MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

GE PACSYSTEMS RX3I

IC695HSC304

FOUR-CHANNEL HIGH-SPEED COUNTER MODULE

Used with the applicable PACSystems RX3i motion and counting configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: GE official manufacturer documentation

PACSystems™ RX3i

IC695HSC304 and IC695HSC308

High-Speed Counter Modules

GFK-2458
January 2010

PACSystems RX3i High Speed Counter modules provide direct processing of rapid pulse signals up to 1.5 MHz for industrial control applications such as:

- Turbine flowmeter
- Meter proving
- Velocity measurement
- Material handling
- Motion control
- Process control

These modules can sense inputs, process input count information, and control outputs without CPU intervention.

High-speed Counter module IC695HSC304 provides: 8 high-speed inputs, 7 high-speed outputs, and 1 to 4 counters.

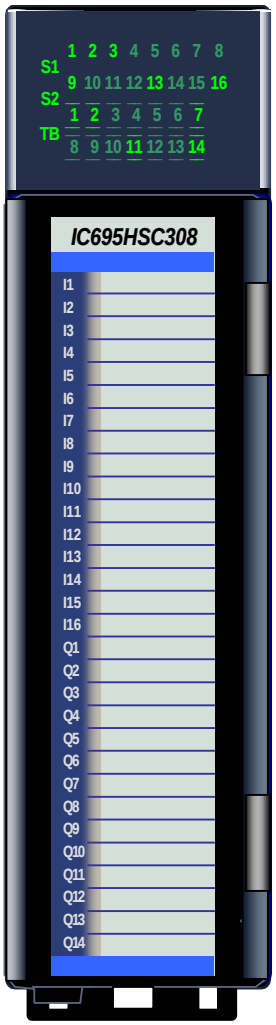
High-speed Counter module IC695HSC308 provides: 16 high-speed inputs, 14 high-speed outputs, and 1 to 8 counters.

Standard counter types A, B, C, D, E , Z, and a user-defined type can be combined on a module.

Module features include:

- Hot insertion/extraction
- Terminal Block insertion or removal detection
- Meets CE, UL/CUL 508 and 1604, and ATEX requirements
- Flash memory for future upgrades
- Module fault reporting
- Configurable I/O Interrupts

Select module parameters easily changed without re-configuration.



These modules must be located in an RX3i Universal Backplane. An RX3i CPU with firmware version 3.81 or later is required. Machine Edition **5.50 with Service Pack 2 SIM 3** or later is required for configuration.

High-Speed Counter modules can be used with a Box-style (IC694TBB032), Extended Box-style (IC694TBB132), Spring-style (IC694TBS032), or Extended Spring-style (IC694TBS132)) Terminal Block. Extended terminal blocks provide the extra shroud depth needed for shielded wiring. See the *PACSystems RX3i System Manual*, GFK-2314 revision B or later for more information about Terminal Blocks. Terminal Blocks are ordered separately.

RX3i High-speed Counter Modules can be hot-inserted and removed following the instructions in the *PACSystems RX3i System Manual*, GFK-2314. When the module is removed from the backplane or power-cycled, it stops counting and accumulated counts are lost.

Release Information

Release History

Release	Comments
IC695HSC304-AA, IC695HSC308-AA	Initial Release

Restrictions and Open Issues in this Release

Description: In applications that include Timed Interrupts or I/O Interrupts, some IC693****** and IC694****** modules in a PACSystems RX3i main or expansion backplane may occasionally be lost during interrupt processing. A fault is logged in the fault table.

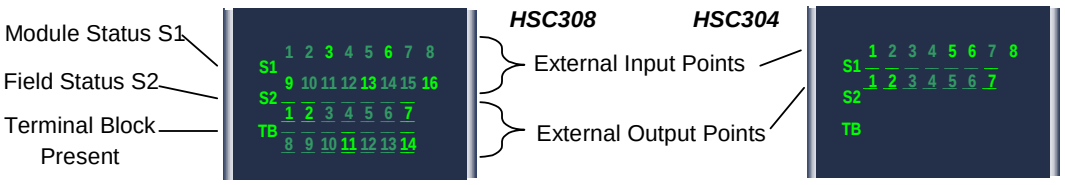
Recommendations: Minimize the time of individual interrupts and the elapsed time of overlapping interrupt blocks. Cycle power to a lost module to restore operation. If the module supports hot-swapping, that will also restore operation.

Installation in Hazardous Locations

- EQUIPMENT LABELED WITH REFERENCE TO CLASS I, GROUPS A, B, C & D, DIV. 2 HAZARDOUS LOCATIONS IS SUITABLE FOR USE IN CLASS I, DIVISION 2, GROUPS A, B, C, D OR NON-HAZARDOUS LOCATIONS ONLY
- WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2;
- WARNING - EXPLOSION HAZARD - WHEN IN HAZARDOUS LOCATIONS, TURN OFF POWER BEFORE REPLACING OR WIRING MODULES; AND
- WARNING - EXPLOSION HAZARD - DO NOT CONNECT OR DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NONHAZARDOUS.

LEDs

Individual green LEDs indicate the ON/OFF status of the module's external input and output points. These LEDs are green when the corresponding points are on. They are off when the corresponding points are off. LED positions are illustrated below.



The Module Status (S1) LED indicates the status of the module. Solid green indicates that the module has been configured. Blinking green indicates no configuration. Blinking amber/yellow indicates a fatal module failure.

The Field Status (S2) LED is off if field power is not present. For module IC695HSC308, this LED is off unless power is present on BOTH V_A and V_B. Solid green indicates that field power is present and that no output circuit faults have been detected on circuits for which fault detection has been enabled in the configuration. If S2 is amber/yellow, field power is present but circuit faults exist for one or more outputs.

The module's red/green Terminal Block LED is green when the module's removable terminal block is locked in place. It is red when the terminal block is not locked. The module also sends an *Addition of Terminal Block* or *Loss of Terminal Block* message to the RX3i CPU to report the Terminal Block status.

During a firmware update, the S1, S2, and TB LEDs blink in a green/off pattern.

Specifications: IC695HSC304 and IC695HSC308

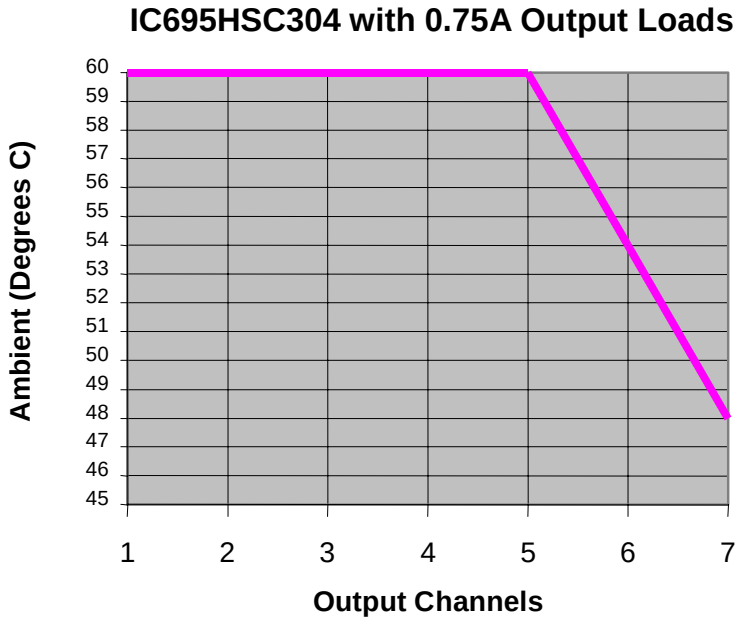
Number of Counter Channels	IC695HSC304: 4 counters (8 inputs and 7 outputs) IC695HSC308: 8 counters (16 inputs and 14 outputs)	
High Speed Counter Types	Configurable as Type A, Type B, Type C, Type D, Type E, Type Z, and User-Defined.	
Maximum Count Rates	1.5MHz with configurable input filtering, all counter types except 750kHz for Type C or User-Defined when using four counter outputs. (40 MHz internal oversampling). For A-Quad B count mode, 1.5MHz is the maximum overall count rate.	
Counting Range	-2147483648 to 2147483647	
Backplane Power Requirements	IC695HSC304:	64mA maximum @ 5V 457 mA maximum @ 3.3V
	IC695HSC308	94mA maximum @ 5V 561mA maximum @ 3.3V
LEDs	Module Status (S1), Field Status (S2), Terminal Block (TB), plus LEDs to indicate state of each input and output point.	
Input Voltages	5VDC nominal: 4.7VDC to 5.5VDC 12 to 24VDC nominal: 10VDC to 26.4VDC	
Peak input voltage	35VDC	
Input Impedance	>5k Ohms	
Output Voltage Range	4.7 to 40VDC, V_A/V_B input range	
Output Current Rating	1.5A maximum per channel, 10.5A maximum per module	
Thermal Derating	Number of output points on at the same time depends on ambient temperature and current per point. For module IC695HSC308, thermal derating also depends on distribution of output points on the module. See the charts that follow	
Output Control	Module outputs can be mapped to any number of counter setpoint outputs. Each counter controls up to 4 setpoints with “turn on” and “turn off” values. If multiple setpoint outputs are assigned to the same external module output, the signals are logically ORed. External outputs can optionally be configured for control through output scan bits from PLC memory.	
Surge Current per Point	4.5A < 450uS (Self-protected for overcurrent faults)	
Minimum Load Current	0mA (up to 150mA to satisfy open load detection)	
Maximum On State Voltage Drop/Output	0.35V @ 1.5A	
Maximum Off-State Leakage Current/Output	200uA	
Output Delay time	Off to On: 125uS @ 1.5A On to Off: 85uS @ 1.5A	
Current Limit	4.5A < 450uS, 1.5A continuous	
Reverse Polarity Protection	Outputs protected from reverse wiring	
Isolation, Field to Backplane (optical) and to frame ground.	250 VAC continuous; 2500 VAC for 1 minute	

Refer to the *PACSystems RX3i System Manual*, GFK-2314, for product standards and general specifications.

Output Points versus Temperature

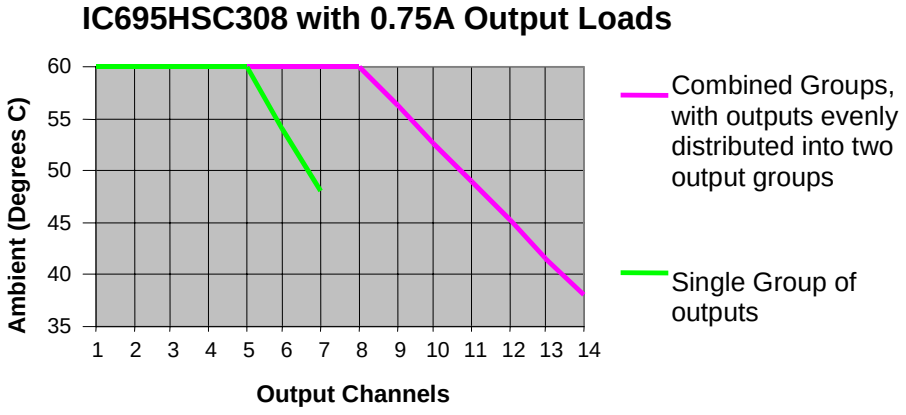
The charts below show thermal deratings for modules IC695HSC304 and IC695HSC308 with maximum loads of 0.75A on each output.

For example, if five outputs are used on module IC695HSC304, at 60C the total current of all outputs would be 3.75 Amps. If smaller loads are used on the outputs, then more output channels can be used at a given temperature.



For module IC695HSC308, more output channels can be used at the same time at a given ambient temperature when outputs are evenly distributed into two groups. If outputs are either set up as one output group or unevenly distributed between two output groups, fewer output channels can be used for a given ambient temperature.

For example, if eight outputs are used on module IC695HSC308, and they are equally distributed between two output groups, the total current of all outputs at 60C can be up to 6 Amps. At a given ambient temperature, if smaller loads are used on the outputs, more output channels can be used.

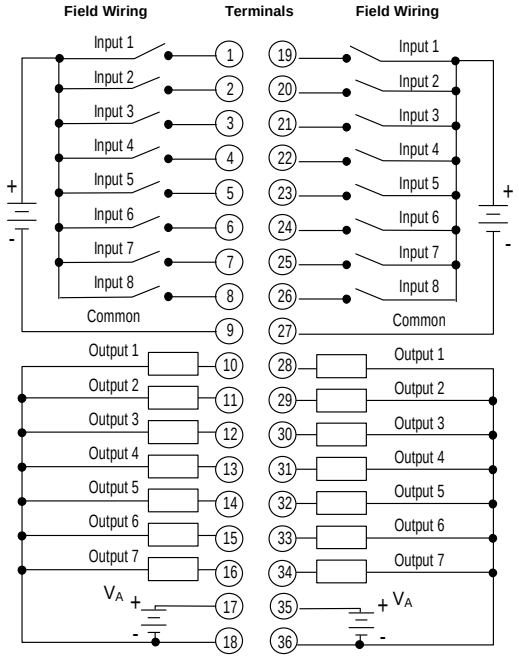


Field Wiring: IC695HSC304

Field wiring connections to the module are made to the removable terminal assembly, as described in the *RX3i System Manual*, GFK-2314. For this module, each row of terminals (eg: 1-18, 19-36) is internally connected. The dual connection points are for wiring convenience; the module cannot be wired for differential inputs. For installations that must meet radiated emissions requirements as in EN 55022, this module's high-speed connections must be made with double-shielded cable. The outside braided shield should be terminated at the entrance to the enclosure and not continue within the enclosure. Both ends of the shielded cable should be grounded. If low-frequency (power line) ground loops are an issue with the application, directly ground one end of the shielded cable and capacitively tie the other end of the shielded cable to ground with approximately 0.01µf capacitance.

All outputs on module IC695HSC304 form a single output group.

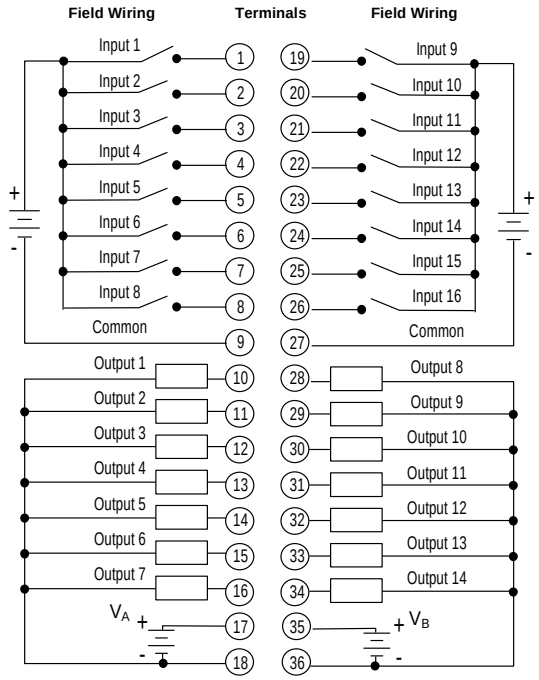
Connections	Terminals	Terminals	Connections
Input 1	1	19	Input 1
Input 2	2	20	Input 2
Input 3	3	21	Input 3
Input 4	4	22	Input 4
Input 5	5	23	Input 5
Input 6	6	24	Input 6
Input 7	7	25	Input 7
Input 8	8	26	Input 8
Common	9	27	Common
Output 1	10	28	Output 1
Output 2	11	29	Output 2
Output 3	12	30	Output 3
Output 4	13	31	Output 4
Output 5	14	32	Output 5
Output 6	15	33	Output 6
Output 7	16	34	Output 7
DC+ for Voltage Source A	17	35	DC+ for Voltage Source A
DC- for Voltage Source A	18	36	DC- for Voltage Source A



Field Wiring: IC965HSC308

Field wiring connections to the module are made to the removable terminal assembly, as described in the *RX3i System Manual*, GFK-2314. All 16 High-Speed Counter inputs on this module are positive logic (source) type. For installations that must meet radiated emissions requirements as in EN 55022, this module's high-speed connections must be made with double-shielded cable. The outside braided shield should be terminated at the entrance to the enclosure and not continue within the enclosure. Both ends of the shielded cable should be grounded. If low-frequency (power line) ground loops are an issue with the application, directly ground one end of the shielded cable and capacitively tie the other end of the shielded cable to ground with approximately 0.01µf capacitance.

Connections	*Terminals*	*Terminals*	*Connections*
Input 1	1	19	Input 9
Input 2	2	20	Input 10
Input 3	3	21	Input 11
Input 4	4	22	Input 12
Input 5	5	23	Input 13
Input 6	6	24	Input 14
Input 7	7	25	Input 15
Input 8	8	26	Input 16
Common	9	27	Common
Output 1	10	28	Output 8
Output 2	11	29	Output 9
Output 3	12	30	Output 10
Output 4	13	31	Output 11
Output 5	14	32	Output 12
Output 6	15	33	Output 13
Output 7	16	34	Output 14
DC+ for Voltage Source A	17	35	DC+ for Voltage Source B
DC- for Voltage Source A	18	36	DC- for Voltage Source B



Inputs 1 to 16 form one isolated input group. Outputs 1 to 7 and 8 to 14 form two isolated output groups, each with its own voltage connections. Outputs should be evenly distributed between the two output groups, as discussed under "Output Points versus Temperature".