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Liefervorschrift / Specification

Firma / Company	**FRIWO Gerätebau GmbH**
Gerätetyp / Type:	FB4S1P18650-28
Artikelnr. / Part-No.:	5500099
Zeichnungsnr. / Drawing-No.:	50.0010.300-00
Datum / Date:	25.04.2016
Sachbearbeiter Verkauf / Contact Sales:	Frederick Balzer
Sachbearbeiter Mechanik / Contact Mech. Eng.:	Martin Schmidt
Sachbearbeiter Elektronik / Contact Elec. Eng.:	KSTDE
Freigabe App. / Approved App.	PRFFR
Freigabe / Approved	KSTAL

Wir bitten Sie, ein Exemplar mit Freigabevermerk an uns zurückzusenden. Sollten Sie dieser Spezifikation nicht unverzüglich widersprechen, gilt die Zustimmung und Fertigungsfreigabe auf Grundlage dieser Spezifikation als erteilt.

We may ask you to return one signed copy of the specification for our records as having your approval. Unless you do not enter your objection to the latest specification issue without delay, your acceptance and release for production on the basis of this specification is deemed to be given.

Kundenfreigabe / Customer Release:

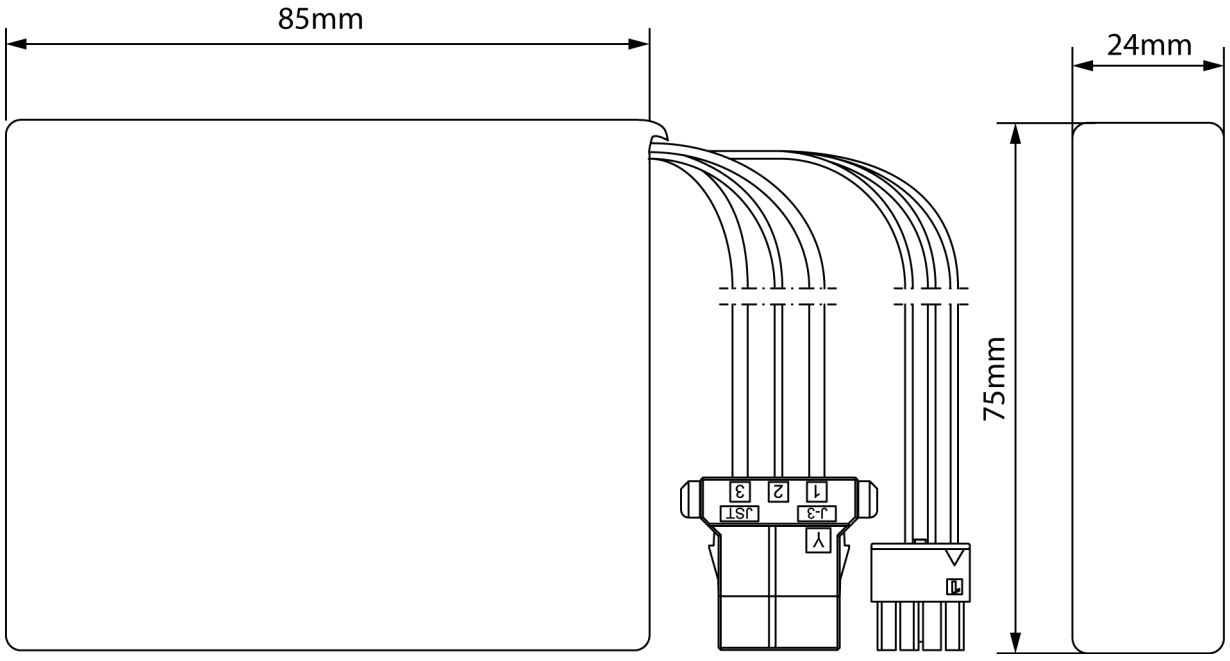
Datum / Date:

Unterschrift / Signature:

Index / Rev.	Datum / Date	Name	Einzelheit / Detail
ⓒ	2017/9/6	Schmidt	Dimension of the battery pack changed.
ⓓ	2018/10/31	Schmidt	Changed the housing colour to black.
ⓔ	2019/9/25	Schmidt	At pos.2.1 & 3.1 tracebility label added.
ⓕ	2020/4/20	Schmidt	Position 1, connector description added. Safety details updated ...
ⓖ	2020/11/6	Schmidt	Dimension changed from 110mm to 85mm.

1 Gehäuse / Housing:

Gehäusetyp / housing type:	Schrumpfschlauch / Shrinking tube
Material:	PVC
Farbe / Colour:	Schwarz / Black
Polarität / Polarity	
Stecker / Connector:	JST F31FSS-03V-KY
Power:	
Pin 1	Black (-)
Pin 2	Yellow (NTC)
Pin 3	Red (+)
Stecker / Connector:	TE Micro Mate-L-Lock 1445022-4
Communication:	
Pin 1	Grey (SMBGND)
Pin 2	White (SMBC)
Pin 3	Green (SMBD)
Pin 4	n.c.



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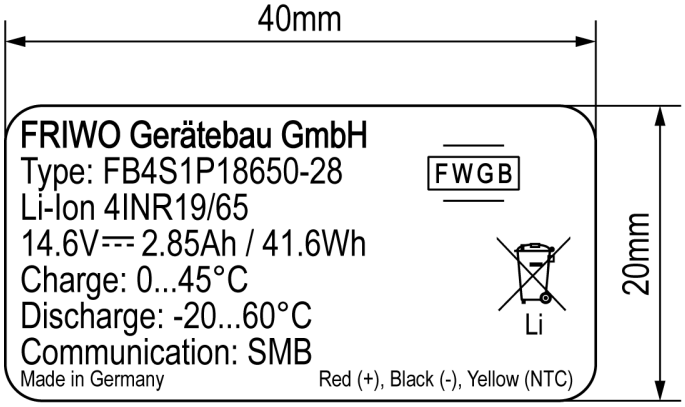
2 Gehäuseaufschriften / Housing labelling:

2.1 Batterie Beschriftung / Battery labelling

M2:1



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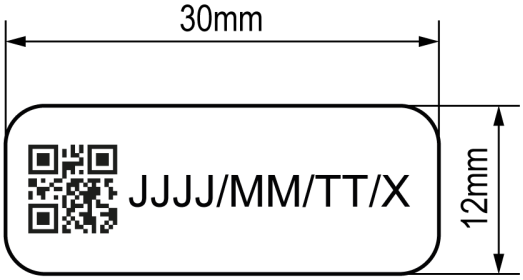

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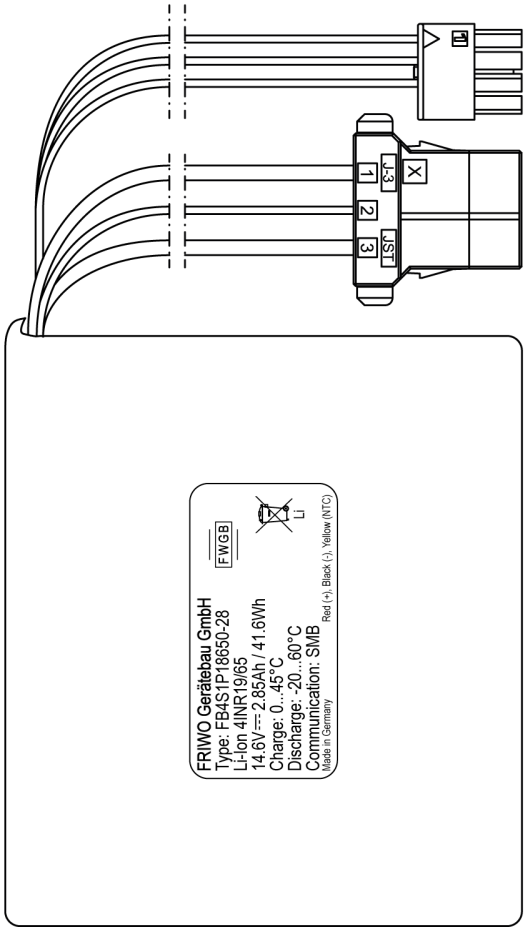

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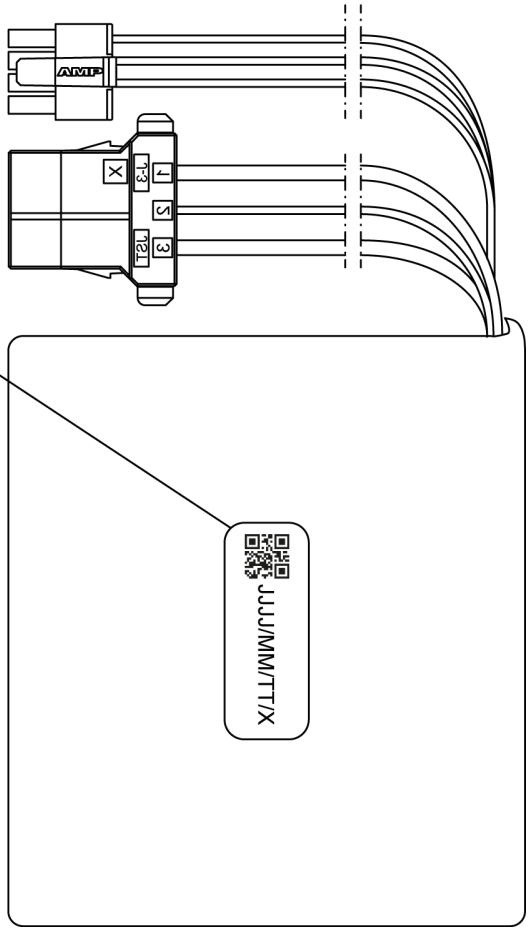


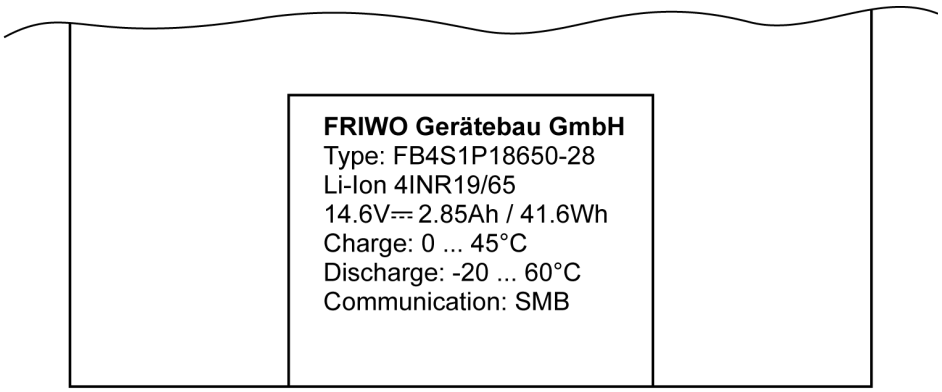
Label printing
acc. to 15.2528.056-06

3 Verpackung / Packaging

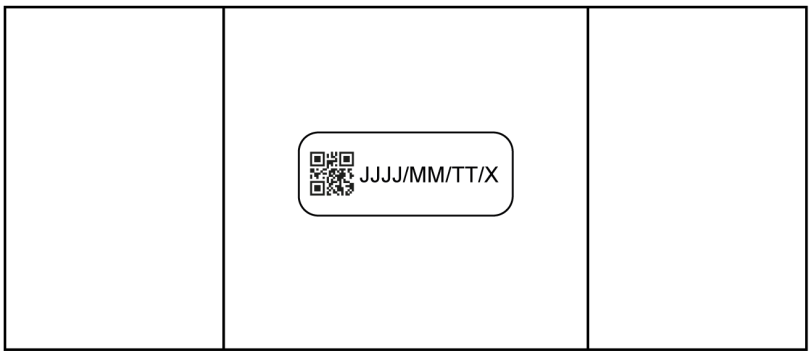
3.1 Einzelverpackung / Individual packaging:

Faltschachtel / Folding box:	15.3565.556-01
Aufkleber / Label:	(50mm x 100mm)
Aufkleber / Label:	(30mm x 12mm)
Warnaufkleber / Caution label:	(40mm x 60mm)

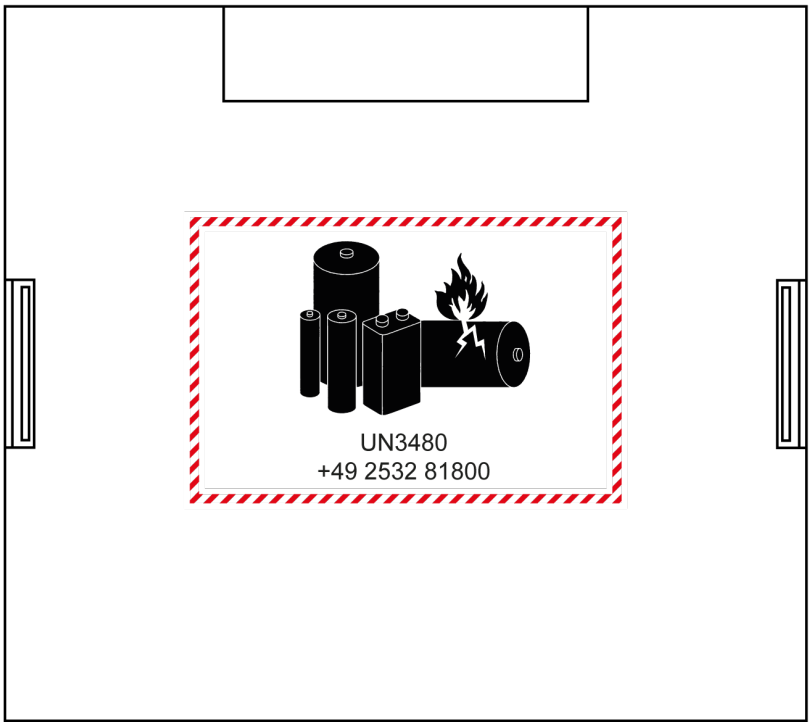
Top view



Front view
Label printing
acc. to 15.2528.056-06

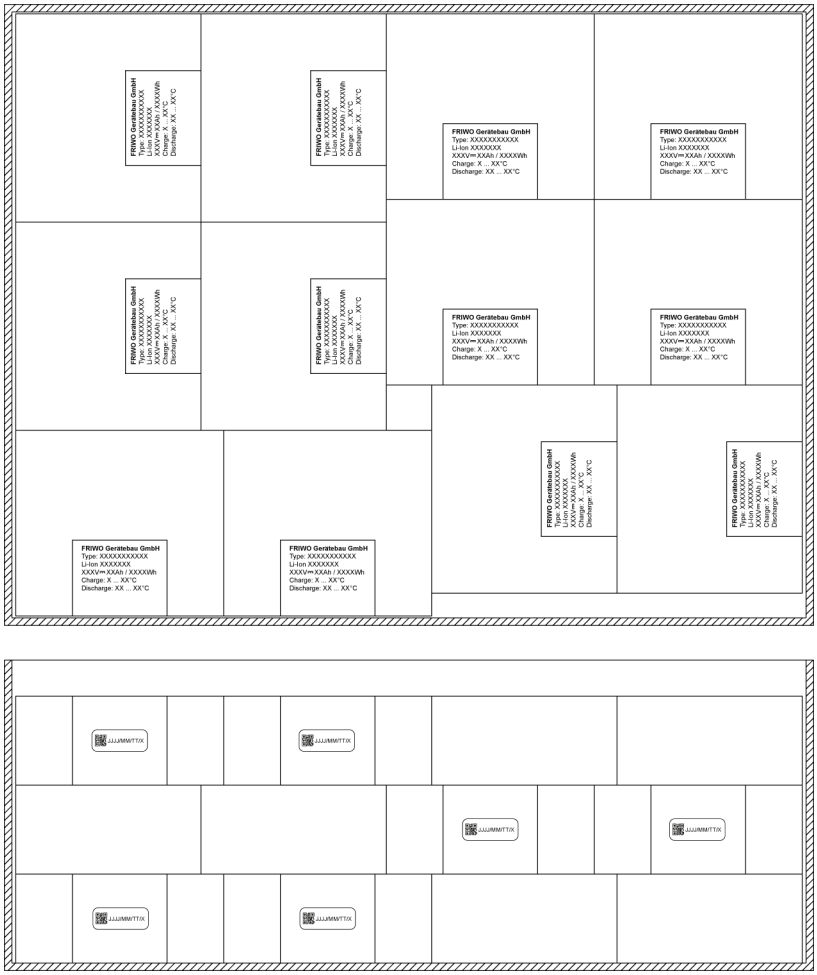


Bottom view



3.2 Sammelverpackung / bulk packaging: 5000193

3.2.1 Aussenabmessungen / Outer dimensions: 420mm x 327mm x 174mm



3.3 Anzahl der Geräte pro Umkarton / amount of units per master carton: 36

3.4 Gewicht pro Stück / weight per unit: 219 g

3.5 Lagertemperatur / storage temperature:

1Jahr / 1 Year: -20°C - +25°C
3 Monate / 3 Month: -20°C - +45°C
1 Monat / 1 Month: -20°C - +60°C
If the cell is kept 50% of charge, the capacity recovery rate is more than 80%

3.6 Transport Klassifizierung / Transport classification

UN Class	Class 9
UN number	UN3480, Lithium Ion Battery
Energie des Batteriepacks / Energy of battery	<100Wh

The following caution label should be placed on bluk packaging and overpackage.

4 Allgemeine Prüfbedingungen / General test conditions

Wenn keine anderen Umgebungsbedingungen angegeben sind, beziehen sich die elektrischen Daten auf eine Temperatur von 25 ±5°C und eine Luftfeuchtigkeit von 65 ±20%.

Unless otherwise specified, all electrical data are tested at temperature of 25 ±5°C and humidity of 65 ±20%.

5 Elektrische Prüfbedingungen / electrical tests

5.1 Battery pack

Zellen / cells	Samsung INR18650-29E
Konfiguration / configuration	4S1P
IEC62133 Bezeichnung /designation	4INR19/65
Nennspannung / nominal voltage	14.6V
Nennkapazität / nominal capacity	2850mAh (0.2C, 2.5V discharge)
Minimale Kapazität / Minmal capacity	2650mAh (2.0C, 3.0V discharge)
Nennenergie / nominal energy	41.6Wh
Ladespannung / charging voltage	16.8V
Lademodus / charging method	CC-CV (constant voltage with current limit)
Ladestrom / charging current	1375mA
Max. Ladestrom / Max. charge	2750mA
Min. Ladestrom / Min. charge	140mA
Maximaler kont. Entladestrom / Max. cont. discharge current	2750mA
Maximaler Entladestrom / Max. discharge current	8250mA (time limited)
Entladesschlussspannung / Discharge cut off voltage	12V
Anfänglicher Innenwiderstand / Initial internal impedance	≤200mOhm
Arbeitstemperatur / Operation temperature	Charge: 0 to 45°C Discharge: -20 to 60°C

Attention: Please ensure cell temperature not rising above specified Limits!

5.2 Protection circuit

Überladeschutz Abschaltspannung / Overcharge protection voltage	4.25V ±0.025V (cell)
Überladeschutz Freigabespannung / Overcharge recovery voltage	4.10V ±0.05V (cell)
Überladeschutz Verzugszeit / over charge protection delay time	1sec
Tiefentladeschutz Spannung / over discharge protection voltage	2.5V ±0.05V (cell)
Tiefentladeschutz Freigabespannung / over discharge recovery voltage	3.0V ±0.1V (cell)
Tiefentladeschutz Verzugszeit / over discharge protection delay time	100ms
Maximaler Entladestrom / Maximum discharge current	8A
Überstromerkennung / over current protection current	8A
Kurzschlusserkennungzeit / short protection delay time	500µs
Stromaufnahme statisch / static selfconsumption current	< 75µA

5.3 Temperature sensor

Wert / Value	10kOhm ±5%
B-Wert / B-value	3988k ±1%
Position / Position	between cells

5.4 Communication

Communication BUS	System managment Bus V1.1 (SMBUS)
Controller	BQ40Z50-R1
PIN 1 / Grey	Vss
PIN 2 / White	SBMC
PIN 3 / Green	SMBD

6 Sicherheitsanleitung / Safety details:

6.1 Aufbau nach folgenden Normen / Construction according

Standard	Version	Description
ROHS directive (Protection circuit)	2011/65/EU	Remove of Hazardous Substances
WEEE directive	2012/19/EU	Waste Electrical and Electronic Equipment
Battery directive	2006/66/EC	Directive on batteries and accumulators and waste batteries and accumators and repealing Directive 91/157/EEC
EN62133-2 1st Ed.	2017-11	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
UL2054	2004-11	Household and commercial batteries

6.2 Zulassungen / Approvals

Standard	Description
UL 1642 (Cells)	Standard for Lithium Batteries
IEC 62133-2 1st Ed.: 2017 (Cells)	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety require¬ments for portable sealed secondary cells, and for batteries made from them, for use in portable applications
UN38.3 / IEC62281 : 2012 (2nd edition) (Pack)	Safety of primary and secondary lithium cells and batteries during transport
IEC62133-2 1st Ed.: 2017 (Pack)	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety require¬ments for portable sealed secondary cells, and for batteries made from them, for use in portable applications

6.3 Warnungen / Precautions
(Source: IEC62133 Edidtion 2.0 2012-12)
Recommendations to equipment manufacturer
a) Do not dismantle, open or shred cells. Batteries should be dismantled only by trained personnel. Multi-cell
battery cases should be designed so that they can be opened only with the aid of a tool.
b) Do not short-circuit a cell or battery. Do not store cells or batteries haphazardly in a box or drawer where
they may short-circuit each other or be short-circuited by conductive materials.
c) Do not remove a cell or battery from its original packaging until required for use.
d) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
e) Do not subject cells or batteries to mechanical shock.
f) In the event of a cell leaking, do not allow the liquid to come into contact with the skin or eyes. If contact has
been made, wash the affected area with copious amounts of water and seek medical advice.
g) Equipment should be designed to prohibit the incorrect insertion of cells or batteries and should have clear
polarity marks. Always observe the polarity marks on the cell, battery and equipment and ensure correct use.
h) Do not mix cells of different manufacture, capacity, size or type within a battery.
i) Seek medical advice immediately if a cell or battery has been swallowed.
j) Consult the cell/battery manufacturer on the maximum number of cells, which may be assembled in a battery
and on the safest way in which cells may be connected.
k) A dedicated charger should be provided for each equipment. Complete charging instructions should be
provided for all secondary cells and batteries offered for sale.
l) Keep cells and batteries clean and dry.
m) Wipe the cell or battery terminals with a clean dry cloth if they become dirty.
n) Secondary cells and batteries need to be charged before use. Always refer to the cell or battery manufacturer’s instructions and use the correct charging procedure.
o) Do not maintain secondary cells and batteries on charge when not in use.
p) After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several
times to obtain maximum performance.
q) Retain the original cell and battery literature for future reference.
r) When disposing of secondary cells or batteries, keep cells or batteries of different electrochemical systems
separate from each other.
s) Drop a device containing the battery once from a height of one meter onto a concrete floor. Test three sets
of fully charged batteries. For dropping, select the direction in which the free fall is likely to have the greatest
impact on the safety of the battery. Instead of dropping a host device, a shock equivalent to dropping may be
given to the battery for simulation.

Recommendations to the end-users
a) Do not dismantle, open or shred secondary cells or batteries.
b) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
c) Do not short-circuit a cell or a battery. Do not store cells or batteries haphazardly in a box or drawer where
they may short-circuit each other or be short-circuited by other metal objects.
d) Do not remove a cell or battery from its original packaging until required for use.
e) Do not subject cells or batteries to mechanical shock.
f) In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has
been made, wash the affected area with copious amounts of water and seek medical advice.
g) Do not use any charger other than that specifically provided for use with the equipment.
h) Observe the plus (+) and minus (–) marks on the cell, battery and equipment and ensure correct use.
i) Do not use any cell or battery which is not designed for use with the equipment.
j) Do not mix cells of different manufacture, capacity, size or type within a device.
k) Battery usage by children should be supervised.
l) Seek medical advice immediately if a cell or a battery has been swallowed.
m) Always purchase the battery recommended by the device manufacturer for the equipment.
n) Keep cells and batteries clean and dry.
o) Wipe the cell or battery terminals with a clean dry cloth if they become dirty.
p) Secondary cells and batteries need to be charged before use. Always use the correct charger and refer to
the manufacturer’s instructions or equipment manual for proper charging instructions.
q) Do not leave a battery on prolonged charge when not in use.
r) After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several
times to obtain maximum performance.
s) Retain the original product literature for future reference.
t) Use only the cell or battery in the application for which it was intended.
u) When possible, remove the battery from the equipment when not in use.
v) Dispose of properly.

7 Entsorgung / Disposal

Wir weisen darauf hin, dass diese Batterien (Akku-Packs) im entladenen Zustand bei den Rücknahmestellen
abgegeben werden sollen bzw. das Vorsorge gegen Kurzschlüsse getroffen werden muss (z.B. durch das
Isolieren der Pole mit Klebestreifen)

We advise you that the battery packs have to be discharged before returning to the collection points or it must
be taken care against short circuits (eg by isolating the poles with tape).