

# V200-18-E46B

## Snap-in I/O Module

The V200-18-E46B plugs directly into the back of compatible Unitronics OPLCs, creating a self-contained PLC unit with a local I/O configuration.

### Features



- 18 isolated digital inputs configurable to type pnp/npn (source/sink), includes 2 shaft encoder inputs.
- 15 isolated relay outputs.
- 2 isolated pnp/npn (source/sink) transistor outputs, includes 2 high-speed outputs.
- 9 analog inputs.
- 2 isolated analog outputs.

- Before using this product, it is the responsibility of the user to read and understand this document and any accompanying documentation.
- All examples and diagrams shown herein are intended to aid understanding, and do not guarantee operation. Unitronics accepts no responsibility for actual use of this product based on these examples.
- Please dispose of this product in accordance with local and national standards and regulations.
- Only qualified service personnel should open this device or carry out repairs.

### User safety and equipment protection guidelines

This document is intended to aid trained and competent personnel in the installation of this equipment as defined by the European directives for machinery, low voltage, and EMC. Only a technician or engineer trained in the local and national electrical standards should perform tasks associated with the device's electrical wiring.

Symbols are used to highlight information relating to the user's personal safety and equipment protection throughout this document. When these symbols appear, the associated information must be read carefully and understood fully.

Symbol	Meaning	Description
	Danger	The identified danger causes physical and property damage.
	Warning	The identified danger can cause physical and property damage.
Caution	Caution	Use caution.



- Failure to comply with appropriate safety guidelines can result in severe personal injury or property damage. Always exercise proper caution when working with electrical equipment.



- Check the user program before running it.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Install an external circuit breaker and take appropriate safety measures against short-circuiting in external wiring.
- To avoid damaging the system, do not connect / disconnect the device when the power is on.

Caution

- Ascertain that terminal blocks are properly secured in place.

### Environmental Considerations



- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration.



- Provide proper ventilation by leaving at least 10mm of space between the top and bottom edges of the device and the enclosure walls.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.

## Wiring



- Do not touch live wires.



- Unused pins should not be connected. Ignoring this directive may damage the device.
- Do not connect the 'Neutral' or 'Line' signal of the 110/220VAC to the device's 0V pin.
- Double-check all wiring before turning on the power supply.

### Wiring Procedures

Use crimp terminals for wiring; use 26-12 AWG wire ( $0.13\text{mm}^2$ – $3.31\text{mm}^2$ ) for all wiring purposes.

- Strip the wire to a length of  $7\pm 0.5\text{mm}$  (0.250–0.300 inches).
  - Unscrew the terminal to its widest position before inserting a wire.
  - Insert the wire completely into the terminal to ensure that a proper connection can be made.
  - Tighten enough to keep the wire from pulling free.
- To avoid damaging the wire, do not exceed a maximum torque of 0.5 N·m (5 kgf·cm).
  - Do not use tin, solder, or any other substance on stripped wire that might cause the wire strand to break.
  - Install at maximum distance from high-voltage cables and power equipment.

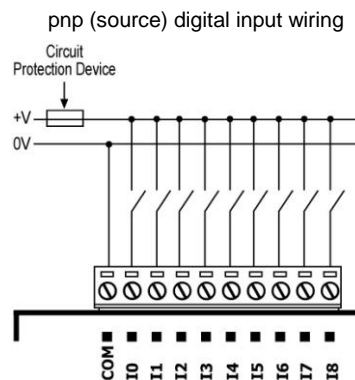
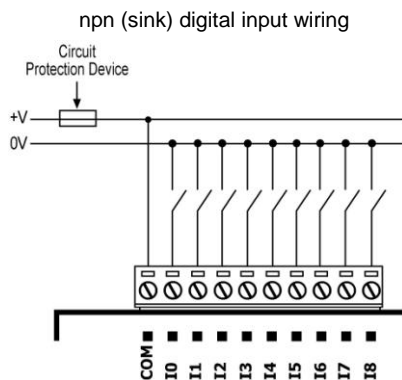
### I/O Wiring—General

- Input or output cables should not be run through the same multi-core cable or share the same wire.
- Allow for voltage drop and noise interference with input lines used over an extended distance. Use wire that is properly sized for the load.

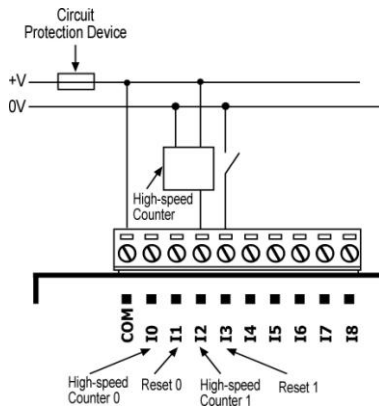
### Digital Inputs

Each group of 9 inputs has a common signal. Each group can be used as either pnp (source) or npn (sink), when appropriately wired as shown in the following figures.

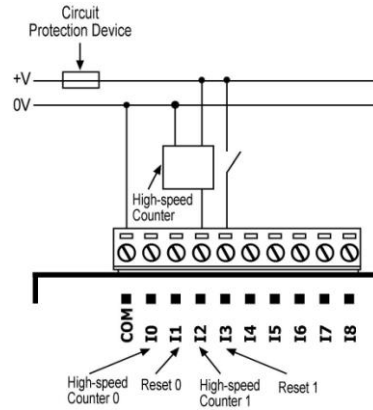
- Inputs I0 and I2 can be used as normal digital inputs, as high-speed counters, or as part of a shaft encoder.
- Inputs I1 and I3 can be used as normal digital inputs, as high-speed counter resets, or as part of a shaft encoder.



npn (sink) high-speed counter

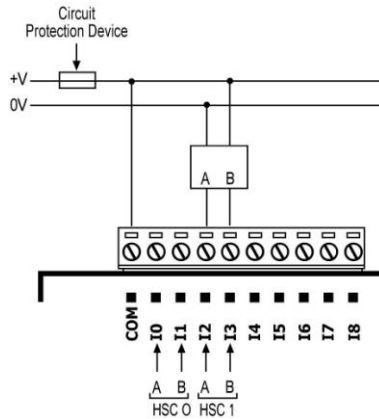


pnp (source) high-speed counter

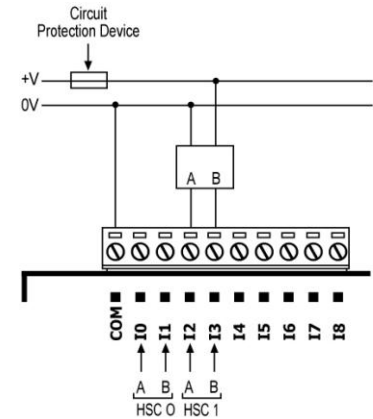


Inputs I0, I1, and I2, I3 can be used as shaft encoders as shown below.

npn (sink) shaft encoder wiring



pnp (source) shaft encoder wiring

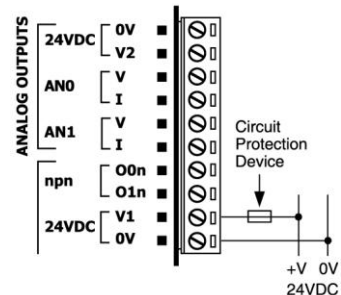


## Digital Outputs

### Wiring Power Supplies

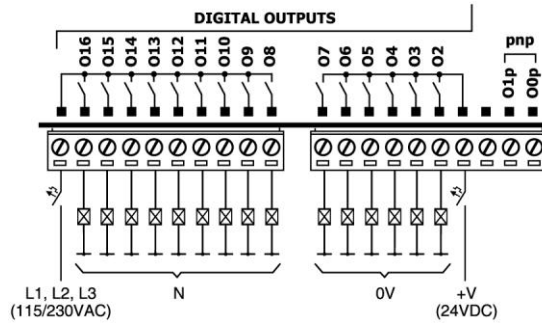
Use a 24VDC power supply for both relay and transistor outputs.

1. Connect the "positive" lead to the "V1" terminal, and the "negative" lead to the "0V" terminal.
  - In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.



**Relay Outputs**

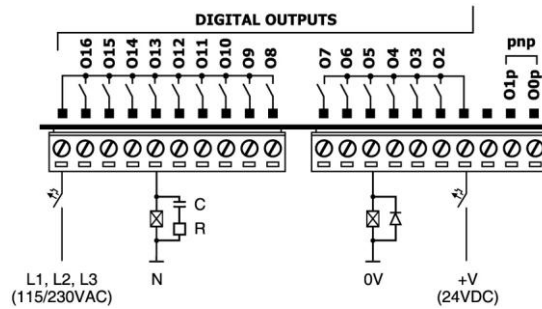
- Each group can be wired separately to either AC or DC as show.
- The 0V signal of the relay outputs is isolated from the controller's 0V signal.



**Increasing Contact Life Span**

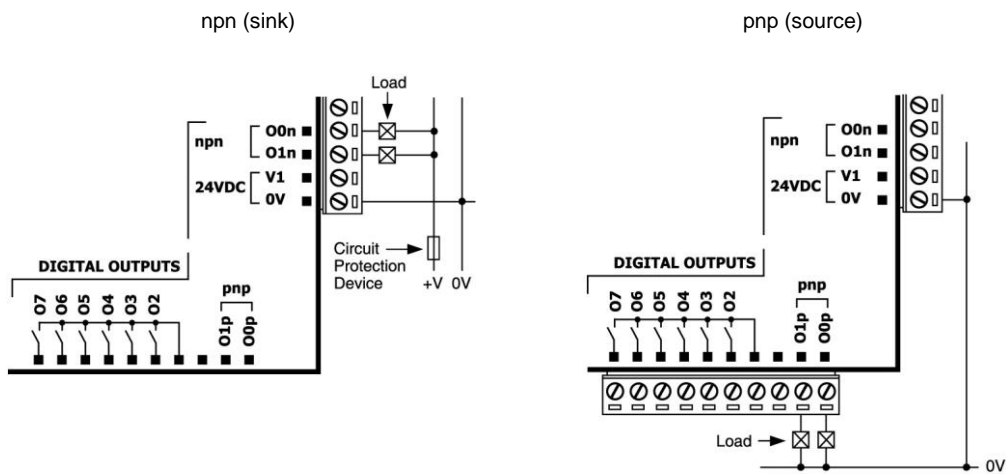
To increase the life span of the relay output contacts and protect the device from potential damage by reverse EMF, connect:

- a clamping diode in parallel with each inductive DC load,
- an RC snubber circuit in parallel with each inductive AC load.



**Transistor Outputs**

- Each output can be wired separately as either npn or pnp.
- The 0V signal of the transistor outputs is isolated from the controller's 0V signal.



## Analog Inputs

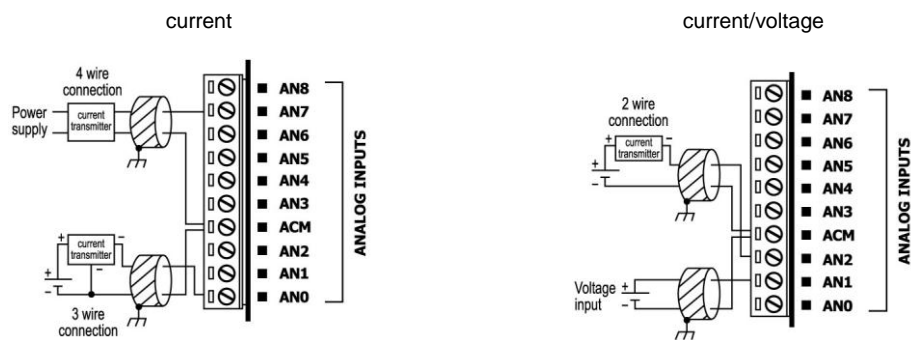
9 analog inputs, which can be wired to work with either current or voltage:

- Inputs 0 to 2 are 10-bit.
- Inputs 3 to 8 are 12 to 14-bit.

To configure an input, open the device and set the jumpers according to the instructions beginning on page 6. Shields should be connected at the signal source.

### Analog Inputs

- All inputs share a common ACM signal, which must be connected to the 0V of the controller.



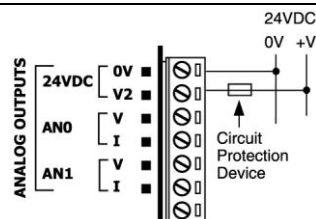
## Analog Outputs Power Supply

Use a 24VDC power supply for all analog output modes.

1. Connect the "positive" cable to the "V2" terminal, and the "negative" to the "0V" terminal.
- In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.
  - Since the analog I/O power supply is isolated, the controller's 24VDC power supply may also be used to power the analog I/Os.

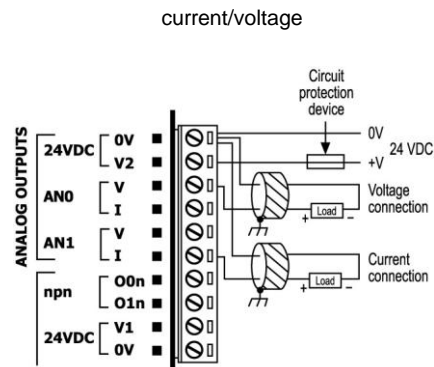


The 24VDC power supply must be turned on and off simultaneously with the controller's power supply.



## Analog Outputs

- Shields should be earthed, connected to the earth of the cabinet.
- An output can be wired to either current or voltage, use the appropriate wiring as shown below.
- Do not use current and voltage from the same source channel.



## Changing Jumper Settings

To access the jumpers, you must remove the snap-in I/O module from the controller, and then remove the module's PCB board.

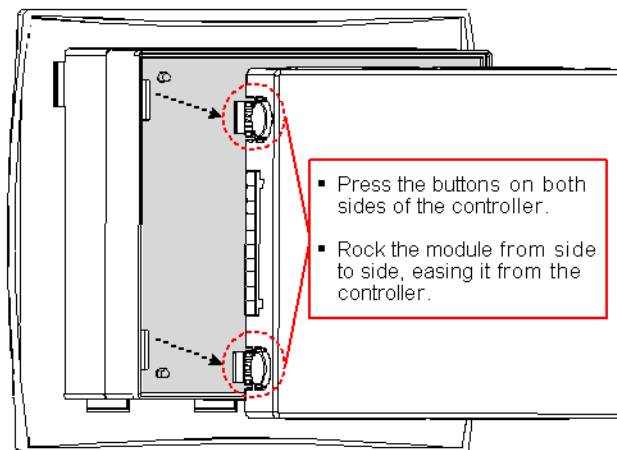


- Before you begin, turn off the power supply, disconnect and dismount the controller.
- Before performing these actions, touch a grounded object to discharge any electrostatic charge.
- Avoid touching the PCB board directly by holding the PCB board by its connectors.

### Accessing the Jumpers

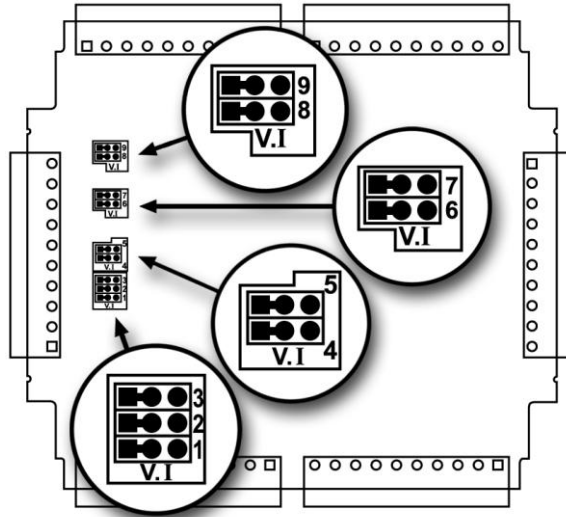
First, remove the snap-in module.

1. Locate the 4 buttons on the sides of the module, 2 on either side. Press the 2 buttons on either side of the module as shown, and hold them down to open the locking mechanism.
2. Gently rock the module from side to side, easing the module from the controller.



3. Using a Philips screwdriver, remove the center screw from the module's PCB board.

Select the desired function by changing the jumper settings according to the figure and tables shown below.

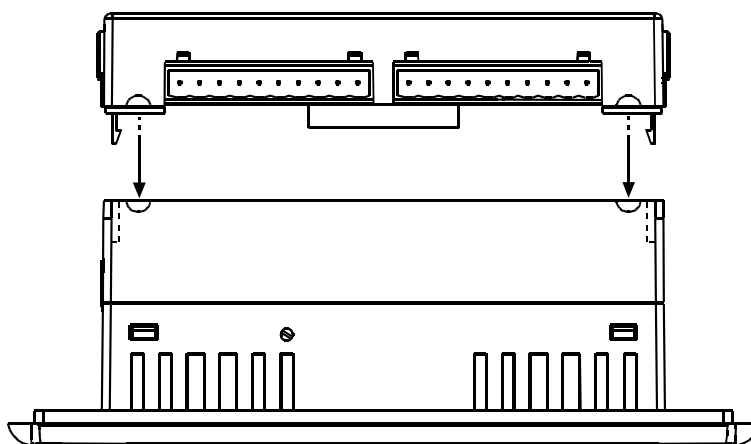


	Jumper #	Voltage*	Current
Analog input 0	1	V	I
Analog input 1	2	V	I
Analog input 2	3	V	I
Analog input 3	4	V	I
Analog input 4	5	V	I
Analog input 5	6	V	I
Analog input 6	7	V	I
Analog input 7	8	V	I
Analog input 8	9	V	I

\* Default factory setting

**Reassembling the controller**

1. Return the PCB board to the module and secure the center screw.
2. Next, reinstall the module. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O Module as shown below.
3. Apply even pressure on all 4 corners until you hear a distinct 'click'. The module is now installed. Check that all sides and corners are correctly aligned.





## V200-18-E46B Technical Specifications

### Digital Inputs

Number of inputs	18 (in two groups)
Input type	pnp (source) or npn (sink)
Galvanic isolation	
Digital inputs to bus	Yes
Digital inputs to digital inputs in same group	No
Group to group, digital inputs	Yes
Nominal input voltage	24VDC
Input voltage	
pnp (source)	0-5VDC for Logic '0' 17-28.8VDC for Logic '1'
npn (sink)	17-28.8VDC for Logic '0' 0-5VDC for Logic '1'
Input current	8.8mA@24VDC for inputs 0 to 3 6mA@24VDC for inputs 4 to 17
Response time	10mSec typical
High-speed inputs	Specifications below apply when these inputs are wired for use as a high-speed counter input/shaft encoder. See Notes 1 and 2.
Resolution	32-bit
Frequency	10kHz maximum
Minimum pulse width	40µs

### Notes:

- Inputs 0 and 2 can each function as either high-speed counter or as part of a shaft encoder. In each case, high-speed input specifications apply. When used as a normal digital input, normal input specifications apply.
- Inputs 1 and 3 can each function as either counter reset, or as a normal digital input; in either case, its specifications are those of a normal digital input. These inputs may also be used as part of a shaft encoder. In this case, high-speed input specifications apply.

### Digital Outputs

#### **Digital Output's Power Supply**

Nominal operating voltage	24VDC
Operating voltage	20.4 to 28.8VDC
Quiescent current	5mA@24VDC.
Max. current consumption	85mA@24VDC. See Note 3.
Galvanic isolation	
Digital power supply to bus	Yes
Digital power supply to relay outputs	Yes
Digital power supply to transistor outputs	No

### Notes:

- Maximum current consumption does not provide for pnp output requirements. The additional current requirement of pnp outputs must be added.

**Relay Outputs**

Number of outputs	15 relays (in two groups). See Note 4.
Output type	SPST-NO (Form A)
Isolation	By relay
Type of relay	Tyco PCN-124D3MHZ or compatible
Outputs' power supply	See Digital Output's Power Supply page 11.
Galvanic isolation	
Relay outputs to bus	Yes
Group to group, relay outputs	Yes
Relay to transistor outputs	Yes
Output current	3A maximum per output (resistive load) 8A maximum total for common (resistive load)
Rate voltage	250VAC / 30VDC
Minimum load	1mA@5VDC
Life expectancy	100k operations at maximum load
Response time	10mS (typical)
Contact protection	External precautions required (see Increasing Contact Life Span, p.4)

**Notes:**

- Outputs 2, 3, 4, 5, 6 and 7 share a common signal. Outputs 8, 9, 10, 11, 12, 13, 14, 15 and 16 share a common signal.

**Transistor Outputs/H.S.O.**

Number of outputs	2, high-speed. Each can be individually wired as pnp (source) or npn (sink).
Output type	pnp: P-MOSFET (open drain) nnp: N-MOSFET (open drain)
Galvanic isolation	
Transistor outputs to bus	Yes
Transistor outputs to transistor outputs	No
Transistor outputs to relay outputs	Yes
Output current	pnp: 0.5A maximum per output nnp: 50mA maximum per output
Maximum frequency	<u>Resistive load</u> pnp: 0.5kHz nnp: 100kHz <u>Inductive load</u> 0.5Hz
ON voltage drop	pnp: 0.5VDC maximum nnp: 0.4VDC maximum
Short circuit protection	Yes (pnp only)
Voltage reference	
pnp (source)	See Digital Output's Power Supply page 11
nnp (sink)	3.5V to 28.8VDC, unrelated to the voltage of either the I/O module or the controller

**Notes:**

- Output #0 and 1 may be used as high-speed outputs.

**Analog Inputs**

Number of inputs	9
Type of input	Set via appropriate wiring and jumper settings.
Isolation	None

**Analog Inputs**

	<b>AN0-AN2 (10-bit)</b>	<b>AN3-AN8 (12-14-bit)</b>
Input range	0-10V, 0-20mA, 4-20mA	0-10V, 0-20mA, 4-20mA
Conversion method	Successive approximation	Voltage to frequency
Normal mode		
Resolution, except 4-20mA	10-bit (1024 units)	14-bit (16383 units)
Resolution at 4-20mA	204-1023 (820 units)	3277 to 16383 (13107 units)
Conversion time	Synchronized to scan time	100mSec minimum per input (according to filter type)
Fast Mode		
Resolution, except 4-20mA	—	12-bit (4096 units)
Resolution at 4-20mA	—	819 to 4095 (3277 units)
Conversion time	—	20mSec minimum per input (according to filter type)
Input impedance	>100k $\Omega$ —voltage 500 $\Omega$ —current	12.77k $\Omega$ —voltage 37 $\Omega$ —current
Absolute maximum rating	$\pm$ 15V—voltage $\pm$ 30mA, 15V—current	$\pm$ 15V—voltage $\pm$ 30mA, 1.1V—current
Full-scale error	$\pm$ 3 LSB (0.3%)	$\pm$ 0.5%
Linearity error	$\pm$ 3 LSB (0.3%)	$\pm$ 0.04%
Status indication	Yes. See Note 6.	Yes. See Note 7.

**Notes:**

6. The analog value can indicate a fault:

**Value: 10-bit**  
1024

**Possible Cause**  
Deviates above the input range

7. The analog value can indicate faults:

<b>Value: 12-bit</b>	<b>Value: 14-bit</b>
-1	-1
4096	16384
32767	32767

**Possible Cause**  
Deviates slightly below the input range  
Deviates slightly above the input range  
Deviates greatly above or below the input range

**Analog Outputs****Analog Output's Power Supply**

Nominal operating voltage	24VDC
Operating voltage	20.4 to 28.8VDC
Quiescent current	30mA@24VDC
Max. current consumption	80mA@24VDC
Galvanic isolation	
Analog power supply to bus	Yes
Analog power supply to analog outputs	No

**Analog Outputs**

Number of outputs	2 (single-ended)
Output range	0-10V, 4-20mA. See Note 8.
Resolution	12-bit (4096 units)
Conversion time	Synchronized to scan time
Load impedance	1k $\Omega$ minimum—voltage 500 $\Omega$ maximum—current
Galvanic isolation	
Analog outputs to bus	Yes
Analog output to analog output	No
Linearity error	$\pm 0.1\%$
Operational error limits	$\pm 0.2\%$

**Notes:**

8. Note that the range of each I/O is defined by wiring and within the controller's software.

**Environmental**

	IP20 / NEMA1
Operating temperature	0° to 50°C (32° to 122°F)
Storage temperature	-20° to 60°C (-4° to 140°F)
Relative Humidity (RH)	10% to 95% (non-condensing)
Dimensions (WxHxD)	138x23x123mm (5.43x0.9x4.84")
Weight	140g (4.94oz)

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