

## 2/4 channels High Speed Counter Units

CS1W-CT021/CT041

- 2 or 4 Channels High Speed Counter Units for CS1 PLC.
- Frequency up to 500 kHz, closed loop response time as low as 0.1 ms.
- 4 Digital In, 4 Digital Out and 28 soft outputs can be freely allocated to counter channels.
- Interrupt functions built in.
- Simple mode or Configurable Mode.
- Three counter types: simple, linear and circular.
- Four counter signal levels: 5 Vdc, 12 Vdc, 24 Vdc and Line Driver.
- On the fly configuration changes.



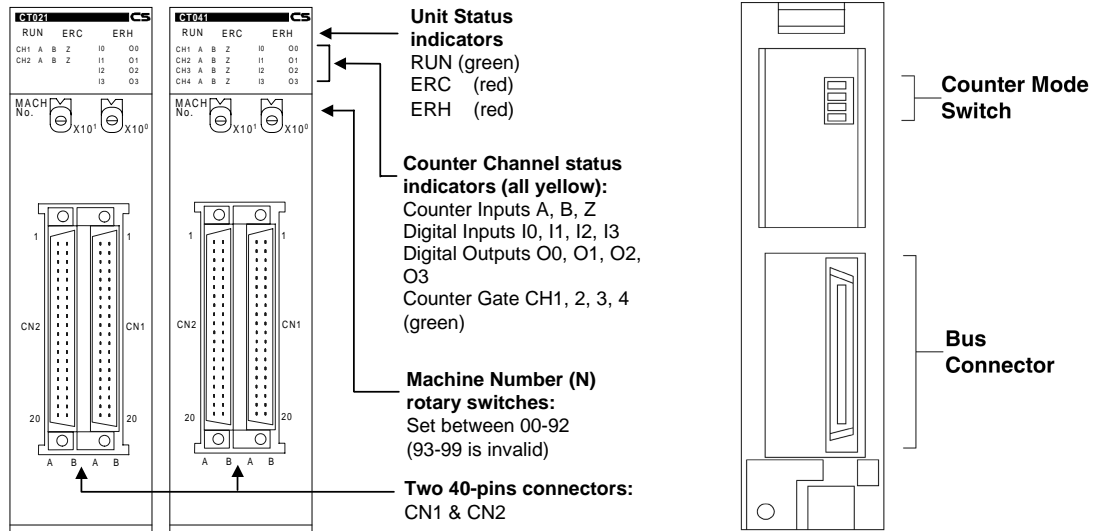
## Ordering Information

Product Code	Description
CS1W-CT021	2 channels High Speed Counter Unit
CS1W-CT041	4 channels High Speed Counter Unit
W902-E2-1	CS1W-CT021/CT041 High Speed Counter Units Operation Manual

## Specifications

Item	CS1W-CT021	CS1W-CT041
Number of counters	2	4
Operation modes	Simple counter, circular counter, linear counter	
Count inputs	Input signals	Phase A and B
	Signal levels	RS-422 line driver signal, 5, 12 or 24 Vdc selectable
	Types of inputs	Phase Differential; Up/Down; Pulse & Direction
	Counting rate	500 kHz max.
	Others	The multiple function (x1, x2 or x4) can be selected for phase differential input Counter inputs are insulated from each other and from the Digital inputs, insulated from the I/O-bus, and also reverse polarity protected
External inputs	Input signal	Input Z
	Signal levels	RS-422 line driver signal, 5, 12 or 24 Vdc selectable
	Input signal	4 Inputs (I0, I1, I2 and I3), that can be freely allocated to any counter
	Signal levels	24 Vdc
	Others	External inputs are insulated from each other, insulated from the I/O-bus, and also reverse polarity protected.
External outputs	Output signal	4 outputs, NPN / PNP selectable
	Signal levels	12 - 24 Vdc
	Switching capacity	46 mA at 10.2 Vdc to 100 mA at 26.4 Vdc; 400 mA max per common
	Others	Digital Outputs are insulated from the I/O-bus Output pattern include these 4 Digital Outputs and 28 soft outputs
Current consumption (5V via backplane)	360 mA	450 mA
Number of words allocated	40 CIO-words. First word allocated = CIO2000 + (Nx10) 400 DM-words. First word allocated = D20000 + (Nx100)	
Storage temperature	-20 to + 75 °C	
Ambient temperature	0 to + 55 °C	
Ambient humidity	10 to 90 % (non-condensing)	
EMC compliance	EN 50081-2, EN 61131-2	
Dimensions (mm)	35 x 130 x 100 (W x H x D)	
Weight	245 g	

# Nomenclature



## Unit status indicators

Name	Colour	State	Unit status
RUN	green	on	Normal operation
		off	Initialisation error
ERC	red	on	Unit error(check CIO n+17, n+18)
		off	Unit has no errors
ERH	red	on	CS1-CPU Unit error
		off	CS1-CPU Unit has no errors

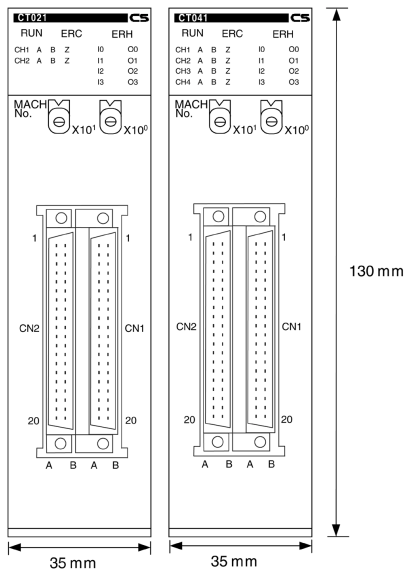
## Counter channel status

Name	Colour	State	Counter channel status
CH1, 2 CH3, 4	green	on	Counter running / Gate open
		off	Counter not running / Gate closed
A, B, Z	yellow	on	Physical input A, B, Z turned on
		off	Physical input A, B, Z turned off
I0, I1 I2, I3	yellow	on	Digital Input turned on
		off	Digital Input turned off
O0, O1 O2, O3	yellow	on	Digital Output turned on
		off	Digital Output turned off

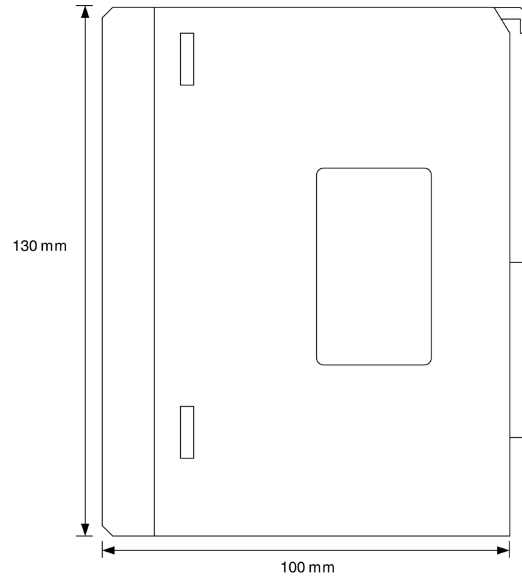
# Dimensions

**Note** All units are in millimeters unless otherwise indicated.

## Front View



## Side View



# Installation

## ■ Connector (CN1 and CN2) Pin-layout

Use the following table to make connections directly to the soldering terminals of the connector jack(s):

Item	Connector 2 (CN2)		Pin No.	
	Row A	Row B		
Power Supply (to feed the outputs)	-PS: 0V	+PS: 12 to 24V	1	
Digital Outputs [0-3] (NPN/PNP)	O2: NPN	O2: PNP	2	
	O3: NPN	O3: PNP	3	
Spare			4	
Digital Inputs [0-3]	I2: 0V	I2: 24V	5	
	I3: 0V	I3: 24V	6	
Spare			7	
Counter 1 & Counter 2	A	CH2: LD- / 0V	CH2: LD+	8
		CH2: 12V	CH2: 24V	9
	B	CH2: LD- / 0V	CH2: LD+	10
		CH2: 12V	CH2: 24V	11
	Z	CH2: LD- / 0V	CH2: LD+	12
		CH2: 12V	CH2: 24V	13
Spare			14	
Counter 3 & Counter 4*	A	CH4: LD- / 0V	CH4: LD+	15
		CH4: 12V	CH4: 24V	16
	B	CH4: LD- / 0V	CH4: LD+	17
		CH4: 12V	CH4: 24V	18
	Z	CH4: LD- / 0V	CH4: LD+	19
		CH4: 12V	CH4: 24V	20

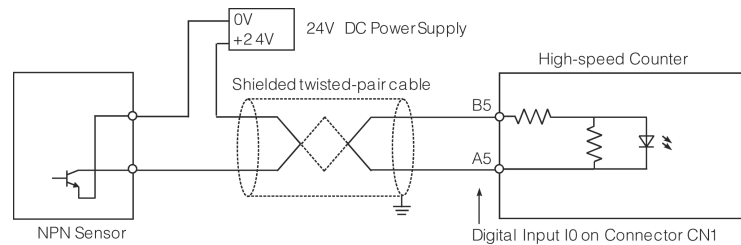
Connector 1 (CN1)		Pin No.
Row A	Row B	
-PS: 0V	+PS: 12 to 24V	1
O0: NPN	O0: PNP	2
O1: NPN	O1: PNP	3
		4
I0: 0V	I0: 24V	5
I1: 0V	I1: 24V	6
		7
CH1: LD- / 0V	CH1: LD+	8
CH1: 5V	CH1: 24V	9
CH1: LD- / 0V	CH1: LD+	10
CH1: 5V	CH1: 24V	11
CH1: LD- / 0V	CH1: LD+	12
CH1: 5V	CH1: 24V	13
		14
CH3: LD- / 0V	CH3: LD+	15
CH3: 5V	CH3: 24V	16
CH3: LD- / 0V	CH3: LD+	17
CH3: 5V	CH3: 24V	18
CH3: LD- / 0V	CH3: LD+	19
CH3: 5V	CH3: 24V	20

Note \*CS1W-CT041 High-speed Counter Unit only.

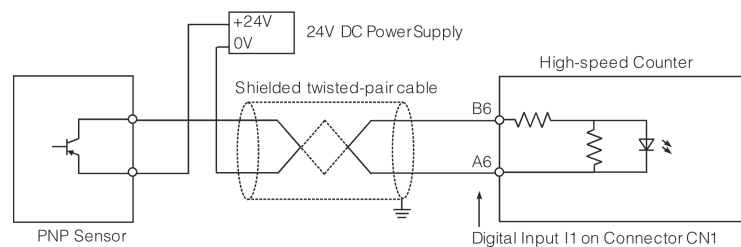
PS = Power Supply Lines, O0-O3 = Digital Outputs, I0-I3 = Digital Inputs, CH1-CH4 = Counter 1 - Counter 4, LD = Line Driver Signals

## ■ Digital I/O Circuit Configurations

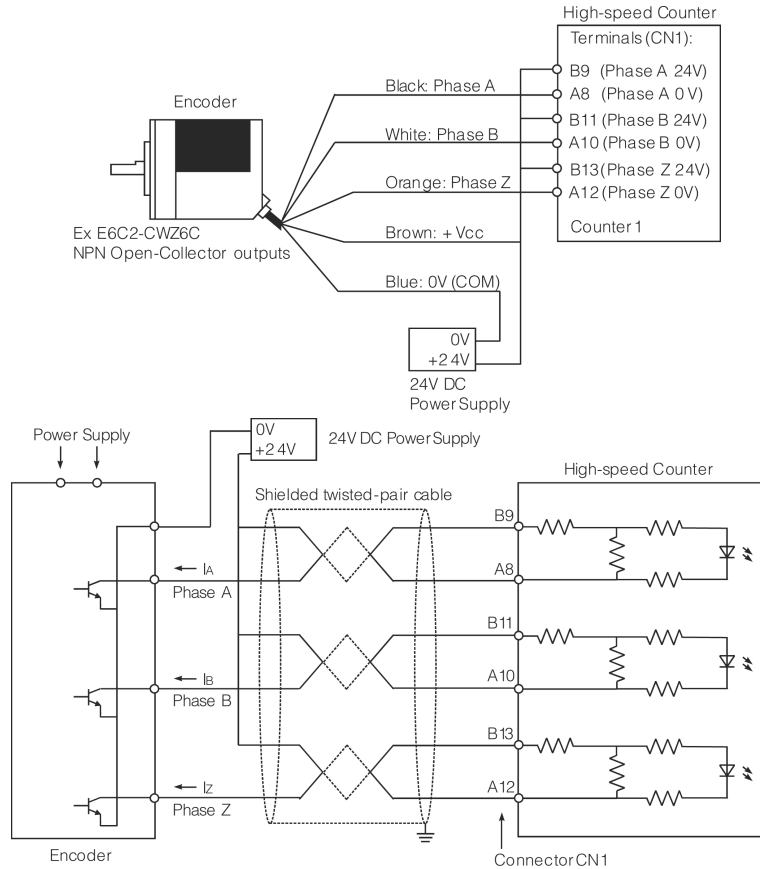
### 24 VDC NPN Sensor



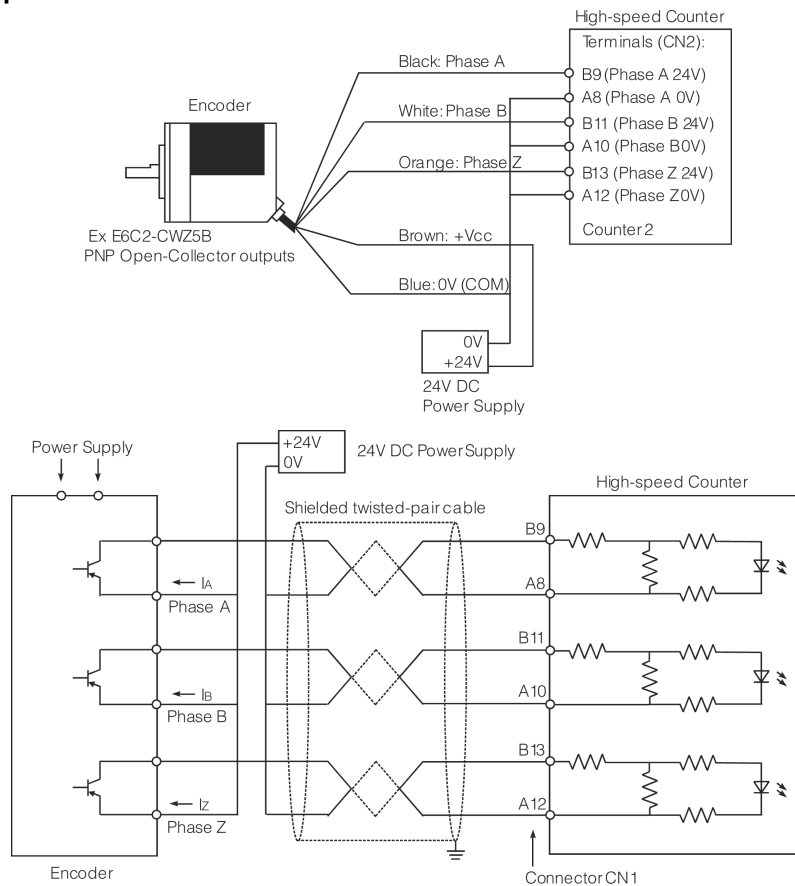
### 24 VDC PNP Sensor



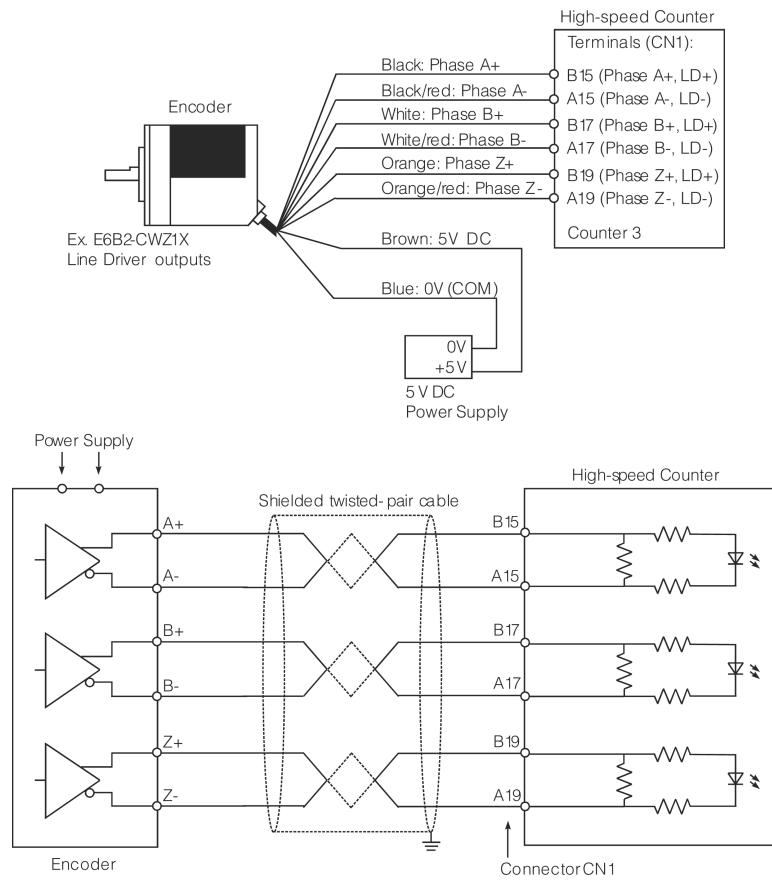
**Counter Input Configurations**  
**5/12/24 VDC NPN Open Collector**



**5/12/24 VDC PNP Open Collector**




Line Driver (RS422)




Operation

Machine Number Switch

Name	Function
MACHINE No. 	Sets the Machine Number* (00 - 92). <ul style="list-style-type: none"> <li>Machine Numbers 93-99 cannot be set and will generate an error.</li> <li>Make sure each Machine Number is used only once per CS1-CPU.</li> </ul> Be sure to turn off the power to the Unit before setting the Machine Number.

Note \* For the CS1W-CT021/041 40 CIO-words and 400 DM-words are allocated.

Counter Type Switch

Name	Function																							
Counter Type: 	Sets the Counter Type of every Counter (the switch is located at the back of the Unit):																							
	<table border="1"> <thead> <tr> <th>Pin</th> <th>Position</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td rowspan="2">1</td> <td>on</td> <td>Circular/Linear Counter*</td> </tr> <tr> <td>off</td> <td>Simple Counter</td> </tr> <tr> <td rowspan="2">2</td> <td>on</td> <td>Circular/Linear Counter*</td> </tr> <tr> <td>off</td> <td>Simple Counter</td> </tr> <tr> <td rowspan="2">3</td> <td>on</td> <td>Circular/Linear Counter*</td> </tr> <tr> <td>off</td> <td>Simple Counter</td> </tr> <tr> <td rowspan="2">4</td> <td>on</td> <td>Circular/Linear Counter*</td> </tr> <tr> <td>off</td> <td>Simple Counter</td> </tr> </tbody> </table>	Pin	Position	Type	1	on	Circular/Linear Counter*	off	Simple Counter	2	on	Circular/Linear Counter*	off	Simple Counter	3	on	Circular/Linear Counter*	off	Simple Counter	4	on	Circular/Linear Counter*	off	Simple Counter
Pin	Position	Type																						
1	on	Circular/Linear Counter*																						
	off	Simple Counter																						
2	on	Circular/Linear Counter*																						
	off	Simple Counter																						
3	on	Circular/Linear Counter*																						
	off	Simple Counter																						
4	on	Circular/Linear Counter*																						
	off	Simple Counter																						

Note \* Circular and Linear Counter are fully DM-configurable. Refer to Operation Manual (Cat. No. W902-E2-1).

■ Operating Simple Counter via CIO

Word* (output)	Bit	Function
<b>General</b>		
n	00-03	Manual Output Control Digital Outputs (On=1, Off=0)
	15	Automatic (=0) / Manual (=1)
n+1	00	Read (next) Error (0→1)
<b>Counter 1</b>		
n+2	00	Open Gate (0→1)
	01	Close Gate (0→1)
	02	Preset (0→1)
	03	Reset (0→1)
	04	Capture (0→1)
n+3, n+4	00-15	Preset Value (80000000 <sub>H</sub> - 7FFFFFFF <sub>H</sub> )
<b>Counter 2</b>		
n+5	See n+2	
n+6, n+7	See n+3, n+4	
<b>Counter 3**</b>		
n+8	See n+2	
n+9, n+10	See n+3, n+4	
<b>Counter 4**</b>		
n+11	See n+2	
n+12, n+13	See n+3, n+4	

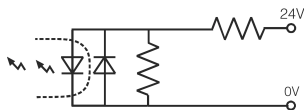
Word* (input)	Bit	Function
<b>General</b>		
n+14, n+15	00-15	Output Status (On=1, Off=0)
n+16	00-03	Input Status (On=1, Off=0)
n+17, n+18	00-15	Error Code
n+19	00	Global Error Indication
	02	Data Transfer Busy
	03	Data Transfer Completed
<b>Counter 1</b>		
n+22, n+23	00-15	Counter Value (80000000 <sub>H</sub> - 7FFFFFFF <sub>H</sub> )
n+24	00	Counter Overflow (=1)
	01	Counter Underflow (=1)
	02	Counter running/Gate Open (=1)
	03	Counting Direction (up=1/down=0)
	04	Preset Activated (=1)***
	05	Reset Activated (=1)***
	06	Capture Activated (=1)***
	07	Z-signal Activated (=1)***
15	Simple Counter selected (=1)	
<b>Counter 2</b>		
n+27, n+28	See n+22, n+23	
n+29	See n+24	
<b>Counter 3**</b>		
n+32, n+33	See n+22, n+23	
n+34	See n+24	
<b>Counter 4**</b>		
n+37, n+38	See n+22, n+23	
n+39	See n+24	

**Note** \* n = CIO2000 + (Nx10), \*\* CS1W-CT041 only, \*\*\* ON for one PLC-scan

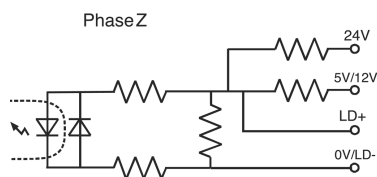
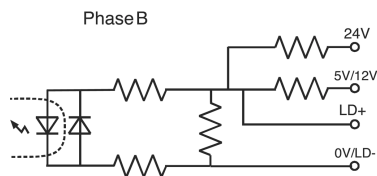
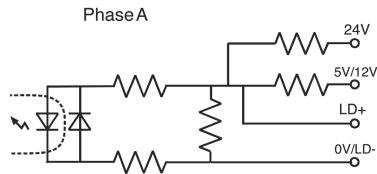
CX-Programmer Support Software or a Programming Console can be used to (DM-) configure Circular and Linear Counters. Refer to Operation Manual (Cat. No. W902-E2-1).

■ Internal Circuit Configuration

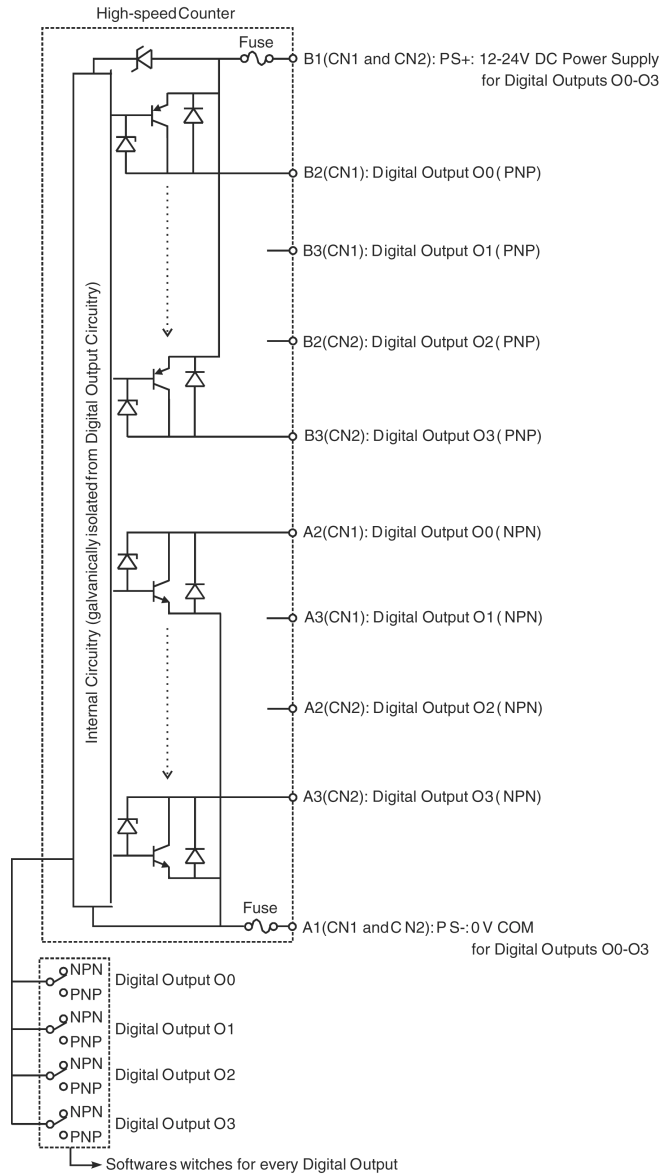
Digital Input



Counter Input





Digital Output



The Power Supply feeds the Digital Outputs, for both NPN- as PNP-configuration.

Accessories

<b>Terminal block types</b>		
	<b>XW2B-40G4</b>	<b>XW2B-40G5</b>
<b>I/O points</b>	32	32
<b>Screw size</b>	M2.4	M3.5
<b>Compatible cables</b>	XW2Z-050B (0.5 m), XW2Z-100B (1 m), XW2Z-150B (1.5 m), XW2Z-300B (3 m), XW2Z-200B (2 m), XW2Z-500B (5m)	

**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**  
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. R076-E2-01 **In the interest of product improvement, specifications are subject to change without notice.**

**OMRON EUROPE B.V.**

Wegalaan 67-69  
2132 JD Hoofddorp  
The Netherlands  
Phone: +31 23 568 13 00  
Fax: +31 23 568 13 88

Printed in the Netherlands