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USER GUIDE

NI 6520/6521

This document describes how to use the National Instruments 6520 and 6521 data acquisition (DAQ) devices with NI-DAQ 7.5 or later. Device specifications can be found on `ni.com/manuals`. If you have not already installed the DAQ device, refer to the *DAQ Getting Started Guide* for installation instructions.

The NI 6520/6521 contains five Form A single-pole single-throw (SPST) non-latching relay outputs, three Form C single-pole double-throw (SPDT) non-latching relay outputs, and eight channel-to-channel isolated industrial inputs. The relay's maximum switching power is 60 W/60 VA. The maximum switching voltage for the NI 6520 is 30 Vrms/42.4 V_{pk}/ 60 VDC. The maximum switching voltage for the NI 6521 is 150 VDC/VAC.

The NI 6520/6521 uses positive logic. A digital high energizes the relay, and a digital low deenergizes it. In the energized state, the common (COM) contact is connected to the normally open (NO) contact. For Form C relays in the deenergized state, the common contact is connected to the normally closed (NC) contact. For Form A relays in the deenergized state, the common contact is not connected to the normally open (NO) contact. When the board (PC) is powered off, the relays are deenergized.

Caution **(NI 6521 Only)** This 150 V Measurement Category II module features 1,400 Vrms isolation between I/O channels and the backplane, as verified by a dielectric withstand test, 5 s maximum. For more information on hazardous voltage requirements and safety information for the NI 6521, refer to the *NI 6521 Isolation Voltages* section.

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Configuration

The NI 6520/6521 device is completely software configurable, so it is not necessary to set jumpers for I/O configuration.

The PCI-6520/6521 is fully compliant with the PCI Local Bus Specification, Revision 2.1, and the PXI-6521 devices are fully compliant with the PXI Hardware Specification, Revision 2.1. The PCI/PXI system automatically allocates all device resources, including the base address and interrupt level. The NI 6520/6521 base address is mapped into PCI memory space. It is not necessary to perform configuration steps after the system powers up.

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The NI 6521 is designed to meet the requirements of UL/IEC 61010-1 and is UL listed.

Refer to the driver software documentation for configuration instructions.

After the NI 6520/6521 device and the driver software are installed, the DAQ device appears under the **Devices and Interfaces** branch of the MAX configuration tree.

If the DAQ device does not appear in MAX, use the following troubleshooting guidelines.

- Verify that you are using the correct version of NI-DAQ (NI-DAQmx 7.5 or later). To download the most recent National Instruments drivers, go to `ni.com/drivers`.
- Press <F5> to refresh the MAX window, or close and re-open MAX.
- Reboot the computer.
- Power off and unplug the computer or chassis, and install the device in a different slot. Refer to the *DAQ Getting Started Guide* for installation instructions and safety guidelines.

Functional Overview

Figure 1 illustrates the key functional components of the NI 6520/6521 device.

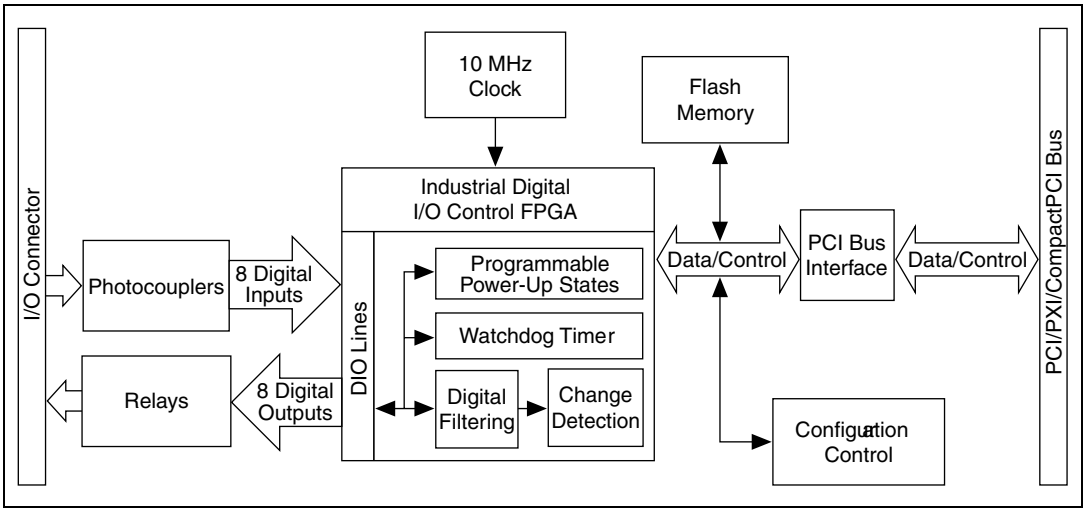


Figure 1. NI 6520/6521 Block Diagram

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Safety Information

The following section contains important safety information that you *must* follow when installing and using National Instruments DIO devices.

Do *not* operate the device in a manner not specified in this document. Misuse of the DIO device can result in a hazard. You can compromise the safety protection built into the DIO device if it is damaged in any way. If the DIO device is damaged, return it to National Instruments for repair.

Do *not* substitute parts or modify the DIO device except as described in this document. Use the DIO device only with the chassis, modules, accessories, and cables specified in the installation instructions. You *must* have all covers and filler panels installed during operation of the DIO device.

Do *not* operate the DIO device in an explosive atmosphere or where there may be flammable gases or fumes. If you must operate the DIO device in such an environment, it must be in a suitably rated enclosure.

If you need to clean the DIO device, use a soft, nonmetallic brush. Make sure that the DIO device is completely dry and free from contaminants before returning it to service.

Operate the DIO device only at or below Pollution Degree 2. Pollution is foreign matter in a solid, liquid, or gaseous state that can reduce dielectric strength or surface resistivity. The following is a description of pollution degrees:

- Pollution Degree 1 means no pollution or only dry, nonconductive pollution occurs. The pollution has no influence.
- Pollution Degree 2 means that only nonconductive pollution occurs in most cases. Occasionally, however, a temporary conductivity caused by condensation must be expected.
- Pollution Degree 3 means that conductive pollution occurs, or dry, nonconductive pollution occurs that becomes conductive due to condensation.

You *must* insulate signal connections for the maximum voltage for which the DIO device is rated. Do *not* exceed the maximum ratings for the DIO device. Do not install wiring while the DIO device is live with electrical signals. Do not remove or add connector blocks when power is connected to the system. Avoid contact between your body and the connector block signal when hot swapping modules. Remove power from signal lines before connecting them to or disconnecting them from the DIO device.

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Operate the DIO device at or below the *measurement category*[1] marked on the hardware label. Measurement circuits are subjected to *working voltages*[2] and transient stresses (overvoltage) from the circuit to which they are connected during measurement or test. Installation categories establish standard impulse withstand voltage levels that commonly occur in electrical distribution systems. The following is a description of installation categories:

- Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS[3] voltage. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.
- Measurement Category II is for measurements performed on circuits directly connected to the electrical distribution system. This category refers to local-level electrical distribution, such as that provided by a standard wall outlet (for example, 115 V for U.S. or 230 V for Europe). Examples of Measurement Category II are measurements performed on household appliances, portable tools, and similar DIO devices.
- Measurement Category III is for measurements performed in the building installation at the distribution level. This category refers to measurements on hard-wired equipment such as equipment in fixed installations, distribution boards, and circuit breakers. Other examples are wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and stationary motors with permanent connections to fixed installations.
- Measurement Category IV is for measurements performed at the primary electrical supply installation (<1,000 V). Examples include electricity meters and measurements on primary overcurrent protection devices and on ripple control units.

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[1] Measurement categories, also referred to as *installation categories*, are defined in electrical safety standard IEC 61010-1.

[2] Working voltage is the highest rms value of an AC or DC voltage that can occur across any particular insulation.

[3] MAINS is defined as a hazardous live electrical supply system that powers equipment. Suitably rated measuring circuits may be connected to the MAINS for measuring purposes.

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Related Documentation

The following documents contain information that you may find helpful as you use this user guide:

- *DAQ Getting Started Guide*—This guide describes how to install the NI-DAQ software, the DAQ device, and how to confirm that the device is operating properly.
- *NI-DAQmx Help*—This help file contains information about using NI-DAQmx to program National Instruments devices. NI-DAQmx is the software you use to communicate with and control NI DAQ devices.
- *Measurement & Automation Explorer Help for NI-DAQmx*—This help file contains information about configuring and testing DAQ devices using Measurement & Automation Explorer (MAX) for NI-DAQmx, and information about special considerations for operating systems.
- *DAQ Assistant Help*—This help file contains information about creating and configuring channels, tasks, and scales using the DAQ Assistant.

Note You can download these documents from `ni.com/manuals`.

Features

Digital Filtering

Use the digital filter option available on the NI 6520/6521 input lines to eliminate glitches on input data. When used with change detection, filtering can also reduce the number of changes to examine and process.

You can configure the digital input channels to pass through a digital filter after the photocouplers, and you can control the timing interval the filter uses. The filter blocks pulses that are shorter than half of the specified timing interval and passes pulses that are longer than the specified interval. Intermediate-length pulses—pulses longer than half of the interval but less than the interval—may or may not pass the filter.

The filter operates on the inputs from the photocouplers. Photocouplers turn on faster than they turn off and pass rising edges faster than falling edges. As a result, the photocouplers can add up to 100 µs to a high pulse or subtract up to 100 µs from a low pulse.

Note A 100 µs change is typical when I_F = 16 mA, and R_L = 10 kΩ.

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Table 1 lists the pulse widths guaranteed to be passed and blocked.

Table 1. NI 6520/6521 Digital Filter Timing Intervals

Filter Interval	Pulse Width Passed		Pulse Width Blocked	
	Low Pulse	High Pulse	Low Pulse	High Pulse
$t_{interval}$	$t_{interval}$ + 100 µs	$t_{interval}$ – 100 µs	($t_{interval}$/2) + 100 µs	($t_{interval}$/2) – 100 µs

You can enable filtering on as many input lines as is necessary for your application. All filtered lines share the same timing interval, which ranges from 100 µs to 200 ms.

Internally, the filter uses two clocks: the sample clock and the filter clock. The sample clock has a 100 ns period. The filter clock is generated by a counter and has a period equal to one half of the specified timing interval. The input signal is sampled on each rising edge of the sample clock, which is every 100 ns. However, a change in the input signal is recognized only if it maintains its new state for at least two consecutive rising edges of the filter clock.

The filter clock is programmable and allows you to control how long a pulse must last to be recognized. The sample clock provides a fast sample rate to ensure that input pulses remain constant between filter clocks.

Digital Filtering Example

Figure 2 shows a filter configuration with an 800 ns filter interval (400 ns filter clock).

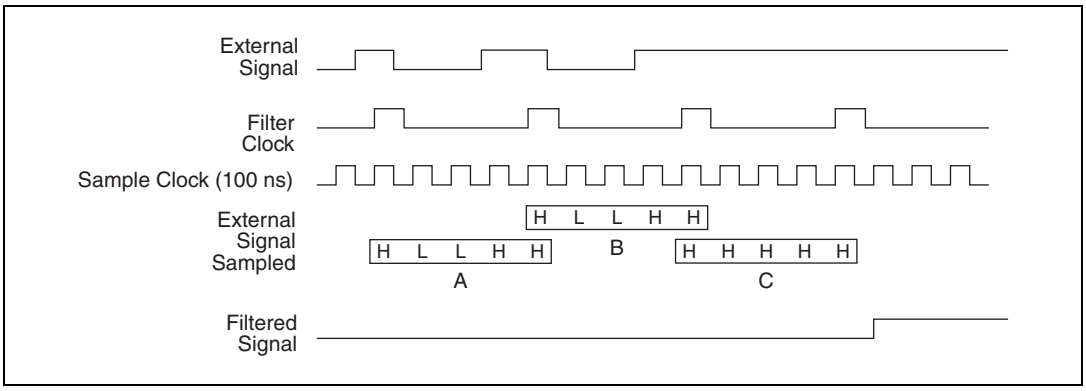


Figure 2. Digital Filtering Example

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In periods A and B, the filter blocks the glitches because the external signal does not remain steadily high from one rising edge of the filter clock to the next. In period C, the filter passes the transition because the external signal remains steadily high. Depending on when the transition occurs, the filter may require up to two filter clocks—one full filter interval—to pass a transition. Figure 2 shows a rising (0 to 1) transition. The same filtering applies to falling (1 to 0) transitions.

Programmable Power-Up States

The default power-up state for Form C relays is deenergized (control bit is low), which makes the contact connect at COM and NC. The Form C relay status is user-configurable. If the power-up state of a Form C relay is configured to energized (control bit is high), the contact connects at COM and NO after power-up.

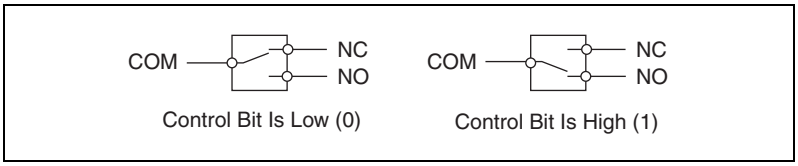


Figure 3. Programmable Power-Up States for Form C Relays

The default power-up state for Form A relays is deenergized (control bit is low), which makes the contact open at COM and NO. The Form A relay status is user-configurable. If the power-up state of a Form A relay is configured to energized (control bit is high), the contact connects at COM and NO after power-up.



Figure 4. Programmable Power-Up States for Form A Relays

User-configurable power-up states are useful for ensuring that the NI 6520/6521 power up in a known state.

To use MAX (recommended) to program the power-up states, select the device and click the **Properties** button. Refer to the software documentation for information about how to program the power-up states using NI-DAQ with LabVIEW or other National Instruments application development environments (ADEs).

Note The response time of programmable power-up states is 400 ms.

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Change Detection

You can program the NI 6520/6521 device to send an interrupt when a change occurs on any input line.

The DIO device can monitor changes on selected input lines or on all input lines. It can monitor for rising edges (0 to 1), falling edges (1 to 0), or both. When an input change occurs, the DIO device generates an interrupt, and the NI-DAQ driver then notifies the software.

Note Excessive change detections can affect system performance. Use digital filtering to minimize the effects of noisy input lines.

The DIO device sends a change detection when any one of the changes occurs, but it does not report which line changed or if the line was rising or falling. After a change, you can read the input lines to determine the current line states. The maximum rate of change detection is determined by the software response time, which varies from system to system.

An overflow bit indicates that an additional rising or falling edge has been detected before the software could process the previous change.

Refer to the software documentation for information about how to set up and implement the change detection.

Change Detection Example

Table 2 shows a change detection example for six bits of one port.

Table 2. Change Detection Example

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Changes to detect	↕	↕	↕	↕	—	—	↑	↓
Enable rising-edge detection	yes	yes	yes	yes	no	no	yes	no
Enable falling-edge detection	yes	yes	yes	yes	no	no	no	yes

This example assumes the following line connections:

- Bits 7, 6, 5, and 4 are connected to data lines from a four-bit TTL output device. The DIO device detects any change in the input data so you can read the new data value.
- Bit 1 is connected to a limit sensor. The DIO device detects rising edges on the sensor, which correspond to over-limit conditions.

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- Bit 0 is connected to a switch. The software can react to any switch closure, which is represented by a falling edge. If the switch closure is noisy, enable digital filtering for this line.

In this example, the DIO device reports rising edges only on bit 1, falling edges only on bit 0, and rising and falling edges on bits 7, 6, 5, and 4. The DIO device reports no changes for bits 3 and 2. After receiving notification of a change, you can read the port to determine the current values of all eight lines. You cannot read the state of any lines that are configured for change detection until the change detection interrupt occurs.

Watchdog Timer

The watchdog timer is a software configurable feature used to set critical outputs to safe states in the event of a software failure, a system crash, or any other loss of communication between the application and the NI 6520/6521 while power is provided to the PC/board.

When the watchdog timer is enabled, if the NI 6520/6521 does not receive a **watchdog reset** software command within the time specified for the watchdog timer, the outputs go to a user-defined safe state and remain in that state until the watchdog timer is disarmed by the application and new values are written, the NI 6520/6521 is reset, or the computer is restarted. The expiration signal that indicates an expired watchdog will continue to assert until the watchdog is disarmed. After the watchdog timer expires, the NI 6520/6521 ignores any writes until the watchdog timer is disarmed.

You can set the watchdog timer timeout period to specify the amount of time that must elapse before the watchdog timer expires. The counter on the watchdog timer is configurable up to $(2^{32} - 1) \times 100$ ns (approximately seven minutes) before it expires.

Digital I/O

I/O Connector

The 37-pin D-SUB connector on the NI 6520/6521 provides access to eight isolated digital inputs and 8 relay outputs. For easy connection to the digital I/O connector, use the National Instruments 37-pin D-SUB accessories. For a list of compatible 37-pin accessories, refer to the *Cables and Accessories* section.

Caution Do not make connections to the digital I/O that exceed the maximum I/O specifications. Doing so may permanently damage the NI 6520/6521 and the chassis. Refer to the *Signal Descriptions* section and the device specifications for information about maximum input ratings.

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The output lines on the NI 6520/6521 consist of electromechanical non-latching relays. For information about connecting to these signals for Form C and Form A relays, refer to the *Relay Signal Connection Example* section.

The input lines on the NI 6520/6521 consist of input photocouplers, which react to a voltage differential rather than only to a voltage increase. For an input channel, if the voltage difference between two input lines is greater than logic threshold, the reading on the digital line will be logic high. Refer to the *Input Signal Connection Example* section for more information on input connection.

For information on safely connecting to the NI 6521, refer to the *37-Pin High-Voltage Accessory Safety Kit Installation Guide* shipped with your device, and also available on `ni.com/manuals`.

Pin Assignments

Figure 5 shows the pin assignments for the 37-pin connector on the NI 6520/6521 device.

The naming convention for each input pin is P0.*X*, where *X* is the line number and a **+** or **–** indicates whether the terminal is positive or negative.

The naming convention for each output pin is P1.*X*NO, P1.*X*COM, and P1.*X*NC for Form C, where *X* is the output channel number, and P1.*X*NO and P1.*X*COM for Form A, where *X* is the output channel number.

Note For input ports, you can connect signals to the two pins of each line, regardless of which one has the higher voltage. Output lines are electromechanical relays and act as bi-directional switches.

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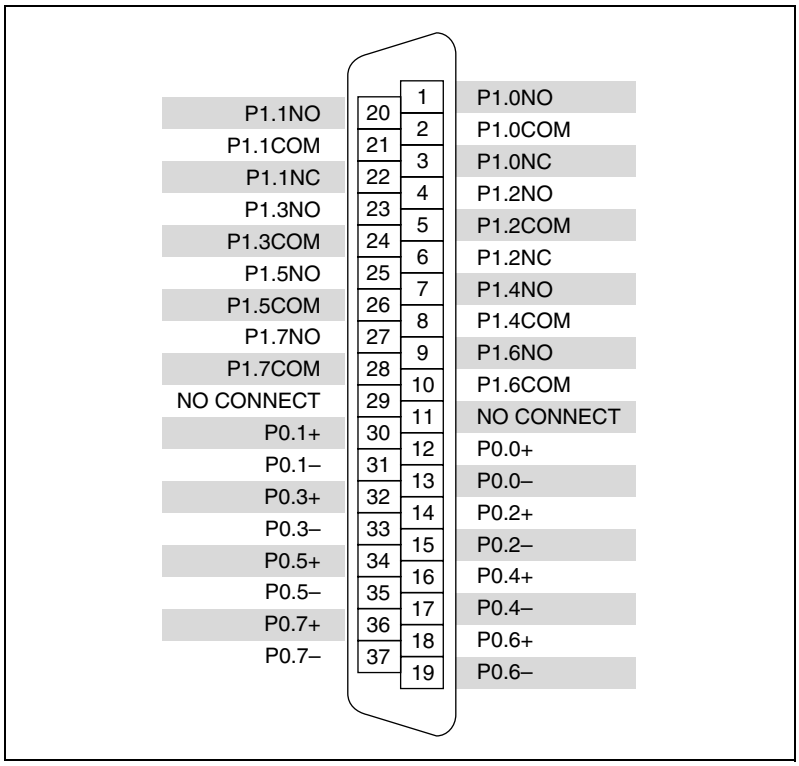


Figure 5. NI 6520/6521 Pin Assignments

For more information on signals on the NI 6520/6521, refer to the *Signal Descriptions* section.

Signal Descriptions

Table 3. NI 6520/6521 Signal Descriptions

Pin	Signal Name	Description
1, 20, 4, 23, 7, 25, 9, 27	NO.<7..0>	**Normally Open**—These are the normally open terminals of the relays.
3, 22, 6	NC.<2..0>	**Normally Closed**—These are the normally closed terminals of the relays. This is the default state for the Form C relays.
2, 21, 5, 24, 8, 26, 10, 28	COM.<7..0>	**Common**—These are the common terminals of the relays.

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Table 3. NI 6520/6521 Signal Descriptions (Continued)

Pin	Signal Name	Description
12, 30, 14, 32, 16, 34, 18, 36	P0.<7..0>+	**Isolated input ports, positive terminals**—Each of these terminals serves as the signal input. You can connect either end of the input signal to it, regardless of whether the level is positive or negative.
13, 31, 15, 33, 17, 35, 19, 37	P0.<7..0>–	**Isolated input ports, negative terminals**—Each of these terminals serves as the signal input. You can connect either end of the input signal to it, regardless of whether the level is positive or negative.

Optically Isolated Differential Inputs

The input lines on the NI 6520/6521 device provide 8 lines of optically isolated digital input. These inputs contain an AC input photocoupler and a resistor for current limiting. The maximum input voltage (VIN) on these lines is 30 VDC.

(NI 6520 Only) The input (VIN) range on the channels is –30 VDC to +30 VDC, for signals connected between P0.*X*+ to P0.*X*–, where *X* is line <0..7>.

Sensing DC Voltages

The NI 6520/6521 can sense DC signals from 11 V to DC power supply levels up to 30 V.

Input voltages between –4 V to +4 V produce a logic low. Input voltages between –30 V to –11 V or between +11 V to +30 V produce a logic high.

The logic state of signals between –11 V to –4 V and +4 V to +11 V is not defined. This corresponds to standard industrial 24 V logic thresholds. There should never be more than a 30 V difference in P0.*X*+ and P0.*X*– terminals. Exceeding 30 V differential voltage could cause damage to the photocouplers.

(NI 6521 Only) The 30 V differential voltage can have up to ±120 V common-mode voltage compared to chassis/digital ground of the NI 6521 device.

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Input Signal Connection Example

Figure 6 and Figure 7 show signal connections for a supply connected to an isolated input. The power supply can be any DC voltage within the NI 6520/6521 device range. Refer to the device specifications for information about voltage ranges.

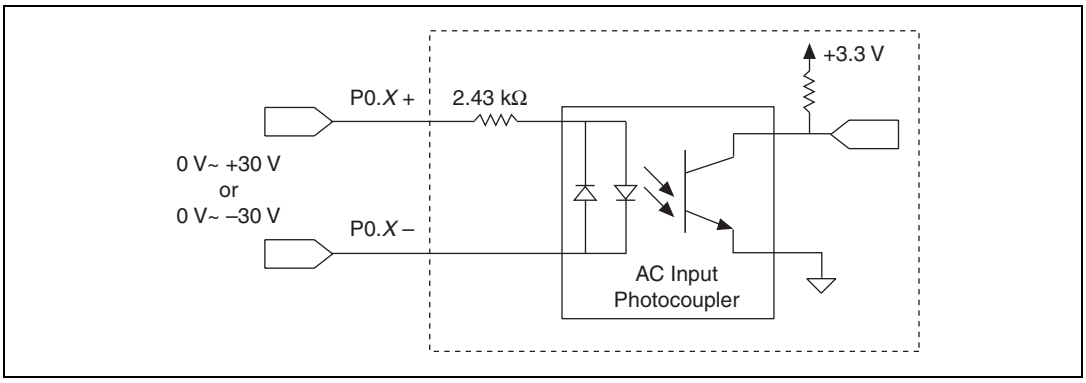


Figure 6. NI 6520 Input Signal Connection Example

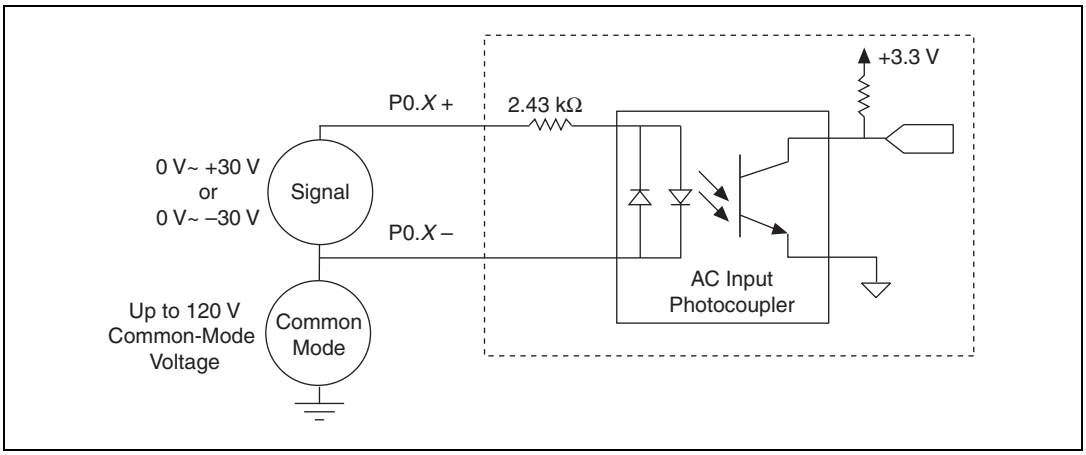


Figure 7. NI 6521 Input Signal Connection Example

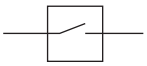
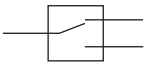
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Mechanical Relays

Relay Forms

Table 4 describes the relay forms available on the NI 6520/6521.

Table 4. NI 6520/6521 Relay Forms

Form	Symbol	Description
Form A		Single-pole single-throw (SPST) relays with a default state of normally open.
Form C		Single-pole double-throw (SPDT) relays that break the connection with one throw before making contact with the other (break-before-make).

Non-Latching Relays

The relays on the NI 6520/6521 are non-latching. A non-latching relay has an initial position of normally closed (NC). This position is maintained by the force of a spring or permanent magnet while no current flows. The normally open (NO) contact is closed by the force of a magnetic field while current flows through the coil. When the current stops, the relay reverts back to its initial NC position.

Non-latching armature relays are useful in control applications when the switch must return to a known state if power is lost.

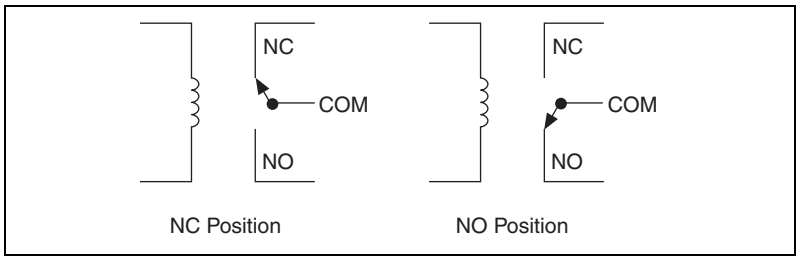


Figure 8. Non-Latching Relay States

Relay Power Ratings

Caution The maximum switching current is limited by the maximum switching power, the maximum voltage, and must not exceed 60 W, 60 VA.

(NI PCI-6520 Only) The maximum power rating for the NI PCI-6520 relays is 60 W or 60 VA, with a maximum current of 2 A for all channels from 0 to 55 °C, external PC ambient.

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(NI PXI-6521 Only) The maximum power rating for the NI PXI-6521 relays is 60 W or 60 VA, with a maximum current of 2 A for all channels from 0 to 55 °C, external PXI chassis ambient.

(NI PCI-6521 Only) The maximum power rating for the NI PCI-6521 relays is 60 W or 60 VA. Figure 9 demonstrates the maximum current ratings for the NI PCI-6521 relays from 0 to 55 °C.

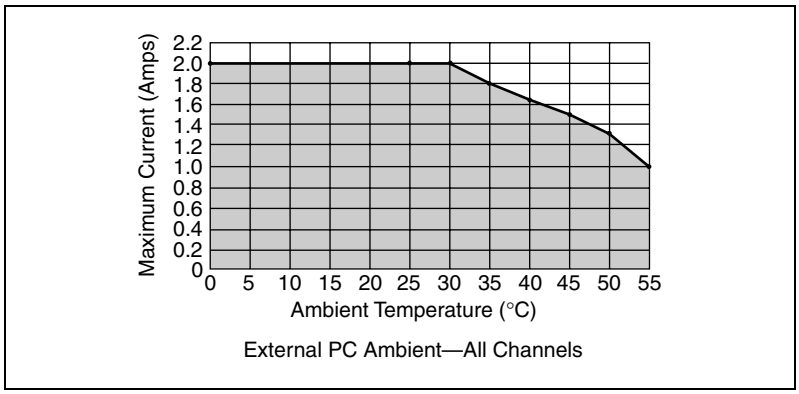


Figure 9. NI PCI-6521 Relay Power Ratings

Power-On and Power-Off Conditions

The relays on the NI 6520/6521 have the default statuses of deenergized (control bit is low) in both power-on and power-off states. For more information on default states of the NI 6520/6521 relays, refer to the *Programmable Power-Up States* section and the *Non-Latching Relays* section.

Relay Signal Connection Example

To connect to the NI 6520/6521 signals for Form C relays, connect NC, NO, and COM, as shown in Figure 10.

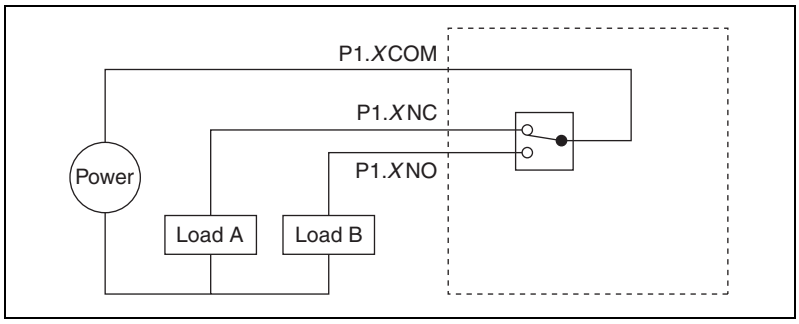


Figure 10. Relay Signal Connection Example for Form C Relays

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To connect to the NI 6520/6521 signals for Form A relays, connect NO and COM, as shown in Figure 11.

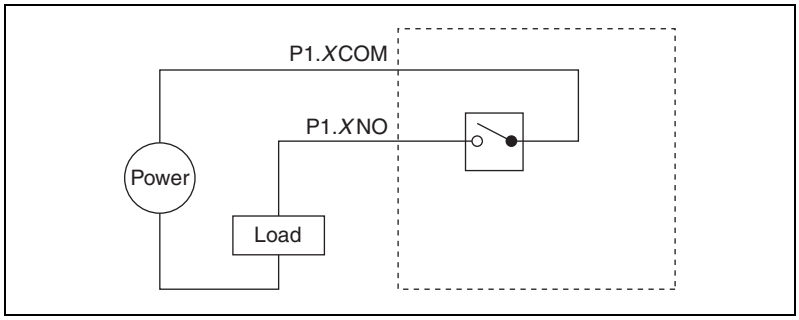


Figure 11. Relay Signal Connection Example for Form A Relays

Power Connections

Isolation Circuitry

Input Isolation Circuitry

The optocouplers optically isolate the NI 6520/6521 digital input channels. Each IC has an optocoupler that provides optical isolation for one channel of input.

Output Isolation Circuitry

The electromechanical relays provide isolation on the NI 6520/6521 output channels. Each relay provides isolation at one channel of output.

Isolation Voltages

NI 6520 Isolation Voltages

The terminals of each I/O channel are isolated from other I/O channels, from the connector shell, and digital ground. Isolation barriers provide isolation up to 30 Vrms/42.4 V_{pk}/60 VDC between any two terminals, except between the two terminals making up a single digital I/O channel.

Caution Do *not* exceed the isolation voltage limits. Exceeding the voltage limits may cause injury or permanently damage the NI 6520 components. National Instruments is *not* liable for any damage resulting from signal connections that exceed these limits.

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NI 6521 Isolation Voltages

Cautions This 150 V Measurement Category II module features 1,400 Vrms isolation between I/O channels and the backplane, as verified by a dielectric withstand test, 5 s maximum. Do *not* use this module for connection to signals or for measurements within Categories III or IV. Do *not* connect to MAINS supply circuits greater than 150 VAC. Refer to the *Safety Information* section for more information on measurement categories. When hazardous voltages (>30 Vrms/42.4 V_{pk}/60 VDC) are present on any signal, all signals must be considered hazardous. Ensure that external wiring or any circuits connected to the device are properly insulated from human contact.

The NI 6521 must be used with special keyed cables and accessories. Refer to the *37-Pin High-Voltage Accessory Safety Kit Installation Guide* shipped with your device and the *NI 6520 Accessory Options* section for more information.

The PCI-6521 must be installed in a PC that adequately grounds the front panel bracket to the chassis of the PC.

Do *not* remove covers from the NI PCI-6521. Doing so can result in electrical shock or death.

Use the PXI-6521 in a PXI chassis with properly installed PXI filler panels. Do *not* remove the filler panels from the NI PXI-6521. Doing so can result in electrical shock or death.

Protecting Inductive Loads

When inductive loads are connected to the relays, a large counter-electromotive force can occur when the relay disconnects the circuit. This occurs because of the energy stored in the inductive load. These flyback voltages can damage the relays and/or the power supply.

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To limit these flyback voltages at the inductive load, install a flyback diode for DC loads or a metal oxide varistor (MOV) for AC loads. For best results, mount the flyback diode within 18 inches of the load. Figure 12 shows an external flyback diode installed across an inductive load for DC loads. Figure 13 shows a MOV installed across an inductive load for AC loads.

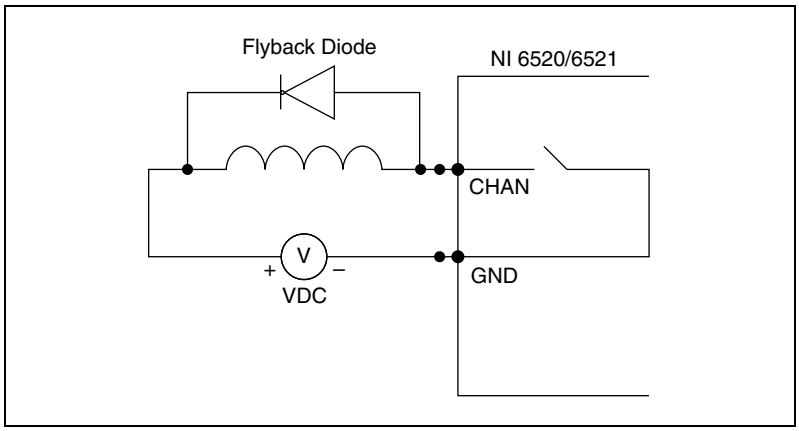


Figure 12. Contact Protection for DC Inductive Loads

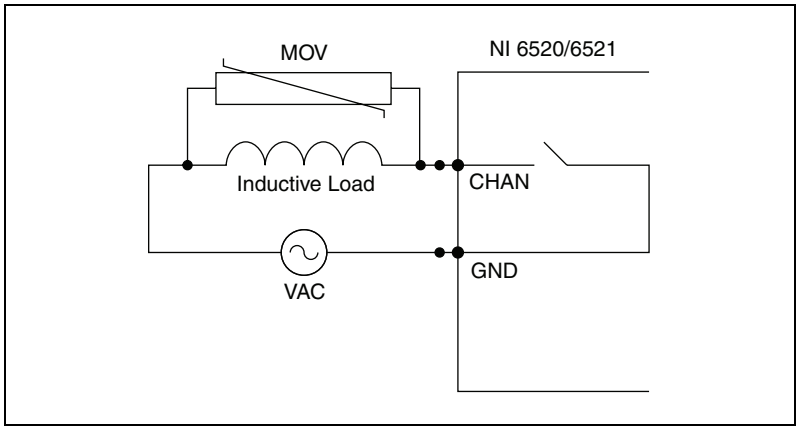


Figure 13. Contact Protection for AC Inductive Loads

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Cables and Accessories

NI 6520 Accessory Options

National Instruments offers the following connectivity options for use with 37-pin safety low voltage (≤30 Vrms/42.4 V_{pk}/60 VDC) NI 6520 devices.

Screw Terminal Connectivity Options

- CB-37F Connector Block—part number 778672-01 (vertical) and 778673-01 (horizontal)
- CB-37F-LP Unshielded, I/O Connector Block with 37-Pin D-SUB—part number 779353-01
- With one of the following cabling options:
  - SH37F-37M Shielded Cable—part number 778621-01 (1 m) and 778621-02 (2 m)
  - SH37F-P-4 37-Pin Female-to-Pigtails Shielded I/O Cable—part number 778620-04 (4 m)
  - R37F-37M-1 37-Pin Female-to-Male Ribbon I/O Cable—part number 779195-01 (1 m)

Or choose from the following custom connectivity options:

- SH37F-P-4 37-Pin Female-to-Pigtails Shielded I/O Cable—part number 778620-04 (4 m)
- TB-37F-37CP 37-Pin Crimp & Poke Terminals, Shell with Strain Relief—part number 779185-01
- TB-37F-37SC 37-Pin Solder Cup Terminals, Shell with Strain Relief—part number 779184-01

For more information about optional equipment available from National Instruments, refer to the National Instruments catalog or visit the National Instruments Web site at `ni.com`.

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PCI-6521 Accessory Options

Caution The NI 6521 must be used with special keyed cables and accessories. Refer to the *37-Pin High-Voltage Accessory Safety Kit Installation Guide* shipped with your device for more information about keying for safety.

- 37-Pin High-Voltage Accessory Safety Kit—part number 779445-01 And the following:
  - CB-37F-HVD High-Voltage Terminal Block, DIN Rail Mount—part number 779491-01, with one of the following cabling options:
    - SH37F-37M-2 37-Pin Female-to-Male Shielded I/O Cable, 2 m—part number 778621-02
    - SH37F-37M-1 37-Pin Female-to-Male Shielded I/O Cable, 1 m—part number 778621-01
- Or choose the following direct connect custom connectivity option:
  - TB-37F-37CP 37-Pin Crimp & Poke Terminals, Shell with Strain Relief—part number 779185-01

PXI-6521 Accessory Options

Caution The NI 6521 must be used with special keyed cables and accessories. Refer to the *37-Pin High-Voltage Accessory Safety Kit Installation Guide* shipped with your device for more information about keying for safety.

- 37-Pin High-Voltage Accessory Safety Kit—part number 779445-01 And your choice of the following:
  - TB-2621 37-Pin High-Voltage CAT II, 150 V Front-Mounting PXI Terminal Block—part number 779444-01
  - CB-37F-HVD High-Voltage Terminal Block, DIN Rail Mount—part number 779491-01, with one of the following cabling options:
    - SH37F-37M-2 37-Pin Female-to-Male Shielded I/O Cable, 2 m—part number 778621-02
    - SH37F-37M-1 37-Pin Female-to-Male Shielded I/O Cable, 1 m—part number 778621-01

  Or choose the following direct connect custom connectivity option:
  - TB-37F-37CP 37-Pin Crimp & Poke Terminals, Shell with Strain Relief—part number 779185-01

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For more information about optional equipment available from National Instruments, refer to the National Instruments catalog or visit the National Instruments Web site at ni.com.

Specifications

Refer to the *NI 6520 Specifications*, available at ni.com/manuals, for more detailed information about the NI 6520 device. Refer to the *NI 6521 Specifications*, shipped with your device and available at ni.com/manuals, for more detailed information about the NI 6521 device.

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At ni.com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

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