

Quick Start Guide

AD8

Command Set to Read Analog Voltages

8-Bit / 10-Bit Analog to Digital Conversion

MORE

1		255 5V	Read
2		255 5V	Read
3		255 5V	Read
4		255 5V	Read
5		255 5V	Read
6		255 5V	Read
7		255 5V	Read
8		255 5V	Read

Read One Input at a Time Read 8 Inputs at a Time

Resolution: ☒ 8-Bit ☐ 10-Bit ☐ Loop

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Analog to Digital Connections

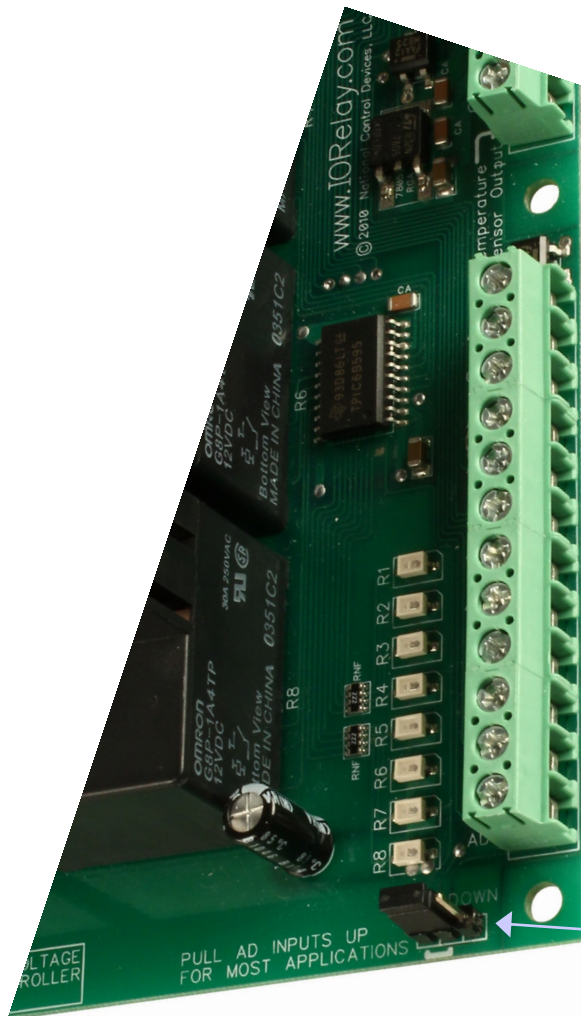
AD8 Series controllers allow users to monitor sensors and switches. A/D inputs should never be left “floating,” which simply means all inputs MUST connect to something (such as a voltage or ground). To prevent inputs from floating, a 10K Resistor connects each input to +5 or Ground using the pull up/down jumper. While this 10K resistor does slightly interfere with the signal, its benefits far outweigh the consequences of leaving inputs floating.

WARNING:

A/D Inputs can accept a voltage from 0 to 5VDC. You should NEVER exceed this voltage range. Negative voltages will damage the A/D inputs. Power the controller BEFORE applying voltages to these inputs. Applying voltages to these inputs while the controller is powered down may result in permanent damage to the CPU.

Reading Switches/Variable Resistance Signals:

A/D inputs are ideal for reading the on/off status of switches. Simply position the Up/Down jumper in the UP Position and connect a switch between input and ground. Our software may then be used to monitor the contact closure status of your switch. AD inputs can also be used for reading variable resistance signals. Position of Up/Down jumper should also be in UP position for reading variable resistance signals. Controller will return 0-255.

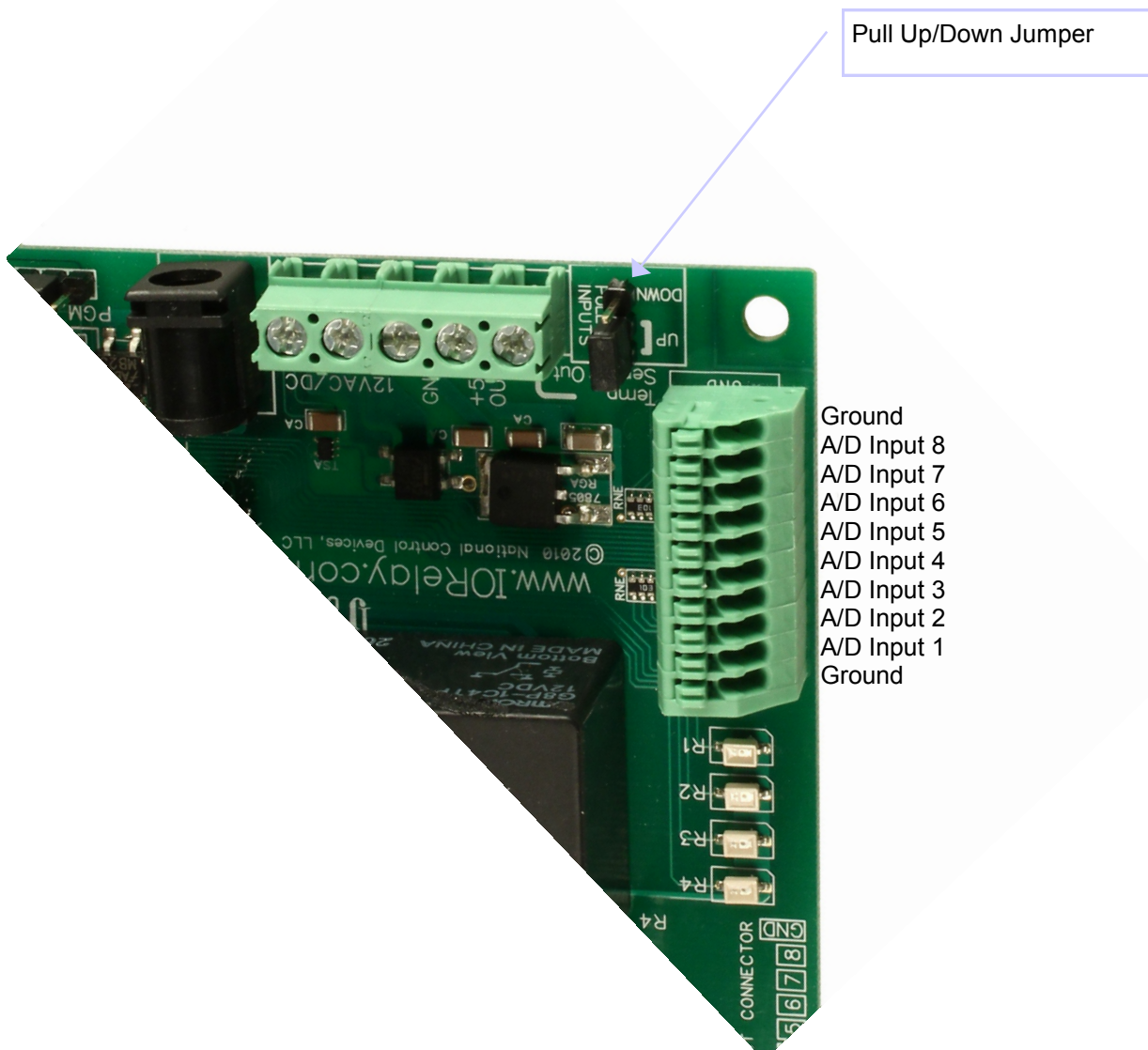


Input AD8
Ground
Input AD7
Input AD6
Ground
Input AD5
Input AD4
Ground
Input AD3
Input AD2
Ground
Input AD1

Pull Up/Down Jumper
Usually in the UP Position

Analog to Digital Connections

Some A/D Connectors are much smaller, depending on the size and space of the circuit board, we often use a spring-loaded connector on circuit boards that do not have a lot of available space.



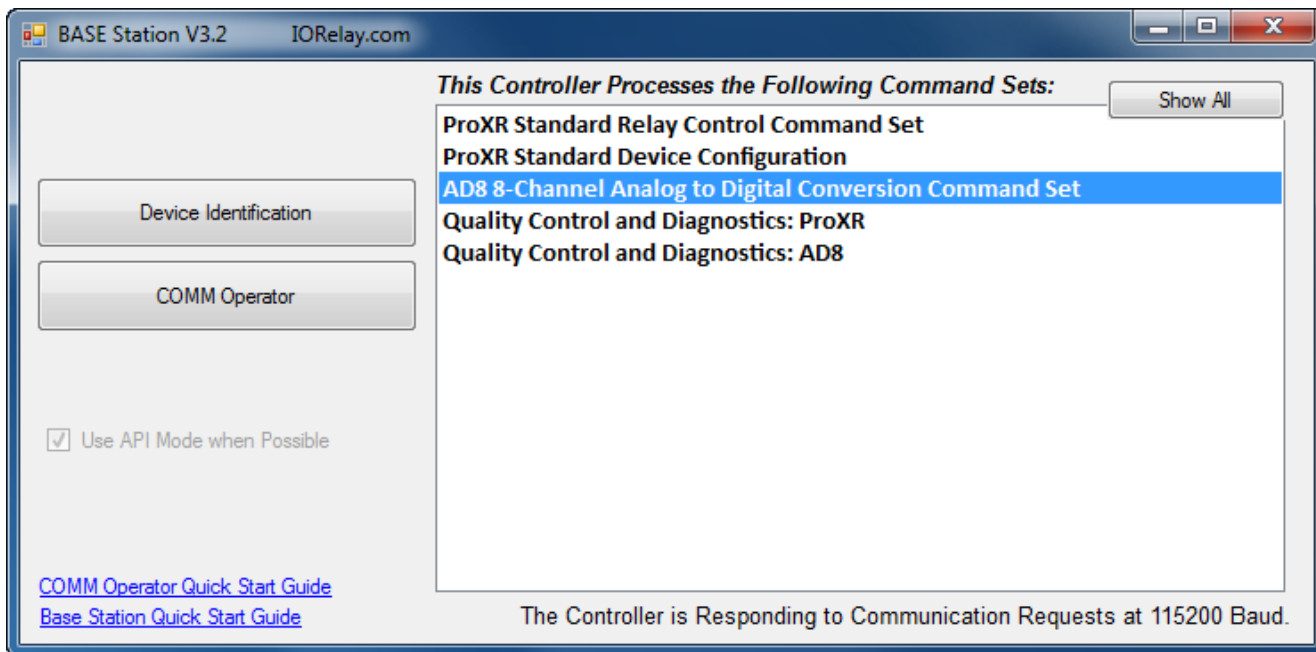
Base Station Software

The AD8 Command Set is used to read analog voltages on controllers equipped with a 8-Channel 8/10-Bit Analog to Digital Converter. The AD8 Command Set converts a Voltage from 0 to 5 Volts DC into numeric values.

In order to communicate with the AD8 controller, run the [NCD Base Station software](#).

- ▶ Connect the device to your computer using your favorite interface technology.
- ▶ Run the NCD Base Station software
- ▶ Select the appropriate COM port or IP Address
- ▶ Click OK.

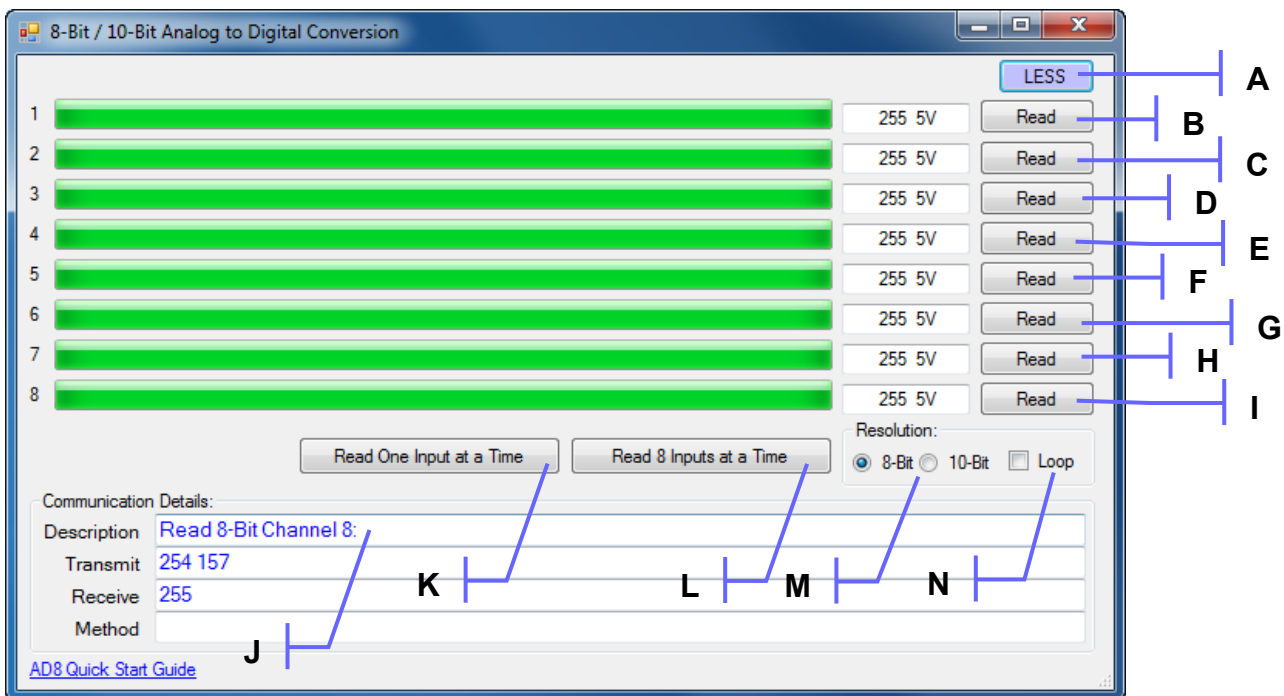
When the dialog box appears, choose 'AD8 8-Channel Analog to Digital Conversion Command Set' as shown in the screen shot below.



Base Station Software

Refer to the screen shot below for the 8-Bit/10-Bit Analog to Digital Conversion:

- A. MORE or LESS. MORE option expands windows to include section I of diagram. LESS option shrinks window to exclude section I.
- B. Read Analog Input Channel 1
- C. Read Analog Input Channel 2
- D. Read Analog Input Channel 3
- E. Read Analog Input Channel 4
- F. Read Analog Input Channel 5
- G. Read Analog Input Channel 6
- H. Read Analog Input Channel 7
- I. Read Analog Input Channel 8
- J. Communication Details. This section is shown when the MORE option from section A of the diagram is selected.
- K. This button queries all A/D Inputs, Each one Individually (8 Individual Commands).
- L. This button queries all A/D Inputs using a single command, which is much faster.
- M. 8-Bit Resolution means each input will return a value from 0 to 255
One Communication Byte is Received from the Device for each Channel using 8-Bit Resolution
- N. 10-Bit Resolution means each input will return a value from 0 to 1023.
Two Communication Bytes are Received from the Device for each Channel using 10-Bit Resolution.
- N. The Loop Option will query constantly until the Loop options are unchecked.



AD8 Command Set

The AD8 Command Set is used to read analog voltages on controllers equipped with a 8-Channel 8/10-Bit Analog to Digital Converter. The AD8 Command Set converts a Voltage from 0 to 5 Volts DC into numeric value. The AD8 Command Set supports 8-Bit Analog to Digital Conversion, which converts 0-5VDC to a numeric value from 0 to 255. The AD8 Command Set also supports 10-Bit Analog to Digital Conversion, which converts 0-5VDC to a numeric value from 0 to 1023.

Since 10-Bit Values must be communicated using two bytes, the following formula must be used to reconstruct the 10-Bit Value:

$$10\text{BitValue} = (\text{MSB} * 256) + \text{LSB} \quad \text{'Converts 2 Bytes into a Value from 0 to 1023}$$

Reads the 8-Bit Analog Input of Channels

This command will read the Analog Input of Channels 1-8 and Return an 8-Bit Value for each.

Send Bytes:	Byte 1:	Byte 2:
Function:	Command	Parameter (Channel 1-8)
Decimal Values:	254	150-157
Hex Values	0xFE	0x96 - 0x9D

Receive Byte: Decimal: 0-255
Hex: 0x00-0xFF

COMM Operator Examples:

254 150	Read the Analog Input Channel 1 and Return a 8-Bit Value
254 156	Read the Analog Input Channel 7 and Return a 8-Bit Value

NCD Component Library Command Method:

Not Yet Implemented

Reads the 10-Bit Analog Input of Channels

This command will read the Analog Input of Channels 1-8 and Return a 10-Bit Value for each.

Send Bytes:	Byte 1:	Byte 2:
Function:	Command	Parameter (Channel 1-8)
Decimal Values:	254	158-165
Hex Values	0xFE	0x9E-0xA5

Receive Bytes: Decimal: 0-255 (MSB) 0-255 (LSB)
Hex: 0x00 - 0xFF 0x00-0xFF

COMM Operator Examples:

254 158	Reads Analog Input Channel 1 and returns a 10-Bit Value
254 163	Reads Analog Input Channel 6 and returns a 10-Bit Value

NCD Component Library Command Method:

Not Yet Implemented

AD8 Command Set

Multi Channel 8-Bit

Reads All 8 Analog Input Channels and Replies with 8 Bytes indicating the 8-Bit Value of Each Analog Input.

Send Bytes:	Byte 1:	Byte 2:
Function:	Command	Returns AD1 - AD8
Decimal Values:	254	166
Hex Values	0xFE	0xA6

Receive Byte: Decimal: 0-255 (AD1-AD8)
Hex: 0x00-0xFF

NCD Component Library Command Method:

Not Yet Implemented

Multi Channel 10-Bit

Reads All 8 Analog Input Channels and Replies with 16 Bytes indicating the 10-Bit Value of Each Analog Input.

Send Bytes:	Byte 1:	Byte 2:
Function:	Command	Returns MSB AD1 - AD8 and LSB AD1 - AD8
Decimal Values:	254	167
Hex Values	0xFE	0xA7

Receive Bytes: Decimal: 0-255 (MSB) 0-255 (LSB)
Hex: 0x00 - 0xFF 0x00-0xFF

NCD Component Library Command Method:

Not Yet Implemented

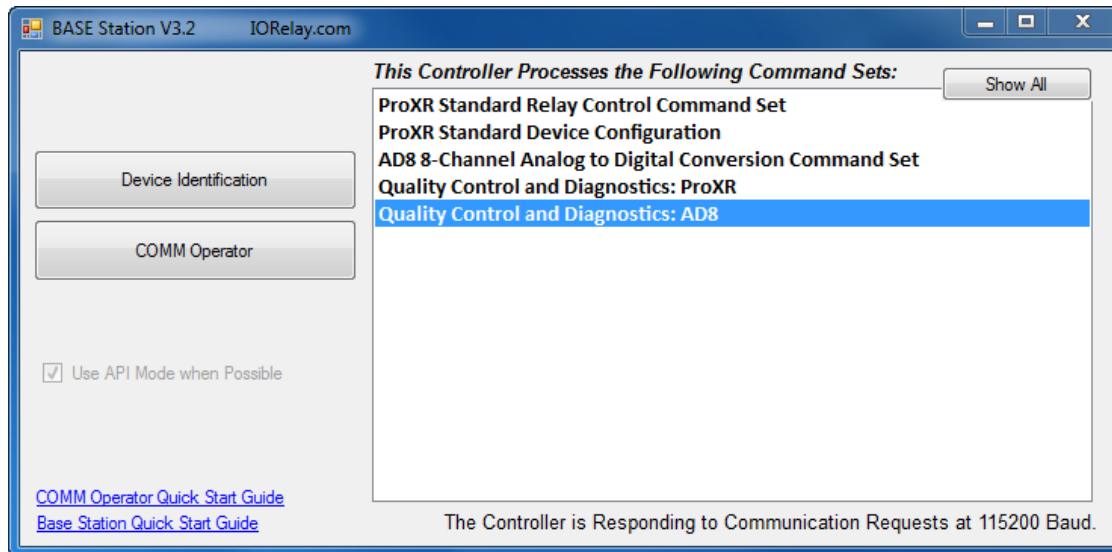
AD8 Command Summary

Transmit	8-Bit A/D Command Description	Receive
254 150	Reads Analog Input Channel 1 and Returns a 8-Bit Value	0-255
254 151	Reads Analog Input Channel 2 and Returns a 8-Bit Value	0-255
254 152	Reads Analog Input Channel 3 and Returns a 8-Bit Value	0-255
254 153	Reads Analog Input Channel 4 and Returns a 8-Bit Value	0-255
254 154	Reads Analog Input Channel 5 and Returns a 8-But Value	0-255
254 155	Reads Analog Input Channel 6 and Returns a 8-Bit Value	0-255
254 156	Reads Analog Input Channel 7 and Returns a 8-Bit Value	0-255
254 157	Reads Analog Input Channel 8 and Returns a 8-Bit Value	0-255
Transmit	10-Bit A/D Command Description	Receive
254 158	Reads Analog Input Channel 1 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
254 159	Reads Analog Input Channel 2 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
254 160	Reads Analog Input Channel 3 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
254 161	Reads Analog Input Channel 4 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
254 162	Reads Analog Input Channel 5 and Returns a 0-Bit Value	0-255 (MSB) 0-255 (LSN)
254 163	Reads Analog Input Channel 6 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
254 164	Reads Analog Input Channel 7 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
254 165	Reads Analog Input Channel 8 and Returns a 10-Bit Value	0-255 (MSB) 0-255 (LSB)
Transmit	Multi-Channel Command Reading	Receive
254 166	Reads All 8 Analog Input Channels and Replies with 8 Bytes indicating the 8-Bit Value of each Analog Input	0-255 (AD1) 0-255 (AD2) 0-255 (AD3) 0-255 (AD4) 0-255 (AD5) 0-255 (AD6) 0-255 (AD7) 0-255 (AD8)
254 167	Reads All 8 Analog Input Channels and Replies with 16 Bytes indicating the 10-Bit Value of Each Analog Input	0-255 (MSB-AD1) 0-255 (LSM-AD1) 0-255 (MSB-AD2) 0-255 (LSB-AD2) 0-255 (MSB-AD3) 0-255 (LSB-AD3) 0-255 (MSB-AD4) 0-255 (LSB-AD4) 0-255 (MSB-AD5) 0-255 (LSB-AD5) 0-255 (MSB-AD6) 0-255 (LSB-AD6) 0-255 (MSB-AD7) 0-255 (LSB-AD7) 0-255 (MSB-AD8) 0-255 (LSB-AD8)

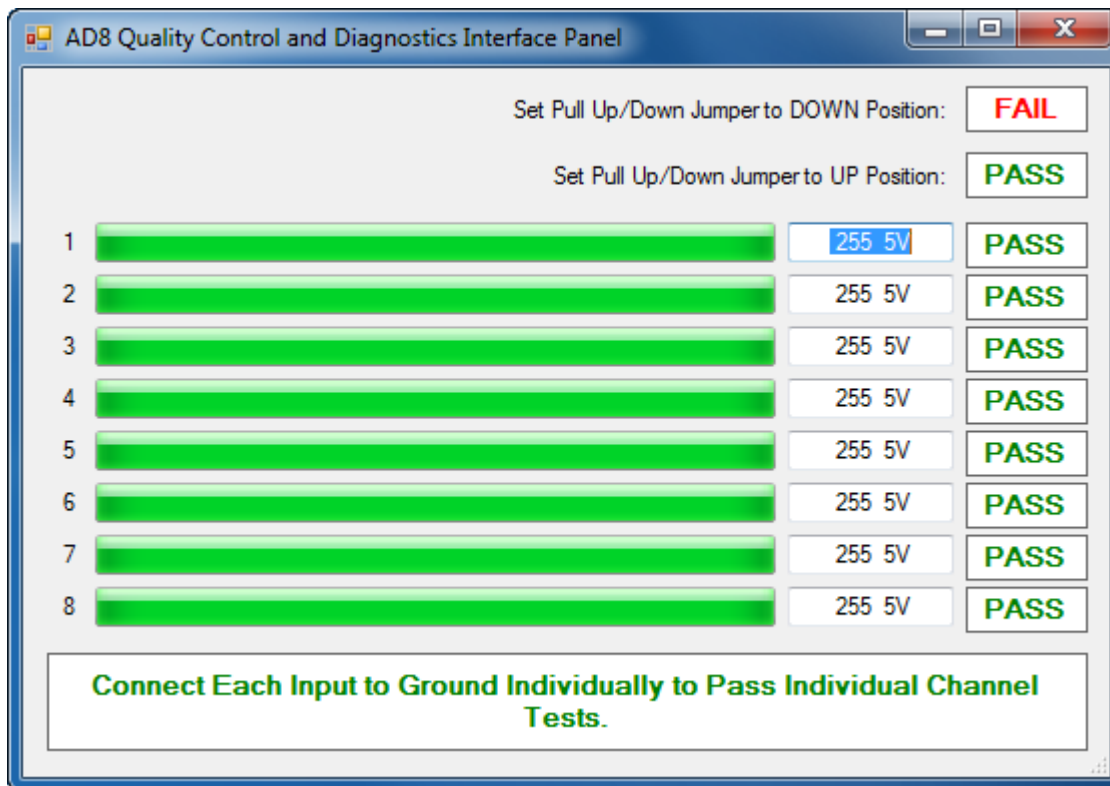
Troubleshooting

NCD Base Station Software

Use the 'AD8 Quality Control and Diagnostics' to help identify problems with the controller.



The testing procedure for AD8 Series devices tests the Up/Down Jumper and all 8 inputs. To "PASS" input Channels 1 through 8, make sure the Up/Down Jumper is in the UP Position, and connect each input individually to ground. As the input goes low, the FAIL will turn to PASS.

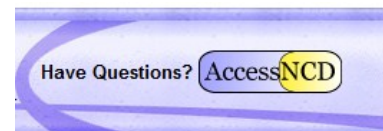


Technical Support

Technical support is available through our website, controlanything.com.

AccessNCD is the way we connect NCD engineers to our customers.

Click on the **AccessNCD** button located on the top right of the header of each page of our website.



For technical support and application information, contact Travis Elliott, our technical engineer. If you feel that you have discovered a bug in the firmware of our controllers, contact Ryan Sheldon, our hardware developer. If you have programming-related questions or have discovered a bug in our software, please contact Shirui Xu, our software engineer.

Click the '*Tech Support Staff*' tab and click on the appropriate engineer link for assistance. Click on our '*Forum*' tab if you would like to post publicly or review problems that other customers have had and our recommended solutions.



Our engineers monitor questions and respond continually throughout the day. Before requesting telephone technical support, we ask that customers please try to resolve their problems through **AccessNCD** first. However, for persistent problems, NCD technical support engineers will schedule a phone consultation.

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