

# IR104 Relay / Optoisolator PC/104 Board User Manual

Revised 4-00

## 1. I/O ADDRESS SELECTION

IR104 occupies 8 addresses in I/O memory, of which 6 are used. The address is selected with jumpers JP1 and JP2. The pins listed under each jumper block are the pins that must be shorted with a jumper for the In position. On each jumper block, pin 1 is on the left and pin 3 is on the right. Note that on JP1, pins 1 and 2 are used, but pin 3 is never used. On JP2, pins 2 and 3 are used, but pin 1 is never used.

Address		JP1	JP2
Hex	Decimal	pins 1 and 2	pins 2 and 3
240	576	Out	Out
260	608	Out	In
280	640	In	Out
300	768	In	In

## 2. I/O MAP

Base +	Write Function	Read Function
0	Relays 1-8	Read back value
1	Relays 9-16	Read back value
2	Relays 17-20	Read back value
3	--	--
4	--	Opto inputs 1-8
5	--	Opto inputs 9-16
6	--	Opto inputs 17-20
7	--	--

## 3. REGISTER BIT ASSIGNMENTS

Addr	Operation	D7	D6	D5	D4	D3	D2	D1	D0
0	Read/Write	RLY8	RLY7	RLY6	RLY5	RLY4	RLY3	RLY2	RLY1
1	Read/Write	RLY16	RLY15	RLY14	RLY13	RLY12	RLY11	RLY10	RLY9
2	Read/Write	0	0	0	0	RLY20	RLY19	RLY18	RLY17
3		X	X	X	X	X	X	X	X
4	Read only	IN8	IN7	IN6	IN5	IN4	IN3	IN2	IN1
5	Read only	IN16	IN15	IN14	IN13	IN12	IN11	IN10	IN9
6	Read only	0	0	0	0	IN20	IN19	IN18	IN17
7		X	X	X	X	X	X	X	X

### Definitions:

Rly1 – Rly20      Relay outputs; 1 = on, 0 = Off  
 In1 – In20      Optoisolator inputs; 1 = on, 0 = off  
 X                  Bit not used  
 0                  Bit reads back as a 0

## 4. I/O HEADER PINOUTS

### Optocoupler inputs

Optocouplers are accessed through a 2x20 pin header **CN3** at the top of the board. Pin 1 is on the left. There is no difference between the A and B connection, since the inputs are not polarity sensitive.

In 1 A	1	2	In 1 B
In 2 A	3	4	In 2 B
In 3 A	5	6	In 3 B
In 4 A	7	8	In 4 B
In 5 A	9	10	In 5 B
In 6 A	11	12	In 6 B
In 7 A	13	14	In 7 B
In 8 A	15	16	In 8 B
In 9 A	17	18	In 9 B
In 10 A	19	20	In 10 B
In 11 A	21	22	In 11 B
In 12 A	23	24	In 12 B
In 13 A	25	26	In 13 B
In 14 A	27	28	In 14 B
In 15 A	29	30	In 15 B
In 16 A	31	32	In 16 B
In 17 A	33	34	In 17 B
In 18 A	35	36	In 18 B
In 19 A	37	38	In 19 B
In 20 A	39	40	In 20 B

### Relay outputs

Relays are on 1x20 detachable screw terminal headers. **CN1** on the left side of the board handles relays 1 – 10, while **CN2** on the right side handles relays 11 – 20. The relay numbers are marked next to each relay so you can identify each relay and its associated screw terminals. Pin 1 on both screw terminals is on the bottom, i.e. each terminal pinout is reversed with respect to the other. The drawings below indicate the pinouts according to their actual board orientation. There is no difference between the A and B connection, since the relays are not polarity sensitive. All connections are NO, normally open.

	<b>CN1</b>	<b>CN2</b>	
Relay 10 B	20	20	Relay 20 B
Relay 10 A	19	19	Relay 20 A
Relay 9 B	18	18	Relay 19 B
Relay 9 A	17	17	Relay 19 A
Relay 8 B	16	16	Relay 18 B
Relay 8 A	15	15	Relay 18 A
Relay 7 B	14	14	Relay 17 B
Relay 7 A	13	13	Relay 17 A
Relay 6 B	12	12	Relay 16 B
Relay 6 A	11	11	Relay 16 A
Relay 5 B	10	10	Relay 15 B
Relay 5 A	9	9	Relay 15 A
Relay 4 B	8	8	Relay 14 B
Relay 4 A	7	7	Relay 14 A
Relay 3 B	6	6	Relay 13 B
Relay 3 A	5	5	Relay 13 A
Relay 2 B	4	4	Relay 12 B
Relay 2 A	3	3	Relay 12 A
Relay 1 B	2	2	Relay 11 B
Relay 1 A	1	1	Relay 11 A

## 5. PROGRAMMING EXAMPLES

### Example 1: Turn on a relay

Current state of relays 1 – 8 is relays 1-4 on, relays 5-8 off.  
Turn relay 8 on:

Current data value at Base + 0 is 00001111 = 15

To turn on relay 8, we need to set bit 7 to 1.

Relay 8 = bit 7 = 10000000 = 128

New data value = 128 OR 15 = 143 (10001111)

Write 143 to Base + 0 to turn on relay 8 and keep relays 1-4 on, 5-7 off.

### Example 2: Turn off a relay

Current state of relays 1 – 8 is relays 1-4 and 8 on, relays 5-7 off.  
Turn relay 3 off:

Current data value at Base + 0 is 10001111 = 143

To turn off relay 3, we need to clear bit 2.

Relay 3 = bit 2 = 00000100 = 4

New data value = 143 AND NOT(4) = 139 (10001011)

Write 139 to Base + 0 to turn off relay 3 and keep relays 1, 2, 4, and 8 on, 5, 6, and 7 off.