Allen-Bradley

Encoder/Counter Modules

1734-IJ and 1734-IK

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://literature.rockwellautomation.com/) 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, when necessary, 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 equipment (such as a drive or motor) to alert people that dangerous voltage may be present.

BURN HAZARD	Labels may be located on or inside the equipment (such as a drive or motor) to alert people that surfaces may be dangerous temperatures.

This publication contains new and revised information not in the last release.

New and Revised Information

See the table for a summary of the major changes in this manual.

Chapter	Change
2	Addition of Before You Begin section
	Addition of attention and warning statements
	Update of the Communicate with Your Module section
Appendix A	Addition of information on how to configure modules in RSLogix 5000

Change Bars

We marked with change bars (as shown with this paragraph) the areas in this manual that are different from previous editions and indicate the addition of new or revised information.

Notes:

Table of Contents

Purpose of This Manual

Read this manual for information about how to install, configure and troubleshoot your Encoder/Counter module.

For This Information:	See:
About the Modules	Chapter 1
Install the Modules	Chapter 2
Encoder/Counter Module Input and Output Data	Chapter 3
Configure Your Encoder/Counter Module	Chapter 4
Access Instantiated Instances	Chapter 5
Troubleshoot with the Indicators	Chapter 6

Who Should Use This Manual

You must be able to use RSNetworx software or similar configuration software to set up and calibrate these modules. You must have the capability to download and use Electronic Data Sheet files.

We assume you know how to do this in this manual. If you do not, refer to your software user manuals or online help before attempting to use these modules.

Related Products and Documentation

For specification, safety approval, and other information refer to the following.

- Publication Number 1734-IN005
  Encoder/Counter Installation Instructions

For related 1734 products and documentation see the table.

Description	Cat. No.	Publication
Very High Speed Counter Modules Installation Instructions	1734-VHSC5 1734-VHSC24	1734-IN003
Analog Input Modules Installation Instructions	1734-IE2C 17340IE2V	1734-IN027
Analog Output Modules Installation Instructions	1734-OE2C 1734-OE2V	1734-IN002
DeviceNet Communication Interface Installation Instructions	1734-PDN	1734-IN057
Field Potential Distributor Installation Instructions	1734-FPD	1734-IN059
POINT I/O 24V dc Expansion Power Supply Installation Instructions	1734-EP24DC	1734-IN058
POINT I/O Selection Guide	1734 series	1734-SG001
Protected Output Module s Installation Instructions	1734-OB2E 1734-OB4E 1734-OB8E	1734-IN056
Relay Output Modules Installation Instructions	1734-OW2 1734-OW4	1734-IN055
Sink Input Modules Installation Instructions	1734-IB2 1734-IB4 1734-IB8	1734-IN051
Source Output Modules Installation Instructions	1734-IV2 1734-IV4 1734-IV8	1734-IN052
Wiring Base Assembly Installation Instructions	1734-TB 1734-TBS	1734-IN511
Wiring Base Assembly Installation Instructions	1734-TB3 1734-TB3S	1734-IN013

Definitions

The following define the intended operation of the Encoder/Counter module.

Term	Definition
Lead Breakage	Typically requires a shunt resistor (across the load) to detect 3 levels of current/input states - • Open (Wire Off, Device = ?) • Off (Wire OK, Device Off) • On (Wire OK, Device On) This method does not check the input against a time base, only that the device wiring (current loop) is intact
Missing Pulse	Typically uses an input pulse to reset a watchdog timer (fixed or programmable HW). This method does detect "Lead Breakage", since a broken wire will time-out the watchdog.
Zero Frequency	Typically uses an input pulse to calculate an input frequency and verify it is above an error threshold. This method does detect Lead Breakage, since a broken wire will generate a 0Hz frequency. Missing Pulse or Zero Frequency will also detect a customer device stuck high or low, since the counter is monitoring for a change in the input state. Currently, the Counter/Encoder Modes **do not** have Zero Frequency Detection - the A & B inputs are time independent, only looking for input edge changes to increment/decrement the count value. The Period/Rate and Continuous Rate modes **do** have Zero Frequency Detection, since the Z input is monitored for Zero Frequency in Firmware (A and B inputs are not used and not monitored). The Rate Measurement mode inherently has Zero Frequency Detection, since no A pulses in any sample period are = 0Hz (B and Z inputs are not used and not monitored).

Operational Mode	Zero Frequency Detection	Input Monitored
Counter	No	None
Encoder	No	None
Period/Rate	Yes	Z Only
Rate Measurement	Y	A Only

About the Modules

What This Chapter Contains

Read this chapter to learn about types, features, and capabilities of encoder/counter modules.

Module Description and Features

Encoder/counter modules install into the Point I/O terminal base (1734-TB or 1734-TBS) and interface with the Point I/O DeviceNet Pass-through (1734-PDN) or the Point I/O DeviceNet Adapter (1734-ADN).

An encoder/counter module serves as a signal conditioner, function block, and counter between the customer process signals on the terminal base and the POINTBus containing the command information. The main functional blocks are the the following.

- Customer digital I/O interface
- Counter ASIC
- Microprocessor

The encoder/counter module accepts feedback from the following.

- Encoders (either single-ended or differential)
- Pulse generators
- Mechanical limit switches
- Frequencies up to 1 MHz

A filter is available with the following settings.
- 50 Hz
- 500 Hz
- 5 kHz
- 50 kHz

Turn the filter off to achieve the fastest counting rate.

The input voltage range is 5V dc (1734-IJ) or 15-24V dc (1734-IK). The module returns the count or frequency in the form of a 24 bit binary number (0 - 16,777,215) expressed in a 32 bit long word.

Each counter has a user-selectable preset and rollover value associated with it.

Operating Modes

The encoder/counter modules operate in the modes shown in the table.

Mode	Description
Counter Mode	Read incoming single phase pulses, return a binary count
Encoder Mode	Read incoming 2 phase quadrature pulses, return a binary count
Period/Rate Mode	Count internal clocks during the On period, return a frequency
Rate Measurement Mode	Read pulses during the sample period, return a frequency

The operation of the counter and encoder modes is nearly identical. The difference between the two modes is in the type of feedback (1 phase versus 2 phase) for the count direction (up or down).

- In **encoder mode**, a transition is expected on B for counting to proceed in a direction.
- In **counter mode**, the B input may be left at a static level.

Select operating modes by writing appropriate configuration data to the module.

Counter Mode

The counter mode reads incoming pulses and returns a binary number (0 - 16,777,215$_{max}$) to the POINTBus. The counter mode only accepts **single phase** inputs. The module determines the Phase B input state, and counts up or down accordingly.

Channel A input is used as the counting pulse while channel B is used to determine the direction.

[B = High, Count = Down; B = Low or floating (not connected), Count = Up]

The Channel B input may be tied high or low for unidirectional counting, or toggled for bidirectional counting.

Example of Counter Mode
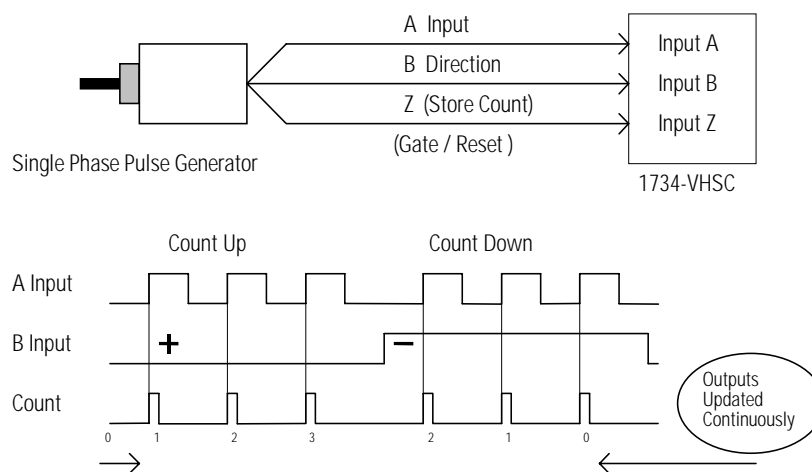

Single Phase Pulse Generator

1734-VHSC

Encoder Mode

The encoder mode reads incoming pulses and returns a binary number (0 - $16,777,215_{max}$) to the POINTBus. The encoder mode only accepts **2 phase** quadrature inputs. The module senses the relationship between the 2 phases, and counts up or down accordingly.

The two basic encoder types are absolute and incremental. A single output incremental encoder is called a tachometer encoder. A dual channel incremental encoder with one channel leading the other by 90° is called a quadrature encoder.

A system using a quadrature encoder may include an optional zero pulse, or index, serving as a reference mark for system reset. The principal disadvantage of a system using incremental encoders is that a power interruption causes the loss of position reference, so a system must be reinitialized or returned to a known zero position.

Absolute encoders typically have higher speed requirements (200 KHz typical) for motion control applications. An absolute encoder has a unique code associated with each position, so the exact position is always known, even if the system power is turned off.

EXAMPLE

Example of Multiplying Encoder Mode X1

Quadrature Encoder

A → Input A
B → Input B
Z (Store Count) → Input Z
(Gate / Reset)

1734-VHSC

Forward Rotation   Reverse Rotation

A Input

B Input

X1 Count

X2 Count

X4 Count

Outputs Updated Continuously
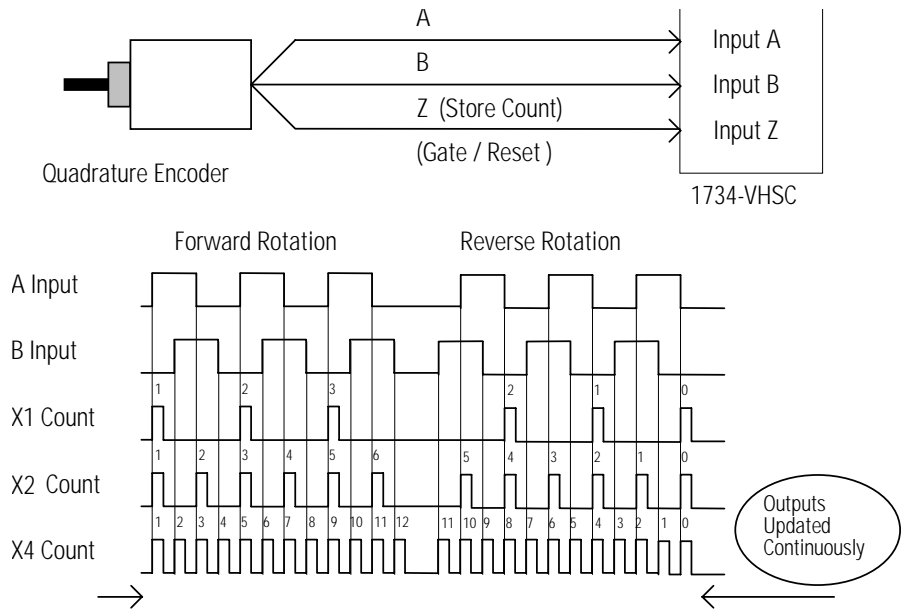
X1 Multiplying Encoder Mode

Quadrature input signals are used to count on the leading (up direction) OR trailing (down direction) edge of A for a bidirectional count, and channel B is used to determine the direction.

[B = leads A, Count = Down; B = follows A, Count = Up]

X2 Multiplying Encoder Mode

Quadrature input signals are used to count on leading AND trailing edges of A for a bidirectional count, and channel B is used to determine the direction.

[B = leads A, Count = Down; B = follows A, Count = Up]

X4 Multiplying Encoder Mode

Quadrature input signals are used to count on leading AND trailing edges of A AND B for a bidirectional count, and channel B is used to determine the direction.

[B = leads A, Count = Down; B = follows A, Count = Up]

Period / Rate Mode

The Period/Rate Mode will return an incoming frequency and a total accumulated count to the POINTBus, by gating an internal 5MHz internal clock with an external signal.

This mode determines the frequency and total number of input pulses by counting the number of internal 5MHz clock pulses over a user-specified number of input signal pulses. At the end of the specified number of pulses, the module returns the frequency (0 - 1 MHz).

EXAMPLE

Example of Period/Rate Mode
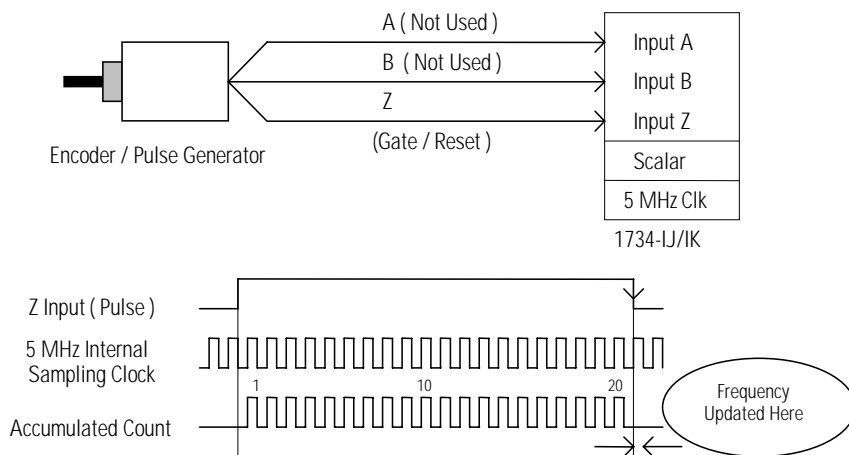
Assumes symmetrical pulse, 50% duty cycle, so Period = Sample Time On X 2 {On & Off}
Frequency = 1 / Period   If Count = 20, Scalar = 1, and Clock Period = (1 / 5 MHz)
Frequency = 1 / [(20 / 1) X (1 / 5 MHz) X 2] = 125 kHz

As the frequency of the incoming pulse train at the Z (Gate/Reset) terminal increases, the number of sampled pulses from the 5 MHz clock decreases. Since accuracy is related to the number of pulses received over the sample period, the accuracy decreases with increasing frequencies at the Gate/Reset terminal. Refer to the following Scaling table.

Relationship Between Sampled Pulses and Input Frequency

Input Frequency at Z Gate/Reset Terminal	Sample Pulses for 1/2 Cycle of Z Gate/Reset Pulse
2.5Hz	1M
5Hz	500k
10Hz	250k
20Hz	125k
50Hz	50k
100Hz	25k
200Hz	12.5k
500Hz	5k
1kHz	2.5k
2 Hz	1.25k
5kHz	500
10kHz	250
20kHz	125
50kHz	50
100kHz	25

Scaling the input frequency through the use of a scalar can lessen the decrease in accuracy. A scalar value of 1 returns an accurate input frequency only if incoming input pulses have a 50% duty cycle.

Operation of Scalar

In the Period/Rate mode, the scalar lets the incoming pulse train at the Z Gate/Reset pin be divided by a user-defined number. There is one scalar value for each counter. Acceptable values for the scalar are 1, 2, 4, 8, 16, 32, 64, and 128. The default value for each scalar is 1. Note that a "0" scalar is equivalent to a "1".

The product of the Sample Period times the scalar should be less than 6.71 seconds in order to avoid a zero frequency detect indication.

(5 MHz sample time = 200ns;
16,777,216 counts x 200ns x 2 half cycles of Z = 6.71 seconds)

Rate Measurement Mode

The Rate Measurement mode determines the frequency and total number of input pulses over a user-specified sample period. At the end of the interval, the module returns a value representing the sampled number of pulses and a value indicating the incoming frequency.

When the count and frequency update, any associated outputs are checked against their associated presets. Frequency is calculated by dividing the accumulated count by the user selected time period, and is returned in the read data. Allowable time periods are 10ms to 3s in 10ms increments, with a default value of 1s. Note that a "0" time period is equivalent to the 1s default.

EXAMPLE

Example of Rate Measurement Mode
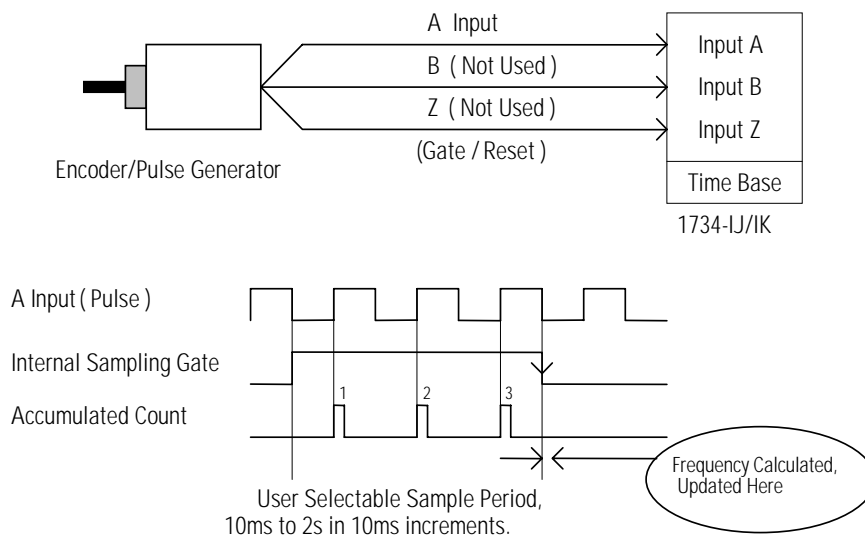
If Sample Period is 50ms, and Count = 3, then Frequency = 3 /50ms = 60Hz

New Data Indicator

A two-bit counter, C1 & C0, updates every time an "event" occurs, indicating that new data is available in the Stored/Accumulated Count words. Definitions for events are as follows.

- Any active gate transition in any of the **Store Count** (Counter or Encoder) modes
- The end of the gate sample period in either the **Period** mode **or Rate** mode
- The end of the programmed sample period in the **Rate Measurement** mode.

To use these bits reliably, acquisition of data from the Counter Module must occur faster than the events, which cause C1/C0 to increment. When C1/C0 is updated, a Change Of State (COS) message can be sent.

Default Configuration

The module's default configuration on startup is as follows.

- Counter Mode
- 50Hz filter on A, B and Z
- No time base
- Rollover = 0x00FFFFFF
- Preset = 0
- No scalar
- Counter Control Safe State = 0

To modify the default settings to those required for your application, refer to the Input and Output section of this manual.

Operating Mode Features

The following table summarizes which features are active in each mode:

Operating Feature	Counter Up / Down	Encoder X1, X2 & X4	Period /Rate	Rate Measurement
Preset	Y	Y	N	N
Rollover	Y	Y	N	N
Software Reset	Y	Y	Y	Y
Store Count - Z Gate / Reset 4 modes	Y	Y	N	N
Scale Input Count at Z Gate / Reset	N	N	Y	N
Z Gate / Reset Invert Bit	Y	Y	Y	N
Sample Period	N	N	N	Y

Operating Mode Features

The Z Gate/Reset Terminall will operate in one of four modes when the Store Count feature is in use. The following figures detail the operation in each mode:

- Store/Continue
- Store/Wait/Resume
- Store-Reset/Wait/Start
- Store-Reset/Start

Store Count Mode 1: Store/Continue

In mode 1, the rising edge of a pulse input on the Z Gate/Reset terminal causes the current counter value to be read and stored in the Read Data file. The counter continues counting. The stored count is available in the Stored/Accumulated Count word. The stored count information remains until it is overwritten with new data.

Store/Continue

Read, Store Count, and Continue Counting
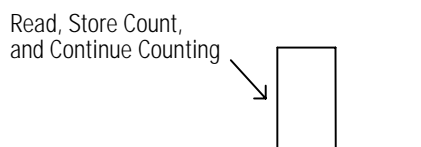
Store Count Mode 2: Store/Wait/Resume

In mode 2, the rising edge of a pulse input on the Z Gate/Reset terminal reads and stores the current counter value in the Stored/Accumulated Count word and inhibits counting while the Z

Gate/Reset terminal is high. Counting resumes on the falling edge of the pulse at the Z Gate/Reset terminal. The stored count information remains until it is overwritten with new data.

Store/Wait/Resume

Stop Counting

Store Count   Resume Counting
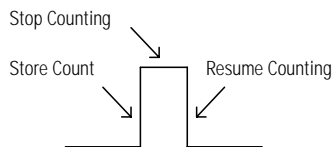
Store Count Mode 3: Store-Reset/Wait/Start

In mode 3, the rising edge of a pulse input on the Z Gate/Reset terminal stops counting, reads, and stores the current counter value in the Stored/Accumulated Count word, and resets the counter to zero. The counter does not count while the input pulse on the Z Gate/Reset terminal is high. Counting resumes from zero on the falling edge of the pulse at the Gate/Reset terminal. The stored count information will remain until it is overwritten with new data.

Store-Reset/Wait/Start

Counter has stopped Counting

Stop Count, Store,   Start Counting
and Reset to zero   from zero
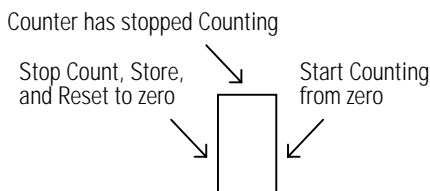
Store Count Mode 4: Store-Reset/Start

In mode 4, the rising edge of a pulse input on the Z Gate/Reset terminal will store the current counter value in the Stored/Accumulated Count word and reset the counter to zero. The counter will continue counting while the Z Gate/Reset terminal is high. The stored count information will remain until it is overwritten with new data.

Store-Reset/Start

Start Counting

Store Count,
and Reset to zero   Continue Counting
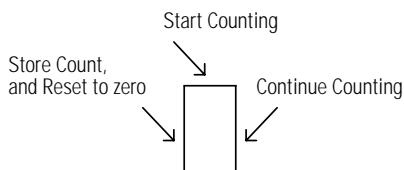
Install the Module

What This Chapter Contains

Read this chapter for information about how to install Encoder/Counter modules.

For information about how to	See page
Before You Begin	2-1
Install the Mounting Base and Wiring Base Assembly	2-1
Install the Module	2-4
Install the Removable Terminal Block	2-6
Remove a Mounting Base	2-6
Wire the Modules	2-7
Communicate with Your Module	2-9

Before You Begin

ATTENTION ⚠	**Preventing Electrostatic Discharge**
	This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment: • Touch a grounded object to discharge potential static. • Wear an approved grounding wriststrap. • Do not touch connectors or pins on component boards. • Do not touch circuit components inside the equipment. • If available, use a static-safe workstation. • When not in use, store the equipment in appropriate static-safe packaging.

ATTENTION	**Environment and Enclosure**
⚠	This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC publication 60664-1), at altitudes up to 2000 meters without derating.

This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR Publication 11. Without appropriate precautions, there may be potential difficulties ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbance.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

See NEMA Standards publication 250 and IEC publication 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure. Also, see the appropriate sections in this publication, as well as the Allen-Bradley publication 1770-4.1 (Industrial Automation Wiring and Grounding Guidelines), for additional installation requirements pertaining to this equipment.

Use these Series C modules with the following:

- ControlNet adapters
  with RSLogix 5000 software, version 11 or higher
- DeviceNet adapters
- EtherNet/IP adapters
  with RSLogix 5000 software, version 11 or higher
- PROFIBUS adapters

Install the Mounting Base and Wiring Base Assembly

The wiring base assembly (1734-TB or 1734-TBS) consists of a mounting base (cat. no. 1734-MB) and a removable terminal block (catalog number 1734-RTB or 1734-RTBS).

You can install the assembly, or just the mounting base. To install the mounting base and wiring base assembly on the DIN rail, proceed as follows.

ATTENTION ⚠	POINT I/O is grounded through the DIN rail to chassis ground. Use zinc-plated, yellow-chromated steel DIN rail to assure proper grounding. The use of DIN rail materials (such as aluminum and plastic) that can corrode, oxidize, or are poor conductors can result in improper or intermittent grounding.
	Secure DIN rail to mounting surface approximately every 200 mm (7.8 inches).

1. Position the mounting base and wiring base assembly vertically above the installed units (adapter, power supply or existing module).

2. Slide the mounting base down so that the interlocking side pieces engage the adjacent module or adapter.

Slide-in Writable Label

Module Locking Mechanism

Insertable I/O Module

Module Wiring Diagram

Mechanical Keying (orange)

DIN Rail Locking Screw (orange)

RTB Removing Handle

Removable Terminal Block (RTB)

Interlocking Side Pieces

Mounting Base

41825
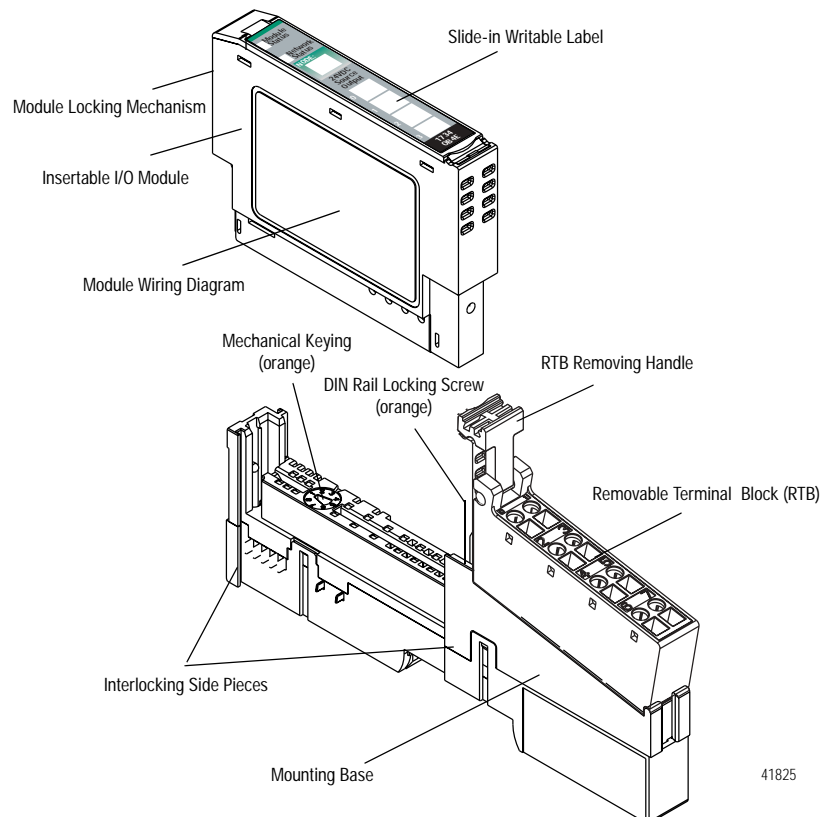
3. Press firmly to seat the mounting base on the DIN rail.

The mounting base snaps into place.
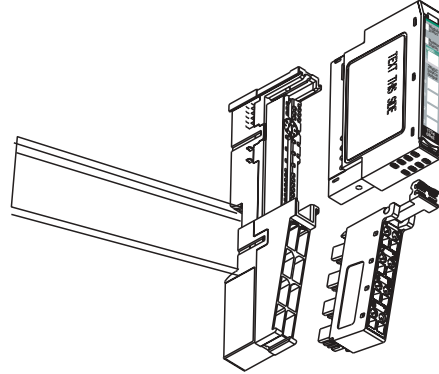
4. To remove the mounting base from the DIN rail:
   a. Remove any installed module and any module immediately to the right.
   b. Use a small-bladed screwdriver to rotate the DIN rail locking screw to a vertical position.

This releases the locking mechanism.

   c. Lift straight up to remove the mounting base.
   d. Repeat this procedure for the next mounting base assembly.

ATTENTION ⚠	Do not discard the end cap shipped with an adapter or communication interface. Use this end cap to cover the exposed interconnections on the last mounting base on the DIN rail. Failure to do so could result in equipment damage or injury from electric shock.

Install the Module

Install the module before or after base installation. Make sure that you correctly key the mounting base before installing the module into the mounting base. In addition, make sure you position the mounting base locking screw horizontal, as referenced to the base.

WARNING	When you insert or remove the module while backplane power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations.

Be sure that power is removed or the area is nonhazardous before proceeding. Repeated electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance that can affect module operation.

1. Using a bladed screwdriver, rotate the keyswitch on the mounting base clockwise until the number required for the type of module you are installing aligns with the notch in the base.

1734-IJ - Position 2
1734-IK - Position 2

Turn the keyswitch to align
the number with the notch.

Notch
(position 3 shown)

44009
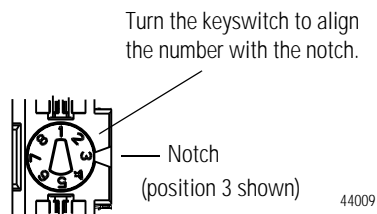
2. Make sure the DIN rail locking screw is in the horizontal position.

You cannot insert the module if you unlock the locking mechanism.

Make sure the DIN rail
locking screw is in the
horizontal position.

44010
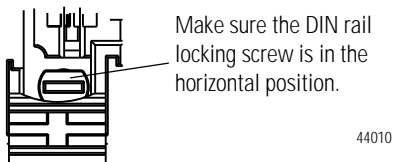
3. Insert the module straight down into the mounting base, and press to secure.

The module locks into place.

44012
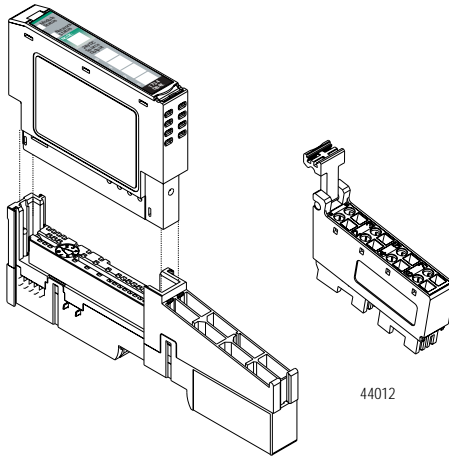
Install the Removable Terminal Block

A removable terminal block comes with your mounting base assembly. Pull up on the RTB handle to remove, and replace as necessary without removing any of the wiring. To reinsert the removable terminal block, proceed as follows.

1. Insert the RTB end opposite the handle into the base unit.

This end has a curved section that engages with the mounting base.

Hook the RTB end into the mounting base end, and rotate until it locks into place.

44011
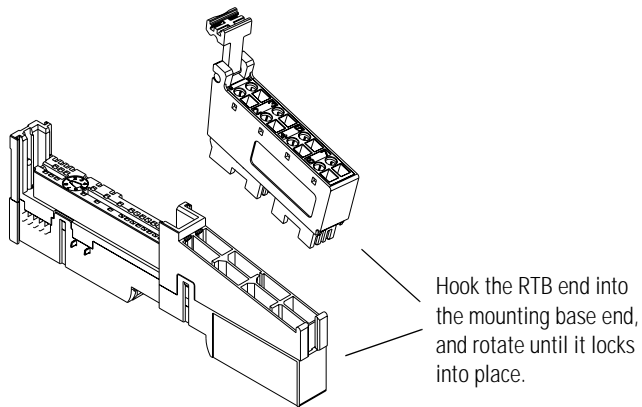
2. Rotate the terminal block into the mounting base until it locks itself in place.

3. If an I/O module is installed, snap the RTB handle into place on the module.

WARNING	When you connect or disconnect the removable terminal block (RTB) with field-side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Remove a Mounting Base

To remove a mounting base, remove any installed module and the removable terminal block (if wired).

1. Unlatch the RTB handle on the I/O module.

2. Pull on the RTB handle to remove the removable terminal block.

WARNING	When you connect or disconnect the removable terminal block (RTB) with field-side power applied, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

3. Press in on the module lock on the top of the module and pull up on the I/O module to remove from the base.

4. Remove the module to the right of the base you are removing.

The interlocking portion of the base sits under the adjacent module.

5. Use a small-bladed screwdriver to rotate the orange DIN rail locking screw on the mounting base to a vertical position.

This releases the locking mechanism.

6. Lift the mounting base straight up to remove.

Wire the Modules

WARNING	If you connect or disconnect wiring while the field-side power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.

Module Status

Network

Status of Input A
Status of Input B
Status of Input Z

Input A   Input Aret

Input B   Input Bret

Input Z   Input Zret

Chassis   Chassis
Ground   Ground
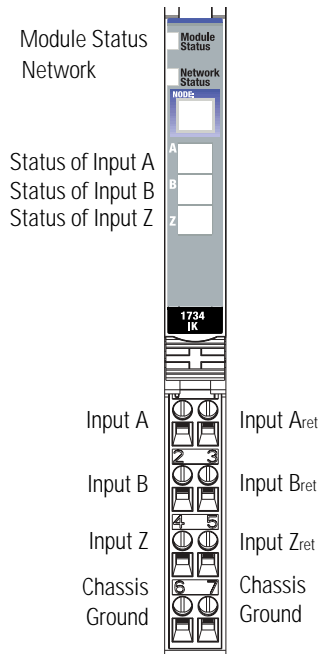
42016

0 A	1 Aret
2 B	3 Bret
4 Z	5 Zret
6 Chas Gnd	7 Chas Gnd

A, B, and Z, and Aret, Bret,
and Zret are inputs
Chas Gnd = Chassis ground

Termination	Definition
0	A
1	Aret
2	B
3	Bret
4	Z
5	Zret
6	Chassis ground
7	Chassis ground

Communicate with Your Module

POINT I/O modules send (consume) and receive (produce) I/O messages. You map these messages into the processor's memory.

This module produces 6 or 10 bytes of input data (scanner Rx) (status). It consumes 1 byte of I/O data (scanner Tx). Use parameters 11 and 12 to select assembly 101, 102, or 103 for data produced by the module.

When you send a configuration to the module, you check it for consistency before applying it. Monitor the PE bit with your user program to isolate any problems with an improperly configured module. If the configuration is acceptable, the counter ASIC is disabled while the ASIC is loaded with new operational parameters. Outputs can turn off during this reconfiguration.

Default Data Map

Message size: 6 or 10 Bytes

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Produces (scanner Rx)	Channel 0 value of present counter state (LSW)															
	Channel 0 value of present counter state (MSW)															
	PE	EF	NR	0	0	0	0	0	0	ZS	BS	AS	C1	C0	ZD	0
	Where: PE = Programming error EF = EEPROM fault status NR = Not ready status bit ZS = Z input status BS = B input status AS = A input status C1/C0 = Stored data count ZD = Zero frequency detected LSW = Least significant word MSW= Most significant word															

Message size:

	07	06	05	04	03	02	01	00
Consumes (scanner Tx)	0	0	0	0	0	VR	CP	CR
	Where: VR = Value reset of stored/accumulated count CP = Counter preset CR = Counter reset							

Module Configuration

Parameter	Set/Get	Description	Bytes
1	Set/Get	Counter Configuration	1
2	Set/Get	Filter Selection	1
3	Set/Get	Decimal Position	1
4	Set/Get	Reserved	1
5	Set/Get	Time Base Value	2
6	Set/Get	Gate Interval	1
7	Set/Get	Channel Scalar	1
8	Set/Get	Channel Rollover Value	4
9	Set/Get	Channel Preset Value	4
10	Set/Get	Counter Control Safe State	1
11	Set/Get	Requested Poll Produce Assembly	1
12	Set/Get	Requested Change of State Produce Assembly	1

Counter Configuration

07	06	05	04	03	02	01	00	
ZI	MD			CF				**Counter 0**
				0	0	0	0	Counter
				0	0	0	1	Encoder X1
				0	0	1	0	Encoder X2
				0	0	1	1	Not used
				0	1	0	0	Encoder X4
				0	1	0	1	Period/Rate
				0	1	1	0	Not used
				0	1	1	1	Rate Measurement
	0	0	0					Store Count Disabled
	0	0	1					Mode 1 - store-continue
	0	1	0					Mode 2 - store-wait-resume
	0	1	1					Mode 3 - store, reset-wait-start
	1	0	0					Mode 4 - store, reset-start
	1	0	1					Reserved
	1	1	0					Reserved
	1	1	1					Reserved
0								Z input - 0 = not inverted
1								Z input - 1 = inverted

Filter Selection

07	06	05	04	03	02	01	00	
0	ZF	BF	AF		FS			
				0	0	0	0	No Filter
				0	0	0	1	50kHz (10μs + 0μs/-1.6μs)
				0	0	1	0	5kHz (100μs + 0μs/-13.2μs)
				0	1	0	0	500Hz (1.0ms + 0μs/-125μs)
				1	0	0	0	50Hz (10ms + 0ms/-1.25ms)
			0					A input not filtered
			1					A input filtered
		0						B input not filtered
		1						B input filtered
	0							Z input not filtered
	1							Z input filtered

Assumes a 50% duty cycle signal.

Scalar Selection

07	06	05	04	03	02	01	00	Scalar[1]
0	0	0	0	0	0	0	1	Z - F_{min} = 0.149Hz
0	0	0	0	0	0	1	0	Z/2 - F_{min} = 0.298Hz
0	0	0	0	0	1	0	0	Z/4 - F_{min} = 0.596Hz
0	0	0	0	1	0	0	0	Z/8 - F_{min} = 1.192Hz
0	0	0	1	0	0	0	0	Z/16 - F_{min} = 2.384Hz
0	0	1	0	0	0	0	0	Z/32 - F_{min} = 4.768Hz
0	1	0	0	0	0	0	0	Z/64 - F_{min} = 9.537Hz
1	0	0	0	0	0	0	0	Z/128 - F_{min} = 19.073Hz

1   Where F_{min} indicates the frequency at which the zero frequency detect is asserted due to counter overflow.

Assemblies

The Encoder and Counter Module uses several words to communicate real-time input and output data as well as non-real-time module information (for example, description, revision, etc.) and configuration. This shows the words that you can exchange. You can read (get) or write (set) data using an Explicit Message.

Instance	Services	Field	Bytes
#101 (0x65)	Get	Present Channel Data	4
		Status	2
#102 (0x66)	Get	Stored Channel Data	4
		Status	2
#103 (0x67)	Get	Present Channel Data	4
		Stored Channel Data	4
		Status	2
#104 (0x68)	Get	Programming Error Code	2
#105 (0x69)	Set/Get	Counter Control	1
#106 (0x6a)	Set/Get	Counter Configuration	1
		Filter Selection	1
		Decimal Position	1
		Reserved	1
		Time Base	2
		Gate Interval	1
		Scalar	1
		Rollover Value	4
		Preset Value	4
		Counter Control SSV	1
#123 (0x7b)	Set/Get	Counter Configuration	1
		Filter Selection	1
		Decimal Position	1
		Reserved	1
		Time Base	2
		Gate Interval	1
		Scalar	1
		Rollover Value	4
		Preset Value	4
		Counter Control SSV	1
		Alignment (reserved = 0)	1

Input and Output Data

That This Chapter Contains

Read this chapter to learn about the input/output data table of your 1734-IJ and 1734-IK.

For more information about:	See page:
Data Table	3-1
Detailed Description of Data Table Information	3-2
Configuration Data	3-4
Communicate Real Time/Nonreal Time Information	3-8

Data Table

See the table for a complete format of the input/output data..

		15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	0
	Input Information																
	Present Channel Data	32-bit Value of the present counter state															
	Stored Channel Data	32-bit value of the stored/accumulated count															
	Status	PE	EF	NR	0	0	0	0	0	0	ZS	BS	AS	C1	C0	ZD	0
	Programming Error Code	PE	0	0	0	0	E10	E9	E8	E7	E6	E5	E4	E3	E2	E1	E0
	Output Information																
	Counter Control									0	0	0	0	0	VR	CP	CR
	Configuration Information																
	Counter Configuration									ZI	MD	MD	MD	CF	CF	CF	CF
	Filter Selection									0	ZF	BF	AF	FS	FS	FS	FS
	Decimal Position	8-bit value used to modify the present channel data display															
	Reserved																
	Time Base	16-bit value used to set the time base															
	Gate Interval	8-bit value used to set the gate interval															
	Scalar	8-bit value used to divide the Z input by 2^n															
	Rollover Value	32-bit value at which the counter is commanded to rollover															
	Preset Value	32-bit value the counter is to be set to when CP is asserted															
	Counter Control SS Value									0	0	0	0	0	VR	CP	CR

Detailed Description of Data Table Information

Present Channel Data (Input Word 1)

This is a 32 bit unsigned long word value representing the current count of the 24 bit counter *(configurations: count [0], x1 encoder [1], x2 encoder [2], x4 encoder [4])* **or** the frequency *(configurations: period/rate [5], rate measurement [7])*. The range of values is 0 ≤value ≤0x00FFFFFF (16,777,215).

Stored/Accumulated Channel Data (Input Word 2)

This is a 32 bit unsigned long word value representing the stored count of the counter at the time of some specified event. In counter configurations *(configurations: count [0], x1 encoder [1], x2 encoder [2], x4 encoder [4])* without store modes selected, these words are not updated. With store modes selected, they are the stored value of the counter at the time of the specified event (ex: rising edge of Z input). In *period/rate [5]* configurations, it is the total accumulation of unscaled Z pulses (for example, if scaling is set to 128, after 128 Z pulses the accumulator will increase by 128 counts).

The maximum frequency that accumulation can follow in period/rate mode is 200Hz x scalar value (ex: 200Hz x 128 is 25kHz). Finally, in *rate measurement [7]* configuration, it is the total number of pulses seen at the A input accumulated over each period as specified by the product of the time base x gate interval. The range of values occupies the entire 32 bit size from 0 ≤value ≤0xFFFFFFFF (4,294,967,295). Changing the configuration does not clear these words.

Module/Channel Status and Programming Error Codes (Input Words 3 and 4)

Programming Error bit (PE) - If an incomplete, incorrect or conflicting set of configuration parameters are sent to the module, the PE bit will be asserted and an error code will be placed in the Programming Error Code word (assembly 68_{16}). The module will **not** enter a normal operational state.

Bit definitions for the error code are:

E10:   Reserved

E9:   The decimal point position is outside of acceptable range.

E8:   Reserved

E7:   Reserved

E6:   A configuration was selected that requires the scalar and none was programmed OR Multiple scalars were selected.

E5:   The preset is out of range (> 0x00FFFFFF).

E4:   A rollover of zero was programmed OR Rollover is out of range (> 0x01000000).

E3:   A configuration requiring time base was selected and no gate interval was set OR Gate interval is out of range (> 200) OR Product of time base and gate interval is greater than 3 seconds.

E2:   A time base was entered that is not a multiple of 10 OR Time base is out of range (> 3000, or 3 seconds).

E1:   ZF/BF/AF were selected and no filter was programmed OR Multiple filters were selected.

E0:   A reserved configuration/mode was programmed.

EEPROM Fault status bit (EF) - If a fault is detected with the EEPROM during power up tests, this bit is asserted to 1. It indicates that the content of the EEPROM has been corrupted, most likely caused by loss of power during an executing write.

Not Ready status bit (NR) - Whenever power is applied to the module, the hardware must be initialized. During this time, the NR bit will be asserted and the **green module status indicator will flash**.

Z input Status (ZS) - This bit indicates the present status of the Z input (1 indicates Z is ON, 0 indicates Z is OFF). This bit is unaffected by Z Invert, ZI, in the Counter Configuration word.

B input Status (BS) - This bit indicates the present status of the B input (1 indicates B is ON, 0 indicates B is OFF).

A input Status (AS) - This bit indicates the present status of the A input (1 indicates A is ON, 0 indicates A is OFF).

C[1,0] Stored data count - This count cycles through [0 0], [0 1], [1 0], [1 1], [0 0]…Each time the stored/accumulated count words are updated, C[1,0] is incremented. This feature assumes the host's sample rate (including network delay and program scan) is as fast or faster than the frequency of the event that updates C[1,0].

Zero frequency Detected (ZD) - This bit is operational when frequency configurations are programmed *(configurations: period/rate [5], rate measurement [7])*.

In ***period/rate [5]*** configuration, counts are acquired during the **ON** state of the Z input. At very low frequencies the counter saturates, indicating a zero frequency detect. The time it takes to determine a zero frequency in these two configurations can be as long as 6.7 seconds (16,777,216 counts x 1/5MHz x 2 half cycles of Z).

In ***rate measurement [7]*** configuration pulses on the A input are counted over a sample interval specified by the time base. The time it takes to determine a zero frequency in this configuration will be determined by the sample interval, for example, time base = 0.300 second (300 milliseconds) to determine ZF.

Configuration Data

The following represents the configuration data used by the module.

Parameter		Configuration Information	Size (bytes)
1	Set/Get	Counter Configuration	1
2	Set/Get	Filter Selection	1
3	Set/Get	Decimal Position	1
4	Set/Get	Reserved	1
5	Set/Get	Time Base	2
6	Set/Get	Gate Interval	1
7	Set/Get	Scalar	1
8	Set/Get	Rollover Value	4
9	Set/Get	Preset Value	4
10	Set/Get	Counter Control SS Value	1

Counter Configuration (Configuration Word 1)

Use this byte to select the type of counter desired.

07	06	05	04	03	02	01	00	
ZI	MD			CF				**Counter 0**
				0	0	0	0	Counter
				0	0	0	1	Encoder X1
				0	0	1	0	Encoder X2
				0	0	1	1	Reserved
				0	1	0	0	Encoder X4
				0	1	0	1	Period/Rate
				0	1	1	0	Reserved
				0	1	1	1	Rate Measurement
	0	0	0					Store Count Disabled
	0	0	1					Mode 1 - store/continue
	0	1	0					Mode 2 - store/wait/resume
	0	1	1					Mode 3 - store, reset/wait/start
	1	0	0					Mode 4 - store, reset/start
	1	0	1					Reserved
	1	1	0					Reserved
	1	1	1					Reserved
0								Z input - 0 = not inverted
1								Z input - 1 = inverted

Filter Selection (Configuration Word 2

This byte sets the A/B/Z input filters

Filter Selection

07	06	05	04	03	02	01	00	
0	ZF	BF	AF	FS				
				0	0	0	0	No Filter
				0	0	0	1	50kHz (10μs + 0μs/-1.6μs)
				0	0	1	0	5kHz (100μs + 0μs/-13.2μs)
				0	1	0	0	500Hz (1.0ms + 0μs/-125μs)
				1	0	0	0	50Hz (10ms + 0ms/-1.25ms)
			0					A input not filtered
			1					A input filtered
		0						B input not filtered
		1						B input filtered
	0							Z input not filtered
	1							Z input filtered

Decimal Position (Configuration Word 3)

This byte changes the significant digits of the frequency or counter display.

In the frequency modes (*period/rate [5]*, *rate measurement [7]*) for example, a -2 will move the decimal point left 2 places, dividing the frequency value by 100, a +1 moves it right, multiplying by 10. The firmware checks for placement to be in the range -4 ≤value ≤+2. A value outside the range will move the decimal point to the zero position and assert the programming error (PE) bit. Moving the decimal point to the left (negative), allows high frequencies, commonly present in rate measurement mode, to fit within a single 16 bit word. Moving the decimal point to the right (positive), allows low frequencies, commonly present in period and continuous rate modes, to have resolution displayed to 0.1Hz and 0.01Hz. Frequencies should be kept below 3.2kHz for 0.1Hz resolution and below 320Hz for 0.01Hz. Scalars of Z/128, Z/64, Z/32 and Z/16 should *not* be used when positioning is applied. 0 is the default setting.

In the counter modes (*counter [0], x1 encoder [1], x2 encoder [2], x4 encoder [4]*), it attenuates the counter display, for example, 20 divides count+1 by 20. The value may be in the range 0 < value ≤255. The result of requesting a number other than 1 performs the function: (COUNT + 1)/ATTENUATION. This is useful for scaling a large counter value to a smaller 16 bit value or a percentage. One is the default setting and zero reverts to 1 to prevent a divide by zero.

Word 4 is reserved.

Time Base and Gate Interval (Configuration Words 5 and 6)

The gate interval byte sets the counter's gate intervall using the time base setting (16-bit word 5) as its time unit. (its resolution is determined by the time base). The actual gate interval is the product of the time base and the gate interval (ex: 50ms gate interval may be produced with a time base of 10 and a gate interval of 5 or a time base of 50 and a gate interval of 1). The maximum value of the product of time base x gate interval is 3 seconds. The gate interval must be entered when *rate measurement [7]* configurations are used. The maximum value is 200.

Scalar (Configuration Word 7)

This bytel scales the Z signal in the *period/rate [5]* configuration. If the filter is applied, then the filtered Z is scaled. Only one bit of the scalar should be set. Selecting a scalar will cause accumulated counts to be adjusted accordingly (selecting a scalar of 128 will increase the accumulated count by 128 after 128 Z pulses have been received*).* We highly recommend that anytime Z is scaled (divide by 2, 4, 8), the Z input should be filtered, otherwise, noise could cause erroneous frequency readings.

Scalar Selection

07	06	05	04	03	02	01	00	Scalar[1]
0	0	0	0	0	0	0	1	Z - F_{min} = 0.149Hz
0	0	0	0	0	0	1	0	Z/2 - F_{min} = 0.298Hz
0	0	0	0	0	1	0	0	Z/4 - F_{min} = 0.596Hz
0	0	0	0	1	0	0	0	Z/8 - F_{min} = 1.192Hz
0	0	0	1	0	0	0	0	Z/16 - F_{min} = 2.384Hz
0	0	1	0	0	0	0	0	Z/32 - F_{min} = 4.768Hz
0	1	0	0	0	0	0	0	Z/64 - F_{min} = 9.537Hz
1	0	0	0	0	0	0	0	Z/128 - F_{min} = 19.073Hz

1 Where F_{min} indicates the frequency at which the zero frequency detect is asserted due to counter overflow.

Rollover (Configuration Word 8)

This long word sets the number of counts the counter will accumulate before rolling over. For example, a value of 1000 will produce a count sequence of: 998, 999, 0, 1, 2…while incrementing or 2, 1, 0, 999, 998…while decrementing. Rollover is a 32 bit number with a useable range of 1 ≤value ≤0x01000000 (16,777,216). In *count [0], x1 encoder [1], x2 encoder [2] and x4 encoder [4]* configurations, it should be specified to some non-zero value; and in *period/rate [5],* and *rate measurement [7]* configurations is a 'don't care'.

Preset (Configuration Word 9)

This long word sets the preset value the counter will be loaded with, when a Counter Preset, CP, command is issued. Preset is a 32 bit number with a range of 0 ≤value ≤0x00FFFFFF (16,777,215).

Safe State Values (Configuration Word 10)

When either the host transitions to PROGRAM mode or a communication fault (broken network cable) occurs, the module copies the safe state word (counter control value) into its real-time working buffer. The definitions are identical to those described under Real-time Output Data.

Communicate Real Time/Nonreal Time Information

The Encoder/Counter Module uses several words to communicate real time input and output data as well as non-real time module information (such as description and revision) and configuration.

Assembly 101 is produced for a polled connection. Assembly 102 is produced for a Change Of State (COS) connection. Assemblies 103, 104, and 106 are by Explicit message only. Assembly 105 is consumed in a polled connection.

Data may be read (get) or written (set) using an Explicit Message. For example, to read the Present Channel Data, assembly 101_{10} (65_{16}) can be requested. The following table shows the words which can be exchanged.

Instances	Services	Field	Bytes
#101 (0x65)	Get	Present Channel Data	4
		Status	2
#102 (0x66)	Get	Stored Channel Data	4
		Status	2
#103 (0x67)	Get	Present Channel Data	4
		Stored Channel Data	4
		Status	2
#104 (0x68)	Get	Programming Error Code	2
#105 (0x69)	Set/Get	Counter Control	1
#106 (0x6a)	Set/Get	Counter Configuration	1
		Filter Selection	1
		Decimal Position	1
		Reserved	1
		Time Base	2
		Gate Interval	1
		Scalar	1
		Rollover Value	4
		Preset Value	4
		Counter Control SSV	1

Configure Your Module

What This Chapter Contains

This chapter describes how to configure your Encoder/Counter modules with RSNetworx.

For more information about:	See page:
Configuration Overview	4-1
Add the Adapter to Your Network	4-1
Add I/O Modules to Your Network	4-2
Set Counter Parameters	4-4
Check I/O Status and View the EDS File	4-6

Configuration Overview

You must use the RSNetworx for DeviceNet software to configure your module. You can configure the module while it is:

- online

    or

- offline

This chapter shows configuration in the online mode. Configuration dialogs appear similar in both modes. The primary difference is that if you make changes offline, you must go on line before the configuration changes take effect.

Add the Adapter to Your Network

Follow these steps:

1. Start the RSNetworx for DeviceNet software.

2. Add the communication device as shown below. (In this case, the chosen device was a 1734-ADN DeviceNet Scanner.)

1. Click here to expand the list of communication adapters.

2. Double-click here to choose the scanner. You can also click and drag the scanner name onto the network. Make sure you choose the 1734-ADN Point I/O Scanner.

The scanner appears on the network.
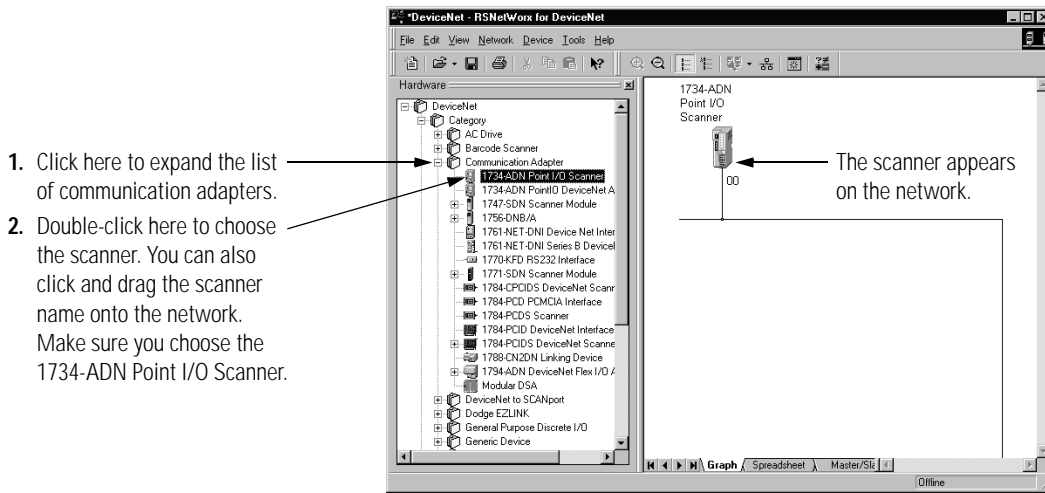
IMPORTANT	The scanner must always exist on the DeviceNet network at Node 00.

Add I/O Modules to Your Network

After you add the communication device, you must add the POINT I/O modules connected to the scanner on the PointBus.

1. Add modules as shown below. (In this case, the communication device shown is a 1770-KFD.)

.

1. Click here to expand the list of Specialty modules.

2. Double-click on the catalog number to choose the module. You can also click and drag the module name onto the network.
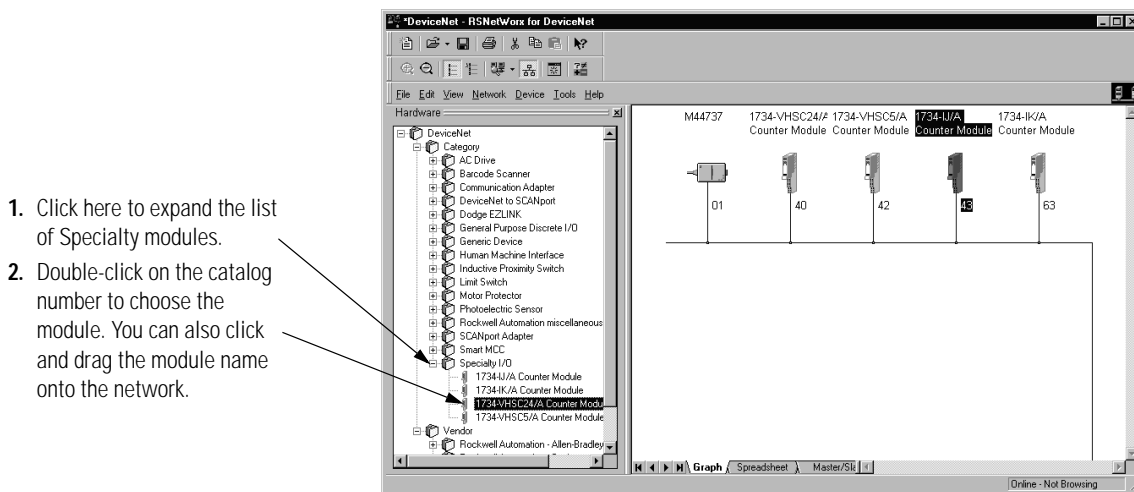
The out-of-the-box node setting for 1734 modules is 63. You can change the setting by using the node commissioning tool. The node commissioning tool is available either online or offline.

IMPORTANT	If you commission a node on line, you must power down your system before the change takes place.
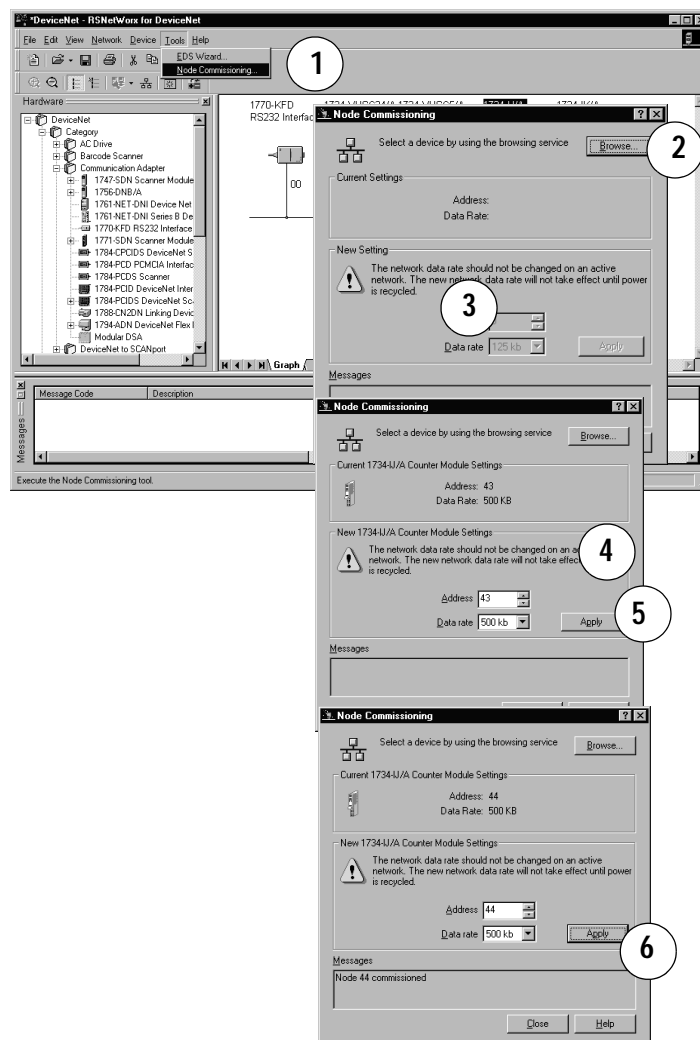
1. Go to the pulldown Tools. Select Node Commissioning.

2. Click on Browse.

3. Select the module to change.

4. The node commissioning dialog returns. It displays the node number and data rate.

5. Change the node number and Apply. The dialog will then identify the new setting.

6. Click on Close to continue.

Set Counter Parameters

After adding the module to the network, you must configure the modules for use.

IMPORTANT	This chapter shows configuration in the online mode. Changes set in this mode take effect when you download to the individual module.

1. Configure the modules as shown below.

1. Right-click on the module.

You can also left click on the module or name and the property dialog will pop up.

2. Click on Properties to configure your adapter.
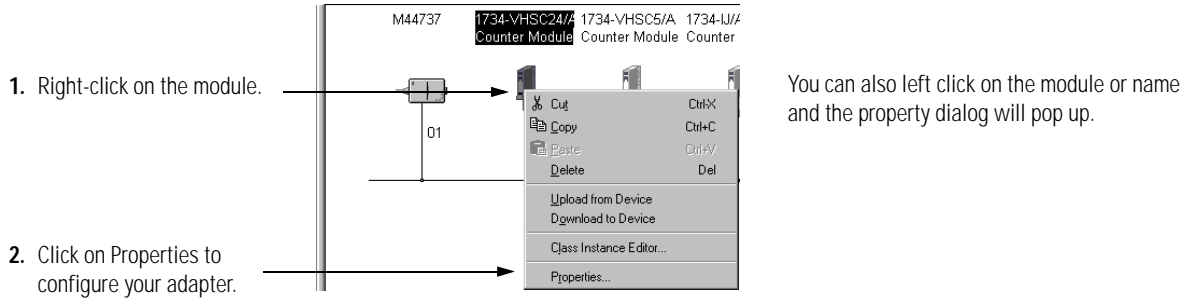
You will see a pop-up dialog with a series of tabs. Each tab provides options view or edit.

These are the tabs you click on to view the options.
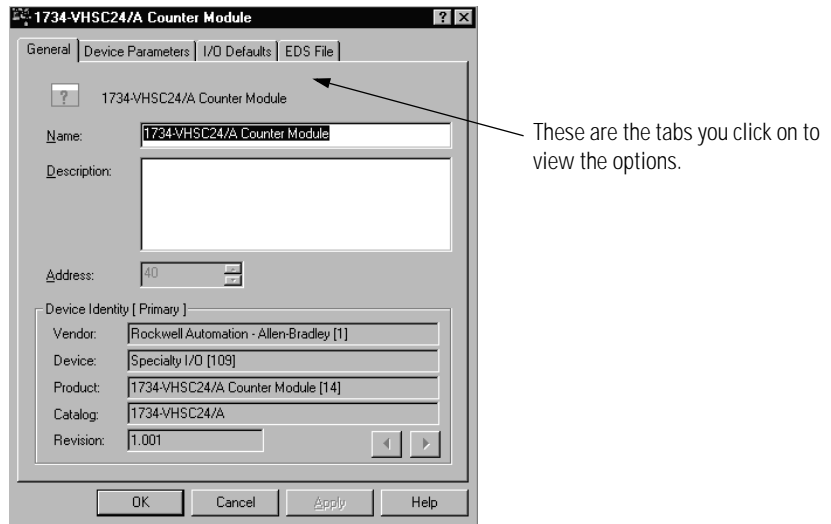
Refer to the dialogs for an explanation of its features.

The module's name appears here.

Type a description here.

The module's address appears here. (This field is read only.)

This dialog also shows the module's device identity. These fields are read-only.
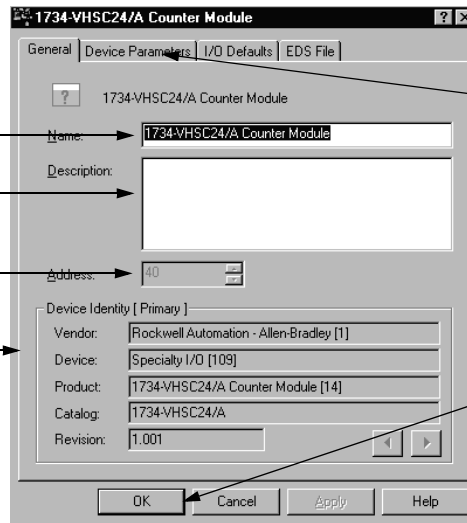
Click on the Device parameters tab to get to the dialog for setting the parameters.

At any point, you can click here to finish changing configuration parameters.

IMPORTANT: If configuration changes are made in offline mode, they do not take effect until the system goes online.
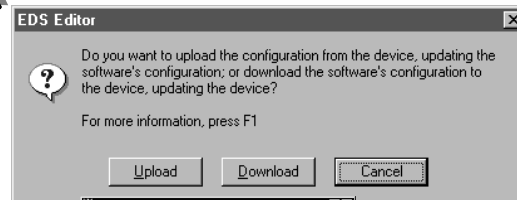
This dialog appears after clicking on the Device parameters tab. If you want the existing parameters uploaded from the module, select Upload. The following dialog will then show the existing parameters set on the module.

Use this pulldown menu to edit or view the parameters. Available choices are:

All parameters
Status
Configuration
PointBus
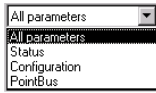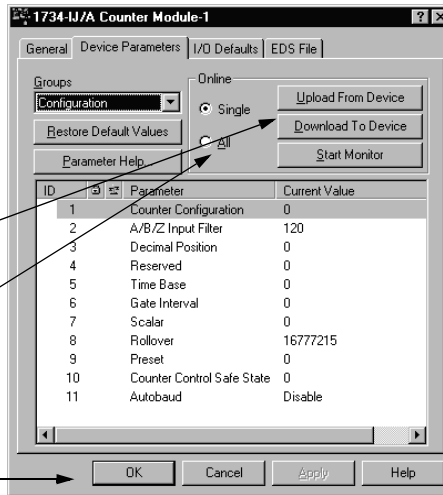
PointBus
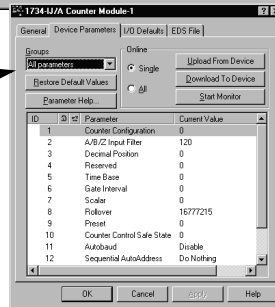
Configuration
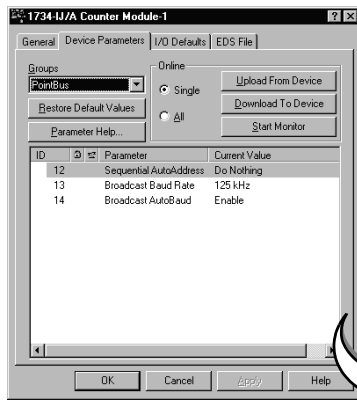
Status
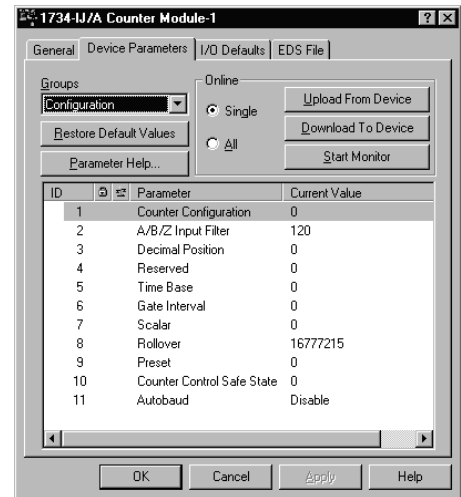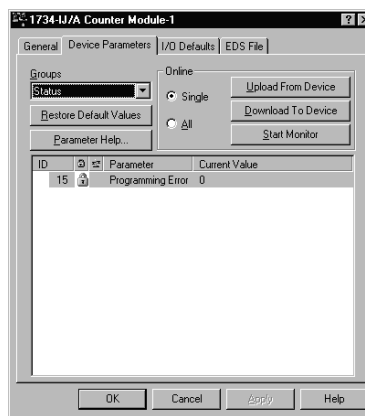
To configure your module, select Configuration and modify the parameters as desired for your application.

When complete, download to your module by clicking on the Download to Device button. You can download each change as you make it using "Single," or download all your changes using "All."
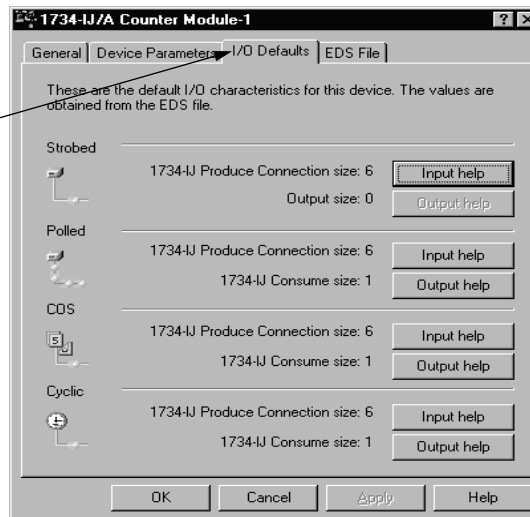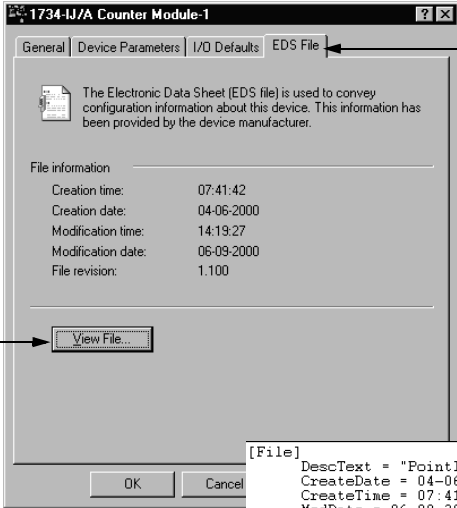
Click here when finished.

Check I/O Status and View the EDS File

View the I/O defaults setup, and the EDS file by clicking on the appropriate tab.

Click on the I/O Defaults tab to display the default characteristics for this module.

This dialog shows the input/output defaults for the four modes. These are:
Strobe
Polled
Change of state and
Cyclic

Click on the EDS File tab to display the statistics of the EDS file used to configure this module.

1734-IJ/A Counter Module-1

General | Device Parameters | I/O Defaults | EDS File

The Electronic Data Sheet (EDS file) is used to convey configuration information about this device. This information has been provided by the device manufacturer.

File information

Creation time:	07:41:42
Creation date:	04-06-2000
Modification time:	14:19:27
Modification date:	06-09-2000
File revision:	1.100

Click on View File to view the actual EDS file.

View File...

OK   Cancel

You can view the actual EDS file or edit the file.

```
[File]
        DescText = "PointIO 1734-IJ/A";
        CreateDate = 04-06-2000;
        CreateTime = 07:41:42;
        ModDate = 06-09-2000;
        ModTime = 14:19:27;
        Revision = 1.1;

[Device]
        VendCode = 1;
        VendName = "Allen-Bradley Company, Inc.";
        ProdType = 109;
        ProdTypeStr = "Specialty I/O";
        ProdCode= 15;
        MajRev = 1;
        MinRev = 1;
        ProdName = "1734-IJ/A Counter Module";
        Catalog = "1734-IJ/A";

[Params]
        Param1 = 0,
                6,"20 0F 24 01 30 01",  $ Link Path Size, Link Path
                0x0000,        $ Descriptor
                8, 1, $ Data Type, Data Size
                "Counter Configuration",
                "",
                "Configures the counter's operational mode. Availabl
                0,255,0,
```

Notes:

Access Instantiated Instances

What This Chapter Contains   In this chapter, you learn how to access imbedded Instantiated Instances (assemblies) in the software. The Encoder/Counter Module uses several words to communicate real time input and output data as well as non-real time module information (such as description and revision) and configuration. These words have been preprogrammed into Instantiated Instances.
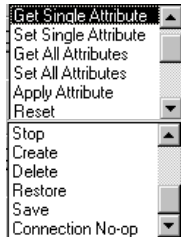
Using Instantiated Instances
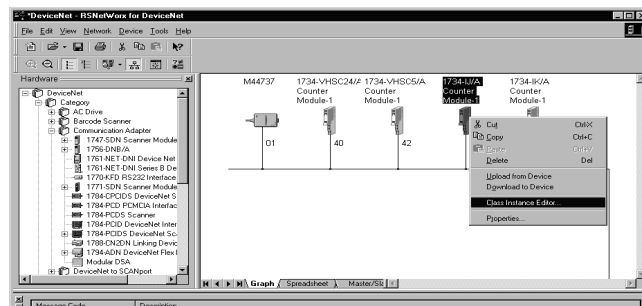
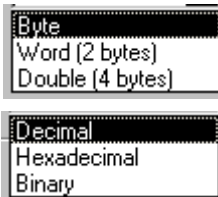Click on the module to select the Class Instance Editor.
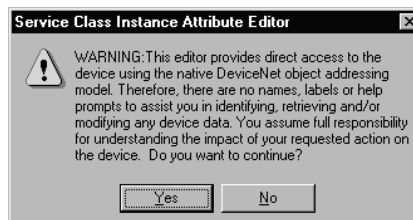
Click on Yes when this dialog appears.

The Class Instance Attribute editor dialog appears.

1. Select the service code

```
Get Single Attribute   ▲
Set Single Attribute   ▮
Get All Attributes
Set All Attributes
Apply Attribute
Reset                  ▼
Stop                   ▲
Create                 ▮
Delete
Restore
Save
Connection No-op       ▼
```

3. Select the Receive Data size and radix.

```
Byte
Word (2 bytes)
Double (4 bytes)
```

```
Decimal
Hexadecimal
Binary
```


Service Class Instance Attribute Editor - [Node 43]
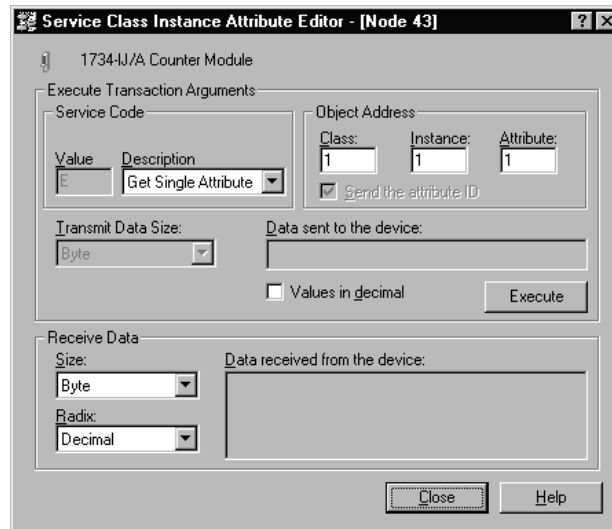
3. Enter the class, instance and attribute here.

4. Click on Execute to initiate the action.

For example:

If you select Instance 101 (polled connection), the dialog looks like this.

Service Class Instance Attribute Editor - [Node 43]
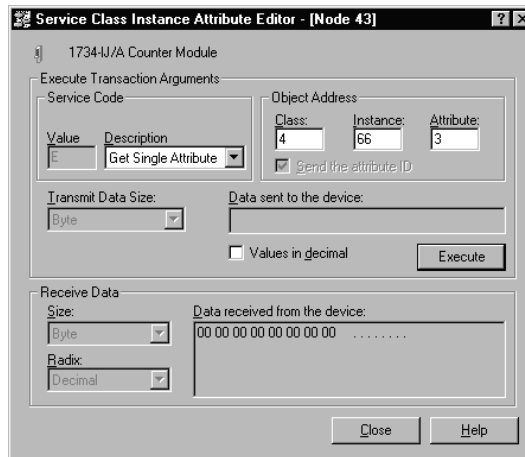
1. Type in the instance number here. This is an example of assembly number 102 (0x66). (The class is always 4 and the attribute is always 3.)

2. Click on execute.

3. Data received and status information is recorded here.

4. Click on Close to finish.

Assemblies

Available assemblies are:

- Assembly 101 is produced for a polled connection.
- Assembly 102 is produced for a Change Of State (COS) connection.
- Assemblies 103, 104 and 106 are by Explicit message only.
- Assembly 105 is consumed in a polled connection .

Data may be read (get) or written (set) using an Explicit Message. For example, to read the Present Channel Data, assembly 101_{10} (65_{16}) can be requested.

Data is ordered as followed (byte 0 is the least significant byte):

8 bit byte	Byte 0
16 bit word	Byte 0, byte 1
32 bit long word	Byte 0, byte 1, byte 2, byte 3

In this example, assembly 101,

Service	Class	Instance	Attribute
0E (Get)	04 (Assembly)	65 (Present Data)	03 (Data Attribute)

Instances	Services	Field	Bytes
#101 (0x65)	Get	Present Channel Data	4
		Status	2
#102 (0x66)	Get	Stored Channel Data	4
		Status	2
#103 (0x67)	Get	Present Channel Data	4
		Stored Channel Data	4
		Status	2
#104 (0x68)	Get	Programming Error Code	2
#105 (0x69)	Set/Get	Counter Control	1

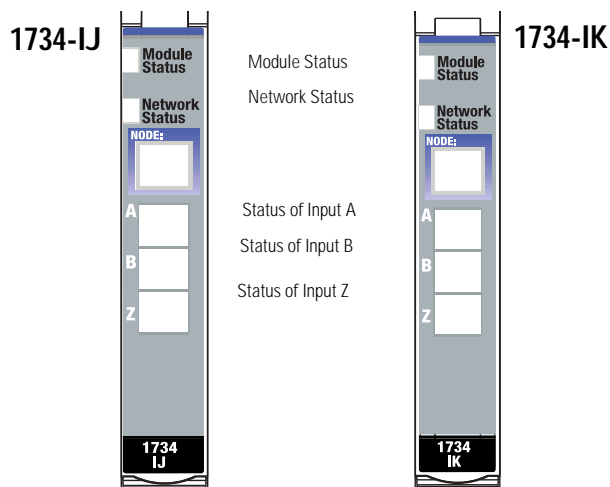| #106 (0x6a)	Set/Get	Counter Configuration	1
		Filter Selection	1
		Decimal Position	1
		Reserved	1
		Time Base	2
		Gate Interval	1
		Scalar	1
		Rollover Value	4
		Preset Value	4
		Counter Control SSV	1

Troubleshoot the Module

What This Chapter Contains

Read this chapter for information about troubleshooting with the indicators.

Troubleshoot with the Indicators

See the figures that show the 5 indicators on the frontplate of each module. Use these indicators for troubleshooting.

1734-IJ

Module Status

Network Status

Status of Input A

Status of Input B

Status of Input Z

1734-IK

Indication	Probable Cause
Module Status	
Off	No power applied to device.
Green	Device is operating normally.
Flashing Green	Device needs commissioning due to configuration missing, incomplete, or incorrect.
Flashing Red	Recoverable fault is present.
Red	Unrecoverable fault may require device replacement.
Flashing Red/Green	Device is in self-test.

Indication	Probable Cause
Network Status	
Off	Device is not online. - Device has not completed dup_MAC_id test. - Device not powered - check module status indicator.
Flashing Green	Device is online, but has no connections in the established state.
Green	Device online and has connections in the established state.
Flashing Red	One or more I/O connections are in timed-out state
Red	Critical link failure with failed communication device is present. Device detected error that prevents it communicating on the network.
Flashing Red/Green	Communication faulted device - the device detected a network access error and is in communication faulted state. Device received and accepted an Identify Communication Faulted Request with long protocol message.

Indication	Probable Cause
Input Status	
Off	Input is inactive.
Yellow	Input is active and under control.

Configure Modules in RSLogix 5000 Software

What This Appendix Contains

Read this appendix for information about how to configure your modules in RSLogix 5000 software, including how to complete entries on the following dialogs.

- Fault/Program Action
- Counter Configuration

Understand Data, Connection, and Communication Formats

Before you configure your modules, note the following about Data formats and Connection types.

- Data format type is Integer.
- Connection types are as follows.
  - Data
  - Listen Only

Communication formats for adapters are as follows.

- Listen Only - Rack Optimization
- None
- Rack Optimization

Choices for formats for the module depend on the Communication format for the adapter. See the table for a listing of possible module Connection formats based on adapter Communication formats.

Adapter Communication Formats	Possible Module Connection Formats
Listen Only - Rack Optimization	Data (default)
	Listen Only
None	Data (default)
	Listen Only
Rack Optimization	Data (default)
	Listen Only

When you change Connection and Data Format, note the following.

- You do not delete the existing module.
- You do not create a new module.
- You bring forward all possible configuration data for the new setting.
- Configuration data that you cannot bring forward sets to the default value.

Once you apply new settings, this becomes the base configuration for the next change in Connection and Data Format settings. When you select Apply, you lose all configuration data from previous data formats.

See the table for a listing of tags and dialogs based on Connection type.

Connection Type	Tags	Dialogs
Data	Input Output Configuration	General Connection Module Info Fault/Program Counter Configuration
Listen Only	Input	General Connection Module Info

Configure Your Module

To configure your module in RSLogix 5000, complete the following.

1. Configure your adapter.

   Refer to the user manual for your adapter for information on how to configure the adapter and add modules to the I/O configuration to include selecting a controller and communication module.

2. Add a 1734-IJ or 1734-IK specialty module, according to the instructions in your adapter user manual.

3. From the Connection dialog, perform the following.

   a. Select a value for the Requested Packet Interval (RPI) entry.

   - Default value is 80.0 milliseconds.
   - Range is 2.0 to 750.0 milliseconds.

   b. Leave the following unchecked.

   - Inhibit Module
   - Major Fault On Controller If Connection Fails While in Run Mode

4. Complete entries for the following dialogs, as explained in this chapter.
   - Fault/Program Action
   - Counter Configuration

Use the Help Button

From the Fault/Program Action and Counter Configuration dialogs, click Help at the bottom of the dialog for information about how to complete entries on the dialogs.

From a warning dialog, click Help at the bottom fo the dialog to get information about that specific error.

Work with the Fault/Program Action Dialog

In Hard Run mode, you disable all controls on the Fault/Program Action, in addition to the enable and disable state for each control. Complete these entries from the dialog.
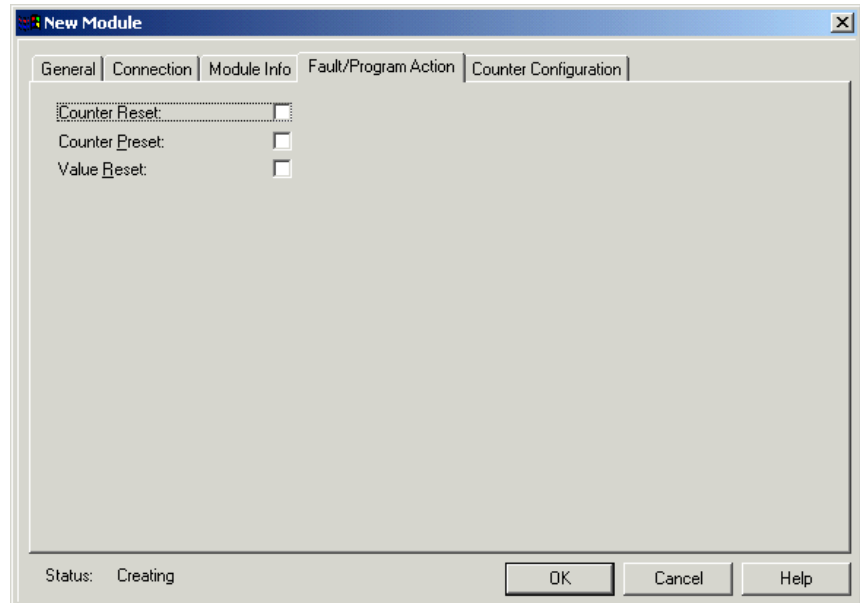

1. Check the checkboxes, as shown in the table.

Check This Checkbox	To
Counter Reset	Reset the counter
Counter Preset	Set the value of the counter, as specified by the preset words
Value Reset	Reset the value of the accumulated (stored) count

2. From the bottom of the Fault/Program Action dialog, perform one of the following.
   - Click another tab at the top of the dialog, for example, click Counter Configuration to continue configuration.
     or
   - Click OK, which closes the Fault/Program Action dialog.
     or
   - Click Cancel to return to default values.
     or
   - Click Apply to save changes you made on any of the dialogs and continue to display the dialog, noting that you enable the Apply button when you make changes to any of the dialogs.

Work with the Counter Configuration Dialog

Complete entries as follows from the Counter Configuration dialog.
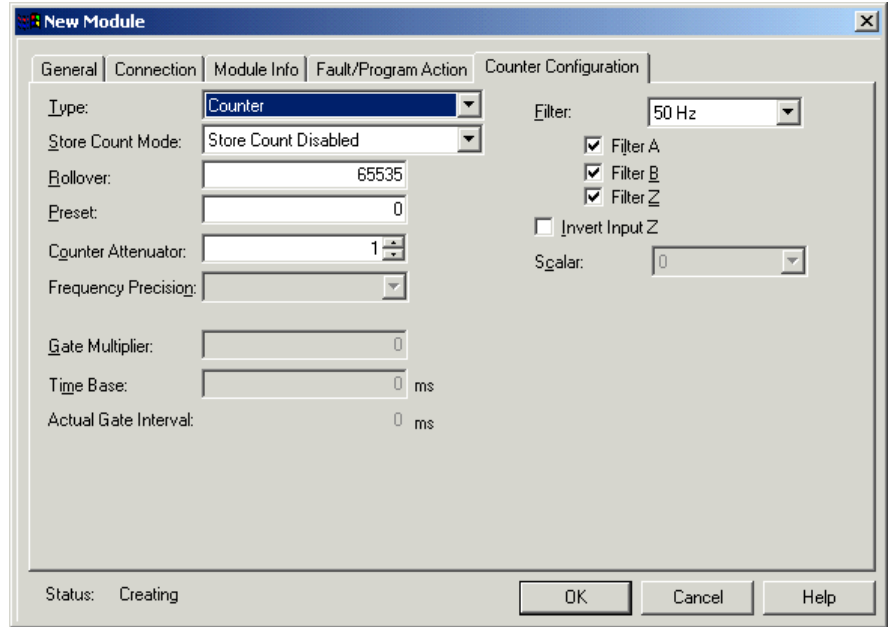
1. For Type, select one of the following, to set the Counter Configuration mode.

   - Counter (default)
   - Encoder X1, Encoder X2, or Encoder X4
   - Period/Rate
   - Rate Measurement

2. Refer to the table to see what entries to complete based on what you enter for Type.

Complete This Entry	If You Select This for Type			
	Counter	Encoder X1, X2, X4	Period/ Rate	Rate Measurement
Store Count Mode	X	X		
Rollover	X	X		
Counter Attenuator	X	X		
Frequency Precision			X	X
Time Base/Gate Interval				X
Invert Input Z	X	X	X	
Scalar			X	

3. Refer to the table to make selections for the following entries.

- Store Count Mode
- Rollover
- Preset
- Counter Attenuator
- Frequency Precision
- Gate Multiplier
- Time Base
- Actual Gate Interval

If You Selected This for Type	For This Value	Select	Comments
Counter (default) Encoder X1 Encoder X2 Encoder X4	Store Count Mode	Store Count Disabled Store-Continue Store-Wait-Resume Store, Reset-Wait-Start Store, Reset-Start	Default is Store Count Disabled. Select an option to determine which mode you use for operating the Z Gate/Reset Terminal,
	Rollover	1 to 16777216	Default is 16777215. Select a value greater than the value for Preset.
	Preset	0 to 16777215	Default is 0. Select a value smaller than the value for Rollover.
	Counter Attenuator	0 to 255	Default is 1. Select a value to attenuate the counter display.
Period/Rate Rate Measurement	Frequency Precision	X 0.0001 X 0.001 X 0.01 X 0.1 X 1 X 10 X 100	Default is X1. Select a value to multiply the frequency by the factor selected.
	Gate Multiplier	1 to 200	Default is 1. Select a value so that the product of Gate Multiplier and Time Base does not exceed 3 seconds (3000 milliseconds).
	Time Base	10 to 3000 milliseconds in multiples of 10	Default is 1000.
	Actual Gate Interval	You do not make a selection, as this is a static field you do not configure.	This is the product of Gate Multiplier and Time Base. An acceptable value is less than 3 seconds (3000 milliseconds).

4. For Filter, select the Frequency from the following, which is the value you use to filter A/B/Z inputs when you check a corresponding checkbox.

- No Filter
- 50 kHz
- 5 kHz
- 500 Hz
- 50 Hz (default)

5. Check the checkboxes for the following, which use the value you selected for Filter.

- Filter A
- Filter B
- Filter Z

6. For Invert, check the checkbox to invert the signal at Z input, if you selected the following for Type.

- Counter
- Encoder X1, Encoder X2, or Encoder X4
- Period/Rate

7. For Scalar, if you selected Period/Rate, choose one of the following values.

- 1
- 2
- 4
- 8
- 16
- 32
- 64
- 128

If you apply the filter, you scale the filtered Z. The value you chose for Scalar scales the Z signal for the following configurations.

- Period/Rate
- Continuous/Rate
- Pulse Generator

When the value for Scalar is one of the following, frequency precision ≤ 1.

- 16
- 32
- 64
- 128

8. Perform one of the following.
- Click another tab at the top of the dialog.
  or
- Click OK, which closes the dialog.
  or
- Click Cancel to return to default values.
  or
- Click Apply to save changes you made on any of the dialogs and continue to display the dialog, noting that you enable the Apply button when you make changes to any of the dialogs.

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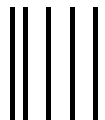
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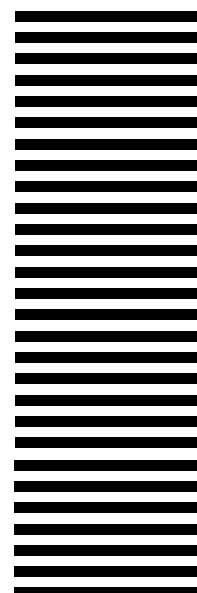
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