

TOSHIBA

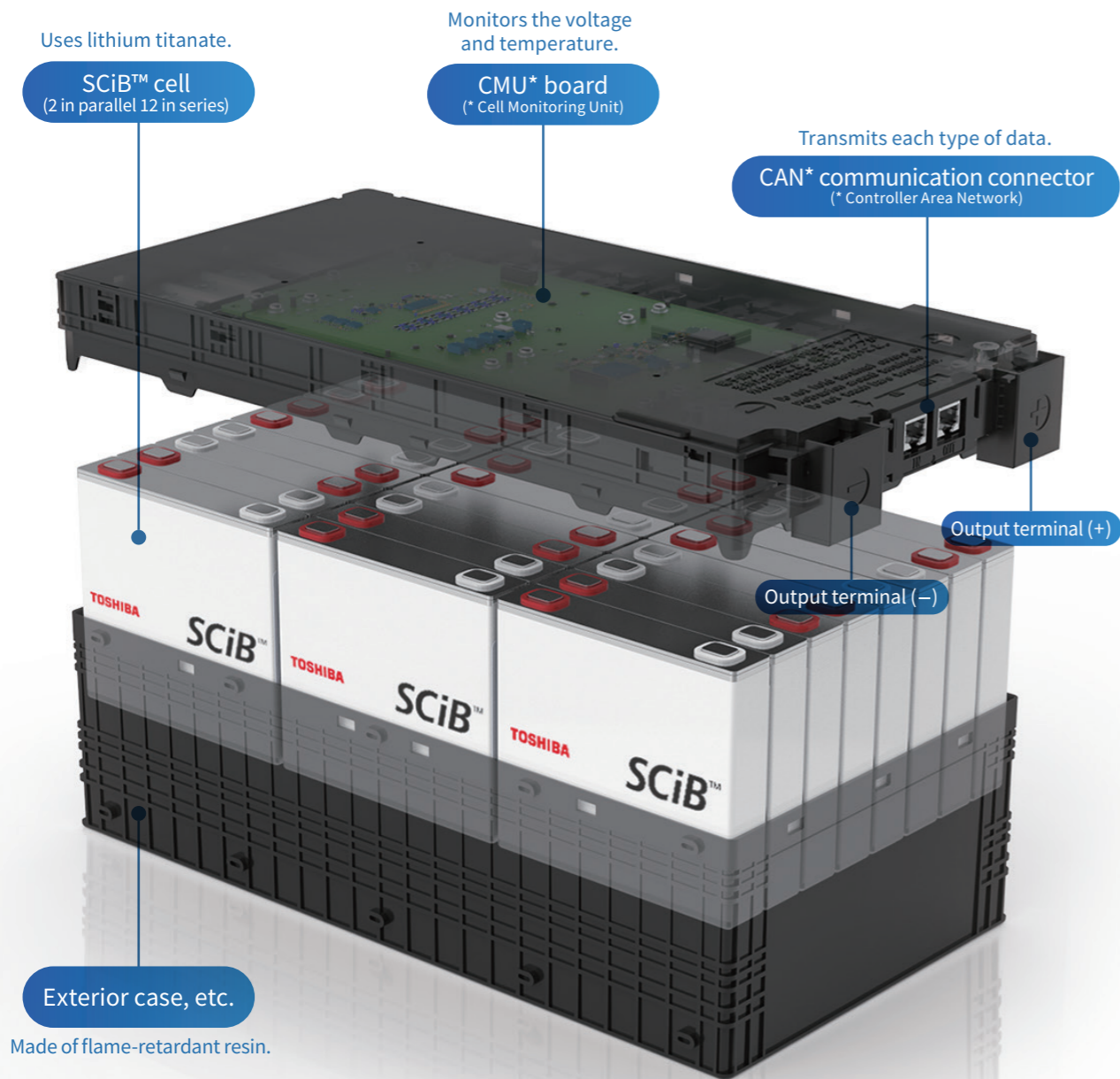
Rechargeable Lithium-ion Battery

SCiB™ Battery System Components



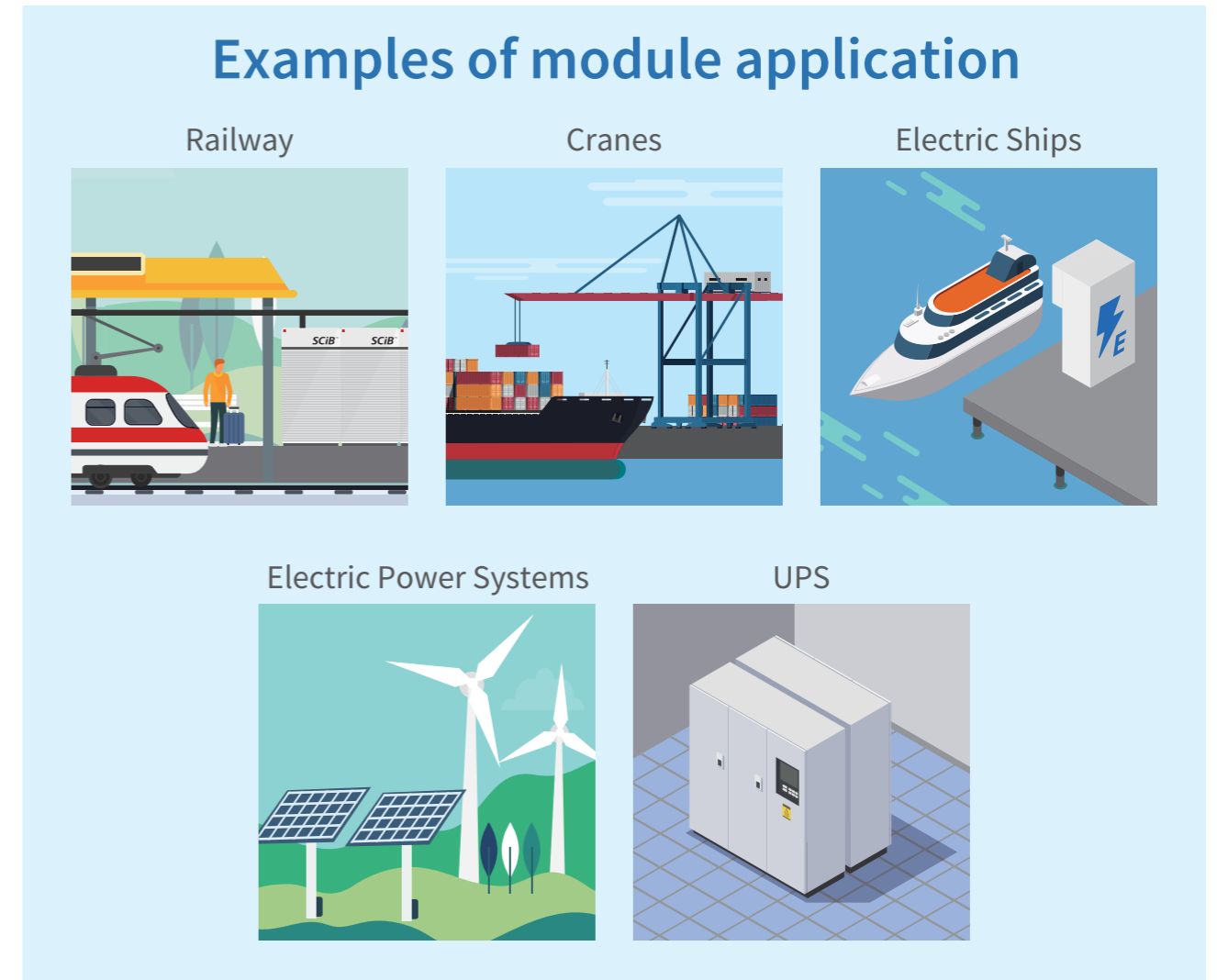
SCiB™ Type3 Battery Module

Capable of constructing various scales of battery systems



* This is an image illustration.

Several SCiB™ cells are combined to provide user-friendly modules. Depending on the requirement, battery systems of various sizes can be built. This product can be used in a wide range of applications that support social infrastructure, from public, industrial, electric power and transportation systems to general households.



Characteristics of Type3 battery module for the stationary / industrial applications

* Cycle life of cell. Cycle characteristics/performance depends on cell type and usage conditions.

* SOC: State of Charge

<p>Safety</p> <p>Low risk of fire or explosion</p>	<p>Long life</p> <p>Cycle life of 20,000* times or more</p>	<p>Low-temperature operation</p> <p>Usable even at -30°C</p>	<p>High input/output</p> <p>Large current can be input/output</p>	<p>Rapid charging</p> <p>Charges to approx. 80% of the capacity in 12 minutes</p>	<p>Wide effective SOC* range</p> <p>Available SOC range of 0-100%</p>
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Note: The above values are measurement using a Type3-20 battery module under specific conditions, and are not guaranteed values. Performance depends on customers' usage conditions.

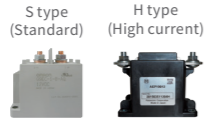
Battery system block diagram

1 BMU (Battery Management Unit)



BMU monitors the cell voltage and temperature of each battery module, and protects the battery if an abnormality is detected. Additionally, this measures the charge/discharge current, and calculates the SOC value. Furthermore, this notifies the upper controller of the battery information, measurement/calculation information, etc. via Ethernet or CAN communication.

2 Contactor (MC)



The contactors are installed respectively to the positive terminal and negative terminal of the main circuit to shut down the main circuit in response to instructions from BMU if an abnormality occurs in the battery.

* The drive signal cable comes with the H type.

3 Current leak sensor (Earth-leakage sensor : ELS)



The current leak sensor detects leakage in response to instructions on the fault diagnostic signal from the upper controller after the main circuit is shut down.

4 Current sensor (Hall Current Transformer : HCT)



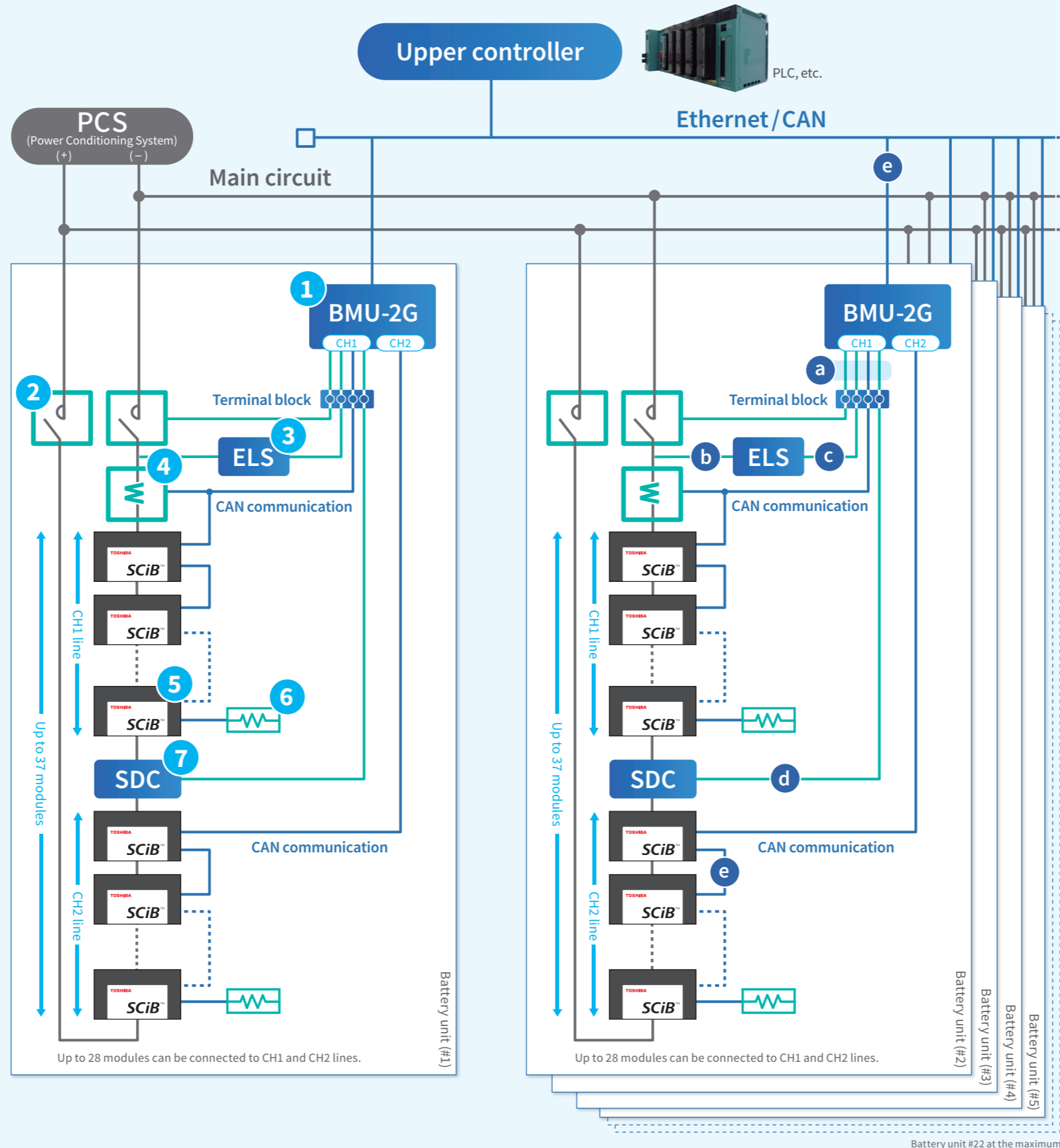
The current sensor measures the charging/discharging current. The measured data is sent to BMU via CAN communication. (only for BMU-2G)

* The CAN communication connector is to be prepared by customers.

5 Battery module (MDL)



The battery module consists of 24 cells (2 in parallel and 12 in series), and incorporates the cell monitoring unit (CMU) that monitors the voltage and temperature of these cells.



6 Termination plug (TP)



The termination plug is the termination resistor for CAN communication.

7 Service disconnect (SDC)



The service disconnect is used to disconnect the main circuit when installing / removing the battery module or during the maintenance work. The built-in fast acting fuse to protect the battery in the case of external short circuit.

* SDC-1500 does not have a built-in protection fuse. Use a commercially-available fuse additionally.

The example of fuse use
 • HINODE ELECTRIC (750GH-200UL)
 • Mersen (HP10NH2GPV200B)

Cable types

a BMU connection cable

Use the BMU connection cable to connect between BMU and other components, upper device, maintenance device, and 12VDC power source.

b Current leak sensor main circuit cable

Use this cable to connect to the connector used for the current leak sensor main circuit connection.

c Current leak sensor connection cable

Use this cable to connect to the current leak sensor control signal connector.

d SDC-750 fitting detection cable

Use this cable to connect to the fitting detection connector of the service disconnect.

* The cable for SDC-1500 is to be prepared by customers.

e Connection cable for Ethernet/CAN communication

This cable is to be prepared by customers.

Use this cable for the CAN-communication connection between BMU-2G and the upper communication (Ethernet), module, BMU, or current sensor (C2 type).

Recommended cable (STP straight cable, category 5e or higher)
 Note: The CAN communication cable extension length cannot exceed 40 m.

Component	Connector	Remarks
BMU-2G	Main on the CH1 side	Mixed with other control cables
	Sub on the CH2 side	
HCT	Current sensor (C2 type)	Common to IN/OUT
MDL	Battery module	RJ45 IN/OUT independent

* Cable end is to be appropriately processed by customers.

Products required for constructing the battery system

Battery module (MDL)					
Product name	Type3-20	Type3-23	Type3-20HP	Dimensions	W190×D361×H125mm (not include protruding portion)
Model name	FM01202CCA04A	FM01202CCB01A	FM01202CCE01A	Nominal voltage	27.6V
Rated capacity	40Ah	45Ah	39Ah	Ambient temperature	-30 to 45 °C
Nominal energy	1104Wh	1242Wh	1076Wh	Ambient humidity	85%RH or less (no condensation)
Max. charge/discharge current	160 A (continuous), 350 A (rush current)		160 A (continuous), 500 A (rush current)	Major built-in functions	Cell voltage measurement, module temperature measurement, cell balancing*, CAN communication *Function to even differences in voltage among cells connected in series
Range of battery voltage	DC18.0V ~ 32.4V				
Weight	Approx 14 kg	Approx 15 kg			

+ Combine the battery module and battery system components for using. Please contact our sales team for details.

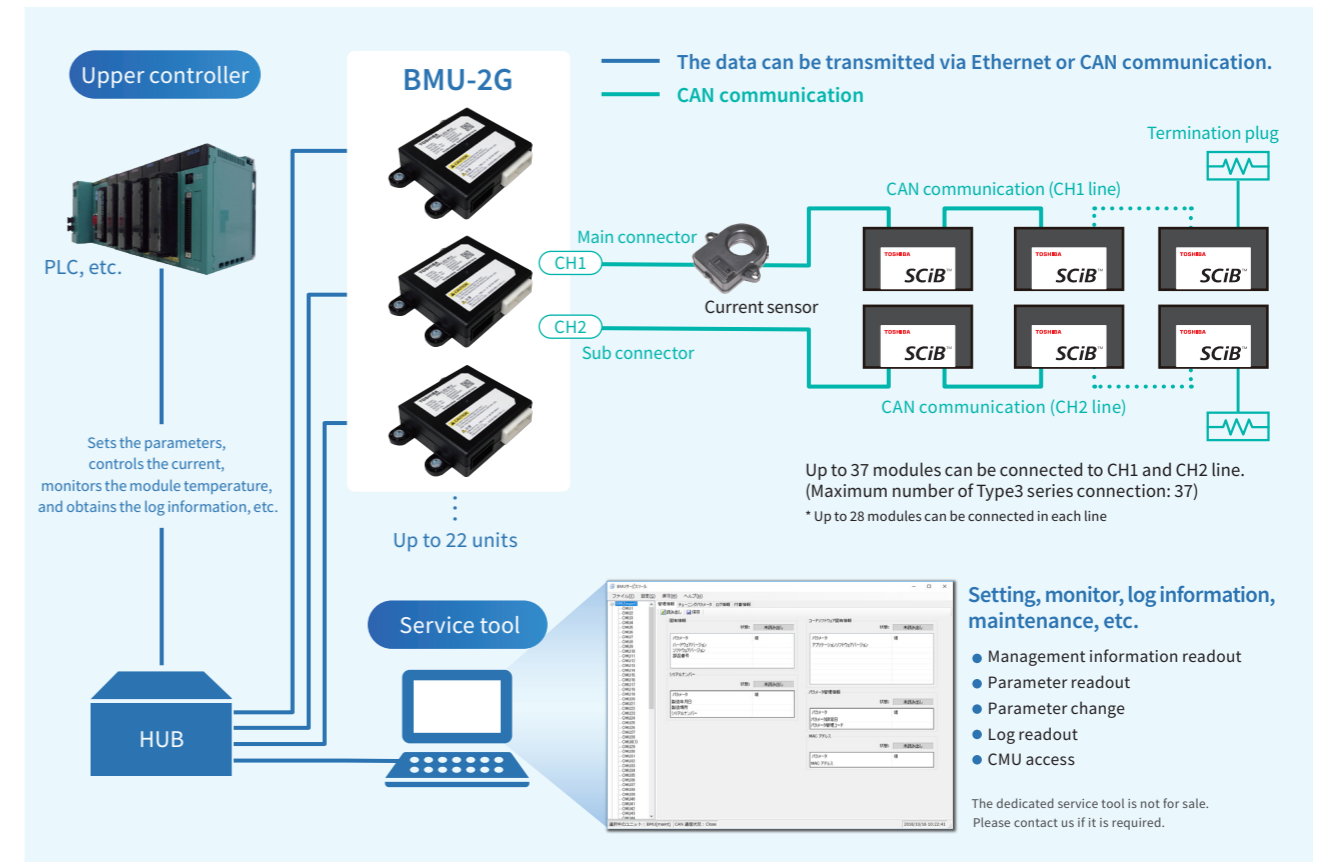
Battery system components							
Product name	Photo	Type	Model name	Specification	Dimensions (mm)	Weight(g)	Remarks
BMU (Battery Management Unit)		2G type (BMU-2G-RJ45)	5P4E0124P001	Upper communication: Select from Ethernet/CAN Maximum number of Type3 series connection: 37* *For BMU-2G, up to 56 modules can be connected.	W95.0×D88.0×H32.0 (Protrusions excluded)	130	Standard type
Contactor (MC)		S type (Standard)	FMW-GAA0004P	Contact rated capacity: 800 VDC-100 A Coil rating: 12 VDC-583 mA ± 10%	W98.0×D44.0×H86.2	650	-
		H type (High current)	5P4E0092P001	Contact rated capacity: 750 VDC-200 A Coil rating: 12 VDC-3.3 A ± 10%	W111.0×D63.0×H74.7	750	Drive signal cable included (Cable length: 300 mm)
Current sensor (Hall Current Transformer : HCT)		C2 type (CAN communication type)	PUR-0000145	Measurement range: -500 to 500 A High resolution	W51.4×D21.3×H71.5	67	The CAN communication connector is to be prepared by customers
		A2 type (Analog type)	FMW-GAA0071P	Measurement range: Channel 1: -30 to 30 A Channel 2: -350 to 350 A	W62.0×D43.5×H24.0	82	C2 type is recommended for BMU-2G
Service disconnect (SDC)		SDC-750P (Plug)	FMW-GAA0003P	Rated voltage: 750 VDC Rated current: 120 A or lower Fuse: 750 VDC - 125 A (built-in)	W149.5×D43.9×H97.0	585	Fast acting fuse
		SDC-750R (Receptacle)	FMW-GAA0012P				
		SDC-1500	5P4E0093P002				
Current leak sensor (Earth-leakage sensor : ELS)		-	FMW-GAA0002P	Ground pressure resistance range: DC ± 800 V Electric leakage detection resistance value: 500 ± 100 kΩ	W73.0×D62.0×H30.0 (Protrusions excluded)	90	Leakage is detected when the Contactor is open
Termination plug (TP)		-	5P4E0003P001	120Ω ± 5% or less (Allowable loss: 1/4W or more)	Overall length: 52.5	10	Termination resistor for CAN communication
Self-Starter Gateway for BMU		-	FMW-GAA0070P	Gateway : CAN ↔ RS232C / DIO conversion Self-starting function Self shutdown function	W95.0×D88.0×H32.0 (Protrusions excluded)	138	-
BMU connection cable		-	FMW-HAA0002P	For connecting between BMU and module/electric leakage sensor/SDC/contactor, etc.	Cable length: 2000	530	Connect to CH1 side of BMU-2G
SDC-750 fitting detection cable		-	FMW-HAA0003P	Connection between SDC-750 and BMU	Cable length: 1000	20	The cable of SDC-1500 is to be prepared by customers
Current sensor (A2 type) connection cable		-	FMW-HAA0006P	Connection between the current sensor and BMU	Cable length: 1000	37	Only for A2 type current sensor
Current leak sensor connection cable		-	FMW-HAA0005P	Connection between the current sensor and BMU	Cable length: 1000	30	-
Current leak sensor main circuit cable		-	FMW-HAA0006P	Connection between the electric leakage sensor and negative terminal contactor	Cable length: 1000	70	-

Please refer to the combination list on page 8.

Characteristics of the second-generation BMU "BMU-2G"



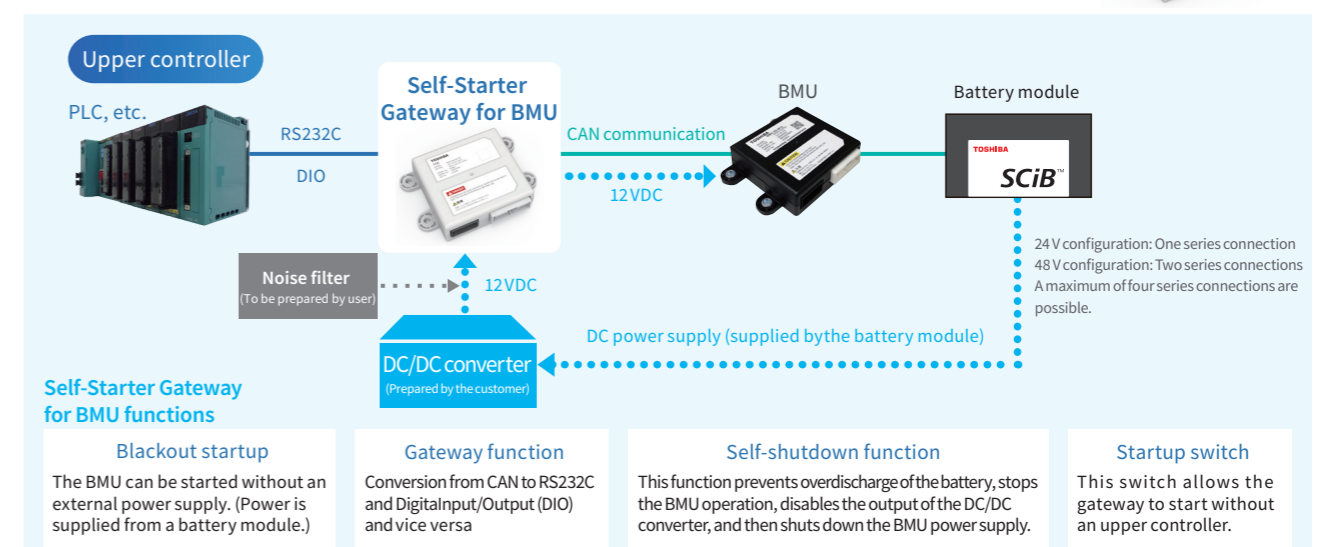
BMU-2G collects the information such as cell voltage or module temperature from each battery module in the battery unit, and performs controls, abnormality detection and diagnosis to protect the battery module. Additionally, BMU-2G reads the total current of the battery unit from the current sensor, and performs the SOC calculation of the battery unit.



Self-starter Gateway for BMU



This gateway eliminates the need for an external power supply to start a system. It allows the interface with an upper controller to be selected from CAN, RS232C, and Digital Input/Output (DIO), simplifying data communications with the upper controller.

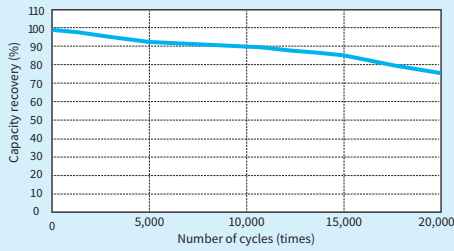


Specifications are subject to change without notice.

Characteristics of 20Ah cell

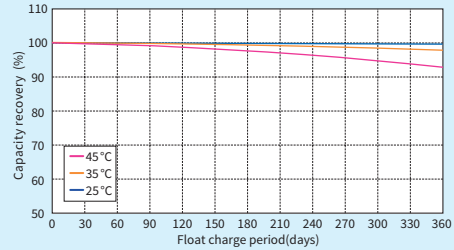
Cycle characteristics

Test conditions
A test condition for the battery: high-rate (3C) charge/discharge cycles at 25°C



Float charge characteristics

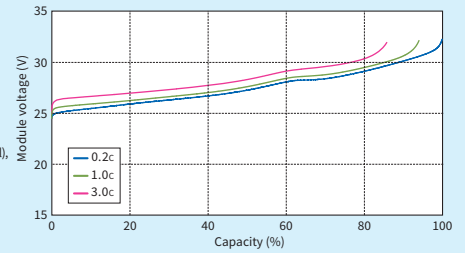
Test conditions
Float charge voltage: 2.7V
Test temperatures: 25, 35, 45°C



Module characteristics (Type3-20)

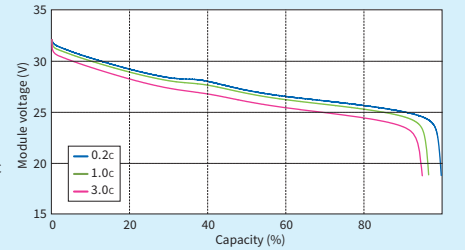
Charge characteristics (rate characteristics)

Test conditions
Discharge: Discharge 0.2C (1.5V cut-off/cell), 25°C
Charge: After rest, charge at each current (2.7V cut-off/cell), 25°C



Discharge characteristics (rate characteristics)

Test conditions
Charge: Step-down charge from 1C to 0.05C (2.7V cut-off/cell), 25°C
Discharge: After rest, discharge at each current (1.5V cut-off/cell), 25°C



* The values described in the technical materials, etc. are not guarantee values. The performance varies according to the customer's conditions for use.

Combination list

Maximum voltage		750V or less	910V or less	1200V or less
Number of Type3 battery module series connection *1		1 to 23	24 to 28	29 to 37
BMU	2G type *2	○	○	○
Contactor	S type (Standard)	○	△*3	
	H type (High current)	○		
Current sensor	C2 type (CAN communication type)	○	○	○
	A2 type (Analog type)	○	○	○
Service disconnect	SDC-750	○		
	SDC-1500	○	○	○
Others	Current leak sensor	○	△*3	
	Termination plug	○	○	○
Cable	BMU connection cable	○	○	
	SDC-750 fitting detection cable	○		
	Current sensor (A2 type) connection cable	○	○	○
	Current leak sensor connection cable	○	△*3	
	Current leak sensor main circuit cable	○	△*3	

Confirmation items for customers

Please let us know about the items listed below when inquiring.

Item	Required specifications	
Rating	Voltage ()V	
	Capacity ()Wh/()Ah	
Discharge	Voltage	Upper limit voltage ()V
		Lower limit voltage ()V
	Current	Average current ()A ()sec or ()h
		Max. operating current ()A ()sec
	Inrush current ()A ()ms	
	Discharging time ()h	
Charging	Current value ()A	
	Charging time ()h	
Application	Operation procedures	
Environment	Installation place (Indoor / Outdoor) (Fixed / Movable)	
	Temperature ()°C to ()°C	
	Altitude ()m or lower	
Schedule	Development period	
	Start of mass production	
Quantity		
Application		
Applied standard		
Others		

*1: Number or series connection is calculated assuming the maximum charging voltage of a cell is 2.7 V. *2: For BMU-2G, up to 56 modules can be connected. *3: Usable up to 24 in series

⚠ Safety precautions

- Do not use this product for facilities in which there is a risk to human life or a disruption to public functionality if the product fails or malfunctions (nuclear power generator controls, aerospace applications, traffic equipment, life support equipment, safety equipment, and others).
- This product is produced under strict quality controls, however it may malfunction depending on the operating environment and conditions. Please consider countermeasure design (redundancies, failsafe measures, etc.) if using this product in facilities in which failure of the product would be expected to cause a great loss or accident.
- The operating environment must be within the range of specifications noted in the catalog and instruction manuals. Using the product outside the specified range may cause injury, a re, or some other accident.
- Be sure to carefully read the instruction manuals before using this product so that you can use it correctly.
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SCiB

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