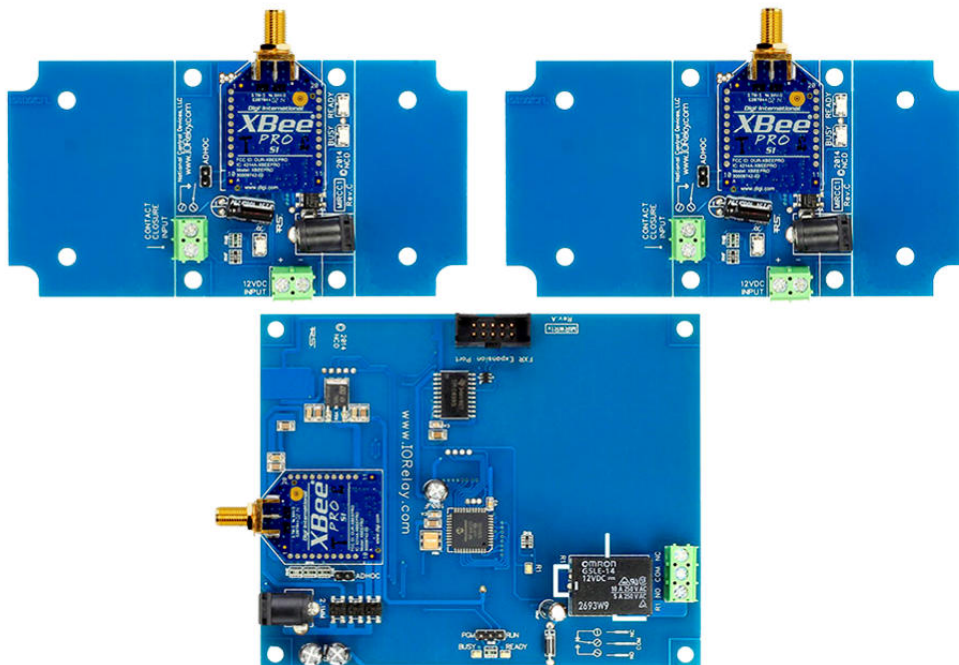


# NATIONAL CONTROL DEVICES

## MirW Series Quick Start Guide

# MIRW

MULTIPLE POINT TO SINGLE POINT RELAY CONTROL



NATIONAL CONTROL DEVICES

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# MirW Series Quick Start Guide

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Notice: Portions of this manual require internet access.

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## **Introduction**

MirW Series Controllers allow switches in multiple remote locations to control relays installed in a single location. MirW series controllers accept contact-closure inputs, and may be used to trigger many types of relays, from high-power solid state relays to low-power mechanical relays. MirW series controllers are sold in groups, including a specialized MirW relay controller and multiple remote transmitters. MirW packages are created on our web site, and come pre-configured to work out of the box. A contact-closure from any of the remotes will directly control a pre-determined MirW relay.

The MirW Series consist of multiple transmitters and a single relay controller. NCD technical support pre-configures the transmitters to work with the relay controller shipped in your order. MirW transmitters should be thought of as a programmable remote control with contact closure inputs. When contact closure inputs are closed, the MirW transmitter sends a pre-configured command to the relay controller to activate relays for your specific application. MirW transmitters can be configured by the user to trigger timers, toggle relays, turn relay groups on and off, or flash individual relays. The MirW Relay controller broadcasts the state of its relays every 2 seconds. All transmitters are configured to display the state of the relays on the MirW relay controller.

MirW controllers are available in 1-Mile Point-to-Point and 2-Mile Mesh options. 1-Mile and 2-Mile options will not work together. 1-Mile Point-to-Point requires every transmitter to be within 1-Mile line-of-sight to the MirW Relay controller. The 2-Mile Mesh version requires a pathway no greater than 2-miles between the relay controller and any of the transmitters. The 2-Mile Mesh version will pass data from transmitter to transmitter until it finds the receiver, so it is very important to have a pathway that never exceeds 2-Miles line-of-sight. The 1-Mile option is faster than the 2-Mile option. Expect reaction time of the 1-Mile version in under a second. Expect reaction time of the 2-Mile version in under 5 seconds in most cases, but it can take up to 30 seconds depending on your installation. Multiple 1-Mile and 2-Mile sets of controllers can exist in the same location without significant interference. All MirW series controllers include an external antenna.

MirW controllers are ready to work out of the box. However, users can configure MirW transmitters to send different relay control commands. MirW transmitters may be configured using a USB interface module (NCD Part Number ZUSB) and Base Station Software ([www.controlanything.com/start](http://www.controlanything.com/start)). Simply configure the MirW transmitter to send the relay control commands specific for your application or use the pre-configured relay control commands shipped with your controller. NCD Technical Support can assist you with advanced configuration requirements and build a package specialized for your specific needs.

Note: Data loss is possible for all wireless devices, MirW series controllers attempt to communicate your data up to 6 times and will not automatically retry after 6 attempts have been made.

## **Getting Started Requirements**

- MirW Series Controllers arrive Pre-Configured
- PWR12 Power Supply for MirW Relay Controller
- PWR12 Power Supply for MirW Sender Controllers

## **Optional Accessories**

- NCD Base Station Software ([www.IORelay/start](http://www.IORelay/start))
- ZUSB Used to Configure MirW Senders

## **Getting Started**

### **Step 1: Plug and Play**

MirW Series controllers are ready to work out of the box. Simply plug power into the MirW Relay Controller and Power each individual MirW Transmitter. The MirW transmitters will start the MirW service on the Relay Controller, and the Busy LED will flash every 2 seconds. It may take up to 30 seconds for the MirW transmitter to begin communicating with the MirW relay controller, particularly when working with the 2-Mile version.

### **Step 2: Contact Closure Inputs**

MirW Transmitters have screw-terminals for Contract Closure Inputs. Simply connect the two terminals together with a wire, button, or switch to send a Relay Control Command to the MirW Relay Controller. Note that inputs are rated for Contact Closure use ONLY. Do NOT apply a voltage to these terminals.

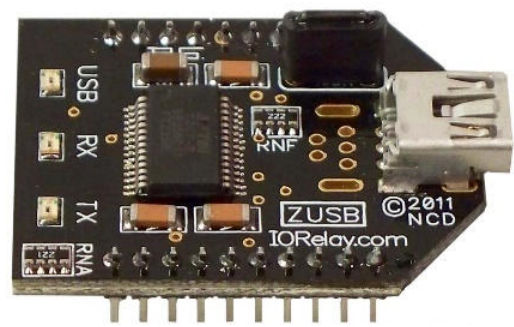
### **Don't Forget:**

Data loss is possible for all wireless devices, MirW series controllers attempt to communicate data transmissions up to 6 times and will not automatically retry after 6 attempts have been made.

## Connecting to a Computer

Before we begin this section, users will need a USB Interface Module (NCD Part Number ZUSB, Pictured to the Right) and Base Station Software: ([www.controlanything.com/start](http://www.controlanything.com/start)).

The MirW Relay Controller may be connected to a computer using the ZUSB interface module. Typically, the MirW relay controller does not need to have a computer connection for configuration, as the MirW Relay Controller has all necessary options preconfigured. The MirW Relay Controller appears in Base Station software as a stripped-down Fusion Series relay controller, as the MirW features are also part of all Fusion series controllers. This allows MirW transmitters to work with all Fusion controllers. The MirW series relay controllers do not have two communication interface ports nor are they equipped with any UXP, A/D or Digital I/O ports. The Taralist port has also been removed from the MirW version. Similarly, the firmware has been stripped of these Fusion features as well. MirW has retained the complete ProXR Advanced Command Set as well as a very limited set of Reactor features. Note that if you would like to customize your MirW transmitters, the [ProXR Advanced Quick Start Guide](#) will be very helpful if you need to issue specialized commands to the MirW relay controller.



MirW Transmitters on the other hand benefit greatly from the custom configuration through Base Station Software. Users have an enormous amount of flexibility to control the MirW or Fusion Series Relay Controllers. MirW Transmitters are relatively simple devices with two basic functions:

1. Transmit Pre-Configured Data to Fusion or MirW Relay Controller
2. Receive and Display Relay Status Information



## Transmitting Pre-Configured Data

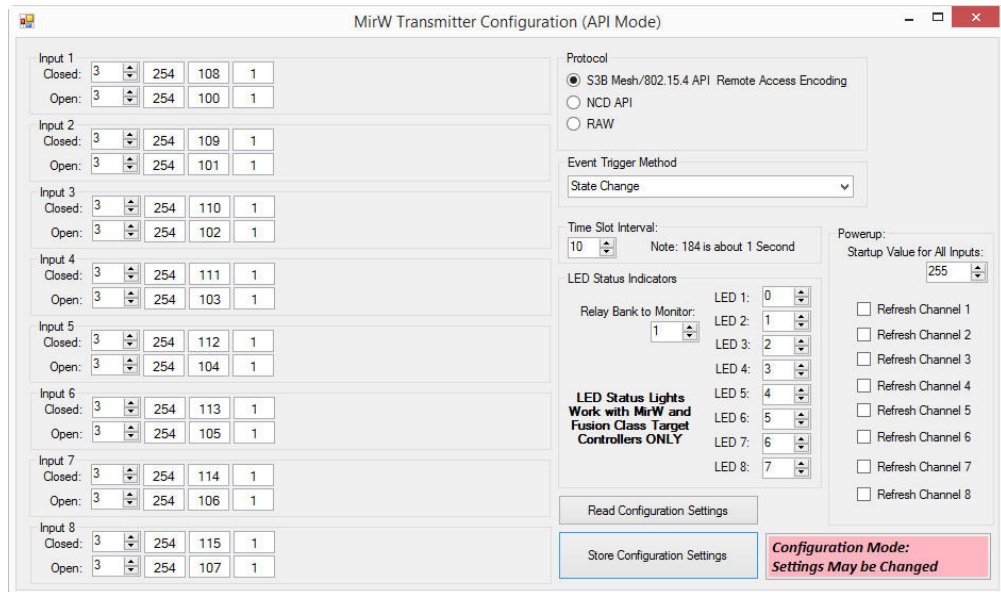
MirW Transmitters are capable of sending commands directly to a MirW or Fusion Series relay controller. Users may customize the commands transmitted using Base Station Software. Please see the [ProXR Advanced Quick Start Guide](#) for a comprehensive list of supported commands, or review the Common Commands section at the end of this manual.

Users may configure a data transmission when contact closure inputs are closed or opened (Closed Event and Open Event). MirW transmitters may be configured to send up to 9 bytes of data for every Closed Event or Open Event. Put simply, up to 9 bytes of data are transmitted when contacts are close and up to 9 bytes of data are transmitted when contacts are opened. MirW transmitters are available with 1, 2, 4, or 8 inputs. Each input may be custom-configured for a specific Closed Event and/or Open Event.

To custom-configure your MirW transmitter, power down the MirW transmitter and remove the Wireless communication module. Next, install the ZUSB and run Base Station Software. The following window will appear:

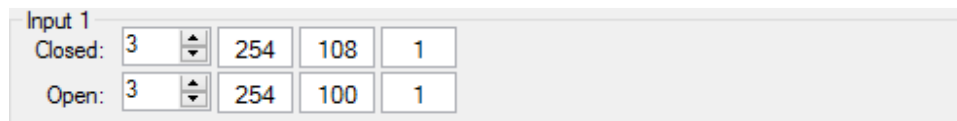


Click the “MirW Series Configuration Control Panel”.



The above window will allow you to configure the MirW transmitter for custom commands and display current relay status information.

#### Configuring Data Bytes:



With the above configuration, 3 data bytes will be transmitted to the remote device when a contact closure input is close. Three additional data bytes will be transmitted when the contact closure inputs are opened. Use the Up/Down arrows to configure how many data bytes you need to send. In the above sample, 254, 108, 1 will be transmitted when a contact closure input is closed and 254, 100, 1 will be transmitted when a contact closure input is opened. The command 254, 108, 1 is a ProXR relay control command, used to activate relay 1 on any ProXR or Fusion Series relay controller when a contact closure input is closed. Similarly, the command 254, 100, 1 is used to deactivate relay 1 when a contact closure input is opened. In the example above, Relay 1 will be activated when contact closure input 1 is closed and Relay 1 will be deactivated when contact closure input 1 is opened. MirW and Fusion Series controllers support the ProXR Advanced command set, so it is possible to change these bytes to do many more things, including relay toggling, relay flashing, activate relays for a duration of time, and much more. The [ProXR Advanced Quick Start Guide](#) will be very helpful if you need to issue specialized commands, optionally, the Common Commands section of this guide will demonstrate some commonly used commands. Just fill in the boxes with the commands shown and store your changes to the MirW transmitter.

Protocol

S3B Mesh/802.15.4 API Remote Access Encoding

NCD API

RAW

The MirW transmitter can be configured to send data using 3 protocol options. If you are using S3B (2-Mile Wireless Option) or 802.15.4 (1-Mile Wireless Option), make sure the setting shown above is stored in your controller, as wireless data cannot be communicated unless this option is selected.

NCD API formats the outgoing data in NCD API format, a protocol that “wraps” your data inside a header and a footer with a checksum. This protocol option is useful if you need the MirW to communicate data over a RS-232 connection.

RAW data sends data exactly as shown on the previous page, this option should be chosen if working with devices manufactured by companies other than NCD.

Event Trigger Method

State Change

The Event Trigger Method has Two Options: State Change and Time Slot Interval. By default, State Change is selected, meaning data is transmitted only when a change is detected on one or more inputs. Time Slot Interval transmits data at the specified Time Slot Interval. Time Slot Interval sends contact-closure state-changes first, then sends the current state of the unchanged inputs (Open or Closed). Data is sent will be continuously transmitted if the Time Slot Interval option is selected.

Time Slot Interval:

184

Note: 184 is about 1 Second

The Time Slot Interval setting sets the timing between data packets. A value of 184 is equal to about 1 second, a maximum value of 255 is a little longer than 1 second between data packets. Note this setting has not been precisely timed, and is subject to minor fluctuations.

LED Status Indicators

Relay Bank to Monitor: 1

**LED Status Lights  
Work with MirW and  
Fusion Class Target  
Controllers ONLY**

LED 1: 0

LED 2: 1

LED 3: 2

LED 4: 3

LED 5: 4

LED 6: 5

LED 7: 6

LED 8: 7

MirW LED Status Lights are programmable if you selected the S3B Mesh/802.15.4 API Remote Access Encoding or the NCD API Option. This control panel is not available if you chose the RAW protocol. This box allows you to display the status of the MirW or Fusion Relays. Use this box to select which relay bank you want to monitor. A value of 1 indicates the first group of 8 relays, a value of 2 indicates the second group of 8 relays. This control panel will allow you to monitor any one of the first 4 banks of relays (any of the first 32 relays on your MirW or Fusion series controller).

LEDs 1 through 8 are programmable. Note that not all MirW transmitters have 8 LED status lights. For instance, a 1-Channel MirW transmitter only has ONE LED status light. Only the 8-Channel MirW transmitter has 8 LED status lights.

The Up/Down arrows let you choose which relay is mapped to the selected LED. For instance, when the “Relay Bank to Monitor” option is set to 1 and the LED 1: value is set to 0, the LED will display the current status of Relay 1 on Relay Bank 1. LEDs can be custom mapped as required. Note that NCD Technical Support will pre-configure your MirW transmitters with the appropriate settings for your application. Typically, the pre-programmed settings will not need to be changed.

Powerup:  
Startup Value for All Inputs:  
255

- Refresh Channel 1
- Refresh Channel 2
- Refresh Channel 3
- Refresh Channel 4
- Refresh Channel 5
- Refresh Channel 6
- Refresh Channel 7
- Refresh Channel 8

The Startup Value for All Inputs allows you to configure an automatic transmission when power is first applies to the controller. A Value of 255 is typical, signaling that all inputs are pulled high. Setting this value to 0 will typically trigger an automatic data transmission when power is first applied, provided all contact closure inputs are open.

Refresh Channel check boxes force a refresh of Channel Status by the controller on power-up, triggering a transmission when power is first applied to the controller.

Be sure to STORE your configuration changes, settings will not take effect until the controller is power cycled.

Note: Base Station Software prevents all automatic data transmissions. It will be necessary to power-cycle the controller after configuration changes have been made.

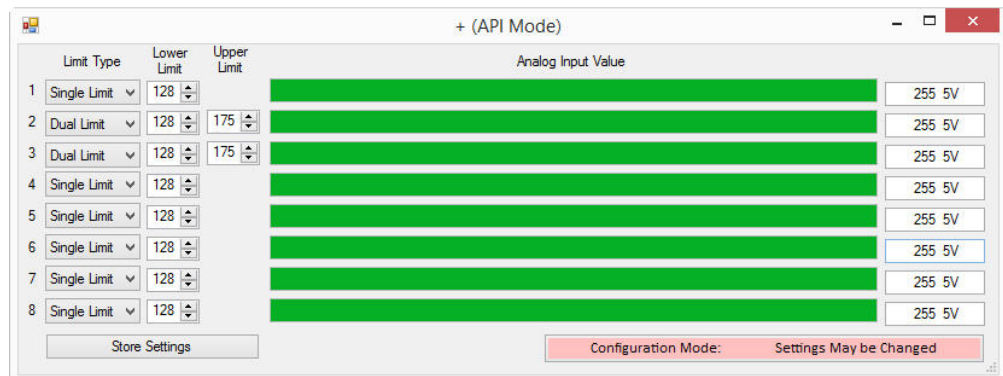
## Advanced Features:

Up until this point, we have always thought of the MirW input transmitter as contact closure inputs ONLY. We strongly suggest that all users use MirW transmitters for contact closure applications ONLY! However, if you are experienced with electronics, you can actually feed a voltage into the A/D Input provided the following two rules are always followed:

1. Never apply a voltage to an input if the controller is powered down!
2. Never apply a voltage to the controller below 0 Volts DC or above 5 Volts DC!



The AD8 8-Channel Analog-to-Digital Conversion Command Set lets you choose advanced settings for users who need more flexibility beyond contact closure inputs. We do NOT suggest using this control panel unless you have a complete understanding of A/D inputs. NCD Technical Support can guide you on this topic if your application requires.



The MirW transmitter reads all inputs as analog voltages. By default, all inputs are pulled high. When a contact-closure input is closed, the voltage drops to 0 and an event is triggered. By default, closed events trigger when the input voltage falls below 128 (2.5VDC) and all Open events are triggered when the input voltage rises above 128 (2.5VDC). This single-limit architecture is useful for most applications, as these are ideal settings when using the inputs only as contact closure inputs.

Note that if you choose to feed a voltage into the A/D inputs, you can set the upper and lower limits for sending Opened and Closed events. This is very useful if you need the MirW transmitter to send data when a specific temperature is reached. Many types of sensors may be connected to the MirW controller provided they have a 10K variable resistance output. Optionally, you can use sensors that feed a specific voltage into the MirW inputs provided you NEVER feed voltage into the controller while it is powered down and you NEVER exceed the 0-5VDC input voltage range.

Be sure to Store settings and power cycle the controller for these changes to take effect.

## **Setting the Destination Address:**

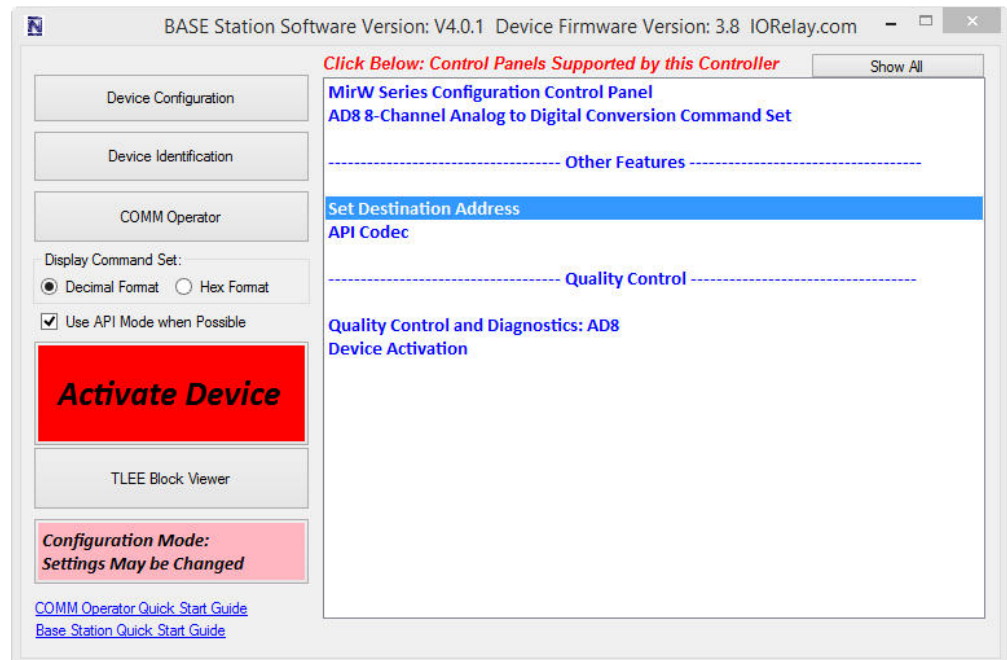
MirW Transmitters are designed to communicate data to a specific MirW relay controller. By default, NCD Technical Support sets the destination address for you. However, if you need to add another transmitter to an existing installation, or if you want to re-task a transmitter for another MirW Relay Controller, it will be necessary for users to set the destination address using these instructions.

The MirW relay controller contains a communication module with a printed address. Follow these steps to obtain the correct destination address of the MirW Relay Controller:

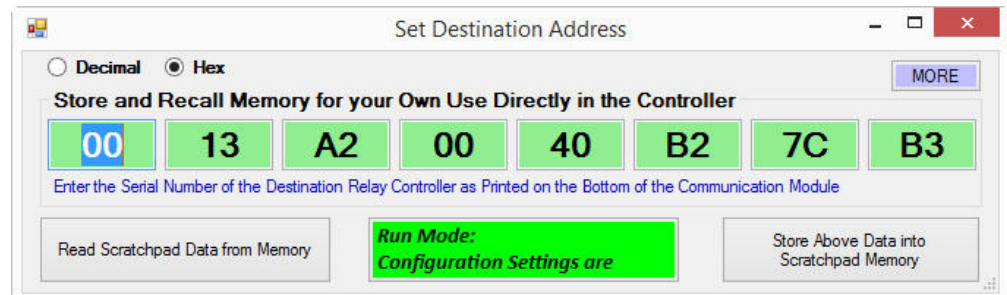
- 1) Power Down the MirW Relay Controller
- 2) Carefully Remove the Wireless Communication Module
- 3) Carefully examine the back of the Communication Module
- 4) Look for a number that begins 0013A200
- 5) Write down the number printed below this number
- 6) Reinstall the Communication Module in the MirW Relay Controller
- 7) Make Sure all Pins are Properly aligned on the Communication Module
- 8) Power Up the MirW Relay Controller



Use Base Station software to change the settings of the MirW Transmitter. The window below will appear:



Click the “Set Destination Address” to change the destination address of the MirW Transmitter.



Enter the destination address as shown in the example above. Store your changes.

Your MirW Transmitter is now ready to send data the destination you have chosen.

## Common Commands

The following commands serve as a quick reference for controlling relays on ProXR series controllers using the KFX module. These command may be entered into the KFX module to help get you running quickly. Note that NCD API should be selected for faster response times and should be compatible with older devices. Also note the first number on each line below indicates the number of bytes to send, which is not part of the actual command.

3, 254, 100, 1	Turn Off Relay 1 Bank 1
3, 254, 101, 1	Turn Off Relay 2 Bank 1
3, 254, 102, 1	Turn Off Relay 3 Bank 1
3, 254, 103, 1	Turn Off Relay 4 Bank 1
3, 254, 104, 1	Turn Off Relay 5 Bank 1
3, 254, 105, 1	Turn Off Relay 6 Bank 1
3, 254, 106, 1	Turn Off Relay 7 Bank 1
3, 254, 107, 1	Turn Off Relay 8 Bank 1
3, 254, 108, 1	Turn On Relay 1 Bank 1
3, 254, 109, 1	Turn On Relay 2 Bank 1
3, 254, 110, 1	Turn On Relay 3 Bank 1
3, 254, 111, 1	Turn On Relay 4 Bank 1
3, 254, 112, 1	Turn On Relay 5 Bank 1
3, 254, 113, 1	Turn On Relay 6 Bank 1
3, 254, 114, 1	Turn On Relay 7 Bank 1
3, 254, 115, 1	Turn On Relay 8 Bank 1
3, 254, 130, 1	Turn On All Relays Bank 1
3, 254, 129, 1	Turn Off All Relays Bank 1
3, 254, 131, 1	Invert the Status of All Relays in Bank 1
3, 254, 132, 1	Reverse the Status of Relays in Bank 1

5, 254, 147, 0, 0, 1 Toggle Relay 1  
5, 254, 147, 1, 0, 1 Toggle Relay 2  
5, 254, 147, 2, 0, 1 Toggle Relay 3  
5, 254, 147, 3, 0, 1 Toggle Relay 4  
5, 254, 147, 4, 0, 1 Toggle Relay 5  
5, 254, 147, 5, 0, 1 Toggle Relay 6  
5, 254, 147, 6, 0, 1 Toggle Relay 7  
5, 254, 147, 7, 0, 1 Toggle Relay 8

5, 254, 148, 0, 0, 1 Pulse Relay 1  
5, 254, 148, 1, 0, 1 Pulse Relay 2  
5, 254, 148, 2, 0, 1 Pulse Relay 3  
5, 254, 148, 3, 0, 1 Pulse Relay 4  
5, 254, 148, 4, 0, 1 Pulse Relay 5  
5, 254, 148, 5, 0, 1 Pulse Relay 6  
5, 254, 148, 6, 0, 1 Pulse Relay 7  
5, 254, 148, 7, 0, 1 Pulse Relay 8

4, 254, 146, 0, 0 Turn Off All Relays Then Turn On Relay 1  
4, 254, 146, 1, 0 Turn Off All Relays Then Turn On Relay 2  
4, 254, 146, 2, 0 Turn Off All Relays Then Turn On Relay 3  
4, 254, 146, 3, 0 Turn Off All Relays Then Turn On Relay 4  
4, 254, 146, 4, 0 Turn Off All Relays Then Turn On Relay 5  
4, 254, 146, 5, 0 Turn Off All Relays Then Turn On Relay 6  
4, 254, 146, 6, 0 Turn Off All Relays Then Turn On Relay 7  
4, 254, 146, 7, 0 Turn Off All Relays Then Turn On Relay 8

### Relay Grouping: Controlling Multiple Relays Together

Change the 100 value below to any value from 100-115 to control the starting relay. Values 100-107 turn off relays, values from 108-115 turn on relays. Example shown for Bank 1, change the 1 to any bank value supported by your controller.

4, 254, 100, 1, 1	Turn Off Relays 1 and 2 as a Group
4, 254, 100, 1, 2	Turn Off Relays 1, 2 and 3 as a Group
4, 254, 100, 1, 3	Turn Off Relays 1, 2, 3 and 4 as a Group
4, 254, 100, 1, 4	Turn Off Relays 1, 2, 3, 4 and 5 as a Group
4, 254, 100, 1, 5	Turn Off Relays 1, 2, 3, 4, 5 and 6 as a Group
4, 254, 100, 1, 6	Turn Off Relays 1, 2, 3, 4, 5, 6 and 7 as a Group
4, 254, 100, 1, 7	Turn Off Relays 1, 2, 3, 4, 5, 6, 7 and 8 as a Group
4, 254, 108, 1, 1	Turn On Relays 1 and 2 as a Group
4, 254, 108, 1, 2	Turn On Relays 1, 2 and 3 as a Group
4, 254, 108, 1, 3	Turn On Relays 1, 2, 3 and 4 as a Group
4, 254, 108, 1, 4	Turn On Relays 1, 2, 3, 4 and 5 as a Group
4, 254, 108, 1, 5	Turn On Relays 1, 2, 3, 4, 5 and 6 as a Group
4, 254, 108, 1, 6	Turn On Relays 1, 2, 3, 4, 5, 6 and 7 as a Group
4, 254, 108, 1, 7	Turn On Relays 1, 2, 3, 4, 5, 6, 7 and 8 as a Group

## Relay Flashing

4, 254, 145, 1, 0	Turn Off Relay 1 Flashing
4, 254, 145, 2, 0	Turn Off Relay 2 Flashing
4, 254, 145, 3, 0	Turn Off Relay 3 Flashing
4, 254, 145, 4, 0	Turn Off Relay 4 Flashing
4, 254, 145, 5, 0	Turn Off Relay 5 Flashing
4, 254, 145, 6, 0	Turn Off Relay 6 Flashing
4, 254, 145, 7, 0	Turn Off Relay 7 Flashing
4, 254, 145, 8, 0	Turn Off Relay 8 Flashing
4, 254, 145, 9, 0	Turn Off Relay 9 Flashing
4, 254, 145, 10, 0	Turn Off Relay 10 Flashing
4, 254, 145, 11, 0	Turn Off Relay 11 Flashing
4, 254, 145, 12, 0	Turn Off Relay 12 Flashing
4, 254, 145, 13, 0	Turn Off Relay 13 Flashing
4, 254, 145, 14, 0	Turn Off Relay 14 Flashing
4, 254, 145, 15, 0	Turn Off Relay 15 Flashing
4, 254, 145, 16, 0	Turn Off Relay 16 Flashing

4, 254, 145, 1, 1	Turn On Relay 1 Flashing
4, 254, 145, 2, 1	Turn On Relay 2 Flashing
4, 254, 145, 3, 1	Turn On Relay 3 Flashing
4, 254, 145, 4, 1	Turn On Relay 4 Flashing
4, 254, 145, 5, 1	Turn On Relay 5 Flashing
4, 254, 145, 6, 1	Turn On Relay 6 Flashing
4, 254, 145, 7, 1	Turn On Relay 7 Flashing
4, 254, 145, 8, 1	Turn On Relay 8 Flashing
4, 254, 145, 9, 1	Turn On Relay 9 Flashing
4, 254, 145, 10, 1	Turn On Relay 10 Flashing
4, 254, 145, 11, 1	Turn On Relay 11 Flashing
4, 254, 145, 12, 1	Turn On Relay 12 Flashing
4, 254, 145, 13, 1	Turn On Relay 13 Flashing
4, 254, 145, 14, 1	Turn On Relay 14 Flashing
4, 254, 145, 15, 1	Turn On Relay 15 Flashing
4, 254, 145, 16, 1	Turn On Relay 16 Flashing

### Relay Timers

The following command samples show you how to trigger relays for a duration of time. When the timer expires, the relay will turn off.

There are many parameters for this command, so the command parameters will be outlined briefly in this document:

7	Total Number of Bytes
254	Byte 1, Header Byte
50	Byte 2, Timer Series Commands
50-65	Byte 3, Timer 1 to 16, Use a separate timer for each relay
0-255	Byte 4, Hours of Duration Timer
0-255	Byte 5, Minutes of Duration Timer
0-255	Byte 6, Seconds of Duration Timer
0-255	Byte 7, Relay Controlled by this Timer

## Technical Support

Technical support is available through our website, [controlanything.com](http://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.

The screenshot shows the top portion of the AccessNCD website. At the top left is the NCD logo. To its right is the text 'AccessNCD' and 'Connecting Customers to NCD Developers, Staff and Each Other'. Below this is a navigation menu with tabs for 'Main', 'My Page', 'Tech Support Staff', 'Photos', 'Videos', 'Forum', 'Blogs', and 'Store'. The 'Tech Support Staff' tab is selected. Below the navigation is a 'Featured Members' section with three profile pictures and their names and roles: Shirui Xu - Software Developer, TravisE NCD Technical Engineer, and RyanS - NCD Hardware Developer. To the right of the featured members is a box with the text 'Welcome to AccessNCD' and 'Sign Up or Sign In'.

*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.

## **Contact Information**

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Osceola, MO 64776  
417-646-5644 phone  
866-562-0406 fax  
Open 9 a.m. - 4 p.m. CST

All orders *must* be placed online at our website, [www.controlanything.com](http://www.controlanything.com)

### **Notice:**

The only authorized resellers of NCD products are

- [www.controlanything.com](http://www.controlanything.com)
- [www.relaycontrollers.com](http://www.relaycontrollers.com)
- [www.relaypros.com](http://www.relaypros.com)
- [www.amazon.com](http://www.amazon.com)

All other websites are not authorized dealers; we have noticed some retailers offering our products fraudulently.

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