



## Spring Applied, Power-Off Brakes

*Rev. 1.08 April 30, 2024*

### **Brake models covered in this document:**

MPC023-24-001-T (NEMA 23)

MPC034-24-003-T (NEMA 34)

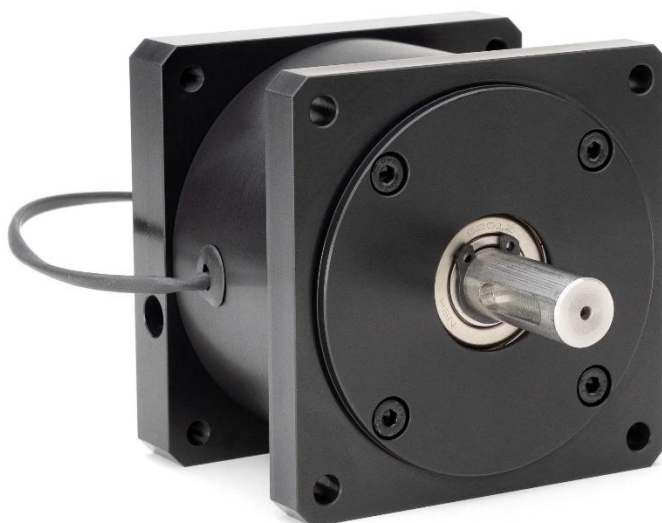


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## Introduction

Thank you for purchasing Teknic's NEMA 23 or NEMA 34 spring applied, power-off brakes. Brakes of this type are designed to stop and hold a load stationary at times when the connected motor is not able to produce torque, as during machine power loss, emergency stops, and drive-initiated safety shutdowns.

One of the most common applications for power-off brakes is on “z-axis” (vertically oriented) mechanical assemblies. Without a brake, highly efficient, backdrivable mechanics will generally fall or crash due to gravity when the motor's power stage is turned off or disabled for any reason.

The brake models discussed in this document are mechanically compatible with Teknic NEMA 23 and NEMA 34 ClearPath and Hudson motors with shaft diameters of 3/8” (for NEMA 23) and 1/2” (for NEMA 34). ***Motors with 1/4” shafts are not compatible with these brake models.*** Non-Teknic motors with similar flange, face and shaft dimensions may be compatible with these brakes.

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### What's in this Document

- Installation information
- Application information
- Dimensioned drawings
- Specifications

## Safety Information

Please read this safety information before using a brake.

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### Precautionary Statement

Always follow appropriate safety precautions when installing and using any automated motion control equipment. Motion control systems should be designed and utilized to prevent personnel from coming into contact with moving parts and electrical contacts that could potentially cause injury or death. Read all cautions, warnings, and notes before attempting to install or operate this device. Follow all applicable codes and standards when using this equipment. Failure to use this equipment as described may impair or neutralize protections built into the product.

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### General Disclaimer

The User is responsible for determining the suitability of this product for his or her application. The User must ensure that Teknic's products are installed and utilized in accordance with all local, state, federal and private governing bodies and meet all applicable health and safety standards.

Teknic has made all reasonable efforts to accurately present the information in the published documentation and shall not be responsible for any incorrect information which may result from unintentional oversights.

Due to continuous product improvements, the product specifications as stated in the documentation are subject to change at any time and without notice. The User is responsible for consulting a representative of Teknic for detailed information and to determine any changes of information in the published documentation.

Should Teknic's products be used in an application that is safety critical, the User must provide appropriate safety testing of the products, adequate safety devices, guarding, warning notices and machine-specific training to protect the operator and/or bystanders from injury.

## Brake Mounting

### Required Tools and Supplies

#### NEMA 23 brake mounted to Teknic ClearPath or Hudson motor

- 3mm hex wrench (for collar clamp screw)
- (4x) Mounting screws (M5-0.8 x 20mm, socket head cap screws).  
**Note:** 8-32 x 3/4" screws may be used if M5 screws are difficult to access with a tool.

#### NEMA 34 brake mounted to Teknic ClearPath or Hudson motor

- 4mm hex wrench (for collar clamp screw)
- (4x) mounting screws (M5-0.8 x 20mm, socket head cap screws).  
**Note:** 8-32 x 3/4" screws may be used if M5 screws are difficult to access with a tool.

### Brake Mounting Instructions (for Teknic ClearPath and Hudson Motors)

1. Power the brake with 24 volts (so the brake is free to spin).
2. Mount the brake input clamp collar to the motor shaft and press the units together until the brake and motor flange faces are flush.
3. Insert and hand-tighten the four flange screws (size M5-0.8 x 20mm)
4. Tighten the clamp collar screw via the screw access hole on the side of the brake body. You may need to spin the brake shaft to align the brake shaft clamp collar with the access hole.
  - a. Tighten NEMA 23 brake to 538 oz-in (3.8 Nm)
  - b. Tighten NEMA 34 brake to 1320 oz-in (9.2 Nm)
5. Fully tighten the four flange screws using a diagonal tightening pattern.
6. Remove 24 volts from the brake.

**Note:** The brake's input coupling "floats" radially relative to the input bore. Because of this, if a brake is not coupled to a motor when you remove power, the brake coupling may become offset such that connecting a motor to the (unpowered) brake isn't possible (i.e., you won't be able to push the brake and motor together fully flush).

To realign the brake's input collar, apply 24 VDC to the brake, insert the motor's shaft into the brake coupling, and press the brake and motor flush together. If the clamp collar screw is not accessible through the hole, apply 24VDC to the brake and rotate the brake shaft until the clamp collar screw is accessible. In addition, if you power and spin the brake without a motor attached you may notice axial and radial free play. This is normal behavior.

## Electrical Installation

**Brake power requirements:** NEMA 23 model (24VDC @ 310mA). NEMA 34 model (24VDC @ 410mA).

**Brake power polarity:** None. Either of the brake's power leads may be connected to the positive (+) or negative (-) 24VDC power supply terminals.

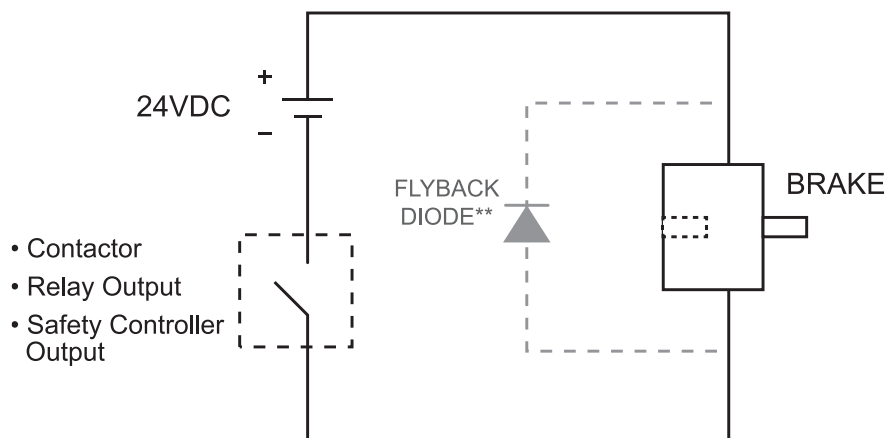
**Brake control methods:** Brakes of this type are commonly controlled via relay outputs, high-power digital outputs (such as those found on ClearCore and ClearLink), dedicated brake outputs of a safety controller, etc.

### Brake Operation Table

Switch/Contactor State	Closed	Open
Voltage applied to brake leads	24VDC	0VDC
Brake State	Released (motion allowed)	Engaged (motion disallowed)

### Wiring Diagrams

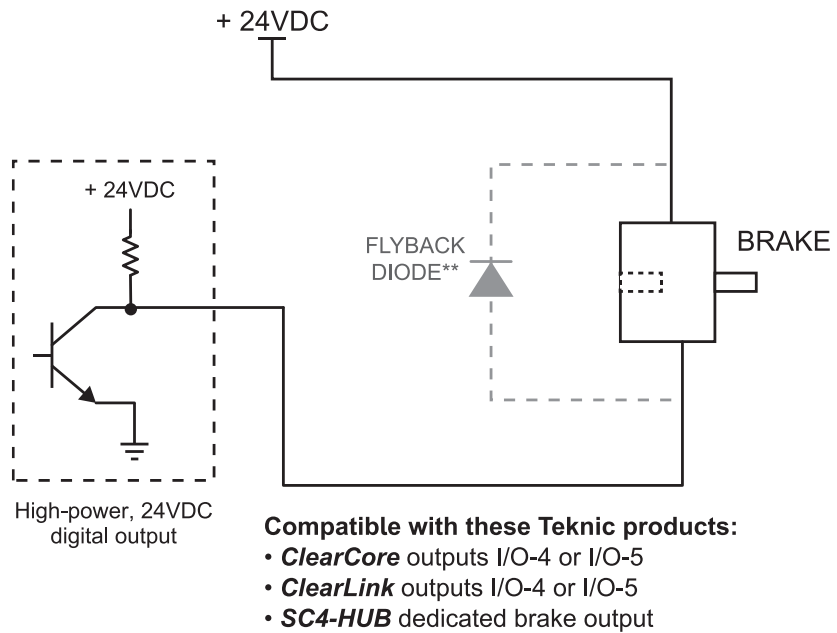
#### Wiring the Brake to a 24VDC Relay Output



**\*\* A flyback diode IS NOT required for ClearCore, ClearLink, and SC-Hub brake outputs, but may be required for other applications.**

*Brake wiring for relay output*

## Wiring the Brake to a 24VDC High-Power Digital Output



*\*\* Flyback diode not required when brake is attached to ClearCore, ClearLink, and SC-Hub brake outputs.*

*Brake wiring for high-power digital output*

## How to Protect I/O Circuits from Brake-related Inductive Kickback

### What is Inductive Kickback?

**Inductive kickback** manifests as a high voltage spike generated by the collapsing magnetic field of a coil-actuated (inductive) device when power is removed from the coil. Devices capable of producing inductive kickback all have an integral inductor (coil) in them, including power-off brakes, contactors, mechanical relays, solenoids, and more. **ClearPath input and output circuits can be permanently damaged from high-voltage spikes caused by inductive kickback.** These voltage spikes can peak in the hundreds of volts for tens of milliseconds. And, while ClearPath I/O circuits are very robust, they are not designed to withstand hundreds of volts above their operating range of 4-28VDC.

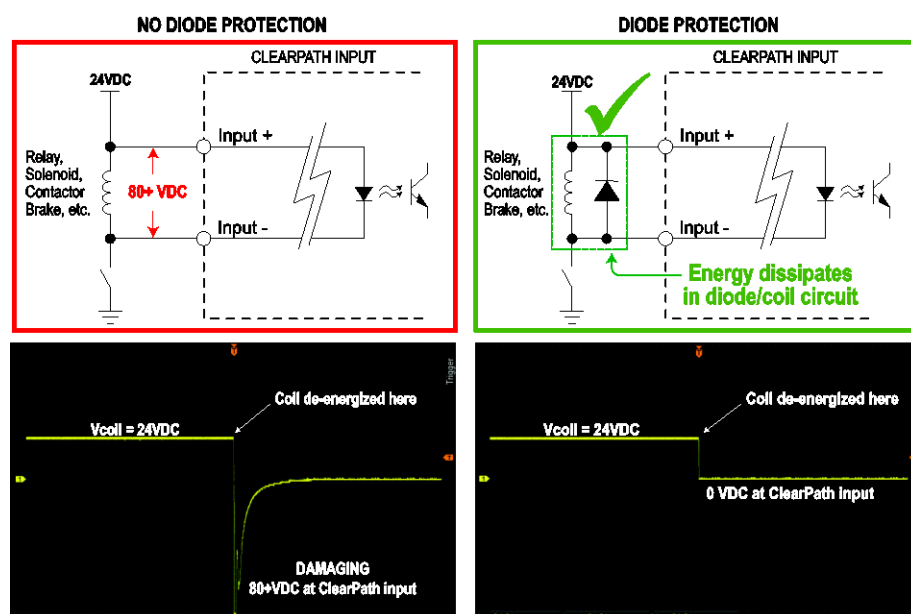


Diagram illustrating the suppressive effect of a flyback diode on inductive kickback

Without a “safe” discharge path, such as is provided by a flyback diode, when the coil from an inductive device is de-energized it will produce a high-voltage spike that will damage ClearPath inputs connected in parallel with the coil.

### How to Protect Low-Power Circuits from Inductive Kickback

**Option #1:** Use a separate power supply for brakes and other inductive devices (solenoids, contactor coils, etc.) to isolate them from low voltage digital devices such as your ClearPath inputs. Avoid connecting brakes and other coils in such a way that they can discharge across your ClearPath I/O.

**Option #2:** If you do need to connect a coil-actuated device (brake) across your ClearPath I/O, **add a protection diode in parallel with the coil in the polarity shown above.** FYI: Protection diodes are referred to by various names including flyback diodes, snubber diodes, and catch diodes. We recommend using a common **1N4004** diode for most applications.

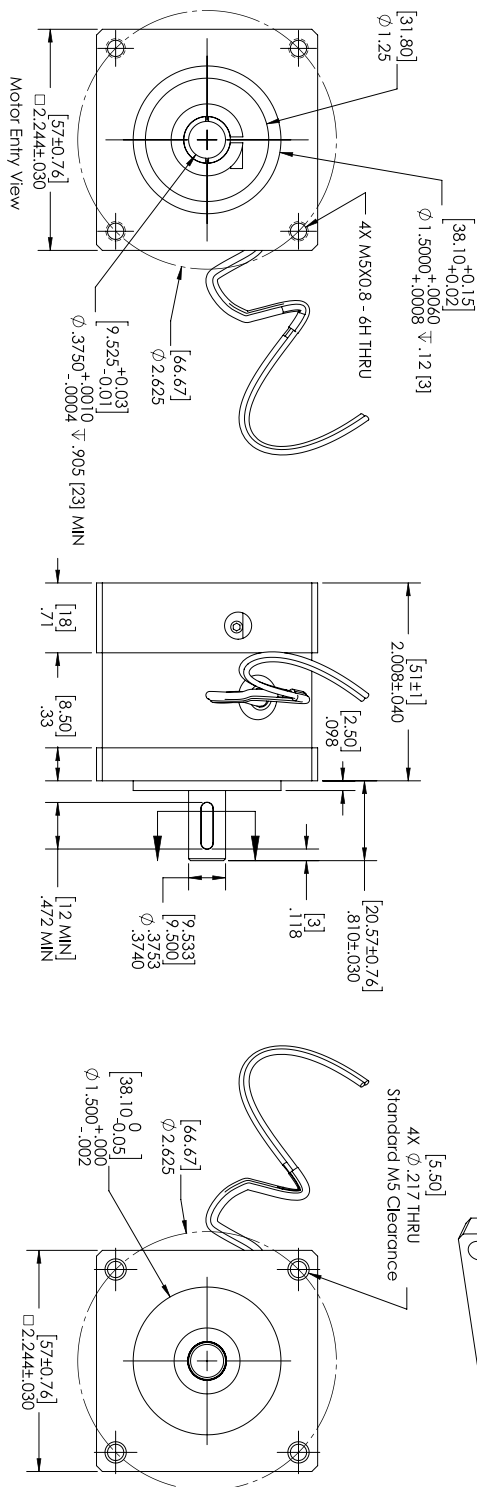


## Dimensioned Drawing: NEMA 23 Brake

Newstart Motion Industries Ltd.  
NEMA 23 Brake  
PN: MPC023-24-001-T

Wire Length: 19.7 [500]  $\pm$ .79 [20]  
Wire Gauge: 22AWG

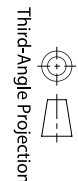
- All dimensions are in inch [mm] unless otherwise noted.
- Sheet Scale 1:1
- Undimensioned features are per 3D file for reference use.
- Unless otherwise specified untoleranced dimensions are nonbasic and default to:  
 XXX:  $\pm .010"$  [0.25mm]  
 XXXX:  $\pm .005"$  [0.125mm]  
 Angles:  $\pm 1^\circ$



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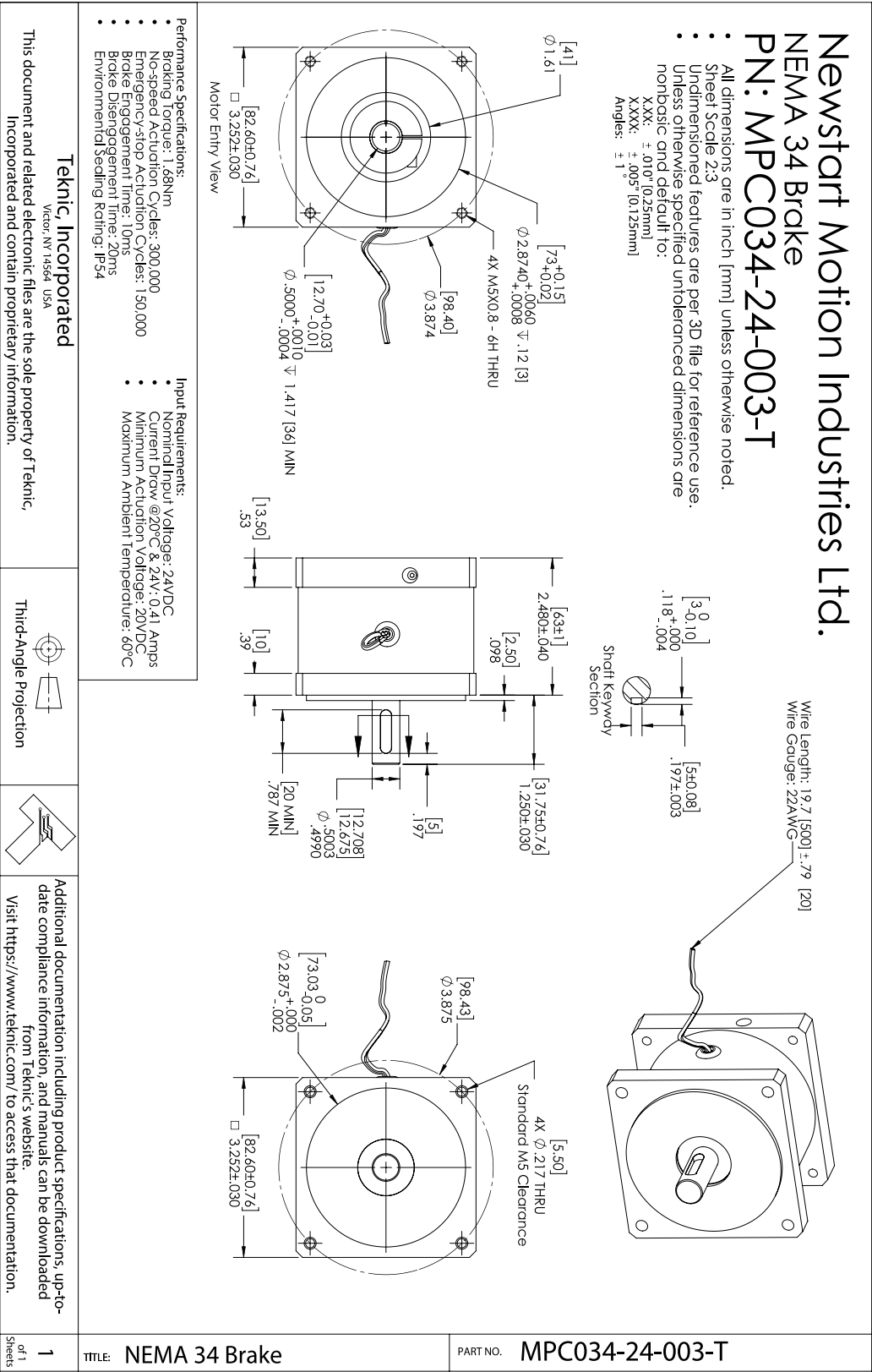
Additional documentation including product specifications, up-to-date compliance information, and manuals can be downloaded from Teknic's website. Visit <https://www.teknic.com/> to access that documentation.

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TITLE: NEMA 23 Brake

PART NO. MPC023-24-001-T

Dimensioned Drawing: NEMA 34 Brake



## Specifications

### Model #: MPC023-24-001-T (NEMA 23)

<b>PRODUCT DESCRIPTION</b>	Type:	Spring applied, power-off brake, NEMA 23 face mount
<b>MECHANICAL</b>	Dimensions:	51mm length ( $\pm 1.0$ ); 57mm x 57mm wide Output shaft diameter: 3/8 inch Input shaft diameter: 3/8 inch
	Clamp collar screw torque:	538 oz-in (3.8 Nm)
	Weight, oz (g):	17.6 oz. (499 g)
<b>INPUT POWER</b>	Voltage requirement:	24 VDC nominal (20 VDC min.)
	Current draw:	0.31 amps
<b>OUTPUT TORQUE, POWER, RPM</b>	Holding torque:	0.5 Nm
	Max. input speed:	6000 RPM
<b>DYNAMIC CYCLE RATINGS</b>	No-speed actuations (brake actuates while motor is stationary):	300,000 cycles (min.)
	Emergency stop cycles (brake actuates while motor is spinning):	Application dependent. Note: emergency stops will reduce the functional life of the brake.
<b>BRAKE ENGAGEMENT AND DISENGAGEMENT TIMING</b>	Engage time (time required for brake to engage after 24VDC is removed):	10 ms (max.)
	Disengage time:	20 ms (max.)
<b>WARRANTY</b>	Duration:	3 years
<b>COUNTRY OF ORIGIN</b>	Manufactured by:	Newstart Motion (China)

**Model #: MPC034-24-003-T (NEMA 34)**

<b>PRODUCT DESCRIPTION</b>	Type:	Spring applied, power-off brake, NEMA 34 face mount
<b>MECHANICAL</b>	Dimensions:	63mm length ( $\pm 1.0$ ); 82.5mm x 82.5mm wide Output shaft diameter: 1/2" Input shaft diameter: 1/2"
	Clamp collar screw torque:	1302 oz-in (9.2 Nm)
	Weight, oz (g):	40 oz. (1134 g)
<b>INPUT POWER</b>	Voltage requirement:	24 VDC nominal (20 VDC min.)
	Current draw:	0.41 amps
<b>OUTPUT TORQUE, POWER, RPM</b>	Holding torque:	1.68 Nm
	Max. input speed:	6000 RPM
<b>DYNAMIC CYCLE RATINGS</b>	No-speed actuations (brake actuates while motor is stationary):	300,000 cycles (min.)
	Emergency stop cycles (brake actuates while motor is spinning):	Application dependent. Note: emergency stops will reduce the functional life of the brake.
<b>BRAKE ENGAGEMENT AND DISENGAGEMENT TIMING</b>	Engage time (time required for brake to engage after 24VDC is removed):	10 ms (max.)
	Disengage time:	20 ms (max.)
<b>WARRANTY</b>	Duration:	3 years
<b>COUNTRY OF ORIGIN</b>	Manufactured by:	Newstart Motion (China)

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