INSTRUCTIONS AND DIRECTIONS FOR USE

To use the battery safety and properly, be sure to read the instruction manual before use.

Warnings

- For stationary batteries, ensure that the room is well ventilated so that the hydrogen concentration is 0.8% or less.
  Failure to do so many cause fire or explosion.
- Do not install the battery in a poorly-ventilated area where the hydrogen concentration becomes more than 0.8% or near open flame.
  Doing so many cause fire or explosion.

Cautions

- The service temperature range of the battery: Discharge -15 ~45℃, Charge 0 ~40℃, Storage -15~40℃.
  Using the battery outside this range many accelerate deterioration or cause the battery to freeze or overheat,
  resulting in damage or deformation.
- Do not use this battery where it is exposed to direct sunlight. Doing so may cause the parts of the battery to deteriorate.
- Do not expose the battery to water or seawater. Doing so may cause damage to the battery or fire,
  or cause the terminals or connecting plates to corrode.
- Do not use the battery near a heat source. Doing so may cause damage to the battery or cause the battery life to shorten.
- Do not use the battery in dusty areas. Doing so may cause a short-circuit.
- Charge the battery under the charging conditions recommended by Furukawa Battery.
  Failure to do so may result in insufficient charging, electrolyte leakage, temperature rise, explosion, deterioration in performance,
  or reduced service life.
- Periodically, inspect the battery. If the results deviate from the standards specified in the instruction manual,
  follow the steps in the instruction manual. Using the battery with such deviations may cause damage to the battery, or burnout.
- According to No. 6 Article 12 of the Fire Service Law Construction Regulations Ministry of Autonomy Ordinance,
  if the total of the product of the rated capacity and the number of cells is 4,800 Ah per cell or more,
  the device must be installed in accordance with the fire prevention ordinance of each municipality issued in accordance with Article 13 and
  Article 44 of the Fire Prevention Ordinance (example).
- Ensure that the maximum discharge current is not exceeded for more than 1 minute for 3 C_{10}A or for more than 5 seconds for 6 C_{10}A.
  Failure to do so may cause damage to the battery.
- Used storage batteries will be recyclable. Please contact us when its discarding.

● Contact Information

ISO9001 certified
JQA-1118
(THE FURUKAWA BATTERY CO.,LTD.)

ISO14001 certified
JQA-EM0380
(Iwaki and Imaichi Plants)

THE FURUKAWA BATTERY CO., LTD.

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2-4-1 Hoshikawa, Hodogaya-Ku, Yokohama City, Kanagawa Prefecture
240-0006 JAPAN

https://www.furukawadenchi.co.jp/

* Colors shown in the may differ from the actual colors. The illustrations in this catalog are conceptual images.

BL-E18d

KS-2308-5E-PDF

FURUKAWA BATTERY

Long-life Valve Regulated Lead-acid battery for cycle use

FCP-SERIES

FCP-500S
FCP-500

FCP-1000S
FCP-1000

FURUKAWA BATTERY

Furukawa long life battery suitable for cycle use [Lead crabon Battery]

- **Longer cycle life**
  FCP：4500 cycles
  FCP-S：6000 cycles
- **Partial charge operation allowed**
- **Multistage loading allowed**
  - ★ Save installation space
  - ★ Shorter time for installation
  - ★ Easier maintenance
    (Front placement of battery cell terminals)

Help from Furukawa for cycle use that will be more widely used in the next generation.

Wide cycle use coverage

Natural energy
(PV generation, wind power generation, etc.) systems

Electric power storage systems
(load leveling, peak cut)

Main Specifications

Type		FCP-500S	FCP-1000S	FCP-500	FCP-1000
Nominal Voltage		2	2	2	2
Mono cell	Height(mm)	508	508	508	508
	Width(mm)	172	172	172	172
	Length(mm)	166	303	166	303
	mass (kg)	43	78	41	75

		Discharge capacity [Ah]*2	DOD70%*3	
			Discharge capacity [Ah]	Discharge watt-hour [Wh]*4
Capacity (25°C)*1	Rated capacity (Ah /10HR)	500		
	0.1C_{10}A discharge	500	350	700
	0.16C_{10}A discharge	425	297	595
	0.23C_{10}A discharge	375	262	525
	0.4C_{10}A discharge	300	210	420
Capacity (5°C)	0.1C_{10}A discharge	465	325	651
	0.16C_{10}A discharge	385	269	539
	0.23C_{10}A discharge	335	234	469
	0.4C_{10}A discharge	265	185	371

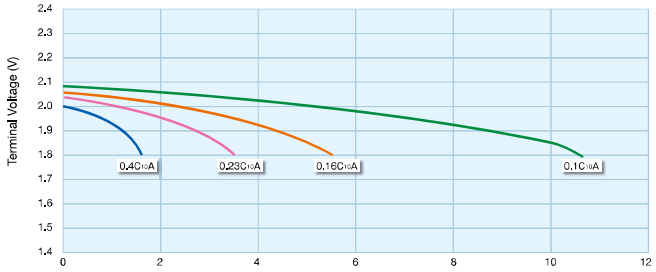
*1 C_{10} is capacity of 10 hour rate.
*2 Cut-off voltage: 1.8 V / cell
*3 DOD:Depth Of Discharge
*4 Values calculated using a nominal voltage of 2V, and may differ from actual values.

		Discharge capacity [Ah]*2	DOD70%*3	
			Discharge capacity [Ah]	Discharge watt-hour [Wh]*4
Capacity (25°C)*1	Rated capacity (Ah /10HR)	1,000		
	0.1C_{10}A discharge	1.000	700	1,400
	0.16C_{10}A discharge	850	595	1,190
	0.23C_{10}A discharge	750	525	1,050
	0.4C_{10}A discharge	600	420	840
Capacity (5°C)	0.1C_{10}A discharge	930	651	1,302
	0.16C_{10}A discharge	770	539	1,078
	0.23C_{10}A discharge	670	469	938
	0.4C_{10}A discharge	530	371	742

*1 C_{10} is capacity of 10 hour rate.
*2 Cut-off voltage: 1.8 V / cell
*3 DOD:Depth Of Discharge
*4 Values calculated using a nominal voltage of 2V, and may differ from actual values.

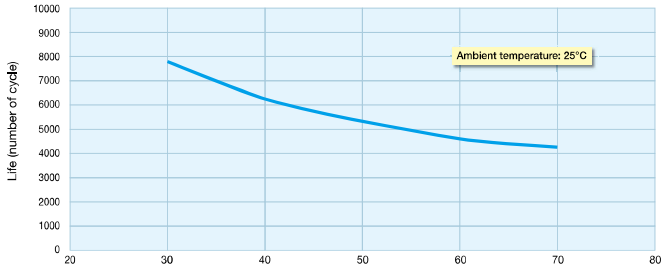
FCP type Main Feature

Discharge Characteristics (example) [Ambient temperature: 25℃]



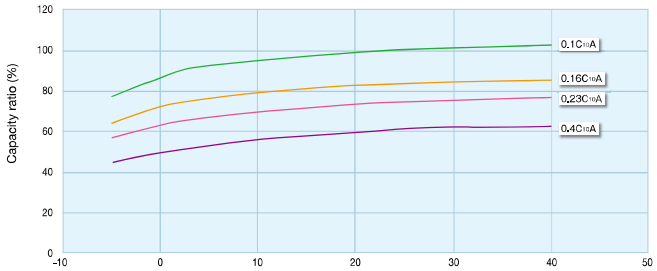
Note)
The discharge characteristic varies depending on the state-of-charge. The characteristic figure is an example, and is not a guaranteed value.

Relationship between depth-of-discharge and life [Ambient temperature: 25℃]



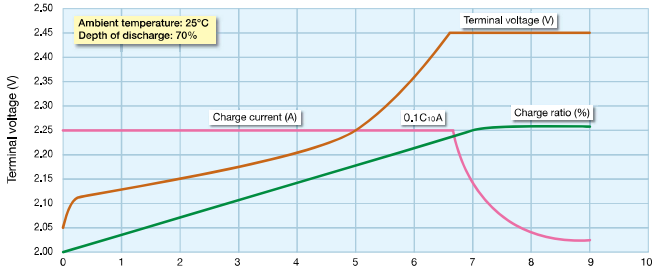
Note)
Depth-of-discharge is ratio of discharge capacity of 0.23 C_{10}A.
Amount of charge is 105 % of the discharge capacity.
Note)
The number of cycles varies depending on the usage environment. The number of cycles is based on internal test results, and is not a guaranteed value.

Relationship between temperature and capacity ratio



Note)
The discharge characteristic varies depending on the state-of-charge. The characteristic figure is an example, and is not a guaranteed value.

Constant current/ voltage charge characteristic (example) [Ambient temperature: 25℃]

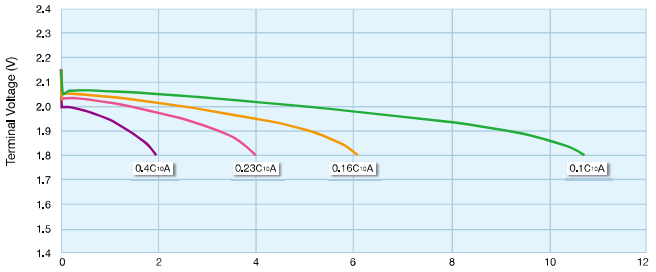


Constant current/voltage charge condition
Constant voltage : 2.47 V/cell
Maximum charge current : 0.1 C_{10}A
Amount of charge : 105 %
Discharging before CC-CV charge :
-0.1 C_{10}A ×7h

Note)
The charge characteristic varies depending on the battery condition. The figure of characteristic is an example, and is not a guaranteed value.

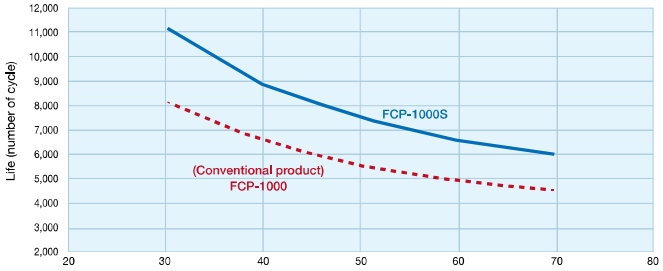
FCP-S type Main Feature

Discharge Characteristics (example) [Ambient temperature: 25℃]



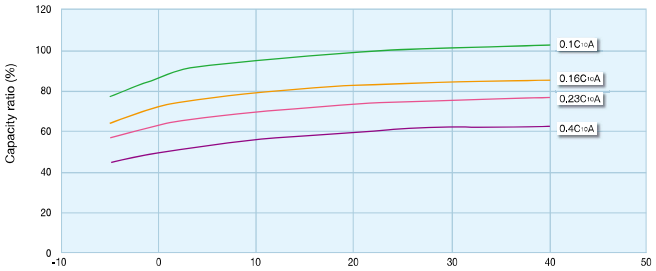
Note)
The discharge characteristic varies depending on the state-of-charge. The characteristic figure is an example, and is not a guaranteed value.

Relationship between depth-of-discharge and life [Ambient temperature: 25℃]



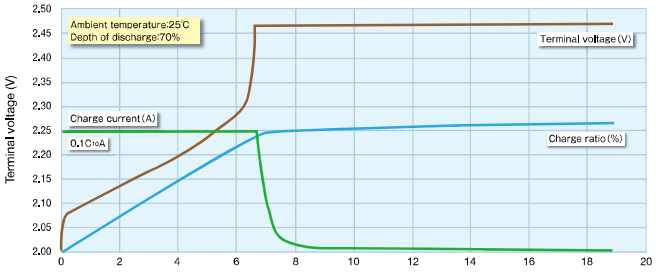
Note)
Depth-of-discharge is ratio of discharge capacity of 0.23 C_{10}A.
Amount of charge is 105 % of the discharge capacity.
Note)
The number of cycles varies depending on the usage environment. The number of cycles is based on internal test results, and is not a guaranteed value.

Relationship between temperature and capacity ratio



Note)
The discharge characteristic varies depending on the state-of-charge. The characteristic figure is an example, and is not a guaranteed value.

Constant current/ voltage charge characteristic (example) [Ambient temperature: 25℃]



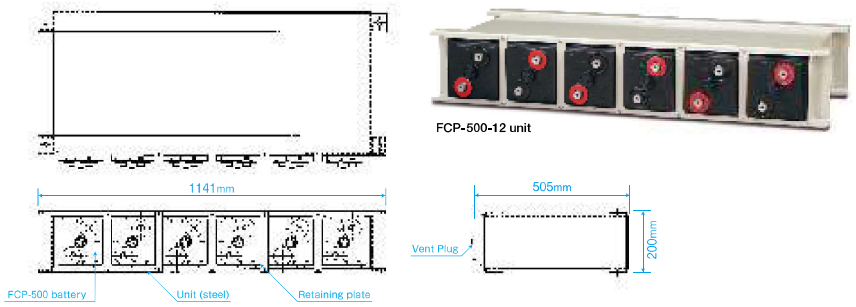
Constant current/voltage charge condition
Constant voltage : 2.47 V/cell
Maximum charge current : 0.1 C_{10}A
Amount of charge : 105 %
Discharging before CC-CV charge :
-0.1 C_{10}A ×7h

Note)
The charge characteristic varies depending on the battery condition. The figure of characteristic is an example, and is not a guaranteed value.

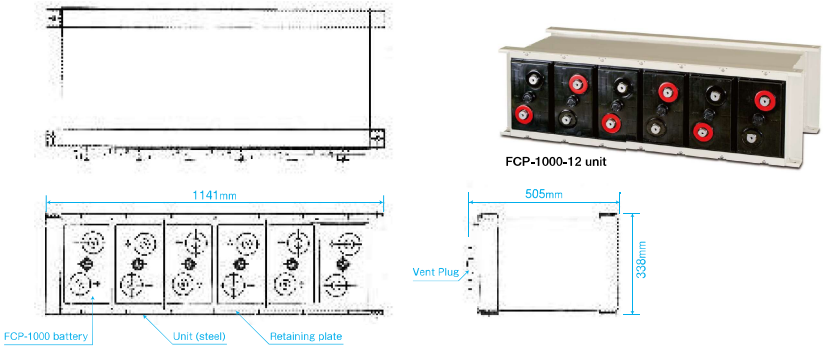
Main Performance

Type		FCP-1000S	FCP-500S	FCP-1000	FCP-500
Expected Life (25℃) *The Expected Life is not a guaranteed value. *The total discharge electric quantity and usage period, which vary depending on the operation conditions and other factors, are not guaranteed values.	Number of cycles (DOD 70 %)*1	6,000 cycles		4,500 cycles	
	Maximum useful life	20 years		15years	
	Above condition(Recommended condition)	Discharge: within 0.23 C10 A Charge: multi-step charging or CC + CV			
	Charge amount	105%		104%	
	Usage range as PSOC (e.g.) *2	SOC: 30 ~ 90 %*3			
	Control voltage (e.g.)	1.8 V ~ 2.35 V / cell			
	Equalizing charge voltage	2.47 V / cell		2.45 V / cell	
	Total discharge electric quantity	3,150kAh	1,570kAh	2,350kAh	1,180kAh
Maximum current at continuous operation	Charge	0.2C10A			
	Discharge	0.4C10A			
Operating temperature range	Charge	0~40℃			
	Discharge	-15~40℃			
	Storage	-15~40℃			

*1 DOD (Depth Of Discharge) *2 PSOC (Partial State Of Charge)



FCP-500-12 unit



FCP-1000-12 unit

FCP-500
FCP-500S

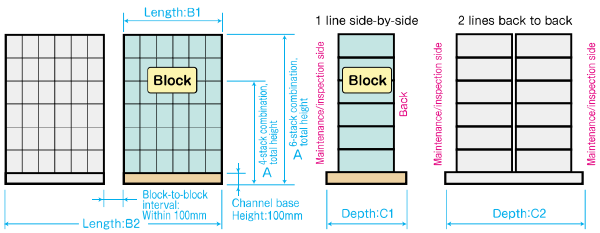
multi-unit battery combinations and outer dimensions (example)

Installation	Number of cells	Number of FCP-500-12 UNIT	Number of block	Nominal voltage of combined batteries (V)	Nominal energy capacity (kwh)	Outer dimensions of combined batteries (approx. mm) Total height: A	Length: B1	Length: B2	Depth: C1	Depth: C2	Floor load (t/m²)	Weight of combined batteries(approx.kg) Upper FCP-500S Lower FCP-500
6-stack	36	6	1	72	36	1,300	1,141	———	560	———	2.77 2.68	1,770 1,710
6-stack 1 lin e side-by-side	72	12	2	144	72	1,300	———	2,532	560	———	2.50 2.41	3,540 3,420
6-stack 2 lines back to back	72	12	2	144	72	1,300	1,141	———	———	1,075	2.96 2.85	3,630 3,500

Installation	Number of cells	Number of FCP-500-12 UNIT	Number of block	Nominal voltage of combined batteries (V)	Nominal energy capacity (kwh)	Outer dimensions of combined batteries (approx. mm) Total height: A	Length: B1	Length: B2	Depth: C1	Depth: C2	Floor load (t/m²)	Weight of combined batteries(approx.kg) Upper FCP-500S Lower FCP-500
*4-stack	24	4	1	48	24	900	1,141	———	560	———	1.87 1.80	1,190 1,150
*4-stack 1 lin e side-by-side	48	8	2	96	48	900	———	2,532	560	———	1.68 1.62	2,380 2,300
*4-stack 2 lines back to back	48	8	2	96	48	900	1,141	———	———	1,075	2.01 1.94	2,470 2,380

* Reference

Diagram of combined multi-unit batteries



FCP-500
6 unit stacks

Remarks
- A block formed by a set of multiple units loaded.
- Standard blocks of ours are the six-stage loading.(FCP-500)
  (Earthquake resistance: static horizontal acceleration is 1G or below, and static vertical acceleration is 0.5G or below.)
- External dimensions given in Tables are references for our standard products.
- Total heights do not include the terminals.
- Total heights include the channel base .(100mm)
- Blocks are separated by within 100mm in horizontal installation.
- Larger capacity achieved by parallel installation.
- For customized installation and capacity, contact us.

Multi-stack installation by battery unit!

Smaller installation area

Shorter time for installation

Easier maintenance

Customizable number of stack (3-stack, 4-stack...)

* Front placement of battery cell terminals

<Application>
- Power smoothing for renewable energy.
- Wind power generation/ Photovoltaic generation
- Peak shaving, Load levelling
- Other applications that charge and discharge repeated.

FCP-1000
FCP-1000S

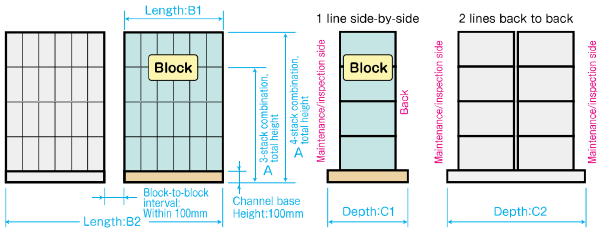
multi-unit battery combinations and outer dimensions (example)

Installation	Number of cells	Number of FCP-1000-12 UNIT	Number of block	Nominal voltage of combined batteries (V)	Nominal energy capacity (kwh)	Outer dimensions of combined batteries (approx. mm)					Floor load (t/m²)	Weight of f combined batteries(approx.kg) Upper FCP-1000S Lower FCP-1000
						Total height: A	Length: B1	Length: B2	Depth: C1	Depth: C2		
4-stack	24	4	1	48	48	1,452	1,141	———	560	———	3.50 3.37	2,230 2,150
4-stack 1 lin e side-by-side	48	8	2	96	96	1,452	———	2,532	560	———	3.15 3.03	4,460 4,300
4-stack 2 lines back to back	48	8	2	96	96	1,452	1,141	———	———	1,075	3.70 3.57	4,540 4,380

Installation	Number of cells	Number of FCP-1000-12 UNIT	Number of block	Nominal voltage of combined batteries (V)	Nominal energy capacity (kwh)	Outer dimensions of combined batteries (approx. mm)					Floor load (t/m²)	Weight of f combined batteries(approx.kg) Upper FCP-1000S Lower FCP-1000
						Total height: A	Length: B1	Length: B2	Depth: C1	Depth: C2		
*3-stack	18	3	1	36	36	1,108	1,141	———	560	———	2.61 2.52	1,670 1,610
*3-stack 1 lin e side-by-side	36	6	2	72	72	1,108	———	2,532	560	———	2.36 2.27	3,340 3,220
*3-stack 2 lines back to back	36	6	2	72	72	1,108	1,141	———	———	1,075	2.79 2.69	3,421 3,300

*Reference

Diagram of combined multi-unit batteries



FCP-1000
4 unit stacks

Remarks
- A block formed by a set of multiple units loaded.
- Standard blocks of ours are the four-stage loading.(FCP-1000)
  (Earthquake resistance: static horizontal acceleration is 1G or below, and static vertical acceleration is 0.5G or below.)
- External dimensions given in Tables are references for our standard products.
- Total heights do not include the terminals.
- Total heights include the channel base .(100mm)
- Blocks are separated by within 100mm in horizontal installation.
- Larger capacity achieved by parallel installation.
- For customized installation and capacity, contact us.

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