

Allen-Bradley

High-Speed Counter Module

(Catalog Number 1746-HSCE)

User Manual

Rockwell Automation

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at http://www.rockwellautomation.com/literature) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual we use notes to make you aware of safety considerations.

WARNING



Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

IMPORTANT

Identifies information that is critical for successful application and understanding of the product.

ATTENTION



Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:

- identify a hazard
- avoid a hazard
- recognize the consequence

SHOCK HAZARD



Labels may be located on or inside the drive to alert people that dangerous voltage may be present.

BURN HAZARD



Labels may be located on or inside the drive to alert people that surfaces may be dangerous temperatures.

Module Overview

This chapter contains the following:

- high-speed counter module overview
- operating modes
- hardware features

High-Speed Counter Module Overview

The High-Speed Counter Module, catalog number 1746-HSCE is an SLC 500 family compatible device except with the 1747-ASB Remote I/O Adapter Module. The high-speed module can be used with SLC 5/02 (and above) processors.

The module's bidirectional counting ability allows it to detect movement in either direction. In addition, x2 and x4 counting modes are provided to fully use the capabilities of high resolution quadrature encoders.

High-speed inputs from quadrature encoders and various high-speed switches are supported. Accepting input pulse frequencies of up to 50k Hz allows precise control of fast motions.

In addition to providing an Accumulated Counter, the module provides a Rate Counter to determine Rate Measurement by indicating the pulse input frequency in Hz. (Refer to the block diagram on the following page.) The Rate Measurement is determined by accumulating input pulses over a fixed period of time. You set the Rate Period to best match your application requirements.

Background Rate calculation is provided in Sequencer and Range Modes. This operation accepts input rates up to 32,767 Hz. The dynamically configurable Rate Period ranges from 10 ms to 2.55 seconds.

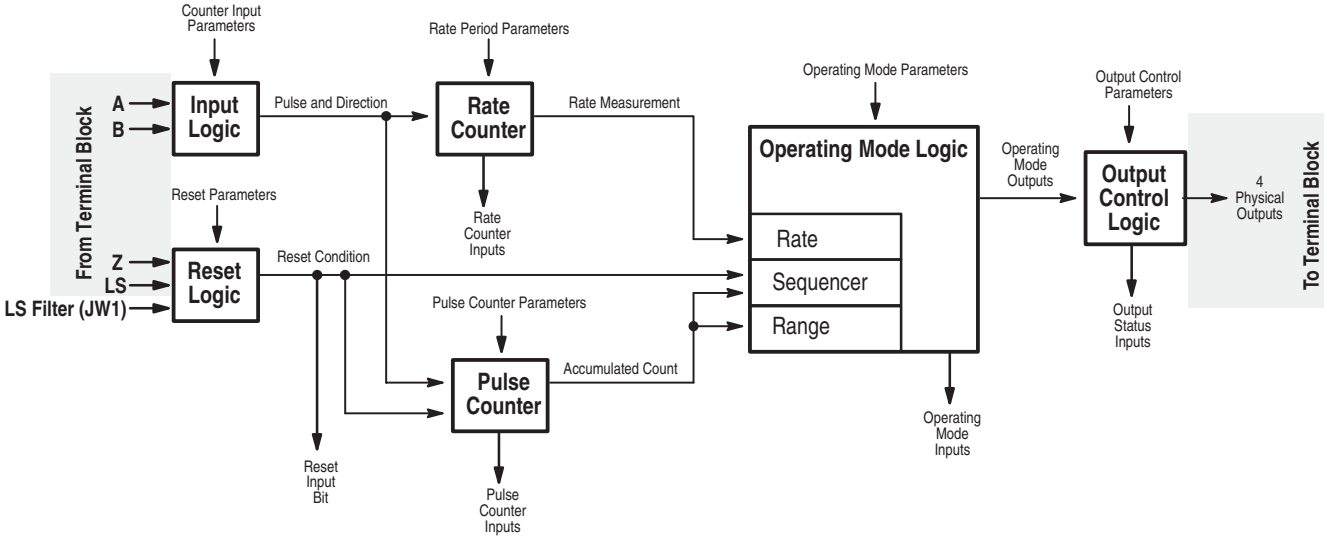
The module's four current sink (open collector) outputs can be controlled from one of two sources:

- the user program
- the module

Control of the counter reset is configured through user-set parameters. The counter can be reset from any combination of the Z input, Limit Switch input, or Soft Reset control bits.

Module operation is determined by selections made in the Setup and Control Word (M0:e.1). Setting the Function Control bit to 1 triggers the module to start the proper pulse counter, rate measurement, and output control functions. Many parameters are dynamic and can be changed without disrupting counter operation.

A block diagram of the module is shown below. Inputs from the terminal block enter the diagram at the left, outputs to the terminal block exit at the right. M0 and Output file parameters from the SLC enter the logic blocks from the top. Input file data to the SLC exit the logic blocks from the bottom.



Counter Input Parameters
- Input Type (M0:e.1/9–11)
- Up/Down Count Direction (M0:e.1/3) *–d*

Reset Parameters
- Soft Reset bit (M0:e.1/4) *–d*
- Reset Mode (M0:e.1/5–7)

Rate Period Parameters
- Rate Period (M0:e.9/0–7 or M0:e.16/0–7) *–d*

Operating Mode Parameters
- Operating Mode (M0:e.1/14–15)
- Function Control Bit (M0:e.1/12)
- Range Definitions:
  - Range Starting Values (M0:e.10 – 33) *–d*
  - Range Ending Values (M0:e.10 – 33) *–d*
  - Range Outputs (M0:e.3 – 8) *–d*
  - Valid Ranges (M0:e.2) *–d*
- Sequencer Definitions:
  - Valid Steps (M0:e.2 and M0:e.3/0–7) *–d*
  - Step Presets (M0:e.17 – 40) *–d*
  - Step Outputs (M0:e.4 – 15) *–d*
  - Initial Outputs (M0:e.3/8–15) *–d*
  - Sequencer Reset (M0:e.1/0) *–d*

Pulse Counter Parameters
- Reset Value (M0:e.34 or M0:e.41) *–d*
- Maximum Count Value (M0:e.34 or M0:e.41)
- Counter Hold bit (M0:e.1/2) *–d*
- Counter Type bit (M0:e.1/13)

Output Control Parameters
- Direct Outputs (O:e.0/0–7) *–d*
- Output Source Select (M0:e.0/0–7) *–d*
- Enable Outputs bit (M0:e.1/1) *–d*

Rate Counter Inputs
- Rate Valid (I:e.0/3)
- Rate Counter Overflow (I:e.0/4)
- Rate Measurement Overflow (I:e.0/5)
- Zero Rate Period Count (I:e.0/2)
- Rate Period Count (I:e.2)
- Rate Measurement (I:e.3)

Pulse Counter Inputs
- Accumulated Count (I:e.1)
- Overflow/Underflow (I:e.0/13)
- Pulse Counter State (I:e.0/14–15)

Reset Input bit (I:e.0/12)

Operating Mode Inputs
- Sequencer Inputs
  - Current Sequencer Step (I:e.5/0–7)
  - Next Sequencer Step (I:e.5/8–15)
  - Sequence Done (I:e.0/6)
- Range inputs
  - Ranges Active (I:e.6/0–11)

Output Status Inputs (I:e.4/8–15)

Error Inputs
- Critical Error (I:e.0/10)
- Configuration Error bit (I:e.0/11)
- Configuration Error Code (I:e.4/0–7)

–d indicates a dynamic parameter

The following terms and abbreviations are specific to this product. For a complete listing of Allen-Bradley terminology, refer to the *Allen-Bradley Industrial Automation Glossary* (publication number AG-7.1).

Input File

The module's Input Data File. This file is updated during the SLC processor input scan.

Output File

The module's Output Data File. This file is updated during the SLC processor output scan.

M Files

The M0 module data files that reside in the module. M files contain setup and control information. The contents of these files can be accessed by your user program.

Module

The High-Speed Counter Module, catalog number 1746-HSCE.

Physical Outputs

An actual outputs on the module.

Soft Outputs

The status bits within the module that can be seen by the module's program and examined by your user program.

SLC Processor

The 5/02 (or later) SLC processor that controls the SLC chassis where the module is located.

Dynamic Parameter

A configuration parameter that can be altered while the counter is operating.

Static Parameter

A parameter that must not be altered while the counter is operating.

Critical Error

An error that halts module operation and turns module controlled outputs OFF.