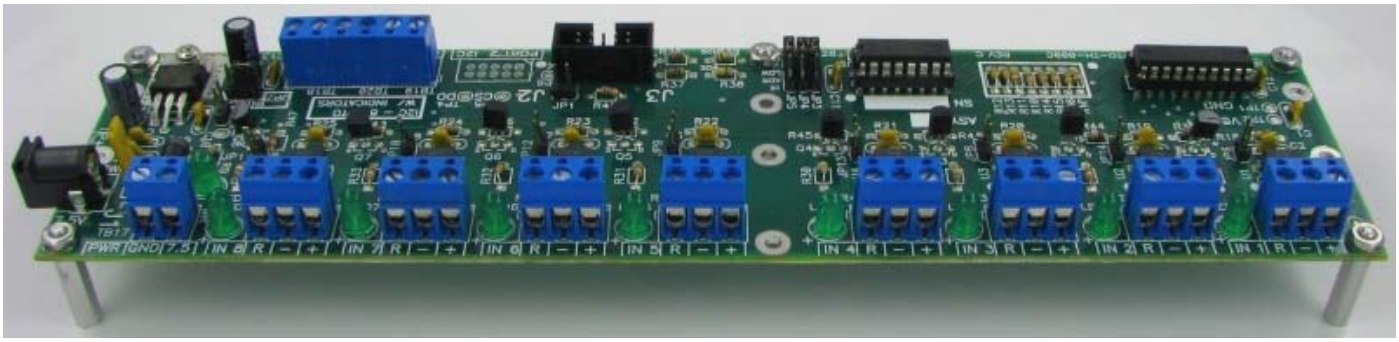
8-Channel Opto-isolated Input Board Via I²C Protocol

P/N KA-I2C-8-OPTO

I2C-Opto8



User Manual

8-Channel Opto-isolated Input Board Via I²C Protocol

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What Does it Do?

The I2C-Opto8 is designed to accept digital input from up to 8 independent sources. It uses Optocouplers (also known as Photocouplers or Optical Isolators) to accept this input while protecting against voltage surges.

Each input port on the I2C-Opto8 has an LED indicator light which activates when the port receives input. Additionally, the I2C-Opto8 can report the state of an input port to a PC or other external device via the on-board I²C communications port.

The I2C-Opto8 is modular and expandable; in addition to being stackable, it can be assigned 1 of up to 8 unique addresses and monitored via the on-board I²C communications port.

What Do I Need to Make it Work?

You will need:

- Controller module
  - USB-I2C-Relay10
  - USB-I2C-RS232-Micro
  - WEB-I2C-Remote
  - Your own custom I2C controller module
- Power Supply
  - 7.5VDC @ 100mA maximum
  - Can be brought in via on-board terminal block TB17

  - Can be brought in via standard 2.1mm X 5.1mm DIN connector J1
  - Can be brought in via I²C port
- 10-pin IDC connector, preferably in the form of a female-female ribbon cable
- 14-22 AWG wire, for connecting input ports to input sources, supplying power and I²C communications port

What Else Does it Work With?

The I2C-Opto8, 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-Opto8 module to the controller via the I²C 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-Opto8 modules.

The I2C-Opto8 module can also be used with:

- I2C-Relay8
- 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-Opto8 modules working side-by-side with I2C-Relay8 output modules on the same controller.

How to Use This Device

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-Opto8 to your controller, we strongly encourage you to refer to the setup directions in the documentation for your controller.

Powering Up the I2C-Opto8

Once your controller is properly powered up and configured, it's time to set up your I2C-Opto8. First you have to decide how you are going to power the module – through the external power, or through the I²C port.

It is recommended that if you are going to connect more than two modules to the controller, you should bring power in either through the terminal block TB17 or the DIN connector J1.

Once you have decided how to power your I2C-Opto8, there is a jumper, JP7 that needs to be configured, as illustrated in Figure 4. You need to make sure that it is in the correct position so that the appropriate power source is used, otherwise the unit will not function.

If the shunt is over the right-hand pin (marked “EXT”), power must either come from the DIN connector, J1, or the terminal block TB17. If the shunt is over the left-hand pin (marked “INT”), power must come from the I2C port

Connecting to the I²C Communications Port

Connecting to the I²C communications port on your I2C-Opto8 can be done in one of two ways:

IDC connectors J3 and 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.

One IDC connector is used as an input connector and one is used as an output connector, so that you can daisy-chain units together.

Terminal Blocks TB18-TB20

First, you will need to short the pins of JP1 together.

The specific pins you need for I²C communications are:

- TB19, “DI”
- TB20, “SK”

- TB18, “GND”
- TB19, “5V”

The location of JP1 and the above pins are shown in Figure 5. Once you find them, use 22-14AWG wire to their sister pins on the controller and then “daisy-chain” them (connecting one to the next to the next) to any other modules the controller should be talking to.

Setting the I²C Address

Each unit operating on the same I²C communications bus must have a unique address. Since the I²C address space consists of 3 bits, that means that up to 8 unique devices can share the same I²C communications bus.

On the I2C-Opto8, the I²C address is configured with three jumpers (1 for each bit of the address). Figure 6 shows you where to find these jumpers.

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

Using the I2C-Opto8

Once your I2C-Opto8 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 1 byte of information onto the I2C bus each time you wish to check the state of 1 or more channels – a byte for the address of the board you want to talk to.

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Address Byte

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

The I2C-Opto8 will then return a byte of information regarding the states of the 8 input channels.

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
IN 8	IN 7	IN 6	IN 5	IN 4	IN 3	IN 2	IN 1

So, writing “011100011” for the address byte and receiving “00001111” for the status byte means that the unit at address 1 is receiving input on channels 1-4 only.

Please refer to the PCF8574a datasheet for more detailed information.

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Illustrations

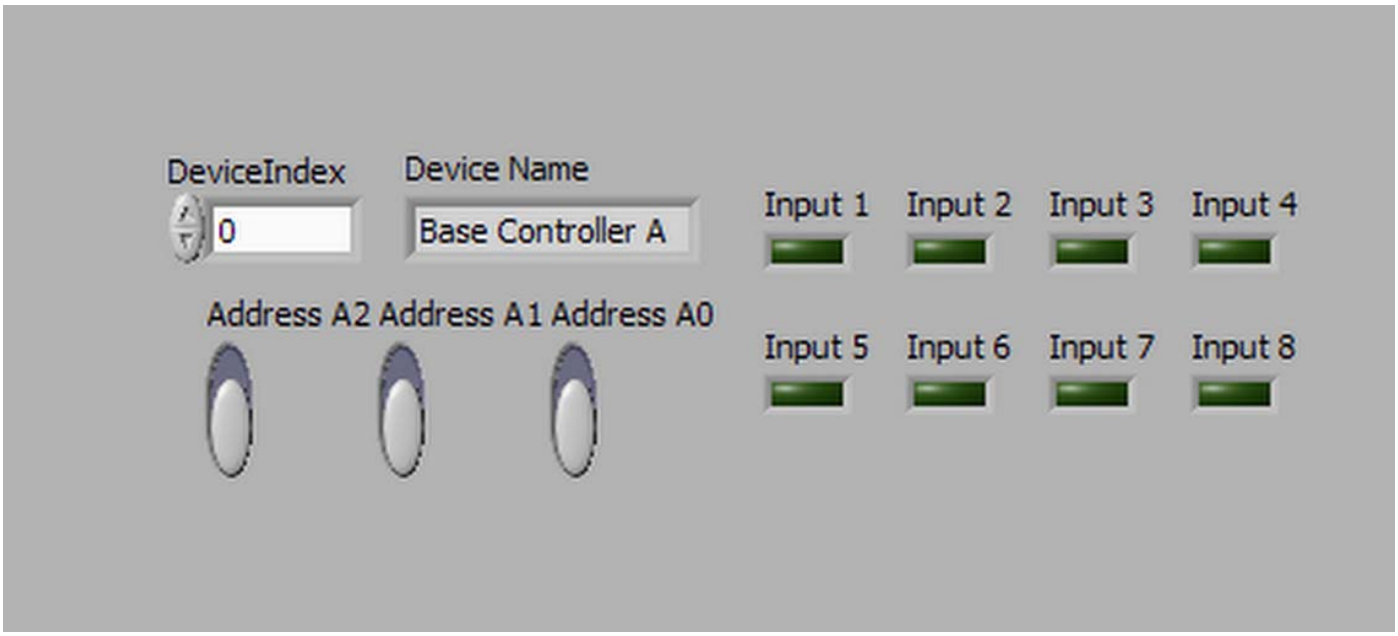

Figure 1: Screen view of LabView interacting with the I2C-Opto8.

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Figure 2: IDC Female-Female Ribbon Cable

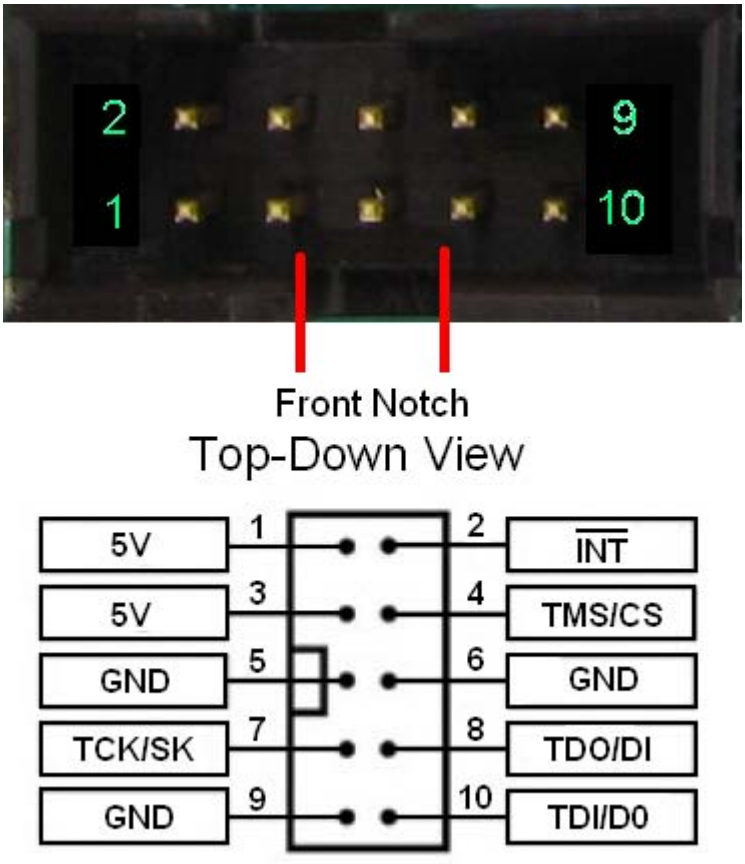

Figure 3: IDC Connector Pinout

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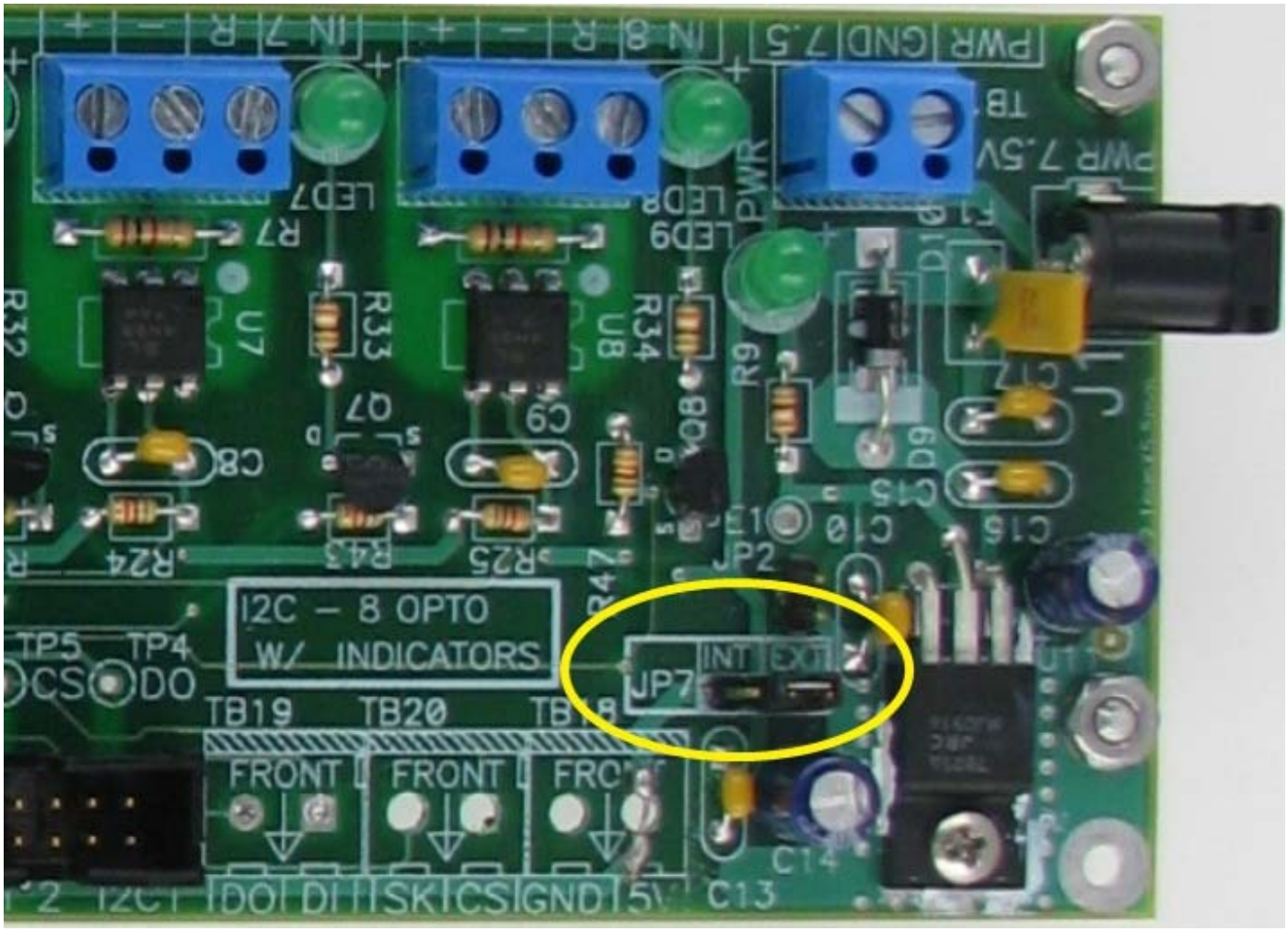

Figure 4: Power Jumper JP7. "INT" means power from the I2C port, "EXT" means power from the DIN connector J1 or terminal block TB17.

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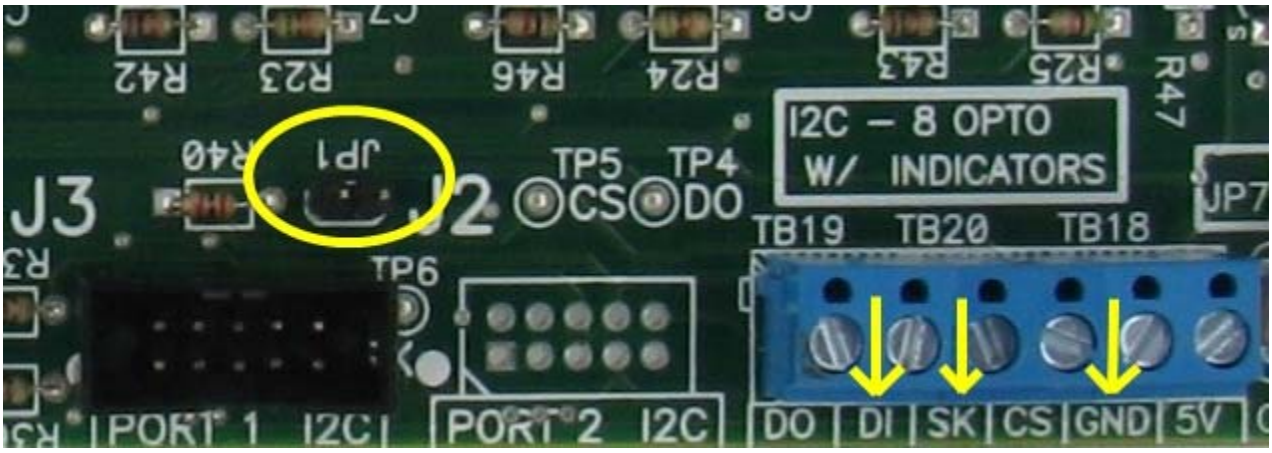

Figure 5: I2C Jumper JP1, and the terminal block pins needed for I2C communications.

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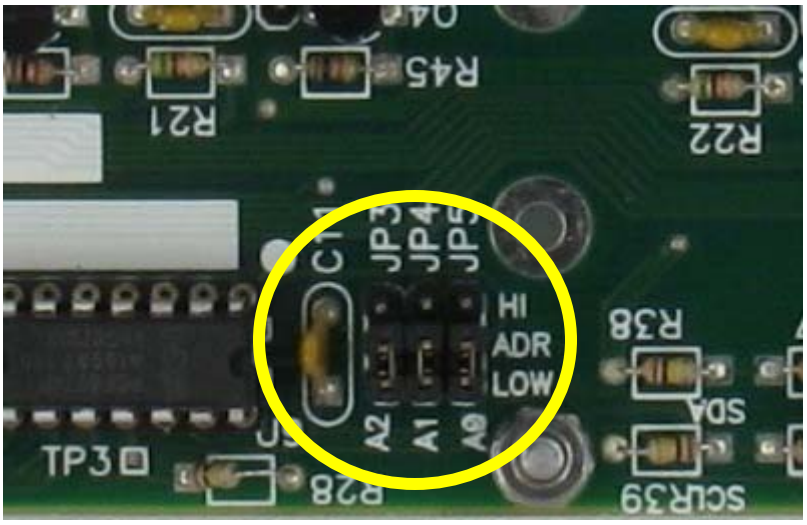

Figure 6: I2C Address Jumpers JP3-JP5.

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Technical Specifications

Number of Input Ports	8
Arrangement	Form A, SPST
Contact Materials	Optically isolated
Input Port Voltage	5VDC, 5mA minimum
Maximum Switching	100 Hz
Isolation	5300Vrms
Max. allowable Voltage	12VDC
Max allowable current	12mA
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 @ 100mA max.
Short-Circuit Protection	1.5A with resettable PTC fuse
Power Indicator	Green LED

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