Isolated Counter Input Module for USB 2.0

CNT24-2(USB)GY

This product is compact isolated up-down counter module which is applied to USB and can be used easily. It not only counts high-speed pulses but also can be used for position alignment control in combination with an encoder. In addition, external electric do not have direct effect on the host computer because of the isolation between control external signals and the CPU of the controller module by Optocoupler. Now serviceable with USB-compatible PCs, this module is best suited for use with notebook PCs with no PCI bus expansion slot. When using it on a desktop computer, you can perform simple connection without the need for opening the host cover. Being connected with USB port, the module can be setup simply. In addition, it can be used immediately owing to the supplied Windows development environment and Utility. The communication in Full Speed (12Mbps) is added to this USB module, and which is compatible with High Speed (480Mbps). High Speed is namely High-Speed data communication which is additional definition in the specification of USB2.0. The host controller performs communication in 480Mbps when corresponding to High Speed of USB2.0.

Features

Support various kinks of counter modes
The count method supports single-phase input, 2-phase input and single-phase input with gate control. Because it can be connected with a rotary encoder, using it can easily perform the position detection and revolution speed measurement.

- Single-phase input
  It can be used to keep track of the number of good products and inferior products on a product examination line.

- 2-phase input
  It can be used to measure moving distance and to detect position. Detailed control can be effected by setting the count input multiplier to 2 or 4.

- Single-phase input with gate control
  Because the pulse count time can be controlled via external signal, it is very convenient to use the module to measure the revolution speed.

Digital filter
The digital filter which is designed to cut the chattering of input pulse signal has been installed. The allowable range of the sampling cycle is 0.1 - 1056.1μsec.

Count-match output
Once the count comparison value has been set, the module will output a signal to external when there is a match between a count value and a count comparison value. The allowable setting range of the output signal width is 0 - 104.5ms.

Isolated from external device
Because the isolation between the CPU and the external device is made by Optocoupler, the change of external circuit will not affect the computer by USB port. (There is not external electric effect on the host computer by way of USB ports because of the isolation between the CPU of the module and external device by Optocoupler.)

Easy to wire
The system incorporates a screwless connector plug that allows you to easily attach and detach wires without using any special tools.

Easy-to-install design
The system, in the module itself, incorporates a 35mm DIN rail mounting mechanism as a standard item, so it can be attached and detached easily.

Easy to extend input channel
By adding expansion modules sold separately, the number of input/output channels can be increased. It adopts the unique configuration of stack connecting which permits a simple, compact system configuration.

CNT24-2(USB)GY + CNT24-2(FIT)GY x 3
(Up to 8 input channels can be extended)

Easy-to-develop-application sample program
Visual Basic, Visual C++, Delphi and C++ Builder sample programs have been prepared. Functions convenient for developing generic applications, such as the functions that acquire the list of the current available modules, are prepared.

Easy-to-debug utility
Counter monitor
Without programming, the user can easily operate the module. The current status can be verified by the indicator. The output value can be set by mouse-clicking on a switch only.

Diagnostic program
When the problem occurred, it will be helpful to solving the problem.
When using the attached AC adaptor POA200-20-2, it is 0 - 40°C.

The USB interface can accommodate up to 127 devices on the bus. As a USB hub itself, CNT24-2(USB)GY can support another 2 devices (up to 129 devices total).

When over 500mA, a bundled AC adapter should be used.

When using the attached AC adapter POA200-20-2, it is 0 - 40°C.

The external power is 5 - 12VDC ±10% (Min.).

The responding speed of API function by USB communication is about several msec in practice. (Depending on the environment of the PC being used (OS, USB host controller).)

The maximum distance of signal extension used at the same time is 30m.

CONTEC provides download services (at http://www.contec.com/apiusbp/) to supply the updated drivers and differential files.

It is the library software, and which supplies command of hardware produced by our company in the form of standard Win32 API function (DLL).

Using programming languages supporting Win32API functions, such as Visual Basic and Visual C/C++ etc., you can develop high-speed application software with feature of hardware produced by our company.

In addition, you can verify the operation of hardware using Diagnostic programs.

It also supplies the up-to-date driver and download service for missing files.

Further details may be found in the help within supplied CD-ROM or the homepage of our company.

The CD-ROM contains the driver software and User's Guide.

Other information may be found in the help within supplied CD-ROM or the homepage of our company.

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CONTEC provides download services (at http://www.contec.com/apiusbp/) to supply the updated drivers and differential files.

API functions library API-USBP(WDM) (Bundled)

Primary corresponding OS: Windows Vista, XP, Server 2003, 2000, Me, 98

Primary corresponding language: Visual Basic, Visual C++, Visual C#, Delphi, C++ Builder

CONTEC provides download services (at http://www.contec.com/apiusbp/) to supply the updated drivers and differential files.

### Accessories (Option)

AC adapter

- Input: 90 - 264VAC, output: 5VDC 2.0A
- Compatible plug: FK-MC0,5/9-ST-2.5 (made by Phoenix Contact)
- Expansion module: CNT24-2(USB)GY : 3 modules (Max.), CNT24-2(FIT)GY : 3 modules (Max.), CNT24-2(FIT)GY : 3 modules (Max.)
- Current consumption/module: +5VDC 180mA (Max.)

DC-DC power supply unit

- Input: 85 - 132VAC, output: 5VDC 3.0A
- Compatible plug: FK-MC0,5/9-ST-2.5 (made by Phoenix Contact)
- Expansion module: CNT24-2(USB)GY : 3 modules (Max.), CNT24-2(FIT)GY : 3 modules (Max.), CNT24-2(FIT)GY : 3 modules (Max.)
- Current consumption/module: +5VDC 180mA (Max.)

### Packing List

Module [CNT24-2(USB)GY] … 1
First step guide … 1
CD-ROM *1 [API-USBP(WDM)] … 1
Interface connector (plugs) FK-MC0,5/9-ST-2.5 ... 2
AC adapter (1.5m) ... 1
USB cable (1.8m) ... 1
Rubber feet ... 4
Manual ... 1

*1 The CD-ROM contains the driver software and User’s Guide.
When connecting this product to an external device, you can use the supplied connector plug. When wiring the Module, strip off approximately 7 - 8 mm of the covering for the cable, and insert the bare wire by pressing the orange button on the connector plug. Releasing the orange button after the wire is inserted fixes the cable. Compatible wires are AWG 28 - 20.

⚠️ CAUTION
Removing the connector plug by grasping the cable can break the wire.

Connecting to a rotary encoder
When the Module is used with an external 5-V power supply, a current limiting resistor do not have to be inserted. When it is used with an external 12-V power supply, however, a resistor of about 400 ohms is required.

Connecting to count-match output
The count-match output section has an open collector configuration based on Optocoupler isolation. Driving the output of this product requires an external power supply 5 – 12V. Nominal output: 35VDC 50mA(Max.)

Point
A surge voltage protection circuit is not provided on the output transistors for this product. Therefore, when driving relays, lamps, and other induction loads using this product, a surge voltage countermeasure should be provided on the load side. For a description of how to deal with surge voltages, see “Surge Voltage Countermeasures”.

Point
The Device ID of this product is fixed at "0".

Signal Layout
This product can be connected to an external device using a 9-pin connector that is provided on this product’s face.

Connection Method

![Diagram showing connection method and signal layout](image-url)
External Input and Output Circuit

Input section

The signal input section consists of an Optocoupler isolated input (compatible with current sink output). Therefore, driving the input section for the module requires an external power supply.

When an external power supply other than 5V is used, insert a current-limiting resistor at position R. If PV denotes an external power supply, the current-limiting resistor R can be calculated as follows:

\[
\frac{P-5}{20} < R\Omega \times \frac{P-5}{15}
\]

For example, P = 12V will require the following resistance: 350Ω < R < 470Ω.

In addition, the general-purpose input signal also has a similar circuit configuration.

Output section

When there is a match between a channel count and a specified value, a one-shot (one pulse) match signal is output to the outside. The signal output section has an open collector configuration based on Optocoupler isolation.

Driving the output of this module requires an external power supply.

Counting Function

The functions supported by this product is listed below. Because the count input multiplier and clear method can be set separately, the supported modes are as follows: single-phase input is of 1 mode, 2-phase input is of 6 modes, single-phase input with gate control is of 2 modes.

<table>
<thead>
<tr>
<th>Input format</th>
<th>Count input multiplier</th>
<th>Clear Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Multiplier</td>
<td>2 Multiplier</td>
</tr>
<tr>
<td>Single-phase input</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2-phase input</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Single-phase input</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Connecting an External Power Supply Such as the AC Adapter in Self-powered Mode

This product must be self-powered for use. For use in self-powered mode, use the +5-VDC input terminal.

When using the supplied AC adapter [POA200-20], please connect directly to the input terminals.

*1 When you use the module in a noisy environment or are nervous about noise, ground the module (using a M3 screw).
*2 When you use the module in a noisy environment or are nervous about noise, connect the AC adapter’s connector plug to the ground.

Beside the AC adapter, a power supply for installation on a DIN rail is also available (as an option). Use the appropriate power supply depending on the operating environment and application.

<table>
<thead>
<tr>
<th>Type</th>
<th>Model</th>
<th>Input</th>
<th>Output</th>
<th>External dimension (mm)</th>
<th>DIN rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC adapter</td>
<td>POA200-20</td>
<td>90 - 264VAC</td>
<td>5.0VDC ±5% 2.0A(Max.)</td>
<td>40.0(W) x 105.0(D) x 30.0(H) (No protrusions)</td>
<td>-</td>
</tr>
<tr>
<td>AC-DC power</td>
<td>POW-AD13GY</td>
<td>95 - 132VAC</td>
<td>5.0VDC ±5% 2.0A(Max.)</td>
<td>52.4(W) x 64.7(D) x 94.0(H) (No protrusions)</td>
<td>Corresponding</td>
</tr>
<tr>
<td>DC-DC power</td>
<td>POW-AD22GY</td>
<td>95 - 265VAC</td>
<td>5.0VDC ±5% 2.0A(Max.)</td>
<td>52.4(W) x 64.7(D) x 94.0(H) (No protrusions)</td>
<td>Corresponding</td>
</tr>
<tr>
<td>power supply</td>
<td>POW-DD22GY</td>
<td>10 - 30VDC</td>
<td>5.0VDC ±5% 3.0A(Max.)</td>
<td>25.2(W) x 64.7(D) x 94.0(H) (No protrusions)</td>
<td>Corresponding</td>
</tr>
<tr>
<td>power supply</td>
<td>POW-DD33GY</td>
<td>30 - 50VDC</td>
<td>5.0VDC ±5% 3.0A(Max.)</td>
<td>25.2(W) x 64.7(D) x 94.0(H) (No protrusions)</td>
<td>Corresponding</td>
</tr>
</tbody>
</table>
Connecting with Expansion Accessories

When lacking of counter input channel used to connecting external device, you have to purchase a new same module, and thus it not only increases cost but also doubles installation space. At the same time, adding channels is considered when designing this product, and additional module can be connected by the connector on module side, so that not only the cost but also the installation space are controlled.

Up to 3 modules CNT24-2(FIT)GY can be connected when adding channels.

In the case of combination of this product and three expansion modules "CNT24-2(FIT)GY", it is possible to control 16 channels output by way of one USB port.

<table>
<thead>
<tr>
<th>Model</th>
<th>Output channel</th>
<th>Current consumption</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNT24-2(FIT)GY</td>
<td>2</td>
<td>+5VDC 150mA (Max.)</td>
<td>Expansion module for CNT24-2(USB)GY</td>
</tr>
</tbody>
</table>

**Point**

Up to 3 modules can be connected.

Please use the supplied AC adapter when adding modules.

Modules with different function from this product can not be connected.