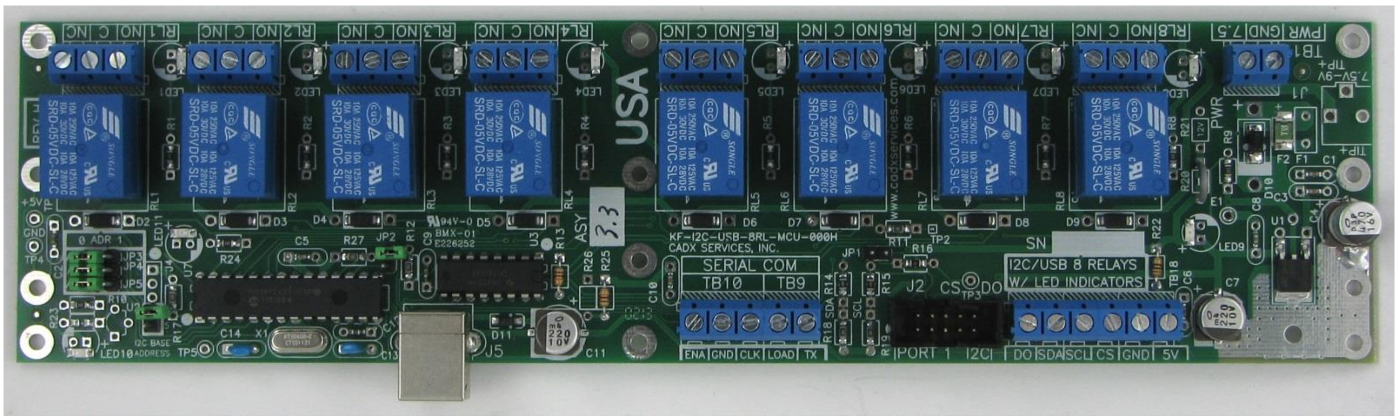
8-Channel Relay Output Board Via I²C, USB Protocol

P/N KA-I2C-8-RL-PWR-TH

I2C-USB-Relay8



User Manual

8-Channel Relay Output Board Via I^2C, USB Protocol

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What is the I2C-USB-Relay8?

The I2C-USB-Relay8 is a module which contains 8 low-voltage mechanical relays which can be independently controlled via a I2C communications bus or via USB. These relays can be used to act as digital outputs.

Each relay output on the I2C-USB-Relay8 has an LED indicator light which activates when the relay is activated.

The I2C-USB-Relay8 is modular and expandable; in addition to being stackable, it can be assigned 1 of up to 16 unique addresses and monitored via the on-board I^2C communications port.

You can also communicate to the I2C-USB-Relay8 via the USB port.

What Do I Need to Make it Work?

If you are going to use I^2C communications to drive this module, you will need:

- Controller module
  - USB-I2C-Relay10
  - USB-I2C-RS232-Micro
  - WEB-I2C-Remote
  - Your own custom I^2C controller module
- 10-pin IDC connector, preferably in the form of a female-female ribbon cable
- 14-22 AWG wire, for connecting ports to output sources, supplying power and I^2C communications port

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If you are going to use USB communications to drive this module, you will need:

- USB cable

You will also need:

- Power Supply
  - 7.5VDC @ 600mA maximum
  - Can be brought in via on-board terminal block TB17
  - Can be brought in via I^2C port
  - Or can be powered by USB

What Else Does it Work With?

The I2C-USB-Relay8, in addition to interfacing with your own custom applications, can be used with a PC running LabView version 7 or later and a USB-I2C-Relay10 control module (see Figure 1).

Simply connect your PC to the control module via USB, connect your I2C-USB-Relay8 module to the controller via the I^2C module, and from there use our LabView drivers to observe the state of all 8 input ports in real-time on up to 2 I2C-USB-Relay8 modules.

The I2C-USB-Relay8 module can also be used with:

- I2C-Opto8
- USB-I2C-RS232-Micro (stand-alone unit programmed via PC)
- WEB-I2C-Remote (stand-alone server which executes commands via Ethernet connection)

You can also have I2C-USB-Relay8 modules working side-by-side with I2C-Opto8 input modules on the same controller.

How NOT to Use This Device

Do not use this device in any application where there will be a lot of switching on and off; the relays are rated for a maximum of 30 on/off transitions per minute. If your application has a lot of switching, a solid-state relay would be better suited.

Do not use this device with excessive inductive loads Mechanical relays are better than solid state relays at handling inductive loads, but the relays used here are rated for an absolute maximum inductive load of 3A.

Do not use excessive voltage (greater than 7.5VDC) to power this device. The closer you can get to 5.6V the more efficiently it will run. The Revision I device has a switching power supply and an input voltage range of up to 30VDC if that's what you need.

Do not use this device in any kind of a medical or other life-saving or life-sustaining application, as it lacks the redundant circuitry required for such applications.

How to Use This Device, USB

Powering Up the I2C-USB-Relay8

The device can be powered directly from the USB cable if the source is capable of providing 500mA. Generally powered USB hubs or USB ports directly on your PC's motherboard support this.

Alternatively you can power the device via a 7.5VDC connection to TB17.

Using the I2C-USB-Relay8

Once your I2C-USB-Relay8 is powered up and connected to your PC, use the software of your choice to transmit a single byte to the USB device. The least significant bit corresponds to relay 1 and the most significant bit to relay 8.

How to Use This Device, I^2C

Setting Up the Controller

Perhaps your preference is for stand-alone operation, or remote accessibility, or a setup which doesn't rely on an Ethernet connection. Whichever controller you choose, there are distinct advantages to each model.

While operation of your controller can be as simple as plugging your controller into your power source and then connecting the I2C-USB-Relay8 to your controller, we strongly encourage you to refer to the setup directions in the documentation for your controller.

Connecting to the I^2C Communications Port

Connecting to the I^2C communications port on your I2C-USB-Relay8 can be done in one of two ways:

IDC connector J2

These connectors are also known as 10-pin IDC connectors. Generally what you plug into these are female-female ribbon cables which look like the illustration found in Figure 2. The pinout for these connectors is illustrated in Figure 3.

Terminal Blocks TB18-TB19

The specific pins you need for I^2C communications are:

- TB19, "SDA"
- TB20, "SCL"
- TB18, "GND"
- TB19, "5V"

Setting the I^2C Address

Each unit operating on the same I^2C communications bus must have a unique address. Since the selectable I^2C address space consists of 2 base addresses with 3 configurable bits each, up to 16 unique devices can share the same I^2C communications bus.

On the I2C-USB-Relay8, the I^2C address is configured with four jumpers (1 for each bit of the address). Figure 5 shows you where to find these jumpers.

The jumper across pins 4 and 5 of J4 set the base address. With the jumper set, the base address is 0100xxx0, unset it is 0111xxx0.

To set the second bit of the address to "1", short the "HI" and "ADR" pins of JP3 together. To set the second bit to "0", short the "LO" and "ADR" pins of JP3 together. Repeat with JP4 and JP5 to set the third and fourth bits of the address.

Using the I2C-USB-Relay8

Once your I2C-USB-Relay8 is connected to your controller and the unit's address is configured, how exactly you actually use the product will rely heavily on the controller interface.

If you are not using one of our controller units, your controller must write 2 bytes of information onto the I^2C bus each time you wish to change the state of 1 or more channels – a byte for the address of the board you want to talk to, and a byte that represents which relays should be engaged and which relays should be disengaged.

Address Byte – J4 unset

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	1	1	X	X	X	0
				A2 (JP5)	A1 (JP4)	A0 (JP3)	$R/\overline{W}$

Status Byte

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X	X	X	X	X	X	X	X
RL8	RL7	RL6	RL5	RL4	RL3	RL2	RL1

So, writing "011100010" for the address byte and "00001111" for the status byte means that the unit at address 1 will turn relays RL1-4 on and relays RL5-RL8 off.

Communications Failsafe

Place a jumper on JP2 (see figure 6) to force all relays to open when communications are interrupted for more than a quarter of a second. Without a jumper on JP2, relays will retain their state until a new command is issued or power is removed.

Illustrations

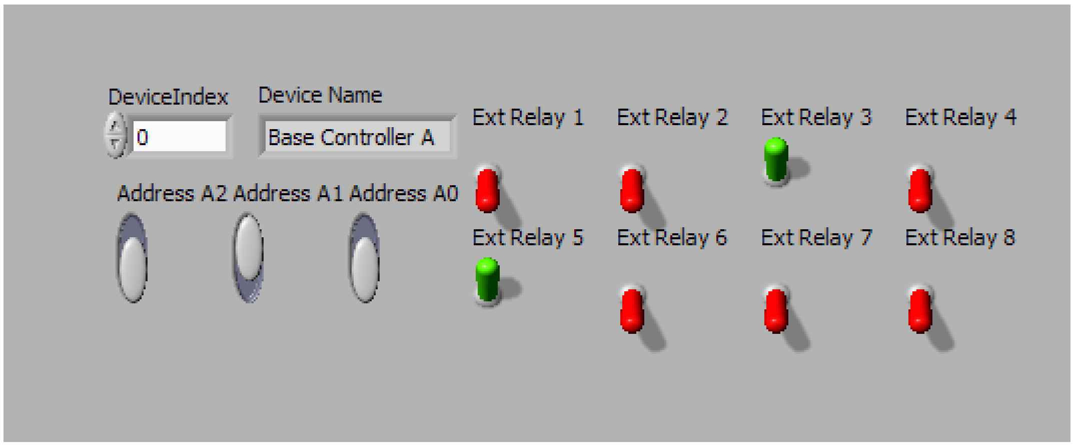

Figure 1: Screen view of LabView interacting with the I2C-USB-Relay8.

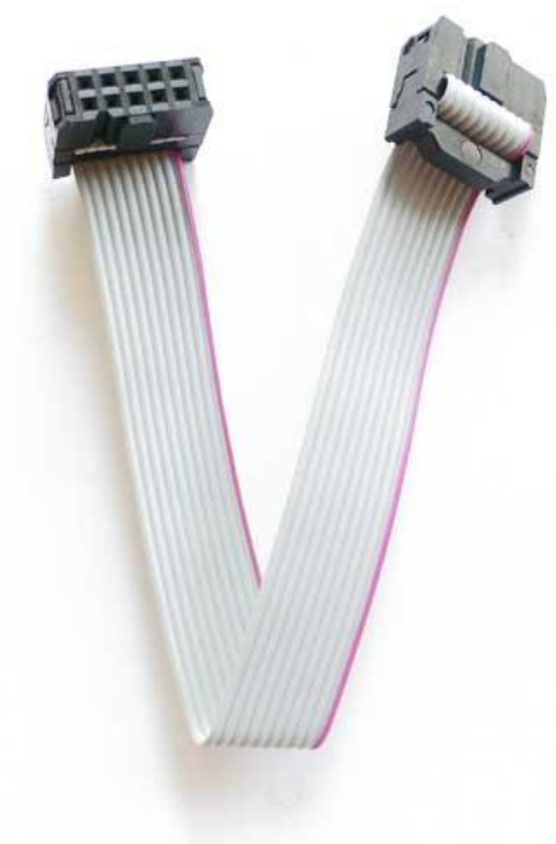

Figure 2: IDC Female-Female Ribbon Cable

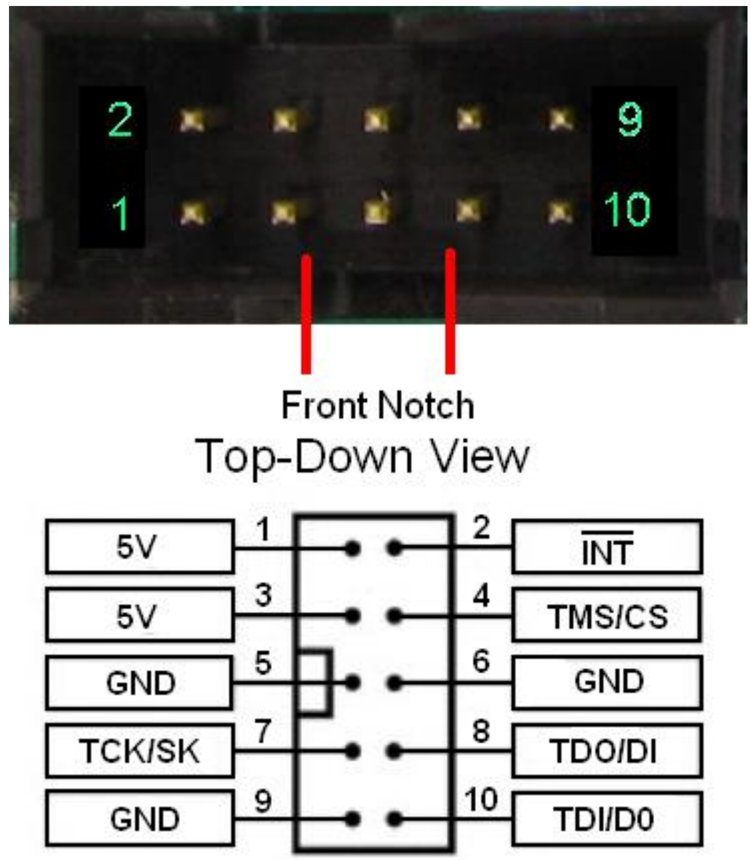

Figure 3: IDC Connector Pinout

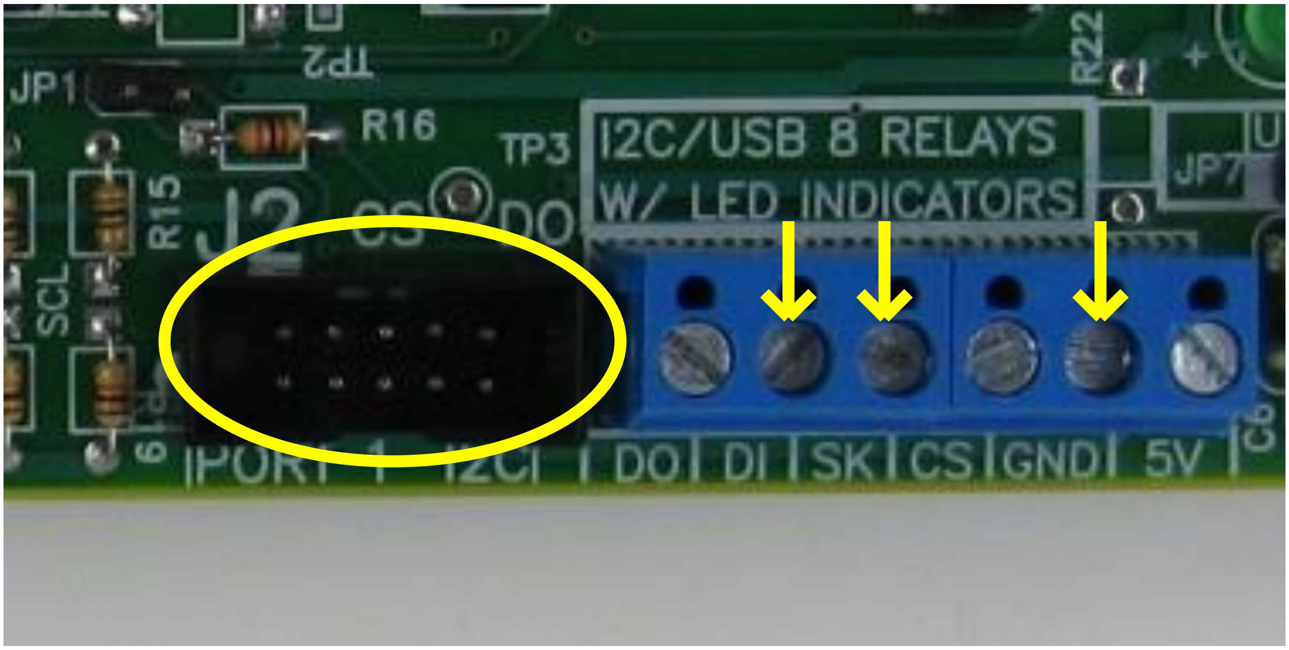

Figure 4: Ribbon connector port J2, and the alternative terminal block pins needed for I^2C communications.

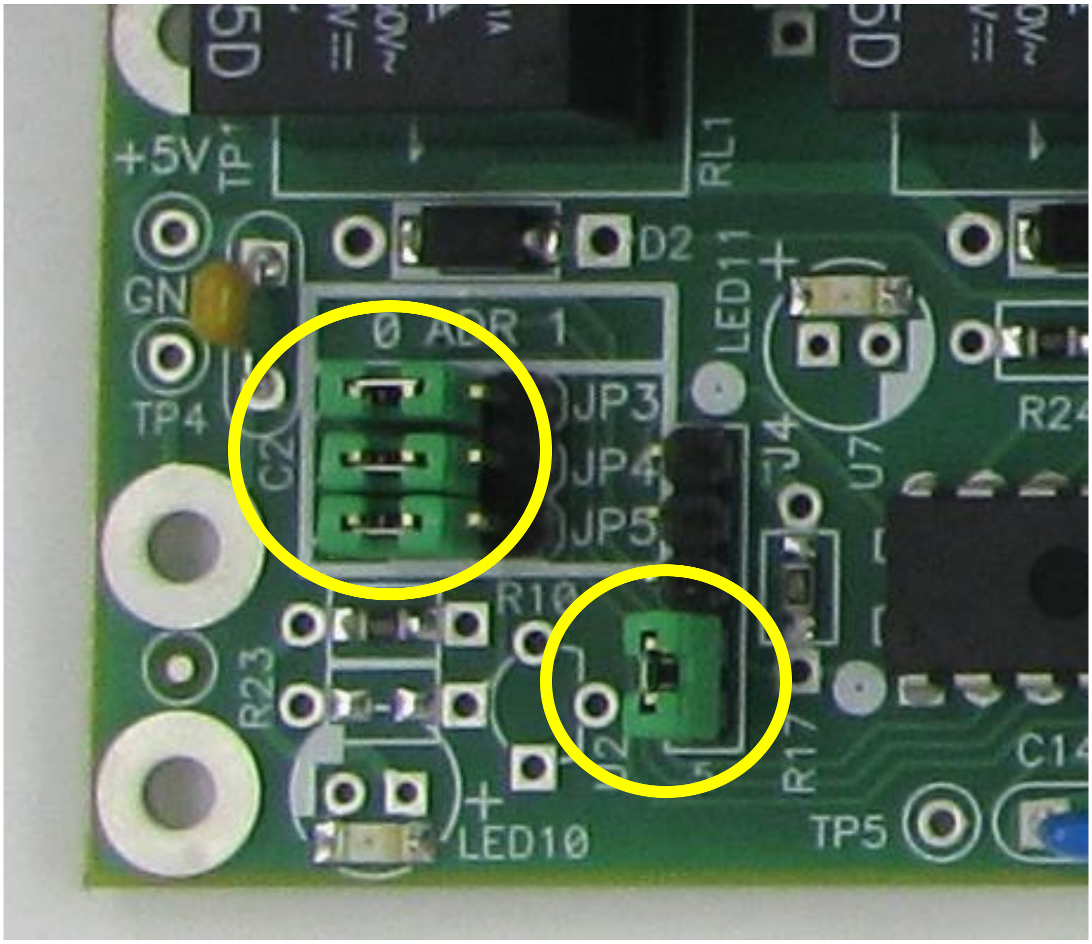

Figure 5: I²C Address Jumpers JP3-JP5 and J4.

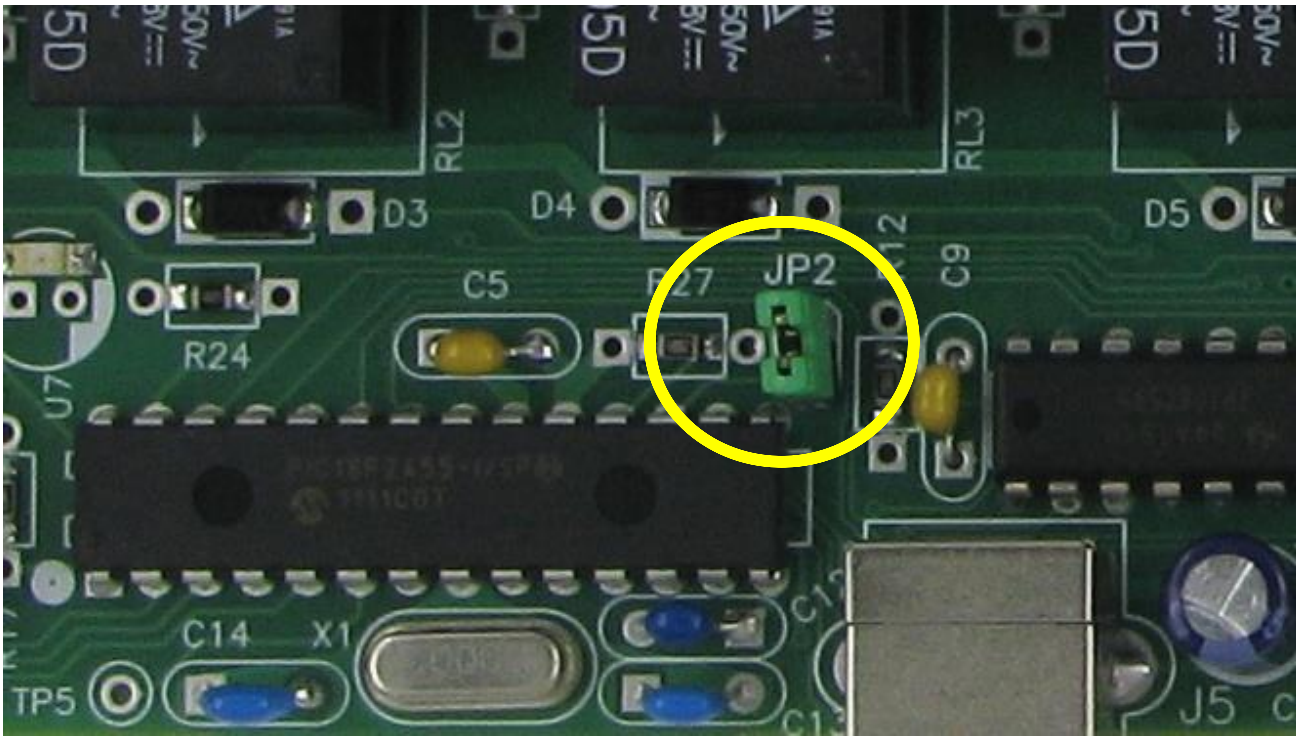

Figure 6: Communications failsafe jumper JP2.

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Technical Specifications

Number of Output Ports	8
Arrangement	8 Form C, SPDT
Contact Materials	Silver alloy
Maximum Switching	20 cycles per minute
Max. allowable Voltage	7.5VDC
Max allowable current	500mA
Operating humidity	10-80% RH non-condensing
Ambient Temperature	0 to 60 C (with no icing)
Unit Weight	About 120 grams (4.3oz)
Form Factor	64 mm W x 252 mm L (2.5" X 9.9")
Total Power Consumption	7.5VDC @ 500mA max.
Short-Circuit Protection	1.5A with resettable PTC fuse
Power Indicator	Green LED

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