

**Warning**

This equipment contains dangerous voltages and controls potentially dangerous rotating mechanical parts.

The terminals can carry hazardous voltages even after the inverter has been switched off. After disconnecting the line supply, wait at least 5 minutes until the drive unit has discharged itself. Only then, carry out any installation work.

Read the instructions in the associated manuals under:

<http://support.automation.siemens.com>. Non-compliance or failure to follow the instructions can result in loss of life, severe personal injury or serious damage to property.

Only suitable qualified personnel should work on this equipment. Qualified persons are defined as persons who are authorized to commission, ground and label systems and circuits in accordance with established safety practices and standards.

The successful and safe operation of this equipment is dependent upon its proper handling, installation, operation and maintenance.

**Warnung**

Das vorliegende Gerät führt gefährliche Spannungen und steuert rotierende mechanische Teile, die gegebenenfalls gefährlich sind.

Die Klemmen können auch dann gefährliche Spannungen führen, wenn der Umrichter außer Betrieb ist. Warten Sie nach dem Unterbrechen der Netzversorgung mindestens 5 Minuten, bis sich das Gerät entladen hat. Führen Sie erst dann Montagearbeiten aus. Beachten Sie die Hinweise in den zugehörigen Betriebsanleitungen unter:

<http://support.automation.siemens.com>. Bei Missachtung oder Nichtbefolgen der Hinweise können Tod, schwere Körperverletzungen oder erheblicher Sachschaden eintreten.

Inbetriebsetzung und Betrieb dieses Geräts dürfen nur von qualifiziertem Personal vorgenommen werden. Qualifiziertes Personal sind Personen, welche die Berechtigung haben, Systeme und Stromkreise gemäß den Standards der Sicherheitstechnik in Betrieb zu nehmen, zu erden und zu kennzeichnen.

Der einwandfreie und sichere Betrieb des Gerätes setzt sachgemäßen Transport, ordnungsgemäße Installation, Bedienung und Instandhaltung voraus.

**Attention**

L'appareil présente des tensions dangereuses et contrôle des pièces mécaniques rotation potentiellement dangereuses.

Les bornes peuvent présenter des tensions dangereuses, même lorsque le variateur est à l'arrêt. Après coupure de la tension du réseau, il convient d'attendre au moins 5 minutes pour permettre la décharge de l'appareil. Procéder à une intervention seulement après écoulement de ce délai.

Respecter les consignes figurant dans les instructions de service correspondantes et disponibles sous le lien suivant : <http://support.automation.siemens.com>. Le non-respect des consignes peut entraîner la mort, des blessures graves ou des dégâts matériels importants.

La mise en service et l'utilisation de cette machine ne doivent être effectuées que par des personnes qualifiées. Par personnes qualifiées on entend des personnes autorisées à mettre en service, mettre à la terre et repérer les systèmes et les circuits électriques dans le respect des règles de l'art en matière de sécurité.

L'exploitation sûre et sans défaut de l'appareil suppose un transport, un entreposage, une installation, une conduite et une maintenance dans les règles de l'art.

**Avvertenza**

Questo apparecchio conduce tensioni pericolose ed aziona parti meccaniche rotanti potenzialmente pericolose.

I morsetti possono condurre tensioni pericolose anche quando il convertitore è stato spento. Dopo avere interrotto l'alimentazione di rete, attendere almeno 5 minuti finché l'apparecchio non si è scaricato. Solo allora si possono eseguire interventi sull'apparecchio.

Leggere le istruzioni riportate nei rispettivi manuali all'indirizzo: <http://support.automation.siemens.com>. In caso di non osservanza o di mancata applicazione delle istruzioni sussiste la possibilità di morte, gravi lesioni fisiche o ingenti danni materiali.

Solo personale qualificato può essere addetto alla messa in servizio e al funzionamento di questo apparecchio. Per personale qualificato si intendono persone autorizzate a mettere in servizio, mettere a terra e contrassegnare sistemi e circuiti elettrici in conformità agli standard della tecnica di sicurezza.

Il funzionamento corretto e sicuro dell'apparecchio presuppone un trasporto, un'installazione, un utilizzo e una manutenzione appropriati.

**Advertencia**

El presente equipo está sometido a tensiones peligrosas y controla piezas mecánicas rotación que también pueden ser peligrosas.

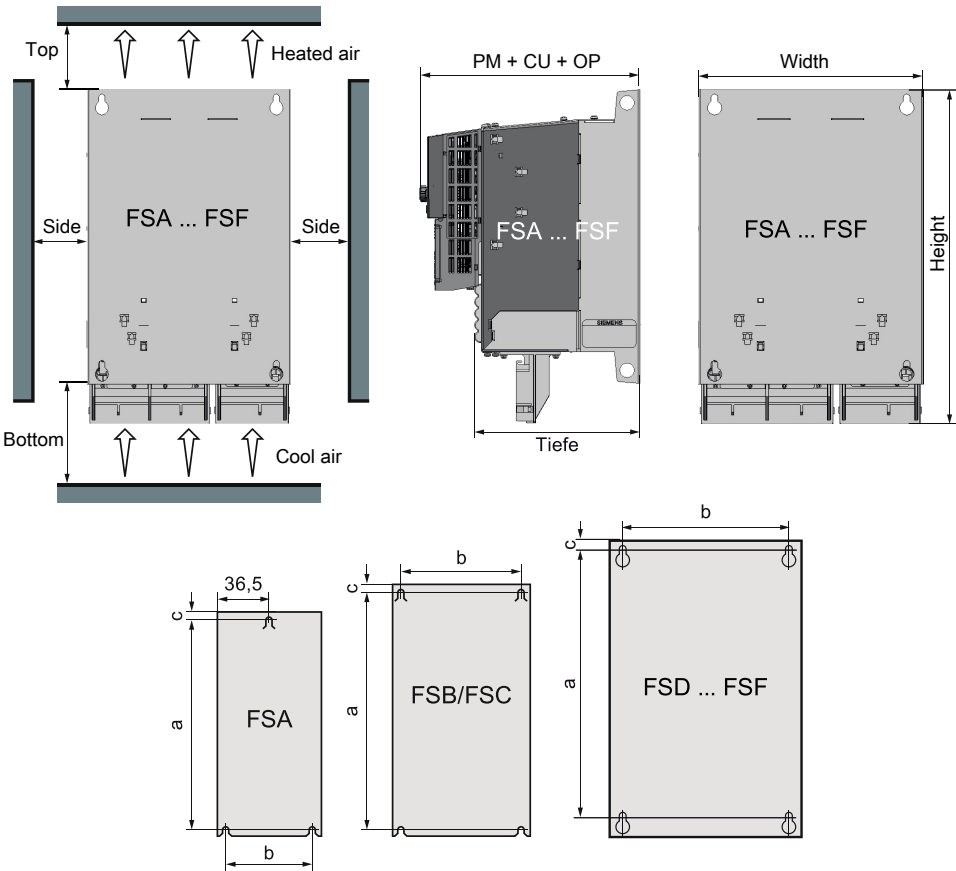
Los bornes o terminales de conexión pueden estar también bajo tensión eléctrica peligrosa incluso aunque el convertidor o variador no esté funcionando. Tras desconectar la alimentación de red, espere al menos 5 minutos para que el equipo pueda descargarse. Sólo entonces proceda a realizar los trabajos de montaje.

Respete las indicaciones que se especifican en las instrucciones de servicio asociadas, y que pueden consultarse en: <http://support.automation.siemens.com>. Si no se observan las advertencias o no se siguen las indicaciones de las instrucciones, existe peligro de muerte, graves lesiones corporales o considerables daños materiales.

La puesta en marcha y el funcionamiento de este equipo debe encomendarse exclusivamente a personal cualificado. Personal cualificado son personas autorizadas para poner en servicio, conectar a tierra e identificar sistemas y circuitos eléctricos conforme a las normas en materia de seguridad.

El funcionamiento correcto y seguro del equipo presupone un transporte, instalación, montaje y puesta en marcha adecuados, así como un manejo y un mantenimiento rigurosos.

Drill Patterns and Dimensions for PM230 IP20 Power Modules



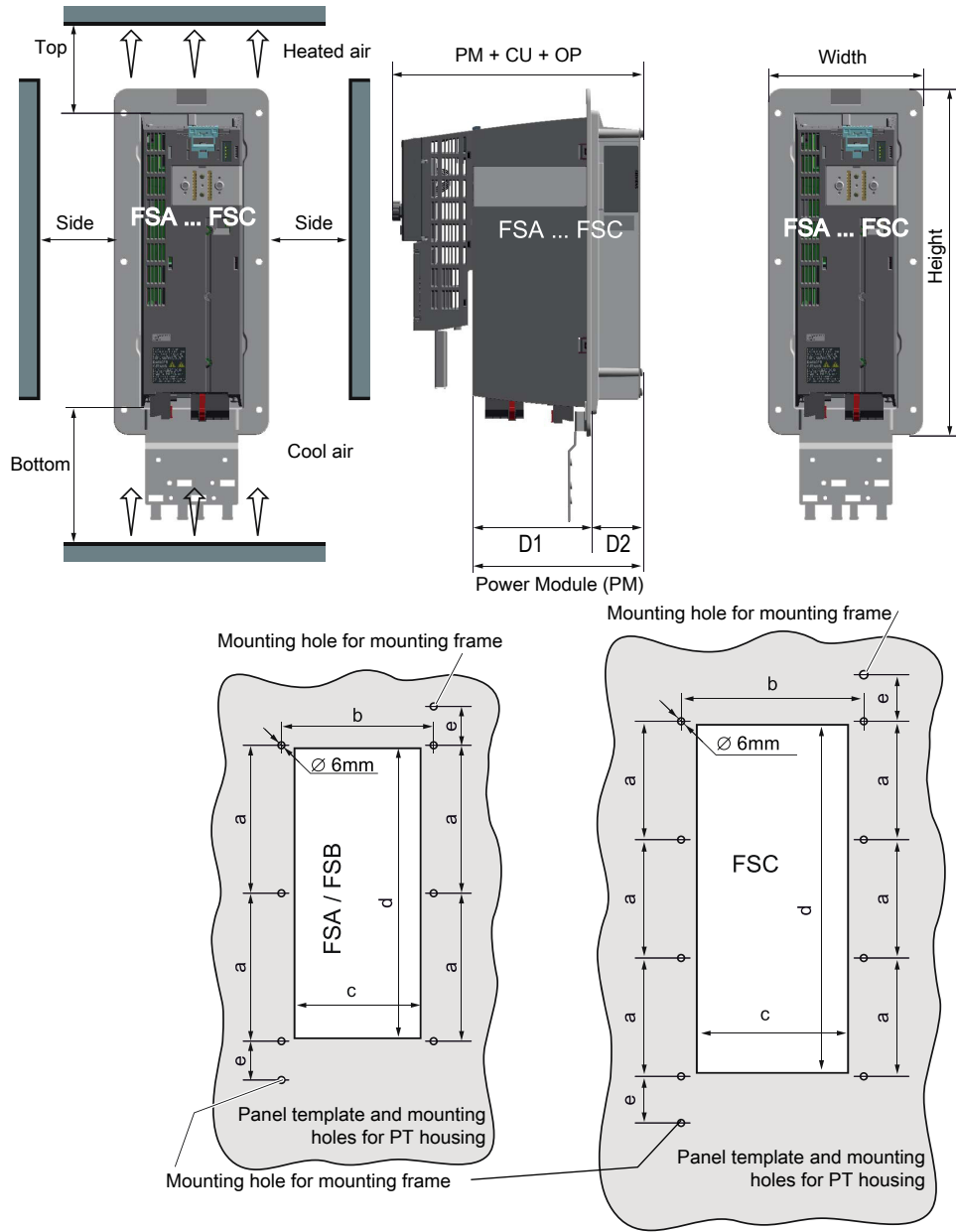
Frame Size	Dimensions (mm)						Distances (mm) ³⁾	
	Height	Width	Depth ²⁾	a	b	c	top	bottom
FSA filtered /unfiltered	196	73	165	186	62.3	6	80	100
FSB filtered /unfiltered	292	100	165	281	80	6	80	100
FSC filtered /unfiltered	355	140	165	343	120	6	80	100
FSD unfiltered	419 ¹⁾	275	204	325	235	11	300	300
FSD filtered	512 ¹⁾	275	204	419	235	11	300	300
FSE unfiltered	499 ¹⁾	275	204	405	235	11	300	300
FSE filtered	635 ¹⁾	275	204	541	235	11	300	300
FSF unfiltered	634 ¹⁾	350	316	598	300	11	350	350
FSF filtered	934 ¹⁾	350	316	899	300	11	350	350
Fixing:		FSA/FSB: Screws M4, 2.5 Nm (22 lbf.in) FSC: Screws M5, 2.5 Nm (22 lbf.in)			FSD/FSE: Screws M6, 6 Nm (53 lbf.in) FSF: Screws M8, 13 Nm (115 lbf.in)			

¹⁾ plus 123 mm using a screen termination kit

²⁾ plus 58 mm using a CU230, plus 40 mm using a CU240, plus another 10 mm or 25 mm using a BOP-2 or an IOP as Operator Panel (OP)

³⁾ The Power Modules can be mounted side-by-side. Due to tolerance reasons, we recommend a lateral distance of about 1 mm

Drill Patterns and Dimensions for PM230 IP20 Push-Through (PT) Power Modules



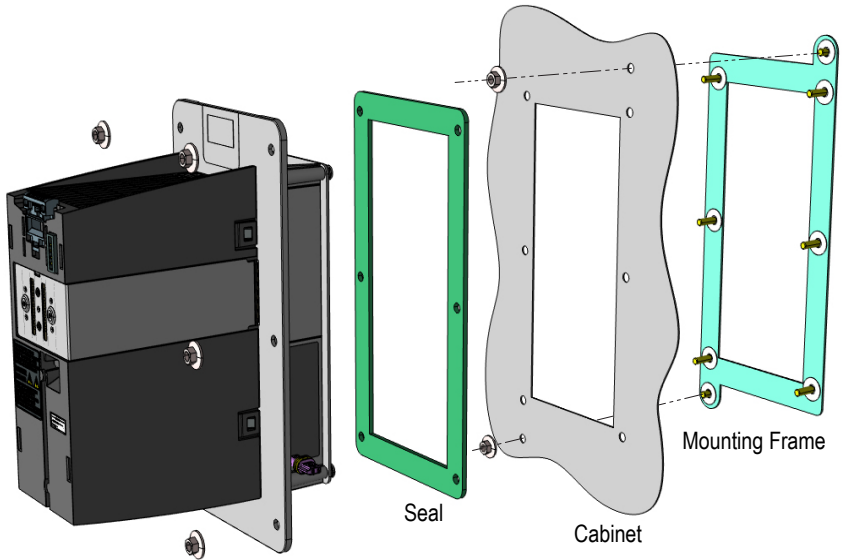
Frame Size	Dimensions (mm)									
	Height	Width	Depth ²⁾	D1	D2	a	b	c	d	e
FSA filtered /unfiltered	238	125.9	170.8	117.7	53.1	103	106	88	198	27
FSB filtered /unfiltered	345	153.9	170.8	117.7	53.1	147.5	134	116	304	34.5
FSC filtered /unfiltered	410.5	200	170.8	117.7	53.1	123	174	156	365	30.5
Fixing:		FSA/FSB/FSC: Screws M5, 6 Nm								

¹⁾ plus 123 mm using a screen termination kit

²⁾ plus 58 mm using a CU230, plus 40 mm using a CU240, plus another 10 mm or 25 mm using a BOP-2 or an IOP as Operator Panel (OP).

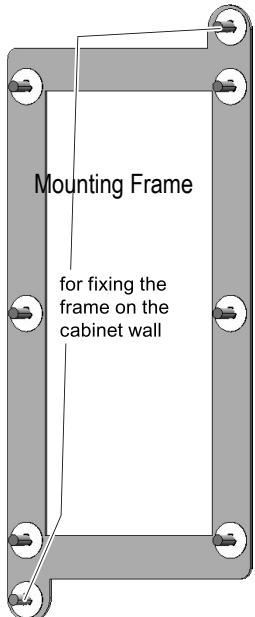
The Power Modules require a distance of 80 mm above and 100 mm below. They can be mounted side-by-side. Due to tolerance reasons, we recommend a lateral distance of about 1 mm

PM230 IP20 Push-Through mounting sequence



Push-Through mounting frame

It is recommended that the optional mounting frame is used to install the Push-through Power Module in a cabinet. This optional mounting frame is designed, in conjunction with, the supplied seal to easily maintain an IP54 rating of the enclosure (the seal is delivered with the Power Module). If the Power Module is mounted without using the optional mounting frame, it is the user's responsibility to ensure the correct IP protection rating is reached.



Maximum cable lengths

Using	Maximum cable length	EMI Level
Screened cables, filtered units (class A)	25 m	Second Environment, C2*
Screened cables, filtered units (class A)	50 m	Second Environment, C3*
Screened cables, unfiltered units,	50 m	EMI Standard not fulfilled
Unscreened cables, filtered or unfiltered units	100 m	EMI Standard not fulfilled

CAUTION - Cable cross-section for grounding: The earth cable must be at least as big as the power cables.

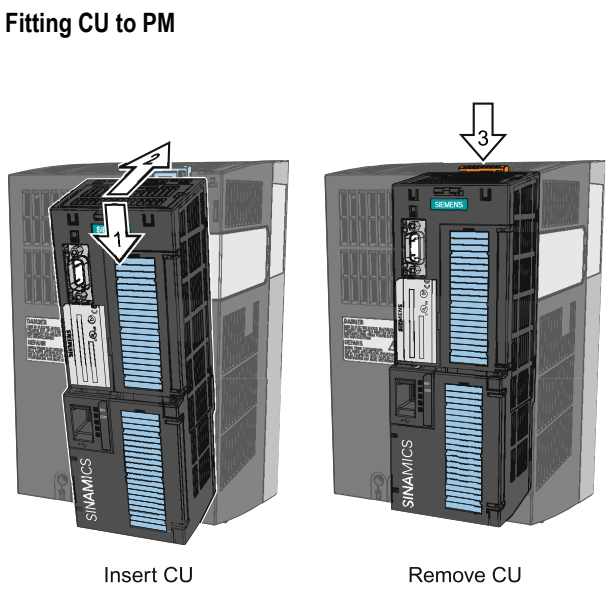
*Only if EMC compliant connections are used.

Components for United States / Canadian installations (UL/cUL)

In order that the system is UL/cUL-compliant, use UL/cUL-certified J-type fuses, overload circuit-breakers or intrinsically safe motor protection devices. Use class 1 75° C copper wire only. Install the inverter with any external recommended suppressor with the following features:

- Surge-protective devices; device shall be a Listed Surge-protective device (Category code VZCA and VZCA7)
- Rated nominal voltage 480/277 VAC, 50/60 Hz, 3-phase
- Clamping voltage VPR = 2000 V, IN = 3 kA min, MCOV = 550 VAC, SCCR = 65 kA
- Suitable for Type 1 or Type 2 SPD application
- Clamping shall be provided between phases and also between phase and ground.

Feature	Specification
Line voltage	3 AC 380 V ... 480 V ± 10% - The permissible voltage depends on the installation altitude
Output voltage	3 AC 0 V ... input voltage * 0.95 (max)
Input frequency	50 Hz ... 60 Hz, ± 3 Hz
Output frequency	0 Hz ... 650 Hz, depending on the control mode
Power factor λ	0.9
Line impedance	Uk ≤ 1 %, no line reactor must be used
Inrush current	Less than rated input current
Pulse frequency (factory setting)	4 kHz - Can be increased up to 16 kHz (up to 8 kHz for 55 kW, 75 kW, 90 kW) in 2 kHz steps. Increasing the pulse frequencies leads to an output current reduction.
Electromagnetic compatibility	Filtered Units are suitable for environmental classes category C2 in accordance with IEC61800-3. For details, see the Hardware Installation Manual, Appendix A2.
Braking methods	DC braking
Protection level	IP20 built-in units
Operating temperature (LO operation)	0 °C ... +40 °C (32 °F ... 104 °F) without derating / up to 60 °C (140 °F) with derating
Operating temperature (HO operation)	0 °C ... +50 °C (14 °F ... 122 °F) without derating / up to 60 °C (140 °F) with derating
Storage temperature	-40 °C ... +70 °C (-40 °F ... 158 °F)
Installation altitude above sea level	Up to 1000 m (3300 ft) without derating / Up to 4000 m (13000 ft) with derating
Humidity	< 95% RH - non-condensing
Environmental requirements	Protected according to environmental class 3C2 to EN 60721-3-3 against damaging chemical substances
Pollution	According pollution degree level 2 - Do not install the inverter in an environment which contains atmospheric pollutants such as dust and/or corrosive gases.
Shock and vibration	Do not drop the inverter or expose to sudden shock. Do not install the inverter in an area where it is likely to be exposed to constant vibration.
Electromagnetic radiation	Do not install the inverter near sources of electromagnetic radiation.
Short Circuit Current Rating (SCCR)	65 kA

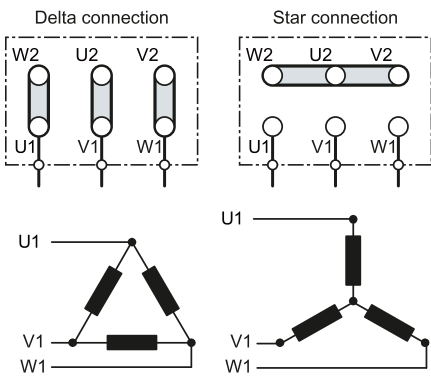


Star and Delta connection

Inside the terminal box of Siemens motors is a diagram showing both methods of connections:

- Star connection (Y)
- Delta connection (Δ)

The motor rating plate provides information for each method of connection.



Typical rating label

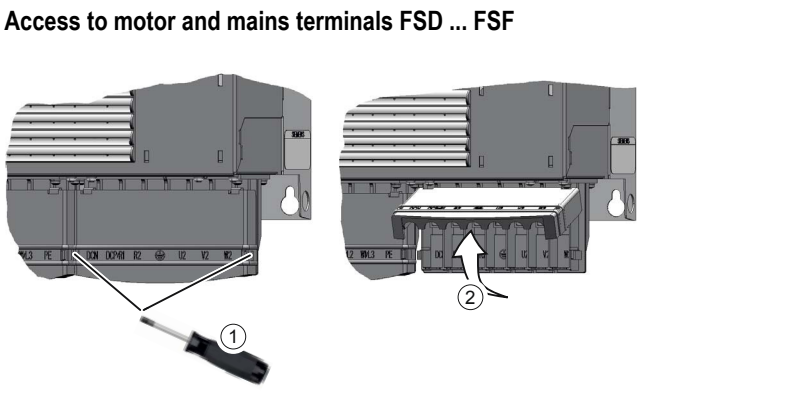
SIEMENS									
D 91056 Erlangen 3~Mot. 1LE1 002-1DB43-4AA0 E0605/0496382 02 001									
IEC/EN 60034 160L IMB3 IP55									
73 kg Th.Cl. 155(F)									
DE NE Bearing 6209-2ZC3 6209-2ZC3									
V	Hz	A	kW	cos φ	eta	1/min	V	A	
400 Δ	50	29,5	15	0,82	89,4%	1460	380-420	30,0-30,2	
690 Y	50	17,1	15	0,82	89,4%	1460	660-725	17,4-17,5	
460 Δ	60	29,5	17,3	0,82	89,4%	1760	440-480	30,2-29,8	

Mains and Motor terminals FSA ... FSC

The Power Modules are fitted with two-part-connectors. The removable part of the connector can be unplugged from the Power Module by pressing the release catch. The connectors are not interchangeable.

Tightening torques:

- FSA 0.4 Nm ... 0.5 Nm (3.5 ... 4.4 lbf.in)
- FSB 0.55 Nm ... 0.6 Nm (4.7 ... 5.3 lbf.in)
- FSC 1.2 Nm ... 1.5 Nm (10.6 ... 13.3 lbf.in)



Motor and mains terminals FSD ... FSF

Tightening torques:

- FSD 6 Nm (53 lbf.in)
- FSE 6 Nm (53 lbf.in)
- FSF 13 Nm (115 lbf.in)

Screening methods

① Line connection

② Motor connection

③ Unshielded cable for line connection

④ Shielded cable for motor connection

⑤ Cable screen

⑥ Suitable clip to fix motor cable screen securely to metal back plate

⑦ Steel band

⑧ Cable strap

⑨ Metal back plate

⑩ Shielding plate

Standards

European Low Voltage Directive
Europäische Niederspannungsrichtlinie
Directive européenne basse tension
Diretiva europea "Baja tension"
Direttiva europea sulla bassa tensione

ISO 9001

Siemens plc operates a quality management system, which complies with the requirements of ISO 9001

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