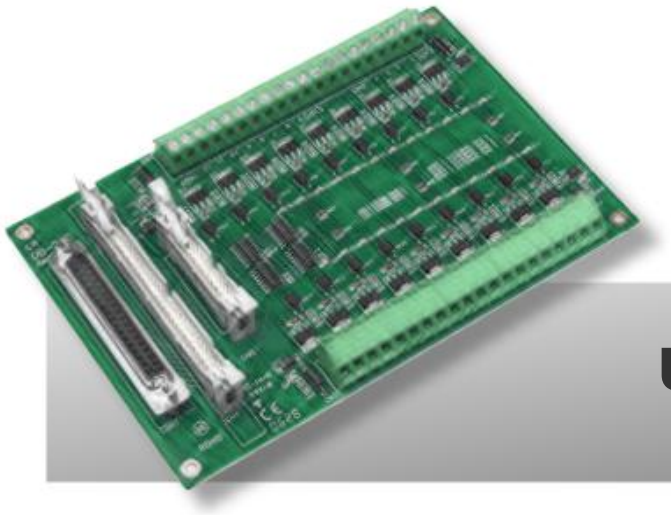


Digital I/O Daughter Board

User Manual

Version 3.2
Nov. 2012

Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

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1. DIO Daughter Board

We provide all kind magnetic relay, SSR, open-collector, PhotoMos relay and isolated digital input, daughter boards for I/O control applications.

1.1 How to Select Daughter Board

You must make sure which digital I/O board you choose and what kind applications you designed. Then select suitable daughter board.

- **Selection criteria for output type daughter board**
  1. Type of contact load
     AC or DC? ; Resistive or inductive or capacitate or lamp? ; Occurrence of back electromotive force or inrush current?
  2. Level of contact load.
     Power load or small signal?
  3. Coil rated voltage
     12 V_{DC} or 24 V_{DC}?
  4. Frequency in switching operation
  5. Demand for life in switching operation
  6. Connector type of digital I/O board
     20-pin or 50-pin Flat cable or D-sub cable?
  7. Mounting
     Panel mounting or DIN-rail mounting

- **Selection criteria for input type daughter board**
  1. Type of input signal
     AC or DC? Dry contact or wet contact?
  2. Level of input signal
  3. Connector type of digital I/O board
     20-pin or 50-pin Flat connector or D-sub connector?
  4. Mounting
     Panel mounting or DIN-rail mounting

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1.2 Selection Table

1.2.1 Output Type Daughter Board

Spec.	DB-16R	DB-24R	DB-24RD
Type	Magnetic Relay	Magnetic Relay	Magnetic Relay
Contact Arrangement (Each channel)	1 C (1 Form C)	1 C (1 Form C)	1 C (1Form C)
Channel number	16	24	24
Contact rating	0.5 A/120 V_{AC} 1 A/30 V_{DC}	0.5 A/120 V_{AC} 1 A/30 V_{DC}	0.5 A/120 V_{AC} 1 A/30 V_{DC}
Expected Life (Rated Load)	200,000 t	200,000 t	200,000 t
Coil rate voltage	12 V (*1)	12 V: DB-24R/12 24 V: DB-24R/24	12 V: DB-24RD/12 24 V: DB-24RD/24
Connector	20-pin header	50-pin header	50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	No	DB-24R/12/DIN DB-24R/24/DIN	DB-24RD/12/DIN DB-24RD/24/DIN
Page	9	25	25

Spec.	DB-24PR	DB-24PRD	DB-24C
Type	Magnetic Relay	Magnetic Relay	Open-collector
Contact Arrangement (Each channel)	1 C (1 Form C) x 8 1 A (1 Form A) x 16	1 C (1 Form C) x 8 1 A (1 Form A) x 16	NPN
Channel number	24	24	24
Contact rating	5 A/250 V_{AC} 5 A/30 V_{DC}	5 A/250 V_{AC} 5 A/30 V_{DC}	(100 mA/30 V_{DC})x16 (600 mA/30 V_{DC})x8
Expected Life (Rated Load)	200,000 t	200,000 t	Very Long life Maintenance free
Coil rate voltage	12 V: DB-24PR/12 24 V: DB-24PR/24	12 V: DB-24PRD/12 24 V: DB-24PRD/24	External Power Supply: 30 V_{DC} max.
Connector	20-pin header 50-pin header	50-pin header & 37-pin D-sub connector	20-pin header & 50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	DB-24PR/12/DIN DB-24PR/24/DIN	DB-24PRD/12/DIN DB-24PRD/24/DIN	DB-24C/DIN DB-24C/D/DIN
Page	31	31	36

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Spec.	DB-24OD	DB-24SSR(DC)	DB-24POR
Type	Open-darin	Solid-state Relay	PhotoMos Relay
Contact Arrangement (Each channel)	N-MOS	1 A (1 Form A)	1 A (1 Form A)
Channel number	24	24	24
Contact rating	250 mA	4 A / 50-250 V_{AC}	
Expected Life (Rated Load)	Very Long life Maintenance free	200,000 t	200,000 t
Coil rate voltage	External Power Supply: 30 V_{DC} max.	12 V: DB-24PRD/12 24 V: DB-24PRD/24	12 V: DB-24PRD/12 24 V: DB-24PRD/24
Connector	20-pin header & 50-pin header & 37-pin D-sub connector	20-pin header 50-pin header	50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	DB-24C/DIN DB-24C/D/DIN	DB-24SSR/DIN DB-24SSR/D/DIN DB-24SSR/D/P/DIN	DB-24POR/DIN DB-24POR/D/DIN
Page	41	50	45

Spec.	DB-16P8R (*)
Type	Magnetic Relay
Contact Arrangement (Each channel)	1 C (1 Form C)
Channel number	8
Contact rating	3 A/250 V_{AC} 3 A/30 V_{DC}
Expected Life (Rated Load)	30,000 t
Coil rate voltage	24 V only
Connector	20-pin header & 50-pin header & 37-pin D-sub connector
DIN-Rail Mounting	DB-16P8R/DIN DB-16P8R/D/DIN
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(*) DB-16P8R:16 isolated digital input channel and 8 relay output channel daughter board

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1.2.2 Input Type Daughter Board

Spec.	DB-16P	DB-24P	DB-24PD
Type	Optically Isolated	Optically Isolated	Optically Isolated
Channels	16	24	24
Input Range	5~24 V_{DC}/V_{AC}	5~24 V_{DC}/V_{AC}	5~24 V_{DC}/V_{AC}
Input Impedance	1.2 kΩ	1.2 kΩ	1.2 kΩ
connector	20-pin header	50-pin header	50-pin header 37-pin D-sub connector
DIN-Rail Mounting	No	DB-24P/DIN	DB-24PD/DIN
Page	13	56	56

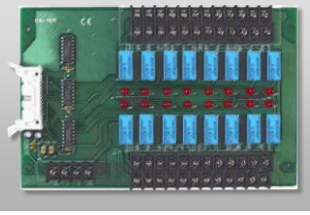
Spec.	DB-16P8R (*)
Type	Optically isolated or dry contact
Channels	16
Input Range	5~30 V_{DC} or Dry contact
Input Impedance	1.2 kΩ
connector	50-pin header, 37-Pin D-sub connector
DIN-Rail Mounting	DB-16P8R/DIN or DB-16P8R/D/DIN
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(*) DB-16P8R:16 isolated digital input channel and 8 relay output channel daughter board

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DB-16R

16-channel Relay Output Board



2. Functional Description

The DB-16R, 16-channel Relay Output Board, consists of 16 form c relays for efficient switch of load by programmed control. It is connector and functionally compatible with 785 series board but with industrial type terminal block. The DB-16R can be connected to DIO-64, A-626, A82x DAS board and PCI-series multi-function board or any other compatible DAS board. The relay are energized by apply 5 volt signal to the appropriate relay channel on the 20-pin flat cable connector. 16 enunciator LEDs, one for each relay, light when their associated relay is activated. To avoid overloading your PC's power supply, this board provides a screw terminal for external power supply.

2.1 Features

- 16-channel relay output board
- 16 Form C Relays
- Accept 20-pin connector to control 16 Form C relays, for use with A-82x, A-62x, DIO-64, PCI-1800, PCI-1200 and PCI-1002 series digital output port or any compatible digital output port.
- LED status indicator
- Screw terminals for field wiring

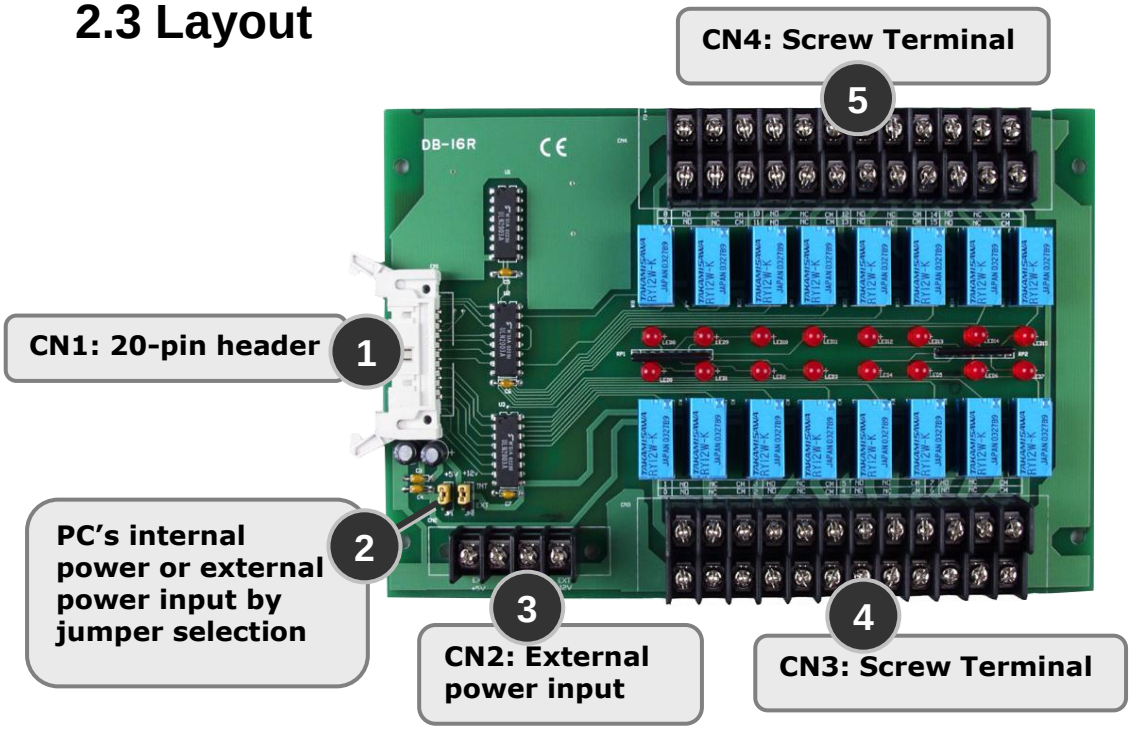
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2.2 Specification

Relay Output		
Channels		16
Type		Form C
Nominal Load		0.5 A/120 V_{AC} 1 A /24 V_{DC}
Max. Switching Power		60 VA, 24 W
Max. Switching Voltage		120 V_{AC}, 60 V_{DC}
Max. Switching Current		1 A
Life Expectancy		Electrical (20 Millions Times)
Time Value	Operate	6 ms
	Release	3 ms
Control Logic		Input TTL high (+5 V), Relay ON
General		
Dimensions (L x W)		205 mm x 114 mm
Environment		
Operating Temperature		0 ~ +60°C
Storage Temperature		-20 ~ +70°C
Humidity		5% ~ 90% RH, non condensing
Power Requirements		
Power Consumption		2 V /0.53 A 5 V /0.2 A

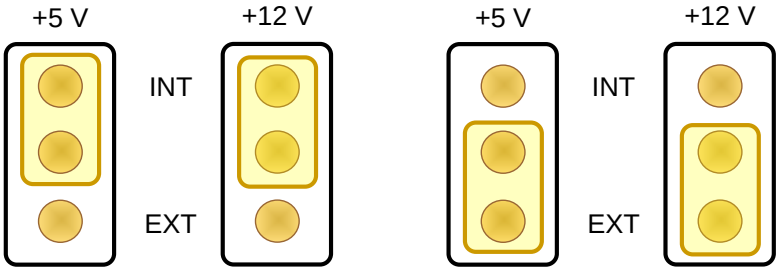
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2.3 Layout



2.4 Jumper Setting

DB-16R PC's internal power or external power input by jumper selection.



Select **Internal Power** (Default Setting)

Select **External Power**

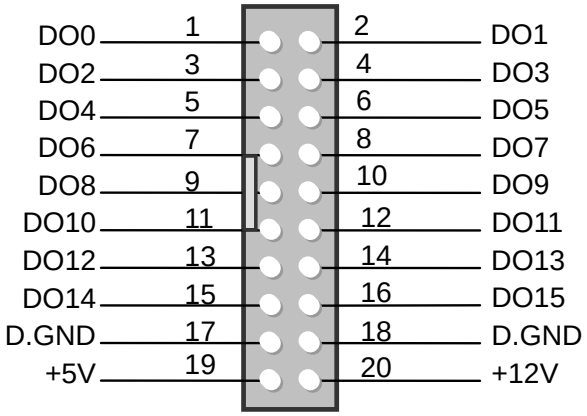
Note:
INT: Internal Power Source; EXT: External Power Source.

Don't install too much DB-16R in one PC if the jumper is set in the internal power. Some PC's power supply is small and used to power PC only. The power supply will be damaged, if install too much DB-16R and using internal power. You should calculate the power consumption of DB-16R and to make sure which setting is better.

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2.5 Pin Assignment

- **CN1: 20-pin header linked to TTL digital I/O board via 20-pin flat cable.**



- **CN2: External power input connector for external power input wiring.**

+5 V	GND	GND	+12 V

Note: Don't wiring to external power input connector if the power selection jumper setting in < INT > position.

- **CN3: Relay contact screw terminal blocks.**

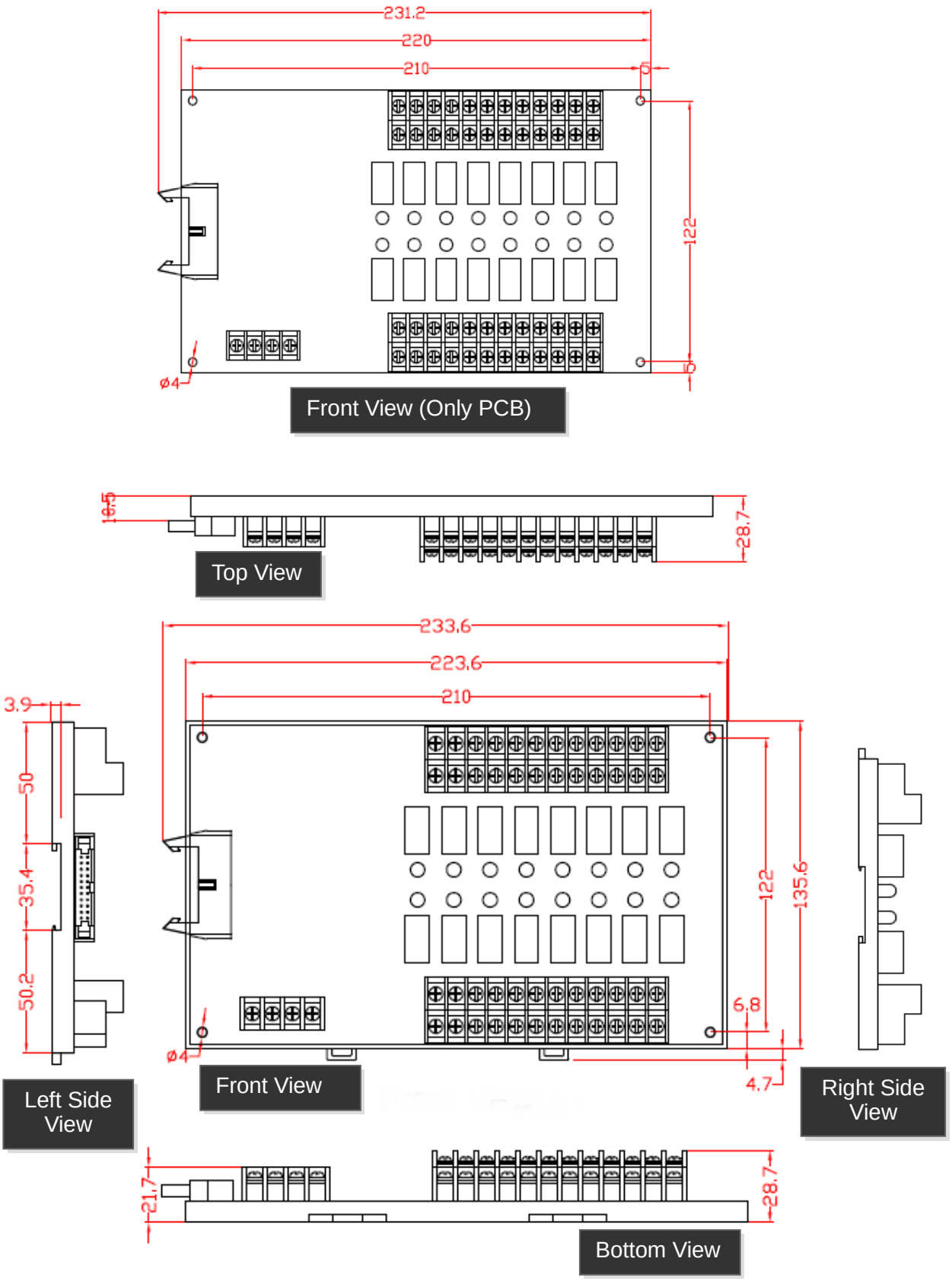
8	NO	NC	CM	10	NO	NC	CM	12	NO	NC	CM	14	NO	NC	CM
9	NO	NC	CM	11	NO	NC	CM	13	NO	NC	CM	15	NO	NC	CM

- **CN4: Relay contact screw terminal blocks.**

1	NO	NC	CM	3	NO	NC	CM	5	NO	NC	CM	7	NO	NC	CM
0	NO	NC	CM	2	NO	NC	CM	4	NO	NC	CM	6	NO	NC	CM

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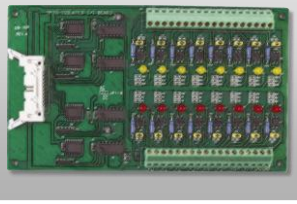
2.6 Dimensions (Unit: mm)



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DB-16P

16-channel Opto-Isolated Digital Input Board



3. Functional Description

The DB-16P is a 16 channel isolated digital input daughter board for A-82x DAS board or any 812PG, 711 series DAS boards. The optically isolated inputs of the DB-16P consist of a bi-directional LED with a resistor for current sensing. You can use the DB-16P to sense DC signal from TTL levels up to 24 V. You can also use DB-16P to sense a wide range of AC signals. The DB-16P registers a constant logic high if the frequency of the input AC signal is greater or equal to 1 kHz, and the voltage of the AC signal is at least 4 V_{rms}. If you are using AC input signal, you should short the AC filter Jumper. You can use the board to isolate the computer from large common-mode voltages, ground loops, and voltage spikes that often occur in industrial environments.

3.1 Features

- 16-channel optically isolated digital input
- Connected to DIO-64, A-62x and A-82x data acquisition boards
- AC/DC signal input
- AC signal input with filter
- Input buffer with voltage comparators
- 3,000 V isolation
- Each channel has it’s LED indicator

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3.2 Specification

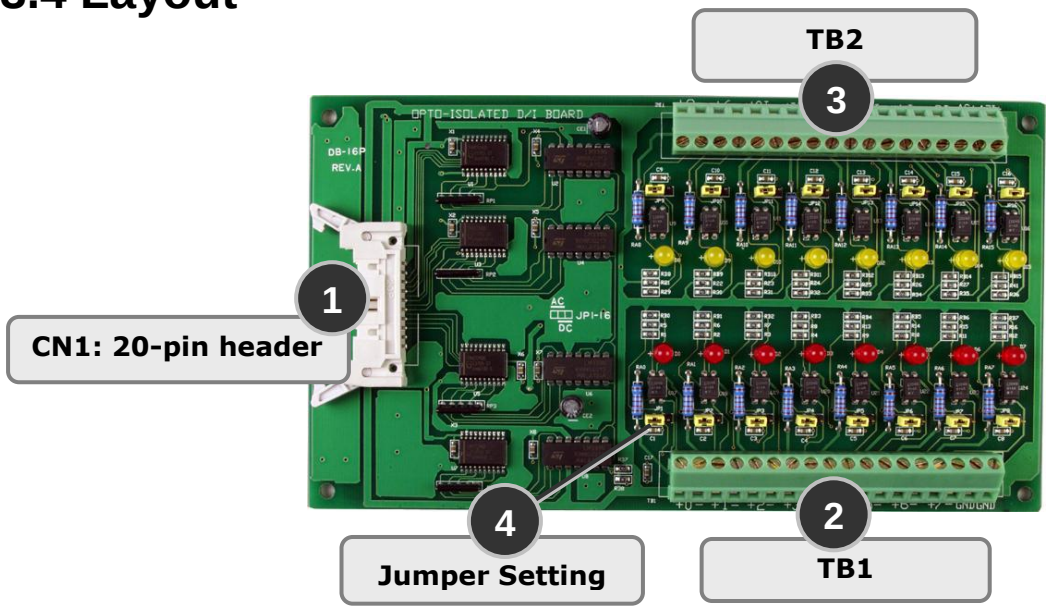
Digital Input		
Channels		16 (optically isolated)
Compatibility		TTL compatible
Input Voltage (Max.)		24 V_{DC} or 24 V_{AC}
Input impedance		1.2 kΩ
Input Current	5 V input	4 mA /channel
	24 V input	20 mA /channel
Input Response Time		20 μs without filter 2.2 ms with filter
Digital Logic Level		
Input Low Voltage (DC or peak AC)	Min.	0
	Max.	+/-1 V
Input High Voltage DC 1 kHz AC	Min.	+/- 3.8 V_{DC} 4 V_{rms}
	Max.	+/-24 V_{DC} 24 V_{AC}
General		
Dimensions (L x W)		205 mm x 114 mm
Environment		
Operating Temperature		0 ~ +50°C
Storage Temperature		0 ~ +60°C
Humidity		5% ~ 90% RH, non condensing
Power Requirements		
Power Consumption		224 mA/ +5 V (Max.) from PC

3.3 Applications

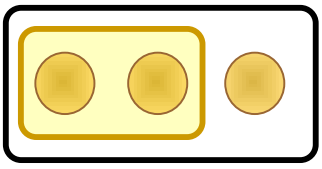
- Isolated digital input sensing
- Process monitoring

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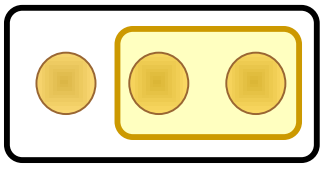
3.4 Layout



3.5 Jumper Setting



For AC signal with filter



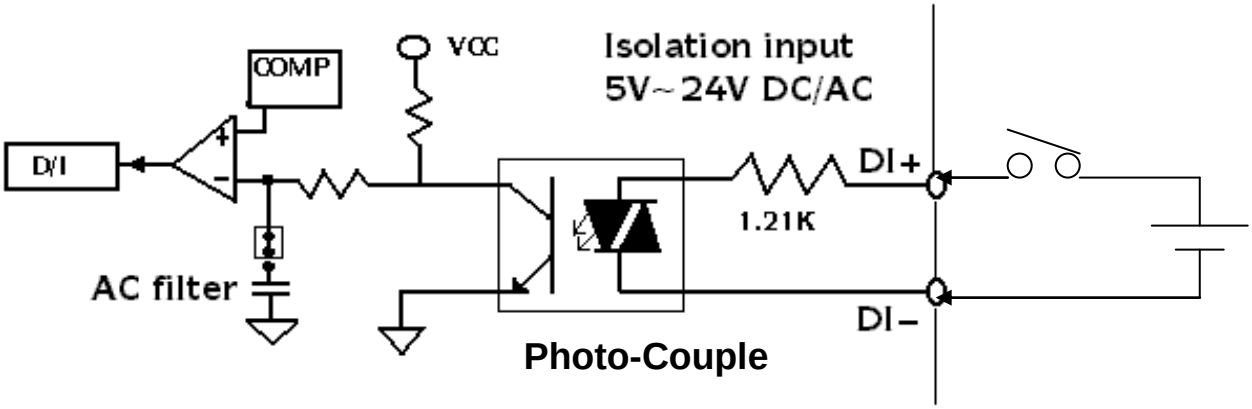
For DC signal without filter

If you are using AC signal, you must short the AC FILTER jumper.
If you are using DC input signals, the AC FILTER is optional. If the response time of input signals less than 20 μs, set the filter off. If you want a slow response (about 5 ~ 10 ms) for rejecting noise or contact bouncing, short the AC FILTER jumper.

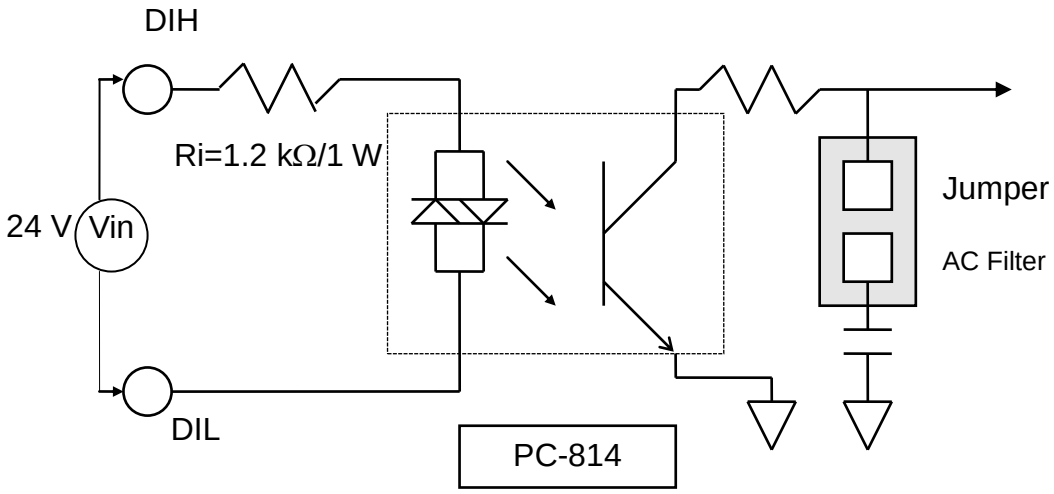
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3.6 Isolated Input

The normal input voltage range is 5 ~ 24 V_{AC} or V_{DC}.



The normal input range can be changed by choosing suitable resistor to limit the current through the Photo-isolator to about 10 mA(**I**f). The default resistor is 1.2 kΩ/1 W.



Ri = Vin/**I**f

Pw = **V**in x **I**f

Calculation Example:

If **V**in =120 V then **R**i=120(V) /0.01(A)=12 kΩ

Pw=120(V) x 0.01(A) =1.2 W

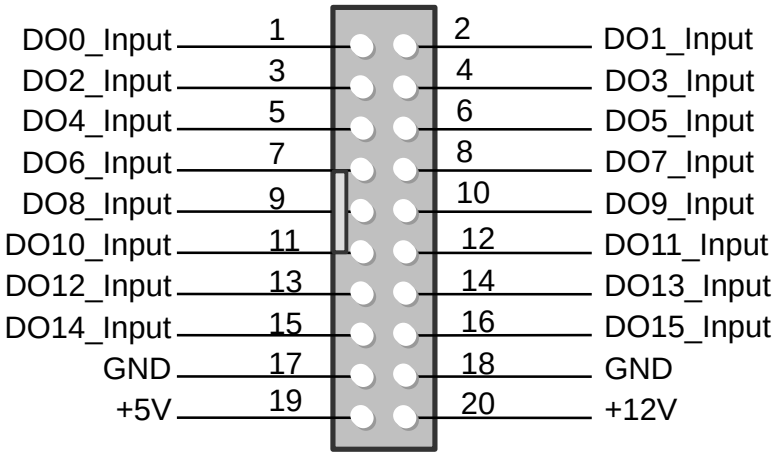
The **R**i must be replaced by 12 kΩ/2 W(1.2 W)

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3.7 Pin Assignment

■ **CN1 pin assignment.**

(20-pin header linked to TTL digital I/O board via 20-pin flat cable)



■ **TB1 pin assignment.**

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Label	0H	0L	1H	1L	2H	2L	3H	3L	4H	4L	5H	5L	6H	6L	7H	7L	F.G.	F.G.

■ **TB2 pin assignment.**

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Label	8H	8L	9H	9L	10H	10L	11H	11L	12H	12L	13H	13L	14H	14L	15H	15L	+5V	+12V

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DB-16P8R

16-channel Input Terminal and 8-channel Relay Output



4. Functional Description

The DB-16P8R is a 16-channel isolated/non-isolated input & 8-channel relay output board. The isolated digital input can be used to sense 3.5 V_{DC} ~ 24 V_{DC} signal. The non-isolated digital inputs are used to sense dry contact. The relay output consists of 16 form C power relays. The user can use this board to isolate the computer from large common-mode voltage, ground loops and transient voltage spike that often occur in industrial environments.

4.1 Features

- 16-channels optically isolated digital input
- 8-channels relay output
- Connects directly to DIO-24, DIO-48, DIO-144, PIO-D144, PIO-D96 and PIO-D48 OPTO-22 compatible digital input card or any 722, 724 OPTO-22 compatible digital input board.
- Isolation digital input
- Dry contact or wet contact by jumper select input range: High 5~24 V_{DC}/ Low 0~1.8 V_{DC}
- Input resistor: 1.2 KOhm/1 W input buffer with voltage comparators
- Relay output 8-channel relay output max. Load 30 V_{DC}/220 V_{AC} @ 5 A

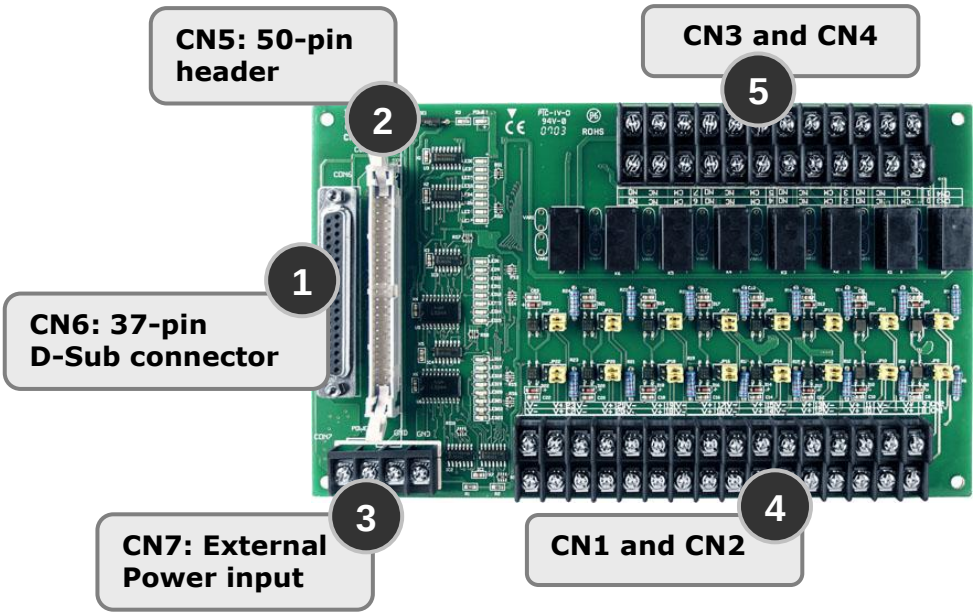
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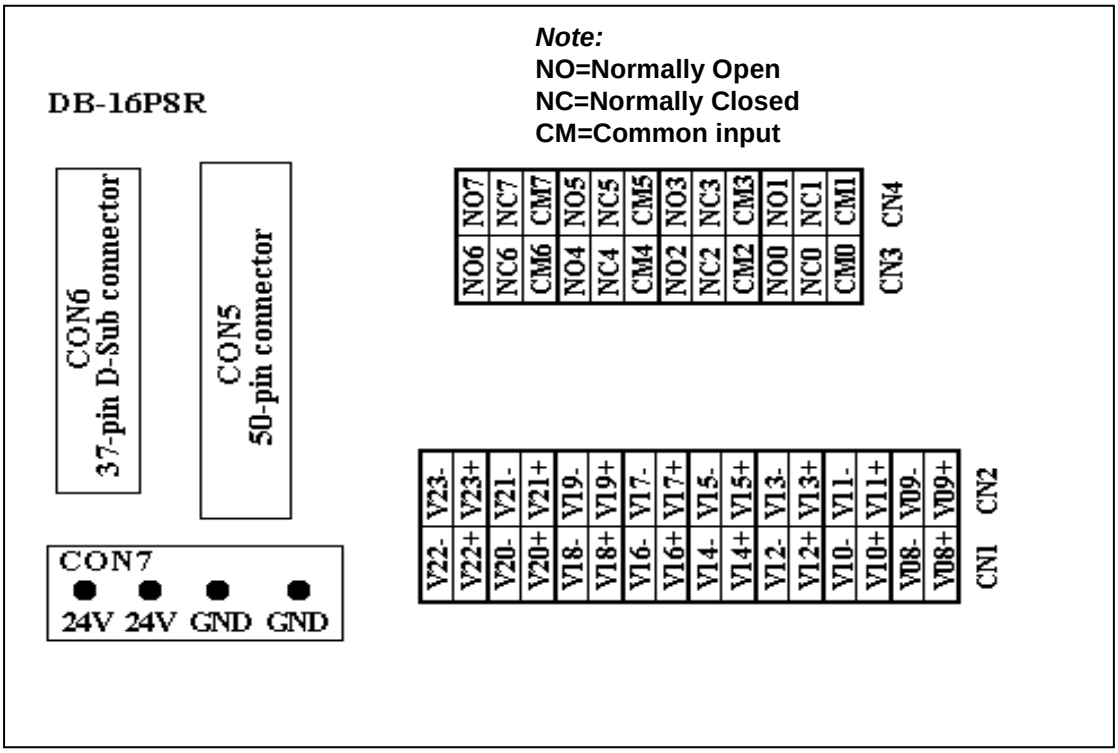
4.2 Specification

Digital Input		
Channels		16
Isolated voltage		3750 V
Input voltage		3.5 V ~ 24 V
Dry Contact Input	Logic high	Input close
	Logic low	Input open
Relay Output		
Channels		8
Contact Arrangement		SPDT (1 Form C)
Nominal Load		250 V_{AC}/5 A
Max. Switching Power		1,250 VA(NO), 750 VA(NC)
Max. Switching Voltage		250 V_{AC}, 150 V_{DC}
Max. Switching Current		5 A
Time Value	Operate	10 ms
	Release	5 ms
Mechanical Life		10 millions operations
General		
Dimensions		213 mm x 132 mm
Environment		
Operating Temperature		0 ~ +60°C
Storage Temperature		-20 ~ +70°C
Humidity		5% ~ 95% RH, non condensing
Power Requirements		
Power Consumption		0.3 A @ 24 V 0.1 A @ 5 V
Power Reply		
Power Consumption	Min.	2.5 μA (All relays off)
	Max.	0.5 A (All relays on)
	Relay On	22 mA (for single relay)

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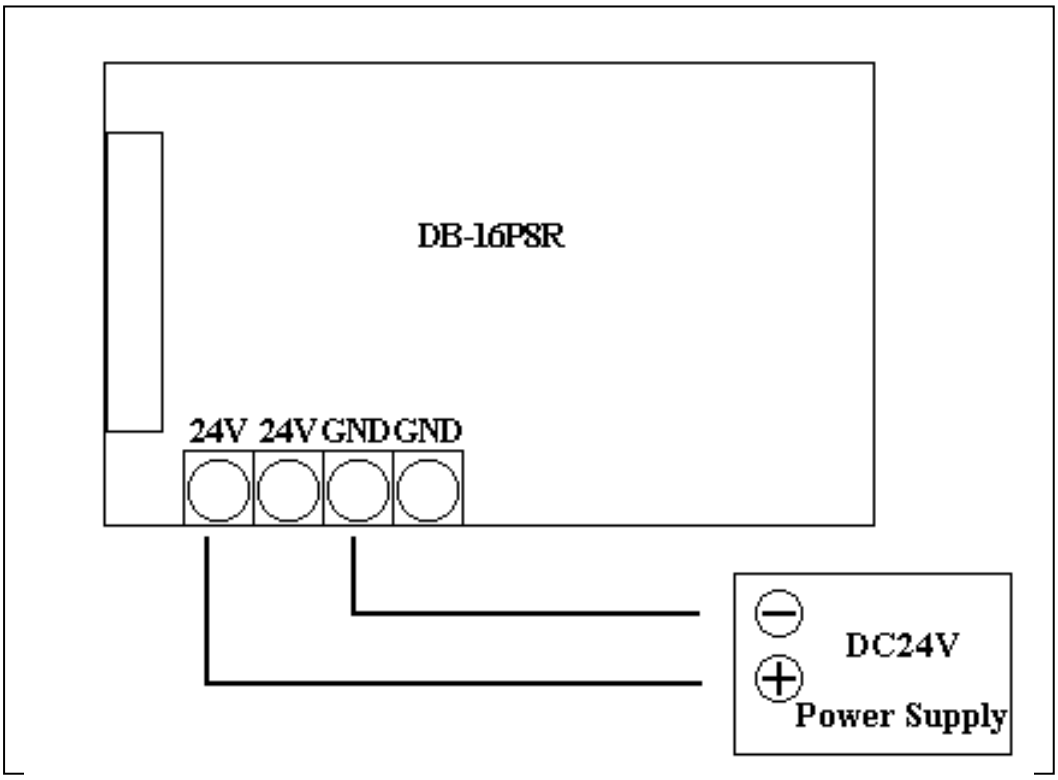
4.3 Layout



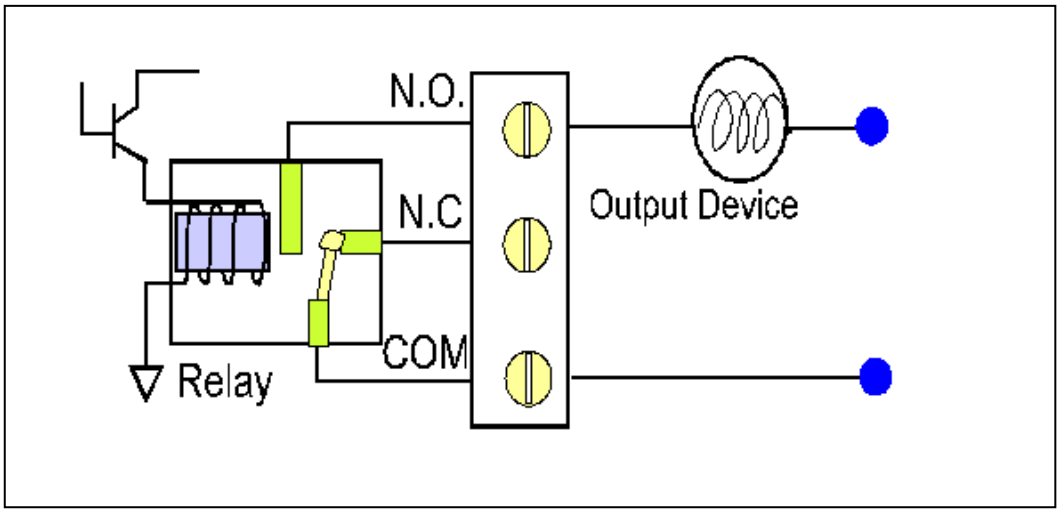


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4.4 External Power and Relay Output



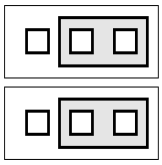
Relay Output



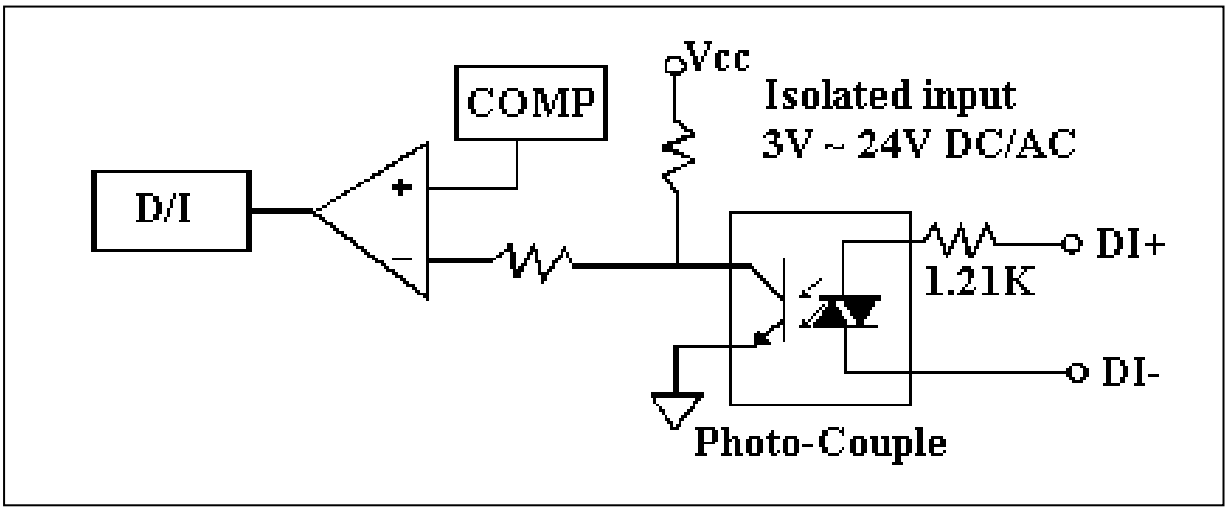
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4.5 Digital Input Configuration

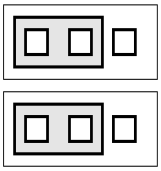
JP8 to JP23 (DI8 to DI23)



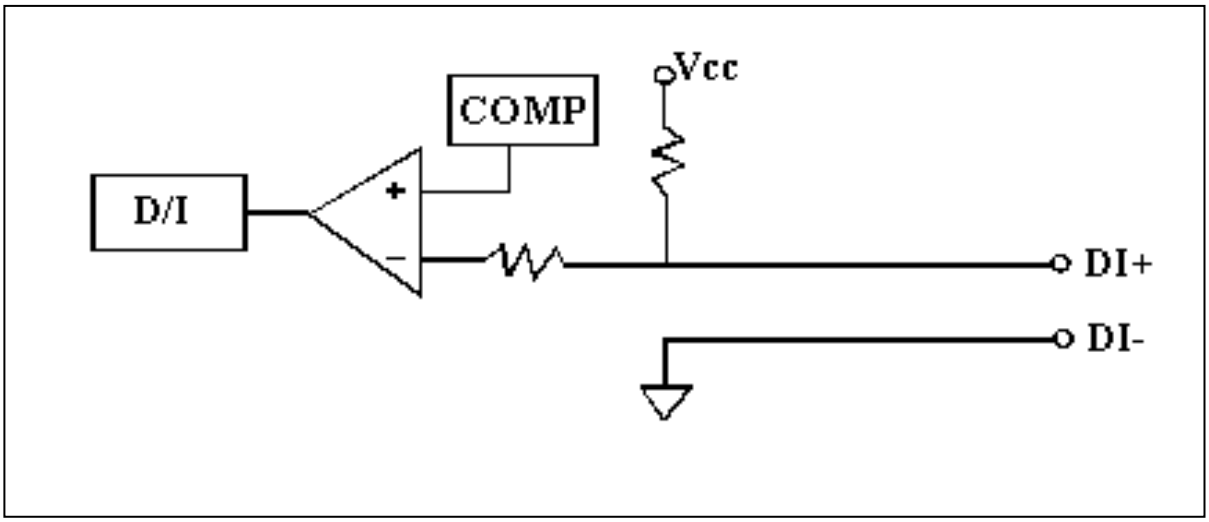
Select Isolated D/I



JP8 to JP23 (DI8 to DI23)



Select Non-Isolated D/I



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4.6 LEDs and Jumper Mapping

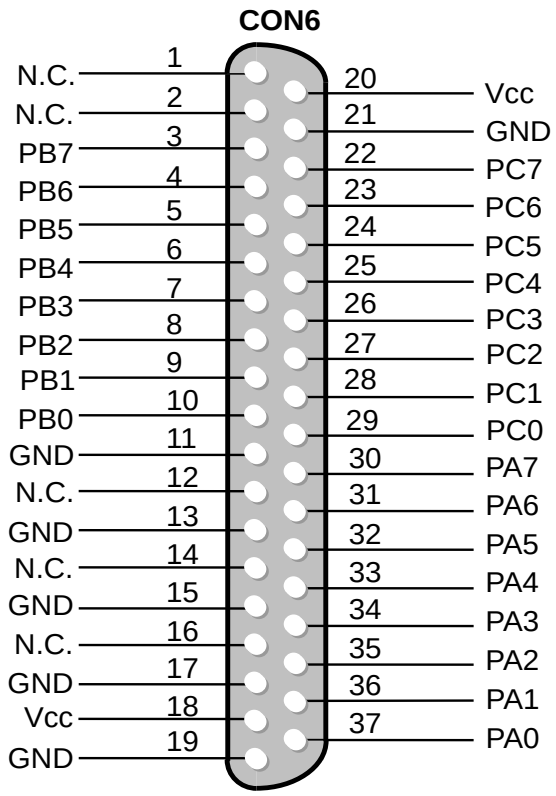
OPTO-22	LEDs	Relays / DIs		CON5(50-pin)	CON6(37-pin)
PA0	LED0	Relay-0		Pin-47	Pin-37
PA1	LED1	Relay-1		Pin-45	Pin-36
PA2	LED2	Relay-2		Pin-43	Pin-35
PA3	LED3	Relay-3		Pin-41	Pin-34
PA4	LED4	Relay-4		Pin-39	Pin-33
PA5	LED5	Relay-5		Pin-37	Pin-32
PA6	LED6	Relay-6		Pin-35	Pin-31
PA7	LED7	Relay-7		Pin-33	Pin-30
PB0	LED8	DI-8	JP8	Pin-31	Pin-10
PB1	LED9	DI-9	JP9	Pin-29	Pin-9
PB2	LED10	DI-10	JP10	Pin-27	Pin-8
PB3	LED11	DI-11	JP11	Pin-25	Pin-7
PB4	LED12	DI-12	JP12	Pin-23	Pin-6
PB5	LED13	DI-13	JP13	Pin-21	Pin-5
PB6	LED14	DI-14	JP14	Pin-19	Pin-4
PB7	LED15	DI-15	JP15	Pin-17	Pin-3
PC0	LED16	DI-16	JP16	Pin-15	Pin-29
PC1	LED17	DI-17	JP17	Pin-13	Pin-28
PC2	LED18	DI-18	JP18	Pin-11	Pin-27
PC3	LED19	DI-19	JP19	Pin-9	Pin-26
PC4	LED20	DI-20	JP20	Pin-7	Pin-25
PC5	LED21	DI-21	JP21	Pin-5	Pin-24
PC6	LED22	DI-22	JP22	Pin-3	Pin-23
PC7	LED23	DI-23	JP23	Pin-1	Pin-22

Note:
1. **JP8 to JP23 select isolated/non-isolated digital input. Refer to Sec.4.5 for more information.**
2. **JP8 select DI-8**
3. **JP9 select DI-9**
4. **.....**
5. **JP23 select DI-23**

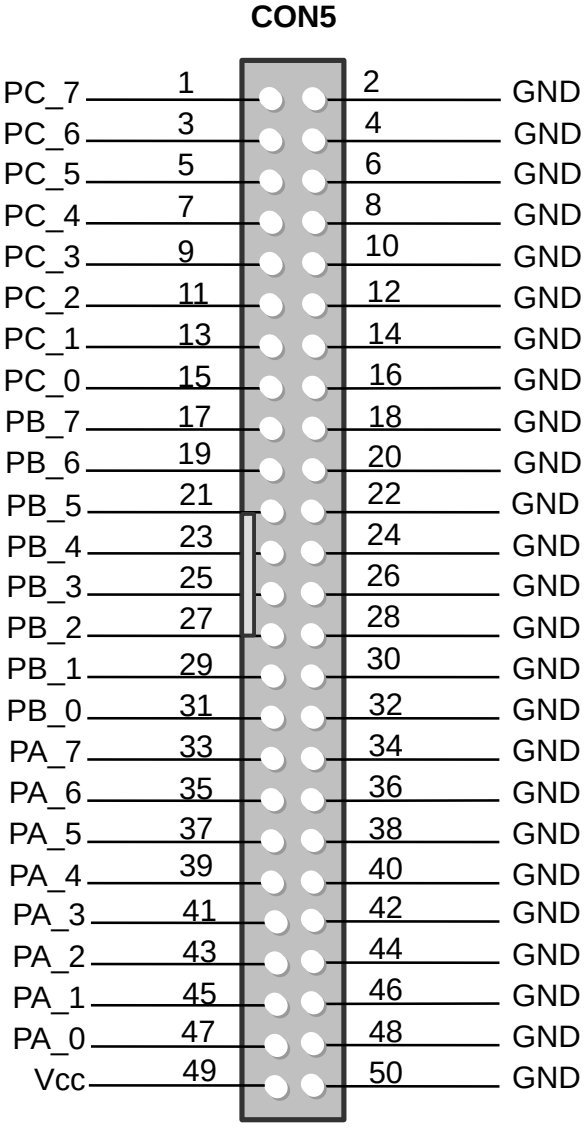
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4.7 Pin Assignment of CON5 and CON6

■ CON6: 37-pin D-Sub connector



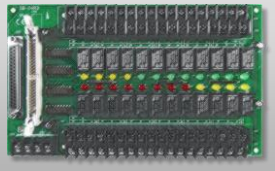
■ CON5: 50-pin flat-cable connector



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DB-24R/DB-24RD

24-channel Relay Output Board



5. Functional Description

The DB-24R / DB-24RD, 24-channel Relay Output Board, consists of 24 form c relays for efficient switch of load by programmed control. The DB-24R can be connected to DIO-24, DIO-48, DIO-D96, DIO-144, PIO-D144, PIO-D96 and PIO-D48 and any other OPTO-22 compatible Digital I/O board the relays are energized by apply 5 volt signal to the appropriate relay channel on the 50-pin header or 37-pin D-sub connector (DB-24RD). Twenty-four enunciator LEDs, one for each relay, light when their associated relay is activated. This board provides a screw terminal for external power supply.

5.1. Features

DB-24R:

- 24 Form C Relays
- Contact rate up to 0.5 A/120 V_{AC}, 1 A/30 V_{DC}
- Accept 50-pin OPTO-22 compatible header, For DIO-24, DIO-48, DIO-144 and PIO-series digital output port or any OPTO-22 compatible digital
- LED indicates relay status
- Screw terminals for filed wiring

DB-24RD

- Accept 50-pin OPTO-22 compatible header, For DIO-24, DIO-48, DIO-144 and PIO-series digital output port or any OPTO-22 compatible digital output port
- The 37-pin D-sub connector can be directly connected to PIO-D144, PIO-D96, PIO-D48, PIO-D56 and PIO-D24.
- 24 Form C Relays
- Contact rate up to 0.5 A/120 VAC, 1 A/30 VDC
- LEDs indicate relay status
- Screw terminals for filed wiring

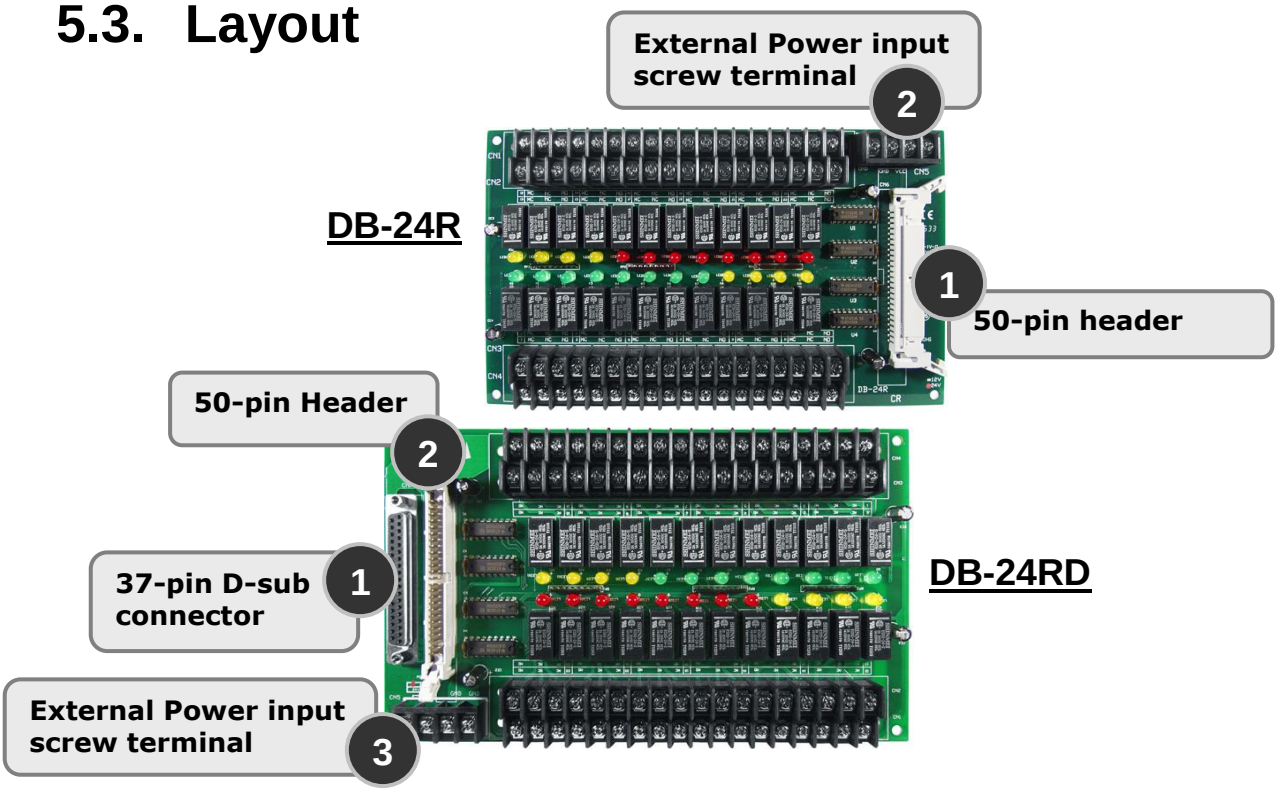
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5.2. Specification

Relay Output		
Channels		24
Type		Form C
Nominal Load		0.5 A/120 V_{AC} 1 A /24 V_{DC}
Max. Switching Power		60 VA, 24 W
Max. Switching Voltage		120 V_{AC} , 60 V_{DC}
Max. Switching Current		1 A
Life Expectancy		Electrical (20 Millions Times)
Time Value	Operate	6 ms
	Release	3 ms
Control Logic		Input TTL high (+5 V), relay on
General		
Dimensions		220 mm x 132 mm
Environment		
Operating Temperature		0 ~ +60°C
Storage Temperature		-20 ~ +70°C
Humidity		5% ~ 95% RH, non condensing
Power Requirements		
Power Consumption		0.53 A @ 12 V 0.2 A @ 5 V

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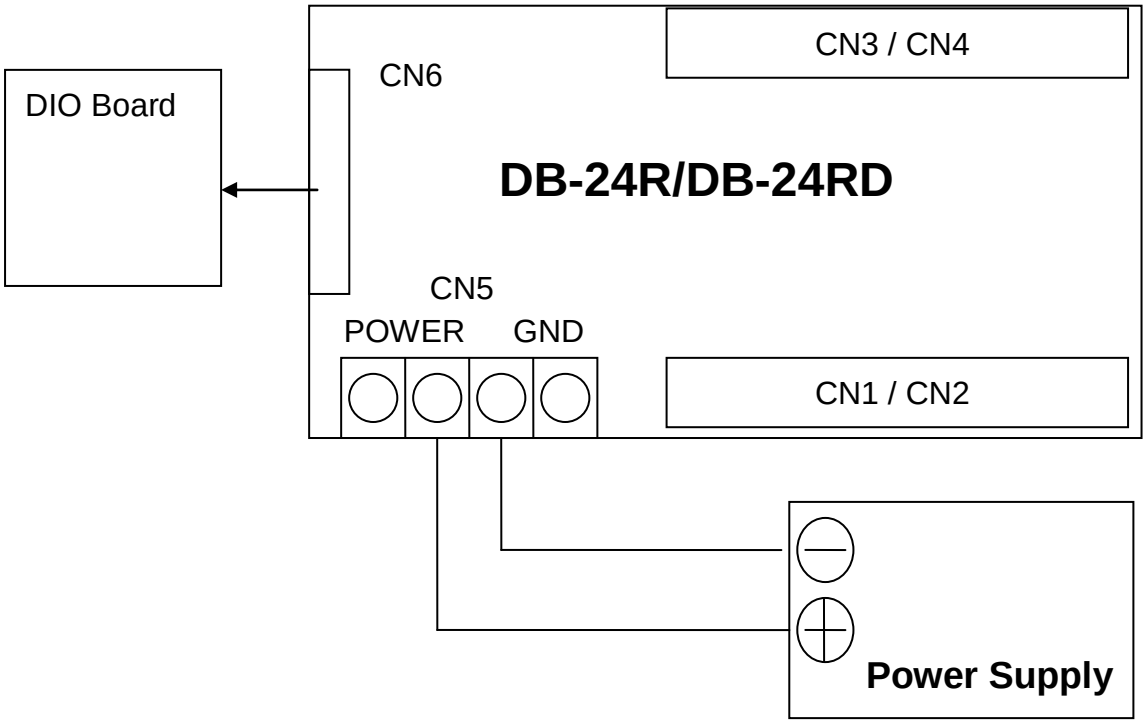
5.3. Layout



DB-24R and DB-24RD support external power supply only.

DB-24R/12 V and DB-24RD/12 V for DC 12 V external power supply

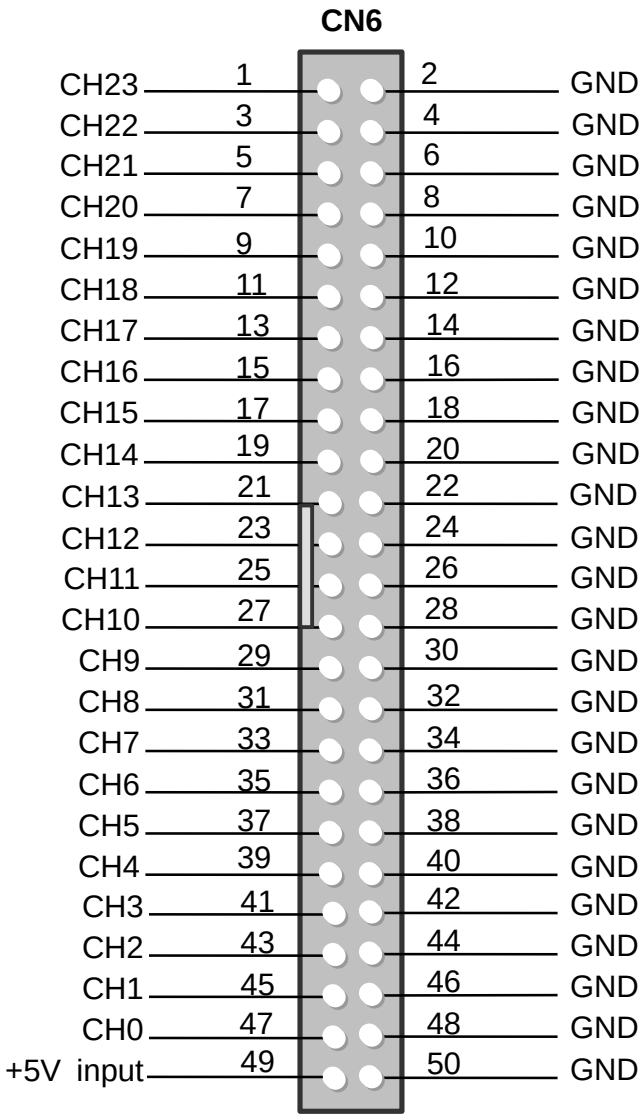
DB-24R/12 V and DB-24RD/24 V for DC 24 V external power supply



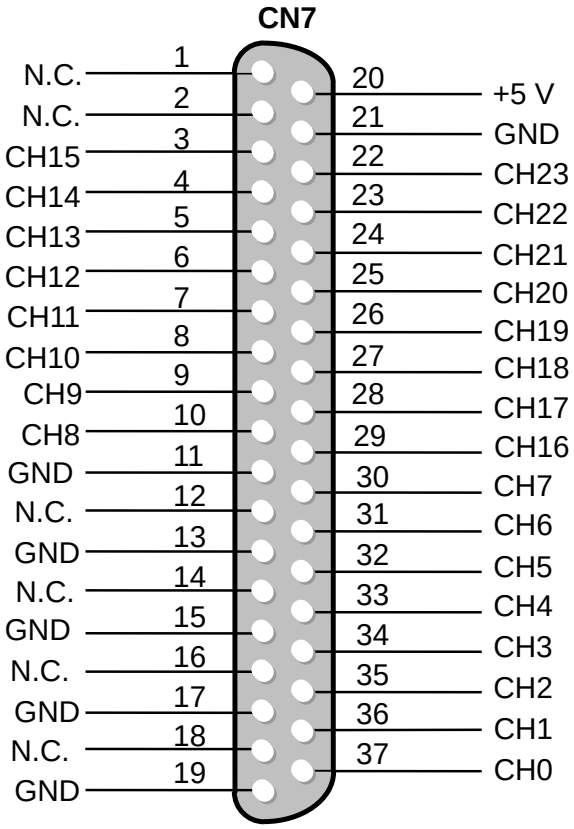
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5.4. Pin Assignment

- **CN6: OPTO-22 50-pin header for DB-24R and DB-24RD**



- **CN7: 37-pin D-sub connector for DB-24RD only**



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■ **CN5: External Power Connector**

+12 V	+12 V	GND	GND

Note:
Input DC+12 V power for optional 12 V version
Input DC+24 V power for optional 24 V version

■ **CN1 and CN2: Screwing terminal**

CH 12	CH 14	CH 16	CH 18	CH 20	CH 22
CH 13	CH 15	CH 17	CH 19	CH 21	CH 23

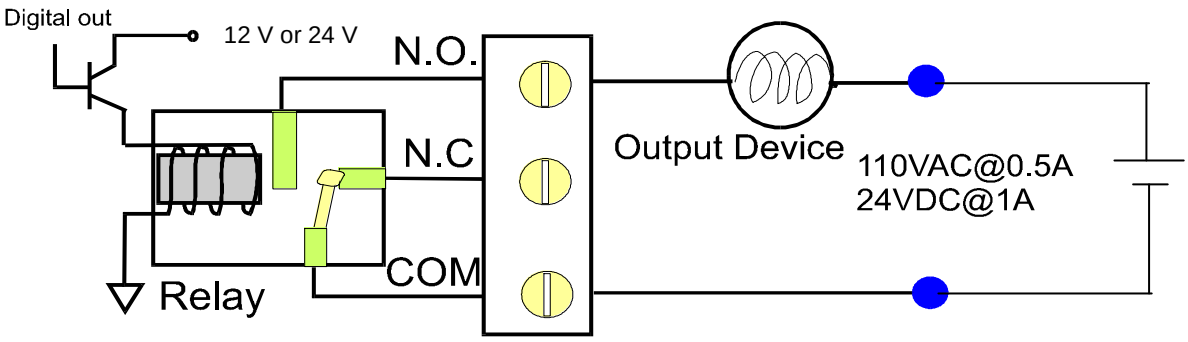
■ **CN3 and CN4: Screwing terminal**

CH 0	CH 2	CH 4	CH 6	CH 8	CH 10
CH 1	CH 3	CH 5	CH 7	CH 9	CH 11

■ **Each Channel**

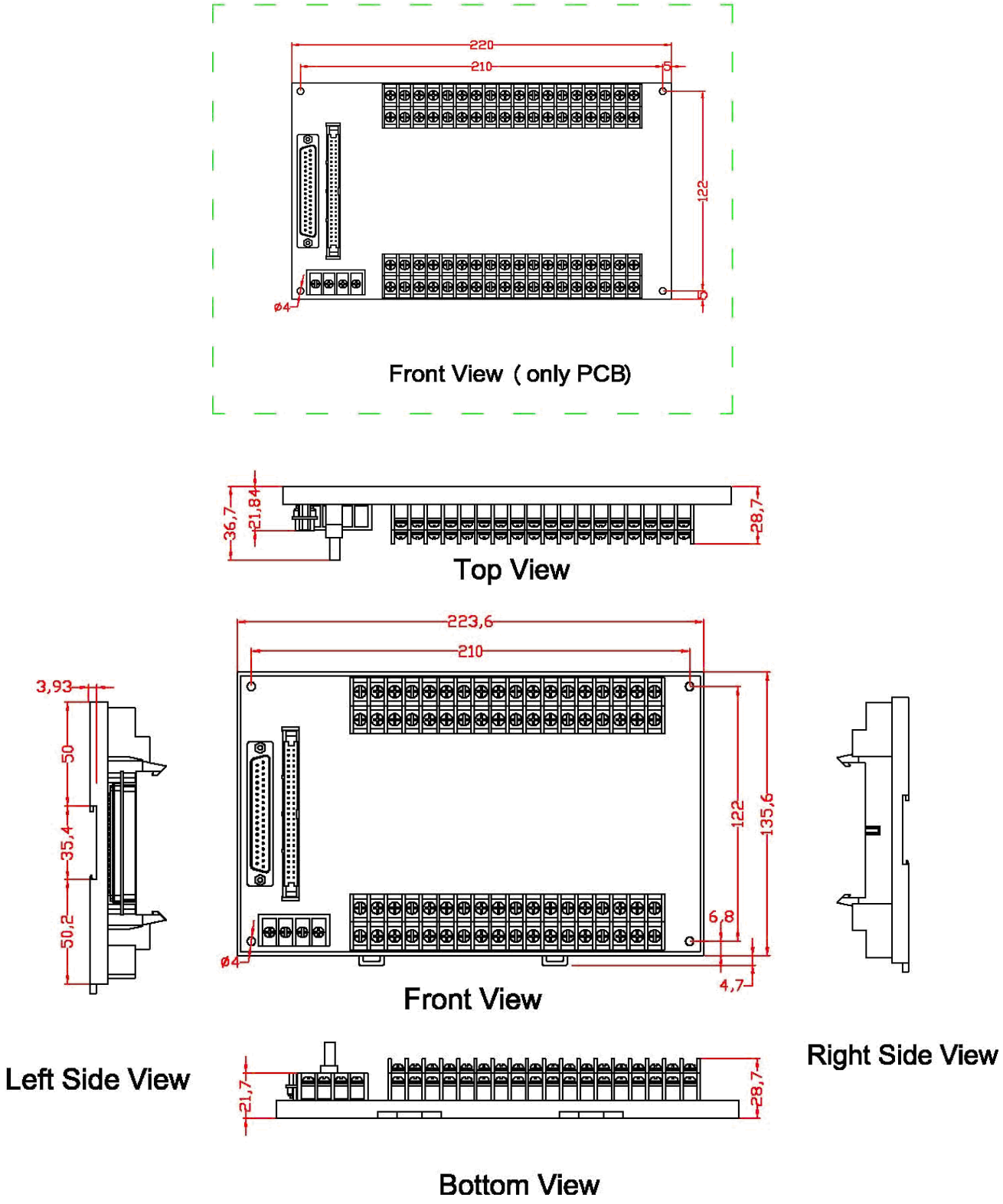
CH 0~23		
MC(common)	NC(Normally Closed)	NO(Normally Open)

■ **Form C Relay**

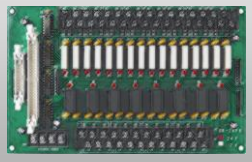


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5.5. DB-24RD Dimensions



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6. Functional Description

The DB-24PR / DB-24PRD, 24 channel power relay output board, consists of 8 Form C and 16 Form A electromechanical relays for efficient switching of load by programmed control. The contact of each relay can control a 5 A load at 250 V_{AC}/ 30 V_{DC}. The relay are energized by applying 5 voltage signal to the appropriated relay channel on the 20-pin header (DB-24PR only), 50 pin header and 37-pin D-sub connector (DB-24PRD only). Twenty-four enunciator LEDs, one for each relay, light when their associated relay is activated. To avoid overloading your PC's power supply, this board provides a screw terminal for power supply. CN1, CN2, CN3 and CN4 are terminal blocks to connect with wiring. The CN7 is used to connect with DIO-24, DIO-48, DIO-144 or any OPTO-22 compatible digital output port. The CN6 is used to connect with A-82XPG series PCI-1800 series ISO-DA series, DIO-64 or any compatible digital output port. The DB-24PRD has one 37-pin D-sub connector. The 37-pin D-sub connector can be directly connected to PIO-D144, PIO-D96, PIO-D48 and PIO-D24's 37-pin D-sub connector.

6.1. Features

DB-24PR:

- 16 Form A Relays, 8 Form C Relays
- DB-24PR accepts two kind connectors:
  - Accept 20-pin header to control 8 Form C (channel 0~7) relays and 8 Form A relays (channel 8~15).
  - Accepts 50-pin header to control 8 Form C relays and 16 Form A relays.
- Each varistor protect one contact.
- LED indicates relay status.

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DB-24PRD

■ DB-24PRD: Accept two kind connectors:

- 37-pin D-sub connector: For PIO-D144, PIO-D96, PIO-D48, PIO-D56 and PIO-D24 digital I/O boards
- 50-pin header: For DIO-144, DIO-96, DIO-48 and DIO-24 digital I/O boards. Other features are same as DB-24PR.

6.2. Specification

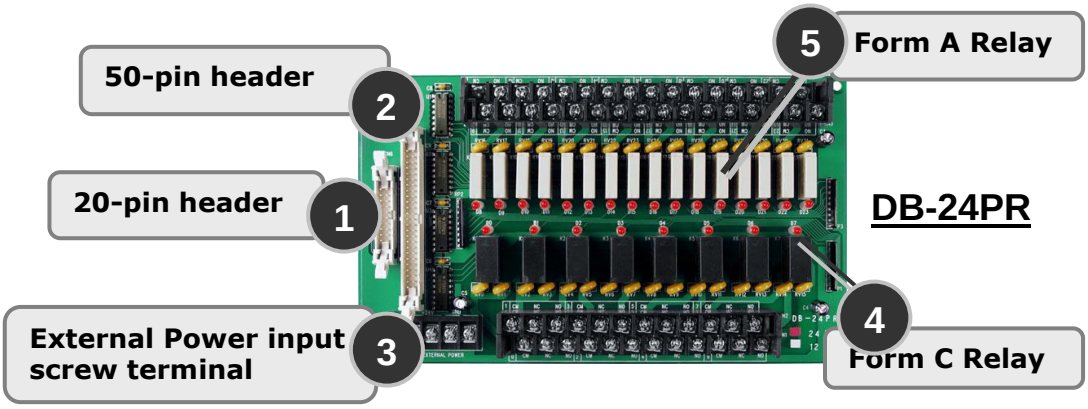
Relay Output			
Channels		16	8
Type		1 Form A (SPST-NO)	1 Form C (SPDT)
Nominal Load		5 A 250 V_{AC} or 30 V_{DC}	250 V_{AC} / 5 A
Max. Switching Power		90 W	1,250 VA(NO), 750 VA(NC)
Max. Switching Voltage		270 V_{AC} , 150 V_{DC}	250 V_{AC}, 150 V_{DC}
Max. Switching Current		5 A	
Life Expectancy		Mechanical (20 Millions Times)	Mechanical (10 Millions Times)
Time Value	Operate	10 ms	
	Release	5 ms	
General			
Dimensions		220 mm x 132 mm	
Environment			
Operating Temperature		0 ~ +60°C	
Storage Temperature		-20 ~ +70°C	
Humidity		5% ~ 95% RH, non condensing	
Power Requirements			
Power Consumption		Min: 2.5 μA (All relays off)	
		Max: 0.5 A (All relays On)	
		1 Relay On: 22 mA	

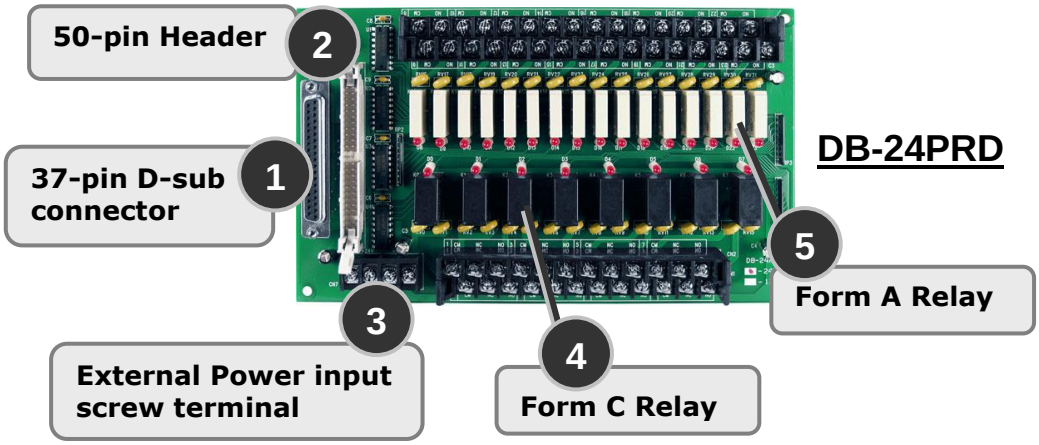
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6.3. Applications

- Test Automation
- Laboratory and Factory Automation
- ON/OFF Control

6.4. Layout





Note:

DB-24PR, DB-24PRD provides external power input only.

The input power has two versions:

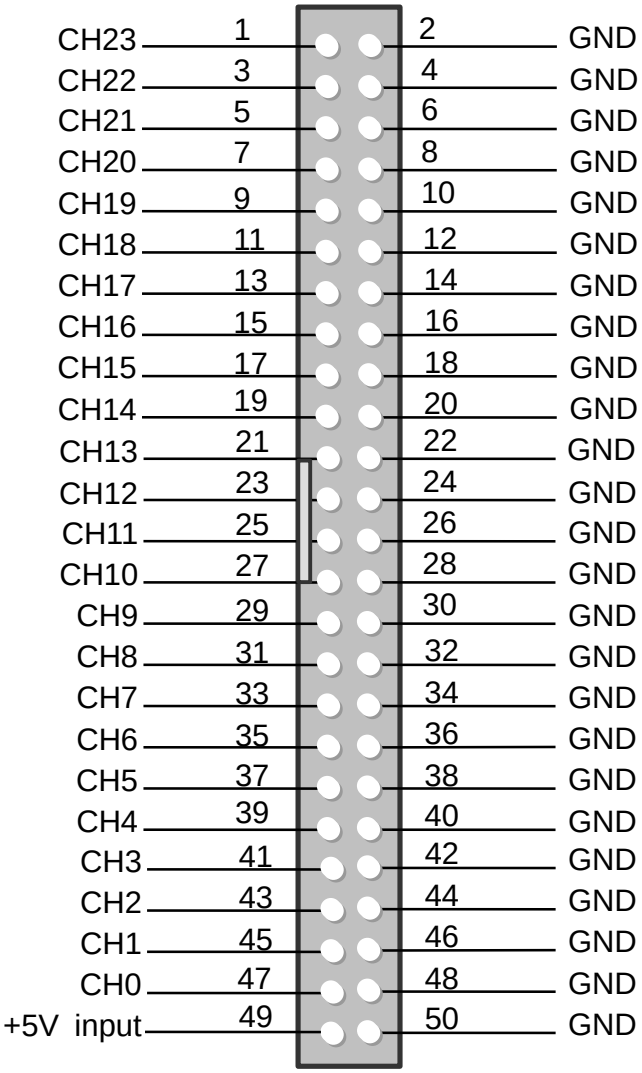
External Power +12 V_{DC} input for 12 V Version

External Power +24 V_{DC} input for 24 V Version

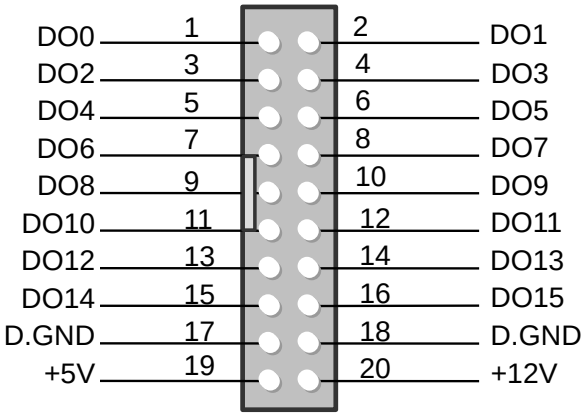
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6.5. Pin Assignment

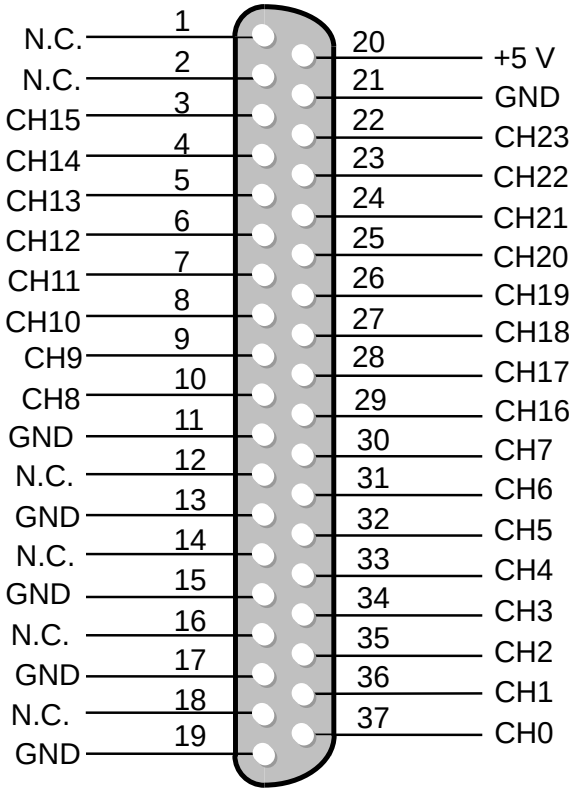
■ CN5: 50-Pin Header for DB-24PR and DB-24PRD



■ CN6: 20-pin header (DB-24PR only)



■ CN6: 37-pin D-sub connector (DB-24PRD only)



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- CN1: Screw Terminal

CH0			CH2			CH4			CH6		
CM	NC	NO	CM	NC	NO	CM	NC	NO	CM	NC	NO

- CN2: Screw Terminal

CH1			CH3			CH5			CH7		
CM	NC	NO	CM	NC	NO	CM	NC	NO	CM	NC	NO

- CN3: Screw Terminal

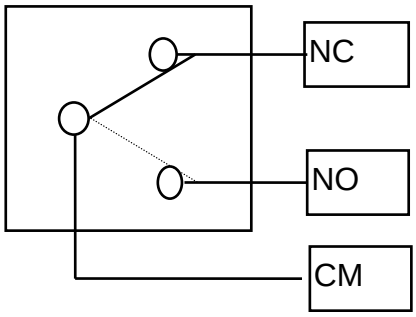
CH23		CH21		CH19		CH17		CH15		CH13		CH11		CH9	
NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM

- CN4: Screw Terminal

CH22		CH20		CH18		CH16		CH14		CH12		CH10		CH8	
NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM	NO	CM

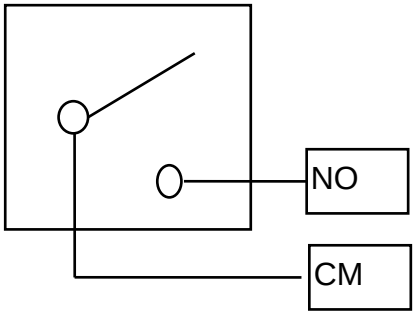
Note :
FOR Channel 0 ~ 7 Form C Relay screw terminals

CM : Common
NC : Normally Closed
NO : Normally Open



For Channel 8 ~24 Form A Relay screw terminal

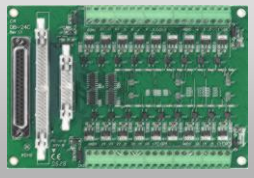
CM : Common
NO : Normally Open



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DB-24C

24-channel Open-Collector Output Board



7. Functional Description

The DB-24C has 24 channels of optically isolated digital outputs, arranged into four isolated banks. Each digital output offers a darlington transistor and integral suppression diode for inductive load. The board interface to field logic signals, eliminating ground-loop problems and isolating the host computer from damaging voltages. The DB-24C has one 37-pin D-sub connector, one 50-pin OPTO-22 compatible male header and one 20-pin male header.
The transistor is energized by applying a 5-voltage signal to the appropriate input channels on the 50-pin header or 20-pin header or 37-pin D-sub connector. Twenty-four enunciator LEDs, one for each transistor, light when their associated transistor is activated. Because there is a 37-pin D-sub connector on the board, the user may use it to interface to any TTL output board. In other words, the user may use it as a general purpose open-collector output board.

7.1. Features

- Group A (high nibble), Group B (low nibble), C (byte) and Group D has 24-channel open-collector output each. The maximum load is 600 mA per channels.
- Accept 20-pin connector to control 16 high current output channels.
- LEDs indicate each channel and power status.
- Overload protection
- 3750 V optical isolation
- 5 V_{DC} logic levels

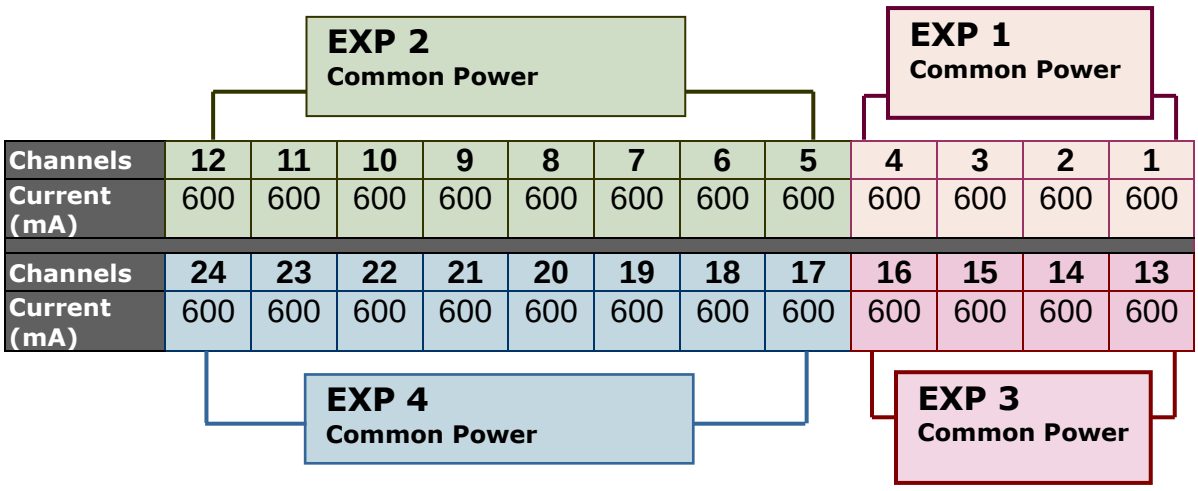
7.2. Applications

- LEDs indicate the status of transistor
- Screw terminals for easy field wiring
- OPTO-22 Compatible connector
- D-sub connector 37-pin connector connects directly to PIO-D144, PIO-D96 and PIO-D24 board or another OPTO-22 board with ADP-37 adapter

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7.3. Specification

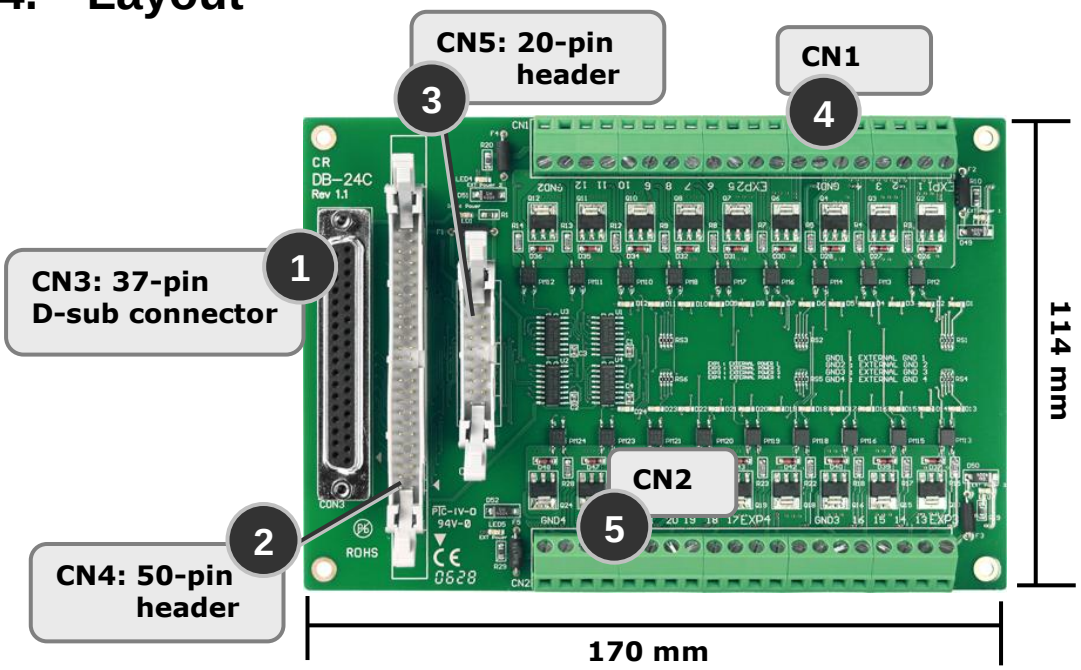
Digital Output	
Channels	24
Type	Optically Isolated
Loading Current	600 mA (max.)
General	
Dimensions	170 mm x 114 mm
Environment	
Operating Temperature	0 ~ +60°C
Storage Temperature	-20 ~ +70°C
Humidity	5% ~ 95% RH, non condensing
Power Requirements	
Power Consumption	0.4 A @ +5 V_{DC} max.



Power	EXP1	EXP2	EXP3	EXP4
Input Voltage	5~30 V_{DC}	5~30 V_{DC}	5~30 V_{DC}	5~30 V_{DC}
Input Current	2.4 A	4.8 A	2.4 A	4.8 A

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7.4. Layout



CN1 : External Power: 5~30 V_{DC} External Power: 5~30 V_{DC}

CH	GND	GND	12	11	10	9	8	7	6	5	Exp2			GND	GND	4	3	2	1	Exp1
mA	-	-	600	600	600	600	600	600	600	600	+			-	-	600	600	600	600	+

CH5~12
Max. Load: 600 mA/channel

CH1~4
Max. Load: 600 mA/channel

CN2 : External Power: 5~30 V_{DC} External Power: 5~30 V_{DC}

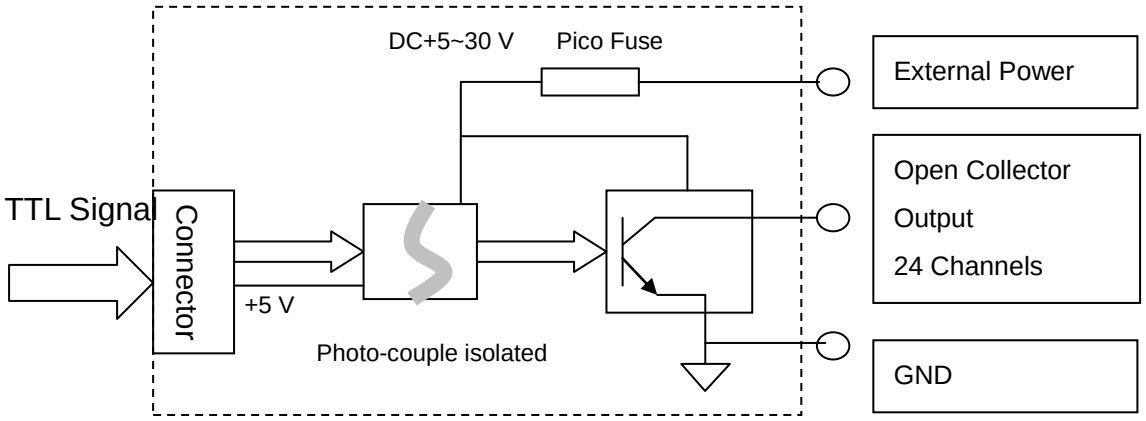
CH	GND	GND	24	23	22	21	20	19	18	17	Exp4			GND	GND	16	15	14	13	Exp3
mA	-	-	600	600	600	600	600	600	600	600	+			--	-	600	600	600	600	+

CH17~24
Max. Load: 600 mA/channel

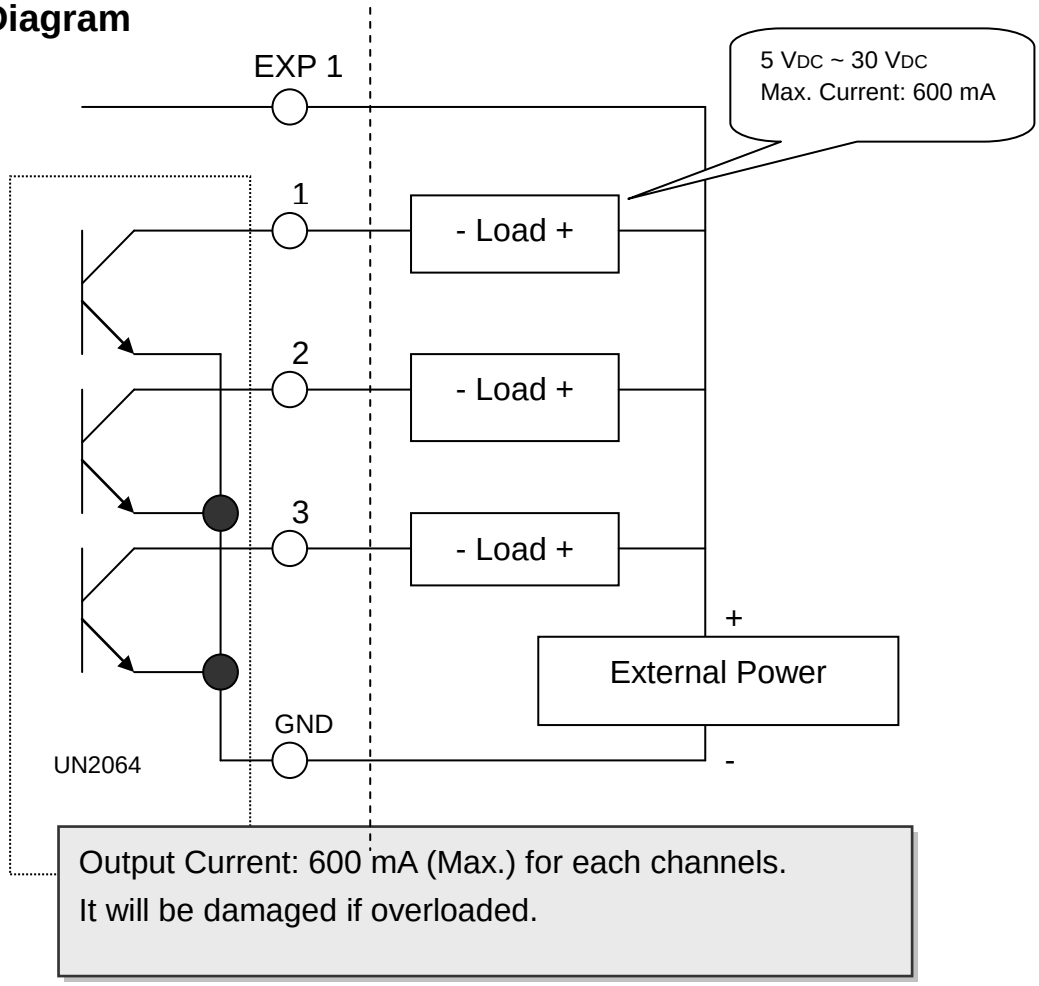
CH13~16
Max. Load: 600mA/channel

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7.5. Block Diagram



Open Collector Output Wiring Diagram

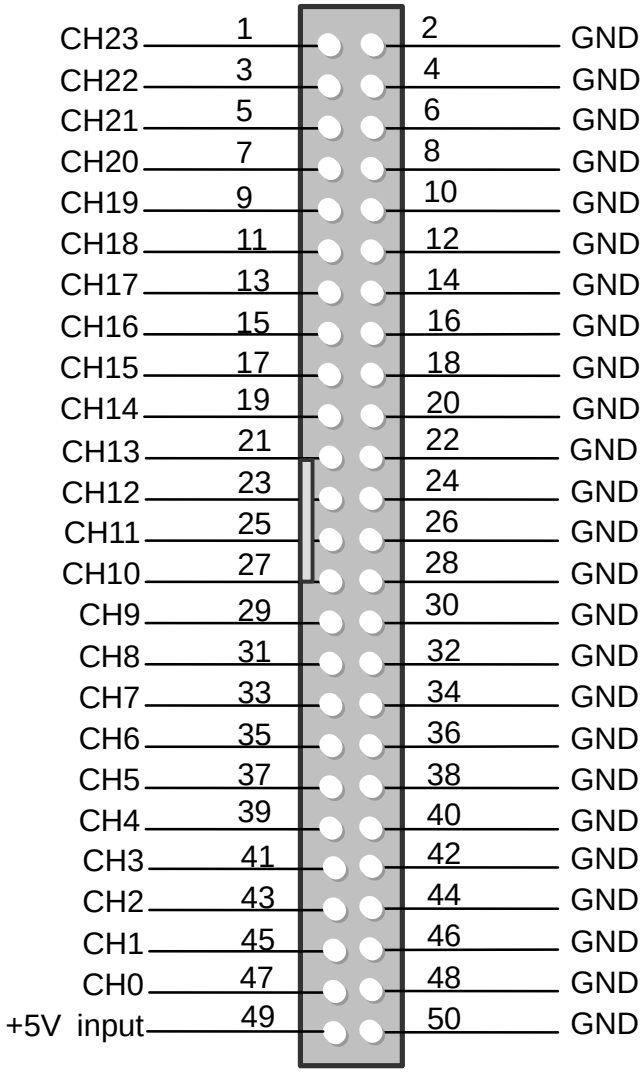


Output Current: 600 mA (Max.) for each channels.
It will be damaged if overloaded.

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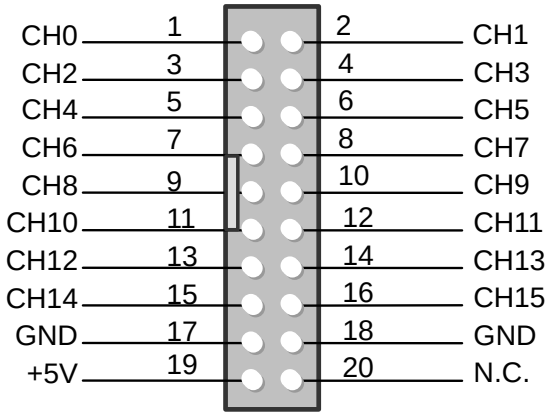
7.6. Pin Assignment

■ CN4: 50-pin header

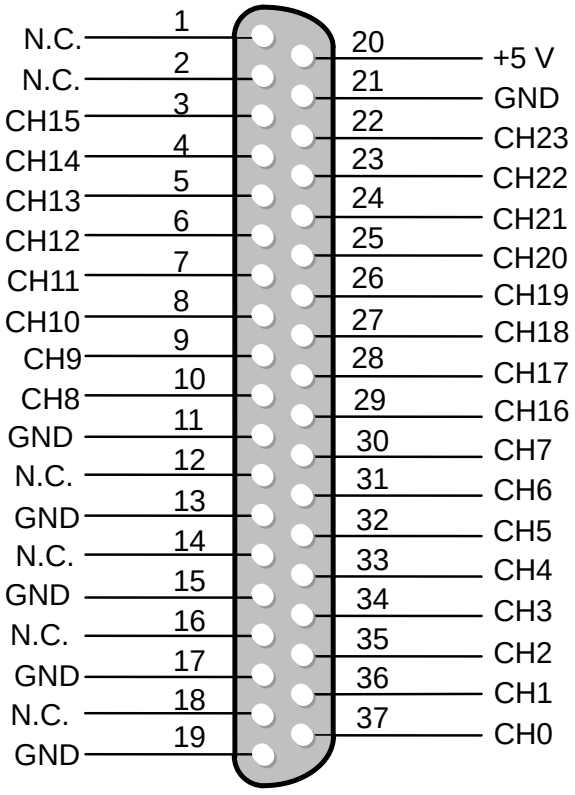


Note:
+5 V: Power input DC +5 V
GND: Power's Ground
CHn: TTL's Signal

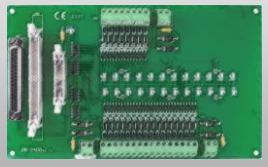
■ CN5: 20-pin header



■ CN3: 37-pin D-sub connector



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8. Functional Description

The DB-24OD has 24-channel optically isolated digital output. The board is the interface for field logic signals, elimination ground-loop problems and isolating the host computer from damaging voltages. The DB-24OD has a single 37-pin D-sub connector, one 50-pin OPTO-22 compatible male header and a 20-pin male header. The transistor is powered by applying a 5-volt signal to the appropriate input channel on the 50-pin header, the 20-pin header or the 37-pin D-sub connector. Twenty-four indicator LEDs, one for each transistor, are lit when their associated transistor is activated. The board may be used to interface with any TTL output board, allowing it to be used as a general purpose open-drain output board.

8.1. Features

- 24-channel high current open-drain output.
- Connects directly to OPTP-22 compatible board or any 722,724 series board
- 24-channel max. load 400 mA (per channel)
- LEDs indicate each channel and power status
- 3750 V optical isolation
- 5 V_{DC} logic levels

8.2. Application

- ON/OFF Control
- Energy Management
- Test Automation
- Process Control

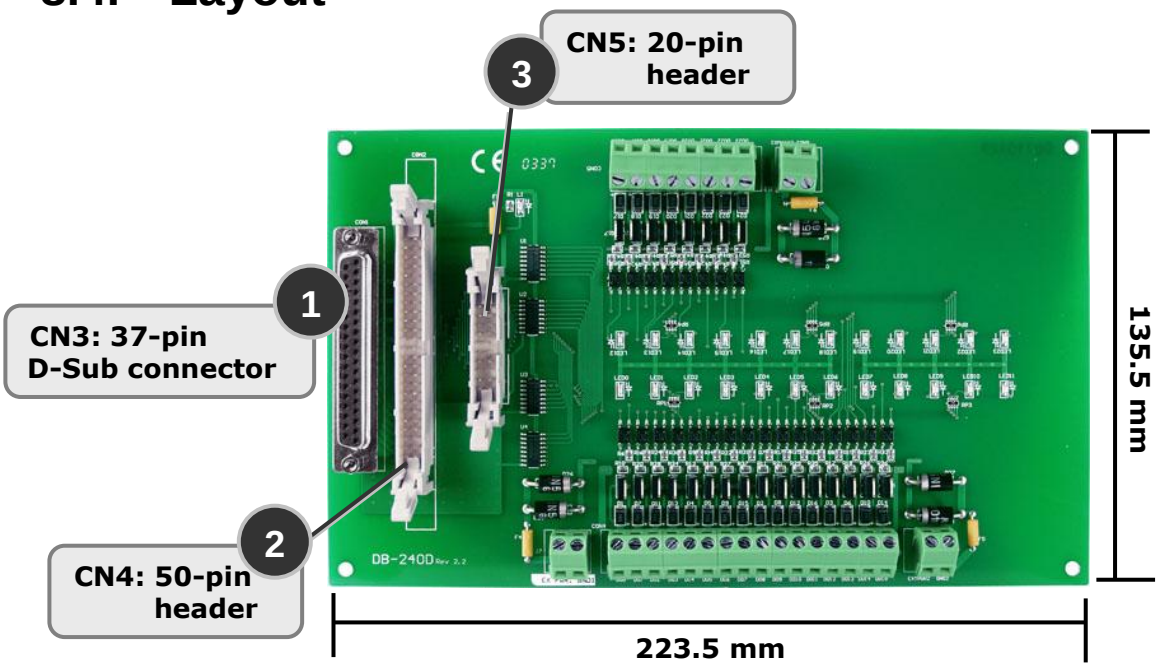
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8.3. Specification

Digital Output	
Channels	24
Type	Optically Isolated
Loading Current	400 mA (max.)
General	
Dimensions	223.5 mm x 135.5 mm
Environment	
Operating Temperature	0 ~ +60°C
Storage Temperature	-20 ~ +70°C
Humidity	5% ~ 95% RH, non condensing
Power Requirements	
Power Consumption	0.4 A @ +5 V_{DC} max.

Power	EXPWR1	EXPWR2	EXPWR3	EXPWR4
Input Voltage	10~24 V_{DC}	10~24 V_{DC}	10~24 V_{DC}	10~24 V_{DC}
Input Current	250 mA	250 mA	250 mA	250 mA

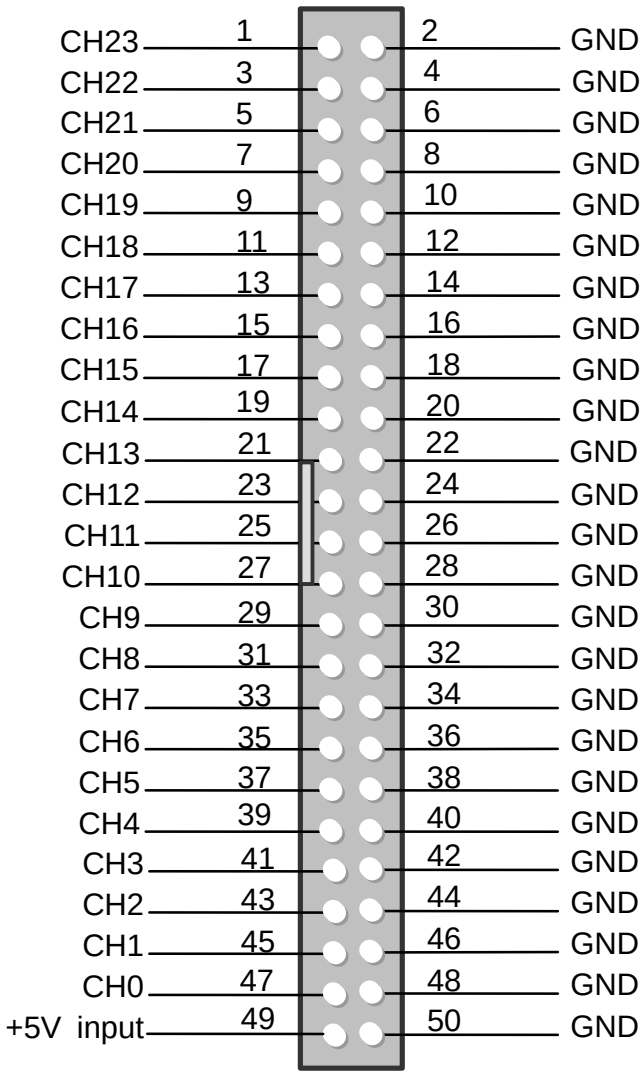
8.4. Layout



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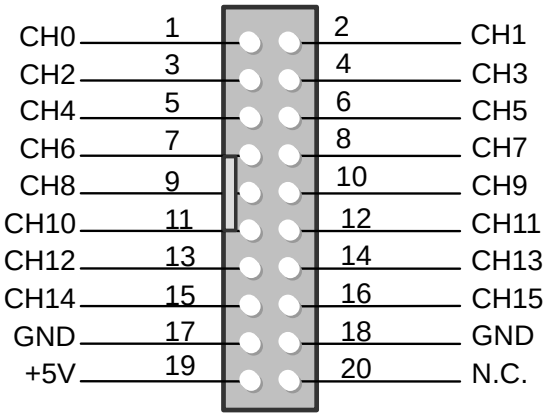
8.5. Pin Assignment

■ CN4: 50-pin header

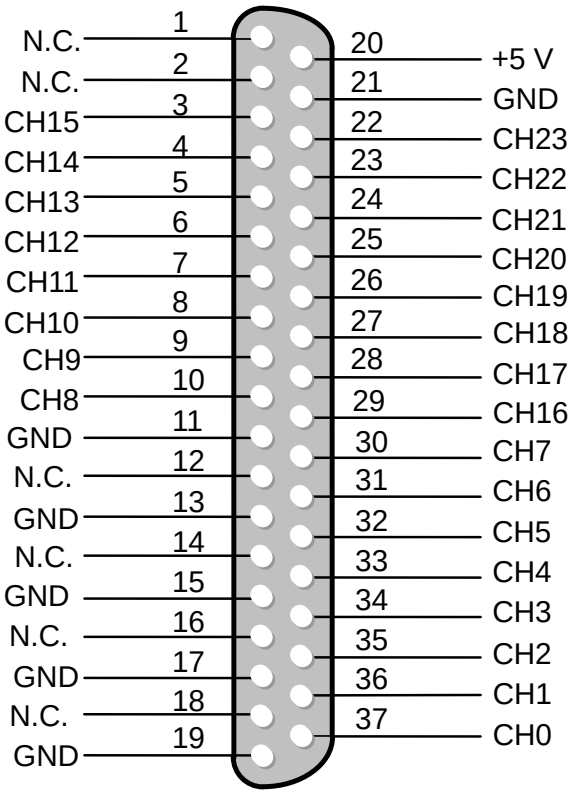


Note:
+5 V: Power input DC +5 V
GND: Power's Ground
CHn: TTL's Signal

■ CN5: 20-pin header



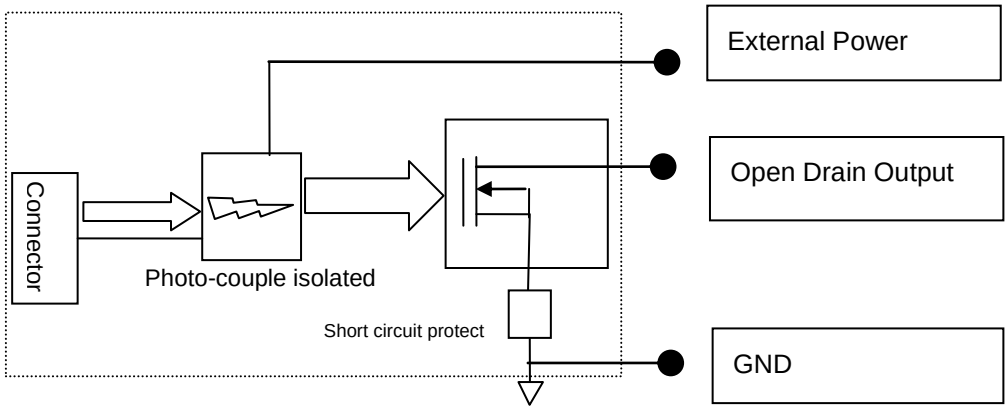
■ CN3: 37-pin D-sub connector



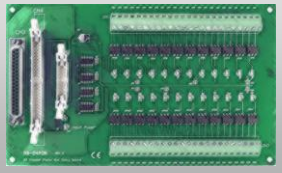
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External Power Input	Output pin
EXPWR1, GND1	D0~D7
EXPWR2, GND2	D8~D15
EXPWR3, GND3	D16~D23

8.6. Block Diagram



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9. Functional Description

The DB-24POR includes 24 normally open, form A, Photo-MOS relays. The board interface to field logic signals, eliminating ground-loop problems and isolating the host computer from damaging voltages. The user can use the DB-24POR to switch load, up to 350 V_{AC} and up to 130 mA. The relay is energized by applying a 5 voltage signal to the appropriate relay channel on the 50-pin OPTO-22 compatible connector or 37-pin D-sub connector. Twenty-four indicators LEDs, one for each relay, light when their associated relay is activated. Because there is a D-sub 37-pin connector on the board, the user may use it to interface to any TTL output board. In other words, the user may use it as a general-purpose photo-MOS relay output board.

9.1. Features

- 24-channel Optically isolated digital output
- 24 Form A PhotoMos relays
- Switch up to max. 0.13 A at max. 350 V_{AC}
- LEDs indicate relay status
- 5000 V optical isolation
- 5 V_{DC} logic levels
- Built-in fuses and diodes to protect from wrong connecting of external power supply.
- 50-pin header connector directly to DIO-24, DIO-48, DIO-144, PIO-D144, PIO-D96, PIO-D56, PIO-D48, PIO-D24 and other OPTO-22 compatible digital output boards.
- D-sub 37-pin connector connects directly to PIO-d144, PIO-D96, PIO-D56, PIO-D48 and PIO-D24 digital output boards.

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9.2. Applications

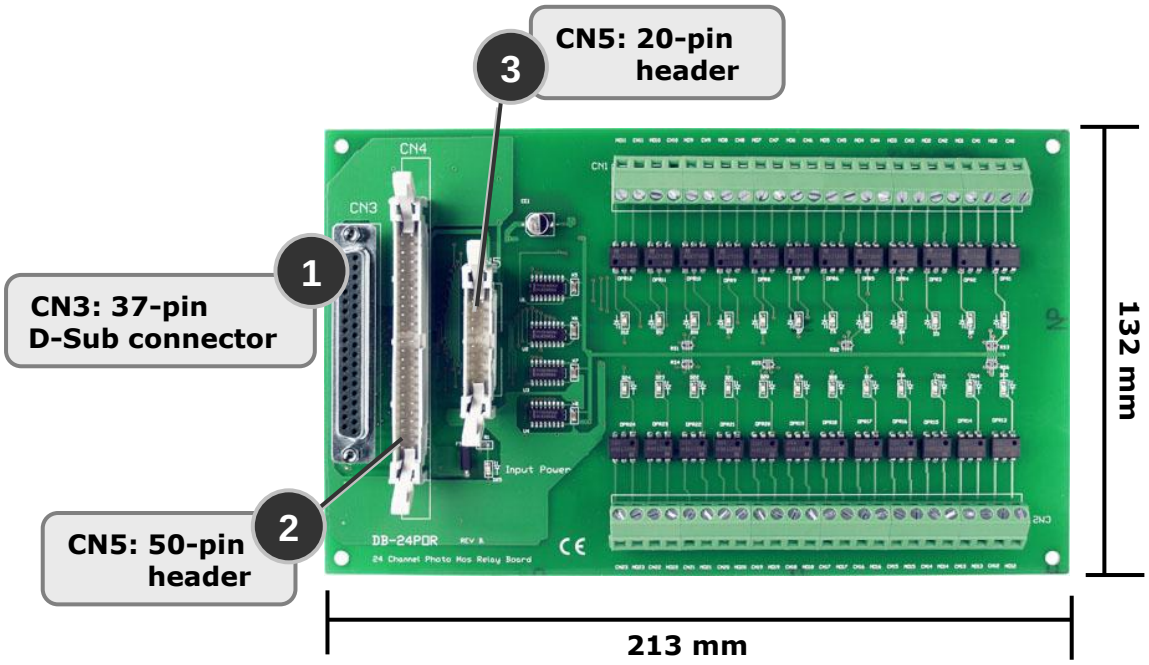
- ON/OFF Control
- Energy management
- IC factory Automation
- Test Automation

9.3. Specification

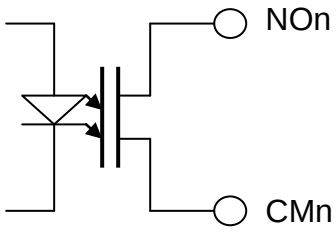
Relay Output	
Channels	24
Type	Form A PhotoMos Relay
Input/Output Isolation	5000 V
Power Dissipation	500 mW
Continuous Load Current	130 mA (Peak AC)
Load Voltage	350 V_{AC} (Peak AC)
Turn ON Time	0.7 ms (Typical)
Turn OFF Time	0.05 ms (Typical)
Output ON Resistance	23 Ω (Typical)
General	
Dimensions	213 mm x 132 mm
Environment	
Operating Temperature	0 ~ +60°C
Storage Temperature	-20 ~ +70°C
Humidity	5% ~ 95% RH, non condensing
Power Requirements	
Power Consumption	0.4 A @ +5 V_{DC} max.

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9.4. Layout



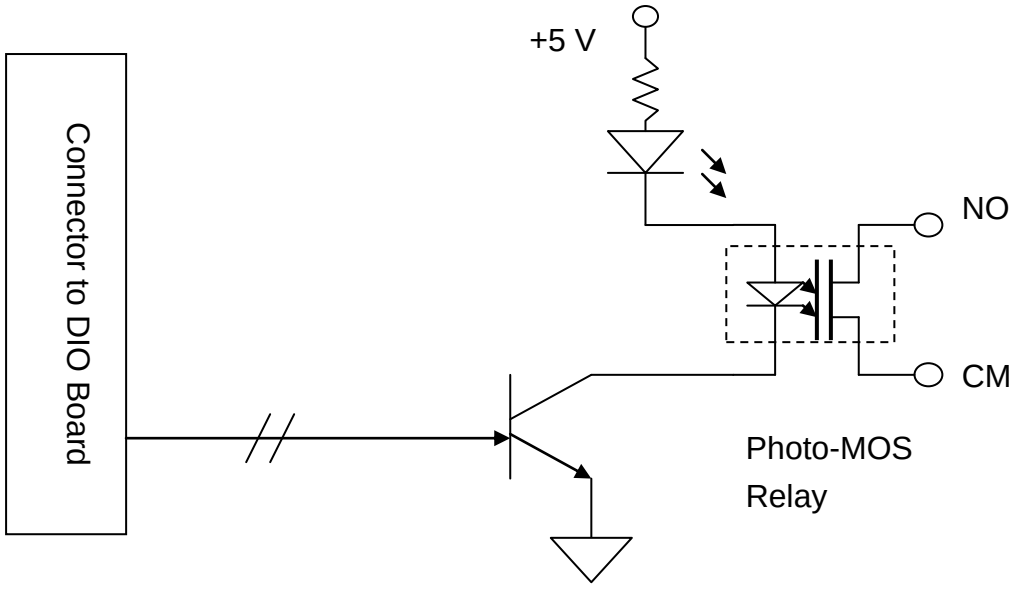
Channel 0~23	NOn	CMn
Form A	Normally Open	Common



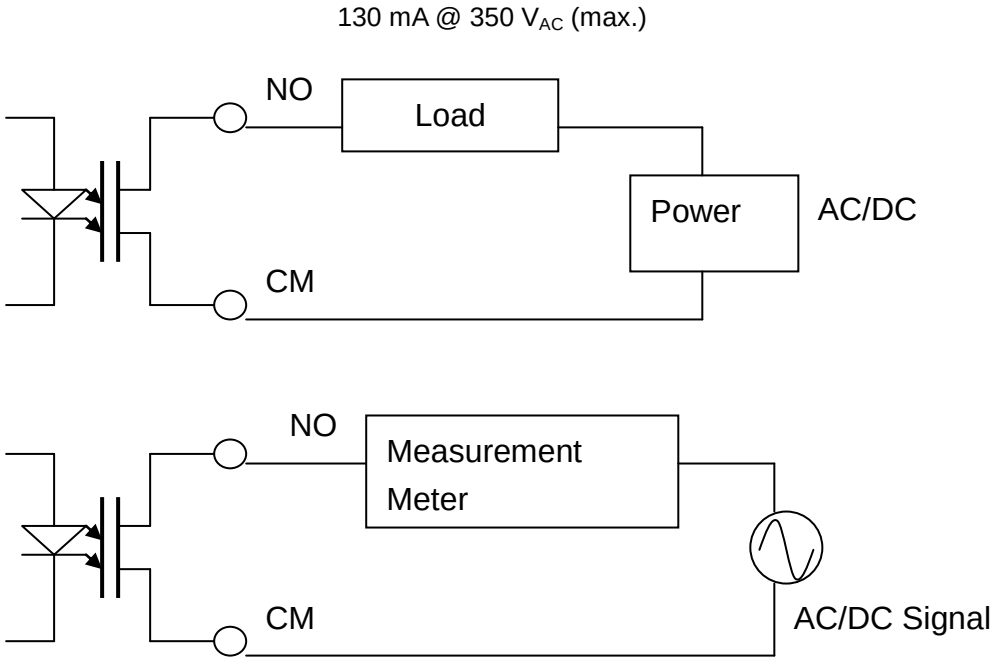
Form A type Photo-MOS Relay

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9.5. Block Diagram



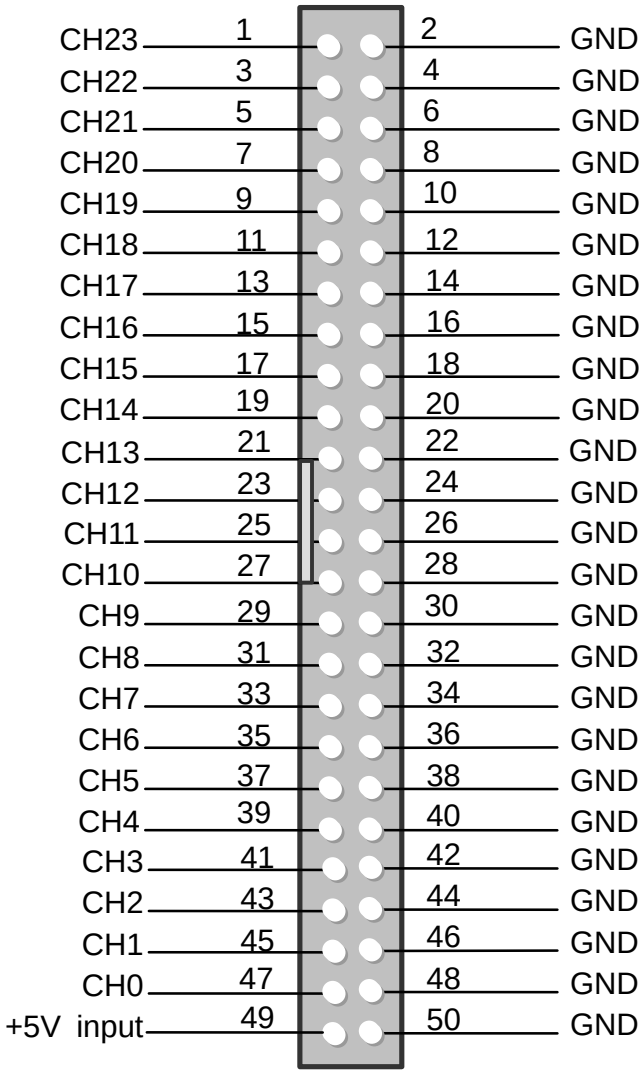
9.6. Wiring Diagram



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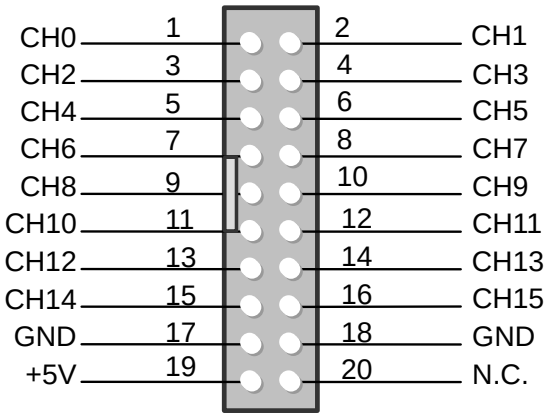
9.7. Pin Assignment

■ CN4: 50-pin header

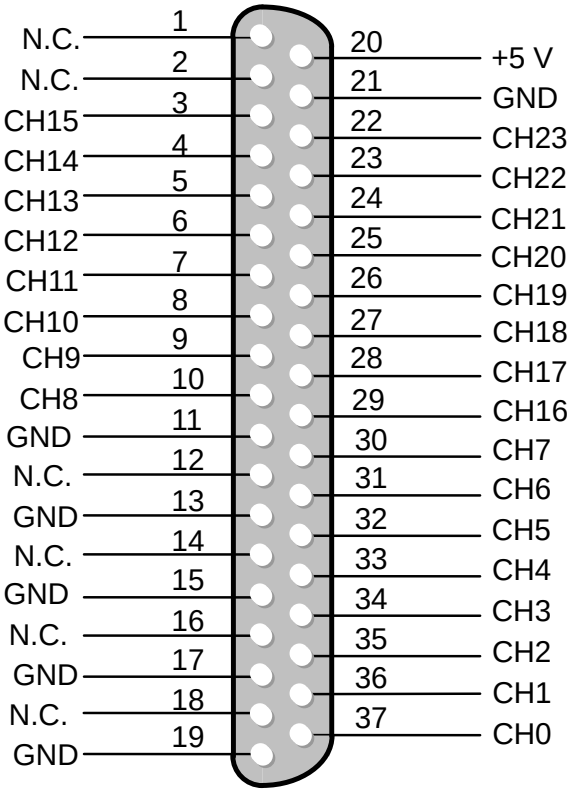


Note:
+5 V: Power input DC +5 V
GND: Power's Ground
CHn: TTL's Signal

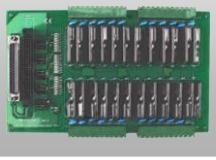
■ CN5: 20-pin header



■ CN3: 37-pin D-sub connector



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10. Functional Description

The DB-24SSR/DB-24SSRDC includes 24 normally open, or Form A, solid-state relays The board interface to filed logic signals, eliminating ground-loop problems and isolating the host computer from damaging voltages. The user can use the DB-24SSR/DB-24SSRDC to switch high voltage load, up to 240 V_{AC}/50 V_{DC} and up to 4 A. The relay is energized by applying a 5-voltage signal to the appropriate relay channel on the 50-pin header or 37-pin D-sub connector. Twenty-four enunciator LEDs, one for each relay, light when their associated relay is activated. Because there is a D-sub 37-pin connector on the board, the user may use it to interface to any TTL output board. In other words, the user may use it as a general purpose solid state relay output board.

10.1. Features

- 24-channel optically isolated digital output
- 24 Form A solid-state relays
- Switch up to 4 A 250 V_{AC}/50 V_{DC}
- Screw terminal for easy field wiring
- 2500 V_{AC} optical isolation
- 5 V_{DC} logic levels
- Can choose plug-in screw-terminal, modification and ensuring simple installation, modification and maintenance.
- 50-pin header connects directly to DIO-24, DIO-48, DIO-144, PIO-D144, PIO-D96, PIO-D48, and PIO-D24 OPTO-22 compatible board.
- D-Sub 37-pin connector connects directly to PIO-D144, PIO-D96, PIO-D48 and PIO-D24 board or another OPTO-22 board with ADP-37 adapter
- Built-in varistor for DB-24SSR only

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10.2. Applications

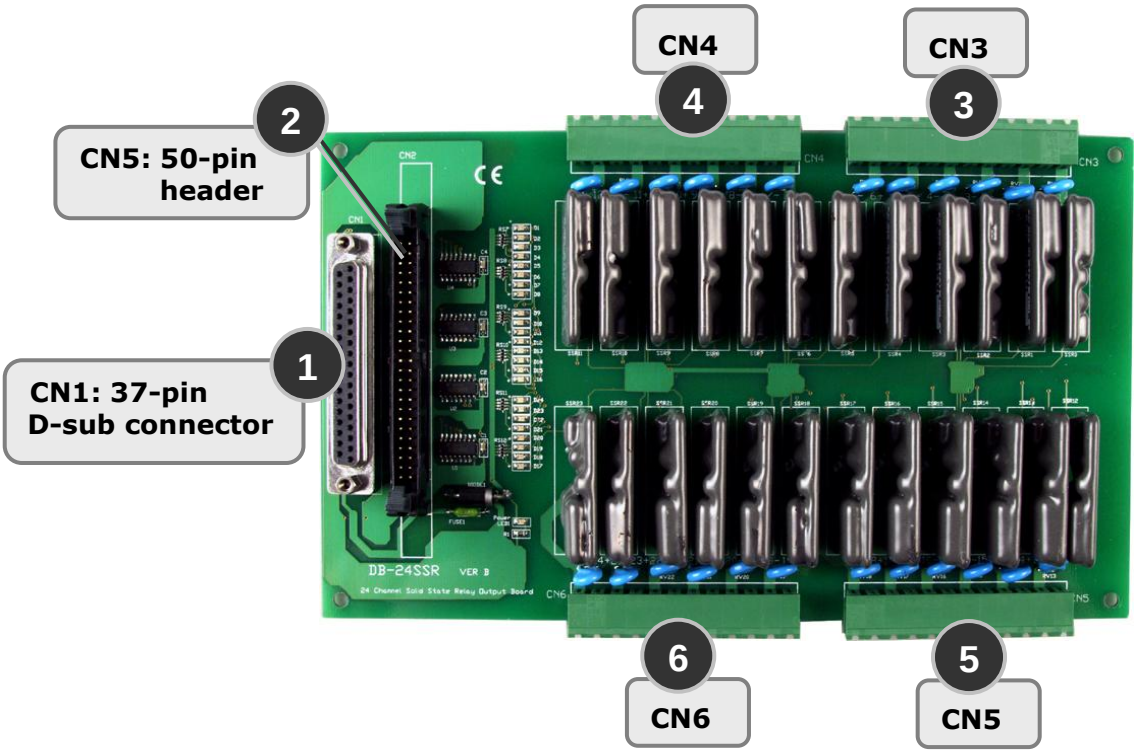
- ON/OFF Control
- Energy management
- Test Automation
- Process Control

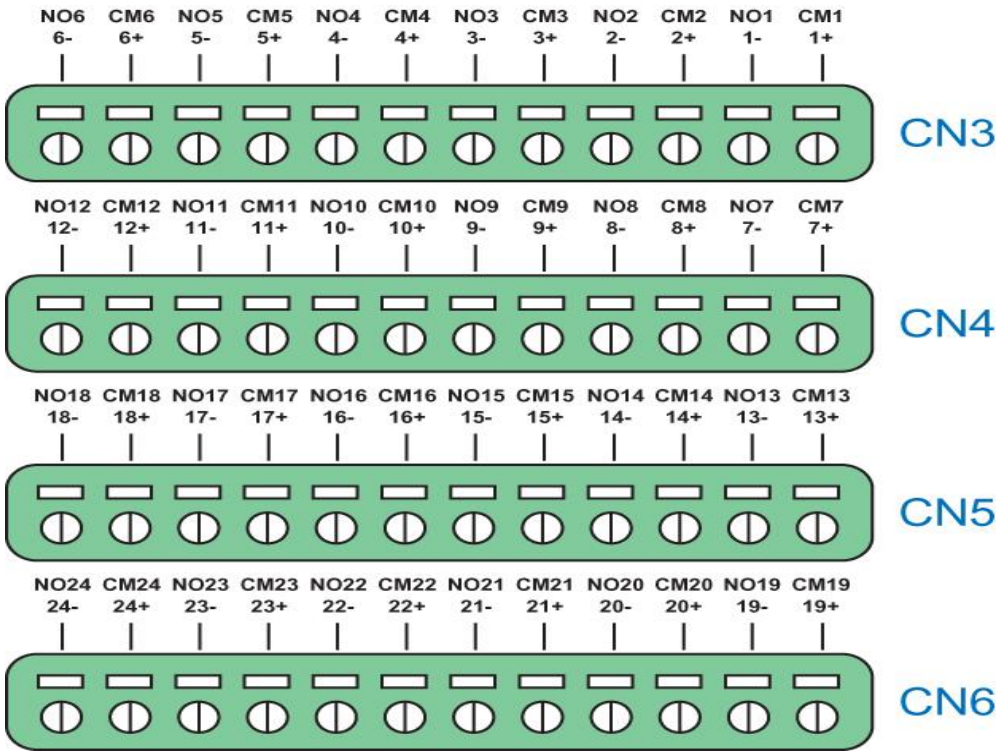
10.3. Specification

Model Name	DB-24SSR	DB-24SSRDC
Relay Output		
Channels	24	
Solid State Relay	AC	DC
Load Voltage	50 ~ 250 V_{AC}	3 ~ 50 V_{DC}
Max. Load Current	4 A	
Repetitive Peak OFF Voltage	600 V	1 mA
Max. “ON-state” Voltage Drop	1.5 V	1.2 V
Surge Current	50 A	10 A
Max. “OFF-state” Leakage Current	5 mA	1 μA
Min. Load Current	20 mA	1 mA
Breakdown Voltage	2500 V (Between input & output)	
Insulation resistance. i.	100,000,000 Ω (min.)	
Operate time, 1/2 cycle of voltage sine wave	1 ms (max.)	0.5 ms (max.)
Zero Crossing	Yes	
Snubber Circuit	Yes	
General		
Dimensions	220 mm x 130 mm x 32 mm	
Environment		
Operating Temperature	0 ~ +60°C	
Storage Temperature	-20 ~ +70°C	
Humidity	5% ~ 95% RH, non condensing	
Power Requirements		
Power Consumption	0.4 A @ +5 V_{DC} max.	
Input Current	0.025 A (Max.)	

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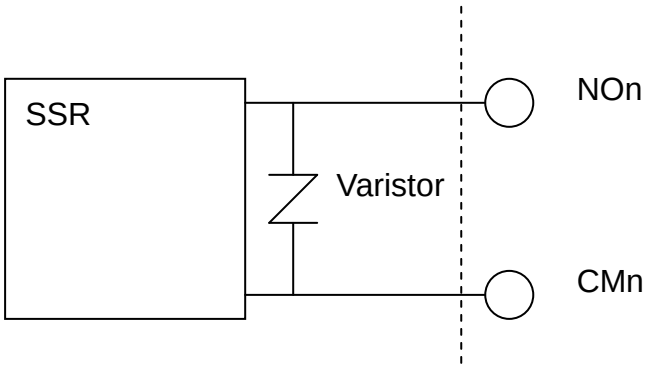
10.4. Layout





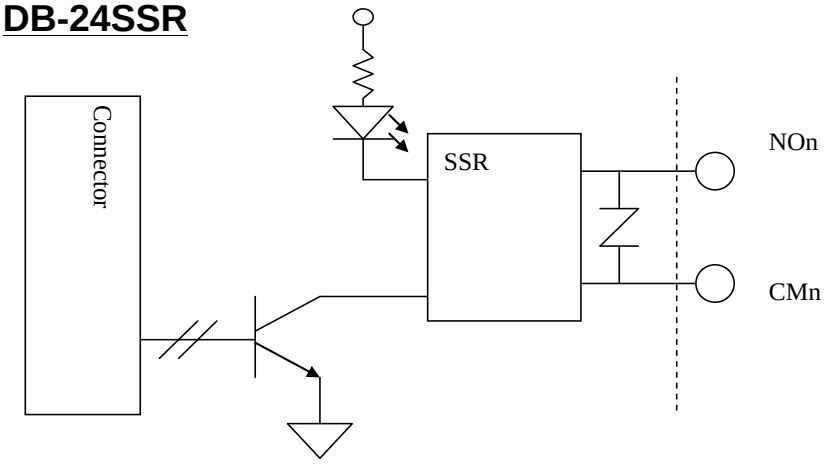
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Channel 0~23	NOn	CMn
Form A	Normally Open	Common

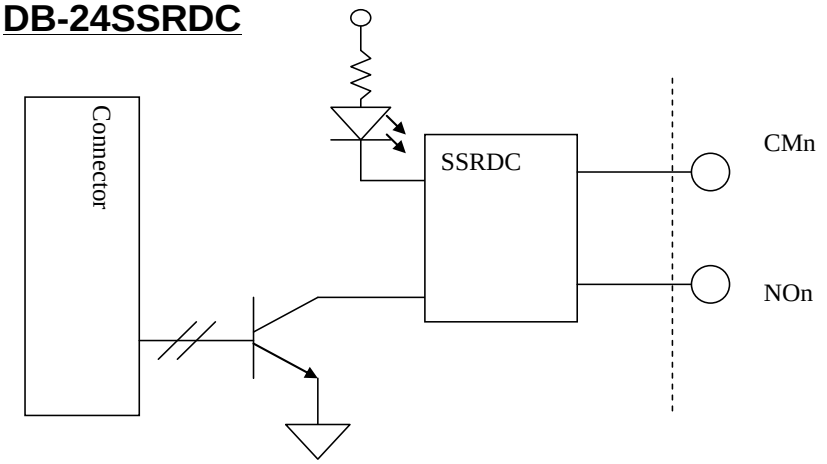


10.5. Block Diagram

DB-24SSR



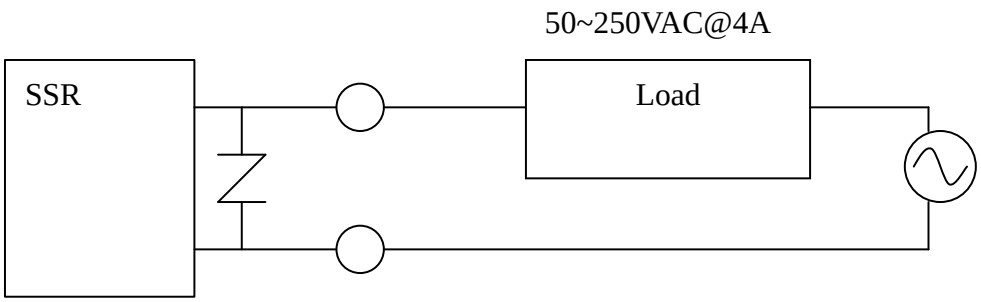
DB-24SSRDC



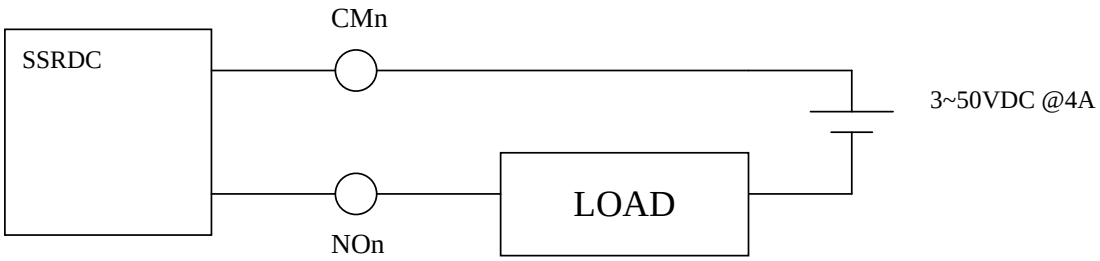
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10.6. Wiring Diagram

DB-24SSR



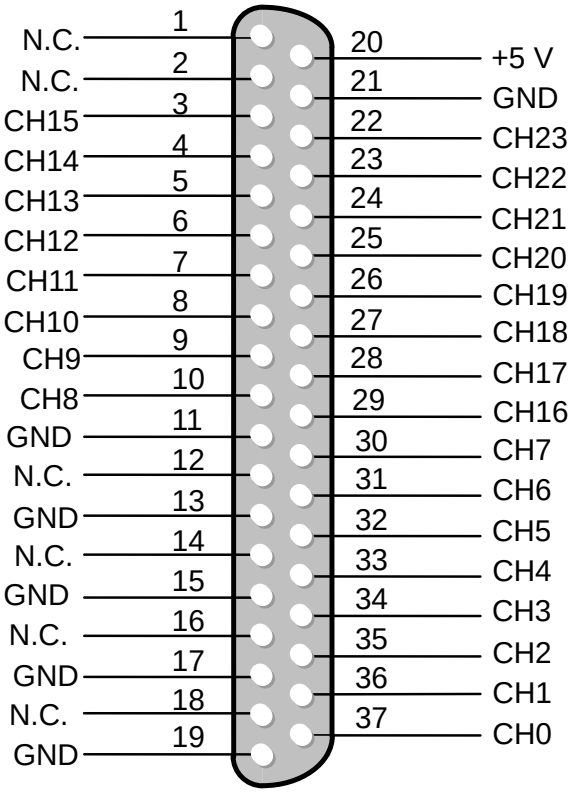
DB-24SSRDC



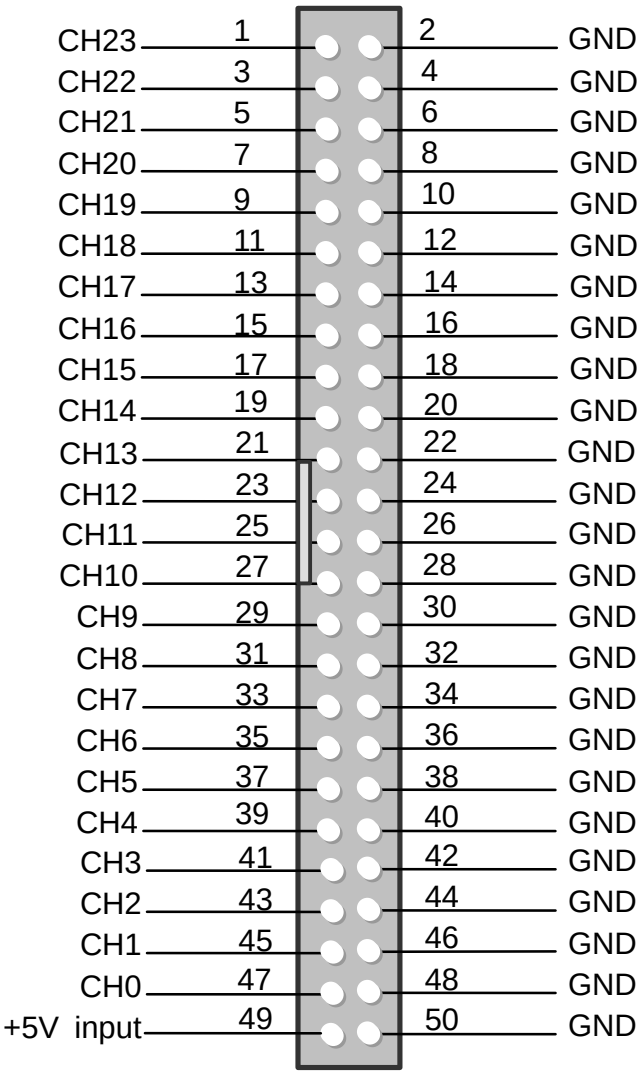
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10.7. Pin Assignment

■ CN1: 37-pin D-sub Connector



■ CN2: 50-pin header

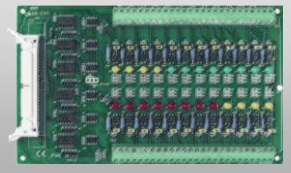


Note:
+5 V: Power input DC +5 V
GND: Power's Ground
CHn: TTL's Signal

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DB-24P/DB-24PD

24-channel Photo-Isolated Digital Input Board



11. Functional Description

The general specification of DB-24P is the same as DB-16P. But DB-24P has one Opto-22 compatible 50-pin connector and can be used for 24 channel photo-isolated digital input.
The DB-24PD is almost the same as DB-24P. But DB-24PD has one 37-pin D-sub connector.

11.1. Features

- 24 optically isolated digital input
- Connect to DIO-24, DIO-48, DIO-144 or any OPTO-22 compatible connector of digital input/output board.
- DB-24PD connect to PIO-D144, PIO-D96, PIO-D48 and PIO-D24
- AC/DC signal input
- AC signal input with filter
- Input buffer with voltage comparators
- 1000 V isolation
- Each channel has it's LED indicator

11.2. Applications

- 24 optically isolated digital input
- Connect to DIO-24, DIO-48, DIO-144 or any OPTO-22 compatible connector of digital input/output board.

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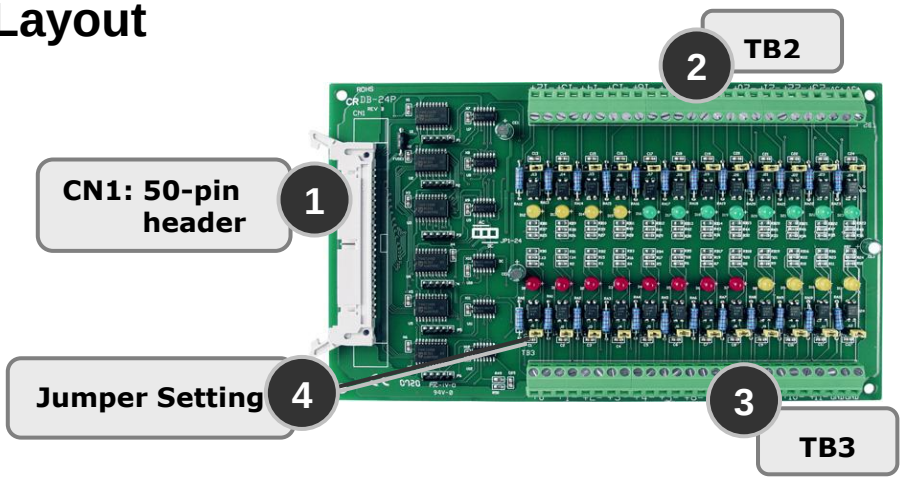
11.3. Specification

Digital Input		
Channels		24
Compatibility		TTL Compatible
Type		Optically Isolated
Max. Input Voltage		24 V_{DC} or 24 V_{AC}
Input Low Voltage (DC or peak AC)	Min.	0
	Max.	+/- 1 V
Input High Voltage DC 1 kHz AC	Min.	+/- 3.8 V_{DC} 4 Vrms
	Max.	+/-24 V_{DC} 24 V_{AC}
Impedance		1.2 K
Current	5 V input	4 mA/channel
	24 V input	20 mA/channel
Response Time		20 μs without filter 2.2 ms with filter
General		
Dimensions		213 mm x 132 mm
Environment		
Operating Temperature		0 ~ +50°C
Storage Temperature		0 ~ +60°C
Humidity		5% ~ 95% RH, non condensing
Power Requirements		
Power Consumption		290 mA/ +5 V (Max.) for DB-24P

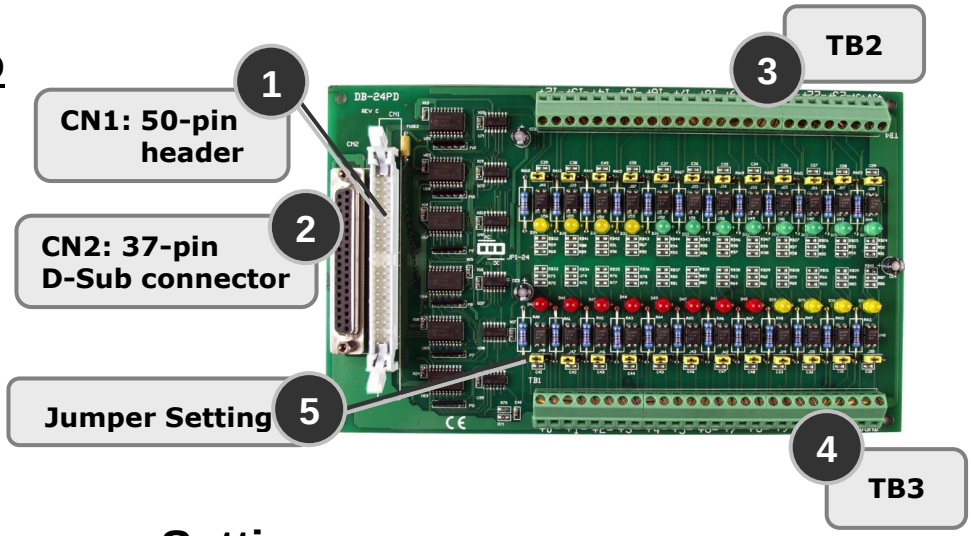
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11.4. Layout

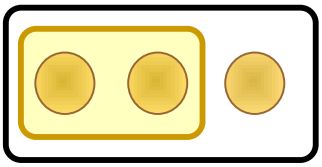
DB-24P



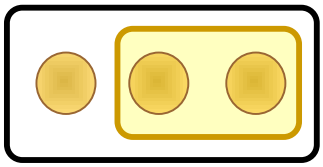
DB-24PD



11.5. Jumper Setting



For AC signal with filter



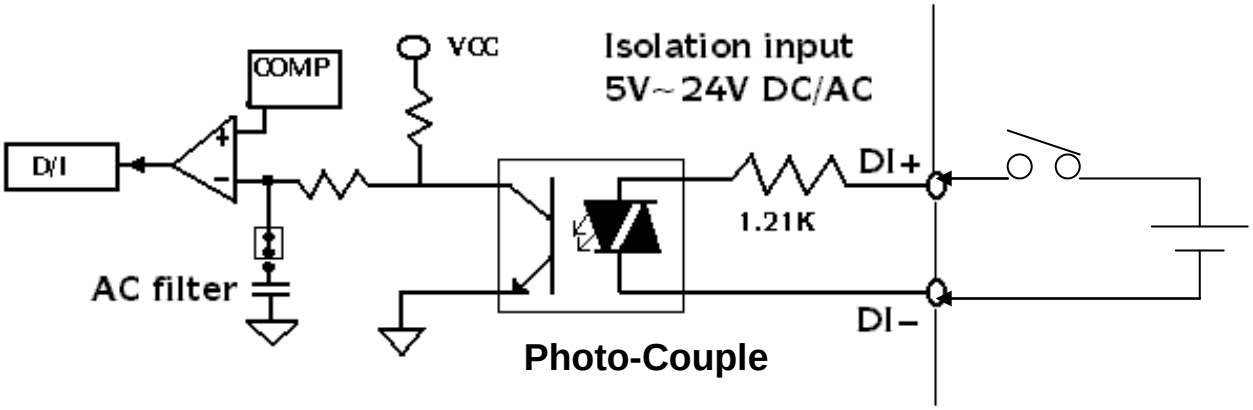
For DC signal without filter

If you are using AC signal, you must short the AC FILTER jumper.
If you are using DC input signals, the AC FILTER is optional. If the response time of input signals less than 20 μs, set the filter off. If you want a slow response (about 5 ~ 10 ms) for rejecting noise or contact bouncing, short the AC FILTER jumper.

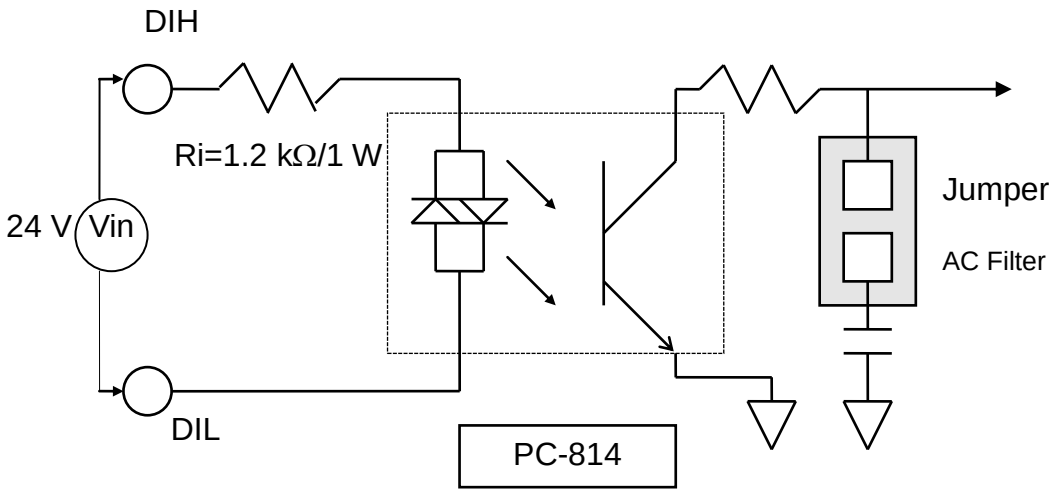
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11.6. Isolated Input

The normal input voltage range is 5 ~ 24 V_{AC} or V_{DC}.



The normal input range can be changed by choosing suitable resistor to limit the current through the Photo-isolator to about 10 mA(**I**f). The default resistor is 1.2 kΩ/1 W.



Ri = Vin/**I**f

Pw = **V**in x **I**f

Calculation Example:

If **V**in =120 V then **R**i=120(V) /0.01(A)=12 kΩ

Pw=120(V) x 0.01(A) =1.2 W

The **R**i must be replaced by 12 kΩ/2 W(1.2 W)

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11.7. Pin Assignment

■ TB3 Pin Assignment

Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Label	0H	0L	1H	1L	2H	2L	3H	3L	4H	4L	5H	5L	6H

Pin Number	14	15	16	17	18	19	20	21	22	23	24	25	26
Label	6L	7H	7L	8H	8L	9H	9L	10H	10L	11H	11L	GND	GND

■ TB2 Pin Assignment

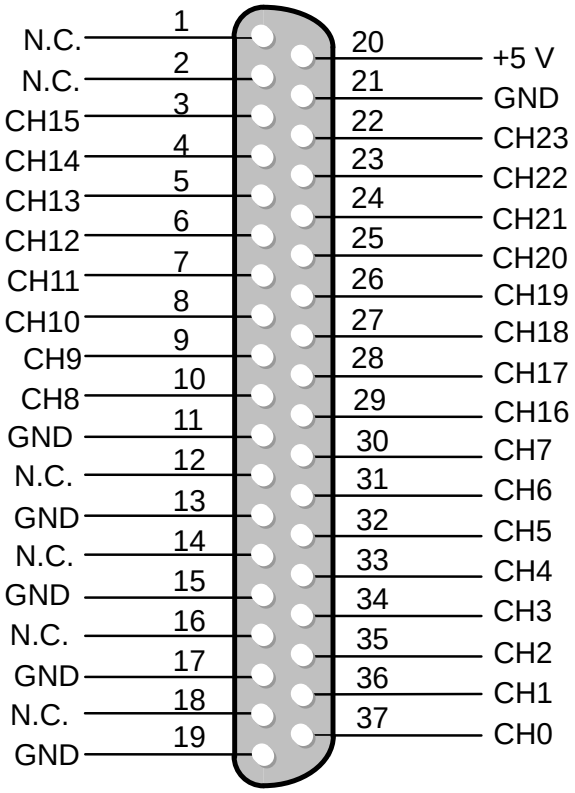
Pin Number	1	2	3	4	5	6	7	8	9	10	11	12	13
Label	12H	12L	13H	13L	14H	14L	15H	15L	16H	16L	17H	17L	18H

Pin Number	14	15	16	17	18	19	20	21	22	23	24	25	26
Label	18L	19H	19L	20H	20L	21H	21L	22H	22L	23H	23L	+5 V	+5 V

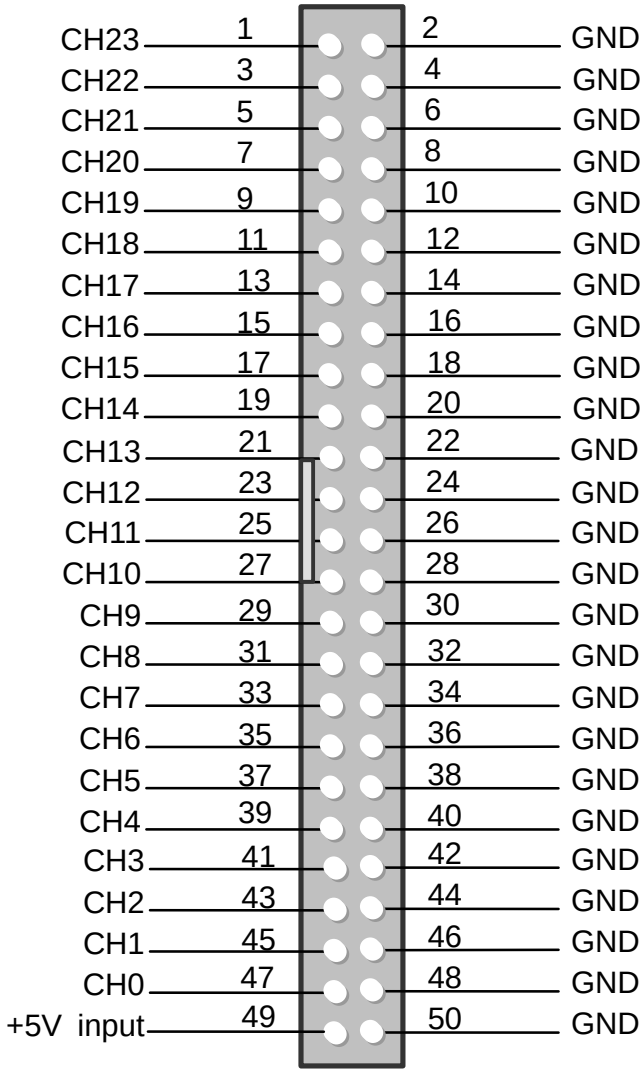
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■ CN1 OPTO-22 Connector Pin Assignment

37-pin D-sub connector Pin Assignment (DB-24PD only)



50-Pin Pin Assignment (DB-24P and DB-24PD)



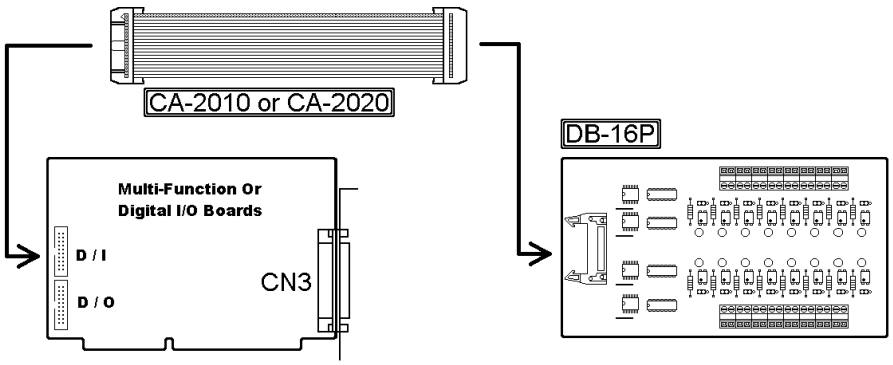
Note:
+5 V: Power input DC +5 V
GND: Power's Ground
CHn: TTL's Signal

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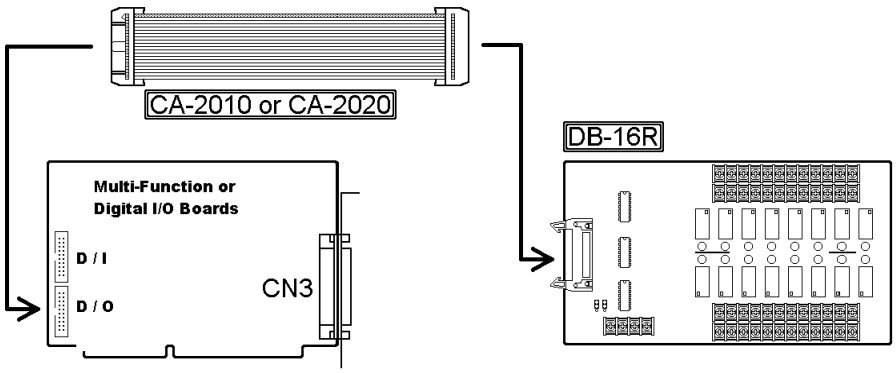
12. Configuration

12.1. Connect to DIO Board

- DB-16P/DB-16R connect to 20-pin digital input/output connector



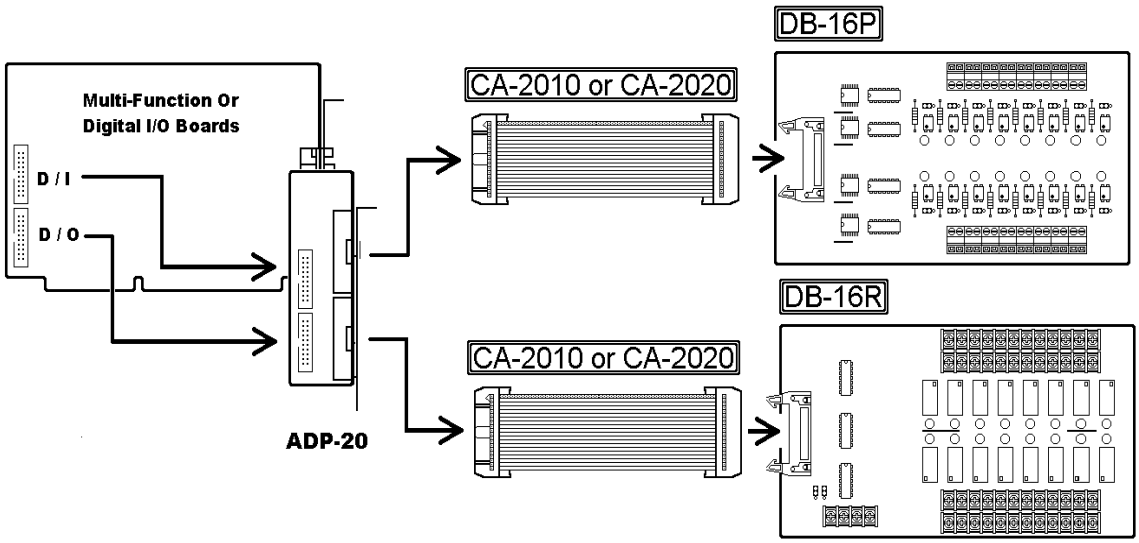
DB-16P linked to digital input port of multi-function board



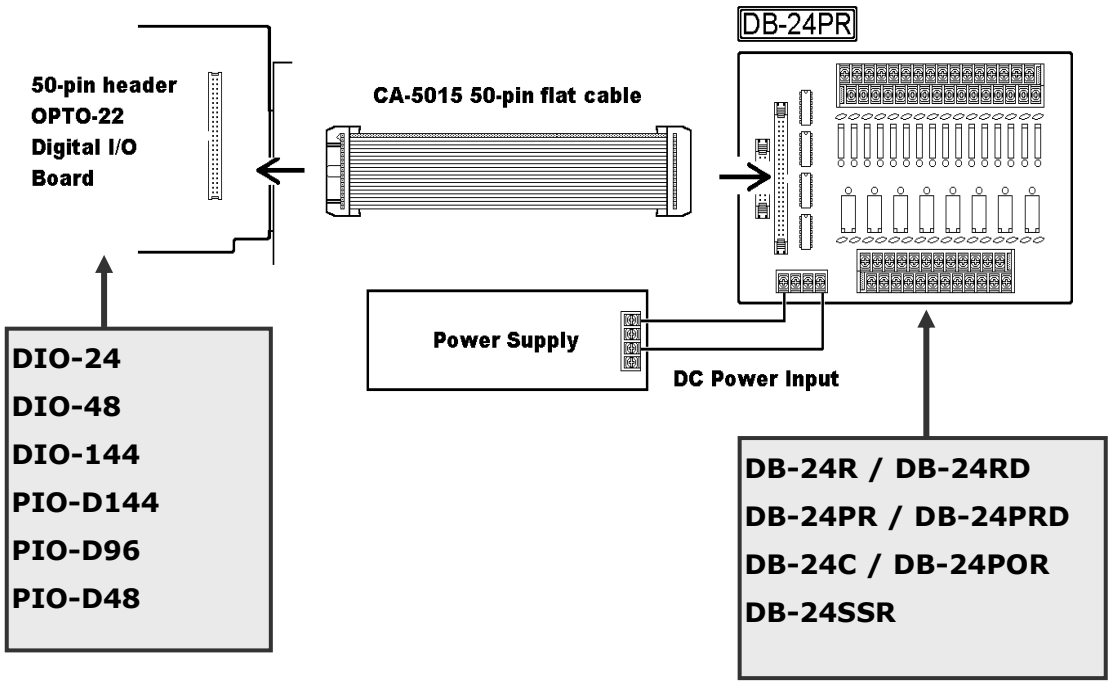
DB-16R linked to digital output port of multi-function board

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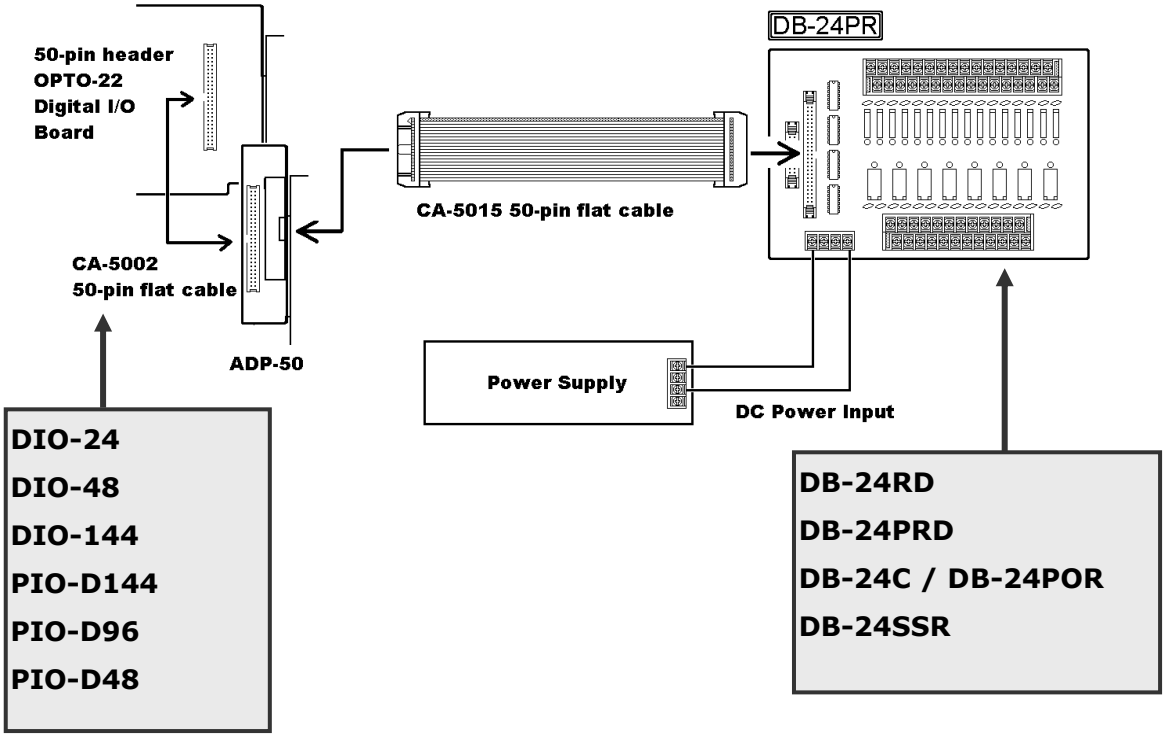
- The DB-16P/DB-16R linked to Multi-Function board via ADP-20 extender.



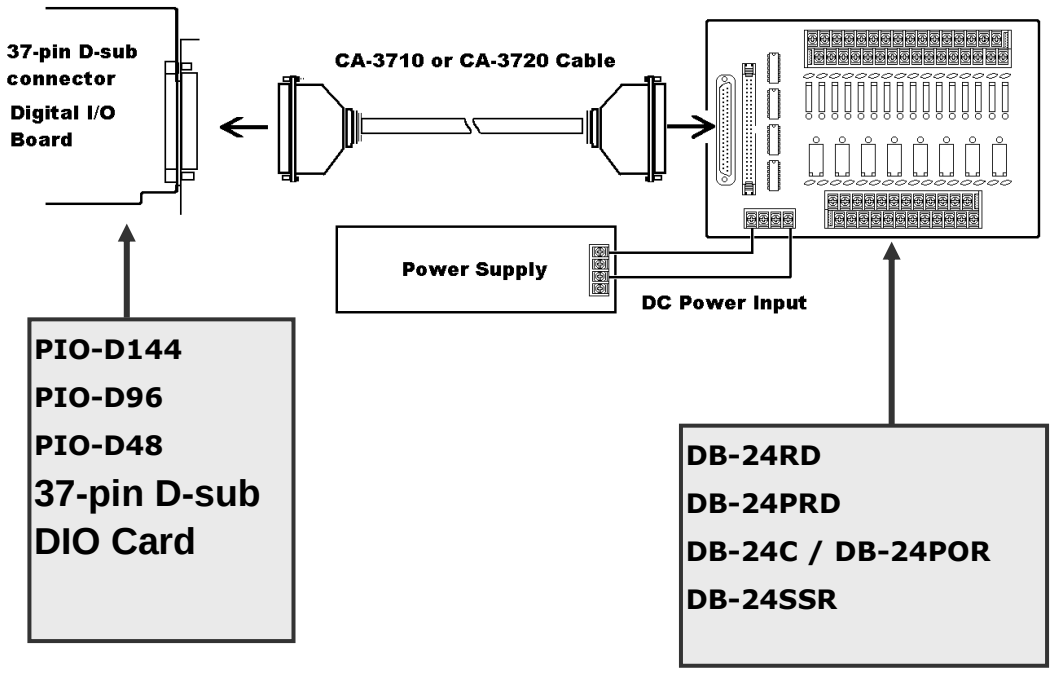
- 50-pin OPTO-22 compatible connector directly connected



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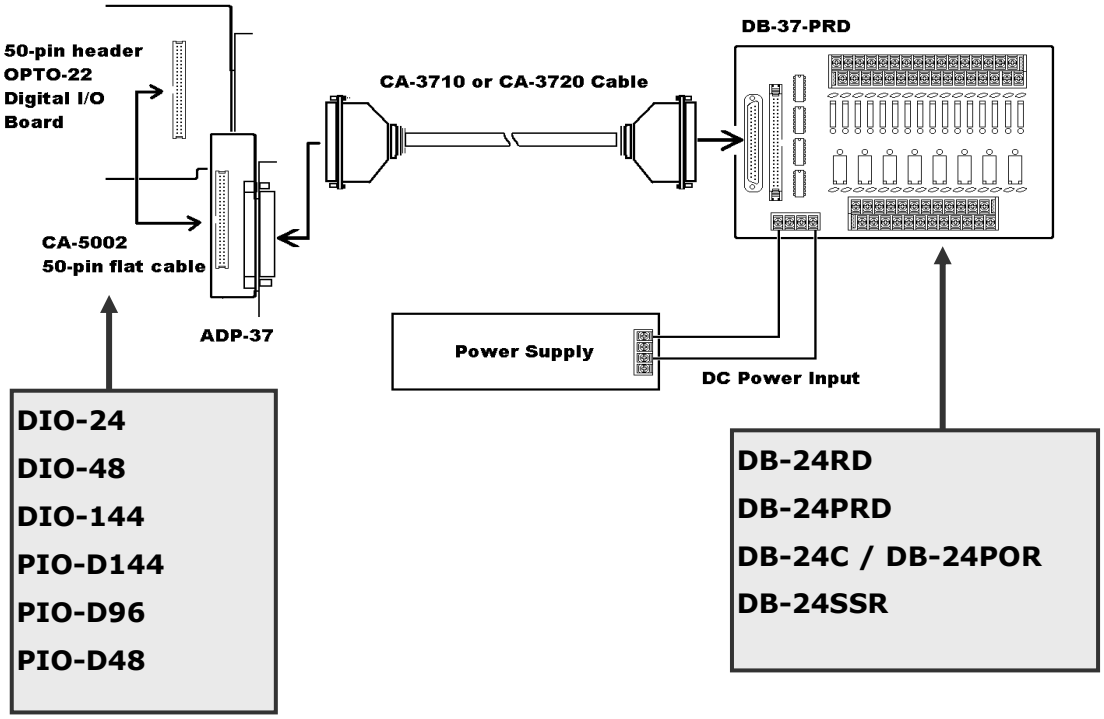


■ Connect to 37-pin D-sub connector



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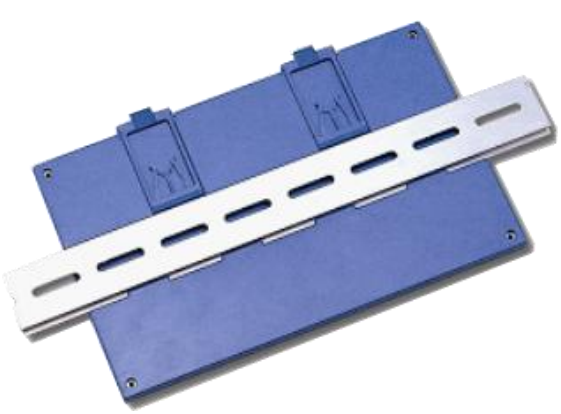
- 50-pin header converts to 37-pin D-sub connector via the ADP-37

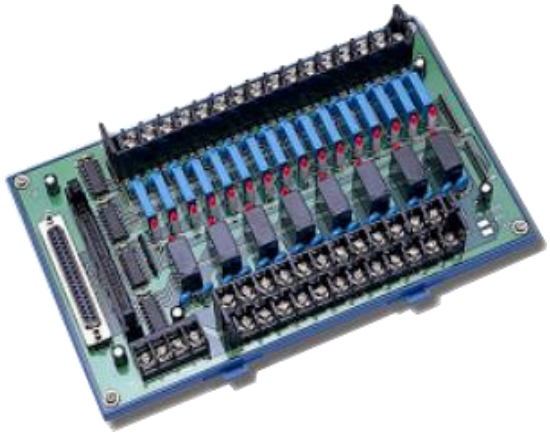


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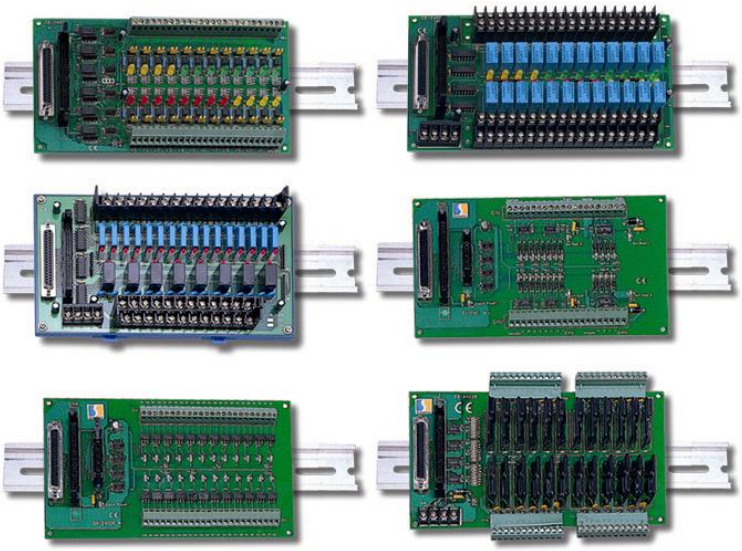
12.2. DIN-Rail Mounting

The DB-24P, DB-24R, DB-24PR, DB-24C, DB-24POR, DB-24SSR, DB-16P8R series daughter boards can choose DIN-OPTO22 kit for DIN-Rail mounting.





DB-24P/DIN
DB-24PD/DIN
DB-24R/DIN
DB-24RD/DIN
DB-24PR/DIN
DB-24PRD/DIN
DB-24C/DIN
DB-24POR/DIN
DB-24SSR/DIN
DB-16P8R/DIN



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