

# SCIB<sup>TM</sup>

# Li-ion Rechargeable Battery for Industrial Applications SCiB™ Industrial Pack (24V)

Model:

FP01101MCB01A

**Instruction Manual** 

**Toshiba Corporation** 

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# Safety precautions

# Précautions de sécurité

The product and the instruction manual provide important safety information to prevent injury to the user or others and to prevent damage to their property.

Read the following explanations on indications and graphic symbols, and follow the instructions.

Ce manuel d'instructions du module de batterie fournit des descriptions importantes afin de prévenir les blessures aux utilisateurs et aux autres individus ainsi que les dommages matériels.

Veillez à bien comprendre les descriptions ci-dessous (marques et symboles utilisés dans les illustrations) avant de lire les descriptions, et observer les sections décrites.

### ● Signal Words (Description des signes)

	Indicates an imminently hazardous situation that, if not avoided, will
<b>A</b> DANGER	result in death or serious injury <sup>1)</sup> .
	Indique une situation dangereuse imminente qui, si elle n'est pas
DANGER	évitée, entraînera des blessures graves voire mortelles <sup>1)</sup> .
	Indicates a potentially hazardous situation that, if not avoided, can
<b>WARNING</b>	result in death or serious injury <sup>1)</sup> .
A WANNING	Indique une situation dangereuse potentielle qui, si elle n'est pas
AVERTISSEMENT	évitée, peut entraîner des blessures graves voire mortelles <sup>1)</sup> .
	Indicates a potentially hazardous situation that, if not avoided, can
_	result in minor or moderate injury <sup>2)</sup> or property damage only <sup>3)</sup> .
<b>A</b> CAUTION	Indique une situation potentiellement dangereuse qui, si elle n'est
ATTENTION	pas évitée, peut entraîner des blessures mineures ou modérées <sup>2)</sup>
ATTENTION	ou des dommages matériels uniquement <sup>3)</sup> .

### (Note) (Remarque)

1. Serious injury means loss of eyesight, injury, burns (high-temperature burn, low-temperature burn), electric shock, fracture, poisoning, etc., which causes after effects and requires hospitalization or long-term hospital visit for treatment.

Une blessure grave désigne une perte de la vue, une lésion, des brûlures (brûlure à température élevée, brûlure à basse température), un choc électrique, une fracture, un empoisonnement, etc., provoquant des effets secondaires et nécessitant une hospitalisation ou un séjour à long terme à l'hôpital pour un traitement.

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2. Minor or moderate injury means injury, burn and electric shock, etc., which does not require hospitalization or long-term hospital visit for treatment.

Une blessure mineure ou modérée désigne une lésion, une brûlure et un choc électrique, etc., n'exigeant pas une hospitalisation ou un séjour à l'hôpital à long terme pour le traitement.

3. Property damage means the extended damage to property and material.

Les dommages matériels désignent des dommages étendus à des biens ou du matériel.

### ● Safety Symbols (Description des symbols)

	Means "Prohibition" or "You must not do".
	Prohibited action is shown in the circle or described near the circle.
	Signifie « Interdiction » ou « Vous ne devez pas faire ».
PROHIBITED	Une action interdite est représentée dans un cercle ou est décrite
INTERDIT	près du cercle.
	Means "Mandatory Action" or "You must do".
	Required action is shown in the circle or described near the circle.
	Signifie une « Action obligatoire » ou « Vous devez faire ».
MANDATORY	L'action exigée est représentée dans un cercle ou est décrite près
OBLIGATOIRE	du cercle.
	Means "Caution".
<b>A</b>	The kind of caution is shown in the triangle or described near the
	triangle.
CAUTION	Signifie une « Mise en garde ».
MIS EN GARDE	Ce genre de mise en garde est représentée dans un triangle ou
	décrite près du triangle.

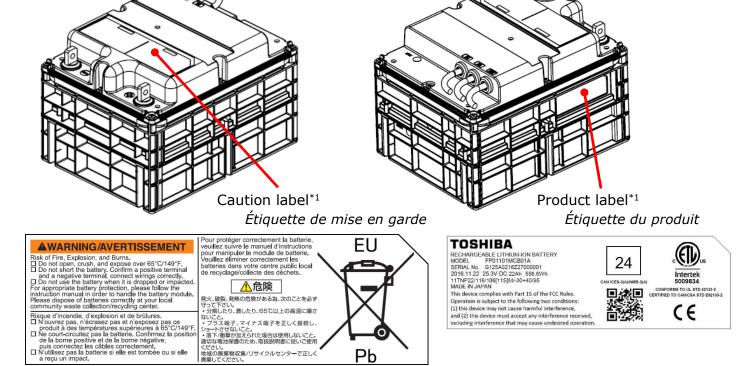
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# 1. Checking of Label on Main Unit Vérification de l'étiquette sur l'appareil principal

1. Make sure that the labels are attached to the main unit as shown in the figures below. If the labels are missing or illegible with stain, please contact us at the contact information provided at the end of this document.

> Vérifiez que les étiquettes sont fixées à l'appareil principal comme indiqué sur l'illustration ci-dessous.

> S'il manque une étiquette ou si elle est illisible en raison de taches, contactez-nous à l'adresse mentionnée à la fin de ce document.



st 1 The caution and product labels above are those pasted on the modules produced in or after April 2021.

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いこと。 ・ブラス端子、マイナス端子を正しく接続し、 ・ブラス端子、マイナス端子を正しく接続し、 ・落下/衝撃が加えられた場合は使用しないこと。 適切な電池保護のため、取扱説明書に従いご使用 い。 D廃棄物収集/リサイクルセンタ**ー**で正しく

\* Les étiquettes de mise en garde et du produit ci-dessus sont celles collées sur les modules produits en avril 2021 ou après.

"Positive terminal" and "negative terminal" in the caution label are hereinafter referred to as "output terminal (+)" and "output terminal (-)" in this document.

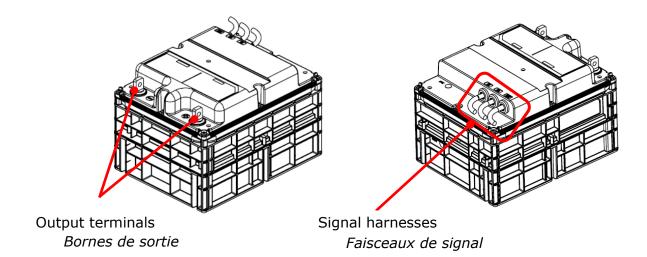
\* La « borne positive » et la « borne négative » dans les étiquettes de mise en garde sont appelées ci-après « borne de sortie côté (+) » et « borne de sortie côté (-) » dans ce document.

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2. Do not hold or pull the output terminal or the signal harness. Such handling may damage the product.

Lors de la manipulation du module, ne levez pas et ne tirez la borne du circuit principal et les faisceaux de signal.

Une telle manipulation pourrait causer une panne.



# 2. For the Safe Use of the Product Pour une utilisation du produit en toute sécurité

Observe the contents and cautions in this instruction manual when handling the product. Failure to observe the cautions may compromise the safety and result in an accident, device malfunction or failure due to leakage, heating, smoking, fire, rupture or electric shock.

Observez les indications et les mises en garde de ce manuel d'instructions lors de la manipulation de ce produit.

Le non-respect des mises en garde peut nuire à la sécurité et entraîner un accident, un dysfonctionnement de l'appareil ou une panne en raison d'une fuite, de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique.

# **A** DANGER

### Do not disassemble or modify this product.

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Disassembly or modification of this product may result in an accident or device failure due to leakage, heating, smoking, fire, rupture or electric shock.

### Ne démontez pas et ne modifiez pas ce produit.

Le démontage ou la modification de ce produit peut nuire à la sécurité et entraîner un accident ou une panne de l'appareil en raison d'une fuite, de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique.

### Do not throw this product into fire, hold it near a flame, or heat it.



Heating this product may result in an accident or device failure due to leakage, heating, smoking, fire, rupture or electric shock

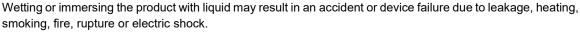
Do not use or store the product in a place with high temperature.

Ne jetez pas ce produit dans le feu, ne le tenez pas près d'une flamme et ne le chauffez pas.

Chauffer ce produit peut nuire à la sécurité et entraîner un accident ou une panne de l'appareil en raison d'une fuite, de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique.

N'utilisez pas et ne stockez pas le produit dans un endroit à température élevée.

### Do not wet or immerse the product with liquid such as water or sea water.



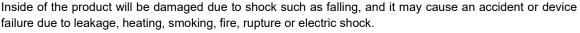


Use and store the product in the place without water or sea water splash or in the water-proof environment.

Ne mouillez pas et ne plongez pas le produit dans un liquide tel que de l'eau ou de l'eau de mer. Mouiller ou plonger ce produit dans un liquide peut nuire à la sécurité et entraîner un accident ou une panne de l'appareil en raison d'une fuite, de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique.

Utilisez et stockez le produit dans un endroit à l'abri des éclaboussures d'eau douce ou d'eau de mer, ou dans un environnement étanche à l'eau.

# Do not drop the product, hit it on another object, press it with sharp objects, or apply strong pressure or any strong shock onto the product.





Make sure to hold it tightly and handle it carefully when carrying it.

Ne laissez pas tomber le produit, ne le heurtez pas avec un autre objet, n'appuyez pas dessus avec des objets pointus et n'appliquez pas de forte pression ou d'impact violent sur le produit.

L'intérieur du produit sera endommagé en raison d'un impact tel qu'une chute et cela pourrait entraîner un accident ou une panne de l'appareil en raison d'une fuite, de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique.

Veillez à le tenir fermement et le manipuler avec précaution lors du transport.

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### A DANGER Do not use battery modules damaged from falling etc. It may cause an accident or device failure due to leakage, heating, smoking, fire, rupture or electric shock. Do not use the product even if it does not look damaged because the internal parts may be damaged. N'utilisez pas un module de batterie endommagé suite à une chute etc. Cela peut nuire à la sécurité et entraîner un accident ou une panne de l'appareil en raison d'une fuite. de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique. N'utilisez pas le produit, même s'il ne semble pas endommagé, parce que les pièces internes pourraient être endommagées. Do not touch the battery module's output terminal (+) or (-) with bare hands. Output terminals of the battery module are always a hot line and the battery module has potential difference of max. 33 V DC between output terminal (+) and (-). Pay attention to electric shock, and wear insulation gloves when handling the battery module. Ne touchez pas les bornes de sortie côté (+) et (-) du module de batterie avec les mains. Les bornes de sortie du module batterie sont toujours sous tension et le module de batterie a une différence de potentiel de max. 33 V CC entre les bornes de sortie (+) et (-). Faites attention au choc électrique, et portez des gants isolants lors de la manipulation du module de batterie. Do not short-circuit the battery module's output terminals (+) and (-). Short circuit of the battery module may cause device damage or burns due to sparks or overheated conductor caused by large current. Also, overheated battery may cause leakage, heating, rupture or fire. Mount the terminal cover to protect the output terminals except when connecting/disconnecting the wiring. Ne créez pas de court-circuit dans les bornes de sortie côté (+) et (-) du module de batterie. Un court-circuit du module de batterie peut provoquer des dommages à l'appareil ou des brûlures dus aux étincelles ou une surchauffe d'un conducteur résultant d'une forte tension. Par ailleurs, une batterie surchauffée peut provoquer une fuite, de la chaleur, de la fumée, une rupture ou un incendie. Fixez le cache de borne pour protéger les bornes de sortie sauf lors de la connexion/déconnexion du câblage. Do not connect in reverse the terminals (+) and (-) of the battery module and of the connected device. Connecting output terminals (+) and (-) in reverse will charge the battery inversely and cause abnormal reaction inside the battery, which may result in leakage, heating, rupture or fire. Also, it may damage the connected device. Make sure that output terminals (+) and (-) are correct when connecting them. Ne connectez pas le module de batterie aux bornes de l'appareil connecté (avec (+) et (-) à l'envers). Connecter en sens inverse les bornes de sortie côté (+) et (-) chargera la batterie à l'inverse et provoquera une réaction anormale à l'intérieur de la batterie, ce qui pourrait entraîner des fuites, de la chaleur, une rupture ou un incendie. Cela pourrait également endommager l'appareil connecté. Assurez-vous que les bornes de sortie côté (+) et (-) sont correctes lors de la connexion. Do not solder directly on the battery module and connected device. The insulator may melt due to the heat, or the gas exhaust valve or protection mechanism may be damaged, which may result in leakage, heating, rupture, or fire. Use applicable connectors and conductors for connection. Ne soudez pas directement sur le module de batterie et l'appareil connecté.

L'isolant pourrait fondre en raison de la chaleur, ou bien la vanne de purge de gaz ou le mécanisme de protection pourrait être endommagé, ce qui pourrait entraîner des fuites, de la chaleur, une rupture ou

Utilisez des connecteurs et des conducteurs appropriés pour la connexion.

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un incendie.

# **A** DANGER

### Do not wear conductive clothing for assembling, maintenance, or removal works.

There is a risk of short circuit or electric shock when conducting assembling, maintenance, or removal works. Do not wear conductive clothing etc. such as rings, a necklace and a watch during the works.



Ne portez pas de vêtements conducteurs pendant les travaux de montage, de maintenance ou de déménagement.

Cela pourrait provoquer un court-circuit ou un choc électrique lors des travaux de montage, de maintenance ou de déménagement.

Ne portez pas de vêtements conducteurs etc. tels que des bagues, un collier et une montre pendant les travaux.

### When charging the battery, observe the specified charging conditions.

Charging under inapplicable conditions (i.e. temperature/humidity/voltage/current exceeding the specifications, use of a modified charger, etc.) results in an excessive current and voltage on the battery, which may cause abnormal chemical reactions in the battery. It may also cause electrolyte leakage, abnormal heating, smoking, rupture, or fire.



Lors du chargement de la batterie, observez les conditions spécifiques de charge.

Charger dans des conditions inapplicables (ex. température/humidité/tension/courant dépassant les spécifications, utilisation d'un chargeur modifié) entraîne une surintensité et une surtension de la batterie, ce qui peut provoquer des réactions chimiques anormales dans la batterie. Cela pourrait également provoquer une perte d'électrolytes, une chaleur anormale, de la fumée, une rupture ou un incendie.

# When malfunction or wrong use causes a blowout of gases, smoke, or fire, extinguish the fire and cool it down.



First, ensure safety for yourself and those around you. Use carbon dioxide gas, powder fire extinguisher, or dry sand for extinguishing and cooling down.

Lorsqu'un dysfonctionnement ou une mauvaise utilisation provoque une émission de gaz, de la fumée ou un incendie, éteignez le feu et laissez refroidir.

Utilisez du gaz de dioxyde de carbone, un extincteur à poudre ou du sable sec et laissez refroidir.

# Installation, maintenance, and removal works must be conducted by a specially trained operator.

Assembling, maintenance, and removal works must be conducted by a specially trained operator (someone trained in handling low-tension electricity etc.)



Please stop (shutdown) the battery modules (refer to section 7.1.2) and disconnect signal harnesses when handling the battery modules.

Les travaux de montage, de maintenance et de déménagement doivent être effectués par un opérateur spécialement formé.

Les travaux de montage, de maintenance et de déménagement doivent être effectués par un opérateur spécialement formé (formé pour la manutention d'électricité basse tension etc.)

Arrêtez (éteignez) les modules de batterie (reportez-vous à 7.1.2) et débranchez les faisceaux de signal lors de la manipulation des modules de batterie.

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# **▲** DANGER

### Take insulation measures for assembling, maintenance, and removal works.

Use insulated tools (or tools with insulating measures) and insulating protective equipment (antistatic shoes, insulated gloves, and protective glasses) before assembling, maintenance, and removal works. Inspect the tools and protective equipment before use for damage, tear, or scratch.

Output terminals of the battery module are always hot lines and large current flows when the output terminals are short-circuited. Be careful not to drop a conductive tool causing a short circuit during work.



# Prenez des mesures quant à l'isolation avant les travaux de montage, de maintenance et de déménagement.

Utilisez des outils isolés (ou des outils avec des mesures d'isolation appropriées) et un équipement protecteur isolant (chaussures anti-statiques, gants isolants et lunettes protectrices) avant d'entreprendre des travaux de montage, de maintenance et de déménagement. Inspectez les outils et les équipements protecteurs et veillez à ce qu'ils ne présentent aucun dommage, déchirure ou égratignure avant l'utilisation.

Les bornes de sortie du module de batterie sont toujours sous tension et il y a un flux de courant important lorsque les bornes de sortie sont en court-circuit. Prenez garde à ne pas laisser tomber un outil conducteur qui provoquerait un court-circuit pendant le travail.

# Interrupt the circuit of charging/discharging system before assembling, maintenance, and removal works.



Make sure to stop charging/discharging operation of the battery module, and interrupt the circuit of charging/discharging system where the battery module is (to be) incorporated before assembling, maintenance, and removal works.

Interrompez le circuit du système de charge/décharge avant les travaux de montage, de maintenance et de déménagement.

Assurez-vous d'arrêter le chargement/déchargement du module de batterie, d'interrompre le circuit du système de charge/décharge à monter avant les travaux de montage, de maintenance et de déménagement.

# When the operator receives an electric shock, the rescuer must wear insulating protective equipment and take first aid measures.

If the rescuer touches the victim who is receiving an electric shock, a secondary accident may occur.

The rescuer must put on insulating protective equipment (antistatic shoes, insulated gloves etc.) before touching the victim.



Take appropriate first aid measures according to the severity of the accident, and take the person to a hospital.

Si l'opérateur reçoit un choc électrique, le secouriste doit porter un équipement protecteur isolant et prendre des mesures de premiers secours.

Si le secouriste touche la victime qui reçoit un choc électrique, un accident secondaire peut se produire. Le secouriste doit toucher la victime après avoir mis un équipement protecteur isolant (chaussures antistatiques, gants isolés etc.).

Prenez les mesures de premiers secours appropriées selon la gravité de l'accident et emmenez la personne à l'hôpital.

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### Avoid use or storage in the following environment.

Use or storage of the product in the following environment may damage the safety and result in an accident, device malfunction or failure due to leakage, heating, smoking, fire, or electric shock.

- (1) A place with low/high temperature outside the environment conditions
- (2) A place with high humidity outside the environment conditions
- (3) A place with sudden temperature changes causing condensation
- (4) A place with a risk of splashes or submersion in water
- (5) A place with strong vibrations or shock
- (6) A place with a lot of dust
- (7) A place with corrosive gases (SO<sub>2</sub>, H<sub>2</sub>S), flammable gases, salt mist, iron mist, oil mist, etc.
- (8) A place near a device generating heat or with direct sunlight
- (9) A place near a device generating strong radio waves or magnetic field



### Évitez l'utilisation ou le stockage dans les environnements suivants.

L'utilisation ou le stockage du produit dans les environnements suivants peut nuire à la sécurité et entraîner un accident, un dysfonctionnement de l'appareil ou une panne en raison d'une fuite, de chaleur, de fumée, d'un incendie ou d'un choc électrique.

- (1) Un endroit à une température faible/élevée en dehors des conditions ambiantes
- (2) Un endroit à humidité élevée en dehors des conditions ambiantes
- (3) Un endroit exposé aux changements de température brusques provoquant de la condensation
- (4) Un endroit exposé aux éclaboussures ou immersion dans l'eau
- (5) Un endroit exposé aux fortes vibrations ou impacts
- (6) Un endroit exposé à la poussière
- (7) Un endroit exposé aux gaz corrosifs (SO<sub>2</sub>, H<sub>2</sub>S), aux gaz inflammables, au brouillard salin, au brouillard ferreux ou au brouillard huileux
- (8) Un endroit situé à proximité d'un dispositif générant de la chaleur ou exposé à la lumière directe du soleil
- (9) Un endroit situé à proximité d'un dispositif générant de fortes ondes radio ou un champ magnétique

### Do not mix batteries of different types.

Mixing different types of batteries may damage the safety and result in an accident, device malfunction or failure due to leakage, heating, smoking, fire, rupture or electric shock.

Do not directly connect any other battery than this product.

### Ne mélangez jamais des batteries de type différent.

Mélanger différents types de batteries peut nuire à la sécurité et entraîner un accident, un dysfonctionnement de l'appareil ou une panne en raison d'une fuite, de chaleur, de fumée, d'un incendie, d'une rupture ou d'un choc électrique.

Ne connectez pas directement une autre batterie que ce produit.



# Protect output terminals of the battery module for storage, return or disposal with insulating materials.

Make sure to provide insulation protection with a terminal cover, insulating tape etc.



If the terminals are not insulated but short-circuited, leakage, heating, smoking, fire, or rupture may be caused.

Protégez les bornes de sortie du module de batterie pendant le stockage, une dévolution ou l'élimination avec des matériaux isolants.

Assurez-vous de fournir une protection isolante avec un cache de borne, un ruban isolant etc.

Si les bornes ne sont pas isolées mais en court-circuit, cela pourrait entraîner des fuites, de la chaleur, de la fumée, un incendie ou une rupture.

## **A** WARNING

### When the electrolyte leaks:

The electrolyte is flammable liquid that is irritating to eyes, skin, and mucous membrane.

- · Keep away the electrolyte from fire and stop use. Otherwise, fire may be caused.
- Do not touch the electrolyte but immediately wipe it off. When the electrolyte is spilt on the floor, table, etc. wear protective clothing, rubber gloves and protective glasses, and wipe it off immediately. Dispose of used cloths in a sealed dry container as industrial waste.

\*The electrolyte components in this product are subject to the regulation of concentration when drained. Do not wash them off with water in the facilities without wastewater treatment equipment.

- · When the electrolyte gas is inhaled, move to a place with fresh air immediately and rest, and see a doctor. In case of respiratory arrest, perform artificial respiration or oxygen inhalation.
- · When the electrolyte adheres to your clothes, immediately change them.
- · When the electrolyte comes into contact with your skin, immediately wash it off with a sufficient amount of water and soap, and see a doctor.
- · When the electrolyte enters your eyes, do not rub your eyes but rinse them with water for 15 minutes or longer immediately, and see a doctor.
- · When the electrolyte is swallowed, rinse the mouth with water immediately, and see a doctor.
- In case of smoking or fire, extinguish it and cool it down. Use carbon dioxide gas, powder fire extinguisher, or dry sand as an extinguishing agent.



### En cas de fuite d'électrolyte :

L'électrolyte est un liquide inflammable qui irrite les yeux, la peau et les muqueuses.

- · Maintenez l'électrolyte à l'abri du feu et cessez l'utilisation. Sinon, il y a risque d'incendie.
- Ne touchez pas l'électrolyte mais essuyez-le immédiatement. Lorsque l'électrolyte est renversé sur le sol, une table, etc., portez des vêtements protecteurs, des gants en caoutchouc et des lunettes protectrices et essuyez-le immédiatement. Débarrassez-vous des vêtements utilisés dans un conteneur sec scellé en tant que déchets industriels.

\*Les composants de l'électrolyte dans ce produit peuvent faire l'objet d'une régulation de concentration lors de la vidange. Ne les lavez pas avec de l'eau dans des installations sans équipement de traitement des eaux usées.

- · Si le gaz d'électrolyte est inhalé, déplacez immédiatement la personne vers un endroit avec de l'air frais et consultez un médecin. En cas d'arrêt respiratoire, effectuez la respiration artificielle ou faites inhaler de l'oxygène.
- · Si l'électrolyte adhère aux vêtements, changez-les immédiatement.
- · Si l'électrolyte entre en contact avec la peau, lavez immédiatement en abondance avec de l'eau et du savon, et consultez un médecin.
- · Si l'électrolyte pénètre dans les yeux, ne frottez pas les yeux mais rincez-les immédiatement à l'eau pendant 15 minutes ou plus et consultez un médecin.
- ·Si l'électrolyte est avalé, rincez immédiatement la bouche avec de l'eau et consultez un médecin.
- En cas de fumée ou de feu, éteignez-le et laissez refroidir. Utilisez du gaz de dioxyde de carbone, un extincteur à poudre ou du sable sec comme agent extincteur.

# When there are signs of electrolyte leakage, keep the module away from fire and stop use.

The electrolyte is flammable liquid.



Keep the product away from fire and stop use when you notice apparent damage (e.g. crack), deformation (e.g. expansion), discoloration, rusting, irritating odor, or other abnormalities.

En cas de signes de fuite d'électrolyte, maintenez à l'abri du feu et cessez l'utilisation.

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L'électrolyte est un liquide inflammable.

Tenez le produit à distance du feu et cessez l'utilisation en cas de dommage apparent (par ex., fêlure), décoloration, rouille, odeur irritante ou d'autres anomalies.

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# **A WARNING**



# Prevent dissimilar metals from contacting each other and causing electrolytic corrosion.

To prevent electrolytic corrosion caused by dissimilar metals contacting each other, it is recommended that nickel-plated connection terminals should be used for the cable and the busbar, and nickel-plated bolts and nuts should be used to fix the connection terminals.

Empêchez les métaux différents de se toucher et de provoquer une corrosion électrolytique. Pour prévenir la corrosion électrolytique résultant du contact de métaux différents, il est recommandé d'utiliser des bornes de connexion nickelées pour le câble et le jeu de barres, et des boulons et des écrous nickelés pour fixer les bornes de connexion.

# **A** CAUTION

# When connecting two battery modules in parallel, use modules with equal voltages (i.e. battery modules between which the voltage gap is 0.3 V or less).

Combining battery modules with different voltages will cause the one with the lower voltage to affect the other one, and result in a poor charging and discharging capacity or the modules' failure to be activated. The battery modules to be connected in parallel should be on the equal voltage level.



Lors de la connexion de 2 modules de batterie en parallèle, utilisez les modules de batterie dont la tension est équivalente (écart de tension de 0,3 V ou moins entre les modules de batterie).

Si vous connectez des modules de batterie dont la tension est différente, les modules de batterie ne peuvent pas démarrer normalement ni assurer suffisamment leur rendement (capacité) à cause de la batterie avec une tension inférieure. Lors de la connexion, utilisez les modules de batterie de tension équivalente en parallèle.

# When connecting the output terminals of the battery module, use specified bolts, nuts, and connection conductors.



Using other bolts and nuts than specified M6 ones, or tightening bolts or nuts without the connection conductor with 2mm thickness may cause damage of output terminals and failures due to insufficient connection strength of bolts and nuts.

Lors de la connexion des bornes de sortie du module de batterie, utilisez les vis et les conducteurs de connexion spécifiés.

Utiliser d'autres vis que les M6 spécifiées ou les vis de serrage sans conducteur de connexion avec 2 mm d'épaisseur pourrait endommager les bornes de sortie et provoquer des pannes en raison d'une force de connexion de vis insuffisante.

### The signal line connected to the product should be 30 m or shorter.



Longer signal lines are more susceptible to noise, and may lead to unstable communication. Make sure that the signal line connected to the product is 30 m or shorter. (recommended: 3 m or shorter)

### La ligne de signal connectée au produit doit être de 30 m ou moins.

Les lignes de signal plus longues sont plus vulnérables au bruit de fond, et peuvent entraîner une communication instable. Vérifiez que la ligne de signal connectée au produit est de 30 m ou moins. (recommandé : moins de 3 m)

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### **A** CAUTION

### To keep a long product life, do not store the product in below conditions.

- · Storage in fully-charged (SOC ≥ 95%) (OCV\*1: 27.94 to 28.82 V\*2) condition
- · Storage in end-of-discharge (SOC ≤ 10%) (OCV\*1: 22.55 to 23.21 V\*2) condition

  The product may not operate due to overdischarge if stored in end-of-discharge condition.
- · Storage in unspecified temperature condition (recommended: under 35 deg C)



Ne stockez pas dans les conditions indiquées ci-dessous afin d'assurer une longue durée de vie.

- Stockage dans un état de charge complète (SOC ≥ 95 %) (OCV<sup>\*1</sup>: 27,94 28,82 V<sup>\*2</sup>)
   Le produit peut être détérioré facilement s'il est stocké dans un état de charge complète.
- Stockage dans un état de fin de décharge (SOC ≤ 10 %) (OCV<sup>\*1</sup>: 22,55 23,21V<sup>\*2</sup>)
   Le produit peut ne pas fonctionner en raison de la décharge accélérée s'il est stocké dans un état de fin de décharge.
- · Stockage à une température non spécifiée (recommandé : moins de 35 degrés C)

### Install the battery module on a level and stable place and fix it.

Conducting works in an inclined or unstable place and installing this product on such a place without fixing it may cause damage or injury due to falling.

Make sure to install this product on a level and stable place, and fix it when assembling it. Also, conduct the works in such a place.



### Installez le module de batterie dans un endroit stable et de niveau et fixez-le.

Effectuer des travaux dans un endroit incliné ou instable et installer ce produit dans un endroit sans le fixer peuvent causer des dommages ou des blessures suite à une chute.

Assurez-vous d'installer ce produit dans un endroit stable et de niveau et de le fixer lors du montage. Exécutez également les travaux à cet endroit.

### Caution on use of the product in residential areas.



This product is an industrial battery. The use of the product in the vicinity of consumer products may cause electromagnetic interference or disturbance.

### Mise en garde concernant l'utilisation dans un quartier résidentiel.

Ce produit est une batterie destinée à des applications industrielles. Si ce produit est utilisé à proximité de produits de consommation, il y a possibilité de provoquer des interférences et des perturbations des ondes radio.

# When tightening output terminals of the battery module with bolts and nuts, do not apply an excessive force.

Tightening the terminals with an excessive force may damage bolts and nuts and cause injury.

Make sure to tighten bolts and nuts with a specified torque using a specified tool.

In case tightening bolts and nuts is not smooth or there is any obstruction, do not forcedly tighten but loosen it, and slowly tighten it again.



Lors du serrage des bornes de sortie du module de batterie avec les boulons et les écrous, n'exercez pas de force excessive.

Serrer les bornes avec une force excessive pourrait endommager les boulons et les écrous et provoquer des blessures.

Veillez à serrer les boulons et les écrous avec un couple de serrage spécifié à l'aide d'un outil spécifié. Au cas où le serrage des boulons et des écrous n'est pas aisé ou en cas d'obstruction, ne forcez pas le serrage, mais essayez de resserrer doucement.

- \*1 OCV ... Open Circuit Voltage (Tension en circuit ouvert)
- \*2 Voltage value per module (Valeur de tension par module)

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# Restriction of Use (Restriction d'utilisation)

- This battery module was designed for industrial applications.
  - Ce module de batterie a été conçu pour des applications industrielles.
- Do not apply the battery module to automobiles or aircrafts.
  - N'utilisez pas le module de batterie sur des automobiles ou des avions.
- Do not use the battery module for equipment (\*1) directly related to human life.
   N'utilisez pas ce module de batterie pour un équipement (\*1) lié directement à la vie humaine.
- Special consideration (\*3) is required for the operation, maintenance and management of systems (\*2) containing equipment related to human safety and heavily affecting the maintenance of public functions. When the product is to be used for those systems, contact our sales department for details.

Prêtez une attention particulière (\*3) au fonctionnement du système, maintenance et équipement de contrôle (\*2) lié à la sécurité humaine et affectant dans une large mesure la maintenance des fonctions publiques. Pour obtenir plus d'information, adressez-vous à notre service des ventes.

• Do not use this battery module in other connection configurations than those described in this document.

N'utilisez pas ce module de batterie dans d'autres configurations de connexion que celles décrites dans ce document.

 Contact our sales department for use of this battery module in other environments and conditions than those specified in this document.

Adressez-vous à notre service des ventes en cas d'utilisation de ce module de batterie dans d'autres environnements et conditions que ceux décrits dans ce document.

- \*1: "Equipment directly related to human life" is as follows.
  - Devices to be used in operating rooms
  - · Life support system
  - · Other equivalent medical equipment
    - \*1 : Les « équipements liés directement à la vie humaine » sont les suivants.
      - · Équipement pour opérations chirurgicales
      - · Respirateur artificiel
      - · Autre équipement médical similaire
- \*2: "Systems containing equipment related to human safety and heavily affecting the maintenance of public functions" is as follows.
  - · Operation control system and air traffic control system for collective transport system
  - Main machine control system of a nuclear power plant, safety protection system of a nuclear power facility, and other lines and systems important to safety.
  - · Other equivalent equipment
  - Electric wheelchair ...etc.
    - \*2 : Les « équipements liés à la sécurité humaine et affectant dans une large mesure la maintenance des fonctions publiques » est la suivante.
      - Système de contrôle de fonctionnement et système de contrôle du trafic aérien pour les systèmes de transport collectif
      - Système de contrôle de la machinerie principale d'une centrale nucléaire, système de protection de sécurité d'une installation nucléaire et d'autres lignes et systèmes importants pour la sécurité.
      - · Autre équipement similaire
      - Fauteuil roulant électrique ...etc.
- \*3: The special considerations are to construct a safe system (i.e. designing a foolproof system, a fail-safe system, a redundant system, etc.) through extensive consultation with our engineers.
  - \*3 : Les considérations spéciales servent à construire un système sécurisé (c'est-à-dire concevoir un système infaillible, un système de sécurité intégrée, un système redondant, etc.) en consultation avec nos ingénieurs.

# Disclaimer (Clause de non-responsabilité)

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Toshiba Corporation (ci-après appelé «Toshiba») n'est pas responsable dans les conditions décrites ci-dessous.

 Any damage incurred by a user due to natural disasters such as earthquake, wind and flood damage, lightning and fire, salt damage, gas damage and other extraordinary natural phenomenon and actions by third party, other accident, intention or negligence of the user, misuse or use of this product under abnormal conditions.

Tout dommage encouru par un utilisateur en raison de catastrophes naturelles comme un tremblement de terre, des dommages causé par le vent et des inondations, la foudre et le feu, des dommages causés par le sel, le gaz et d'autres phénomènes naturels extraordinaires et actes commis par des tiers ou tout autre accident, intention ou négligence de la part de l'utilisateur, une mauvaise utilisation ou utilisation de ce produit dans des conditions anormales.

 Any damage incidental to the use or non-use of this product (loss of business profit, suspension of business, change or loss of memorized contents).

Tout dommage accessoire relatif à l'utilisation ou non-utilisation de ce produit (perte des bénéfices imposables, suspension des activités, changement ou perte de contenu mémorisé).

Any damage due to non-observance of the contents of this document.

Tout dommage survenu en raison du non-respect du contenu de ce document.

- Any damage arising from the malfunction due to the operation out of specification performed by the user.

Tout dommage résultant d'un dysfonctionnement dû à une opération en dehors des spécifications effectuée par l'utilisateur.

- Any failure of this product caused by the influence of your equipment (inverter and other equipment).

Toute panne du produit causée par l'influence de votre équipement (onduleur et autre équipement).

 The technical information described in this document is intended for informational purposes only, and does not license or warrant the intellectual property rights or other rights of Toshiba or third parties.

Les informations techniques décrites dans le présent document donnent des explications sur le produit. Cela n'implique pas que Toshiba ou un tiers garantissent l'utilisation de la propriété intellectuelle ou d'autres droits concernant lesdites informations ou l'octroi de la licence.

• Failure to follow the instructions or warnings in this document may compromise the safety, reliability or performance of the product.

Si les instructions de ce document ne sont pas suivies, nous ne pouvons pas garantir la sécurité, la fiabilité ou les performances.

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# 1. Overview

This document describes how to handle the  $SCiB^{TM}$  Industrial Pack (24V) for Industrial Applications (hereafter called "Battery Module(s)"). The primary target reader of this document is the installation personnel of the Battery Module.

### 1.1 Multiple Connections of the Battery Module

The Battery Module can either be used as an individual module alone or two modules connected in parallel.

Note that, to prevent failure of the battery charger or connected device, it is prohibited to connect three or more Battery Modules in parallel, or to connect two or more Battery Modules in series.

			,	
		The number of Battery Modules in parallel		
		1 MDL	2 MDLs	3 MDLs or more
The number of Battery Modules in series	1 MDL	Allowed	Allowed	Not allowed
	2 MDLs	Not allowed*1	Not allowed	Not allowed
	3 MDLs or more	Not allowed	Not allowed	Not allowed

Table 1-1 Allowed Number of Battery Modules Connected

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<sup>\*1</sup> If you need to use two modules connected in series, SCiB™ Industrial Pack (48V) is available.

### 1.2 Glossary

Listed below are the definitions of terminologies and abbreviations used in this document.

Table 1-2 Definitions of Terminologies and Abbreviations

Item Description		
SCiB™ Industrial	Battery module consisting of 11 SCiB <sup>TM</sup> cells in series (1P11S) with a rated	
Pack (24V)	capacity of 22 Ah.	
,	Model: FP01101MCB01A	
CC:DIM Industrial	Battery module consisting of 11 SCiB <sup>TM</sup> cells in series (1P11S) with a rated	
SCiB™ Industrial	capacity of 22 Ah. Exclusively for use in a 48-V system, two modules of SCiB™ Industrial Pack (48V) must be connected in series.	
Pack (48V)	Model: FP01101MCB02A	
Cell	The minimum unit of batteries which makes up the Battery Module.	
CCII	1 parallel 11 series	
1P11S	Cell configuration of 11 series connections of one cell connected in	
	parallel.	
Dathaman data	(Battery) Module	
Battery module (MDL)	A constituent unit where multiple cells are connected and contained in a	
(MDL)	case.	
	Battery Management Unit	
BMU	A control unit that provides protection for the Battery Module, detects	
	abnormalities or failures, gives notification of the battery capacity, etc.	
CAN	Controller Area Network	
CAN	Communication standard that is used to exchange data between devices	
	interconnected State of Charge	
	The charge remaining in the battery represented in percentage, where	
SOC	0% indicates a completely discharged state and 100% indicates a fully	
	charged state.	
No voltage contact		
signal	Open-Drain output signal	
BOL	Beginning of Life	
DOL	The initial stages of the Battery Module's life.	
	Digital Output	
DO	The SOC information (in 2bit, in 25-percentage increments) and the	
	warning signal for discharge/charge/temperature are outputted by setting	
	the output level to Open (Open-Drain) or Low.	
FET	Field Effect Transistor	
FET	A semiconductor switch that controls charge/discharge.	
	(FET-ON: closed circuit, FET-OFF: open circuit)	
Self-discharge	A phenomenon in chemical batteries in which the stored charge of the	
_	battery decreases with the passage of time.	
Cell balance	The process of equalizing the voltage among the cells in the battery module when there are cell voltage differences.	
	inodule when there are cell voltage differences.	

### 1.3 Reference Documents

For appropriate use of the Battery Module, please refer to the following reference documents.

Table 1-3 Reference Documents

Item	Specification		
SPC-COM-E0061	Lithium-ion Battery for Industrial Applications SCiB™ Industrial Pack (24V) Product Specifications		
SPC-COM-E0059	Lithium-ion Battery for Industrial Applications SCiB™ Industrial Pack (24V) CAN Interface Specifications		

# 2. Product Specifications

Table 2-1 shows the specification of the Battery Module.

The Battery Module is a battery pack which consists of 11 series connections of one  $SCiB^{TM}$  cell connected in parallel (1P11S) with BMU inside.

Table 2-1 Lithium-ion Battery for Industrial Applications SCiB™ Industrial Pack (24V)(FP01101MCB01A) Specifications

Item	Spe	Note		
Model	FP01101MCB01A	FP01101MCB01A		
Designation of the Battery Module	11TNP22/116/106[:	11TNP22/116/106[11S]M/-30+40/95		
Applied cell	SCiB™ cell		Model: NP2211F10FHB	
Cell configuration	1 in parallel × 11 in	series	-	
Allowed number of modules connected	SCiB™ Industrial Pack (24V) x 1 OR SCiB™ Industrial Pack (24V) x 2 in parallel		With SCiB™ Industrial Pack (24V) (Model: FP01101MCB01A), you are only allowed to either use one module alone or connect two modules in parallel. It is prohibited to connect three or more SCiB™ Industrial Pack (24V) modules in parallel. If you need to connect two modules in series, please use SCiB™ Industrial Pack (48V) (Model: FP01101MCB02A).	
Nominal voltage	25.3 V DC		-	
Nominal capacity*1	SCiB™ Industrial Pack (24V) x 1	22 Ah, 556.6 Wh	Capacity measured in conditions below (one module alone): - Status: BOL - Module ambient	
	SCiB™ Industrial Pack (24V) x 2 in parallel	44 Ah, 1113.2 Wh	temperature:     25±5 deg C - Charge:     1.0 It (22 A), 0.5 It (11 A),     0.2 It (4.4 A) / cell 2.7     V-cut; Step-down     Charge - Discharge:     0.2 It (4.4 A) / cell 1.5     V-cut	
Max. current (Charge/Discharge)	SCiB™ Industrial Pack (24V) x 1	125 A or less	- The Battery Module can be used continuously in areas where the cell temperature does not exceed 55 deg C and the temperature of the circuit does not exceed the protection temperature.	
	SCiB™ Industrial Pack (24V) x 2 in parallel	150 A or less	<ul> <li>If it exceeds 125 A or more for 220 sec, or 210 A or more for 2 sec per module, charging or discharging stops.</li> <li>When the Battery Module is to be used with large current, please contact us.</li> </ul>	

Item	Spe	Note	
Operational voltage range	16.5 V to 29.7 V DO (Cell voltage range:	If the min. cell voltage remains at or under 1.9 V and uncharged for a certain period of time, the Battery Module is shut down to reduce the risk of overdischarge. *4	
External dimensions	W247±2 × D188±2	2 × H165±2 (mm)	Dimensions per Battery Module
Length of signal harness	250±30 (mm) × 3	harnesses	-
Mass	Approx. 8.3 kg		Mass per Battery Module
	Main circuit	Bolt nut terminal (B6)*2 (nickel-plated)	Please tighten with M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
	Control signal	- CAN input/output:     CAN 2.0B - Contact input signal:     No voltage contact     signal - Contact output signal:     No voltage contact     signal	-
External interface	Control signal 1	8 pins for host communication (CAN input/output, activation signal, address, etc.)	Using connectors (Refer to section 2.3 for details) *For details on CAN output, refer to CAN Interface Specifications (SPC-COM-E0059)
	Control signal 2  Control signal 3	6 pins for status notification (four-level scale notification of SOC, status notification signal, 5 V DC)	Using connectors (Refer to section 2.3 for details) No voltage contact output The maximum allowed voltage of contact output is 30 V.
		8 pins for lower communication (CAN input/output, activation signal, address, etc.)	Using connectors (Refer to section 2.3 for details) *For details on CAN output, refer to CAN Interface Specifications (SPC-COM-E0059)
	Measurement	Voltage, current, temperature	-
Function	Action Protection	Cell balance action  - Overcharge protection  - Over discharge protection  - Over current protection  - Over temperature protection  - Under temperature protection	-

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Item	Spe	ecification	Note
	CAN output	<ul> <li>Cell voltage</li> <li>Temperature inside module</li> <li>Charge/discharge current</li> <li>SOC*5</li> <li>System abnormality notification</li> </ul>	-
	Contact output signal	DO1: Discharge status notification DO2: Charge status notification DO3: Temperature status notification DO4, DO5: SOC*5 notification on a four-level scale (in 2 bit)	Refer to section 2.3.3 for details.
Resin case material	Material: PC (Polyca Color: Black	rrbonate)	Flame retardant grade: UL94 V-0
Rated voltage and current of built-in fuse	150 V, 200 A		Manufacturer: Mersen Item name: A15QS200-4
	Operation ambient temperature	-30 to +45 deg C	-
	Storage ambient temperature	-30 to +55 deg C	recommended: 35 deg C or lower
Environmental	Humidity	85%RH or lower	with no condensation*3
conditions	Atmosphere	Do not place the Battery Module in the presence of dust, corrosive or flammable gases, salt mist or iron.	-
	Operation altitude	2,000 m or lower	-
Applicable standards	CE marking	Below standards and directives apply EMC Directive 2014/30/EC - EN 61000-6-2:2005 - EN 61000-6-4:2007+A1:2011	Applicable to modules produced in or after January 2018.
	Third-party certification	• UL 62133:2015 Ed.1 • CSA E62133 Issued: 2013/11/01 • IEC 62133:2012 • UL 62133-2:2020 Ed.1 • CSA C22.2#62133-:2020 Ed.1	Applicable to modules with Serial No. "G122" to "G124"  Applicable to modules with Serial No. "G125" or greater

\*1: This is initial characteristics at the time of shipping.

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<sup>\*2: &</sup>quot;(B6)" is the terminal shape defined in JIS C 8702-2:2009 (IEC 61056-2:2012).

<sup>\*3:</sup> Condensation may damage the Battery Module and render it inoperative. The environment should be managed and necessary measures be taken against condensation, not only after the Battery Module has been incorporated in your device and operating, but also during the storage—both before and after the unpacking—or when installing the Battery Module or when moving the Battery Module from its storage location.

<sup>\*4:</sup> It is applicable to modules of which Serial No. is started with "G123" or greater and which are produced in or after May 2019.

<sup>\*5:</sup> The SOC is outputted as a reference value. The SOC estimation may be inaccurate if the battery has been operating continuously and/or at low temperature. If you have questions, please contact us.

The cells in the Battery Module will be degraded with repeated charging and discharging. Even if the Battery Module is in storage, it will be degraded with the passage of time. The degree of degradation depends on the ambient temperatures, SOC, charging/discharging conditions, etc.

To keep a long product life, the handling below is recommended.

- During storage, keep the ambient temperature at the recommended +35 deg C or lower, and handle the Battery Module as described in section 7.8 (charge it up to 40% SOC (OCV: 24.30 V per module) once a year).
- For transportation, use the means of transportation where the temperature can be managed, and keep the ambient temperature at the recommended +35 deg C or lower.
- For operation, avoid an environment where the temperature remains at the upper limit of +45 deg C for a long time.
   Caution should be exercised against condensation when moving the Battery Module away from an environment where temperature is controlled.

Storing or operating the Battery Module beyond the range of recommended ambient temperatures may decrease the battery capacity, degrade its performance, cause the cell to expand, or shorten the battery life. Keeping the Battery Module over the upper storage temperature limit of +55 deg C, for instance, will accelerate the self-discharge and lead to cell expansion.

When the Battery Module is connected to build a system, please pay attention to the following.

- Do not connect the Battery Module with batteries of other manufacturers or with other products of Toshiba.
- For the charging/discharging cable to be connected with the main circuit, be sure to select an electric wire that withstands the maximum current and voltage of the system.
- Blowing the fuse due to overcurrent or external short circuit is non-recovery failure. Please take countermeasures on the equipment side, such as installing a fuse in the equipment so as not to blow the built-in fuse.
- If the system is to be located and operate outdoors, be sure to take measures against corrosion, salt damage, or condensation on the equipment side.

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### 2.1 Appearance and Dimensions

### 2.1.1 Appearance and Dimensions of the Battery Module

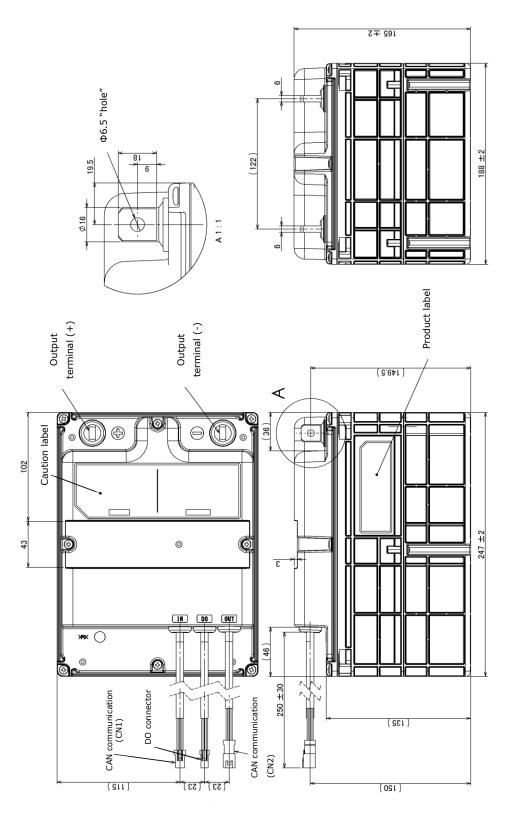


Figure 2-1 Appearance and Dimensions of the Battery Module (Reference Image) (unit: mm)

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### 2.1.2 Appearance and Dimensions of the Termination Adapter

Appearance and dimensions of the Termination Adapter (model type: FMW-GAA0059P) are shown in below.

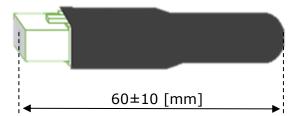


Figure 2-2 Appearance and Dimensions of the Termination Adapter (Reference Image)

### 2.1.3 Appearance and Dimensions of the Termination Adapter 2

Termination Adapter 2 (model type: FMW-GAA0064P) is a signal harness with a builtin terminator, and is necessary when using the Battery Module without CAN communication.

(Refer to section 2.3.1 for details on how to connect the adapter.)

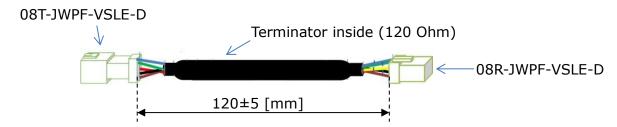
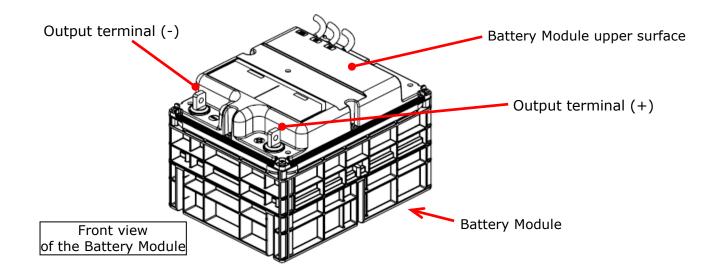


Figure 2-3 Appearance and Dimensions of the Termination Adapter 2 (Reference Image)

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### 2.2 Name of Each Part

The names of Battery Module parts are shown below.



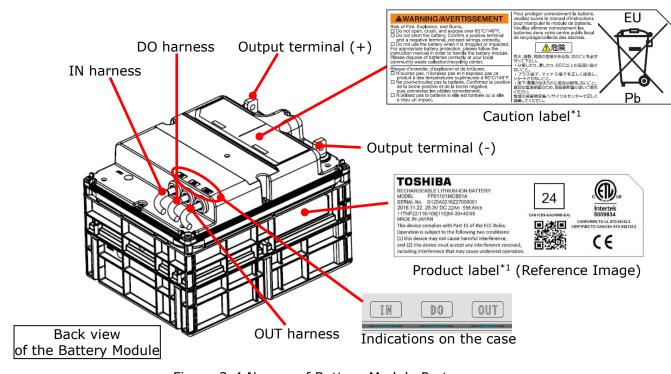


Figure 2-4 Names of Battery Module Parts

\*1 The caution and product labels above are those pasted on the modules produced in or after April 2021.

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### 2.3 Signal Harness

This section describes the pin assignment of IN, OUT, and DO harness connectors and provides information on the applicable connectors in Table 2-2, Table 2-3, and Table 2-4.

### 2.3.1 IN Harness

Connector type: JST connector 08R-JWPF-VSLE-D

\* Please prepare "JST connector 08T-JWPF-VSLE-D" on the user side.

Table 2-2 Connector Pin Assignment of IN Harness

Terminal No.	Color	Signal Name	Note	
1	Yellow	MOD1_in	Module quantity recognition signal (in) (Only to be used by	
2	Brown	MOD2_in	module [2] in 2 in parallel $\times$ 1 in series configuration)	
3	Green	ADR1_in	CAN address numbering signal (in) (Only to be used by module $[2]$ in 2 in parallel $\times$ 1 in series configuration)	
4	Orange	EN_in_Ref	Activation signal (battery output ON). Activate by short circuiting EN_in_Sig/ Stop by open circuiting*1	
5	Red	CAN_Ref	CAN communication and control circuit GND*2	
6	White	CAN_L	CAN	
7	Black	CAN_H	CAN communication signal*3	
8	Blue	EN_in_Sig	Activation signal (battery output ON). Activate by short circuiting EN_in_Ref/ Stop by open circuiting*1	

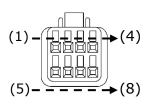


Figure 2-5 08R-JWPF-VSLE-D
Pin Assignment
(Image of Connector Insertion Point)

08T-JWPF-VSLE-D (to the device on the user side)

08R-JWPF-VSLE-D (from the Battery Module)

Figure 2-6 Image of IN Harness Connector

### \*1: ①Install a contact switch between EN\_in\_Ref and EN\_in\_Sig.

Please pay attention to the amount of charge of the battery module, and immediately turn the contact switch OFF (open) when not using it. There is a possibility that the battery module becomes overdischarged due to the power consumption of the BMU in the battery module (For the power consumption, refer to Product Specifications (SPC-COM-E0061) Chapter4), or due to the power consumption of the equipment, etc.

- ②Be careful of the connection destination if you use switches with polarities such as transistors. For the signal terminal EN\_in\_Ref (pin 4) is to be at lower potential (\(\display \) GND), and the current flows in the direction of EN\_in\_Sig (pin 8) to EN\_in\_Ref (pin 4) when the switch is turned ON (short-circuited).
- ③The resistance of the signal path that includes the switch should be configured as shown below without diode.

Switch Status	ON (Short-circuited)	OFF (Open)
Signal path resistance	200 Ohm or below	100 k Ohm or above

<sup>\*</sup>Diode can cause the activation to be unstable with its forward voltage (Vf).

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\*2: Caution is needed when grounding the signal line.

There is no conduction between CAN\_Ref (terminal No.5; CAN communication and control circuit GND) and the output terminal (-).

- \*3: When connecting two Battery Modules in parallel without using CAN communication
  - (i) If the user prepares the terminator

If the user prepares the harness, it is necessary to install CAN terminator. Refer to Figure 2-7, and connect the resistor (120 Ohm,  $\pm 5\%$ , 1/4 W) between the terminals No.6 (CAN\_L) and No.7 (CAN\_H).

\*The terminator is not necessary when CAN communication is used.

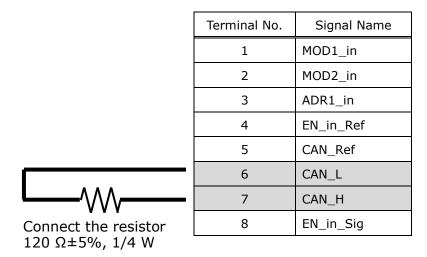


Figure 2-7 Connection of Terminator prepared by User

(ii) If Termination Adapter 2 (model type: FMW-GAA0064P) is used

It is necessary to connect the Termination Adapter 2 to the Battery Module [1]. Refer to Figure 2-8, and connect the Termination Adapter 2 (refer to section 2.1.3) to the IN harness of the Battery Module [1].

The harness to connect the Termination Adapter 2 with the user's device needs to be prepared by the user.



Figure 2-8 Connection of Termination Adapter 2

If you connect the contact switch in addition to the Termination Adapter 2, refer to 2.3.1 \*1.

For the pin assignment of the Termination Adapter 2 for startup and shutdown, refer to the table below.

Terminal No.	Color	Signal Name	Note
4	Yellow	EN_out_Ref	Activate by short circuiting EN_out_Sig/ Stop by open circuiting
8	Blue	EN_out_Sig	Activate by short circuiting EN_out_Ref/ Stop by open circuiting

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### 2.3.2 OUT Harness

Connector type: JST connector 08T-JWPF-VSLE-D

\*Connect the Termination Adapter.

Table 2-3 Connector Pin Assignment of OUT Harness

Terminal No.	Signal Name	Note				
1	MOD1_out	Module quantity recognition signal (out)				
2	MOD2_out	Module quantity recognition signal (out)				
3	ADR1_0ut	CAN address numbering signal (out)				
4	EN_out_Ref	Activate module on the high voltage side/Stop signal				
5	CAN_Ref	CAN communication and control circuit GND*1				
6	CAN_L	CAN company in the principle				
7	CAN_H	CAN communication signal				
8	EN_out_Sig	Activate module on the high voltage side/Stop signal				

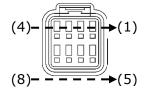


Figure 2-9 08T-JWPF-VSLE-D
Pin Assignment
(Image of Connector Insertion Point)

\*Depending on the battery module configuration, either the Termination Adapter or the IN harness of the Battery Module [2] is to be connected to the OUT harness.

(Refer to the connection diagrams in chapter 6. "Connection Configuration.")

\*1: Caution is needed when grounding the signal line.

There is no conduction between CAN\_Ref (terminal No.5; CAN communication and control circuit GND) and the output terminal (-).

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### 2.3.3 DO Harness

Connector type: JST connector 06R-JWPF-VSLE-D

\*Please prepare "JST 06T-JWPF-VSLE-D" on the user side.

Table 2-4 Connector Pin Assignment of DO Harness

Terminal No.	Color	Signal Name	Note					
1	Red	Under voltage warning	Normal: Open (Open-Drain), Abnormal: LOW					
2	Green	Over voltage warning	Normal: Open (Open-Drain) , Abnormal: LOW					
3	Yellow	Over temperature warning	Over temperature warning of battery (cell) or circuit Normal: Open (Open-Drain), Abnormal: LOW					
4 (D04)	Brown	SOC1	Indicates SOC condition* by 2 Bit (High=Open-Drain)  Note that the threshold for the output change depends on whether SOC increases or decreases.					
			Level	During Charging	During Discharging	DO4	DO5	
5 (D05)	Blue	SOC2	4	76% to 100%	74% to 100%	Low	Low	
			3	From 51% to below 76%	From 49% to below 74%	Low	High	
			2	From 26% to below 51%	From 24% to below 49%	High	Low	
			1	From 0% to below 26%	From 0% to below 24%	High	High	
6	Orange	5V	25mA (max.) LED Lighting, etc. Under overload conditions above 25 mA, startup failure or CAN communication abnormality may occur. Utmost caution is needed so that the load current should not exceed 25 mA.					

<sup>\*</sup>The SOC is outputted as a reference value. The SOC estimation may be inaccurate if the battery has been operating continuously and/or at low temperature.

(1)- → (3) (4)- → (6)

Figure 2-10 06R-JWPF-VSLE-D
Pin Assignment
(Image of Connector Insertion Point)

06T-JWPF-VSLE-D (to the device on the user side)

06R-JWPF-VSLE-D (from the Batterv Module) Figure 2-11 DO Harness Connector Image

\* The GND for the output signal of DO connector is CAN\_Ref (terminal No.5; CAN communication and control circuit GND) of the IN harness. Caution is needed when grounding the signal line.

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Table 2-5 DO Output Transition through Protection Stages

Item	Low Voltage (Terminal No.1)		Overvoltage (Terminal No.2)		High Temperature (Terminal No.3)	
	Judgment condition	DO Output	Judgment condition	DO Output	Judgment condition	DO Output
Warning	1.5 V/cell or lower	Low	2.7 V/cell or more	Low	Module: 55 deg C or more Circuit parts: 90 deg C or more	Low
Error	1.4 V/cell or lower	<b>V</b>	2.8 V/cell or more		Module: 66 deg C or more Circuit parts: 95 deg C or more	-
Permanent error	1.2 V/cell or lower	-	3.0 V/cell or more	<b>1</b>	-	-

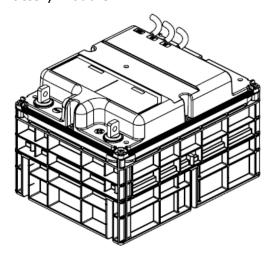
<sup>\*</sup> For details on the protection function of the Battery Module, please refer to section 7.7.

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# 3. Confirmation of Product

### 3.1 Product and Accessories

### **★**Battery Module



SCiB™ Industrial Pack (24V)

★Accessories for Use the Battery Module (sending separately)



**Termination Adapter** 

\*Use 1pcs per system



Termination Adapter 2

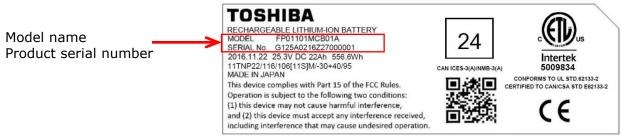
\*It is necessary when connecting two Battery Modules in parallel without using CAN communication. (not necessary in case of other configurations)

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### 3.2 Before Unpacking

Upon receipt, check the delivered packages for damages on the products or packages. If damages are found, please contact us at the contact information provided at the end of this document.

- (1) Make sure that no abnormal odor is emitted. Abnormal odor suggests a possible leakage of the electrolyte solution.
- (2) If items are damaged or missing, please contact us at the contact information provided at the end of this document.
- (3) When contacting us, please remember to provide us with the model name and the product serial number given on the product label on the side of the packing box.



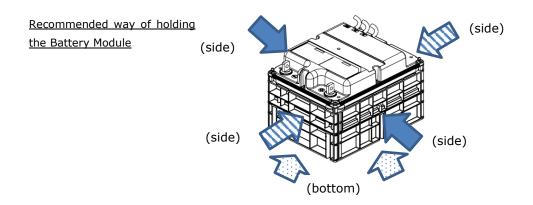
Product Label\*1

### 3.3 Unpacking

Open the packing box and take the Battery Module out. Be careful not to drop the products when taking them out.



- (1) Open the packing box on a horizontal and stable floor.
- (2) Hold the Battery Module on its bottom or place your fingers on the grooves on opposing sides, hold it firmly and handle it carefully. Dropping the Battery Module may cause injuries or product damages.
- (3) The Battery Module weighs approximately 8.3 kg (18.30 lbs).





Do not hold the output terminal or the signal harness to hold up the Battery Module.

It may damage the Battery Module or its accessory parts.

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<sup>\*1</sup> The product label above is the one pasted on the modules produced in or after April 2021.

# 4. Confirmation before Installation

Verify the following before installation of the Battery Module.

- (1) No crack, scratch, or damage on the Battery Module's exterior
  In case abnormalities are found, do not use the Battery Module, and either contact
  our agency or contact us at the contact information provided at the end of this
  document.
- (2) No abnormal odor from the Battery Module
  If abnormal odor is emitted, do not use the Battery Module, because the electrolyte solution may be leaking.
- (3) Horizontal and stable floor for installation
  Do not install the Battery Module on a tilted or unstable place.
- (4) Insulation measures and use of insulated tools
  Make sure that the operator wears insulating protective equipment and uses tools
  with insulating measures, and no electrically conductive items. Assembly of the
  Battery Module involves operations on hot lines.
- (5) Measures against short-circuits from dropping conductive items
  When handling the Battery Module, or devices where the Battery Module is installed,
  do not wear electrically conductive items, such as rings, wrist watches, necklaces,
  stationaries, or tools that are made of metal. Do not place such items near where the
  Battery Module is stored. Electrically conductive objects may cause short-circuits.
- (6) Shut off the charging/discharging system
  Make sure to disconnect the main circuit of the charging/discharging system of the
  device on which the Battery Module is to be installed. When multiple Battery Modules
  are connected, the system may involve a high voltage and a large current, with risks
  of accidents due to arc or electric shocks.
- (7) Working atmosphere at room temperature (25±5 deg C) Extremely high ambient temperatures may cause sweating and heighten the risk of electric shocks, whereas extremely low ambient temperatures may cause the operator to wear protective clothing against the cold, which may lower the working efficiency and safety.
- (8) Measures against condensation

  Condensation may damage the product and render it inoperative. Caution should be exercised not only during the operation but also when moving the Battery Module from the place of work or the storage location. To prevent condensation, protect the Battery Module from sudden temperature differences, and make sure that the Battery Module is unpacked where there is no difference between the module temperature and the ambient temperature.
- (9) Working environment

  Make sure that the place of work or installation is free from dust, corrosive gases (such as SO<sub>2</sub> or H<sub>2</sub>S), flammable gases, salt mist, iron mist, oil mist, etc.
- (10) Two Battery Modules to be connected in parallel
  Connect in parallel two Battery Modules that are on the equal state of charge and
  voltage and on the equal level of degradation. When battery modules on different
  states of charge or voltage are connected, the protection function will prevent you
  from using them. For details, refer to section 7.5.
  In connecting two Battery Modules in parallel, make sure to connect the modules that
  were delivered around the same time and are on the equal state of charge and
  voltage. (For how to check the voltage, refer to section 7.2.)

# 5. Installation / Removal

- Ensure safety for operators with insulation measures and measures against falling objects as needed.
- Before the installation or removal, be sure to shut off the current system on which the Battery Module is (to be) connected, and make sure that no ground fault takes place in the main circuit.
- Connect the main circuit before connecting the signal lines.
- Make sure that the crimp terminal is in firm contact with the output terminal to ensure the right fixation without interference with the case.
- Do not touch the metal part of the terminal with bare hands.
- Take measures against short-circuits. The terminal parts of the connection cable should remain protected with insulation tape until just before the installation, and should be protected with insulation tape immediately after the removal, so that live parts should not remain exposed.
- Connect the Battery Module with the correct terminal of the correct device. With devices with polarities, make sure that the module is connected in the correct direction.
- Do not lift up or pull up the cables which are connected to the output terminal.
- After connection, take adequate insulation measures such as putting an insulation cap on the output terminal.
- Besides the above-mentioned precautions, follow those described in chapter 4 "Confirmation before Installation."

### 5.1 Installation of the Battery Module

Firmly fix the Battery Module on the installation location.

- 1. If the Battery Module is to be mounted within a device, be sure to install the Battery Module with its upper surface facing up. (Refer to section 2.2 Name of Each Part.)
- Fix the Battery Module on its upper surface as shown in Figure 5-1 below. (Image of fixing parts is for illustration purposes.)
   It is recommended that the structure which is banded or fixed by pressing full

face of the module, not pressing only a part or an edge. If press the hollow part of the Battery Module upper surface, press the boss end by two M10 bolts. Make sure to tighten bolts within specified tightening torque (2Nm on one side) so as not to damage the Battery Module. (It is the guideline in case of using M10 bolts. Please adjust tooling sizes and install methods in other cases.)

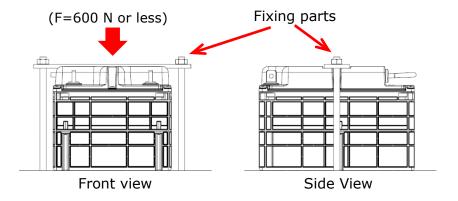


Figure 5-1 Example of Fixing Battery Module

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### 5.2 Installation

(1) Use M6 bolts and nuts to tighten the conductor on the module's output terminal. Recommended crimp terminal:

J.S.T. Mfg. Co.,Ltd. Ring tongue terminal (R-type) Model No. 22-6 \*The output terminals are nickel-plated.

(2) Tightening torque should be 5.0 to 6.8 Nm. (Tighten with M6 bolts and nuts of the strength class 4.8 or more.)



When connecting the Battery Module output terminal with a connection conductor, make sure that the connection conductor is not connected at an angle, and that there is no foreign object stuck between the output terminal and the connection conductor. Contact failures may increase the resistance at the connection part and cause abnormal heating. Also do not pull the connected cable.



Make sure that the cables as well as the Battery Module are fixed with retention mechanism or with a band, so they will not be easily loosened. Mechanical stress such as vibration may cause the insulation coating to be peeled off or the wire to be disconnected, and may result in abnormal heating, electric shocks, or power shutdown.



For the installation, be sure to use tools that comply with the industrial standards of the country where the Battery Module is used. Use of non-compliant tools may cause problems such as damaged screw heads.



Make sure that the voltage between the output terminals (+) and (-) is 1 V or less.

Contact us if the voltage exceeds 1 V.



Make sure that the output terminals are not deformed or discolored, and that the coating on the signal harness is not damaged. If deformation, discoloration, or damage is found, protect the affected part with insulation tape and contact us. Do not use the affected Battery Module because deformation, discoloration, or damage may cause contact failures and result in abnormal heating or short-circuits.

### 5.3 Removal

Make sure to shut down the Battery Module before the removal. (Refer to section 7.1.2.) Disconnect the charging/discharging system, remove the signal line of the Battery Module, and then remove the main circuit connection. As for the device on which the Battery Module had been installed, remove the connected peripherals as needed.

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# 6. Connection Configuration

# 6.1 Connection Configuration of the Battery Module

The connection configuration of the Battery Module, the load (your device), and the charger depends on the number of the connected battery modules (alone or 2 modules in parallel) and the communication system in use.

# 1) For Use of 1 Battery Module Alone

	Communica	tion System		_	Connection	How to
No.	CAN Communication	DO Output	Section	n Page	Configuration Figure	connect
1	Not Used	Not Used	6.1.1.1	P.20 to 21	Figure 6-1	Table 6-1
2	Used	Not Used	6.1.1.2	P.22 to 23	Figure 6-2	Table 6-2
3	Not Used	Used	6.1.1.3	P.24 to 25	Figure 6-3	Table 6-3
4	Used	Used	6.1.1.4	P.26 to 27	Figure 6-4	Table 6-4

# 2) For Use of 2 Battery Modules in Parallel

	Communica	tion System			Connection How to	
No.	CAN Communication	DO Output	Section	Page	Configuration Figure	connect
1	Not Used	Not Used	6.1.2.1	P.28 to 29	Figure 6-5	Table 6-5
2	Used	Not Used	6.1.2.2	P.30 to 31	Figure 6-6	Table 6-6
3	Not Used	Used	6.1.2.3	P.32 to 33	Figure 6-7	Table 6-7
4	Used	Used	6.1.2.4	P.34 to 35	Figure 6-8	Table 6-8

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# 6.1.1 For Use of 1 Battery Module Alone

Sections 6.1.1.1 through 6.1.1.4 describe the connection configurations for the use of 1 Battery Module alone.

# 6.1.1.1 With No CAN Communication or DO Output

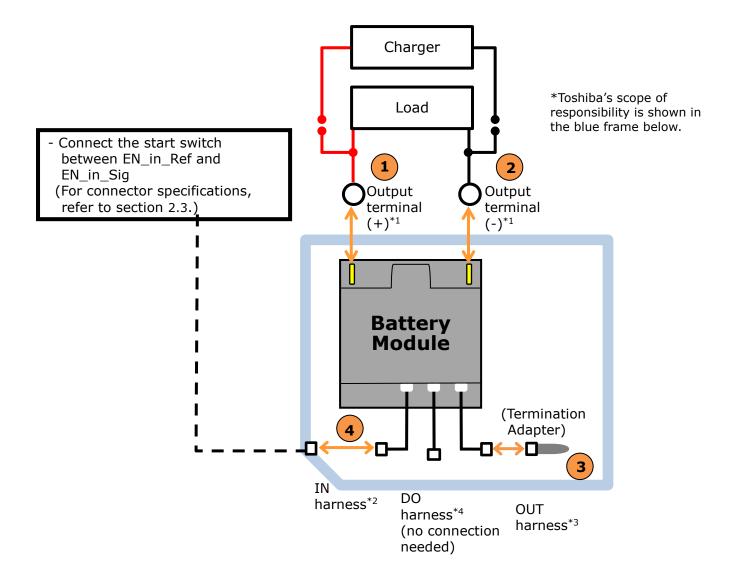


Figure 6-1 Connection Configuration with No CAN Communication or DO Output

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Table 6-1 F	low to C	`onnect to	the Terminal	/ Connector

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	-Please connect the start switch or the equivalent circuitPlease prepare the harness. Refer to section 2.3 for the connector specifications.
*3	OUT harness	Termination Adapter	-
*4	DO harness	No connection needed	-

#### Connection Procedures

Please connect each device from ① to ④ in order as shown in

# Figure 6-1.

Make sure that there is no gap or foreign object stuck on the output terminal, and push the connector of the signal harness until it clicks to make sure it is fixed firmly.

- Main circuit cable (red):
  - Connect the positive terminal (output terminal (+)) of the Battery Module to your device (charger / load).
- 2 Main circuit cable (black):
  - Connect the negative terminal (output terminal (-)) of the Battery Module to your device (charger / load).
- 3 Connect the Termination Adapter to the OUT harness.
- ④ Connect the IN harness to the signal harness of your device.

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<sup>\*</sup>For precautions on the Termination Adapter, refer to section 6.2.

# 6.1.1.2 With Only CAN Communication

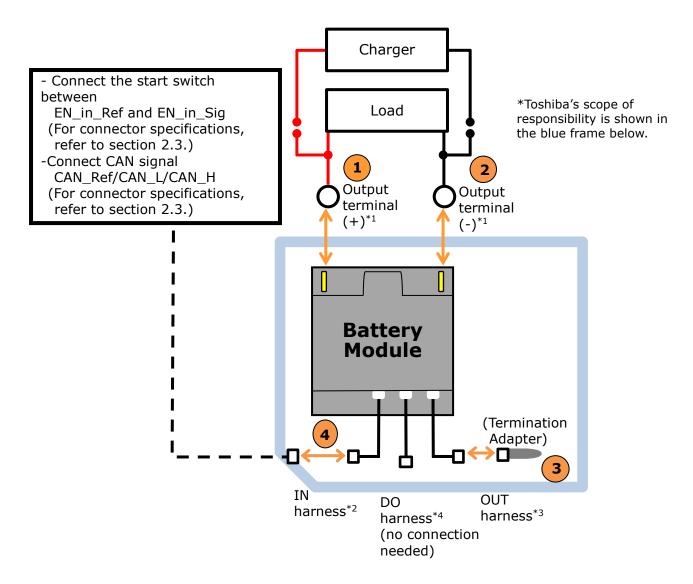


Figure 6-2 Connection Configuration with Only CAN Communication

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Table 6-2 How to Connect to the Terminal / Connector
--

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	Please prepare the harness. Refer to section 2.3 for the connector specifications.
*3	OUT harness	Termination Adapter	-
*4	DO harness	No connection needed	-

#### Connection Procedures

Please connect each device from ① to ④ in order as shown in Figure 6-2. Make sure that there is no gap or foreign object stuck on the output terminal, and push the connector of the signal harness until it clicks to make sure it is fixed firmly.

Main circuit cable (red):

Connect the positive terminal (output terminal (+)) of the Battery Module to your device (charger / load).

2 Main circuit cable (black):

Connect the negative terminal (output terminal (-)) of the Battery Module to your device (charger / load).

- 3 Connect the Termination Adapter to the OUT harness.
- ④ Connect the IN harness to the signal harness of your device.

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<sup>\*</sup>For precautions on the Termination Adapter, refer to section 6.2.

# 6.1.1.3 With Only DO Output

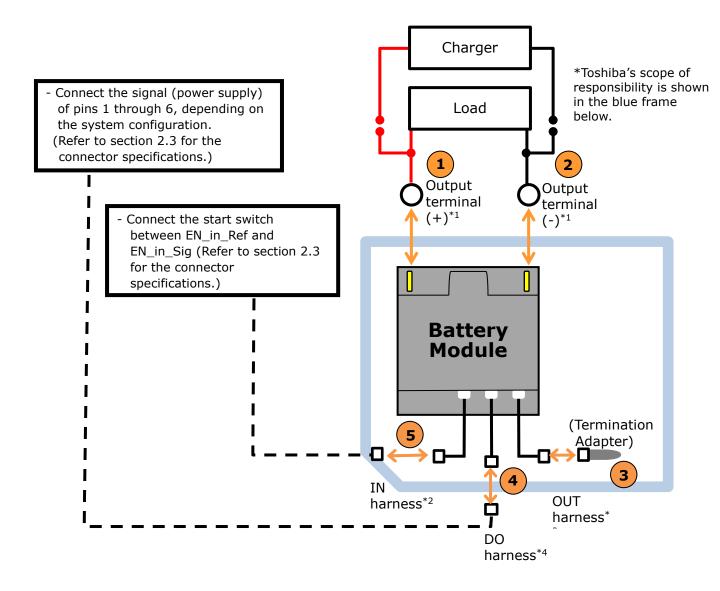


Figure 6-3 Connection Configuration with Only DO Output

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Table 6-3 How to Connect to the Terminal /Connector
---

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	-Please connect the start switch or the equivalent circuitPlease prepare the harness. Refer to section 2.3 for the connector specifications.
*3	OUT harness	Termination Adapter	-
*4	DO harness	Harness with connector	Please prepare the harness. Refer to section 2.3 for the connector specifications.

#### Connection Procedures

Please connect each device from ① to ⑤ in order as shown in Figure 6-3.

Make sure that there is no gap or foreign object stuck on the output terminal, and push the connector of the signal harness until it clicks to make sure it is fixed firmly.

- Main circuit cable (red):
  - Connect the positive terminal (output terminal (+)) of the Battery Module to your device (charger / load).
- ② Main circuit cable (black):
  - Connect the negative terminal (output terminal (-)) of the Battery Module to your device (charger / load).
- 3 Connect the Termination Adapter to the OUT harness.
- ④ Connect the DO harness to the signal harness of your device.
- © Connect the IN harness to the signal harness of your device.

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<sup>\*</sup>For precautions on the Termination Adapter, refer to section 6.2.

# 6.1.1.4 With Both CAN Communication and DO Output

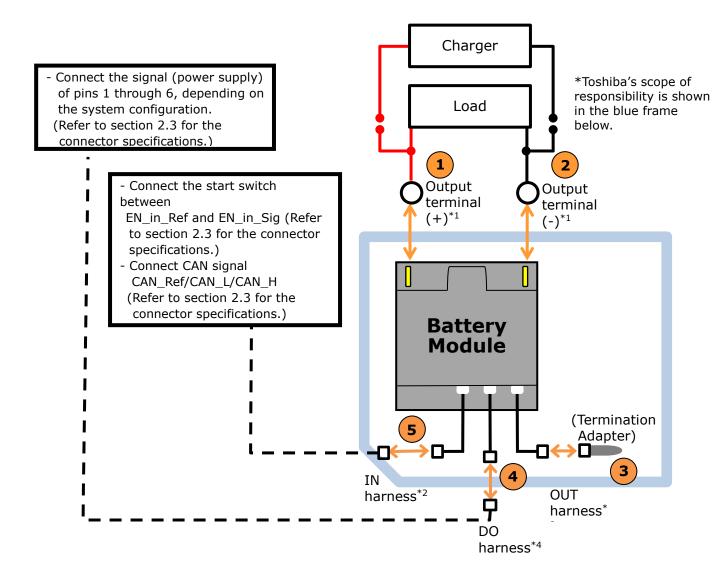


Figure 6-4 Connection Configuration with Both CAN Communication and DO Output

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Table 6-4 How to	Connect to	the Terminal	/ Connector
Table 6-4 flow to	Connect to	the terminal	/ Connector

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	Please prepare the harness. Refer to section 2.3 for the connector specifications.
*3	OUT harness	Termination Adapter	-
*4	DO harness	Harness with connector	Please prepare the harness. Refer to section 2.3 for the connector specifications.

#### > Connection Procedures

Please connect each device from 1 to 5 in order as shown in Figure 6-4.

Make sure that there is no gap or foreign object stuck on the output terminal, and push the connector of the signal harness until it clicks to make sure it is fixed firmly.

- Main circuit cable (red):
  - Connect the positive terminal (Output terminal (+)) of the Battery Module to your device (charger / load).
- 2 Main circuit cable (black):
  - Connect the negative terminal (Output terminal (-)) of the Battery Module to your device (charger / load).
- 3 Connect the Termination Adapter to the OUT harness.
- ④ Connect the DO harness to the signal harness of your device.
- © Connect the IN harness to the signal harness of your device.

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<sup>\*</sup>For precautions on the Termination Adapter, refer to section 6.2.

# 6.1.2 For Use of 2 Battery Modules in Parallel

Sections 6.1.2.1 through 6.1.2.4 describe the connection configurations for the use of 2 Battery Modules connected in parallel.

# 6.1.2.1 With No CAN Communication or DO Output

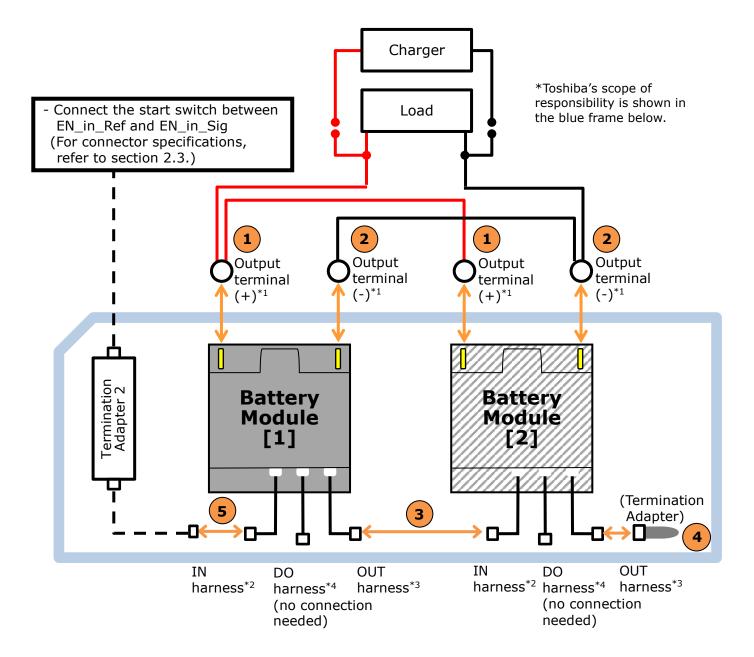


Figure 6-5 Connection Configuration with No CAN Communication or DO Output

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Table 6-5 How to Connect to the Terminal / Connector
--

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	[Battery Module 1] -Please connect the start switch or the equivalent circuitPlease prepare the harness to be connected to the Termination Adapter 2. (Refer to section 2.3 for the connector specifications.) [Battery Module 2] -Please connect to the OUT harness of the Battery Module 1.
*3	OUT harness	Termination Adapter	-
*4	DO harness	No connection needed	-

Note: Refer to 7.5 (3) In case 2 Battery Modules are connected in parallel.

#### Connection Procedures

Please connect each device from 1 to 5 in order as shown in Figure 6-5.

Make sure that there is no gap or foreign object stuck on the output terminal, and push the connector of the signal harness until it clicks to make sure it is fixed firmly.

Main circuit cable (red):

Connect the positive terminals (output terminals (+)) of the Battery Modules to your device (charger / load).

2 Main circuit cable (black):

Connect the negative terminals (output terminals (-)) of the Battery Modules to your device (charger / load).

- 3 Connect the signal harness between the Battery Modules.
- ④ Connect the Termination Adapter to the OUT harness.
- © Connect the Termination Adapter 2 to the IN harness, and connect it to the signal harness of your device.

(In case the terminator is prepared by the user, the Termination Adapter 2 is not needed. (Refer to section 2.3 for details.))

\*For precautions on the Termination Adapter and the Termination Adapter 2, refer to section 6.2.

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# 6.1.2.2 With Only CAN Communication

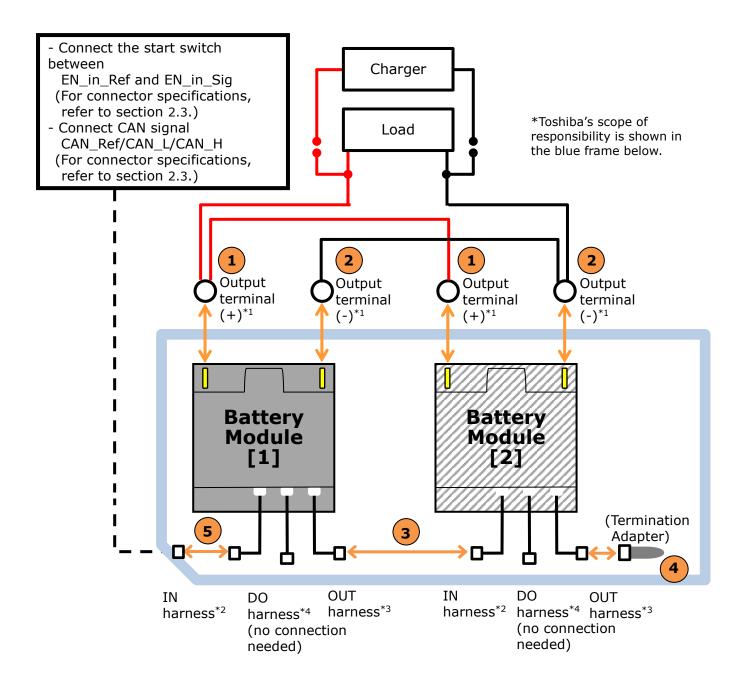


Figure 6-6 Connection Configuration with Only CAN Communication

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Table 6-6 How to Connect to the Terminal / Connector

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	[Battery Module 1] -Please prepare the harness to be connected to the IN harness. (Refer to section 2.3 for the connector specifications.) [Battery Module 2] -Please connect to the OUT harness of the Battery Module 1.
*3	OUT harness	Termination Adapter	-
*4	DO harness	No connection needed	-

Note: Refer to section 7.5 (3) In case 2 Battery Modules are connected in parallel.

#### Connection Procedures

Please connect each device from ① to ⑤ in order as shown in

# Figure 6-6.

Make sure that there is no gap or foreign object stuck on the output terminal, and push the connector of the signal harness until it clicks to make sure it is fixed firmly.

- 1 Main circuit cable (red):
  - Connect the positive terminals (output terminals (+)) of the Battery Modules to your device (charger / load).
- 2 Main circuit cable (black):
  - Connect the negative terminals (output terminals (-)) of the Battery Modules to your device (charger / load).
- 3 Connect the signal harness between the Battery Modules.
- 4 Connect the Termination Adapter to the OUT harness.
- © Connect the IN harness to the signal harness of your device.

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<sup>\*</sup>For precautions on the Termination Adapter, refer to section 6.2.

# 6.1.2.3 With Only DO Output

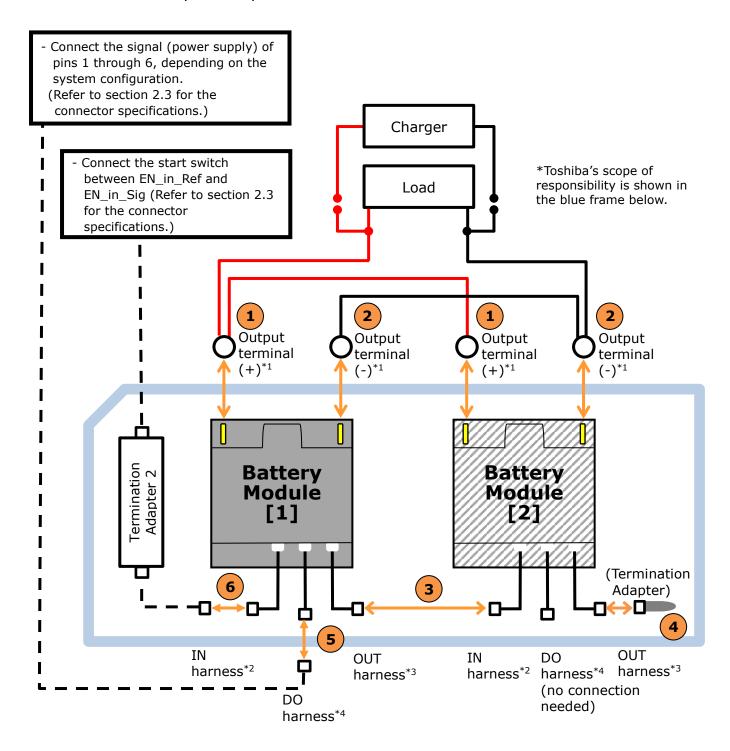


Figure 6-7 Connection Configuration with Only DO Output

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Table 6-7	How to	Connact t	a tha	Torminal	/Connector
Table 6-7	HOW TO	Connect t	o me	Terminai	/Connector

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	[Battery Module 1] -Please connect the start switch or the equivalent circuitPlease prepare the harness to be connected to the Termination Adapter 2. (Refer to section 2.3 for the connector specifications.) [Battery Module 2] -Please connect to the OUT harness of the Battery Module 1.
*3	OUT harness	Termination Adapter	-
*4	DO harness	Harness with connector	Please prepare the harness. Refer to section 2.3 for the connector specifications.

Note: Refer to section 7.5 (3) In case 2 Battery Modules are connected in parallel.

#### Connection Procedures

Please connect each device from 1 to 6 in order as shown in Figure 6-7. Make sure that there is no gap or foreign object stuck on the output terminal, and push

the connector of the signal harness until it clicks to make sure it is fixed firmly.

- 1 Main circuit cable (red):
  - Connect the positive terminals (output terminals (+)) of the Battery Modules to your device (charger / load).
- 2 Main circuit cable (black):
  - Connect the negative terminals (output terminals (-)) of the Battery Modules to your device (charger / load).
- 3 Connect the signal harness between the Battery Modules.
- 4 Connect the Termination Adapter to the OUT harness.
- © Connect the DO harness to the signal harness of your device.
- © Connect the Termination Adapter 2 to the IN harness, and connect it to the signal harness of your device.
  - (In case the terminator is prepared by the user, the Termination Adapter 2 is not needed. (Refer to section 2.3 for details.))

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<sup>\*</sup>For precautions on the Termination Adapter and the Termination Adapter 2, refer to section 6.2.

#### 6.1.2.4 With Both CAN Communication and DO Output

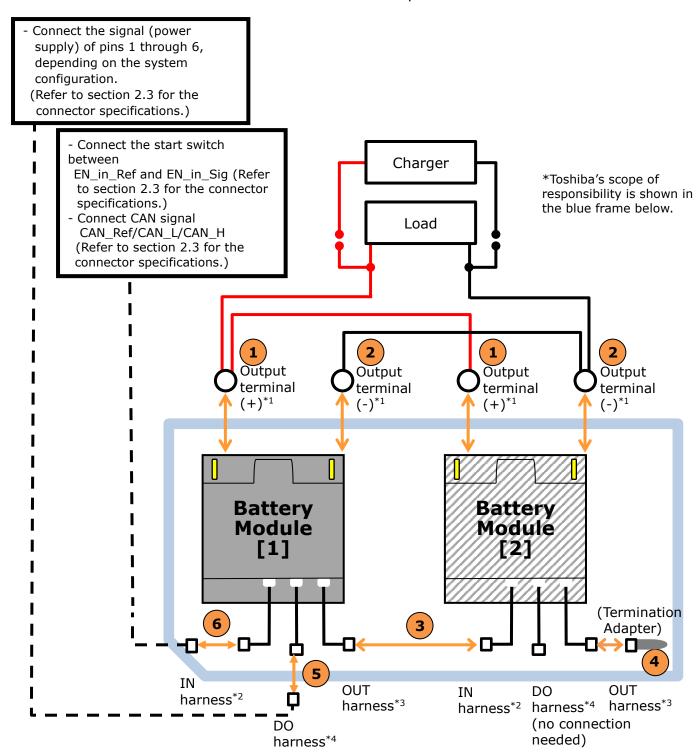


Figure 6-8 Connection Configuration with Both CAN Communication and DO Output

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Table 6-8	$H \cap W + \cap$	Connect t	n the	Terminal	/ Connector

	Item	How to connect	Note
*1	Output terminal (+) Output terminal (-)	Tighten with M6 bolts and nuts the cable with M6 round terminal.	Please prepare cables with round terminal and M6 bolts and nuts of the strength class 4.8 or more. (Tightening torque: 5.0 to 6.8 Nm)
*2	IN harness	Harness with connector	[Battery Module 1] -Please prepare the harness to be connected to the IN harness. (Refer to section 2.3 for the connector specifications.) [Battery Module 2] -Please connect to the OUT harness of the Battery Module 1.
*3	OUT harness	Termination Adapter	-
*4	4 DO harness Harness with connector		Please prepare the harness. Refer to section 2.3 for the connector specifications.

Note: Refer to section 7.5 (3) In case 2 Battery Modules are connected in parallel.

#### Connection Procedures

Please connect each device from 1 to 6 in order as shown in Figure 6-8. Make sure that there is no gap or foreign object stuck on the output terminal, and push

the connector of the signal harness until it clicks to make sure it is fixed firmly.

- Main circuit cable (red):
  - Connect the positive terminals (output terminals (+)) of the Battery Modules to your device (charger / load).
- 2 Main circuit cable (black):
  - Connect the negative terminals (output terminals (-)) of the Battery Modules to your device (charger / load).
- 3 Connect the signal harness between the Battery Modules.
- 4 Connect the Termination Adapter to the OUT harness.
- © Connect the DO harness to the signal harness of your device.
- 6 Connect the IN harness to the signal harness of your device.

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<sup>\*</sup>For precautions on the Termination Adapter, refer to section 6.2.

# 6.2 Precautions on Termination Adapter and Termination Adapter 2



# **CAUTION**

- When handling the Termination Adapter or the Termination Adapter 2, be sure to hold the connector part, not the heat-shrink tubing.
- A resistor is covered under the heat-shrink tubing covers, so do not bend the part or hold it under pressure.
- Do not use the adapter with a tensile force applied to it.
- Do not pull the heat-shrink tubing when fitting the connector. Pulling the heat-shrink tubing may cause the adapter to shrink, the connector to come loose, or the wire to be disconnected.

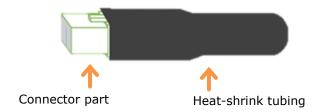


Figure 6-9 Termination Adapter

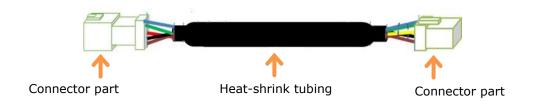


Figure 6-10 Termination Adapter 2

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# 7. How to Use

Provided below is a basic instruction on how to use the hardware of the Battery Module. Make sure that all system devices have been assembled before operating the Battery Module. Be sure to follow the precautions and instructions given in the sections "7.4 Precautions on Use," "7.5 Precautions on Charging," and "7.6 Precautions on Discharging."

# 7.1 Startup and Shutdown

Connect the contact switch (or an equivalent circuit) between "No.4: EN\_in\_Ref" and "No.8: EN in Sig" on the connector terminal of IN harness (Refer to section 2.3).

# 7.1.1 Startup

Output of voltage (for charging and discharging) and of signals is started when the Battery Module starts up by turning the switch to ON (i.e. short-circuiting between No.4:EN\_in\_Ref and No.8: EN\_in\_Sig), unless there are abnormalities in the battery status. The signals are to be outputted approximately 2.4 seconds after the switch is turned on.

#### 7.1.2 Shutdown (Stop)

The Battery Module is shut down either by turning the switch to OFF (i.e. opencircuiting between No.4: EN in Ref and No.8: EN in Sig) or by transmitting the shutdown command via CAN communication. If the Battery Module is stopped by the shutdown command, it is necessary to turn the switch to OFF and then back to ON to activate the Battery Module.

# 7.2 How to Measure Voltage

To check the voltage of the Battery Module, start up the Battery Module (section 7.1.1) and measure the voltage between the output terminals (+) and (-). Note that no voltage is outputted while the Battery Module is shut down.

#### 7.3 Auxiliary Charging

Check the voltage of the Battery Module (refer to section 7.2), and charge the battery as needed.

Auxiliary charging is also needed when the Battery Module is to be used after a long-term storage or transportation. For instructions and precautions on storage, refer to section 7.8.

#### 7.4 Precautions on Use



Please pay attention to the amount of charge of the battery module, and immediately turn the contact switch OFF when not using it. There is a possibility that the battery module becomes overdischarged due to the power consumption of the BMU in the battery module (amount of power consumption: please refer Product Specifications (SPC-COM-E0061) Chapter4) and the power consumption of the equipment, etc.



To prevent BMU—the control device in the module—from malfunctioning, do not use CAUTION mobile phones or PHS within 1 m from the Battery Module in operation.



Take measures against condensation, not just during assembly and storage, but also while the Battery Module is in operation. Condensation may damage the Battery Module and render it inoperative.

Check the Battery Module regularly to make sure that screws and connectors are fixed AUTION firmly and not coming loose.

# 7.5 Precautions on Charging

- (1) Before turning on the system, check the connection status of the connected devices.
- (2) When charging the Battery Module, be sure to follow the instructions below.
  - A warning will notify you of over voltage through DO and CAN communication when either of the cell voltage reaches 2.7 V. Stop charging when you get the warning.
  - Make sure that the charge voltage is 29.7 V or less.
  - Although the Battery Module startup in the state of low SOC (approximately 15.4 V or less; min. cell voltage 1.2 to 1.4V), it outputs power so that the charger can check the battery voltage. The purpose of the function is monitoring the voltage. If charging is not checked until the cell voltage decreases 20mV or more by discharging or current consumption, or 1 min. has elapsed since startup, the Battery Module stops discharging and be shut down. (It is applicable to modules of which Serial No. is started with "G123".)

#### The recommended charging conditions are shown below.

- Charging control: CC/CV control

(Constant-Current / Constant-Voltage control)
Do not use a charger which only has a voltage

control system.

Use of a charger with no current control system will result in overcurrent charging, and fail to charge the Battery Module appropriately.

- Charge voltage: 28.6 V or less (for constant-current charging,

voltage cut charging)

28.6 V (for constant voltage for constant-current

constant-voltage charging)

- Protection on the charger: To prevent overcharge or accidents caused by

charging a broken Battery Module, select a charger which allows the maximum and minimum voltage limits to be set as shown below and stops charging when the limits are

exceeded.

Maximum voltage set limit: 29.7 V or less. Minimum voltage set limit: 13.2 V or more.

Note:

If the battery voltage fails to rise after charging, there may be abnormalities with the battery or the charging path. If this happens, you are

advised to stop the charging.

- Charge current: 125 A (maximum) (within the range where the

cell temperature does not exceed the upper limit)

Emergency stop of charging: You are advised to select a charger that, if

abnormality is detected on the Battery Module during charging, can receive the abnormality

information and stop its output.

Operating ambient temperature: -30 to +45 deg C

- Humidity: 85%RH of lower (with no condensation)

\*If you consider charging conditions other than those described above, please contact us at the contact information provided in section 8.6. "Contact."

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(3) In case 2 Battery Modules are connected in parallel

The Battery Module is equipped with protection function which prevents the flow of excessive electric current in case the voltage difference exceeds 0.3 V between 2 modules connected in parallel (Discharge FET: OFF, Charge FET: ON). Note that, <u>if the voltage difference is 0.3 V or more, the following restrictions are applied until the voltages are equalized.</u>

Voltage signals cannot be outputted.

- The Battery Module can only be charged at a charge current of 25 A or less.

- Of the 2 modules, only the one with the lower voltage can be charged. If the restrictions are applied, be sure to fully charge the Battery Modules in CC/CV-charging conditions shown below.

CC-current: 1 A or more, 25 A or less

CV-voltage: 28.6 V

Figure 7-1 below is the protection flow for 2 Battery Modules connected in parallel. It is necessary to have the voltages equalized as instructed with reference to the precautions above.

(4) Besides the above-mentioned precautions, follow those described in section 7.4 "Precautions on Use."

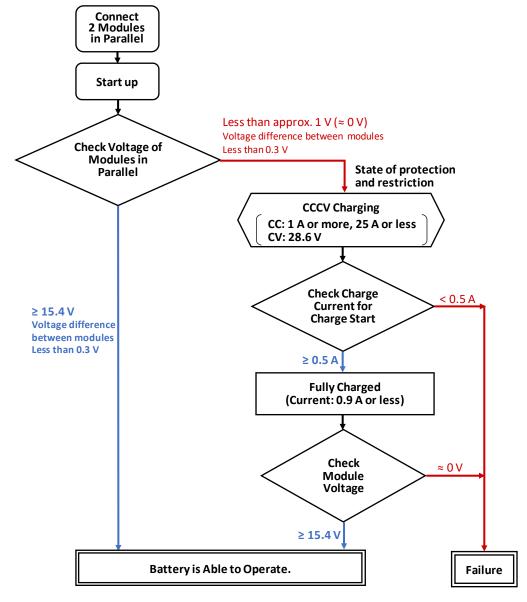


Figure 7-1 Protection Flow for 2 Battery Modules Connected in Parallel

# 7.6 Precautions on Discharging

- (1) Before turning on the system, check the connection status of the connected devices.
- (2) When discharging the Battery Module, please follow the instructions below.
  - A warning will notify you of under voltage through DO and CAN communication when either of the cell voltage drops to 1.5 V. Stop discharging when you get the warning.
  - Make sure that the discharge voltage of the Battery Module does not drop to 16.5 V or less.
  - If the Battery Module is left uncharged after reaching the discharge cut-off voltage (16.5 V), it will reach the under voltage error (refer to 7.7.27.7). Be sure to charge the module within one hour after its reaching the discharge cut-off voltage.

If the Battery Module is left uncharged after reaching under voltage error, it will fall into the state of under voltage permanent error and never be able to be used again. Be sure to charge the module within one week after its reaching under voltage error.

(3) Besides the above-mentioned precautions, follow those described in section 7.4 "Precautions on Use."

#### 7.7 Protection Function of the Battery Module and Troubleshooting

For the safe use of the module, BMU in the Battery Module is equipped with protection function.

The protection function works in accordance with the condition of the Battery Module.

If the Battery Module comes to a stop, wait a while and try re-activating it.

If the Battery Module fails to be re-activated, it may be in the state of "Permanent Error" or "Failure" as defined in the table below.

Table 7-1 Definition of warning, error, permanent error, and failure

Types of Abnormalities	Definition				
Warning	The state leading up to an error				
Error	An abnormal state related to cell voltage / temperature, current, or communication				
Permanent error	A seriously abnormal state related to cell voltage / temperature				
Failure	Malfunction of major components				

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#### 7.7.1 Warning

If the Battery Module reaches the upper or lower limit provided in chapter 2 "Product Specifications," you will be notified of the abnormality via CAN and DO output. If necessary actions are not taken, the Battery Module may likely reach the state described in section 7.7.2 "Error" where the charging/discharging is forced to stop. If you receive the warning, be sure to take actions as shown in "Expected Host System Operation After Judgment" in Table 7-2.

Table 7-2 Warning

			Module (	perat	ion A	After Judg	gment		Expected	
Item	Judgment Condition	Chavas	Discharge	<u> </u>	Com	CAN munication	DO Output		Host System Operation	Cancellation Condition
		Charge FET	FET	Shut down	bit	Output	Terminal	Output	After Judgment	Condition
Over voltage warning	Max. cell voltage in the module is 2.7 V or higher*1	ON	ON	_	b7	Output	No.2	Low	Stop charging. Discharge.	Max. cell voltage in the module is 2.55 V or lower.
-	Min. cell voltage in the module is 1.5 V or lower*1	ON			b6	Output	No.1		Stop discharging. Charge.	
Under voltage warning	Min. cell voltage in the module is 1.9 V or lower*2		N ON	_				Low	Cancel the state that the module is left with startup (SW-off and shutdown)	Min. cell voltage in the module is 2.1 V or higher
Module over temperature warning	Module temperature is 55 degC or higher*1	ON	ON	_	b3	Output	No.3	Low	Stop charging/ discharging.	Module temperature is 50degC or lower
Module under temperature warning	Module temperature is -30 degC or lower*1	ON	ON	_	b2	Output	_	-	Stop charging/ discharging.	Module temperature is -25degC or higher
Circuit over temperature warning	FET or shunt temperature (higher one) is 90 degC or higher	ON	ON	_	b1	Output	No.3	Low	Stop charging/ discharging.	FET or shunt temperature (higher one) is 85 degC or lower
Cell voltage difference warning	(Max. cell voltage) – (Min. cell voltage) in the module is 500 mV or higher.	ON	ON	_	b0	Output	_	_	Stop charging/ discharging.	(Max. cell voltage) – (Min. cell voltage) in the module is 400mV or lower.

<sup>\*1:</sup> The judgment time is 400 to 600 msec. And it takes another 200 msec (typ.) to notify the host system via CAN bus.

- 1) In case of controlling the system via CAN output

  For details on the warning code, refer to CAN Interface Specifications (SPC-COM-E0059, Table 4-2 of PART 1P1S and PART 2P1S). CAN output is to continue until the cancellation condition is fulfilled.
- In case of controlling the system via DO output
   Each DO output is to continue until the cancellation condition is fulfilled. For details on the output transition, refer to section 2.3.3, Table 2-5.

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<sup>\*2:</sup> The judgment time is 300 sec. And it takes another 200 msec (typ.) to notify the host system via CAN bus.

#### 7.7.2 Error

If necessary actions are not taken in the state described in section 7.7.1 "Warning" and the upper or lower limit provided in chapter 2 "Product Specifications" is exceeded, the protection element in the Battery Module comes into operation to stop the charging/discharging. If the Battery Module is shut down in a self-sustained manner, turn the switch to OFF (refer to section 7.1.2), wait a while, and try re-activating it.

Table 7-3 Error

			Module (		Expected Host					
Item	Judgment Condition	Charge	Discharge	Shut	Com	CAN munication	DO Ou	tput	System Operation	Cancellation Condition
	Condition	FET	FET	down	bit	Output	Terminal	Output	After Judgment	
Over voltage error	Max. cell voltage in the module is 2.8 V or higher*1	OFF	ON	_	b7	Output	No.2	Low	Discharge	Max. cell voltage in the module is 2.55 V or lower.
Under voltage	Min. cell voltage in the module is 1.4 V or lower*1	ON -	OFF*2	Shut	b6	Output	No.1	Low	Charge	Min. cell voltage in the
error	Min. cell voltage in the module is 1.9 V or lower*6		OFF	down <sup>*3</sup>	БО	очерис	11011	2011	charge	module is 2.1 V or higher.
Charge over current error	Charge current remains • 125 A or higher for 220 sec • 210 A or higher for 2 sec • 30 A or higher*4	OFF	OFF	Shut down	b5	Output	_	_	_	The module is shut down.
Discharge over current error	Discharge current remains • 125 A or higher for 220 sec • 210 A or higher for 2 sec	OFF	OFF	Shut down	b4	Output	_	_	_	The module is shut down.
Module over temperature error	Module temperature is 66degC or higher*1	OFF	OFF	Shut down	b3	Output	-	-	_	The module is shut down.
Module under temperature error	Module temperature is - 35degC or lower*1	OFF	OFF	Shut down	b2	Output	_	_	_	The module is shut down.
Circuit over temperature error	FET or shunt temperature (higher one) is 95degC or higher*1	OFF	OFF	Shut down	b1	Output	_	_	_	The module is shut down.
Module voltage difference error	Voltage difference between two modules in parallel remains above 0.3 V for 1 sec at startup	OFF*5	OFF	_	b0	Output	_	_	_	The voltage difference is 0.3 V or lower, and the current is less than 30 A.

<sup>\*1:</sup> The judgment time is 400 to 600 msec. And it takes another 200 msec (typ.) to notify the host system via CAN bus.

#### 1) In case of controlling the system via CAN output

For details on the error code, refer to CAN Interface Specifications (SPC-COM-E0059, Table 4-3 of PART 1P1S and PART 2P1S). CAN output is to continue until either the cancellation condition is fulfilled or the Battery Module is shut down in a self-sustained manner.

<sup>\*2:</sup> If under voltage error is detected just after starting, discharge FET is ON. If the state which min. cell voltage has decreasing 20mV lasts for 10 sec or more since the error had confirmed, discharge FET transfers to OFF.

<sup>\*3:</sup> The module is shut down if the module cannot confirm charge current above 1.6 A within 60 sec.

<sup>\*4:</sup> The charge current of 30 A or higher is judged to be a charge over current error in case the two modules in parallel are having a module voltage difference error.

<sup>\*5:</sup> Of the two modules in parallel, only the one with the lower voltage is to have its charge FET turned on and is able to be charged. Refer to section 7.5 for details.

<sup>\*6:</sup> The judgment time is 600 sec. And it takes another 200 msec (typ.) to notify the host system via CAN bus.

#### 2) In case of controlling the system via DO output

In the state of error, the DO output in section 7.7.1 "Warning" is to continue for over voltage and under voltage. Each DO output is to continue until either the cancellation condition is fulfilled or the Battery Module is shut down in a self-sustained manner.

For details on the DO output transition through protection stages, refer to section 2.3.3, Table 2-5.

#### 7.7.3 Permanent Error

If either the protection operation fails to function normally against 7.7.2 Error, or the necessary actions—such as charging the module after it has reached under voltage error—are not taken, the Battery Module enters into a state of permanent error. If this happens, stop using the Battery Module.

Table 7-4 Permanent error

	Judgment Condition		Module	Expected						
Item		61	Discharge FET	Shut down	CAN Communication		DO Output		Host System	Cancellation
		Charge FET			bit	Output	Terminal	Output	Operation After Judgment	Condition
Over voltage permanent error	Max. cell voltage in the module is 3.0 V or higher*1	OFF	OFF	_	b7	Output	No.2	Low	Stop use.	Unable to cancel
Under voltage permanent error	Min. cell voltage in the module is 1.2 V or lower*2	OFF	OFF	_*3	b6	_*4	_	_	Stop use.	Unable to cancel

- \*1: The judgment time is 400 to 600 msec. And it takes another 200 msec (typ.) to notify the host system via CAN bus.
- \*2: The judgment time is 1800 to 2000 msec. And it takes another 200 msec (typ.) to notify the host system via CAN bus.
- \*3: The Battery Module enters into a state of shutdown in 7.7.2 Error (refer to Table 7-3), so no instruction for shutdown is given for permanent error.
- \*4: Although the control inside the battery is set up so that CAN is able to be outputted, CAN is in fact not outputted because the battery is shut down in the state of permanent error.
  - 1) In case of controlling the system via CAN output
    For details on the permanent error code, refer to CAN Interface Specifications
    (SPC-COM-E0059, Table 4-4 of PART 1P1S and PART 2P1S).
  - 2) In case of controlling the system via DO output

In the state of permanent error, the DO output in section 7.7.1 "Warning" is to continue only for over voltage permanent error.

For details on the DO output transition through protection stages, refer to section 2.3.3, Table 2-5.

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#### 7.7.4 Failure

Tables 7-5, 7-6, and 7-7 provide failure modes of the Battery Module. Those failure modes are sent via CAN output. For details on the failure modes, refer to CAN Interface Specifications (SPC-COM-E0059, Tables 4-5, 4-6, and 4-7 of PART 1P1S and PART 2P1S). If you are notified of the Battery Module failure via CAN output, stop the module, remove it from your device, and contact us.

Table 7-5 Failure 1

		Modu	ıle Operati	gment			
Item	Judgment Condition	Charge	Discharge	Shut		CAN nunication	Cancellation Condition
		FET	FET	down	bit	Output	
MPU failure (self diagnosis)	Error related to MPU is detected by the self-diagnosis of module	OFF	OFF	-	b7	*1	The module is shut down.
VTM communication failure	Error related to VTM communication is detected by the self-diagnosis of module	OFF*2	ON	_	b6	Output	The module is shut down.
Module misconnection failure	Error is detected by the module connection which does not match with the number of modules.	OFF	OFF	_	b5	Output	The module is shut down.
Module configuration Failure	Error is detected by the module connection which does not match with the connection type. (Unconnected terminators, etc)	OFF	OFF	_	b4	Output	The module is shut down.

Table 7-6 Failure 2

			Мос	dule Opera	tion Aft	er Ju	dgment		
Iter	n	Judgment Condition	Charge	Discharge	Shut	Com	CAN munication	Cancellation Condition	
			FET FET		down	bit	Output		
VTM failure (temp. monitor	·)	Error related to VTM temperature measurement function is detected by the self-diagnosis of module	OFF*2	ON	_	b7	Output	The module is shut down.	
Current measurement circuit failure		Error related to current sensing circuit is detected by the self-diagnosis of module.	OFF*2	ON	_	b6	Output	The module is shut down.	
EEPROM failure (important area)		Error related to important information stored in EEPROM is detected by the self-diagnosis of module	OFF*2	ON	_	b5	Output	The module is shut down.	
CAN	1 module alone	N/A	ON	ON	_	b4	_	N/A	
Communication failure between modules	Between 2 modules in parallel	Error is detected when the module fails to receive CAN communication or normal data from the other module for 2 seconds.	OFF	ON	Shut down*3	b4	Output	The module is shut down.	
VTM failure (voltage monitor)		Error related to VTM voltage measurement function is detected by the self-diagnosis of module	OFF*2	ON	_	b2	Output	The module is shut down.	
Failure of circuit temperature measurement		Error related to circuit temperature measurement function is detected by the self-diagnosis of module	OFF*2	ON	-	b1	Output	The module is shut down.	
AD conv. failure		Error related to AD conv. is detected by the self-diagnosis of module	OFF*2	ON	_	b0	Output	The module is shut down.	

<sup>\*1:</sup> It depends on where the failure takes place.

<sup>\*2:</sup> Charge FET is forced OFF 1 minute after the failure notification is sent via CAN. However, if any of the conditions below is satisfied, Charge FET is forced OFF immediately.

<sup>-</sup> Charge current of 15 A or more continues to flow for 2 sec.

<sup>-</sup> The integrated value of the charge current has increased by 0.1 Ah or more after the failure occurrence.

<sup>-</sup> Current measurement circuit failure and cell voltage measurement failure are detected at the same time.

<sup>\*3:</sup> The Battery Module is shut down if the failure continues for 30 min. or more.

Table 7-7 Failure 3

		Modu	ule Operati				
Item	Judgment Condition	Charge	Discharge	Shut	Com	CAN munication	Cancellation Condition
		FET	FET	down	bit	Output	
VTM failure (except for voltage and temp. monitor)	Error related to VTM function except for voltage and temp. monitor is detected by the self-diagnosis of module.	ON	ON	-	b6	Output	The module is shut down.
EEPROM failure (normal area)	Error unrelated to important data stored in EEPROM is detected by the self-diagnosis of module.	ON	ON	_	b4	Output	The module is shut down.

# 7.8 Storage

- 1) After discharging is over, charge the Battery Module up to approximately 40% SOC (OCV: 24.30 V/module), and store it at the recommended ambient temperature of +35 deg C or less where the module is not subject to direct sunlight.
  - If the Battery Module is to be separated and stored individually, be sure to charge the module up to approximately 40% SOC (OCV: 24.30 V/module) before removing the module from the device.
- 2) If the Battery Module is not to be used either for storage or transportation be sure to shut it down (i.e. turn off the switch that is connected to the IN harness). If the Battery Module is left in an activated state, the power consumption of BMU may cause the module to be overdischarged, and render it inoperative.
- 3) Self-discharge will decrease SOC of the Battery Module even while the module is not in operation. Be sure to charge the Battery Module up to approximately 40% SOC (OCV: 24.30V/module) at least once a year.
- 4) To ensure safety and to protect the Battery Module during storage. be sure to provide insulation protection for the output terminals (+) and (-) with insulating tape.
- 5) Take measures against condensation, not just during storage, but also when the Battery Module is assembled or moved from the storage location. Condensation may damage the Battery Module and render it inoperative.

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# 7.9 Abnormality

In case an abnormality occurs while the Battery Module is in operation, stop the charging/discharging immediately and interrupt the circuit of the charging/discharging system.

- Be sure to take insulation measures against electric shocks before checking on the wiring on the current path. The wiring on the Battery Module side may remain live even after the circuit of the charging/discharging system is interrupted.
- When the Battery Module becomes overcharged, the cells may be heated and cause the valves to open to give off abnormal odor. If abnormal odor is confirmed, do not touch the system or the Battery Module.

#### <Unable to Charge>

- Follow the instructions in section 6.1 Connection Configuration of the Battery Module and check if the Battery Module is securely connected to the system device to which the Battery Module is installed.
- If the Battery Module fails to be charged despite being securely connected to the system device, contact us at the contact information provided in section 8.6 "Contact."

<The Device Where the Battery Module is Installed Does Not Operate>

- See chapter 6. Connection Configuration of the Battery Module, and make sure that the Battery Module is connected correctly.
  - An incorrectly connected signal harness can prevent the Battery Module from activating.
- Make sure that the start switch you installed is turned on. (Refer to section 2.3 Signal Harness and chapter 6. Connection Configuration of the Battery Module.)
- Auxiliary charging is required before the Battery Module is used for the first time. (Refer to section 7.3.)
- Check the voltage between the output terminals and make sure that the voltage is outputted.
- The Battery Module is equipped with protection function which prevents the flow of excessive electric current in case the voltage difference exceeds 0.3 V between 2 modules connected in parallel. Note that, if the voltage difference is 0.3 V or more, restrictions are applied until the voltages are equalized. (Refer to section 7.5 for details.)

If the restrictions are applied, be sure to fully charge the Battery Modules in CC/CV-charging conditions shown below.

CC-current: 1 A or more, 25 A or less

CV-voltage: 28.6 V

- If the device fails to operate even after the above-mentioned actions have been taken, the blowout of the protection fuse (not replaceable by the user) or some fault on the Battery Module is possible. Contact us at the contact provided in section 8.6 "Contact."
- In case you have some other problems where the Battery Module is found inoperative, contact us at the contact information provided in section 8.6 "Contact."

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# 8. Others

# 8.1 Disposal of the Battery Module

- (1) Disposal of the Battery Module or its accessory parts must be outsourced to a specialized waste disposal company. For details, contact us at the contact information provided in section 8.6 "Contact."
- (2) To prevent the battery from being overheated from short-circuits, it is recommended that the Battery Module should be completely discharged, and its terminal parts protected with insulating tape, before disposal.
- (3) With regard to the disposal of the device where the Battery Module is installed, restrictions are imposed by relevant laws, ministerial ordinances, and/or regulations of each region and country. Be sure to abide by those laws. The Battery Module also needs to be installed in such a manner that it can easily be removed from the device.
- (4) The laws, ministerial ordinances, and/or regulations of each region and country make it obligatory to register and contract with a specialized waste disposal company, and to provide designated symbol marks concerning disposal. Be sure to check and abide by the relevant laws and display requirements.
- (5) EU Battery Directive Information for users



This product indicates "crossed out wheeled dust bin symbol" on the label in accordance with Battery Directive (2006/66/EC). As this product is categorized to industrial battery, the directive demands the End user to dispose of waste industry batteries separately from municipal wastes in the collection and recycling schemes which are provided by each EU Member State to prohibit incineration and/ or landfill of waste batteries posing negative effects on the environment and human health and to contribute to resource efficiency.

#### 8.2 Transportation of the Battery Module

The Battery Module is to be delivered in a special packing box for land transportation. In case the Battery Module is to be transported as an individual module via air or sea,

In case the Battery Module is to be transported as an individual module via air or seplease contact us at the contact information provided at the end of this document.

#### (Reference)

This battery is among the lithium ion batteries categorized as dangerous goods under Class 9 of "The UN Recommendations on the Transport of Dangerous Goods" (hereinafter "UN Recommendations"), and is subject to transport restrictions.

Accordingly, the transportation of the Battery Module, such as air and sea transportation, requires the packing in accordance with the UN Recommendations No.3480, with the exception of land transportation within Japan.

For transportation, the packing should meet the Packing group II performance requirements specified by the UN Recommendations.

In the case of air transportation, the total mass of the package (including the Battery Module) needs to be 35 kg or less (NET) and at 30% SOC or less for cargo aircraft only.

# 8.3 Transportation of the Battery Module Incorporated in Device

The UN Recommendation also applies to the transportation of device in which the Battery Module is incorporated. The transportation method differs depending on the application type. Be sure to transport the Battery Module in the method that complies with the relevant laws and regulations of each country.

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# 8.4 Main Raw Materials of the Battery Module

Table 8-1 Main raw materials of resin used for the Battery Module

Item	Component
Enclosure etc.	Polycarbonate
PCB (BMU)	EP (epoxy resin)

Table 8-2 Main raw materials of packing material

Item	Component
Packing box	Corrugated cardboard
Buffer material	Expanded polyethylene

#### 8.5 After-Sales Service

The Battery Module comes with a limited warranty applicable for one (1) year from the date of shipment.

In case of abnormalities, contact us at the contact information provided in section 8.6.

#### 8.6 Contact

For the inquiry about the product, please contact to the distributer of the product.

<Contact of manufacturer>
Toshiba Corporation, Battery Div.

72-34, Horikawa-cho, Saiwai-ku Kawasaki-shi, Kanagawa 212-8585, Japan https://www.webcom.toshiba.co.jp/scib/en/contact.php

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February 28<sup>th</sup>, 2017: New issue April 15<sup>th</sup>, 2021: Ninth edition

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