to terminals 1-4 as shown. (If the block will be used as a BSM controller, do not attach the serial bus to terminals 1-4. See "Using a Relay Block as a BSM Controller" instead).

Terminals 1 to 4 are for the serial bus. These terminals accept one AWG #12 wire (avg 3.3mm2 cross-section) or two AWG #14 wires (each avg 2.1mm2 in cross-section). The minimum recommended wire size is AWG #22 (avg .36mm2 in cross-section). Terminals 1 - 4 can also accommodate spade or ring terminals up to 0.27 inch (6.85mm) wide with a minimum opening for a #6 screw, and up to 0.20 inch (5.1mm) depth from the screw center to the back barrier. Be sure unshielded wire ends are not longer than 2 inches (5 cm).

If the block is at either end of the bus, connect a terminating resistor of the appropriate type (see the *System and Communications User's Manual* for details) across its Serial 1 and Serial 2 terminals.



Using a Relay Block as a BSM Controller

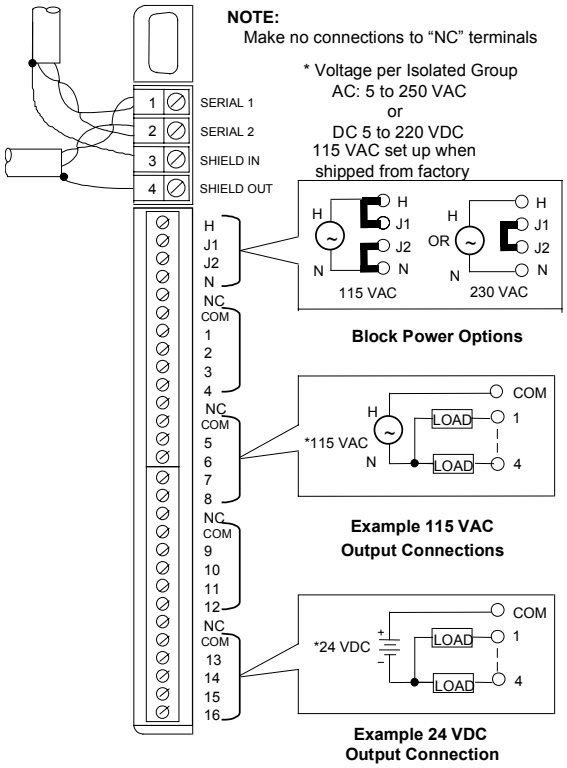
A Relay block can be used to control a Bus Switching Module. There are two different BSM versions available. It is important to match the BSM to the type of voltage that will power the block's outputs. If the voltage will be 24/48 VDC, BSM version IC66*BSM021 is required. If the voltage will be 115 VAC or 125 VDC, IC66*BSM120 is needed instead.

Install the BSM at the block's serial bus terminals, as described in the *Bus Switching Module datasheet.* Connect the bus cable to the BSM. Connect the BSM wires to the block as explained below.

Field Wiring

Terminals 5 to 32 are for field devices. They take a single wire up to AWG #14 (avg 2.1mm2 in cross-section). Minimum recommended size is AWG #20 (avg .54mm2 in cross-section).

Power for AC loads may come from the block AC power supply or other AC source(s). Power for DC loads may come from one or more DC sources. Each group may use a separate AC or DC source.



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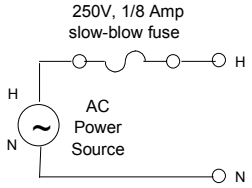
Block Power

Relay Output blocks require a 115 VAC or 230 VAC power source. Voltage selection is made by jumpers on the Terminal Assembly. When shipped from the factory, the power selection jumpers are set for 115 VAC operation. For 230 volt AC power, change the jumpers as shown. Correct jumper placement is important; incorrect jumper placement may result in damage to the block. Connect the power source to the H and N terminals (5 and 8).

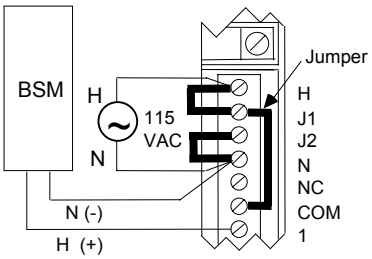
For applications where Class 1 Division 2 conditions must be met for Factory Mutual, install an external 250 volt 1/8 amp slow-blow fuse in series with the Hot AC power connector as shown below.



With the external fuse indicated, this block meets FM Class 1 Divi

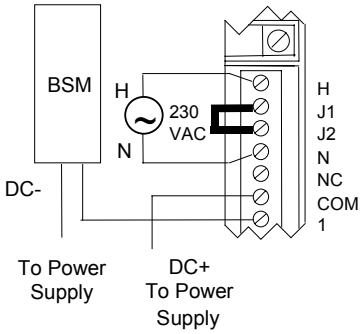
sion 2 requirements. Block and Points Powered by 115VAC

If the block and points are powered by 115 VAC, connect one wire of BSM version IC66*BSM120 to point 1 and connect the other BSM wire to N. Jumpering terminal J1 to COM as shown above right allows the points to operate on the same 115 VAC source that powers the block.



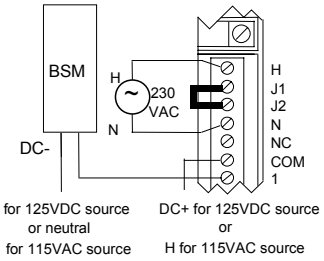
Block Powered by 230VAC, Points Powered by 24-48VDC

If the block is powered by 230VAC and the points are powered by a 24-48 VDC source, connect one wire of BSM version IC66*BSM021 to point 1 and the other to DC- (24-48VDC).



Block Powered by 23VAC, Points Powered by 115VAC or 125VDC

If the block is powered by 230 VAC and the points are powered by either a 115 VAC source or a 125 VDC source, use BSM version BSM120. Connect one wire of the BSM to point 1. For a 125 VDC source, connect the other BSM wire to DC-. For a 115 VAC source, connect the other BSM wire to the neutral side of the power supply.



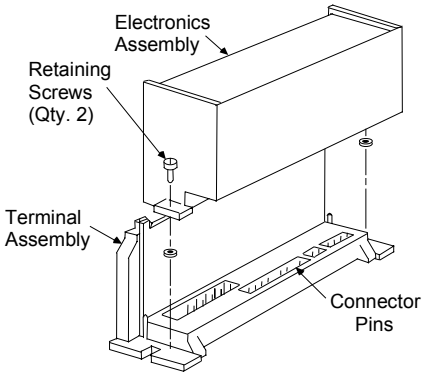
External Fuses and Snubbers

Relay blocks have no internal fuses. Following normal practices, external fuses of 2 Amps or less can be installed in series to protect loads.

External snubbers are not necessary for correct operation of the block. However, the use of snubbers is recommended. Snubbers will reduce switching transient pulses and lengthen the contact life of the relays. Use a diode connected in parallel with a DC inductive load or an R-C network across the contacts.

Removing an Electronics Assembly

The block's Electronics Assembly can be replaced with a compatible model without removing field wiring or reconfiguring the block.



1. Unscrew the retaining screws at the top and bottom of the block.
2. Using a Block Puller (IC660BLM507), engage the tabs in the first vent slots. Move the tool to the center of the block and squeeze the handle.
3. Pull the Electronics Assembly upward.

Warning

If power is applied to the field terminals, power is also exposed on the connector pins at the base of the Terminal Assembly, and electrical shock hazard exists. Do not touch the connector pins! Death or injury may result.

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Inserting an Electronics Assembly

1. Align the Electronics Assembly in the guides and push down firmly.

Caution

Do not exert excessive force; it may damage the block.

2. If unusual resistance is met, remove the Electronics Assembly. If power is applied to the block, DO NOT TOUCH THE CONNECTOR PINS! Inspect the Terminal Assembly, connector receptacle, and connector edge board (on the Electronics Assembly). Be sure the keying matches. Remove any obstacles and reinsert the Electronics Assembly. Pay close attention to the alignment of the guide pins.
3. Secure the Electronics Assembly with the screws on the top and bottom of the Terminal Assembly.

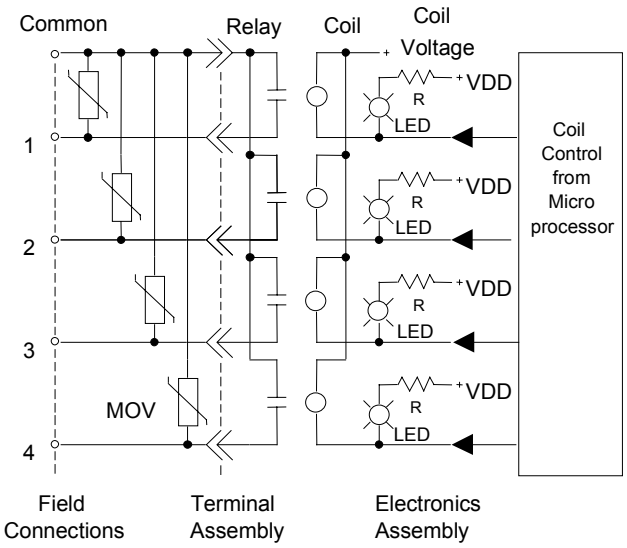
Block Operation

All 16 relay-type outputs are either normally-open or normally-closed, depending on the block version. Outputs are grouped into four groups of four relays. Each group of four shares a common input terminal.

Each circuit has its own LED that shows the commanded state of the coil. A logical '1' received from the CPU causes the block to energize the corresponding relay coil, and '0' causes the coil to be deenergized. This has opposite effects on these two blocks. When the coil of a normally-open relay is energized, the relay is energized and the relay contact closes. When the coil of a normally-closed relay is energized, the relay contact opens.

The Relay Output blocks provide an EEPROM Failure diagnostic only. There are no diagnostics associated with the individual circuits.

Circuit LEDS show the commanded state of each coil.



Note: Relay Normally-Open version shown. Normally-closed is the same, except for relay type.

LEDs

The block's Unit OK and I/O Enabled LEDs show its operating status:

Unit OK	*I/O Enabled*	*Meaning*
ON	ON	Block functioning, CPU communicating
ON	OFF	Block functioning No CPU communications for 3 bus scans
ON	Blinking	Block functioning, Circuit forced
Blinking	ON	Circuit fault, CPU communicating
Blinking	OFF	Circuit fault No CPU communications for 3 bus scans
Alternate Blinking		Circuit fault, Circuit forced
Synchronous Blinking		No CPU communications - block number conflict
OFF	Don't Care	No block power, or block faulty

Individual circuit LEDS show the commanded state of each coil.

Configuration

First, the block must be configured with a Hand-held Monitor to:

- Enter its Device Number (serial bus address).
- Enter its Reference Number (required only for IC600 and IC550 series PLCs only).

Note: If a block is configured offline, it must be properly grounded and have a 75 Ohm resistor installed across its Serial 1 and Serial 2 terminals. See the *Discrete and Analog I/O Blocks User's Manual* for instructions. The rest of the features can be configured either using a Hand-held Monitor, or by sending a Write Configuration datagram to the block from the host.

Feature	*Circuit or Block*	*Factory Setting*	*Selections*
Device Number	Block	null	0 to 31 (a number must be selected)
Reference Address	Block	none	Depends on host CPU type
Baud Rate	Block	153.6 std	153.6 std, 153.6 ext, 76.8, 38.4 Kbd
Hold Last State	Circuit	no	yes, no
Output Def. State	Circuit	coil off	coil on, off
BSM Present	Block	no	yes, no
BSM Controller	Block	no	yes, no
Outputs Default Time	Blockl	3 bus scans	2.5, 10 seconds
Redundancy Mode	Block	none	none, duplex, hot standby
Duplex Default	Block	off	on, off
Configuration Protection	Block	disabled	enabled, disabled