NI-9361 Getting Started

2025-03-21

Contents

NI-9361 Pinout

The NI-9361 provides connections for eight digital input channels for the embedded counters.

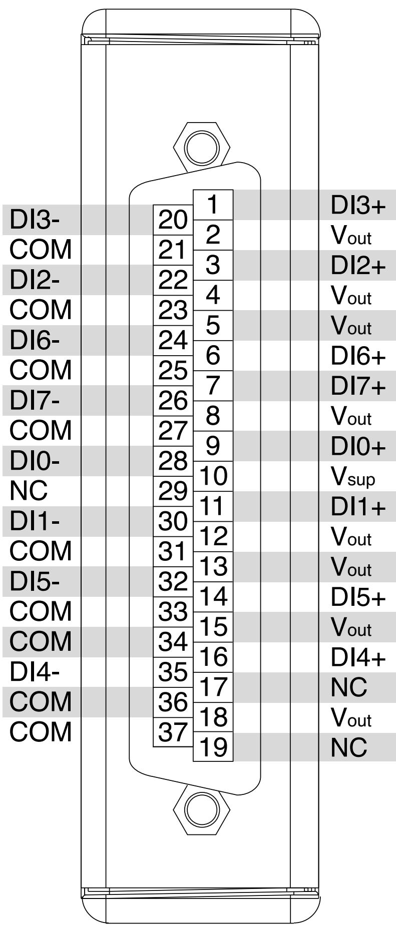


Table 1. Signal Descriptions

Signal	Description
COM	Common reference connection to isolated ground
DI+	Digital input signal connection for singled-ended measurements and positive digital input signal connection for differential measurements

Signal	Description
DI-	Negative digital input signal connection for differential measurements
NC	No connection
V_{out}	Voltage supply output connection
V_{sup}	Voltage supply input connection

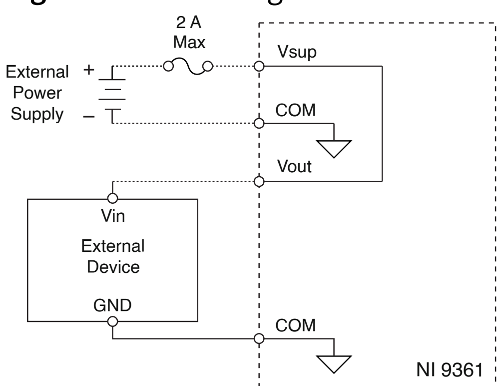
Connecting an External Power Supply

You can optionally connect an external power supply to the NI-9361 to provide current for the devices that you connect to the module. Install a 2 A maximum, fast-acting fuse between the external power supply and the Vsup terminal.

Note Refer to the ***NI-9361 Specifications*** for more information about the Vsup pins.

Caution Do not remove or install modules if the connected external power supply is powered on.

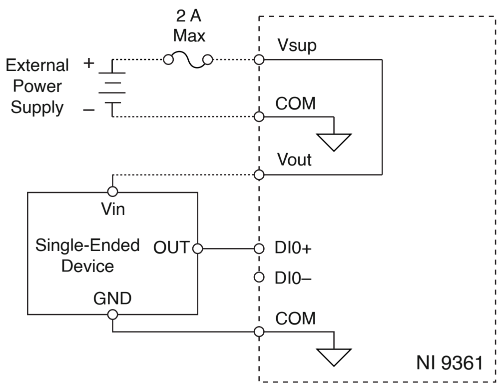
Figure 1. Connecting an External Power Supply



Connecting Single-Ended Devices

You can connect single-ended devices, such as TTL or CMOS to the NI-9361. For single-ended connections, connect the device out to the DI+ terminal on the NI-9361. Do not connect the DI- terminal on the NI-9361 for single-ended connections.

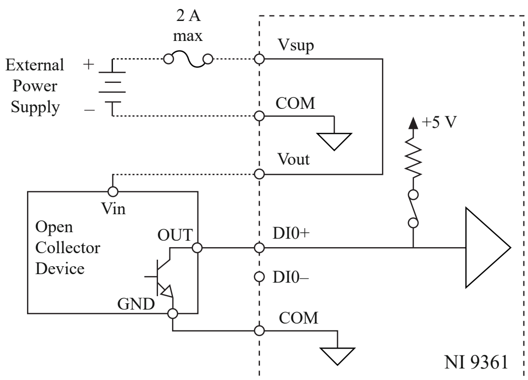
Figure 2. Connecting a Single-Ended Device



Connecting Single-Ended Devices with Open Collector Outputs

You can connect a device with open collector or open drain outputs to the NI-9361.

Figure 3. Connecting a Single-Ended Device with Open Collector Outputs

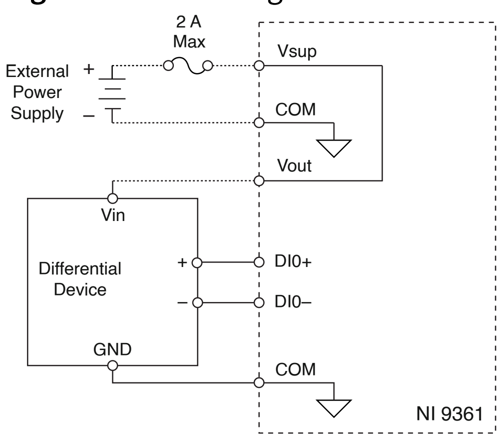


An open collector device does not actively drive the signal high and relies on an external pull-up. The NI-9361 provides a 5 V pull-up on each DI+ pin that can be enabled individually to pull the signal high.

Connecting Differential Devices

You can connect differential devices to the NI-9361. For differential connections, connect the positive device out to the DI+ terminal on the NI-9361 and the negative device out to the DI- terminal on the NI-9361.

Figure 4. Connecting a Differential Device



The NI-9361 measures the difference between the DI+ and DI- terminals to determine if that difference is greater or less than the digital logic levels. If the difference between the terminals is within the input high range, the channel registers as high. If the difference between the terminals is within the input low range, the channel registers as low.

Connecting Incremental Encoders

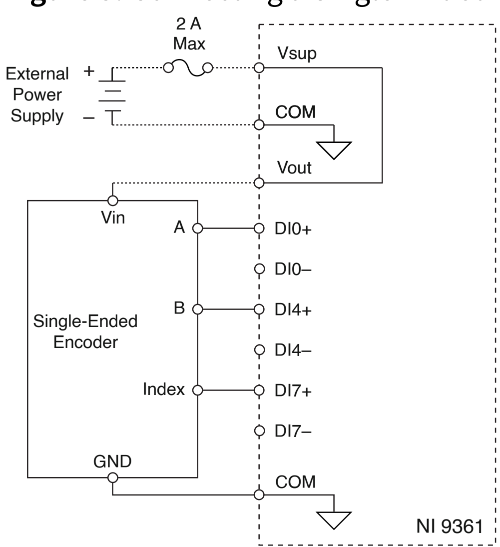
Incremental Encoders

Incremental encoders typically have channel A and channel B. By monitoring both the number of pulses and the relative phase of channels A and B, you can track both the position and direction of rotation. Some encoders have a third channel, channel Z, which is also referred to as the index channel. A high level on channel Z causes the counter to be reloaded with a specific value in a specific phase of a cycle.

Connecting Single-Ended Incremental Encoders

You can connect single-ended incremental encoders to the NI-9361.

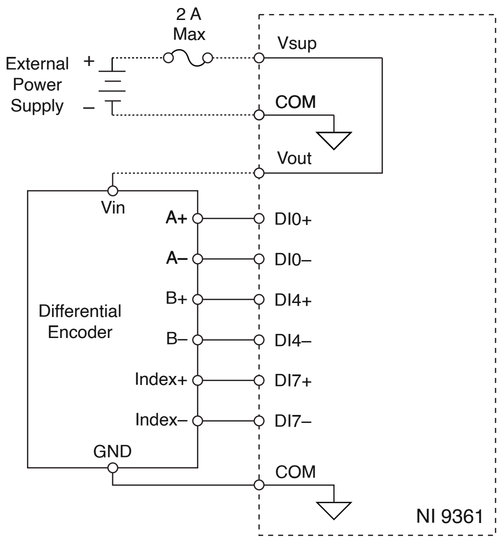
Figure 5. Connecting a Single-Ended Incremental Encoder



Connecting Differential Incremental Encoders

You can connect differential incremental encoders to the NI-9361.

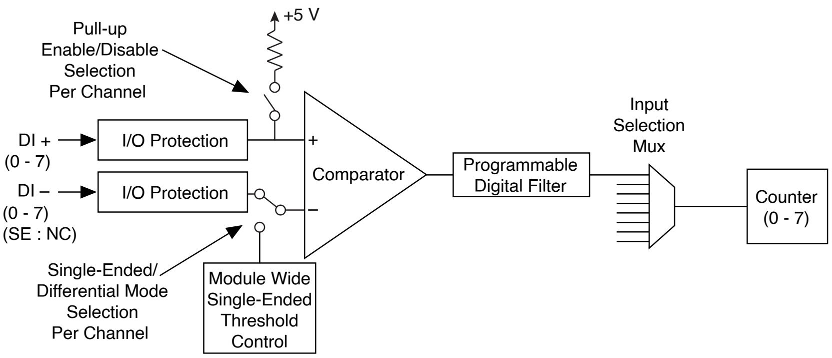
Figure 6. Connecting a Differential Incremental Encoder



NI-9361 Front End Control

The NI-9361 has 8 inputs that support both single-ended and differential modes. You can configure each of the input signals as the input to any of the 8 counters on the module. The following figure shows the circuitry of one of the digital inputs. Each digital input is similar.

Figure 7. Digital Input Circuitry



I/O Protection

The voltage input level and the current input level of the digital signals are listed in the specifications of your device. The I/O protection circuitry protects the module in events such as overvoltage, overcurrent, and ESD. Refer to the ***NI-9361 Specifications*** for more information about the protection level supported.

Input Mode

You can configure the digital inputs to any of the following modes:

- Single ended
- Single ended with pull up
- Differential

Note In single-ended and single-ended with pull-up modes, you must leave the corresponding DI- terminal open and connect the input signal to the

> corresponding DI+. You can set the programmable threshold voltage between 1 V to 4 V.

The NI-9361 provides a 5 V pull-up on each DI+ terminal which can be enabled individually. The 5 V pull up is about 1 kΩ, and is able to source up to about 5 mA of current to the sensor signal line connected to DI+. The pull up is useful for sensors with open-collector or open-drain outputs such as Hall Effect sensors. An open-collector device does not actively drive the signal high and relies on an external pull-up to perform this function.

In differential mode, there is no programmable threshold voltage. The 5 V pull up is disabled. The differential line signals are connected to the corresponding DI+ and DI- terminals.

Programmable Digital Filter

The NI-9361 has a digital filter on each of the digital input lines to filter unwanted glitches on the digital input signal.

You can configure the following filter properties for each of the input lines:

- Enable or disable the digital filter.
- Minimum pulse width of the input signal that passes through the filter.

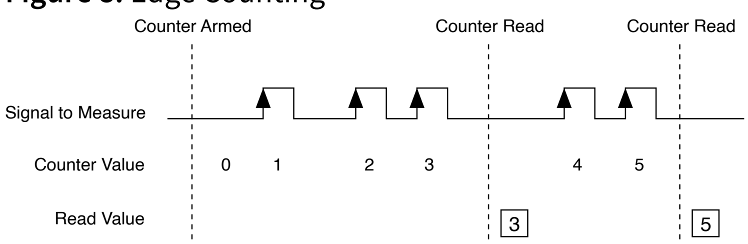
Counter Input Measurements

Edge Counting

You can take edge counting measurements with the NI-9361.

The counter counts the number of active edges on a signal. The NI-9361 returns the current count value when the counter is read. The following figure shows an example of edge counting.

Figure 8. Edge Counting



Channel Settings

You can configure the following counter properties:

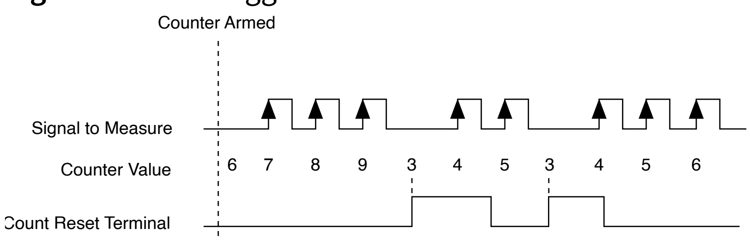
- Input terminal of the signal-to-measure.
- The initial value of the count.
- The active edge, rising or falling, that is counted.
- Count direction to increment or decrement the counter on each edge—You can set this property to:
  - Count Up
  - Count Down
  - Externally Controlled

> **Note** If you select Externally Controlled, the NI-9361 monitors a hardware signal to determine the count direction. When the signal is high, the counter counts up; when the signal is low, the counter counts down. You can set which signal to monitor.

- Counter Reset—You can configure the counter to reset the count to a specific value in response to a hardware signal using the following Reset Trigger properties:
  - Enable or disable the Reset Trigger feature.
  - Input terminal of the signal to be used as the Reset Trigger.
  - Reset Trigger active edge to select the rising or falling edge of the signal to trigger a reset.
  - The reset value to change the count value to in response to the Reset Trigger.
- Count Edges Pause Trigger—You can configure the counter to pause counting based on a hardware signal using the following properties:
  - Enable or disable the Count Edges Pause Trigger feature.
  - Input terminal of the signal to be used as the Count Edges Pause Trigger.
  - Count Edges Pause Trigger level to select pause counting when the signal is high or low.

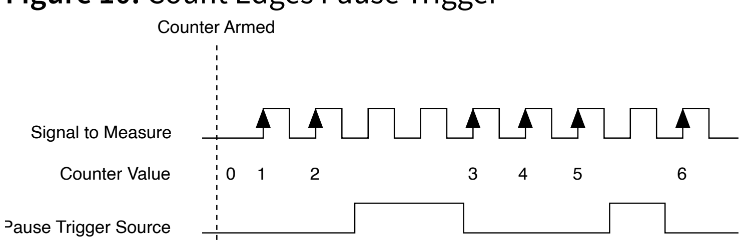
The following figure shows an example of a count edge measurement using the Reset Trigger with the initial value of the count value set to 6, Reset Trigger active edge set to rising edge, and the reset value set to 3.

Figure 9. Reset Trigger



The following figure shows an example of edge counting with Count Edges Pause Trigger level set to high.

Figure 10. Count Edges Pause Trigger



Trigger Settings

Counter Arm—You can control when the counter starts counting through the counter arm control. The counter waits for the active edge on the signal-to-measure after it is armed, and counts on every active edge on the signal-to-measure. Refer to your software documentation for more information on arming the counter.

Pulse/Duty Cycle Measurement

You can take pulse or duty cycle measurements with the NI-9361 on CompactRIO systems only.

The counter measures the high and low durations of a pulse on a signal. Using the measured values, you can calculate the duty cycle of the signal. The NI-9361 returns the current measurement values when the counter is read. The measurement values consist of the high and low times of the pulse in the number of ticks of the 100 MHz counter timebase.

You can calculate the signal period using the following equation:

$$Signal\ Period = T_{pulsehigh} + T_{pulselow}$$

where

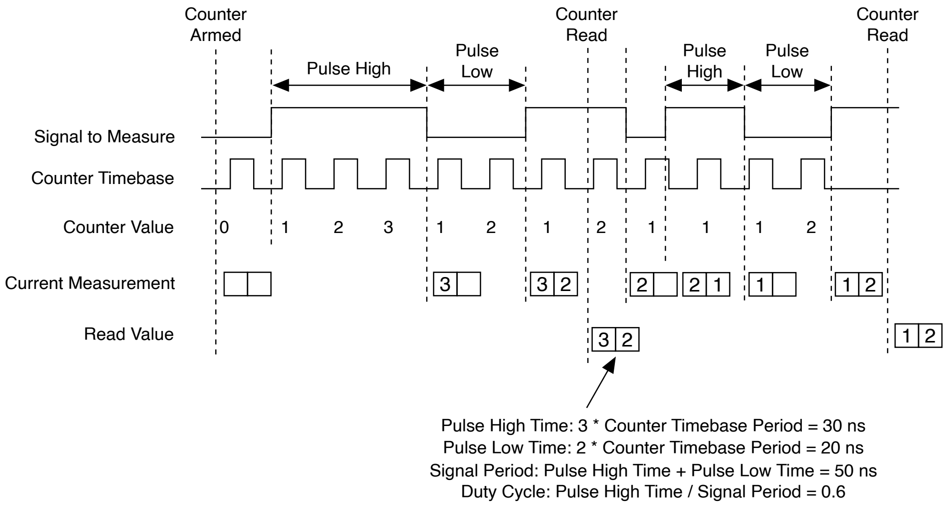
- $T_{pulsehigh}$ is the pulse high time
- $T_{pulselow}$ is the pulse low time

You can calculate the duty cycle using the following equation:

$$Duty\ \ Cycle = \frac{T_{pulsehigh}}{Signal\ Period}$$

The following figure shows an example of pulse measurement.

Figure 11. Pulse Measurement



Channel Settings

You can configure the following counter properties:

- Input terminal of the signal-to-measure.
- The active edge, rising or falling, the NI-9361 begins the measurement.
- Maximum measurable period.
  - You can set the maximum measurable period of the signal. If the input signal period is slower than this value, the counter returns a measurement value of zero. Use this property to get updated measurement data when the signal slows down or is stopped instead of previous measurements. To disable this feature, set the maximum measurable period to zero. When this feature is disabled, the counter keeps measuring until a valid measurement is detected, the counter overflows, or the user stops the counter.

Trigger Settings

Counter Arm—You can control when the counter starts the pulse measurement through the counter arm control. After the counter is armed, it waits for the active edge on the signal-to-measure, and then it begins measuring the signal high and low times. The measurement data is only ready and valid once the counter has finished measuring the first signal period. The counter returns a value of zero for both the high and low times prior to the first measurement becoming ready. Refer to your software documentation for more information on arming the counter.

Frequency/Period Measurement

You can take frequency or period measurements with the NI-9361.

The counter measures and returns the period information of a signal. The NI-9361 supports a few frequency measurement methods depending on the settings set by the user. The NI-9361 returns the current period measurement values when the counter is read. The measurement values consist of the number of full periods of the signal-to-measure measured and also the duration of these full periods in the number of ticks of the 100 MHz counter timebase.

You can calculate the signal period using the following equation:

$$Signal\ Period = \frac{N_{ticks} \times T_{base}}{N_{periods}}$$

where

- T_{base} is the counter timebase period which is 10 ns
- N_{ticks} is the number of ticks of the counter timebase that elapsed during the measurement
- $N_{periods}$ is the number of full periods of the signal-to-measure measured

You can calculate the frequency using the following equation:

$$Signal\ Frequency = \frac{1}{Signal\ Period}$$

Channel Settings

You can configure the following counter properties:

- Input terminal of the signal-to-measure.
- The active edge, rising or falling, the NI-9361 begins the measurement.
- Maximum measurable period—You can set the maximum measurable period of the signal. If the input signal period is slower than this value, the counter returns a measurement value of zero. Use this property to get updated measurement data when the signal slows down or is stopped instead of previous measurements. To disable this feature, set the maximum measurable period to zero. When this feature is disabled, the counter keeps measuring until a valid measurement is detected, the counter overflows, or the user stops the counter.

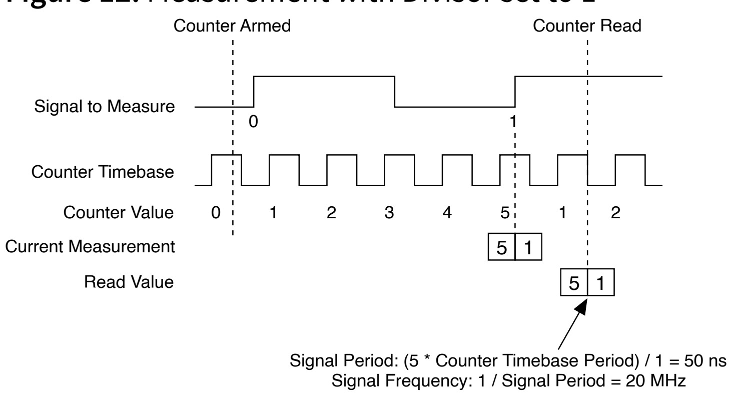
Measurement Method

You can configure the following properties to configure the frequency measurement method:

- Divisor—Divisor specifies the number of periods of the input signal to measure to determine the average input signal period.
- Measurement Time—Measurement Time specifies the amount of time over which to measure and average multiple periods of the input signal. In this measurement mode, the counter measures how ever many periods of the input signal fit within the specified Measurement Time.
- Both the Divisor and Measurement Time—When both the Divisor and the Measurement Time values are set, the counter goes into Dynamic Averaging mode. In this mode, the counter simultaneously performs the measurement based on both the Divisor and Measurement Time settings, and returns whichever measurement completes first.

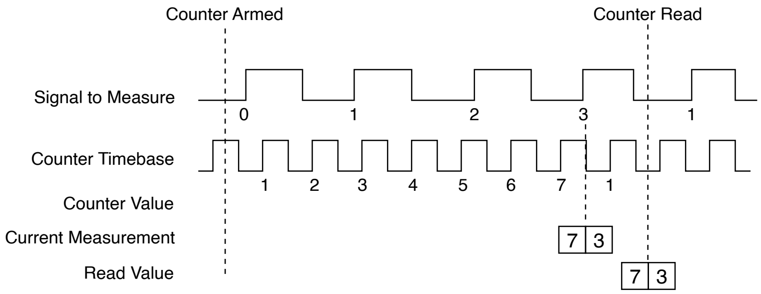
The following figure shows an example of setting the Divisor to 1 for the frequency measurement.

Figure 12. Measurement with Divisor set to 1



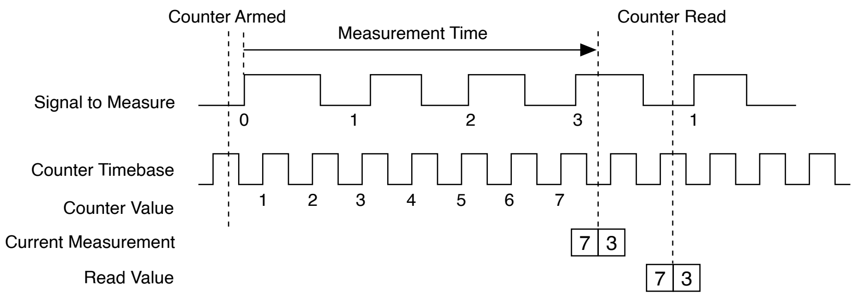
The following figure shows an example of setting the Divisor to 3 for the frequency measurement.

Figure 13. Measurement with Divisor set to 3



The following figure shows an example of Measurement Time.

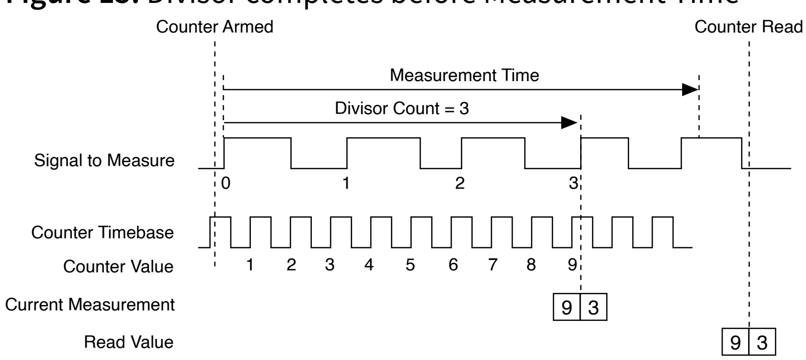
Figure 14. Measurement using Measurement Time



In the following examples, both the Divisor and Measurement Time are set for frequency measurement.

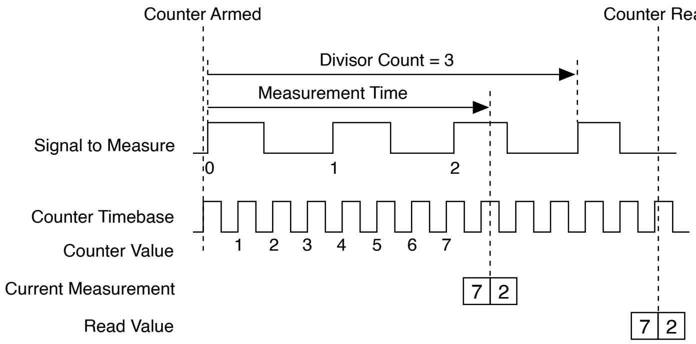
In the following figure, the Divisor period of the input signal, in this case 3, is met before the measurement time elapsed, thus the Divisor setting is used for the frequency measurement.

Figure 15. Divisor completes before Measurement Time



In the following figure, the measurement time elapsed before the 3 divisor periods of the input signal, thus the Measurement Time setting is used for the frequency measurement.

Figure 16. Measurement Time completes before Divisor



The following table shows the summary of different frequency measurement methods.

Divisor	Measurement Time	Counter Characteristic
1	0 (Disabled)	Measure 1 period of the input signal.
N	0 (Disabled)	Measure N periods of the input signal.
0 (Disabled)	M	Measures all the period of the input signals that occur within the M measurement time.
N	M	Returns the measurement of N periods of the input signal or the measurement that occurs within the M measurement time, whichever completes first.

Trade-offs—Different frequency methods are used to trade-off between measurement accuracy and measurement update rate for different input signal frequencies. Increasing the divisor or measurement time improves the measurement accuracy but also reduces the measurement rate.

Measurement Error—Measurement error is caused by the uncertainty in measuring the frequency of the input signal due to the finite resolution of the counter timebase clock.

You can calculate the maximum error using the following equation:

$$\textit{Measurement Error}\left(\%\right) = \frac{f_x}{\left(N_{periods} \times f_k\right) - f_x} \times 100\ \%$$

where

- f_x is the frequency of the input signal
- $N_{periods}$ is the number of signal periods measured
- f_k is the counter timebase frequency

You can calculate the maximum frequency error using the following equation:

$$Measurement\ \ Frequency\ Error\left(Hz\right) = f_x \times \frac{f_x}{\left(N_{periods} \times f_k\right) - f_x}$$

For example, when measuring the frequency of a 1 MHz input signal with the divisor count of 10, and the counter timebase of 100 MHz, the maximum error is

$$\frac{1\ MHz}{\left(10 \times 100\ MHz\right) - 1\ MHz} \times 100\ \% = 0.1\ \%$$

The maximum frequency error is

$$1\ MHz \times \frac{1\ MHz}{\left(10 \times 100\ MHz\right) - 1\ MHz} = 0.001\ MHz$$

The resulting measured frequency is 1 MHz ± 0.001 MHz.

Note This error does not include the error introduced by the timebase accuracy.

Trigger Settings

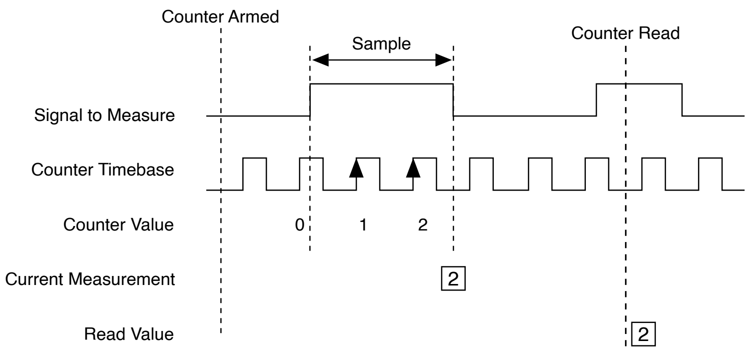
Counter Arm—You can control when the counter starts the frequency measurement through the counter arm control. After the counter is armed, it waits for the active edge on the signal-to-measure, and then it begins measuring the signal period. The measurement data is only ready and valid once the counter has finished measuring the first measurement according to the Divisor and Measurement Time settings. The counter returns a value of zero for both the N_{ticks} and $N_{periods}$ times prior to the first measurement becoming ready. Refer to your software documentation for more information on arming the counter.

Pulse Width Measurement

You can take pulse width measurements with the NI-9361.

The counter measures and returns the duration of a pulse on a signal. The NI-9361 returns the current pulse width measurement value when the counter is read. The measurement values consist of the pulse width duration of the signal-to-measure in the number of ticks of the 100 MHz counter timebase. The following figure shows an example of pulse width measurement.

Figure 17. Pulse Width Measurement



Channel Settings

You can configure the following counter properties:

- Input terminal of the signal-to-measure.
- The active edge, rising or falling, the NI-9361 begins the measurement. To measure a high pulse, set the active edge to rising. To measure a low pulse, set the active edge to falling.
- Maximum measurable period—You can set the maximum measurable period of the signal. If the input signal period is slower than this value, the counter returns a measurement value of zero. Use this property to get updated measurement data when the signal slows down or is stopped instead of previous measurements. To disable this feature, set the maximum measurable period to zero. When this feature is disabled, the counter keeps measuring until a valid measurement is detected, the counter overflows, or the user stops the counter.

Trigger Settings

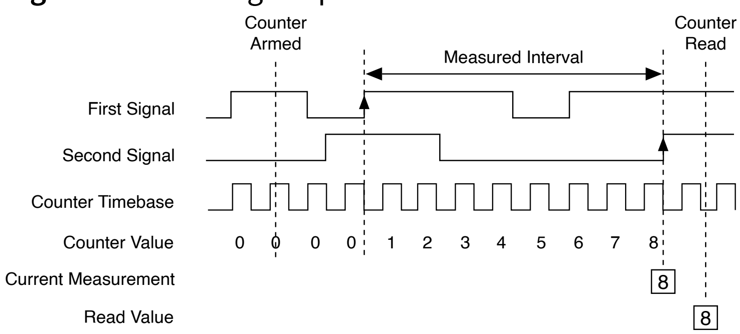
Counter Arm—You can control when the counter starts the pulse width measurement through the counter arm control. After the counter is armed, it waits for the active edge on the signal-to-measure, and then it begins measuring the pulse width. The measurement data is only ready and valid once the counter has finished measuring the first pulse width. The counter returns a value of zero prior to the first measurement becoming ready. Refer to your software documentation for more information on arming the counter.

Two-Edge Separation Measurement

You can take two-edge separation measurements with the NI-9361 on CompactRIO systems only.

The counter measures the time between two events. The beginning event is an active edge on a first signal. The ending event is an active edge on a second signal. The NI-9361 returns the current time between the two events in the number of ticks of the 100 MHz counter timebase when the counter is read. The following figure shows an example of two-edge separation measurement.

Figure 18. Two-Edge Separation



Channel Settings

You can configure the following counter properties:

- Input terminal of the first signal.
- Input terminal of the second signal.
- The active edge of the first signal, rising or falling, the NI-9361 begins the measurement.
- The active edge of the second signal, rising or falling, the NI-9361 ends the measurement.
- Maximum measurable separation—You can set the maximum measurable separation of the signals. If separation time between the first and second signals is longer than this value, the counter returns a measurement value of zero. Use this

property to get updated measurement data when the signal slows down or is stopped instead of returning previous measurements. To disable this feature, set the maximum measurable separation to zero. When this feature is disabled, the counter keeps measuring until a valid measurement is detected, the counter overflows, or the user stops the counter.

Trigger Settings

Counter Arm—You can control when the counter starts the two-edge separation measurement through the counter arm control. After the counter is armed, it waits for the active edge on the first signal, and then it begins measuring the separation. The measurement data is only ready and valid once the counter has finished measuring the separation between the first and second edges. The counter returns a value of zero prior to the first measurement becoming ready. Refer to your software documentation for more information on arming the counter.

Incremental Encoder Measurements

You can perform position and velocity measurements using incremental encoders with the NI-9361, such as the quadrature and two-pulse encoders.

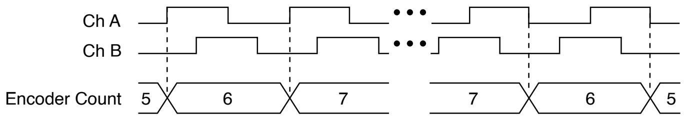
Quadrature Encoder Overview

A quadrature encoder can have up to three channels: A, B, and Z. When channel A leads channel B in a quadrature cycle, the counter increments. When channel B leads channel A in a quadrature cycle, the counter decrements. The amount of increments and decrements per cycle depends on the type of encoding: X1, X2, or X4.

X1 Encoding

The following figure shows a quadrature cycle and the resulting increments and decrements for X1 encoding. When channel A leads channel B, the increment occurs on the rising edge of channel A. When channel B leads channel A, the decrement occurs on the falling edge of channel A.

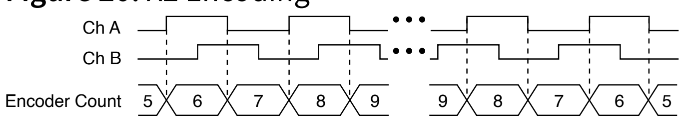
Figure 19. X1 Encoding



X2 Encoding

The counter increments or decrements on each edge of channel A, depending on which channel leads the other. Each cycle results in two increments or decrements, as shown in the following figure.

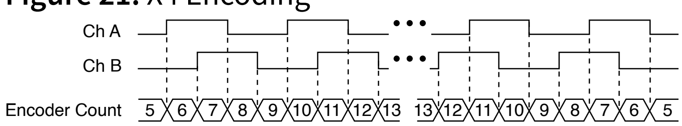
Figure 20. X2 Encoding



X4 Encoding

The counter increments or decrements on each edge of channels A and B. Whether the counter increments or decrements depends on which channel leads the other. Each cycle results in four increments or decrements, as shown in the following figure.

Figure 21. X4 Encoding



Channel Z

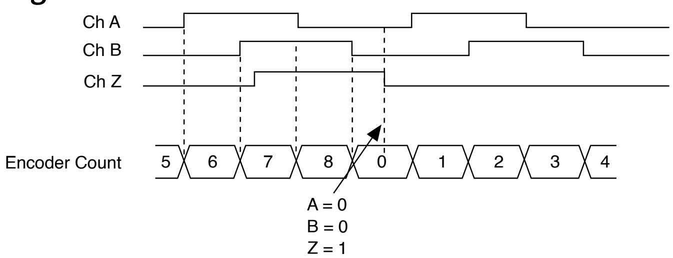
Some quadrature encoders have a third channel, channel Z, which is also referred to as the index channel. A high level on channel Z causes the counter to be reloaded with a specified value in a specified phase of the quadrature cycle. Depending on configuration, this reload can occur in any one of the four phases in a quadrature cycle.

Channel Z behavior-when it goes high and how long it stays high-differs with quadrature encoder designs. Refer to the documentation for your quadrature encoder to obtain timing of channel Z with respect to channels A and B. You must then ensure that channel Z is high during at least a portion of the phase you specify for reload.

In the following figure, the reload phase is when both channel A and channel B are low.

The reload occurs when this phase is true and channel Z is high. Thus, when channel B goes low to enter the reload phase, the reload occurs. After the reload occurs, the counter continues to count as before. The figure illustrates channel Z reload with X4 decoding.

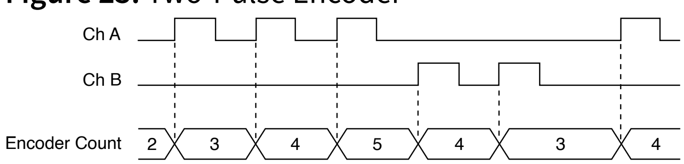
Figure 22. Channel Z Reload



Two-Pulse Encoder Overview

The counter supports two-pulse encoders that have two channels: A and B. The counter increments on each rising edge of channel A. The counter decrements on each rising edge of channel B, as shown in the following figure.

Figure 23. Two-Pulse Encoder

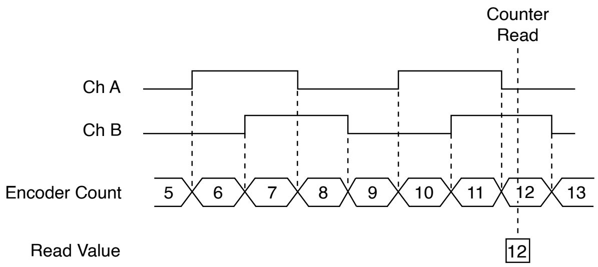


Position Measurement

You can take position measurements with the NI-9361.

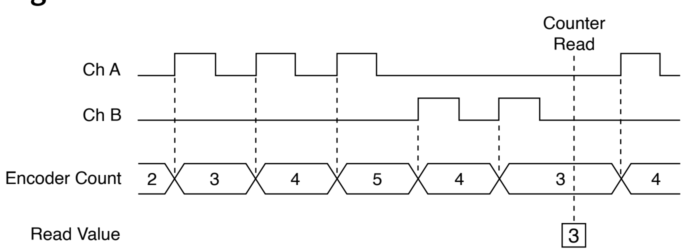
The counter measures position using an encoder. The NI-9361 returns the current encoder count value when the counter is read. The following figure shows an example of an encoder position measurement using a quadrature encoder.

Figure 24. Quadrature Encoder Position Measurement



The following figure shows an example of two-pulse encoder position measurement.

Figure 25. Two-Pulse Encoder Position Measurement



Channel Settings

You can configure the following counter properties:

- Decoding Type: Configurable to two-pulse decoding for two-pulse encoder or X1, X2 or X4 decoding for quadrature encoder.
- Input terminal of A signal.
- Input terminal of B signal.
- The initial value of the count.

You can configure the following counter properties for encoders supporting Z terminal:

- Z index enable to enable the reset of the counter based on the Z signal.
- Input terminal of Z signal.
- Z index phase for quadrature encoders to indicate when to reset the counter.
- Z index value to indicate the value to reset the counter to.

Trigger Settings

Counter Arm—You can control when the counter starts the encoder position measurement through the counter arm control. The counter waits for the active edge on the encoder signal after it is armed and starts counting after it is detected. Refer to your software documentation for more information on the arming of the counter.

Velocity Measurement

You can take velocity measurements with the NI-9361.

The counter measures the amount of time that elapses between changes in the encoder count value. The concept is similar to a period measurement and the counter supports the same Measurement Time and Divisor settings described for period measurement mode. Refer to the Frequency/Period Measurement section for detailed information about these settings.

The measurement value consists of the number of changes to the encoder count value and the duration of these changes measured by the number of 100 MHz counter timebase ticks. The encoder count value is returned as a signed number where the sign of the number corresponds to the direction of movement.

You can calculate the encoder velocity using the following equation:

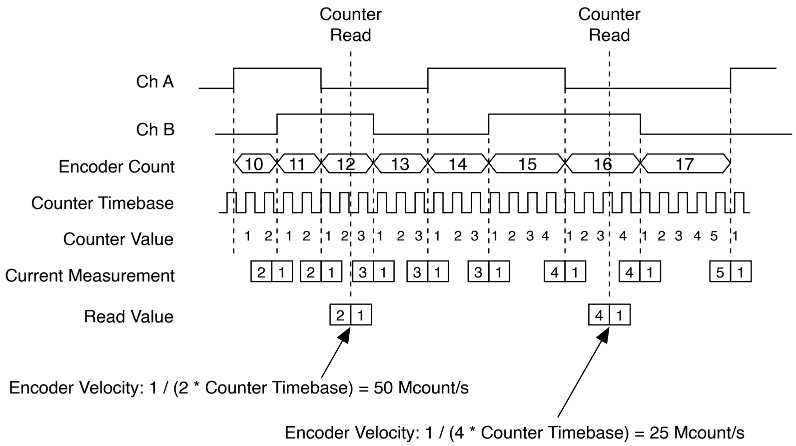
$$Encoder\ Count\ Velocity\left(Counts \middle/ s\right) = \frac{N_{counts}}{N_{ticks} \times T_{base}}$$

where

- N_{counts} is the signed number of encoder count periods measured
- N_{ticks} is the number of ticks of the counter timebase that elapsed during the measurement
- T_{base} is the counter timebase period of 10ns

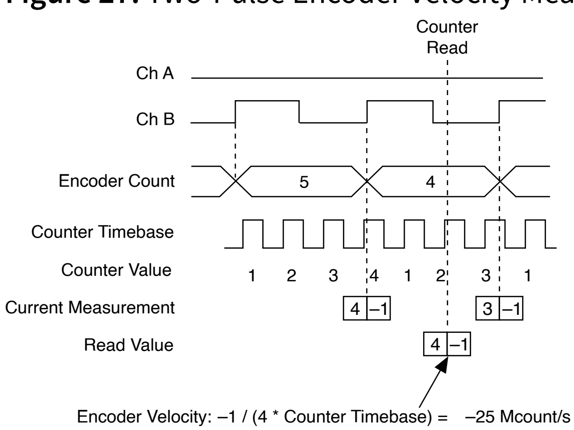
For encoder velocity measurements using a quadrature encoder, when A leads B, a positive value is returned. When B leads A, a negative value is returned. The following figure shows an example of velocity measurement using an X4 encoding type quadrature encoder. The Divisor count is set to 1 and the Measurement Time is disabled.

Figure 26. Quadrature Encoder Velocity Measurement



For a two-pulse encoder, when a pulse is detected on Channel A, a positive value is returned. When a pulse is detected on Channel B, a negative value is returned. The following figure shows an example of velocity measurement using a two-pulse encoder. The Divisor count is set to 1 and the Measurement Time is disabled.

Figure 27. Two-Pulse Encoder Velocity Measurement



Channel Settings

You can configure the following counter properties:

- Decoding Type: Configurable to two-pulse decoding for two-pulse encoder or X1, X2 or X4 decoding for quadrature encoder.
- Input terminal of A signal.
- Input terminal of B signal.
- Maximum Measurable Count Period—You can set the maximum measurable count period of the signal. If the encoder count value changes slower than this value, the counter returns a measurement value of zero for both N_{ticks} and N_{counts}. Use this

property to get updated measurement data when the encoder slows down or is stopped instead of previous measurements. To disable this feature, set the Maximum Measurable Count Period to zero. When this feature is disabled, the counter keeps measuring until a valid measurement is detected, the counter overflows, or the user stops the counter.

Measurement Method

You can configure the following properties to configure the encoder velocity measurement method:

- Divisor
- Measurement Time
- Both the Divisor and Measurement Time

Refer to the Frequency/Period Measurement section for detailed information about these settings.

Trigger Settings

Counter Arm—You can control when the counter starts the encoder velocity measurement through the counter arm control. After the counter is armed, it waits for the active edge on the encoder signal, and then it begins measuring the encoder velocity. The measurement data is only ready and valid once the counter has finished measuring the first measurement according to the Divisor and Measurement Time settings. The counter returns a value of zero for both the N_{ticks} and N_{counts} times prior to the first measurement becoming ready. Refer to your software documentation for more information on arming the counter.

Counter Signal Routing

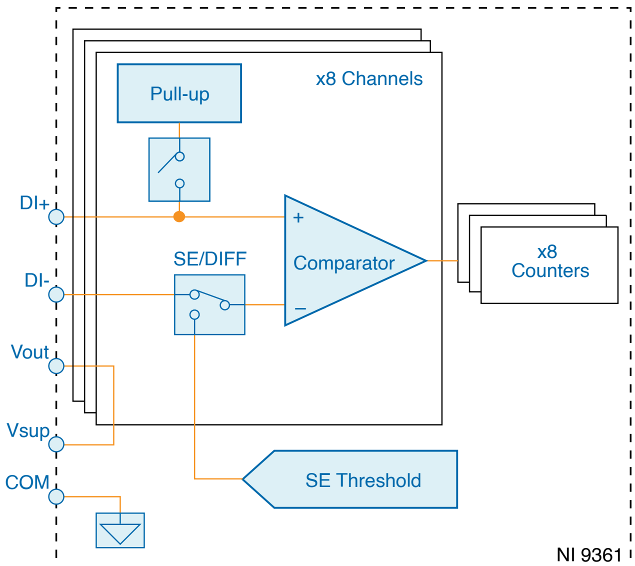
The NI-9361 has flexible signal routing features. The input signals to the counters can be routed from any of the eight digital input terminals. You can change the signal routing by configuring the counter properties.

The software routes certain digital input signals to each of the counters by default. The following table shows the default routing for counter signals.

Table 2. Default Routing for Counter Signals

Measurement	Signal	Counter							
		0	1	2	3	4	5	6	7
Edge Counting	Source	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
	Reset	DI4	DI5	DI6	DI7	DI0	DI1	DI2	DI3
	Count Direction	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
	Pause Trigger	DI3	DI2	DI1	DI0	DI7	DI6	DI5	DI4
Pulse/Duty Cycle	Source	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
Pulse Width	Source	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
Period/ Frequency	Source	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
Two-Edge Separation	1st Edge	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
	2nd Edge	DI4	DI5	DI6	DI7	DI0	DI1	DI2	DI3
Encoder Position	A	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
	B	DI4	DI5	DI6	DI7	DI0	DI1	DI2	DI3
	Z/Reset	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
Encoder Velocity	A	DI0	DI1	DI2	DI3	DI4	DI5	DI6	DI7
	B	DI4	DI5	DI6	DI7	DI0	DI1	DI2	DI3

NI-9361 Block Diagram



The NI-9361 is a channel-to-earth isolated counter input module that provides 8 flexible digital input channels that route to 8 embedded counters. The inputs are designed for connection to encoders, hall-effect sensors, as well as many other types of sensors with digital outputs.

You can configure the front end of each channel individually to operate in differential or single-ended mode.

In single-ended mode, you can configure a programmable voltage threshold level and enable or disable an internal pull-up resistor.

Conformal Coating

The NI-9361 is available with conformal coating for additional protection in corrosive and condensing environments, including environments with molds and dust.

In addition to the environmental specifications listed in the ***NI-9361 Safety, Environmental, and Regulatory Information***, the NI-9361 with conformal coating meets the following specification for the device temperature range. To meet this specification, you must follow the appropriate setup requirements for condensing environments. Refer to ***Conformal Coating and NI RIO Products*** for more information about conformal coating and the setup requirements for condensing environments.

Operating humidity (IEC 60068-2-30 Test Db)	80 to 100% RH, condensing

Related information:

- Conformal Coating and NI RIO Products