

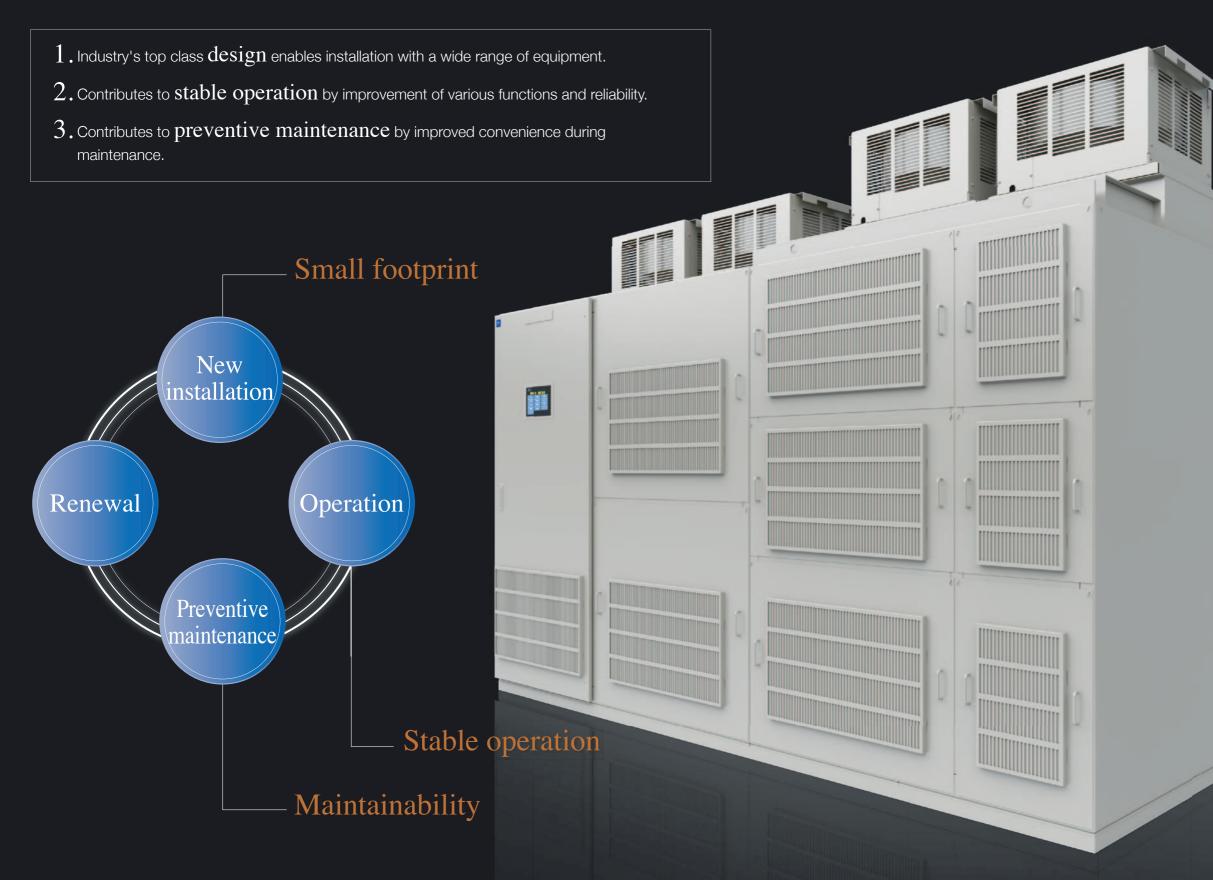
Innovating Energy Technology

Medium-voltage Drives FRENIC4600FM6e



Offering comprehensive benefits throughout of new equipment to renewal.

the entire lifecycle from installation



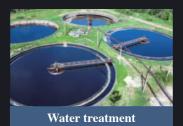
Application field



Fans, induction blowers, dust collectors, cooling water pumps



Granulators, compressors, fans and pumps



Drainage pumps, water conveying pumps, water supply pumps



Fans, kilns, separators, bucket elevators



Other

Turbo refrigerators, Banbury mixers, ball mills

Industry's top class design enables installation with a wide range of equipment.

Industry-leading compact structure

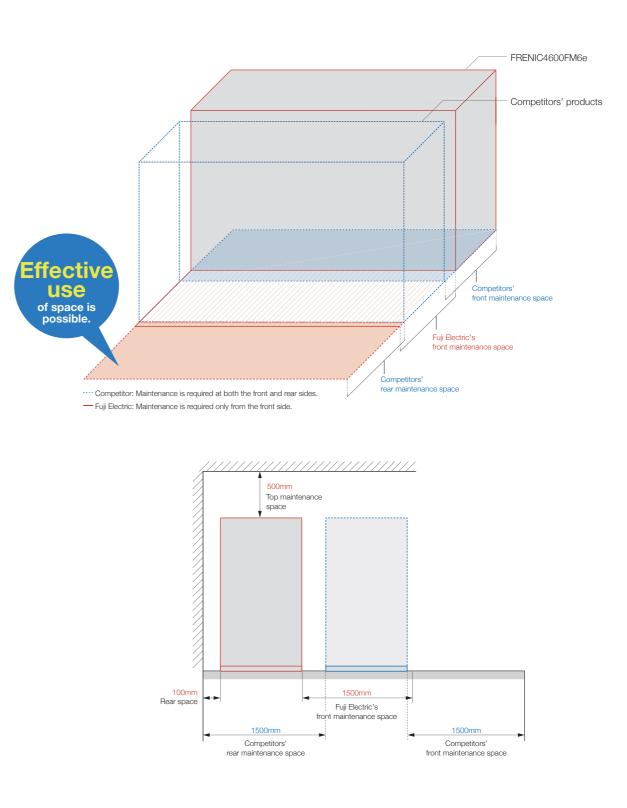
Simple main circuit configuration enables a smaller and lighter design than that of conventional models. Also contributes to a reduction in installation costs, such as building construction expenses, and enables a wider choice of installation locations.

- Volume: reduction of approx. 27% compared to conventional models
- Footprint: reduction of approx. 17% compared to conventional models

Effective utilization of electric compartment space

With complete access possible from the front of the unit, there is no need to provide maintenance space on the rear side. This enables the space in the electric compartment to be effectively utilized.

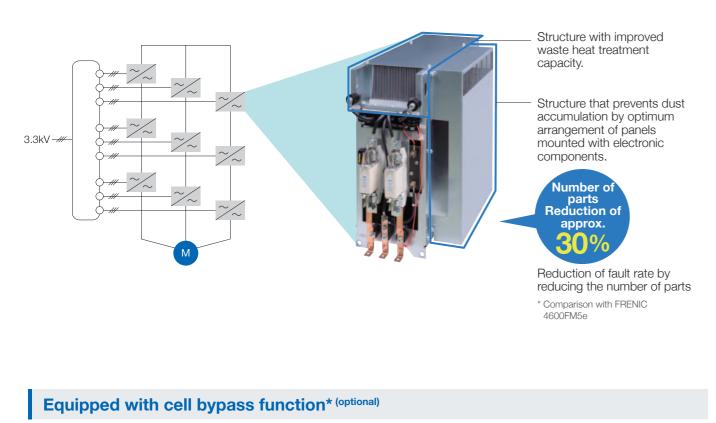




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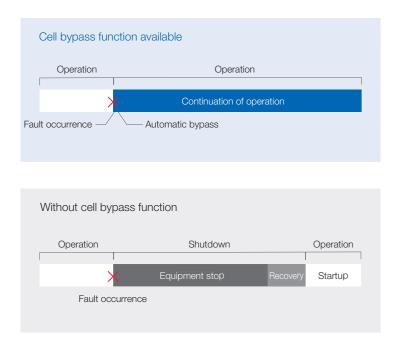
Contributes to stable operation by improvement of various functions and reliability.

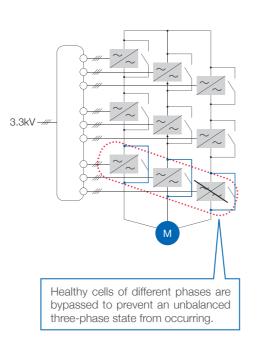
Inverter cell structure makes full use of Fuji Electric's experience and expertise.



* Fuji Electric research

In the event of a cell fault, it is possible to bypass the failed cell and operate the unit using only healthy cells. Automatic switch-over during inverter operation does not stop the equipment.





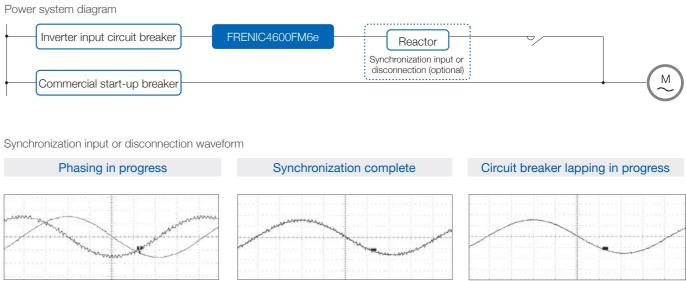
Auto-restart function upon an instantaneous power failure can be selected to match the purpose of the equipment.

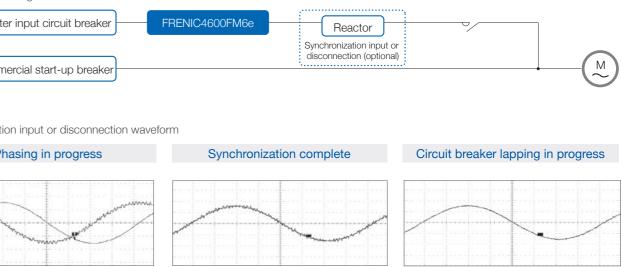
It is possible to select the operation pattern to match the application when an instantaneous voltage drop occurs.

- Selection of major fault
- Selection of free-run restart (optional)
- Selection of continued operation (optional) · Operation continues for 300 msec from the instantaneous power failure detection level (detected at system voltage = 85% or less)

Synchronized input or disconnection function that enables the power supply to be switched over without stopping the equipment.

Inverter output is switched over according to the phase of the system voltage. This function enables the power supply to be switched over without instantaneous disruption and shock, so the equipment does not need to be shut down.





Backup by a commercial bypass system

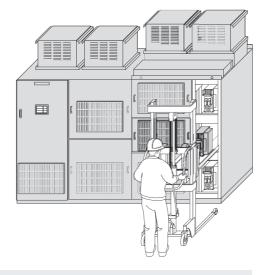
A commercial bypass system can be constructed by using a commercial start-up circuit in combination. Enables equipment operation to continue when the inverter is stopped.

* A reactor (optional) is required on the inverter output side for this function

Contributes to preventive maintenance by improved convenience during maintenance.

Quick exchange of cells is possible.

Easy-to-carry structure enables cells to be easily exchanged also in the event of a fault.



Standard equipped LCD touch panel features good visibility.

7-inch liquid crystal display mounted on the front enables easy monitoring and operation.

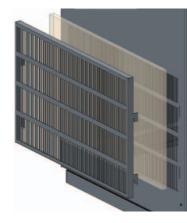


Main functions of LCD touch panel

- Start and stop of the inverter
- Set, change and display of control parameters
- Display of actual value data as bar graphs
- Display of fault causes (first fault, detailed
- Japanese, English and Chinese are available for the LCD touch

Air filters can be replaced without touching the high voltage charging section

Air filters that need to be replaced on a regular basis are mounted on the outside of the panel. There is no danger of coming in contact with the high-voltage charging unit when replacing the filter.



After installation, change to a film capacitor is possible (optional).

Electrolytic capacitors are equipped in the standard specification. Change to a film capacitor is possible during

component maintenance. Selection is possible to meet the customer's requirements with regard to installation cost and running cost.

Interactive and easily accessible DDC loader maintenance tool

Operation monitoring scree

Maintenance and adjustment are normally performed using the touch panel, but a DDC loader is also available for use as a maintenance adjustment tool. The DDC loader can be used easily and interactively on the screen of a personal computer.

* Loader software is included free of charge. PC hardware is optional.

Main functions of maintenance tool

- Set, change, display, and save control parameters
- Operating status display: Display of block diagrams, actual values, and internal data
- Display of fault causes: first fault, detailed display, trace back data
- * Japanese and English are available for the display language. * Windows 7 is the currently supported OS. (Support for Windows 10 is planned.)



Operation monitoring screen

Trace data screen

Reduction of stress on power supply and motors

Reduces power supply side harmonic current and does not affect the equipment.

A multiphase diode rectification system is used to prevent obstacles caused by harmonic currents generated by equipment using semiconductors. This inverter does not stress the power supply in compliance with the harmonic suppression guideline.*

* Guideline on harmonics countermeasures for consumers receiving high voltage or special high voltage power, as established on September 30, 1994.

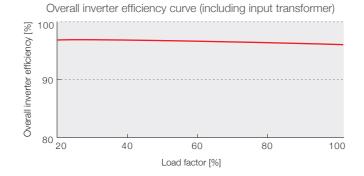
Harmonic current co	ntent (3.3 kV)
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Degree	5	7	11	13	17	19	23	25	35	37
Guideline [%]	4.00	2.86	1.83	1.49	1.14	1.02	0.87	0.80	0.80	0.80
Actual value [%]	1.57	0.71	0.48	0.25	0.14	0.07	0.08	0.01	0.00	0.00

Note: Example of measurement using an actual load.

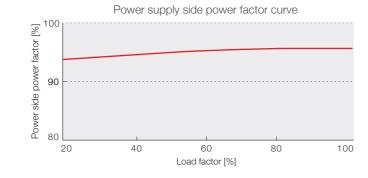
High efficiency with an overall efficiency of approx. 97%

- Output transformer is not required, and this eliminates output transformer losses.
- Switching losses are reduced by multilevel pulse width modulation (PWM) control.
- Harmonic losses of the input transformer primary winding are reduced, and this reduces harmonic current on the power supply side.



High power factor with a power supply power factor of 95% or more (at full load).

- Multiphase diode full-wave rectification enables operation with the power supply power factor as the high power factor.
- Phase-advancing capacitors and DC reactors for improving the power supply power factor are not necessary.
- Inverter operation is possible with a lower capacity power supply.



Various functions that reduce stress on motors

- Output current waveform becomes almost sinusoidal with multilevel PWM control and reduces the motor torque ripple.
- Switching surge is minimized and reduces motor stress.
- Output current is almost sinusoidal and reduces motor harmonic losses.

Providing higher quality and full support

Providing stable quality and full support

From manufacturing to inspection to shipment, our power electronics factory (Suzuka city, Mie prefecture) handles all processes to provide products of reliable quality to our customers.



Global Sales and Service Network

Our service network spans the grobe. For service information, please contact your local FUJI Electric sales and service staff.



3 kV series

Input voltage [kV]	Rated capacity [kVA]	Rated current [A]	Maximum current *1 (overload) [A]	Full width (transformer panel + converter panel) [mm]	Depth *2 [mm]	Overall height [mm]	Overall height (excluding fan) [mm]	Approximate mass *3 [kg]							
3.0	920	178	106	2900	1100			4200							
3.3	1020	170	190	196 (1750+1150)	1100			4300							
3.0	1180	222	051	251 3400			0000	5400							
3.3	1300	228	201			0570		5400							
3.0	1380	000		(1900+1500)	1200	2576	2062	5000							
3.3	1520	266	293	293				5600							
3.0	1610	010	3500	3500				C100							
3.3	1780	312	343	(1950+1550)				6100							
3.0	2000	005		10.1	40.4	404	40.4	40.4	40.4	40.4		1200			7000
3.3	2200	385	424	4100	1300	0004	0100	7300							
3.0	2300	110	(2150+1950)		2604	2162	7700								
3.3	2530	443	487					7700							

*1 Output current is limited at an output frequency of 25 Hz or less. (70% of the rated current at a frequency of 0.2 Hz)
*2 The required maintenance space in front of the unit is 1500 mm. (Space requirement is common to models of all capacities.)
*3 Approximate mass is for the standard specification, and may vary depending the use of optional features. Note: The external dimensions are subject to change.

Model description



1 Basic ty	/ре	3Input vo	Itage, frequency	Output voltage		
Code symbol	Product category	Code symbol	Input voltage, frequency	Code symbol	Output voltage	
FRN46-6	FRENIC4600FM6e	305	3.0kV 50Hz	30	3.0kV	
		306	3.0kV 60Hz	33	3.3kV	
2 Control	method	335	3.3kV 50Hz		6.0kV	
Code symbol	制御方式			60		
F	VT specification (V/f simplified sensorless vector)	336	3.3kV 60Hz	66	6.6kV	
С	CT specification	605	6.0kV 50Hz			
C	(V/f simplified sensorless vector)	606		5 Output capacity		
	CT specification	000	6.0kV 60Hz	Code symbol	Output capacity	
S	(V/f sensorless vector)	665	6.6kV 50Hz	1020~2530	1020~2530kVA	
V	CT specification (Vector with sensor)	666	6.6kV 60Hz	1650~5270	1650~5720kVA	

	oodo oyinboi	raxinary porror ouppry
_	A	Control power supply: Single-phase, 200/220 V Fan power supply: Three-phase, 200/220 V
_	Z	Other
	(7)Locatio	on of manufacture
_	0	
1	Code symbo	Location of manufacture

6 Auxiliary power supply Code symbol Auxiliary power supply

Code symbol	Location of manufact
J	Japan
None	China

6 kV series

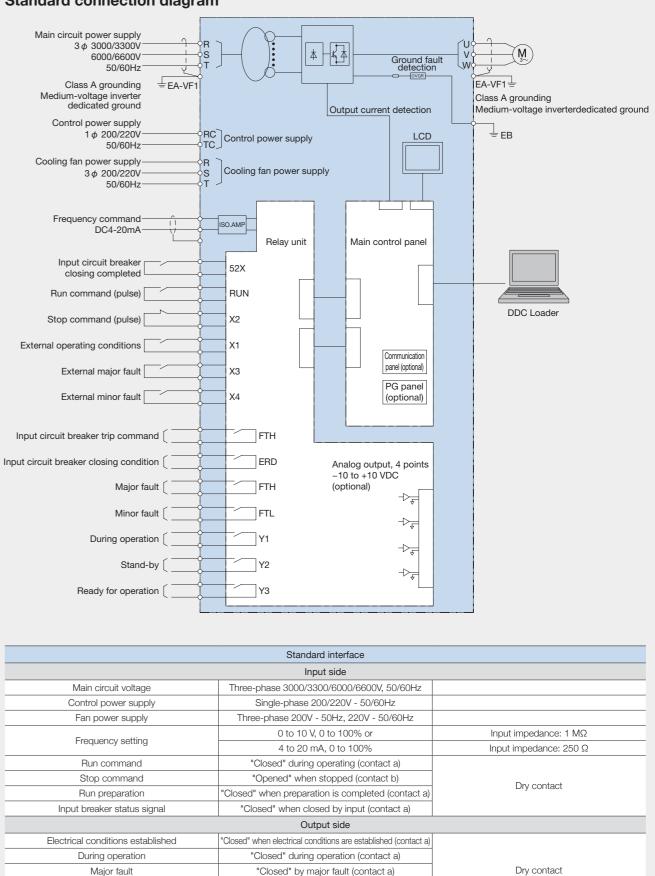
Input voltage [kV]	Rated capacity [kVA]	Rated current [A]	Maximum current *1 (overload) [A]	Full width (transformer panel + converter panel) [mm]	Depth *2 [mm]	Overall height [mm]	Overall height (excluding fan) [mm]	Approximate mass * ³ [kg]		
6.0	1500	- 144	159					6100		
6.6	1650	144	109					0100		
6.0	1700	- 164	180	3900	1200	2604	2162	6300		
6.6	1870	104	100	(2000+1900)	1200	2004	2102	0000		
6.0	1840	- 178	196					6500		
6.6	2030	170	190					0300		
6.0	2000	- 192	212					7700		
6.6	2200	192	212	4500				1100		
6.0	2240	- 217	000	238	(2050+2450)				8000	
6.6	2470	217	230			2704	2262	0000		
6.0	2500	- 241	265	4600	1300			8300		
6.6	2750	241	200					6300		
6.0	2760	- 266	203	293	(2150+2450)	1300			8700	
6.6	3040	200	290					0700		
6.0	3000	- 289	318	010	000 010					9300
6.6	3300	209		4700		2904	2462	9000		
6.0	3230	- 312	343	(2200+2500)		2904	2402	9600		
6.6	3560	512	343					9000		
6.0	3700	256	392					11700		
6.6	4070	356	392					11700		
6.0	4000	005	400	5400	1400			10000		
6.6	4400	- 385	423	(2450+2950)	1400			12000		
6.0	4600	440	4.40			3004	2562	10500		
6.6	5060	443	487			3004	2002	12500		
6.0	4800	460	EOO					10500		
6.6	5280	- 462	508	6300	1500	,		13500		
6.0	5200	500	EE O	(2600+3700)	1500			10000		
6.6	5720	- 500	550					13800		

*1 Output current is limited at an output frequency of 25 Hz or less. (70% of the rated current at a frequency of 0.2 Hz) *2 The required maintenance space in front of the unit is 1500 mm. (Space requirement is common to models of all capacities.) *3 Approximate mass is for the standard specification, and may vary depending the use of optional features. Note: The external dimensions are subject to change.

Standard specification

	Item	FRENIC4600FM6e
	Ambient temperature	Ambient temperature: 0 to 40°C Storage temperature: –10 to 60°C Transport temperature: –20 to 70°C (–20 to –10°C, 60 to 70°C: within 24 hours
Ambient conditions	Humidity	Up to 90% RH (non-condensing)
	Altitude	1000 m above sea level
	Vibration	4.9 m/s ² or less (10 to 50 Hz)
	Location of installation	Indoor (General environment without corrosive gas, dust, flammable or volatile gases)
Applica	able standard	JIS, JEC, JEM
	Panel structure	Steel sheet, self-standing enclosed structure, with maintenance access at front
Structure	Protective structure	IP20
	Cooling method	Forced air cooling using ceiling fan
	Paint color	Munsell 5Y7/1, semi-gloss
	Main circuit	Three-phase 3000/3300/6000/6600 V, 50/60 Hz
	Control power supply	Single-phase 200 V, 50/60 Hz 220 V, 50/60 Hz
Input	Fan power supply	Three-phase 200 V, 50/60 Hz 220 V, 50/60 Hz
	Allowable power supply fluctuation	Voltage: -10% to +10%, frequency: ±5%
	Control method	Simplified sensorless vector control with V/f constant control Vector control with speed sensor (induction motors) Speed sensorless vector control (induction motors) Vector control with speed sensor (synchronous motors) * With optional resolver Speed sensorless vector control (synchronous motors)
	Output frequency	0 to 72 Hz (72 Hz to 120 Hz, optional)
	Frequency accuracy	±0.5Hz
	Frequency resolution	0.005%
Control method	Acceleration, deceleration time	0.1 to 5500 S
	Overload tolerance	110% 60s
	Main control functions	Current limit, deceleration overvoltage avoidance, instantaneous power failure restart, cell bypass function (optional)
	Main protective functions	Overcurrent, main circuit fuse blown, overvoltage, undervoltage, CPU abnormality, cooling fan stop, etc.
	Transmission function (optional)	Modbus, Profibus-DP, T-LINK

Standard connection diagram



	Standard interface
	Input side
Main circuit voltage	Three-phase 3000/3300/6000/6600V, 50/60Hz
Control power supply	Single-phase 200/220V - 50/60Hz
Fan power supply	Three-phase 200V - 50Hz, 220V - 50/60Hz
F	0 to 10 V, 0 to 100% or
Frequency setting	4 to 20 mA, 0 to 100%
Run command	"Closed" during operating (contact a)
Stop command	"Opened" when stopped (contact b)
Run preparation	"Closed" when preparation is completed (contact a)
Input breaker status signal	"Closed" when closed by input (contact a)
	Output side
Electrical conditions established	"Closed" when electrical conditions are established (contact a)
During operation	"Closed" during operation (contact a)
Major fault	"Closed" by major fault (contact a)
Minor fault	"Closed" by minor fault (contact a)
Input circuit breaker closing condition	"Closed" when electrical conditions are established (contact a)
Input circuit breaker trip signal	"Closed" by major fault (contact a)
Applog signal (aptional) *	0 to 10 V
Analog signal (optional) *	4 to 20 mA
	* The analog output signal can be selected (ou

r fault (contact a) Load resistance 10 kΩ or more

Load resistance 750 Ω or less

(contact capacity: 250 VAC, 2A; 30 VDC, 3A)

* The analog output signal can be selected (output current, output voltage, output frequency, etc.).

For Fuji Electric Co., Ltd.

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