OMRON

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.
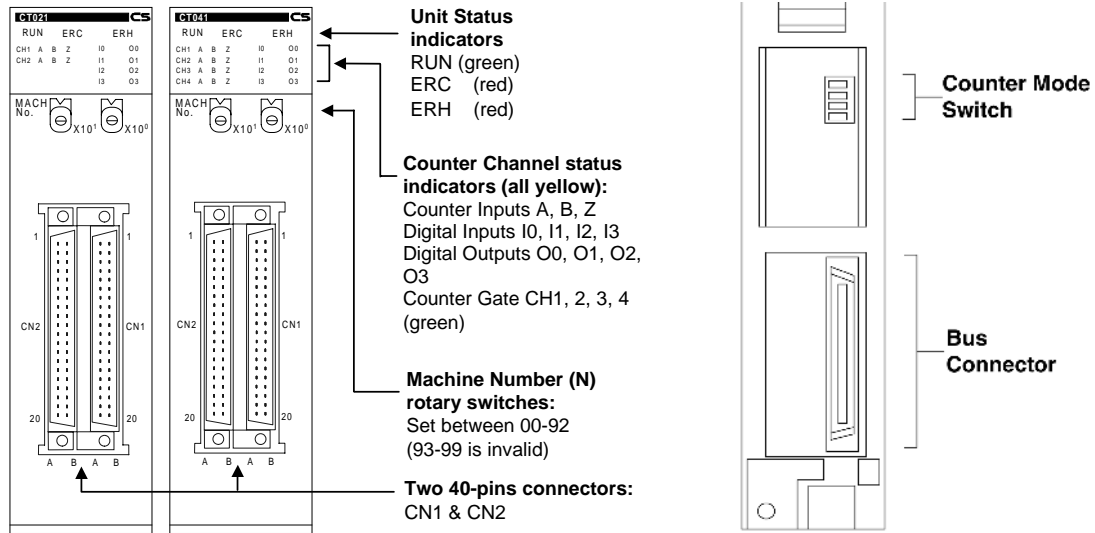- On the fly configuration changes.

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
RUN (green)
ERC (red)
ERH (red)

Counter Channel status indicators (all yellow):
Counter Inputs A, B, Z
Digital Inputs I0, I1, I2, I3
Digital Outputs O0, O1, O2, O3
Counter Gate CH1, 2, 3, 4 (green)

Machine Number (N) rotary switches:
Set between 00-92 (93-99 is invalid)

Two 40-pins connectors:
CN1 & CN2

Counter Mode Switch

Bus Connector

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

35 mm

35 mm

130 mm

Side View

130 mm

100 mm
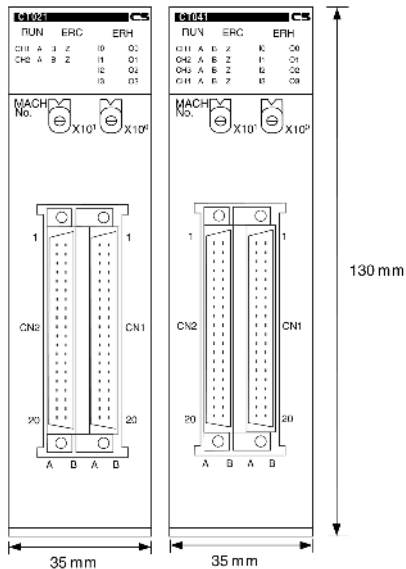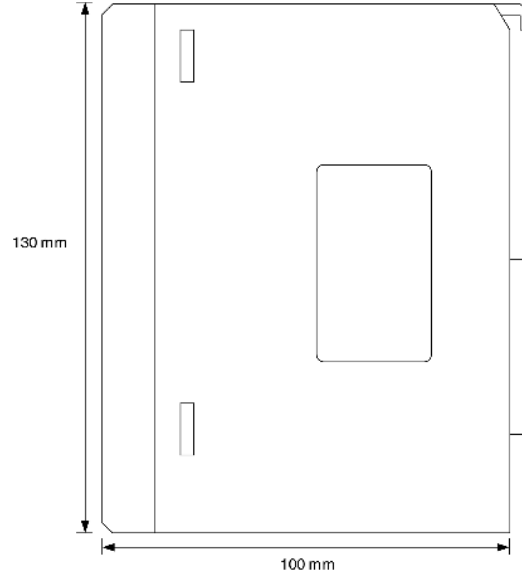
Installation ──────────────────────

■ 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.	Connector 1 (CN1)		Pin No.
		Row A	Row B		Row A	Row B	
Power Supply (to feed the outputs)		-PS: 0V	+PS: 12 to 24V	1	-PS: 0V	+PS:12 to 24V	1
Digital Outputs [0-3] (NPN/PNP)		O2: NPN	O2: PNP	2	O0: NPN	O0: PNP	2
		O3: NPN	O3: PNP	3	O1: NPN	O1: PNP	3
Spare				4			4
Digital Inputs [0-3]		I2: 0V	I2: 24V	5	I0: 0V	I0: 24V	5
		I3: 0V	I3: 24V	6	I1: 0V	I1: 24V	6
Spare				7			7
Counter 1 & Counter 2	A	CH2: LD- / 0V	CH2: LD+	8	CH1: LD- / 0V	CH1: LD+	8
		CH2: 12V	CH2: 24V	9	CH1: 5V	CH1: 24V	9
	B	CH2: LD- / 0V	CH2: LD+	10	CH1: LD- / 0V	CH1: LD+	10
		CH2: 12V	CH2: 24V	11	CH1: 5V	CH1: 24V	11
	Z	CH2: LD- / 0V	CH2: LD+	12	CH1: LD- / 0V	CH1: LD+	12
		CH2: 12V	CH2: 24V	13	CH1: 5V	CH1: 24V	13
Spare				14			14
Counter 3 & Counter 4*	A	CH4: LD- / 0V	CH4: LD+	15	CH3: LD- / 0V	CH3: LD+	15
		CH4: 12V	CH4: 24V	16	CH3: 5V	CH3: 24V	16
	B	CH4: LD- / 0V	CH4: LD+	17	CH3: LD- / 0V	CH3: LD+	17
		CH4:12V	CH4: 24V	18	CH3: 5V	CH3: 24V	18
	Z	CH4: LD- / 0V	CH4: LD+	19	CH3: LD- / 0V	CH3: LD+	19
		CH4:12V	CH4: 24V	20	CH3: 5V	CH3: 24V	20

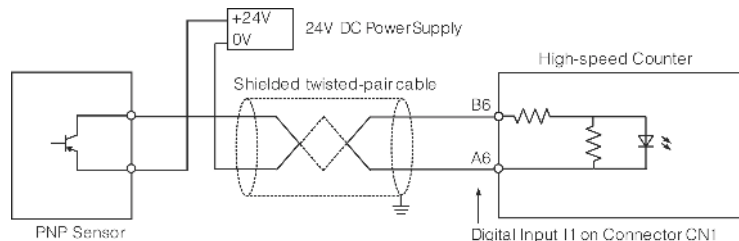**Note**   *CS1W-CT041 High-speed Counter Unit only.

PS = Power Supply Lines, O0-O3 = Digital Outputs, I0-I3 = Digital Inputs, CH1-CH4 = Counter 1 - Counter 4, LD = Line Driver Signals
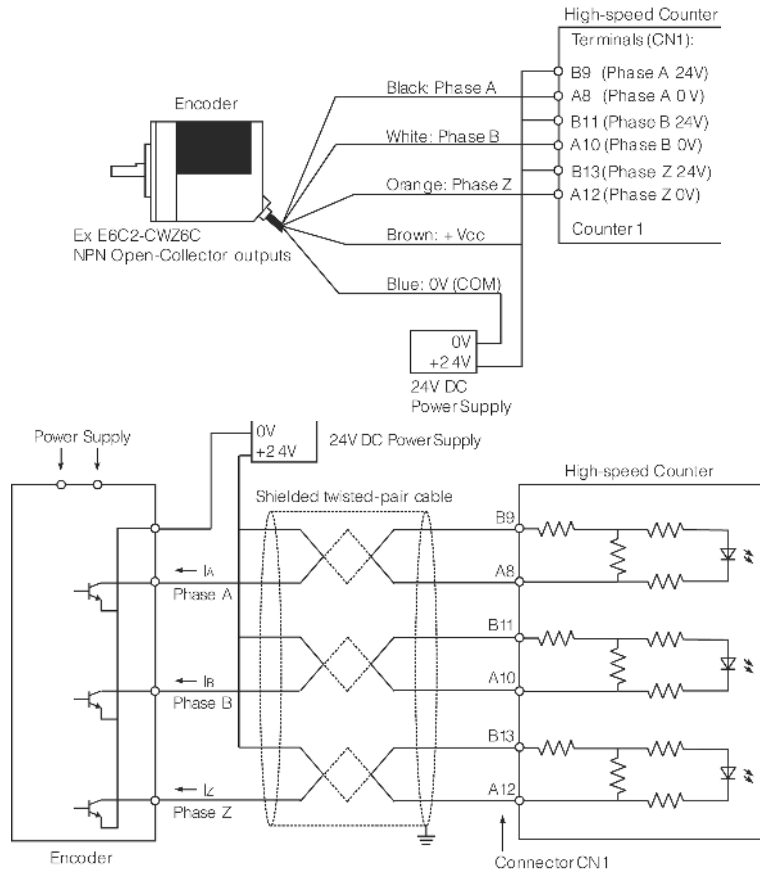
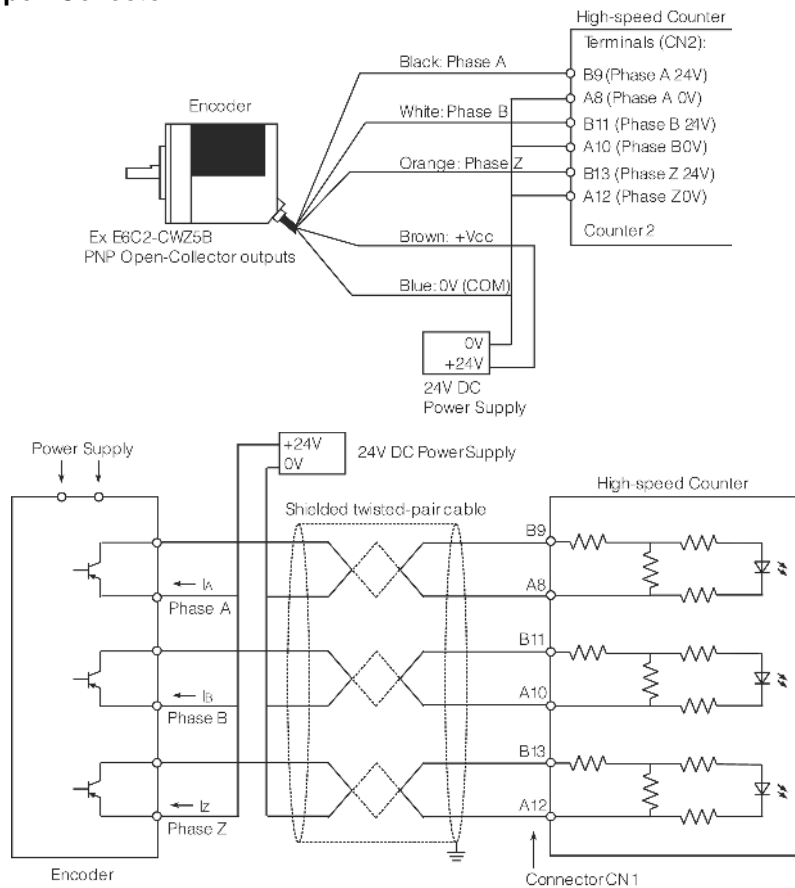## ■ Digital I/O Circuit Configurations

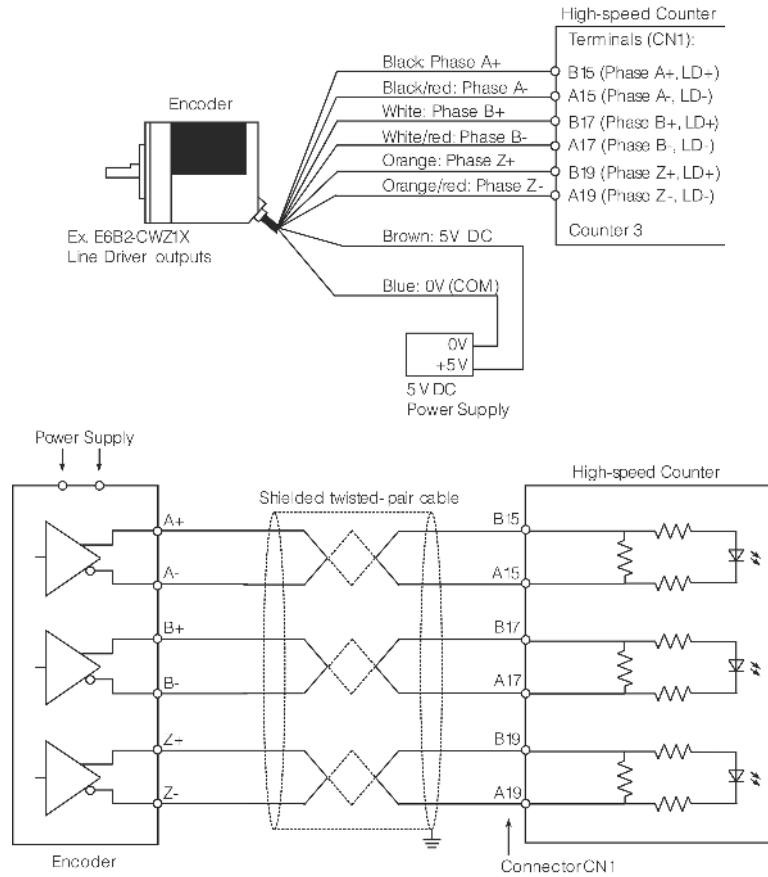### 24 VDC NPN Sensor

24 VDC PNP Sensor

3
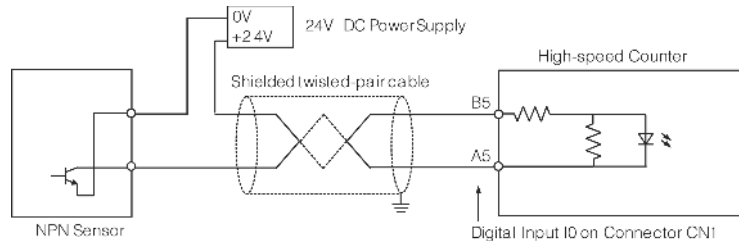
■ Counter Input Configurations
5/12/24 VDC NPN Open Collector

5/12/24 VDC PNP Open Collector

Line Driver (RS422)

Operation

■ Machine Number Switch

Name	Function
MACHINE No. MACH No. ⊖X10¹ ⊖X10⁰	Sets the Machine Number* (00 - 92). • Machine Numbers 93-99 cannot be set and will generate an error. • Make sure each Machine Number is used only once per CS1-CPU. 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):		
	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).
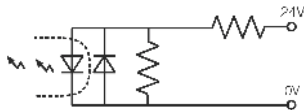
■ Operating Simple Counter via CIO

Word* (output)	Bit	Function
General		
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)
Counter 1		
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_H - $7FFFFFFF_H$)
Counter 2		
n+5		See n+2
n+6, n+7		See n+3, n+4
Counter 3**		
n+8		See n+2
n+9, n+10		See n+3, n+4
Counter 4**		
n+11		See n+2
n+12, n+13		See n+3, n+4

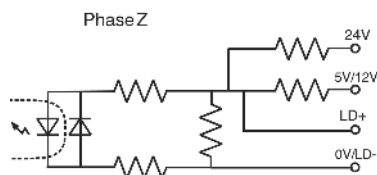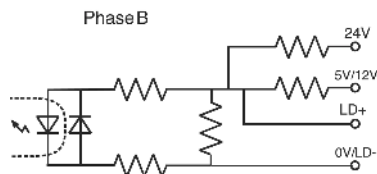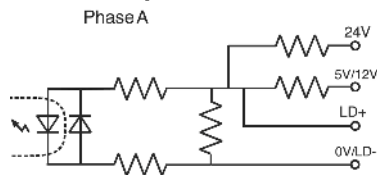| Word* (input)	Bit	Function
General		
n+14, n+15	00-15	Output Status (On=1, Off=0)
n+16	00-03	Input Status (On=1, Off=0)
n+17, n+18	00-15	Error Code
n+19	00	Global Error Indication
	02	Data Transfer Busy
	03	Data Transfer Completed
Counter 1		
n+22, n+23	00-15	Counter Value (80000000_H - $7FFFFFFF_H$)
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)
Counter 2		
n+27, n+28		See n+22, n+23
n+29		See n+24
Counter 3**		
n+32, n+33		See n+22, n+23
n+34		See n+24
Counter 4**		
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).
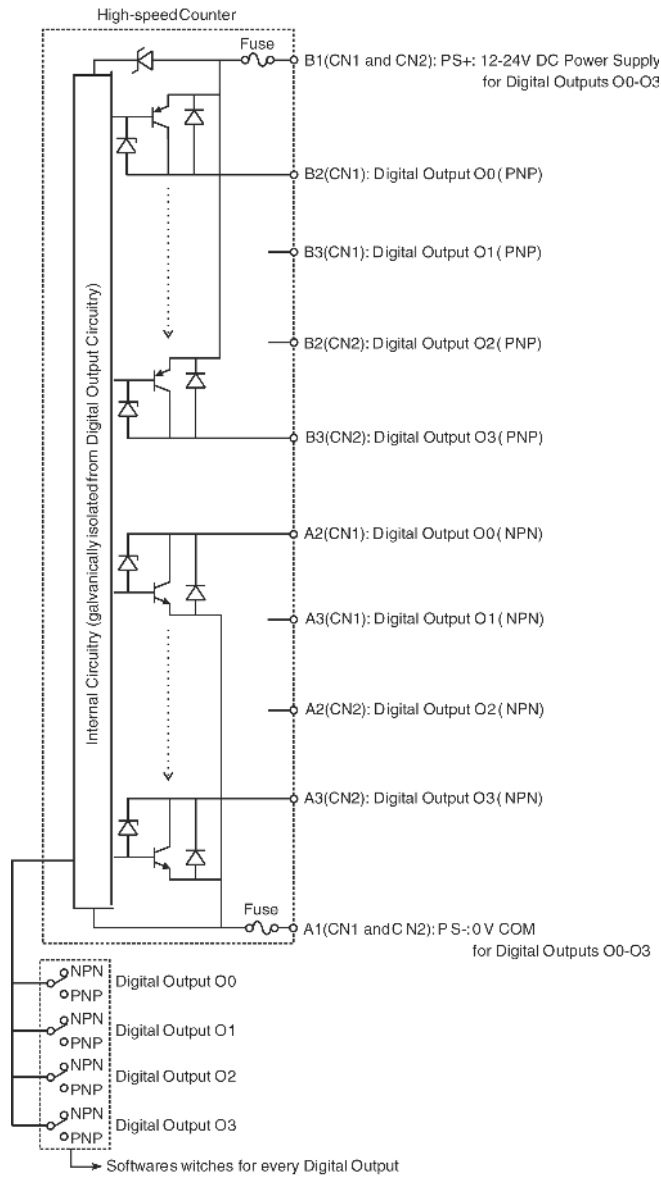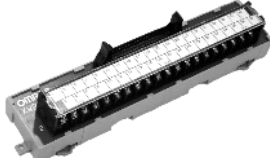
■ Internal Circuit Configuration
Digital Input

Counter Input

Digital Output

High-speed Counter

Fuse
B1 (CN1 and CN2): PS+: 12-24V DC Power Supply
for Digital Outputs O0-O3

B2 (CN1): Digital Output O0 (PNP)

B3 (CN1): Digital Output O1 (PNP)

B2 (CN2): Digital Output O2 (PNP)

B3 (CN2): Digital Output O3 (PNP)

A2 (CN1): Digital Output O0 (NPN)

A3 (CN1): Digital Output O1 (NPN)

A2 (CN2): Digital Output O2 (NPN)

A3 (CN2): Digital Output O3 (NPN)

Fuse
A1 (CN1 and CN2): PS-: 0 V COM
for Digital Outputs O0-O3

Internal Circuitry (galvanically isolated from Digital Output Circuitry)

NPN / PNP : Digital Output O0
NPN / PNP : Digital Output O1
NPN / PNP : Digital Output O2
NPN / PNP : Digital Output O3

→ Software switches for every Digital Output

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

Accessories

Terminal block types		
	XW2B-40G4	**XW2B-40G5**
I/O points	32	32
Screw size	M2.4	M3.5
Compatible cables	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)	

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