

## Tips of Digital I/O Boards

### 1. Digital I/O

Board-level data acquisition provides input and output signals between external machinery and the computer (with ON-OFF signal available via the PC). If a digital I/O board is used, the relay of various control circuits and the state of the operation switches can be supervised. Ongoing monitoring of controller input / output and digitized data can be easily done.

### 2. Digital I/O Board Types / Applications

#### ■ Opto-isolated I/O

In these boards, the logic and input-and-output circuits are isolated with an optical photo-coupler. A signal (information) is converted and transmitted via light thereby avoiding the electric noise generated in the operation circuit. However, since a photo-coupler requires additional power, an external DC power supply is required. Used with light electrical machinery whose operation circuits are DC 5-24V, such as a digital switch or display machine.

##### ● High-speed Opto-Isolated

Supplies high-speed photo-coupler isolation I/O. Used when high-speed I/O is required.

##### ● Opto-Isolated I/O w/on-board Power Supply

Supplies an internal logic circuit which carries an isolated DC power supply making it possible to supply the power to operate the photo-coupler from on board DC-DC converter. Used when an external power supply cannot be supplied.

#### ■ Relay Output

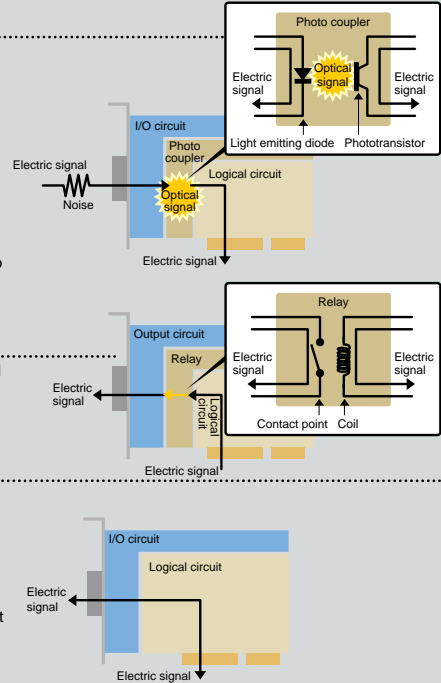
Uses a mechanical contact relay for the output circuit. The logic and output circuits on the board are isolated by a mechanical contact relay. AC load can also be connected. Used when controlling high voltage electrical machinery in which an operation circuit is AC or exceeds DC24V.

#### ■ TTL I/O

Supplies high-speed I/O, directly linking the input-output and logic circuits on the board. However, it is best used when the electrical noise is at a minimum and wiring distance is short, since Relay TTL is easily influenced by electrical noise. Used when a small TTL level (5VDC) relay is needed for connection with the external machinery.

##### ● Bi-directional TTL I/O

Directly links the input-output and logic circuits via an i8255 (or equivalent) chip. It can carry out variable eight-point bi-directional I/O. Used for TTL level (5VDC) bi-directional I/O connection with external machinery.



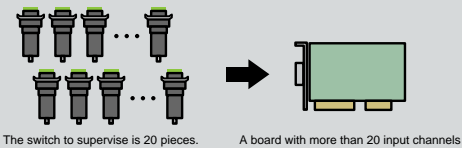
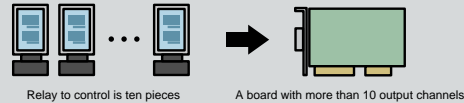
### 3. Selection of Digital I/O Boards

There are a number of digital I/O boards to choose from, each with varying specifications. The following will help in selecting the optimal board for your application.

#### STEP 1 How many input / output channels are needed?

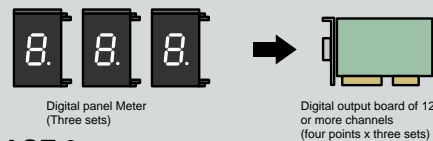
##### CASE 1 [for relay control and/or switch monitoring]

When deciding how many I/O channels are needed consider both the number of relays or switches (on/off) on the equipment to be monitored and their functions; i.e. alarms, reset, handshake.



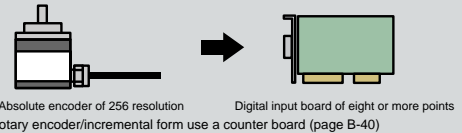
##### CASE 2 [7 segment display unit BCD or binary code with digital switches]

If the type of decimal number or hexadecimal is used, 4 bits (four points) of output or an input are usually needed for one digit.



##### CASE 3 [rotary encoder/absolute-type with binary output]

Consider the resolution of one rotation. For example, if it is the type that resolves one rotation each 256 minutes, ( $256 = 2^8 \rightarrow 8$  bits) eight point input is needed.



\* For a rotary encoder/incremental form use a counter board (page B-40)

#### STEP 2 Which I/O circuitry is suitable for machinery to be monitored?

##### CASE 1

[open collector and input circuit designs / the output circuit of the machinery / voltage of operation circuit in photo-coupler insulation input (DC) does not exceed DC24V]

→Suitable boards - opto-isolated I/O i.e. PIO-32/32L(PCI)

##### CASE 2

[input and output of equipment perform high-speed communication on TTL level-diagram]

→Suitable boards - non-insulated TTL-level I/O i.e. PIO-32/32T(PCI)

→If greater insulation is required insulated TTL-level I/O is suitable i.e. PIO-16/16TB(PCI)

#### STEP 3 What other factors need to be considered?

- Check for necessary response speed, interrupts and optional functions.
- Decide on support software according to development environment or control need.