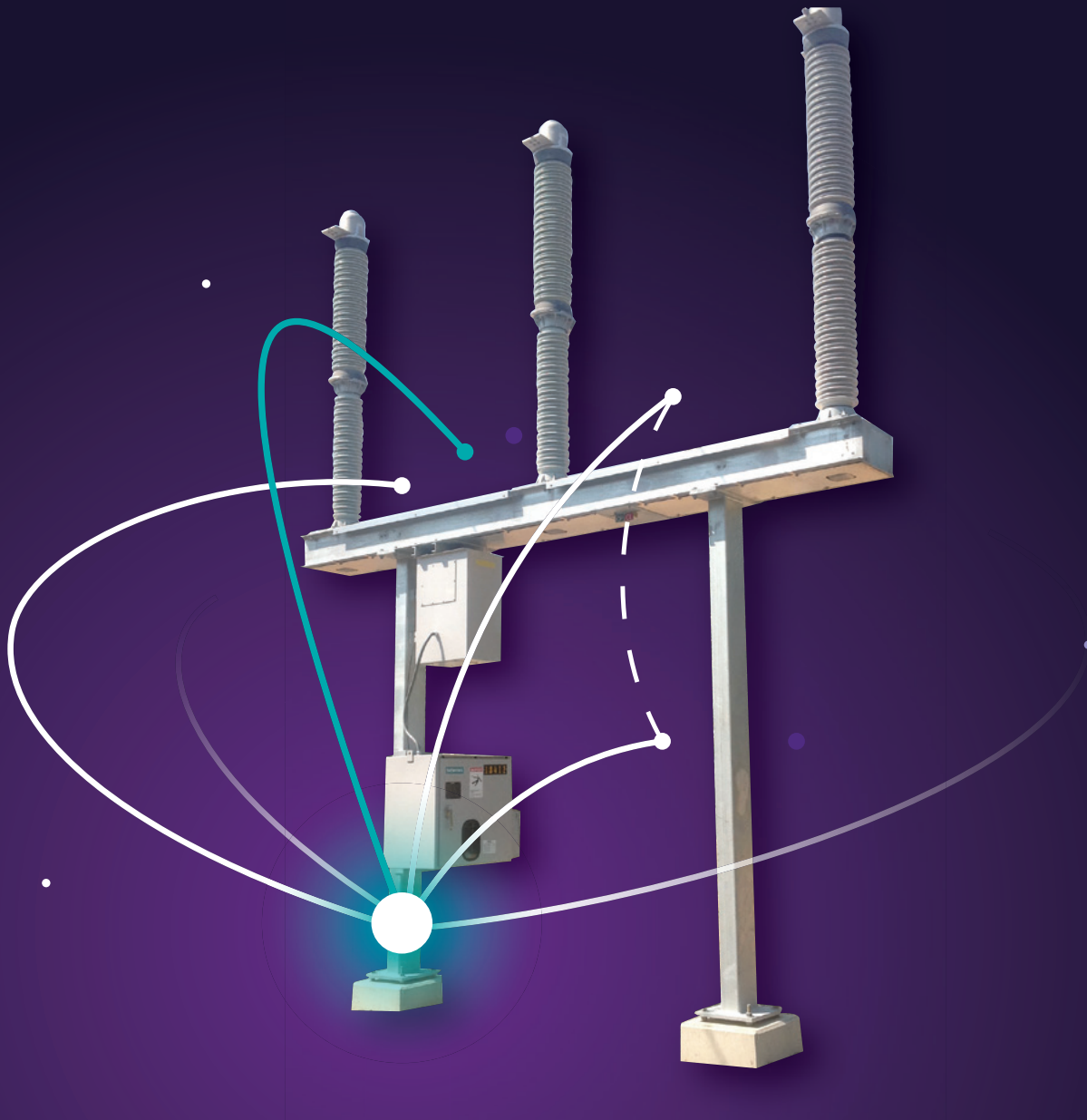


**SIEMENS**  
energy



## CPV2/CPV2S/3AP

Circuit Switchers and  
Live-Tank Breakers  
72.5 kV- 800 kV



## Siemens Energy CPV2/CPV2S Circuit Switchers and 3AP Live-Tank Breakers

The Siemens Energy (SEI) circuit switchers and live-tank breakers are an ideal solution for applications that require two or three-cycle circuit interruption. These breakers save space and provide fast protection at an economical cost.

Both breaker types are controlled by a FA-spring operating mechanism, the same mechanism used in the Siemens Energy circuit breakers around the globe and feature:

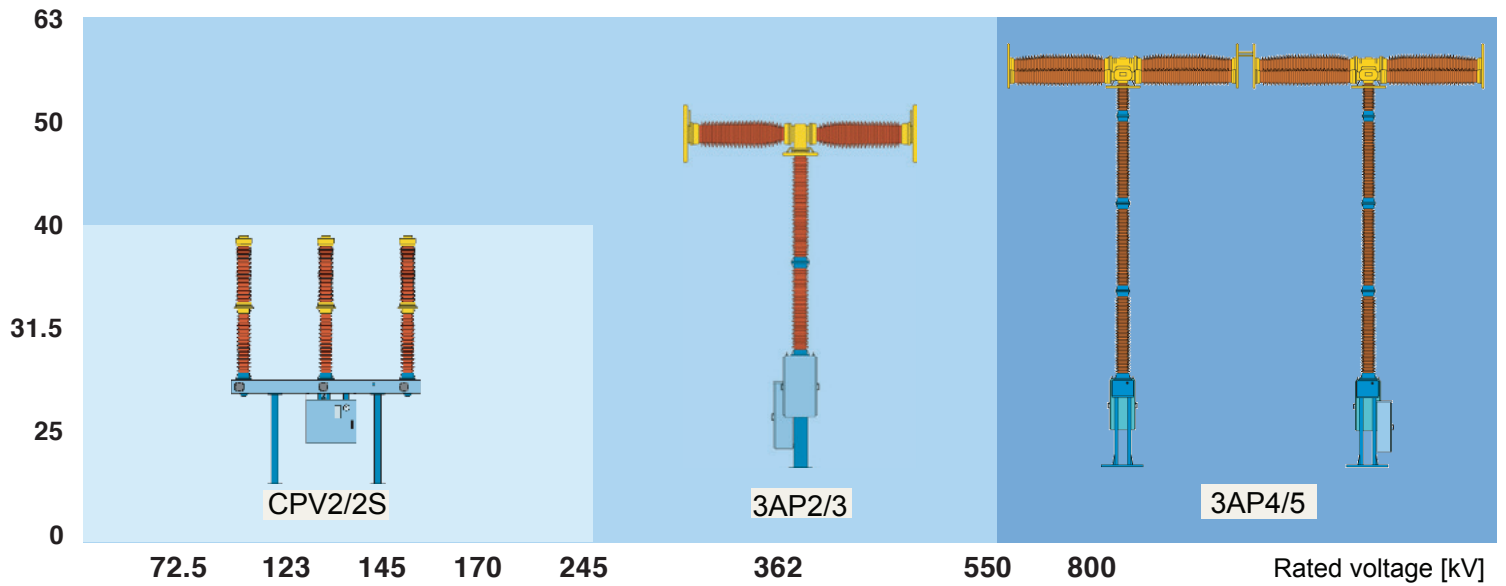
- High short circuit interrupting capabilities
- 12 yr/25 yr maintenance cycle
- Simple installation
- Two or three cycle rating
- Low cost of ownership.

The SEI CPV2/CPV2S/3AP can switch and protect transformers, cables, shunt capacitor banks and reactors. It also functions as a low cost, low temperature, high fault interrupting device.

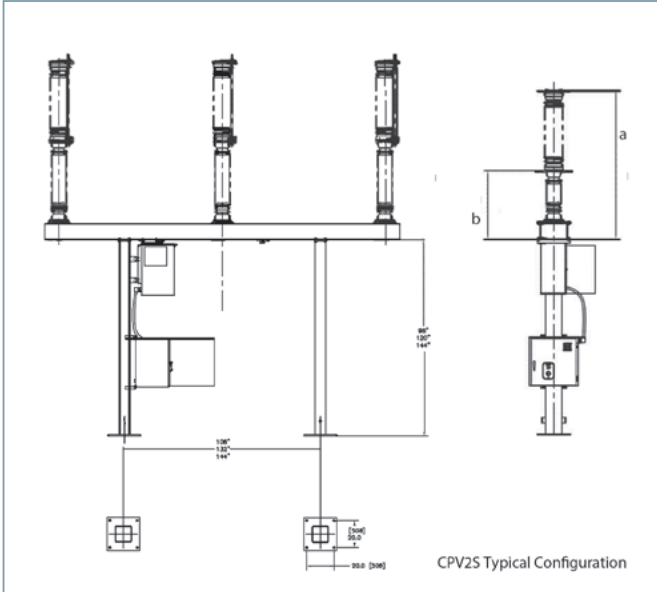
The SEI CPV2/CPV2S/3AP is ideal in new or existing substations where space is limited, for the installation of a horizontal circuit switcher or a conventional SF<sub>6</sub> dead-tank circuit breaker. Additionally, the vertical type CPV2/CPV2S/3AP is also the preferred model for retrofit installations where a circuit switcher is recommended to replace an existing fault interrupting device.

### Gas Monitoring

The CPV2/CPV2S/3AP is equipped with a temperature compensated pressure switch to automatically monitor the SF<sub>6</sub> gas status in the pole units. This switch with its gauge, is located either under the base frame or inside the control cabinet. It has two sets of contacts. One set provides an alarm indication when the gas pressure approaches within five (5) psi of the lockout value. The second set prevents operation if gas pressure falls to a level at which current interruption is not assured. The temperature compensating feature of the switch avoids alarms and lockouts due to normal pressure variations associated with local temperature changes.



Type		CPV2/CPV2S						3AP2/3	3AP4/5 3AP4/5
Rated voltage	[kV]	72.5	123	145	170	245	362	550	800
Power frequency withstand voltage	[kV]	160	260	310	365	460	520	860	1150
Lightning impulse withstand voltage	[kV]	350	550	650	750	900	1175	1800	2100
Rated current up to	[A]	4000	3150/4000	3150/4000	4000	4000	5000	5000	5000
Rated breaking	[kA]	40	40	40	40	40	63	63	63



## CPV2/CPV2S Features & Ratings

### Key features:

- 72.5kV thru 170kV shipped assembled
- 245kV and above shipped in sub-assemblies
  - Factory timed and tested to save installation time and costs
  - Pre-engineered designs facilitate reduced approval times and allow quicker delivery times
- Vertical interrupter design (245kV and below only)
  - Requires minimum installation space
  - Ideal for retrofit applications
- Increased interrupting ratings
- Fast three-cycle interrupting speed
  - Significantly reduces system disturbances and minimizes damage to key system components

- Full strength interrupter insulation
  - Maintains full BIL insulation across open contacts and permits use of non-disconnect models
- Proven spring-spring operator mechanism
- Color coded density monitor with integral pressure gauge
- Rupture disk on each phase.

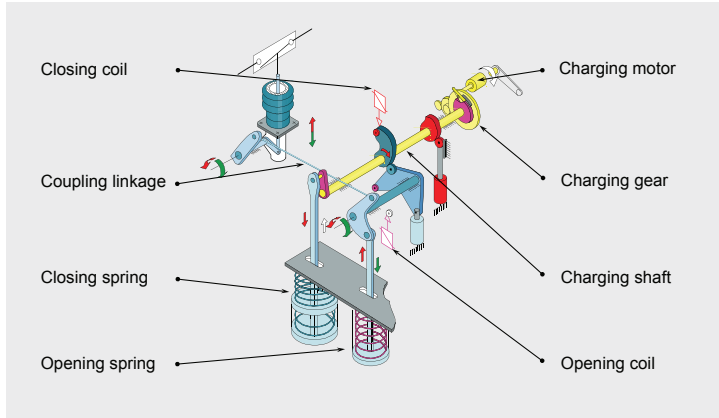
## Ratings and Specifications

Identification	Ratings								Related capabilities		
	Voltage			Insulation		Current			Current		
	Nominal kV class	Rated max kV	Rated voltage range factor	Low freq. (kV, rms)	Impulse (kV, crest)	Rated continuous current (amps, rms)	Rated short circuit current at rated (KA)	Interrupting time (cycles)	Maximum symmetrical interrupting capability (kA)	3-sec short time current carrying capability (kA)	closing and latching capability (kA)
CPV2-72.5-20	69	72.5	1	160	350	1200 thru 4000	20	3	20	40	108
CPV2-72.5-25	69	72.5	1	160	350	1200 thru 4000	25	3	25	40	108
CPV2-72.5-31.5	69	72.5	1	160	350	1200 thru 4000	31	3	31.5	40	108
CPV2-72.5-40	69	72.5	1	160	350	1200 thru 4000	40	3	40	40	108
CPV2/CPV2S-121-20	115	121	1	260	550	1200 thru 3150	20	3	20	40	108
CPV2/CPV2S-121-25	115	121	1	260	550	1200 thru 3150	25	3	25	40	108
CPV2/CPV2S-121-31.5	115	121	1	260	550	1200 thru 3150	31	3	31.5	40	108
CPV2/CPV2S-121-40	115	121	1	260	550	1200 thru 3150	40	3	40	40	108
CPV2/CPV2S-145-20	138	145	1	310	650	1200 thru 3150	20	3	20	40	108
CPV2/CPV2S-145-25	138	145	1	310	650	1200 thru 3150	25	3	25	40	108
CPV2/CPV2S-145-31.5	138	145	1	310	650	1200 thru 3150	31	3	31.5	40	108
CPV2/CPV2S-145-40	138	145	1	310	650	1200 thru 3150	40	3	40	40	108
CPV2-170-20	161	170	1	365	750	1200 thru 4000	20	3	20	40	108
CPV2-170-25	161	170	1	365	750	1200 thru 4000	25	3	25	40	108
CPV2-170-31.5	161	170	1	365	750	1200 thru 4000	31	3	31.5	40	108
CPV2-170-40	161	170	1	365	750	1200 thru 4000	40	3	40	40	108
CPV2-245-20	230	245	1	460	900	1200 thru 4000	20	3	20	40	108
CPV2-245-25	230	245	1	460	900	1200 thru 4000	25	3	25	40	108
CPV2-245-31.5	230	245	1	460	900	1200 thru 4000	31	3	31.5	40	108
CPV2-245-40	230	245	1	460	900	1200 thru 4000	40	3	40	40	108
CPV2S-245-63	230	245	1	460	1050	1200 thru 4000	63	3	63	63	170

Structure Height	8'0" (96.0")					10'0" (120.0")					12'0" (144.0")				
	kV Rating	72.5	*123	*145	170	245	72.5	*123	*145	170	245	72.5	*123	*145	170
Internal kV BIL	350	550	650	750	900	350	550	650	750	900	350	550	650	750	900/1050
Insulator kV	72.5	121	145	170	245	72.5	121	145	170	245	72.5	121	145	170	245
Phase Spacing	48	102	102	110	48	102	102	110	48	102	102	110	48	102	110
	84	120	120	84	120	120	84	120	120	84	120	120	84	120	120
"a" Dim (in.)	109.2	124.1	148.5	186	109.2	124.1	148.5	186	109.2	124.1	148.5	186	109.2	124.1	148.5
"B" Dim (in.)	50.3	68.7	81.8	100	50.3	68.7	81.8	100	50.3	68.7	81.8	100	50.3	68.7	81.8
Net Weight (lbs)	4450	4750	5100	8800	4550	4850	5200	8900	4650	4950	5300	9000	4650	4950	5300



Identification		Ratings							Related capabilities		
Type	Nominal kV class	Voltage		Insulation		Current			Maximum symmetrical interrupting capability (kA)	3-sec short time current carrying capability (kA)	closing and latching capability (kA)
		Rated max kV	Rated voltage range factor	Low freq. (kV, rms)	Impulse (kV, crest)	Rated continuous current (amps, rms)	Rated short circuit current at rated (kA)	Interrupting time (cycles)			
3AP-362-20	345	362	1	555	1300	1200-5000	20	2	20	20	54
3AP-362-31.5	345	362	1	555	1300	1200-5000	31.5	2	31.5	31.5	85
3AP-362-40	345	362	1	555	1300	1200-5000	40	2	40	40	108
3AP-362-50	345	362	1	555	1300	1200-5000	50	2	50	50	135
3AP-362-63	345	362	1	555	1300	1200-5000	63	2	63	63	170
3AP-550-20	500	550	1	860	1800	1200-5000	20	2	20	20	54
3AP-550-31.5	500	550	1	860	1800	1200-5000	31.5	2	31.5	31.5	85
3AP-550-40	500	550	1	860	1800	1200-5000	40	2	40	40	108
3AP-550-50	500	550	1	860	1800	1200-5000	50	2	50	50	135
3AP-550-63	500	550	1	860	1800	1200-5000	63	2	63	63	170
3AP4 800-40	745	800	1	960	2050	1200-5000	40	2	40	40	108
3AP4 800-50	745	800	1	960	2050	1200-5000	50	2	50	50	135
3AP4 800-63	745	800	1	960	2050	1200-5000	63	2	63	63	170



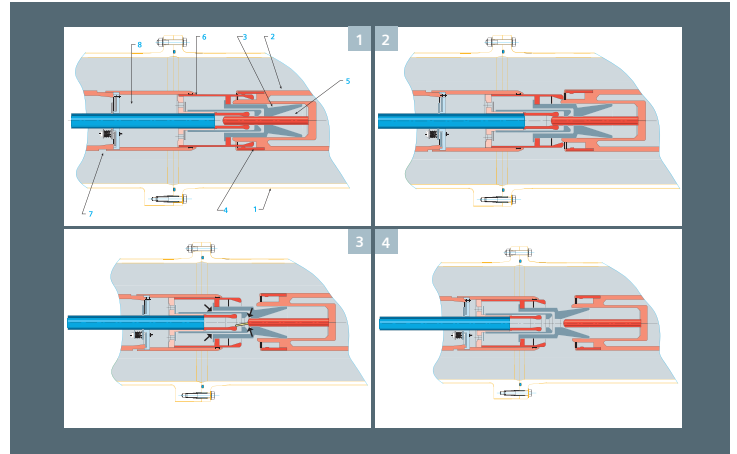
### Operating Mechanism FA2/FA4 Stored Energy Spring Mechanism

The FA operator and necessary control and monitoring equipment are housed in a common cabinet. Large doors located on either side of cabinet are easily removed for unobstructed access to the cabinet interior. The FA operating mechanism stores energy within a powerful spring in order to close the circuit switcher. To compress the operator spring a gear motor is used, which is an electric motor with an integral gear reduction. The purpose of storing the motor-supplied energy in the spring is to allow a rapid closing operation of the circuit switcher. It takes about ten seconds for the gear motor to compress the spring, but the spring can discharge and close the switcher in less than 0.1 seconds.

With the circuit switcher open, operation is initiated by energizing the close solenoid.

The closing spring discharges, simultaneously closing the switcher and charging the opening spring. The gear motor will run to compress the closing spring.

The switcher is maintained in the closed position by a latch system in the operator. A trip operation is initiated by energizing a solenoid which releases the trip latch and allows the switcher to open.

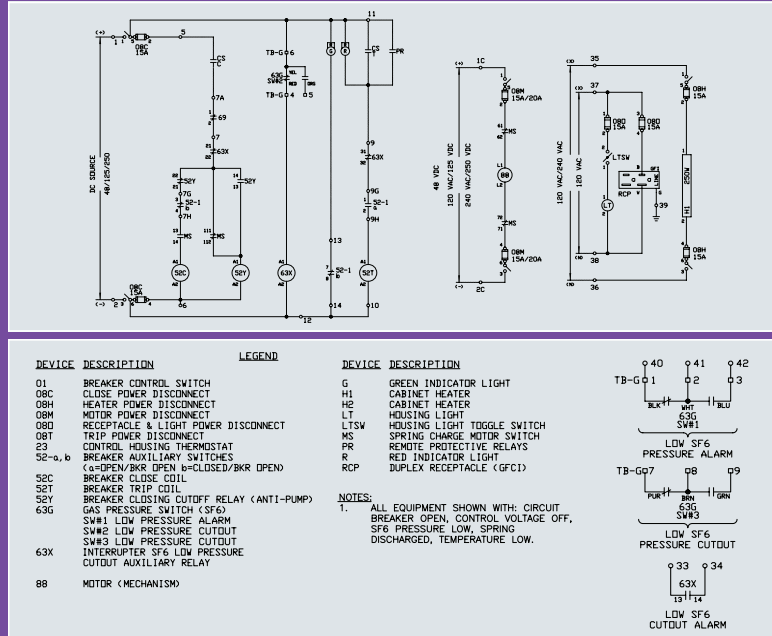


### Arc Assist

The breaker includes the field-proven arc-assist interrupter. Each interrupter consists of a main contact assembly and an arcing contact mounted inside a pole unit housing. During the opening operations, the puffer action in the compression cylinder of the interrupter is sufficient for low current faults and switching operations. During high current interruptions, heat from the arc causes the pressure to rise in the heating volume chamber. The resulting high pressure gas from the heating volume extinguishes the arc. This arc-assist technology, coupled with Siemens Energy's true spring-spring operating mechanism assures that the components are subjected to less stress which results in optimal operating reliability.

#### Key:

1. Aluminum housing
2. Stationary contact support
3. Nozzle
4. Main contact
5. Arcing contact
6. Heating volume
7. Moving contact support base
8. Compression cylinder



## Common Components

As a testament to the reliability of the spring- spring operating mechanism, SEI has more than 100,000 spring-spring mechanisms successfully installed worldwide. The FA mechanism incorporates sealed roller bearings that allow wear-free transitions of force to ensure a long service life. The charging gear, with its long-wearing spur wheels and principle of no- load decoupling, is another component that is designed for no maintenance. Low operating mechanism force assures that the transition elements are subjected to less stress, thus resulting in optimal operating reliability.

## CPV2/CPV2S/3AP Specification

### Longer operating life and lower maintenance costs

When considering any circuit switcher or Live-tank breaker, today's utilities must be concerned not only with initial price and installation, but also with the ongoing costs of ownership. The Siemens Energy breaker wins in every category. Its relatively low cost, simple installation and maintenance make it a strong investment.

In addition to reliable performance it can also address a number of special requirements, such as:

- Switching capacitors, cables and reactors
- Environmentally restricted sites requiring oil sumps
- System stability problems requiring three-cycle interrupting
- Reclosing duty without de-rating interrupting capability
- High contamination zones that require extra creep and low contamination weather shields

### Getting the best breaker for your needs

Specify the following information when ordering in order to receive the best product for your needs:

1. Breaker type and rating
2. Trip voltage (see ratings section)
3. Close voltage (see ratings section)
4. Motor voltage: 120VAC/125VDC, 240VAC/250VDC, 48VDC
5. Heater voltage: 115, 230VAC
6. Include customer specifications covering special equipment, accessories, test, etc.

### CPV2/CPV2S/3AP specification

Basic breaker/Circuit Switcher

1. Three- pole SF<sub>6</sub> filled outdoor power breaker with three interrupters
2. Galvanized base and pedestals
3. Light gray standard color
4. Light gray ANSI #70 Insulators
5. Spring-spring operating mechanism
6. Instrumentation to monitor SF<sub>6</sub> gas pressure and low pressure alarms
7. Up to 36 stage auxiliary switch
8. Trip coil and close coil
9. Cabinet heater to prevent condensation
10. Terminal blocks and wiring
11. Operations counter
12. Fused knife switches
13. Grounding pads
14. Mechanical position indicator
15. Provision for travel transducer attachment
16. Set of tools required for installation.

### Operational modifications

1. Capacitor trip
2. Relays for reclosing or non-reclosing switcher application
3. External pull-to-trip handle
4. Cabinet light and convenience outlet
5. Dual trip coils
6. Reversible auxiliary switch stages for customer usage
7. Control switch
8. Local/remote switch
9. Additional cabinet heaters/thermostats





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