

High-efficiency, Full IGBT

Fuji Large-capacity UPS

**UPS7000HX-T4 Series
(E Type: 300-500 kVA)**

UPS7000HX-T4 Series



Ideal High-reliability, High-efficiency UPS for Critical Systems

The progress of our societies based upon information technology, the widespread expansion of Internet data centers and semiconductor manufacturing plants, the industrial facilities using IT — all of these application scenarios absolutely require an uninterrupted supply of electrical power.

The UPS devices used for such applications must be equipment with a high degree of reliability.

Based on our proven UPS technology, in our Fuji UPS7000HX-T4 Series we made full use of state-of-the-art device and power electronics technologies to create large-capacity UPS products that feature high reliability and high efficiency.

High efficiency of **96.5%** achieved with a three-phase, four-wire constant inverter power supply system

- AT-NPC* 3-level (new 3-level) conversion technology
- Application of Fuji-made RB-IGBT elements
- Circuit rationalization, such as transformerless isolation, by means of DC voltage control
- Significant reduction in running cost

*AT-NPC: Advanced T-type Neutral Point Clamped

High reliability achieved through systemization and our proven track record

- Synchronized switchover system with bypass
- Parallel redundant system (See system introduction example on page 7.)
- Standby redundant system

High reliability

High efficiency

7000HX-T4

Space-saving design

Compact and lightweight design

- We reduced the footprint of the facility equipment while maintaining the space for servers.

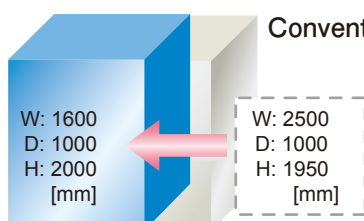
High functionality

Variety of functions achieved through our proven track record

- Soft start to suppress inrush current
- Power walk-in function
- Battery service life assessment
- Simple Network Management Protocol (SNMP/Modbus) (option)

Reduction in size for 35%

Comparison of space for 500 kVA units



Note: The 7000HX-T4 series does not require any space at the rear.

Applications

- Large data centers
- Internet service rooms
- Telecommunications
- Industrial systems

Rated Specifications and External Dimensions



Rated specifications

Series	UPS7000HX-T4 series				
Model	E/300	E/400	E/500		
AC input	Number of phases	3-phase, 4-wire			
	Voltage	380*/400 V (-35 to +15%), 415 V (-35 to +10%), (battery assisted at -10% or less)			
	Frequency	50/60 Hz ±5%			
	Power factor	>0.99			
	THDi	<5%			
Bypass input	Number of phases	3-phase, 4-wire			
	Voltage	380/400 V ±15%, 415 V (-15%, +10%)			
	Frequency	50/60 Hz ±5%			
	Bypass overload capacity	500% 1 cycle	800% 1 cycle		
AC output	Output power	300 kVA, 300 kW	400 kVA, 400 kW	500 kVA, 500 kW*2	
	Number of phases	3-phase, 4-wire			
	Voltage	380/400/415 V			
	Voltage accuracy	<±1%			
	Frequency	50/60 Hz			
	Frequency accuracy	±0.01% (At self-oscillation)			
	Load power factor	Rated 1.0 (0.7 to 1.0 delay)			
	Transient voltage regulation	<±5%			
	Voltage waveform distortion factor	< 2% (Linear load), < 5% (Non-linear load IEC62040-3)			
	Overload capacity	125% 10 min*2, 150% 1 min*2			
	Peak-to-rms ratio	≤3			
	Battery	Rated voltage	480 VDC (240 cells) to 528 VDC (264 cells)		
	External dimensions	Width	1600 mm		
Depth		1000 mm			
Height		2000 mm (Height including base)			
Weight		1700 kg			
Compliance standards	Safety	IEC62040-1			
	Electromagnetic compatibility (EMC)	IEC62040-2			
	Performance	IEC62040-3			
	Product declaration	CE Certification reservation			
Other	Operating temperature	0 to +40°C (at rated voltage, rated load)			
	Altitude	Standard 1000 m or less			
	Relative humidity	5 to 95% (Non-Condensing)			
	Audible noise level	<75dB			
	Cooling system	Forced air cooling			
	Installation site	Indoors			
	Protection class	IP20			
	Colors	Munsell 5Y7/1 (semi-gloss)			
	Cable entry	Top entry			
	Soft-start function	Yes			
	Communication interface (option)	Simple Network Management Protocol (SNMP) Modbus RTU			

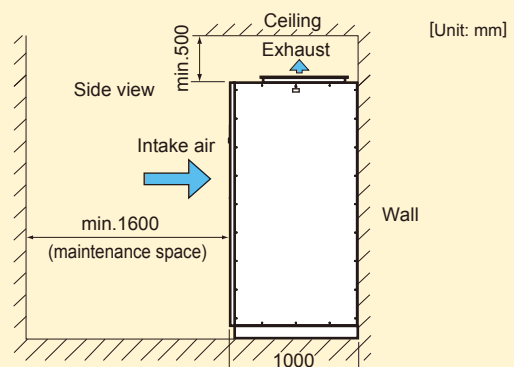
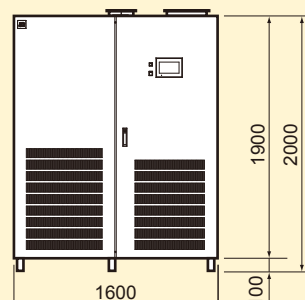
*1: In case of 380V, PF=0.9

*2: Limitations exist on temperature conditions.

External dimensions

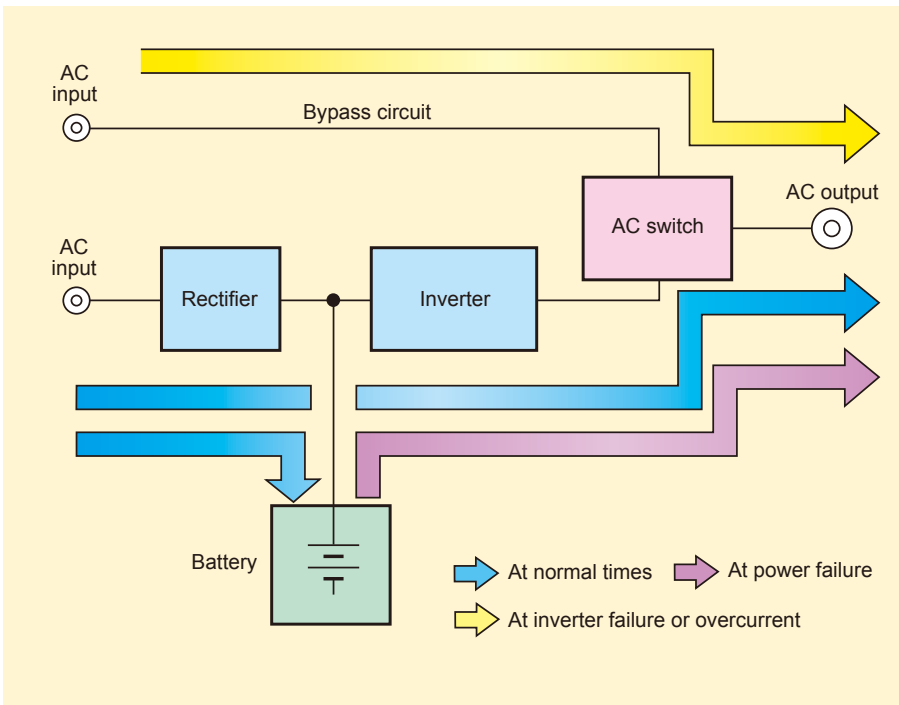
UPS main unit

Front view



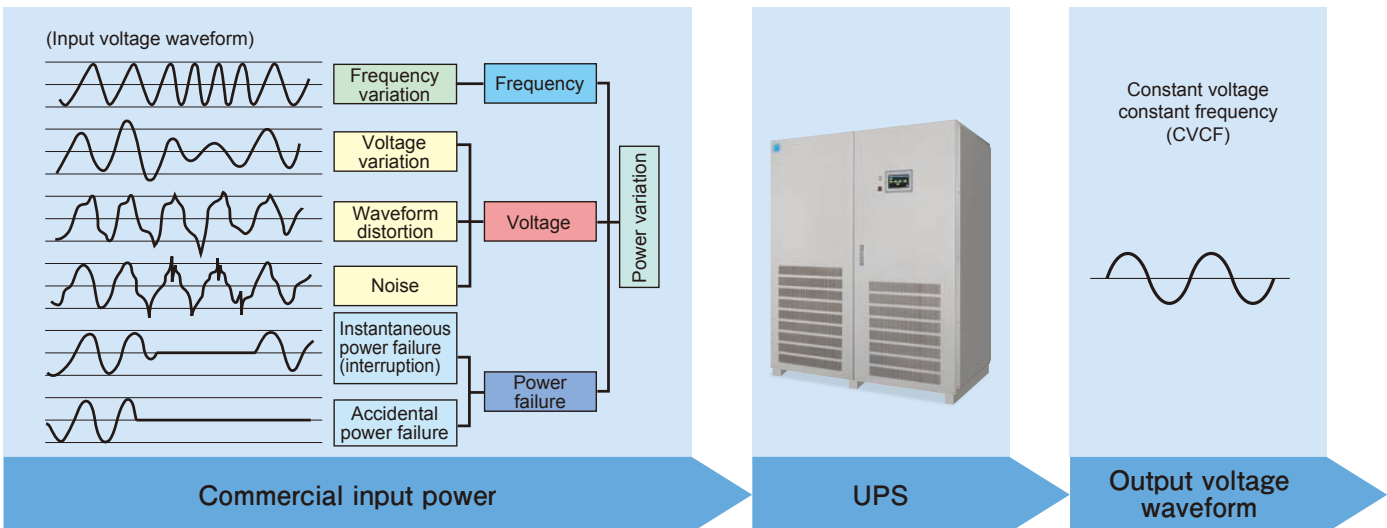
Basic UPS Configuration

Constant-voltage and constant-frequency inverter power supply system



A UPS consists of a rectifier, inverter, and battery. At normal times, the UPS continues to provide stable electric power at a constant voltage and constant frequency (CVCF) through the inverter while synchronizing with the commercial power supply. In the event of a power failure, the inverter draws power from the battery to continue providing electric power without any instantaneous interruption. If an overcurrent on the load side occurs, power is supplied through the bypass circuit. When the load current returns to normal, the inverter begins supplying electric power once again.

Full protection against power failures





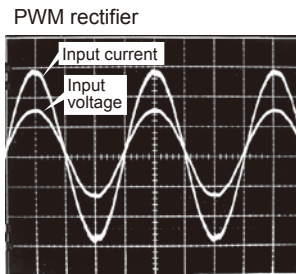
● PWM rectifier

Suppresses input harmonic current

The input harmonic current is suppressed using momentary waveform control to make the input current of the rectifier sinusoidal, and for this reason, there is no negative effect from harmonic current on the input at power generation equipment or phase on-site advanced condensers.

High input power factor

By controlling the AC input voltage and current to be in-phase, most of the reactive power is eliminated which makes the input power factor almost 1.0 and thus enables the input capacitance to be reduced.



● PWM inverter

Soft start-up on loads

The soft-start function (which gently raises the output voltage) of the output voltage during start-up achieves a load-friendly start-up system that suppresses the inrush current from load equipment (such as transformer and capacitive loads).

Little distortion of output voltage, even with distorted PC current

By means of instantaneous waveform control, even for loads (rectifier loads) with distorted current such as from PCs, the output voltage waveform is controlled to be sinusoidal, thus achieving output voltage that is mostly free of harmonics.

Minimal imbalance of output voltage, even with unbalanced three-phase loads

By means of separate three-phase control, unbalanced three-phase loads will cause almost no imbalance of the output voltage.

Power walk-in control

The soft-start function (power walk-in control) of the input current when the UPS starts up or when power is recovered after a power failure prevents surge on the input power.

System-friendly load migration function

When the power supply is manually switched from the inverter to being directly supplied from the system through the bypass circuit, such as for maintenance inspections, this function controls the inverter output current to slowly migrate the load to the power directly supplied by the bypass circuit. This function suppresses rapid load changes to the power supplied from the system side and can reduce voltage fluctuations.

AT-NPC 3-level Circuit

AT-NPC 3-level conversion circuit

AT-NPC 3-level conversion circuit using RB-IGBT

● Comparison of AT-NPC 3-level and conventional methods

Compared with conventional 2-level and 3-level products, by adopting our own in-company developed RB-IGBT*, we have achieved conductive loss reduction and reactor loss reduction in an AT-NPC 3-level (T-type) conversion circuit.

In addition, together with the AT-NPC 3-level circuit, we have also achieved low noise by optimizing the number of output voltage steps.

*RB-IGBT: A reverse blocking IGBT (RB-IGBT) is a low-loss, bi-directional switch (device) that features reverse voltage performance that cannot be provided by conventional IGBTs.

2-level	3-level (Conventional model: NPC)	AT-NPC 3-level
IGBT: 1200 V	IGBT: 600 V (Increase in number of IGBTs)	IGBT: 1200 V RB: 600 V
Conventional technology		Fuji Electric's proprietary technology (World's first)

AT-NPC 3-level circuit

AT-NPC 3-level module (1200 V, 300 A)

Application of RB-IGBT achieves a reduction in power losses and a reduction in the number of components

2-level system

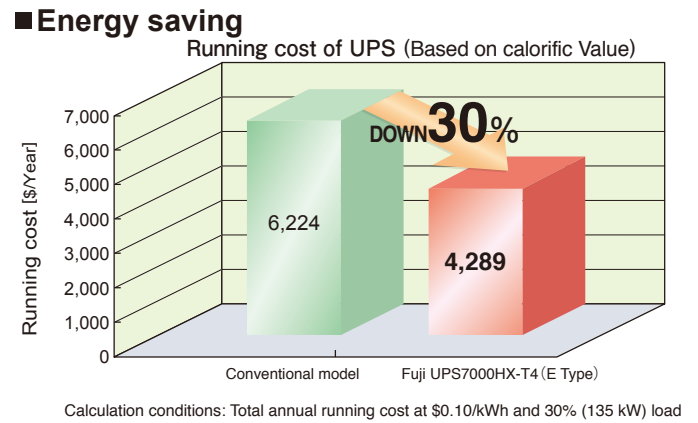
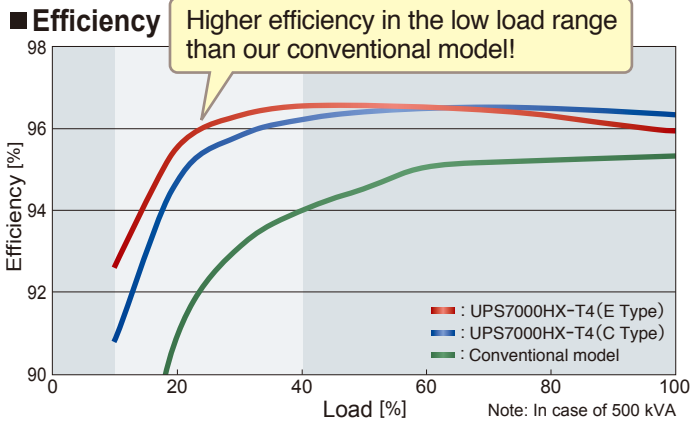
3-level system

Making the PWM square wave stepwise reduces the harmonic components.

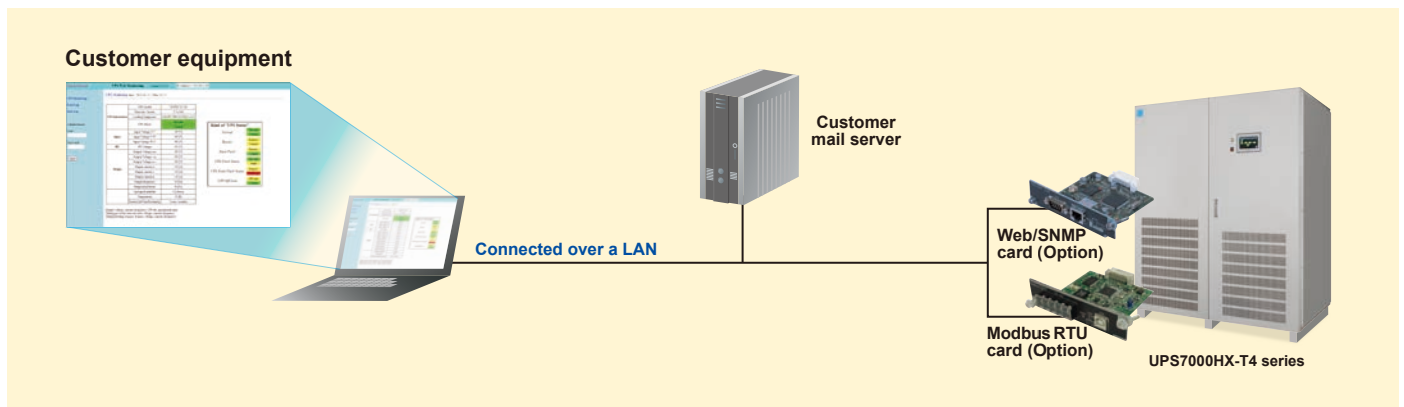
- Reduction in filter losses
- Reduction in switching losses



Comparison of equipment efficiency (Compared with our conventional model)



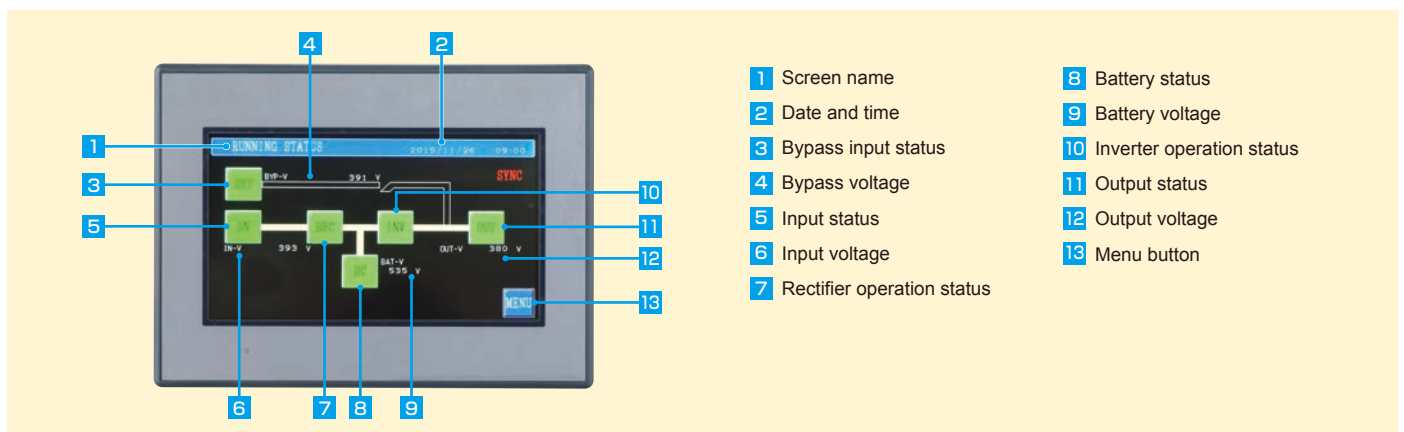
Network-enabled products



Connecting the UPS to a network

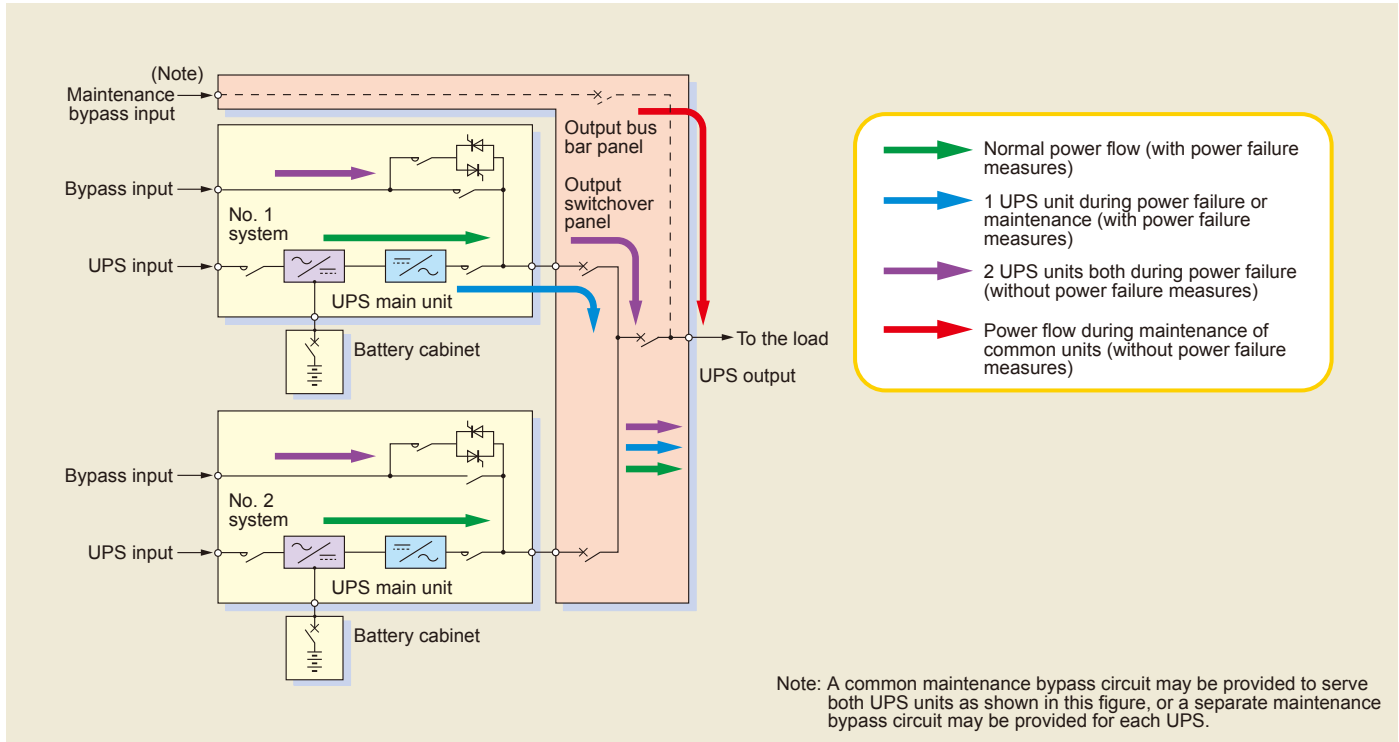
Product name	Model	Shutdown software	Description
Web/SNMP card (Option)	RRACWL02	Netshut	UPS can be monitored and mail sent over the network. Includes eight Netshut licenses. Additional licenses can be purchased to shut down more than 100 servers.
Modbus RTU card (Option)	RRACWL04	—	The Modbus protocol enables the status, measurement information and other UPS data to be monitored over the communication system.

Operation display panel



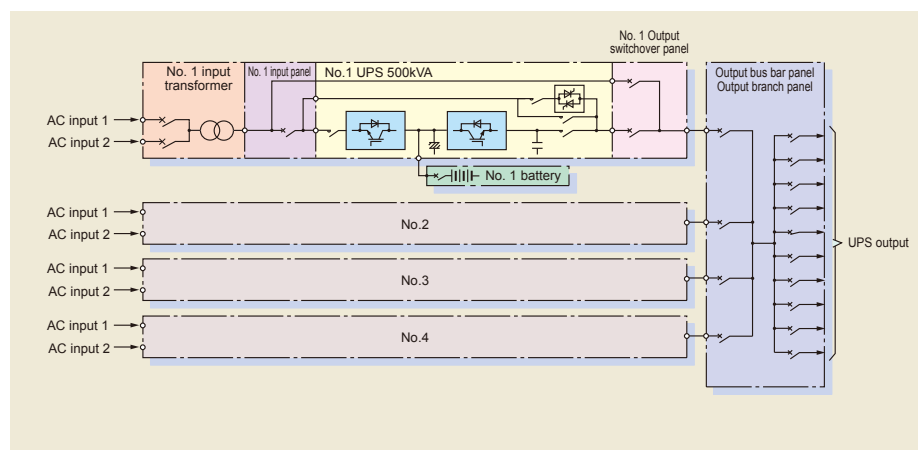
Examples of System Configurations

Power flow in a parallel redundant UPS operation mode (fully independent type)



System introduction example

- An example of a 500 kVA, parallel redundant UPS operation system (N + 1 system) using 4 UPS units.
- Up to 8 UPS units can be connected in parallel.
- High reliability can be expected from a system that is redundant from input to UPS output.
- During UPS system maintenance or in the event of a failure of one UPS unit, the UPS system will still provide power.



Fuji Electric Standard Battery Rack

(Option)



Fuji Electric standard battery rack

Our standard battery rack products form a significant part of the solutions we provide for data centers and server rooms.

■ Main features

- Designed for simple assembly and adjustment
- Lightweight for easy relocation and expansion
- Modular design for low cost
- Build-in circuit breaker

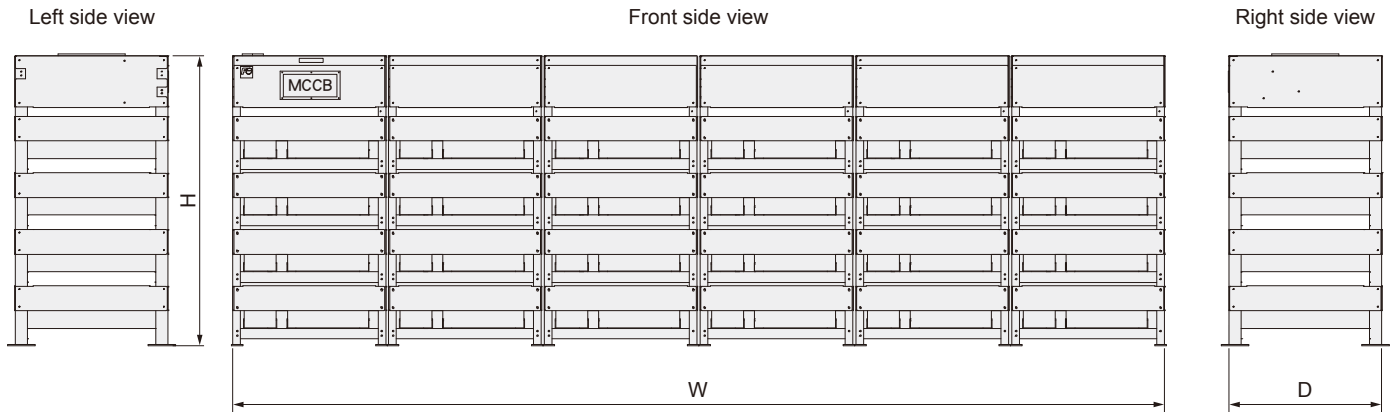


■ Fuji Electric standard battery rack product list

UPS7000HX-T4 Series	Back-up Time* [min]	Width(W) [mm]	Depth(D) [mm]	Height(H) [mm]	Mass [kg]
300 kVA	10	3060	1000	1900	3930
	30	6120			6540
400 kVA	10	4080			6160
500 kVA	10	6120			6540

*: Initial stage of battery, amperes at 25°C, normal load

■ External dimensions (for 300 kVA, 30 min model)



Installation requirements

- This equipment is for indoor use.
When installing this equipment, please avoid areas exposed to direct sunlight, wind, and rain, as well as to the elements, and install it in a UPS room of noncombustible construction.
- Avoid places with a lot of dust and dirt, as well as hot and humid places.
- This equipment is designed for use in locations with temperature conditions ranging from 0 to +40°C, but from the standpoint of the service life of the batteries and the stable operation of the UPS, we recommend operating in temperatures below 25°C.
- Do not use for loads that may cause regenerative power.
- Use of this equipment for any of the following applications will require careful consideration of such issues as multiplexing of the system and installation, operation, maintenance, and management of emergency power generation equipment. Please contact us in advance to discuss such special requirements.
 - Medical equipment directly involved with human life
 - Equipment that could lead to personal injury
 - Critical social and public computer systems

©In the event of any trouble occurring due to the use of this product (hardware and software), Fuji Electric will not compensate for any damages whatsoever, including damages caused by errors or trouble in connected equipment or software, as well as any other secondary damages.

Compliance with CE marking



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