

TECHNICAL BULLETIN

[ 1 / 12 ]

FA-A-0222-C

## Precautions for Transport Recommendations on Lithium Batteries

■Date of Issue

June 2017 (Ver.C: May 2019)

■Relevant Models

MELSEC-A/QnA/Q/L/QS series and MELSEC iQ-R series programmable controllers

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Thank you for your continued support of Mitsubishi Electric programmable controllers, MELSEC-A/QnA/Q/L/QS series and MELSEC iQ-R series.

Transport recommendations on lithium batteries (hereinafter UN Recommendations) have been revised and effective as of January 1, 2009. Accordingly, the corresponding part of the IATA Dangerous Goods Regulations has been changed from the 44th Edition to the 50th Edition.

This technical bulletin summarizes how to transport lithium batteries in compliance with the UN Recommendations by air, based on the 50th Edition of the IATA Dangerous Goods Regulations. The regulations in the IATA Dangerous Goods Regulations are reviewed and changed every year. A customer who transports lithium batteries is responsible for the package. Please check the latest Edition of the IATA Dangerous Goods Regulations and the UN Recommendations whenever transporting lithium batteries.

In the UN Recommendations, lithium batteries are classified into dangerous goods (Class 9) and non-dangerous goods according to the amount of lithium. Packaging methods of the batteries depend on the classification.

The 59th Edition of the IATA Dangerous Goods Regulations was issued on January 1, 2018, and there are some changes on the regulations. For details, refer to the IATA Dangerous Goods Regulations 59th Edition.

Note that the descriptions in this bulletin provide information as of May 2019.

## 1 CHANGE ON LITHIUM BATTERIES

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### January 2018

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In the revision as of January 1, 2018, requirements for packaging of lithium metal batteries board passenger aircraft were added.

☞ Page 5 TRANSPORT GUIDELINES

### January 2017

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In the revision as of January 1, 2017, design of the label which is required on the packages to be shipped by air has changed.

☞ Page 10 Class 9 hazard label

☞ Page 11 Warning notice

### January 2015

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Lithium metal batteries have been forbidden for transport aboard passenger aircraft since January 1, 2015.\*1\*2

\*1 Lithium metal batteries transported as cargo are restricted to Cargo Aircraft Only. The change does not apply to lithium metal batteries transported by sea.

\*2 The change does not apply to lithium metal batteries packed with equipment or contained in equipment.

#### Point

If lithium batteries will be transported to, from, or through the United States by air, the batteries must comply with the regulations of the United States as well as the UN Recommendations. For air transport regulations on primary lithium batteries in the United States, refer to the following technical bulletin.

📖 Regulation on transportation of primary lithium batteries and relevant guidelines in the United States (FA-A-0221)

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### January 2009

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In the revision as of January, 2009, the regulations on transport of non-dangerous goods have been changed.

The regulations on transport of dangerous goods have not been changed.

The following are the changes in the 50th Edition from the 44th Edition.

(1) A declaration for non-dangerous goods must be attached to a product for each shipment. The format depends on a carrier. Contact the carrier for the documentation.

(2) When only lithium batteries are packed or lithium batteries are packed with equipment, a drop test report must be submitted upon request from a carrier. A drop test must be performed by the shipper with referring to the following.

☞ Page 11 Packaging certification

(3) A label showing a shipper's contact must be affixed. Prepare the label referring to the following section. For details, contact the carrier.

☞ Page 11 Non-dangerous Goods Regulations

(4) When a product is overpacked (including when multiple packages are packed in one), the package must be marked with the word "OVERPACK" and affixed with a handling label. For details, refer to the following.

☞ Page 11 Non-dangerous Goods Regulations

(5) When only lithium batteries are packed or lithium batteries are packed with equipment, the package is subject to the UN Recommendations independent of the number of batteries. (In the 44th Edition, the package is not controlled if the included number of batteries is within the allowable number.) Also, when lithium batteries are contained in equipment and packed, the package is subject to the UN Recommendations if the contained number of batteries are more than the allowable number. (In the 44th Edition, the package is not controlled independent of the number of batteries.)

## 2 MODELS SUBJECT TO THE UN RECOMMENDATIONS

The following table lists the models subject to the UN Recommendations among products for programmable controllers, MELSEC-A/QnA/Q/L/QS series and MELSEC iQ-R series.

For the batteries of the programmable controllers used, refer to the manuals for each product.

Check the transport guidelines with referring to this table. (☞ Page 5 TRANSPORT GUIDELINES)

Product	Model	Packaging status	Battery type	Classification in transport
Q series battery	Q8BAT	Lithium batteries only	Lithium metal battery (battery)	Dangerous goods
	Q8BAT-SET			
Q/L series, MELSEC iQ-R series battery	Q7BATN		Lithium metal battery (cell)	
	Q7BAT			
	Q7BATN-SET			
	Q7BAT-SET			
A/QnA series battery	A10BAT		Lithium metal battery (battery)	
A/QnA series battery	A8BAT			
Q/L/QS series, MELSEC iQ-R series battery	Q6BAT		Lithium metal battery (cell)	
A/QnA series battery	A6BAT			
K series battery	K6BAT			
MELSEC iQ-R series battery	FX3U-32BL			
Q series memory card battery	Q2MEM-BAT, Q3MEM-BAT			
AnS/QnA(S) series gateway set	Q6KT-NETGW-SS, Q6KT-NETGW-RS, Q6KT-NETGW-TS, Q6KT-NETGW-TB	Lithium batteries contained in equipment	Lithium metal battery (A6BAT)	Non-dangerous goods
Q series CPU module	All models		Lithium metal battery (Q6BAT)	
L series CPU module	All models			
QS series CPU module	All models			
MELSEC iQ-R series CPU module (Programmable controller CPU, Process CPU, SIL2 Process CPU, Safety CPU)	All models (other than R00CPU, R01CPU, and R02CPU)			
Q series C Controller module	All models			
MELSEC iQ-R series C Controller module	R12CCPU-V		Lithium metal battery (cell)	
BOX Data Logger	NZ2DL		Lithium metal battery (Q6BAT)	
Q series network module	QJ71WS96, QJ71WS96-MES, QJ71MES96			
Q series memory card	Q2MEM-1MBSN, Q2MEM-1MBS, Q2MEM-2MBSN, Q2MEM-2MBS		Lithium batteries packed with equipment	
	Q3MEM-4MBS, Q3MEM-8MBS	Lithium metal battery (Q3MEM-BAT)		
	Q3MEM-4MBS-SET, Q3MEM-8MBS-SET			
QnA(S) series memory card	Q1MEM-128S, Q1MEM-128SE, Q1MEM-1MS, Q1MEM-1MSE, Q1MEM-256S, Q1MEM-256SE, Q1MEM-2MS, Q1MEM-512S, Q1MEM-512SE, Q1MEM-64S, Q1MEM-64SE	Lithium metal battery (cell)		
Q series MELSECWinCPU module	Q10WCPU-W1-E, Q10WCPU-W1-CFE	Lithium batteries contained in equipment		

FA-A-0222-C

The packaging status is defined as follows:

Packaging status	Description
Lithium batteries only	Only lithium batteries are packed.
Lithium batteries packed with equipment	Lithium batteries and equipment are separated in the same package. (Example: The Q2MEM-BAT and Q2MEM-1MBS are separated in the same package.)
Lithium batteries contained in equipment	Lithium batteries are contained in equipment and packed. (Example: The Q6BAT is mounted on the R04CPU and packed.)

### 3 EFFECTIVE DATES OF THE UN RECOMMENDATIONS

The following table lists the dates when the UN Recommendations are taken effect in each transport.

Transport	UN Recommendations (as of January, 2009)	Start of enforcement
Air transport (ICAO* <sup>1</sup> /IATA* <sup>2</sup> )	Controlled	January 1, 2003 (44th Edition) January 1, 2009 (50th Edition)
Sea transport (IMDG Code* <sup>3</sup> )	Controlled	January 1, 2004 (44th Edition)
Land transport (domestic)	Not controlled	Not determined
Land transport (international)	Depends on regulations of each country.	Depends on regulations of each country. United States: October 1, 2004 Europe: July 1, 2003

\*1 ICAO: International Civil Aviation Organization

\*2 IATA: International Air Transport Association

\*3 IMDG Code: International Maritime Dangerous Goods Code specified by IMO (International Maritime Organization)

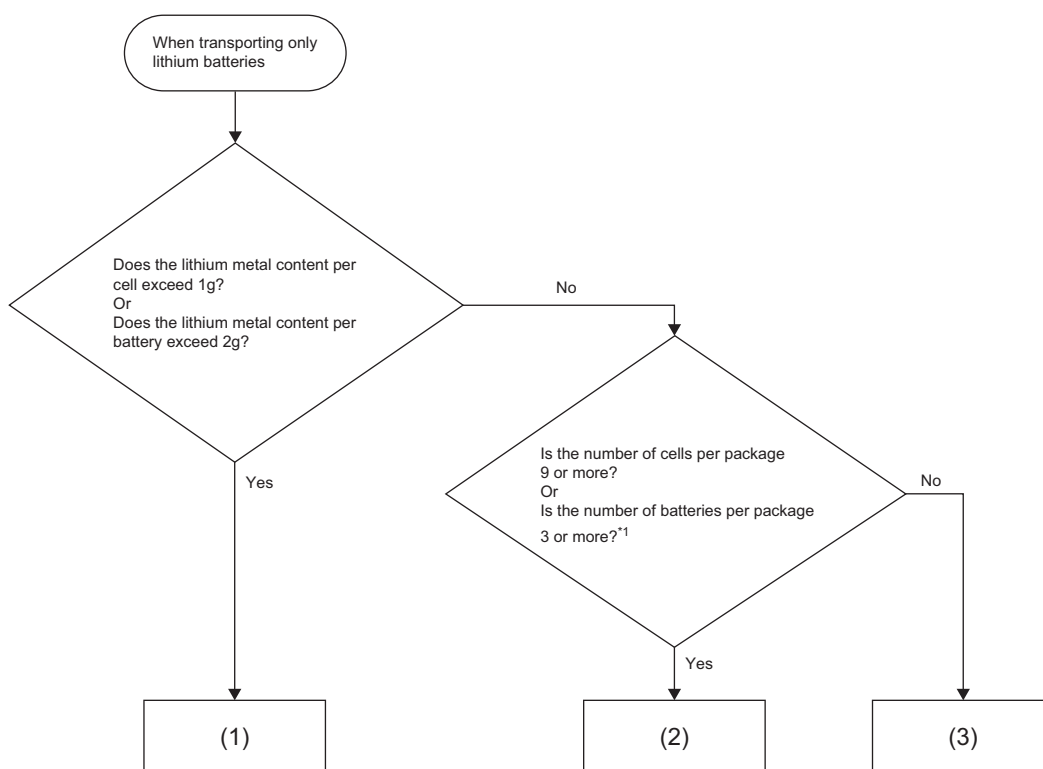
## 4 TRANSPORT GUIDELINES

When a customer transports the programmable controller (MELSEC-A/QnA/Q/L/QS series and MELSEC iQ-R series) product by means of transport subject to the UN Recommendations shown below, pay attention to descriptions in this chapter. Note that the packaging guidelines differ between dangerous goods and non-dangerous goods.

📄 Page 4 EFFECTIVE DATES OF THE UN RECOMMENDATIONS

### 4.1 When Only Lithium Metal Batteries are Packed

Use the following flowchart to take the necessary actions when transporting only lithium metal batteries.



\*1 When a cell or battery contains the lithium metal of 0.3g or less, select "No" regardless of the number of lithium batteries.

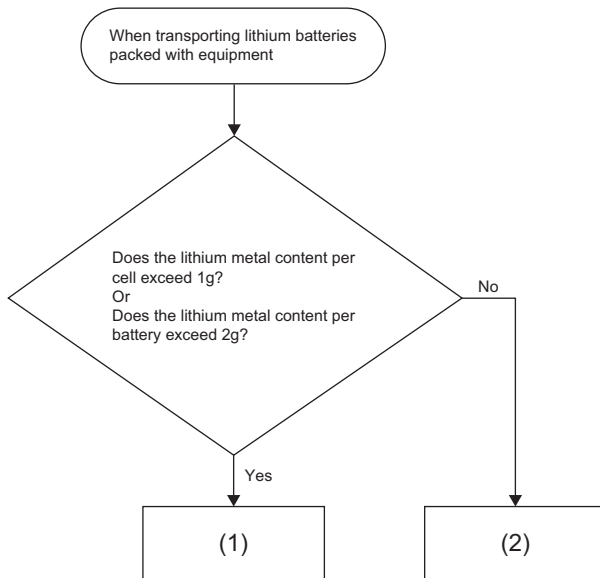
Item	(1)	(2)	(3)
Packaging requirements	Section IA	Section IB	Section II
Restrictions	Net weight of lithium batteries per package <ul style="list-style-type: none"> <li>• Passenger aircraft: Transport prohibited</li> <li>• Cargo aircraft: 35kg</li> </ul>	Net weight of lithium batteries per package <ul style="list-style-type: none"> <li>• Passenger aircraft: Transport prohibited</li> <li>• Cargo aircraft: 2.5kg</li> </ul>	<ul style="list-style-type: none"> <li>• Passenger aircraft: Transport prohibited</li> <li>• Up to one package per air way bill or HAWB</li> <li>• Lithium batteries must be carried into the aircraft separately from non-dangerous goods.</li> </ul> Lithium batteries containing the following amounts of lithium metal cannot be packed in the same package. <ul style="list-style-type: none"> <li>■ Cell or battery of 0.3g or less               <ul style="list-style-type: none"> <li>• Number of cells and batteries per package: No restriction</li> <li>• Net weight of cells and batteries per package: 2.5kg</li> </ul> </li> <li>■ Cell of more than 0.3g and 1g or less               <ul style="list-style-type: none"> <li>• Net weight of cells per package: 8 or less</li> <li>• Net weight of cells per package: No restriction</li> </ul> </li> <li>■ Battery of more than 0.3g and 2g or less               <ul style="list-style-type: none"> <li>• Net weight of batteries per package: 2 or less</li> <li>• Net weight of batteries per package: No restriction</li> </ul> </li> </ul>
Dangerous goods declaration	Required	Required	Not required

FA-A-0222-C

Item	(1)	(2)	(3)
Air way bill (AWB)	Text of "Dangerous goods as per attached shipper's declaration" or "Dangerous goods as per attached DGD" and "Cargo Aircraft Only" or "CAO"	Text of "Dangerous goods as per attached shipper's declaration" or "Dangerous goods as per attached DGD" and "Cargo Aircraft Only" or "CAO"	Text of "Lithium metal batteries in compliance with Section II of PI968" and "Cargo Aircraft Only" or "CAO"
Labeling and marking	<ol style="list-style-type: none"> <li>Class 9 label for lithium batteries and CAO handling label</li> <li>Mark as dangerous goods according to the requirements of DGR Chapter 7</li> </ol>	<ol style="list-style-type: none"> <li>Class 9 label for lithium batteries, CAO handling label, and lithium battery mark</li> <li>Mark as dangerous goods according to the requirements of DGR Chapter 7</li> </ol>	<ol style="list-style-type: none"> <li>CAO handling label and lithium battery mark</li> <li>Mark as required according to the PI968 Section II (for overpack)</li> </ol>
UN-approved container	Must be a UN-approved container that meets the requirements of packing group II	Not required (However, the container must have passed the 1.2m drop test.)	Not required (However, the container must have passed the 1.2m drop test.)
Packed with different dangerous goods	Do not pack a lithium battery in the same outer package with dangerous goods classified in Class 1 other than Division 1.4S (explosives), Division 2.1 (flammable gas), Class 3 (flammable liquid), Division 4.1 (flammable solid) or Division 5.1 (oxidizing substances).	Do not pack a lithium battery in the same outer package with dangerous goods classified in Class 1 other than Division 1.4S (explosives), Division 2.1 (flammable gas), Class 3 (flammable liquid), Division 4.1 (flammable solid) or Division 5.1 (oxidizing substances).	Do not pack a lithium battery in the same outer package with other dangerous goods.
Overpack	Do not place a lithium battery in the same overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S (explosives), Division 2.1 (flammable gas), Class 3 (flammable liquid), Division 4.1 (flammable solid) or Division 5.1 (oxidizing substances).	Do not place a lithium battery in the same overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S (explosives), Division 2.1 (flammable gas), Class 3 (flammable liquid), Division 4.1 (flammable solid) or Division 5.1 (oxidizing substances).	<ul style="list-style-type: none"> <li>Up to one package per overpack</li> <li>Do not place a lithium battery in the same overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S (explosives), Division 2.1 (flammable gas), Class 3 (flammable liquid), Division 4.1 (flammable solid) or Division 5.1 (oxidizing substances).</li> </ul>
Shipper-loaded ULD	Not allowed	Not allowed	Not allowed

## 4.2 When Lithium Metal Batteries are Packed with Equipment

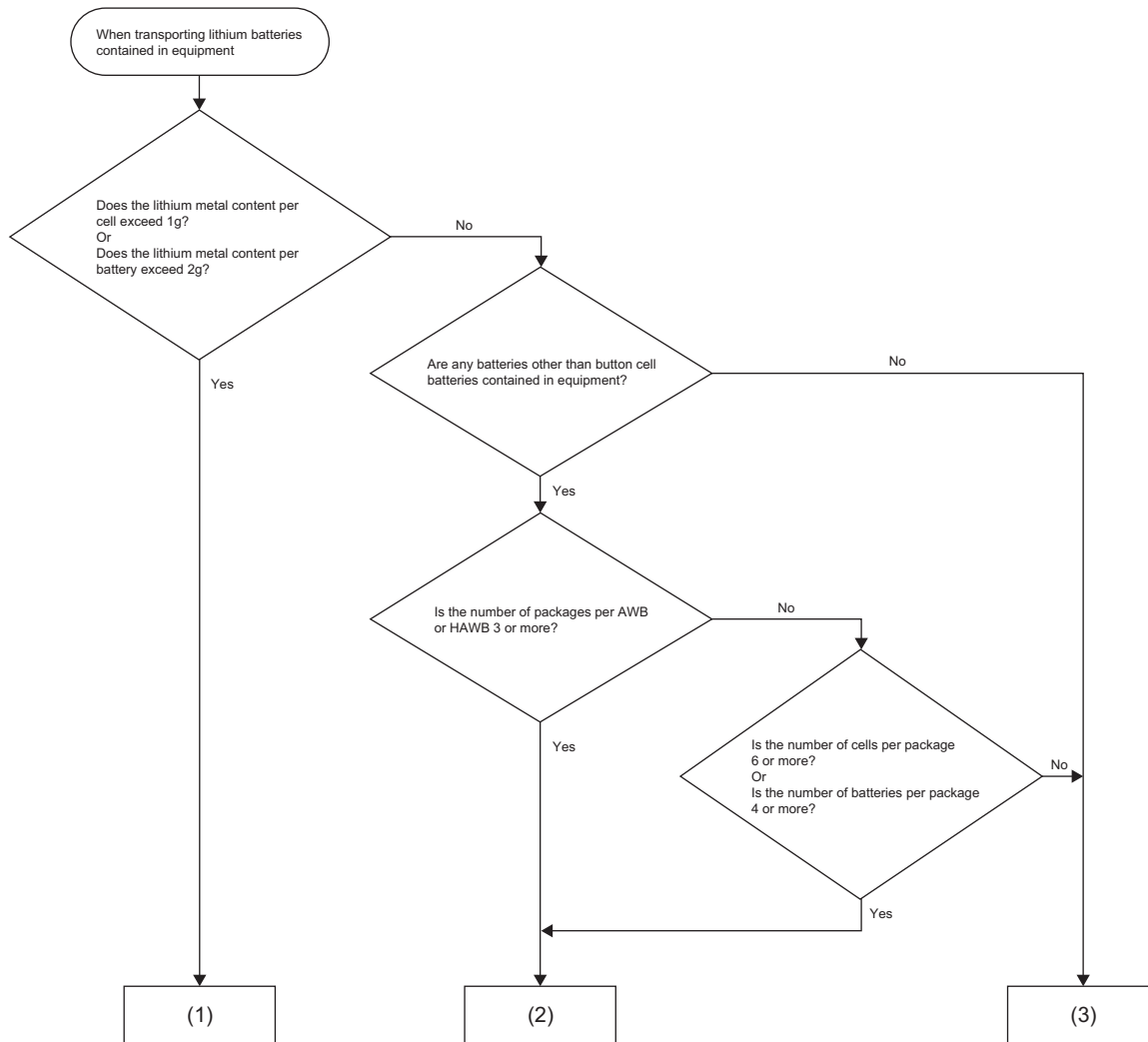
Use the following flowchart to take the necessary actions when transporting lithium metal batteries packed with equipment.



Item	(1)	(2)
Packaging requirements	Section I	Section II
Restrictions	The number of lithium batteries per package is the proper number of lithium batteries for operating equipment and up to two spare lithium batteries. Also take into account the net weight of lithium batteries per package. <ul style="list-style-type: none"> <li>• Passenger aircraft: 5kg</li> <li>• Cargo aircraft: 35kg</li> </ul>	The number of lithium batteries per package is the proper number of lithium batteries for operating equipment and up to two spare lithium batteries. Also take into account the net weight of lithium batteries per package. <ul style="list-style-type: none"> <li>• Passenger aircraft: 5kg</li> <li>• Cargo aircraft: 5kg</li> </ul>
Dangerous goods declaration	Required	Not required
Air way bill (AWB)	Text of "Dangerous goods as per attached shipper's declaration" or "Dangerous goods as per attached DGD"	Text of "Lithium metal batteries in compliance with Section II of PI969"
Labeling and marking	<ol style="list-style-type: none"> <li>1. Class 9 label for lithium batteries</li> <li>2. Mark as dangerous goods according to the requirements of DGR Chapter 7</li> </ol>	<ol style="list-style-type: none"> <li>1. Lithium battery mark</li> <li>2. Mark as required according to the PI969 Section II (for overpack)</li> </ol>
UN-approved container	The container in which lithium batteries are packed must be a UN-approved container that meets the requirements of packing group II. (In addition, when transporting aboard passenger aircraft, non-flammable and non-conductivity cushioning materials and metal intermediate or outer container must be used.)	Not required (However, the container in which lithium batteries are packed must have passed the 1.2m drop test.)
Shipper-loaded ULD	Not allowed	Allowed (A lithium battery mark is also required on the outside of the ULD.)

### 4.3 When Lithium Metal Batteries are Contained in Equipment

Use the following flowchart to take the necessary actions when transporting lithium metal batteries contained in equipment.



Item	(1)	(2)	(3)
Packaging requirements	Section I	Section II	Section II
Restrictions	Lithium metal content per lithium battery <ul style="list-style-type: none"> <li>• Cell: 12g or less</li> <li>• Battery: 500g or less</li> </ul> Also take into account the net weight of lithium batteries per package. <ul style="list-style-type: none"> <li>• Passenger aircraft: 5kg</li> <li>• Cargo aircraft: 35kg</li> </ul>	Net weight of lithium batteries per package <ul style="list-style-type: none"> <li>• Passenger aircraft: 5kg</li> <li>• Cargo aircraft: 5kg</li> </ul>	Net weight of lithium batteries per package <ul style="list-style-type: none"> <li>• Passenger aircraft: 5kg</li> <li>• Cargo aircraft: 5kg</li> </ul>
Dangerous goods declaration	Required	Not required	Not required
Air way bill (AWB)	Text of "Dangerous goods as per attached shipper's declaration" or "Dangerous goods as per attached DGD"	Text of "Lithium metal batteries in compliance with Section II of PI970"	Not required Do not describe the text of Section II on the AWB.
Labeling and marking	1. Lithium battery mark 2. Mark as required according to the chapter 7 of DGR (for overpack)	1. Lithium battery mark 2. Mark as required according to the PI970 Section II (for overpack)	Not required
UN-approved container	Not required	Not required	Not required
Shipper-loaded ULD	Not allowed	Allowed (A lithium battery mark is also required on the outside of the ULD.)	Allowed



## 5 REGULATION OVERVIEW

### 5.1 Dangerous Goods Regulations

This section describes regulations on dangerous goods.

For details, refer to the IATA Dangerous Goods Regulations.

#### Packaging specifications

The specifications must comply with the Packing Instructions 968, 969, and 970 in the 50th Edition of the IATA Dangerous Goods Regulations.

Depending on the packaging status, how to handle lithium metal batteries as dangerous goods differs. For details, refer to the following.

Lithium batteries only (Packaging standard: Section IA, Section IB)

☞ Page 5 When Only Lithium Metal Batteries are Packed

Lithium batteries packed with equipment (Packaging standard: Section I)

☞ Page 7 When Lithium Metal Batteries are Packed with Equipment

Lithium batteries contained in equipment (Packaging standard: Section I)

☞ Page 8 When Lithium Metal Batteries are Contained in Equipment

#### Packaging certification

The packaging certification (UN3090, UN3091) must be obtained from the authority. For details on a test for the certification, contact the authority.

However, the certification is not required when a UN-approved container is purchased from a manufacturer.

Packaging when lithium batteries are contained in equipment depends on a carrier.

For details, contact the carrier.

#### Warning notice

The UN mark and UN container marking must be described and affixed and the Class 9 hazard label must be affixed on the outer packaging.

Packaging when lithium batteries are contained in equipment depends on a carrier.

For details, contact the carrier.

#### ■ UN mark

This mark is granted by the authority.



#### ■ UN container marking

Describe the following information on the UN container marking.

- "Lithium battery" in the PROPER SHIPPING NAME field
- "UN3090" for transportation of lithium batteries only or "UN3091" for transportation of lithium batteries packed with or contained in equipment in the UN NO. field
- The name and address of the shipper and consignee in the SHIPPER and CONSIGNEE fields, respectively

FA-A-0222-C

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**■ Class 9 hazard label**

For how to obtain this label, contact the authority.



Minimum dimensions: 100mm high, 100mm wide

**Transport document**

The Shipper's Declaration for Dangerous Goods must be attached to a package for each shipment.

For details, contact the carrier.

**Battery safety test**

All transported lithium batteries must pass the safety test specified by the UN. The lithium batteries for programmable controller products listed in the following page have passed the safety test. No actions need to be taken by a customer.

📄 Page 3 MODELS SUBJECT TO THE UN RECOMMENDATIONS

## 5.2 Non-dangerous Goods Regulations

This section describes regulations on non-dangerous goods.

For details, refer to the IATA Dangerous Goods Regulations.

### Packaging specifications

Except lithium batteries contained in equipment, lithium batteries and equipment must be individually separated in an inner packaging and they must be packed with strong outer packaging so that the batteries can be protected against external short circuit.

Depending on the packaging status, how to handle lithium metal batteries as dangerous goods differs. For details, refer to the following.

Lithium batteries only (Packaging standard: Section II)

☞ Page 5 When Only Lithium Metal Batteries are Packed

Lithium batteries packed with equipment (Packaging standard: Section II)

☞ Page 7 When Lithium Metal Batteries are Packed with Equipment

Lithium batteries contained in equipment (Packaging standard: Section II)

☞ Page 8 When Lithium Metal Batteries are Contained in Equipment

### Packaging certification

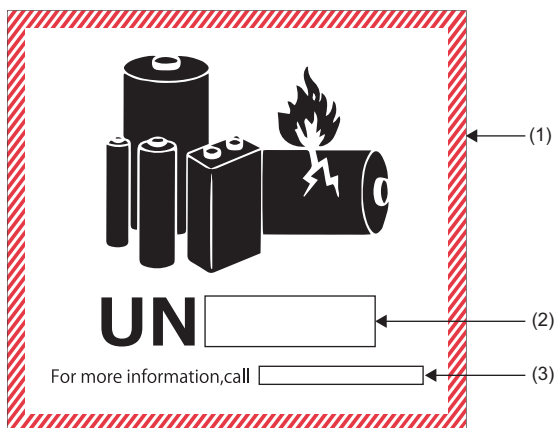
Except lithium batteries contained in equipment, each package must be capable of withstanding a 1.2m drop test in any orientation (self-certification is allowed.) without:

- Damages to lithium batteries contained therein;
- Shifting of the contents so as to allow battery to battery contact;
- Release of contents.

Upon a request from a carrier, a drop test report must be submitted. When only lithium batteries are packed or lithium batteries are packed with equipment, a drop test must be performed to the package and the drop test report must be created. For details, contact the carrier.

### Warning notice

Affix the below shown handling label specified in the 50th Edition of the IATA Dangerous Goods Regulations on the surface of each outer packaging. (Describe a sender's phone number available for 24 hours.) The label must be affixed on outer packaging of each package that passed a drop test (including individual packaging boxes shipped by us) and to outer packaging after overpack. If individual packaging box is too small to affix the label on, affix the label on the outer packaging only.



(1) The hatching must be red and the minimum width must be 5mm.

(2) Describe the UN number on the label.

- Lithium batteries only: UN3090
- Lithium batteries packed with equipment: UN3091
- Lithium batteries contained in equipment: UN3091

Note: When one or more packages are placed into an overpack, all the applicable numbers must be described.

(3) Describe a sender's phone number available for 24 hours.

Minimum dimensions: 110mm high, 120mm wide

For details, contact the carrier.

When lithium batteries are contained in equipment and the number of lithium batteries (cell) in one package is less than five, the warning notice and the transport document are not required.

**Transport document**

A declaration for non-dangerous goods must be attached to a package for each shipment with the following information.

- Inclusion of lithium batteries in the package
- Corrective actions when the package is impacted

Format of the document depends on a carrier.

For details, contact the carrier.

When lithium batteries are contained in equipment and the number of lithium batteries (cell) in one package is less than five, the warning notice and the transport document are not required.


**Battery safety test**

All transported lithium batteries must pass the safety test specified by the UN. The lithium batteries for programmable controller products listed in the following page have passed the safety test. No actions need to be taken by a customer.

 Page 3 MODELS SUBJECT TO THE UN RECOMMENDATIONS

**Overpack**

When a package including lithium batteries is overpacked with outer packaging (including when multiple packages are packed in one), the package will be regarded as an overpack and must be marked with the word "OVERPACK" on the outer packaging. (The marking is also required for a package that includes lithium batteries and equipment individually in an inner packaging and not subject to the UN Recommendations.)

When a package subject to the UN recommendations is overpacked, affix the handling label on the outer packaging. ( Page 11 Warning notice)

**REVISIONS**

Version	Date of Issue	Revision
-	June 2017	First edition
A	November 2017	Addition of FX3U-32BL
B	August 2018	Available for e-Manual Viewer
C	May 2019	Change of the classification in transport for Q6BAT, A6BAT, and K6BAT Addition of Q7BATN, Q7BATN-SET, Q2MEM-1MBSN, and Q2MEM-2MBSN Correction of Chapter 4 and 5