CELL POWER

powered by intercel

MORE THAN BATTERIES

Technical manual for

Cellpower CLF Cyclic Lithium Batteries

Version 1.01a

Safety

Working Safely with Cellpower CLF Series Batteries

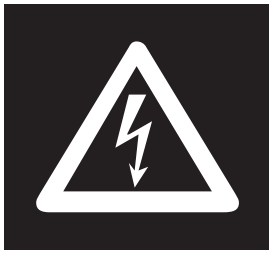
As with all information in this manual, the following safety precautions and warnings must always be observed. Failure to follow these guidelines may result in damage or injury, for which Cellpower Batteries does not accept responsibility.

Each CLF battery housing features several warning symbols. Before installation and use, it is important to familiarise yourself with their meanings and follow the corresponding safety recommendations. These symbols must never be removed or obscured. An explanation of each symbol can be found below.

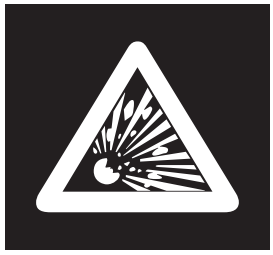
Please read the manual before use

Wear Eye protection

Smoking, open flames and sparks prohibited



Beware of high voltage



Beware of explosive gasses

Important points of attention

There are a number of points of attention that you should take note of. These are listed below per topic. For more information on the relevant topics, please refer to the corresponding sections.

General points of attention

- ! Never disassemble, compress, or penetrate the battery pack.
- ! Never install or use a damaged battery pack.

Points of attention regarding battery specifications (Section 2)

- ! One must stay within the described technical specifications at all times. Exceeding this limit may lead to potentially dangerous situations and may cause damage that is not covered by the warranty, or injury for which Cellpower does not consider itself responsible.

Points of attention regarding the Battery Management System (BMS; Section 3)

- ! If the BMS has to intervene regularly, it is recommended to carry out preventive checks on the entire installation for irregularities.
- ! The BMS is at all times a technical aid, not a warranty. It helps the battery life and performance, but only within reasonably acceptable limits.

❗ Even a correctly functioning BMS cannot prevent (collateral) damage to the battery or application at all times. Cellpower therefore offers no guarantee in this regard.

Points of attention regarding the installation of the battery (Section 4)

❗ It is best never to place the battery in an environment colder than -20°C or warmer than 60°C.

❗ Do not place the battery pack in an environment with a constant humidity of 80% or higher.

❗ Cellpower CLF batteries can only be connected in parallel with each other; never in series.

❗ Always use only the supplied bolts for connection to the battery terminals. These bolts are mounted in the terminal inserts of your battery.

❗ Make sure that when removing or mounting the bolts, no electrical conducting connection is made between the two battery terminals.

Points of attention regarding the use of the battery (Section 5)

❗ Do not use a battery charger other than that prescribed by Cellpower.

❗ If a battery charger is used that is not prescribed by Cellpower, the warranty on the CLF battery may be voided entirely.

❗ Stop the charging process immediately if the battery pack or charger becomes too hot.

❗ Charge the battery to at least 80% of its capacity at least once a year

Points of attention regarding storage, transport and disposal of the battery (Section 6)

For storage

❗ Completely disconnect the battery from the application and other externally connected items, even if they are a charger.

❗ Store the battery pack in a cool (ideally 20°C) and well-ventilated location; never in direct sunlight or a location where there is otherwise regular exposure to UV radiation.

❗ Store the battery pack in a location where the battery terminals cannot make contact. For safety reasons, it is best to cover them with insulating tape or the originally supplied battery terminal caps.

❗ Charge the battery to at least 80% of its capacity before storage.

❗ Check the voltage of the stored battery at least once every 100 days and, if necessary, recharge it to at least 80% of its capacity.

For transport

❗ Never transport a damaged Lithium battery.

For disposal

❗ Familiarise yourself with the locally applicable laws and regulations regarding the disposal of Lithium batteries and follow them at all times.

In addition to the above points of attention, the warranty conditions and (delivery) conditions apply at all times. These can be found at www.intercel.eu

Technical manual for the Cellpower CLF Cyclic Lithium Batteries

Dear Customer,

Congratulations on choosing a Cellpower CLF Lithium battery. The CLF Lithium series offers unprecedented cyclic performance.

In order to keep your battery fun for as long as possible, Cellpower has carefully drawn up this technical manual. Here you can find all the information you need to install, use and maintain your Cellpower CLF battery. By carefully reading the information in this manual, you can ensure that the CLF battery continues to perform at its maximum performance for as long as possible.

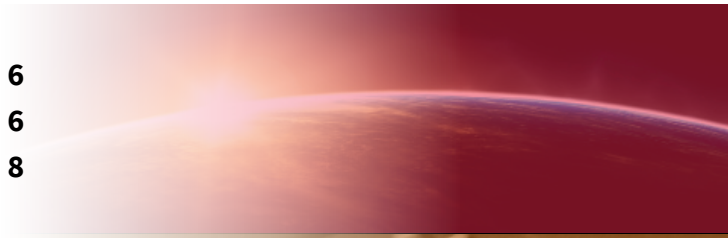
This manual is intended for both the installer and the user of the CLF Lithium battery. Servicing of the CLF battery should only be carried out by a qualified service technician.

More information or additional documentation can be found on www.intercel.eu, or by contacting the European Cellpower distributor:

Intercel B.V.
Tel: +31 (0) 23 514 99 00
Email: sales@intercel.eu
Web: www.intercel.eu

Cellpower batteries
Email: sales@cellpower.nl
Web: www.cellpowerbatteries.com

Index








1. Introduction

1.1 Product description

The Cellpower CLF Lithium Iron Phosphate (LiFePO4) series makes lithium technology more accessible. With the ability to achieve up to three times more cycles than AGM batteries, Cellpower CLF batteries offer a significantly longer lifespan and greater resistance to short intermediate charges. At the same time, they are more than half as compact and lighter, making them an efficient and practical energy solution.

Designed for demanding applications, the Cellpower CLF series delivers powerful cyclic performance over extended periods without significant capacity loss. Extensive testing under the most challenging conditions has proven its durability and reliability. With high-temperature resistance and a solid housing, a Cellpower CLF battery continues to perform where other batteries would have failed.

1.2 Long lasting quality

Cellpower CLF battery series batteries have been subjected to a series of challenging and demanding tests in order to offer the best and most reliable quality. For more information, see section '**1.2.2 Product certifications**'.

1.2.1 The 6 durable qualities of the Cellpower CLF series

1. Robustly built battery cells
The individual cells of CLF batteries are manufactured with the highest quality materials and with wide safety margins. This ensures safe and reliable operation of the battery even under the most challenging conditions.

2. Battery pack insulated with epoxy resin board
To prevent internal short circuits, the internal battery pack is insulated with an epoxy resin board. This protective layer prevents internal damage, even in cases of unexpected heavy usage or external impact.

3. Active protection by BMS
The built-in Battery Management System (BMS) actively monitors battery parameters and performance, automatically optimising the condition of the Cellpower CLF battery. If the battery is subjected to severe misuse, the BMS can disconnect it temporarily to prevent permanent damage.

4. Passive protection by fuse
In addition to active BMS protection, Cellpower CLF batteries feature an additional layer of safety through a built-in passive fuse. This not only enhances safety but also prevents damage to the BMS. Additionally the 24V pins of the data communication port are equipped with an automatic resetting fuse. In case of a short circuit or other event, disconnect your wiring harness from the port, wait 30 seconds, inspect your wiring and then reconnect. The fuse will restore power to the installed data monitors and modules.

5. UN38.3 and IEC62133:2017 certified
To endorse the durable and solid qualities of the Cellpower CLF batteries, all 24V CLF batteries have been UN38.3 and IEC62133:2017 tested and certified by TÜV. CLF batteries not only promise long-lasting quality, but also deliver it.

6. Anti Corrosion Coated Steel (ACCS) housing
Cellpower CLF batteries are designed for long-term reliability, both in performance and construction. The housing is made of solid yet lightweight Anti Corrosion Coated Steel (ACCS), providing durability and resistance to external impacts. This robust design ensures that Cellpower CLF batteries can withstand demanding conditions while maintaining optimal functionality.

1.2.2 Product certifications

Thanks to the successful completion of a diverse series of tests and inspections carried out by TÜV, all 24V batteries from the Cellpower CLF series have UN38.3, IEC61000 and IEC62133:2017 certifications. To this end, the following test procedures have been carried out.

1.2.2a UN38.3 Test procedures

Test	Description	Passed?
Altitude simulation	Simulation of unpressurised aircraft	✓
Thermal shock	Resistance to temperatures ranging from -40°C to 72°C	✓
Vibration	Simulation of vibrations during transport	✓
Shock	Simulation of impacts and drops during transportation	✓
External short circuit	Simulation of an external short to the terminals of the battery	✓
Impact	Mass of 9.1kg dropped on the cell from height of 61cm	✓
Overcharge	Battery charged with double the recommended charge voltage and current	✓
Forced discharge	Simulation of misconnected charger and cells installed in reverse	✓
Final result		✓

1.2.2b IEC62133:2017 Test procedures

Test	Unit tested		Passed?
	Individual cell	Battery	
Continuous charge	✓	N/A*	✓
Case stress	N/A*	✓	✓
External short circuit	✓	✓	✓
Free fall	✓	✓	✓
Thermal abuse	✓	N/A*	✓
Crush	✓	N/A*	✓
Overcharge	N/A*	✓	✓
Forced discharge	✓	N/A*	✓
Mechanical tests	✓	N/A*	✓
Forced internal short	N/A*	✓	✓
Final result			✓

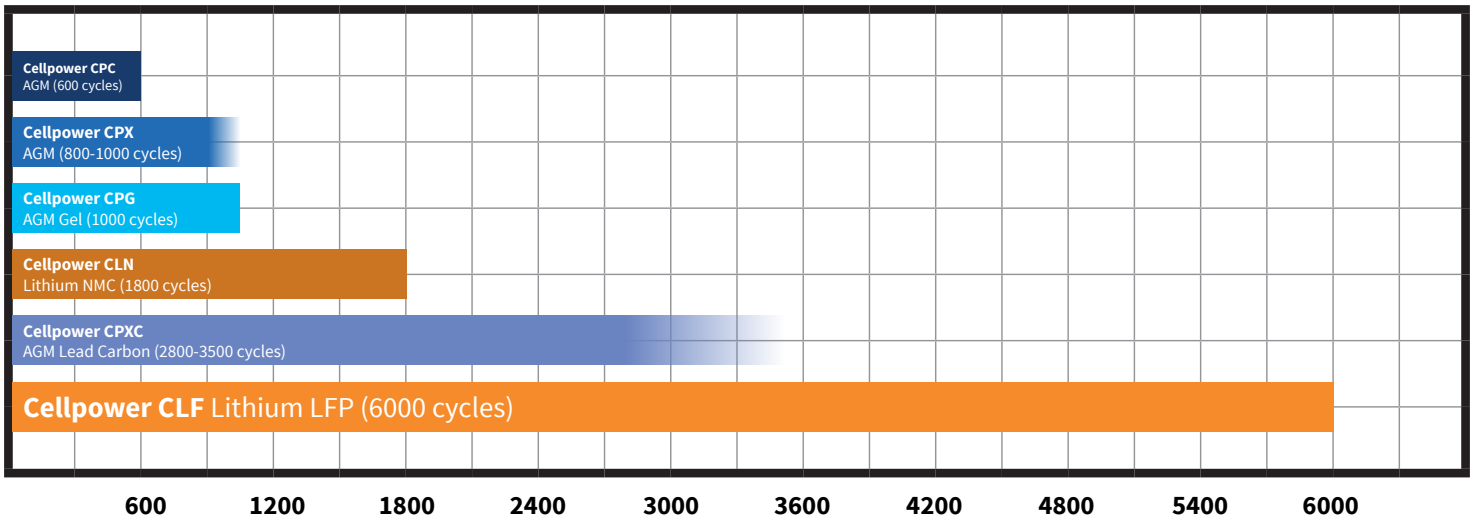
*: Not applicable to this test criterium

1.3 Manufacturing certifications

Cellpower understands better than anyone that good quality of our products is crucial for the reliable operation of your application. That is why Cellpower strictly ensures that all our products meet high quality standards. If it does not meet our requirements, it will not be delivered. In this way, the user can be sure of a well-functioning product.

Cellpower strives for a better environment. To achieve this, Cellpower sets strict requirements for the production methods of our factories. For example, all manufacturers are at least ISO 14001 and ISO 9001 approved and waste and residues are carefully disposed of. To guarantee this quality, Cellpower regularly inspects assembly lines, also paying attention to good working conditions for the staff.

Comparison of cyclic service life between AGM, Gel & Lithium battery series (@50% D.O.D.)



2. Battery specifications

2.1 Characteristics

The Cellpower CLF battery series consists of three models in the 24V line: CLF 40-24, CLF 60-24, and CLF 80-24. All provide a voltage of 24 volts but differ in capacity. In addition to the 24V line, a 48V line is also available. For more information, please contact your Cellpower distributor.

2.1 General product features

Series brand	Cellpower
Series name	CLF
Cell type	LFP (LiFePO4)
Cyclic design life	4000 Cycles at 80% D.O.D., 6000 cycles at 50% D.O.D. (@25°C ambient temperature)
Certifications	UN38.3 & IEC62133:2017
Additional features	Integrated Battery Management System (BMS), Heavy duty casing, Smart connection for monitoring devices (see section 4 for more details)

2.2 Maximum reliability

The Cellpower CLF series is designed with maximum reliability in mind. To ensure long-lasting performance, only high-quality materials and components are used in the production of CLF batteries. The solid ACCS (Anti Corrosion Coated Steel) housing provides durability, while the built-in BMS optimises battery performance automatically. For easy installation, the batteries are equipped with M6 or M8 terminals. Additionally, an industry-standard communication port using the highly reliable CAN-Bus protocol ensures seamless data transfer.

2.3 Technical specifications per model

Parameter	CLF 40-24	CLF 60-24	CLF 80-24	CLF 40-48
Product image				
Nominal voltage	25.6 V	25.6 V	25.6 V	51.2 V
Nominal capacity (25°C)	40 Ah	60 Ah	80 Ah	40 Ah
Internal resistance	≤30mΩ (fully charged)	≤N/AmΩ (fully charged)	≤10mΩ (fully charged)	≤10mΩ (fully charged)
Self-discharge	Less than 3% per month	Less than 3% per month	Less than 3% per month	Less than 3% per month
Charge temperature range	0°C ~ 55°C	0°C ~ 55°C	0°C ~ 55°C	0°C ~ 55°C
Discharge temperature range	-20°C ~ 55°C	-20°C ~ 55°C	-20°C ~ 55°C	-20°C ~ 55°C
Charge Voltage	29.2 V	29.2 V	29.2 V	58.4 V
Max. charge current	20 A	30 A	40 A	20 A
Max. constant discharge current	40 A	80 A	80 A	40 A
Max. pulse discharge current (max. 30 sec)	120 A	150 A	150 A	75 A
Energy	5Hr: 1024 Wh	5Hr: 1536 Wh	5Hr: 2048 Wh	5Hr: 2048 Wh
Cut-off Voltage	20.0 V	20.0 V	20.0 V	40.0 V
Housing material	Anti Corrosion Coated Steel (ACCS)	Anti Corrosion Coated Steel (ACCS)	Anti Corrosion Coated Steel (ACCS)	Anti Corrosion Coated Steel (ACCS)
Dimensions (lxwxh)	197x165x185mm (including CAN-Bus socket)	259x169x219mm (including CAN-Bus socket)	329x169x224mm (including CAN-Bus socket)	329x169x224mm (including CAN-Bus socket)
Standard terminal	Insert M6	Insert M8	Insert M8	Insert M8
Approximate weight	9.7 kg	15.0 kg	20.0 kg	20.0 kg

3. Battery Management System

3.1 Introduction

Each Cellpower CLF lithium battery is equipped with an advanced Battery Management System (BMS) that monitors, protects, and optimises battery performance. The BMS ensures safe operation by intervening in cases of overvoltage, deep discharge, excessive temperature, or other unsafe conditions. If the battery is used outside of its specifications, the BMS can automatically disconnect it to prevent damage and extend its lifespan.

In addition to protection, the BMS actively optimises internal cell balancing, ensuring that the battery operates efficiently over time. However, while the BMS safeguards against deep discharge, it cannot prevent permanent damage if extreme or repeated deep discharges occur. To avoid irreversible damage, always follow the recommended usage guidelines outlined in section 5.

For more details on the specific operating thresholds of the BMS, refer to section '**3.2 Technical specifications**'.

3.2 Technical specifications

In the table below you can find an overview of the technical data of the BMS, which is built into every CLF battery. The user should note that the maximum performance of the BMS does not have to correspond to the maximum permissible performance of the battery. The BMS always has a certain margin to prevent it from having to intervene too often. Therefore, always consult the datasheet of the battery itself to find out what the maximum permissible performance of the battery itself is. These should be considered leading in order to enjoy maximum performance and a longer service life for as long as possible.

3.2 Specifications Battery Management System Cellpower CLF

Aspect	Value		Aspect	Value	
	CLF 40-24, 60-24 & 80-24	CLF 40-48		CLF 40-24, 60-24 & 80-24	CLF 40-48
Charging Voltage	28.4V ~ 29.2V CC/CV	56.8V ~ 58.4V CC/CV	**Low Voltage delay time**	3 Sec.	3 Sec.
Balancing current	50 ~ 75mA	50 ~ 75mA	**Low Voltage recovery**	22.0V ±0.1V	44.0V ±0.1V
Communication consumption	≤20mA	≤20mA	**Overcurrent protection**	200A	200A
Standard mode consumption	≤10mA	≤10mA	**Overcurrent delay time**	3 Sec.	3 Sec.
Power down mode	≤100µA	≤100µA	**Overcurrent recovery mode**	Disconnect load, auto recovery	Disconnect load, auto recovery
Max. continuous charge current	80A	40A	**Short-circuit protection**	200 ~ 600uS	200 ~ 600uS
Max. continuous discharge current	80A	40A	**Short-circuit recovery mode**	Disconnect load, auto recovery	Disconnect load, auto recovery
High Voltage protection	30.4V ±0.1V	60.8V ±0.1V	**Over temperature protection cell**	65°C	65°C
High Voltage delay time	3 Sec.	3 Sec.	**Over temperature protection BMS**	80°C, 1 measuring point	80°C, 1 measuring point
High Voltage recovery	28.0V ±0.1V	56.0V ±0.1V	**Protection circuit (MOSFET)**	≤10mΩ	≤10mΩ
Low Voltage protection	20.0V ±0.1V	40.0V ±0.1V	**Operating temperature range**	-20°C ~ 70°C	-20°C ~ 70°C

4. Installation

4.1 Inspection prior to installing

Prior to installing the battery, thoroughly inspect it for any signs visual of damage or defects. If you detect any damage or defects in a new battery, do not use it. Instead, immediately notify your supplier. A visual inspection of the battery may include but is not limited to checking:

- Extensive damage or signs of moisture to the packaging
- Loose, damaged or corroded battery terminals
- Deformations in the casing of the battery
- Missing terminal caps and or dust cap on the data connector
- Inspection of safety

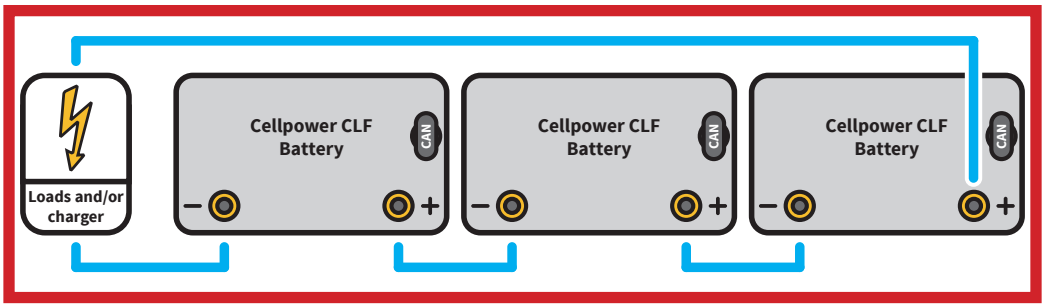
4.2 Safe parallel connection

Cellpower CLF batteries are equipped with an advanced Battery Management System (BMS). This system protects the battery by intervening in case of imminent overvoltage, deep discharge, or other unsafe conditions.

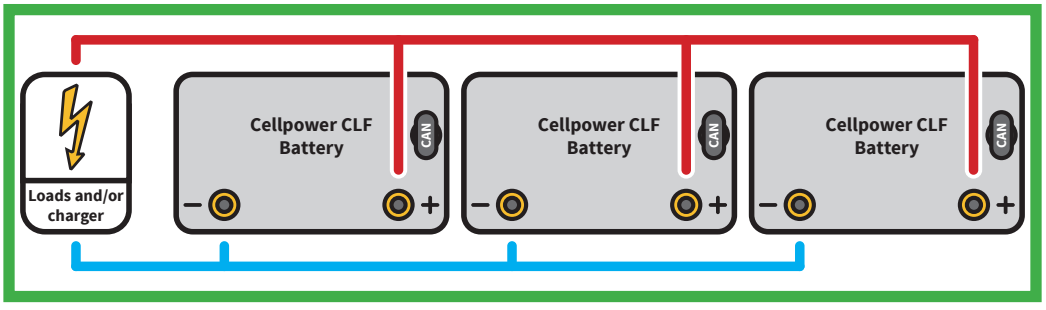
IMPORTANT: While the BMS is designed to safeguard the battery in cases of deep discharge, it cannot prevent permanent damage if extreme or repeated deep discharge occurs. To avoid irreversible damage, always follow recommended usage guidelines as outlined in section 5.

4.2.1 Series vs. Parallel connection

Each CLF battery is equipped with its own BMS, which means they must never be connected in series. Series connections will cause irreparable damage to the BMS and the battery itself. Parallel connection is allowed. Multiple CLF batteries can only be connected in parallel to increase capacity while maintaining the correct voltage. Next is an example connection diagram illustrating how to safely connect multiple CLF batteries in parallel for optimal performance.
A maximum of 6 batteries can be safely connected in parallel. If more energy capacity is needed, please contact your Cellpower distributor for technical support to ensure a safe and reliable setup.



*A **series connection** between multiple CLF batteries like shown above, **is never allowed**. If connected in series, the BMS's of the individual batteries will be overloaded and permanently damaged.*



*A **parallel connection** between multiple CLF batteries like shown here, **is allowed**. This setup enables the use of multiple CLF batteries without causing damage to the BMS.*

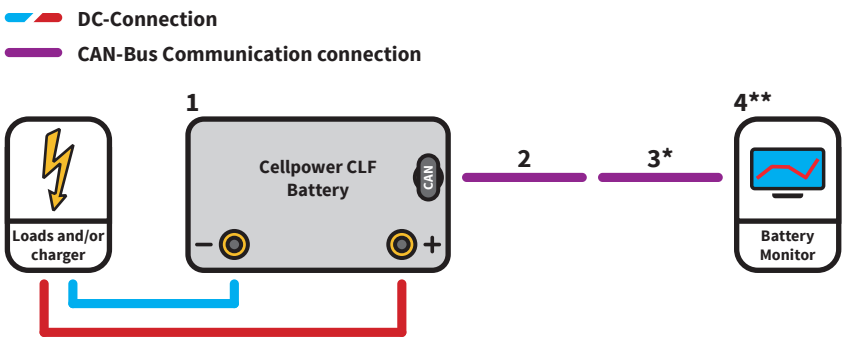
4.2.2 Connecting and disconnecting the battery terminals

In order to be able to connect current conducting parts to the CLF battery, all Cellpower CLF batteries are supplied with suitable bolts as standard. These have already been installed in the terminals upon delivery. In order to be able to connect things to the terminals, they must first be removed from the battery terminals. It is recommended to always connect the + (positive) terminal first, before connecting anything to the - (negative) terminal. If bolts are not included when a new CLF battery is delivered, please contact your supplier.

4.3 Battery monitoring

Cellpower offers suitable battery monitors. Either for built-in purposes, like dashboards and electronic housings, and mounted applications, like handlebars or on top of other surfaces. See section 7 for more information on the specific monitor models. Below you can find an example of a configuration with a CLF battery and battery monitor.

Cellpower CLF Battery to Battery Monitor



4.1 Needed components for this configuration		
1	CLF 40-24	CLF 60-24 or 80-24
2	CCA-0042 Cellpower CLF 40 Plug adaptor	CCA-0041 Cellpower CLF 60/80 Plug adaptor
3	CCA-0043* CLF BAT MONITOR 2 Plug adaptor	CCA-0043* CLF BAT MONITOR 2 Plug adaptor
4	CLF BAT MONITOR 1 or CLF BAT MONITOR 2**	CLF BAT MONITOR 1 or CLF BAT MONITOR 2**

**: CCA-0043 Plug adaptor is only required in combination with the built-in CLF BAT MONITOR 2 battery monitor. If the CLF BAT MONITOR 1 is being used, no additional plug adaptor is required in position 3.*
***: For a built-in monitor, use CLF BAT MONITOR 2. For a mounted monitor, use CLF BAT MONITOR 1. Consult your Cellpower distributor to see which type of battery monitor suits your application best. For more information, see section 7.*

4.3.1 Interface and communication protocols

All Cellpower CLF batteries are equipped with a CANbus interface. The Controller Area Network (CANbus) is a robust communication protocol widely used in battery management systems (BMS) to ensure reliable and efficient data exchange between connected components. Designed for high-speed and real-time communication, CANbus enables seamless integration of sensors, controllers, and actuators within complex systems. This protocol supports the monitoring and control of critical battery parameters, such as voltage, current, temperature, and state of charge, with minimal latency and high fault tolerance. Its versatility and scalability make CANbus an ideal choice for applications in electric vehicles, renewable energy systems, industrial automation, and more, ensuring safe and optimised operation in demanding environments.

CLF 60-24, CLF 80-24 and CLF 40-48 are equipped with a RS485 interface. RS485 is a widely adopted serial communication standard known for its robustness and long-distance transmission capabilities in industrial and technical systems. Commonly used in battery management systems (BMS), RS485 enables reliable data exchange between devices such as sensors, controllers, and monitoring systems. It supports multi-point connections, allowing multiple devices to communicate over a single twisted-pair cable, reducing complexity and installation costs. With its strong resistance to electromagnetic interference and support for communication over distances up to 1200 meters, RS485 is ideal for applications requiring stable and efficient data transmission in challenging environments, including renewable energy storage, industrial automation, and electric mobility systems.

4.3.2 CAN-Bus data communication wiring harness

Cellpower offers three types of cables and connectors for CAN-Bus data communication. Below and on the next page you can find an overview of these accessories and a few examples of typical wiring diagrams in which these are used.

4.2 Available wiring and connector accessories

4.2.1 Adaptors

Item name	Item description	Function
CCA-0041	Cellpower CLF 60/80 Plug adaptor	CLF 60-24 & CLF80-24 to wiring harness
CCA-0042	Cellpower CLF 40 Plug adaptor	CLF 40-24 to wiring harness
CCA-0043	CLF BAT MONITOR 2 Plug adaptor	CLF Built-in Bat Monitor to wiring harness
CCA-0045	CBDT 200 CAN 250 IoT Plug adaptor	IoT Module to wiring harness

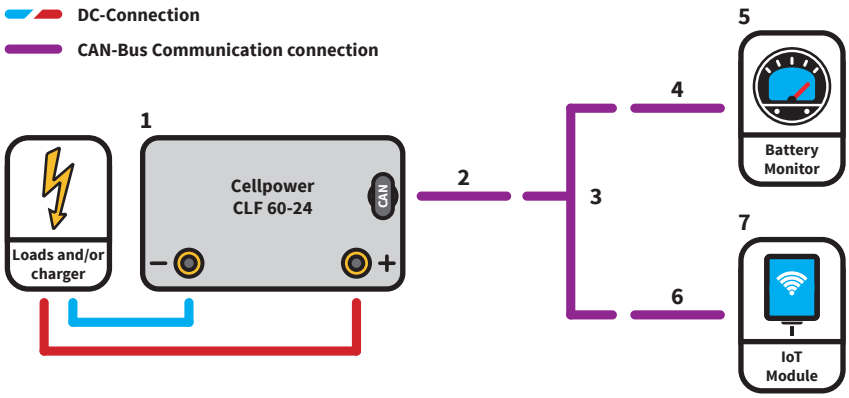
4.2.2 Extension cables

Item name	Item description	Function
CCA-0046	Extension Cable 1.5m	To install devices at any place in your system. High speed data transfer is guaranteed up to cable length of 40 meters
CCA-0047	Extension Cable 2.5m	

4.2.3 Cable splitters

Item name	Item description	Function
CCA-0048	Y-cable splitter	Allows for multiple devices to be installed in the CAN data communication wiring harness

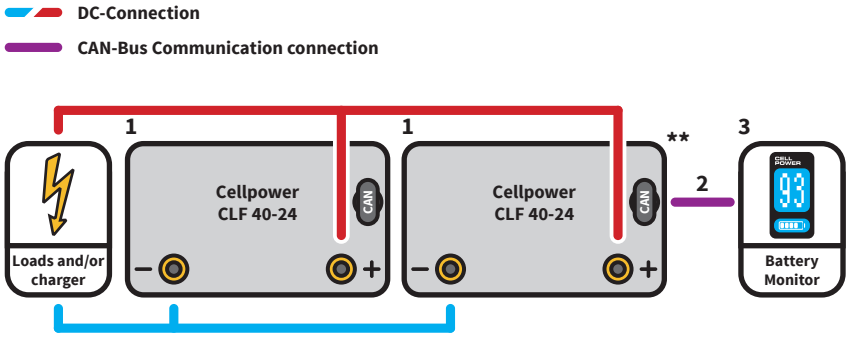
4.3.2.1 Cellpower CLF Battery to Battery Monitor & IoT Module



4.3.2.1 Needed components for this configuration

#	Item name	Item description
1	CLF 60-24	Cellpower Cyclic Lithium battery 24V - 60Ah
2	CCA-0041	Cellpower CLF 60/80 Plug adaptor
3	CCA-0048	Y-cable splitter
4	CCA-0043	CLF BAT MONITOR 2 plug adaptor
5	CLF BAT MONITOR 2	Cellpower CLF/CLPL built-in battery monitor
6	CCA-0045	CBDT 200 CAN 250 IoT Plug adaptor
7	CBDT 200 CAN 250	Cellpower Battery Data Tracker (IOT Module) Can250

4.3.2.2 Multiple Cellpower CLF Batteries* to Battery Monitor



*: Cellpower CLF batteries may **only** be connected in **parallel**. **Never** in **series**! Maximum of 6 CLF batteries in parallel connection.
**: When multiple CLF batteries are connected in parallel, only the CAN-Bus socket of one of those batteries needs to be connected.

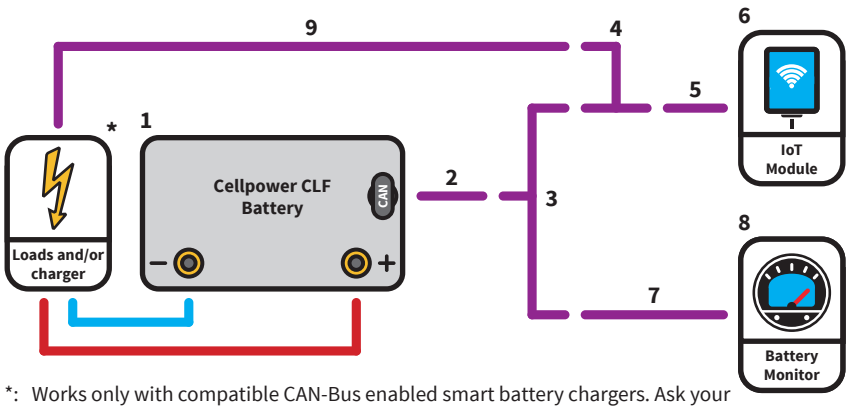
4.3.2.2 Needed components for this configuration

#	Item name	Item description
1	2x CLF 40-24	Cellpower Cyclic Lithium battery 24V - 40Ah
2	CCA-0042	Cellpower CLF 40 Plug adaptor
3	CLF BAT MONITOR 1	Cellpower CLF CAN mounted battery bonitor

4.3.2.3 Cellpower CLF Battery to Battery Monitor, IoT Module & CAN-Bus enabled smart charger

DC-Connection

CAN-Bus Communication connection



*: Works only with compatible CAN-Bus enabled smart battery chargers. Ask your Cellpower distributor for more information.

4.3.2.3 Needed components for this configuration

#	Item name	Item description
1	CLF 60-24	Cellpower Cyclic Lithium battery 24V - 60Ah
2	CCA-0041	Cellpower CLF 60/80 Plug adaptor
3	CCA-0048	Y-cable splitter
4	CCA-0048	Y-cable splitter
5	CCA-0045	CBDT 200 CAN 250 IoT Plug adaptor
6	CBDT 200 CAN 250	Cellpower Battery Data Tracker (IOT Module) Can250
7	CCA-0043	CLF BAT MONITOR 2 plug adaptor
8	CLF BAT MONITOR 2	Cellpower CLF/CLPL built-in battery monitor
9	CCA-0047	Extension Cable 2.5m

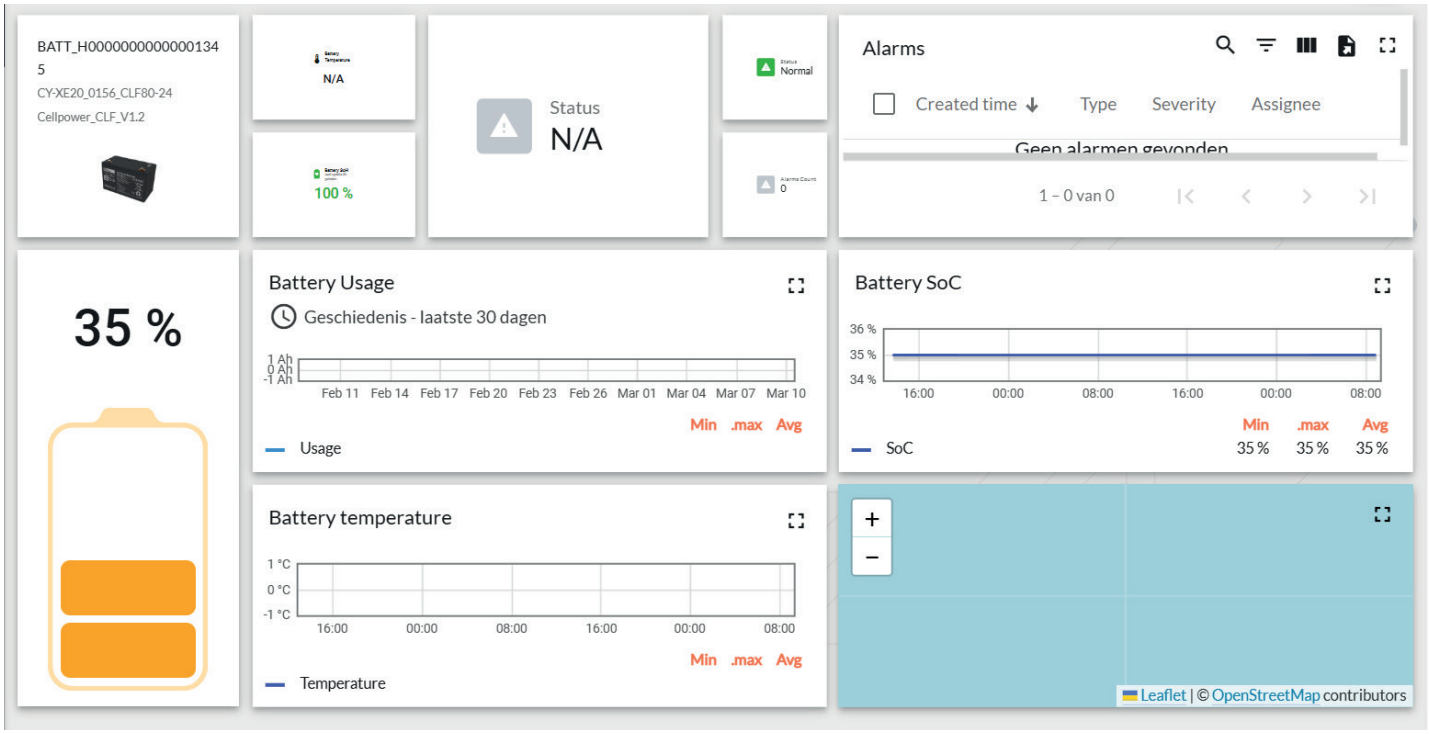
4.3.3 Remote (IoT) monitoring

The IoT Monitoring System and Intercel IoT Dashboard provides real-time insights into your battery's status and performance. It tracks key parameters such as voltage, current, temperature, and charge level via a secure cloud connection.

Beneficial to maintain you system trough:

- Monitoring of battery performance 24/7
- Receiving alerts to prevent failures
- Optimising of the battery lifespan and efficiency

Refer to the IoT manual for instructions on registration and set-up. Log in with your personal details at https://iot.intercel.eu.



5. In use

5.1 Inspection before usage

Before using the battery, thoroughly inspect it for any signs of damage or defects. If you detect any damage or defects in a new battery, do not use it. Instead, immediately notify your supplier. A visual inspection of the battery may include but is not limited to checking:

- Cracks or deformations in the battery casing
- Leakage of electrolyte or other fluids
- Swollen or bloated battery housing
- Corrosion or discoloration on terminals or connectors
- Loose or damaged wiring and connectors
- Burn marks or signs of overheating

5.2 Charging the battery

A Cellpower CLF Lithium battery should be charged using a compatible and appropriately programmed lithium battery charger. Using an unsuitable charger may lead to overvoltage, which can damage the battery and compromise its safety. For optimal performance and longevity, Cellpower recommends using a charger that meets the specifications outlined in the battery's datasheet. These datasheets specify the most suitable charging parameters and can be requested from your Cellpower distributor.

IMPORTANT: Using a non-recommended charger may have a negative impact on battery performance, lifespan, and may void warranty coverage.

Cellpower CLF batteries can be used and charged at lower temperatures. However, when charging at temperatures between 0°C and -10°C, the charging current must be reduced to less than 0.1C to prevent damage to the battery. We advise strongly against use or storage of the battery at temperatures lower than -10°C. Failure to adhere to this guideline may compromise battery performance and lifespan and will void the warranty.

5.3 Keeping the battery in good condition

Cellpower CLF batteries are designed to be maintenance-free. Under normal conditions and proper use, they do not require any maintenance to achieve their maximum design lifespan. However, following these best practices will help ensure optimal performance, safety, and longevity:

- Periodically charge the battery to 100% and keep it on the charger after reaching full charge for some time. This helps the Battery Management System calibrate the State of Charge (SoC) and allows the battery cells to balance properly, improving overall battery health

- Use the correct charger – Always charge the battery with a compatible, approved lithium battery charger that meets the specifications outlined in the datasheet. Using an unsuitable charger may lead to overvoltage, reduced lifespan, or even permanent damage

- Store the battery properly – When not in use, store the battery in a dry, well-ventilated area at a temperature between 10°C and 30°C. Avoid extreme temperatures, direct sunlight, or humid environments

- Avoid deep discharges – For maximum lifespan, avoid fully discharging the battery. It is recommended to recharge before the state of charge (SOC) drops below 20%

- Respect temperature limits – Use and charge the battery only within the recommended temperature range. Charging below -10°C or above 45°C can cause permanent damage and void the warranty

- Protect from extreme environments – Avoid exposing the battery to excessive vibration, shock, dust, moisture, or corrosive substances

- Check connections regularly – Ensure battery terminals and connectors remain clean, secure, and corrosion-free to maintain efficient power transfer

- Avoid prolonged storage without charging – If the battery is not in use for an extended period, charge it to around 50-80% SOC and check the charge level every 3 to 6 months to prevent deep discharge

Following these guidelines will help maintain the performance, safety, and longevity of your Cellpower CLF battery.

5.4 Discharging the battery

Thanks to the Lithium Iron Phosphate ($LiFePO_4$) chemistry, Cellpower CLF batteries offer a significantly higher cyclic service life than comparable Lithium NMC, AGM, lead-acid, or gel batteries. However, the exact number of cycles achieved depends on how deep the battery is discharged during regular use. In general, deeper discharges reduce the overall cycle life of the battery. The depth of discharge (DoD) is directly proportional to the battery's lifespan:

- Shallow discharges (e.g., 30-50% DoD) allow for a higher number of cycles
- Moderate discharges (e.g., 70% DoD) provide a balanced lifespan and usable capacity
- Deep discharges (e.g., 80-100% DoD) reduce the total number of cycles over time

For specific cycle life data, refer to the battery's datasheet, where the expected lifespan at different DoD levels is specified in a graph.

6. Storage, transport and disposal

6.1 Storage

The batteries from the Cellpower CLF Lithium series have a low self-discharge rate, allowing them to be stored for extended periods without damage. However, to ensure long-term storage without issues, it is essential to follow the previously (section 5.3) mentioned guidelines for maintaining good battery condition. In particular, attention should be given to the recommended storage temperatures and state of charge (SoC). If these guidelines are not carefully followed and the battery loses voltage over time, it has not been stored properly and may no longer be recoverable. When stored correctly and consistently under the right conditions, a Cellpower CLF Lithium battery can remain in good condition for an extended period without any problems. For a new, fully charged CLF battery, keep in mind a minimum self-discharge rate of about 2% per month.

6.2 Transport

Transport of lithium products requires special attention and is subject to strict requirements. Therefore, always check the applicable local, national and international laws and regulations before transporting, shipping or receiving a Lithium battery. Always read the most up-to-date laws and regulations that you must comply with in your specific situation. Please note that every specific mode of transport is bound by other rules. For example, there are different rules for air transport than for road transport.

6.3 Transport classification

For transport, the lithium battery is classified as UN3480, Lithium-Ion Batteries under the UN Model Regulations, UN Recommendations on the Transport of Dangerous Goods. These recommendations serve as the basis for most, if not all, regulations regarding the transport of dangerous goods worldwide. Personnel directly involved in preparing lithium batteries for transport should receive adequate training and/or proper certification, as this is a requirement in most countries. Alternatively, packaging and shipping can be outsourced to a specialised third-party company to ensure compliance with all applicable regulations. Regulations for handling, packaging, and documentation vary depending on the mode of transport (air, sea, road, or rail). It is important to follow the specific requirements for each transport method to ensure safety and compliance.

Example of Class 9 label

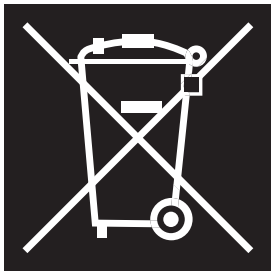
Air Transport	Personnel handling/preparing need to be trained according to the guidelines set out in the 'IATA Dangerous Goods Regulations 61st edition', chapter 1.5, or the current ICAO-TI Chapter 4
Road Transport (ADR for Europe)	We recommend that personnel handling and preparing the goods for transport should have had sufficient training
Sea Transport (IMDG)	We recommend that personnel handling and preparing the goods for transport should have had sufficient training
Rail Transport (RID for Europe)	We recommend that personnel handling and preparing the goods for transport should have had sufficient training
River Transport (ADN for Europe)	We recommend that personnel handling and preparing the goods for transport should have had sufficient training

For transportation, “Class 9 Miscellaneous Dangerous Goods” and UN Identification labels for shipping Lithium batteries and Class 9 Lithium cells must be prominently displayed on the outer visible layer of the shipping container. Also refer to the relevant transport documents.

Transport classification product	Classification packaging material
UN 3480, Class 9	Group PI965, Section I

6.4 Disposal

Every Cellpower CLF battery has two symbols that indicate how the battery should be disposed of. These should be followed carefully along with the instructions below. This prevents environmental damage and potentially dangerous situations.



Take note of the applicable laws and regulations for disposal. Battery can be sent to the original supplier for disposal. Do not dispose of with other waste, but hand in separately.

This product or parts of it is suitable for recycling.

Before a CLF battery can be disposed of, it must first be completely discharged and the battery terminals must be covered, for example with insulating tape or the original supplied terminal covers. By disposing of the battery correctly, parts and materials of it can be reused. Before disposing of the battery, take note of your local, national and international laws, rules and regulations. For disposal within the European Union, at least the European Waste Catalog (EWC) regulations must be followed.

7. Accessories

7.1 The right battery is just the beginning

For optimal use of the battery, the right accessories are essential. Intercel offers a wide range of accessories designed to monitor and maintain battery performance. Our accessories meet the same high-quality standards as the CLF battery series, ensuring a reliable and efficient energy system when used together. Additionally, all Cellpower accessories are designed with low standby consumption, minimising unnecessary energy loss.

7.2 Battery chargers

Optimal battery performance starts with using a high-quality battery charger. A proper charger ensures that the battery remains optimally charged and reaches its maximum service life. Lithium batteries require special attention due to their built-in electronics. Not all chargers are compatible, and using an unsuitable charger could, in the worst-case scenario, cause permanent damage to the battery. To prevent this, Cellpower offers CCL battery chargers, specifically designed for its own Lithium battery series, ensuring safe and efficient charging.

Model	Voltage	Current (A)	Suitable for battery capacity	Dimensions lxwxh (mm)
CCL 24-6	Out: 24VDC nom.	6.0	24Ah - 60Ah	210x175x65
CCL 24-8	Out: 24VDC nom.	8.0	32Ah - 80Ah	210x175x65
CCL 24-10	Out: 24VDC nom.	10.0	40Ah - 100Ah	210x175x65
CCL 24-10W	Out: 24VDC nom.	10.0	40Ah - 100Ah	205X123X65
CCL 24-12	Out: 24VDC nom.	12.0	48Ah - 120Ah	210x175x65
CCL 24-20W	Out: 24VDC nom.	20.0	80Ah - 200Ah	187x123x68
CCL 24-30W	Out: 24VDC nom.	30.0	120Ah - 300Ah	231x136x116
CCL 24-50W	Out: 24VDC nom.	50.0	200Ah - 500Ah	282x168x96
CCL 48-12W	Out: 48VDC nom.	12.0	48Ah - 120Ah	187x122x68
CCL 48-30W	Out: 48VDC nom.	30.0	120Ah - 300Ah	282x168x95

7.3 Battery monitors and IoT module

A battery monitor provides real-time insight into the status of the connected battery or batteries. It allows the user to immediately see whether the battery needs recharging and helps detect any defective batteries early, so they can be replaced before causing issues. This makes it easy to track battery quality and performance, preventing unexpected failures and ensuring reliable operation.

For even more advanced monitoring, the Cellpower IoT module enables remote access to battery data via the Cellpower IoT platform. This allows users to track performance, receive alerts, and optimise battery usage from anywhere.

Model	Product type	Suitable for	Dimensions lxwxd (mm)
CLF BAT MONITOR 1	Battery monitor	Mounted applications	63x23x40
CLF BAT MONITOR 2	Battery monitor	Built-in applications	60x60x59
CBDT 200 CAN 250	IoT Module	Remote monitoring	86x82x30

7.4 Battery tester

With the Cellpower CBT battery tester, no technical defect goes unnoticed. This capacity tester, designed for AGM, Gel, and Lithium batteries, allows for easy and reliable performance evaluation. It quickly determines whether a battery is still functioning optimally. With the accompanying software, a comprehensive battery performance analysis can be conducted on a computer, providing detailed insights for maintenance and troubleshooting. The battery tester is available for our 24V CLF batteries.

Model	Includes	Dimensions lxwxh (mm)
CBT 25-24	CBT 24V battery tester including clamps, user manual	200x140x190

7.5 CAN-Bus data communication wiring harness

Cellpower offers three types of cables and connectors for CAN-Bus data communication.

Adaptors		
Model	**Description**	**Function**
CCA-0041	Cellpower CLF 60/80 Plug adaptor	CLF 60-24 & CLF80-24 to wiring harness
CCA-0042	Cellpower CLF 40 Plug adaptor	CLF 40-24 to wiring harness
CCA-0043	CLF BAT MONITOR 2 Plug adaptor	CLF Built-in Battery Monitor to wiring harness
CCA-0045	CBDT 200 CAN 250 IoT Plug adaptor	IoT Module to wiring harness
Extension cables		
Model	**Description**	**Function**
CCA-0046	Extension Cable 1.5m	To install devices at any place in your system. High speed data transfer is guaranteed up to cable length of 40 meters
CCA-0047	Extension Cable 2.5m	
Cable splitters		
Model	**Description**	**Function**
CCA-0048	Y-cable splitter	Allows for multiple devices to be installed in the CAN data communication wiring harness

8. Quality, warranty and liability

8.1 Cellpower quality

Cellpower understands better than anyone that the quality of our products is crucial for the reliable operation of your application. That is why Cellpower strictly ensures that all our products meet high quality standards. If it does not meet our requirements, it will not be delivered. It means that the user can be sure of a well-functioning product.

8.2 Cellpower and the environment

Cellpower strives for a better environment. To achieve this, Cellpower sets strict requirements for the production methods of our factories. For example, all manufacturers are at least ISO 14001 and ISO 9001 approved and waste and residues are carefully disposed of. To guarantee this quality, Cellpower regularly inspects assembly lines, also paying attention to good working conditions for the staff. To make an extra contribution to a better world, Cellpower also sponsors projects in developing areas.

8.3 Warranty and liability

All Cellpower battery products are covered by a warranty against manufacturing and assembly defects. If this warranty is invoked, the most recent warranty conditions as they can be found on www.intercel.eu apply.

Cellpower stands for the quality, reliability and safety of its products. However, Cellpower considers its own liability to be finite. The user of the cordless product is expected to take personal responsibility when using a Cellpower cordless product. In addition, no actions should be carried out at all times that go against one's own common sense, or that could lead to potentially dangerous situations. In addition, Cellpower appeals to the responsibility and reasonableness of the user. All applicable warranty conditions can be found at www.cellpower.nl. For all terms and conditions regarding liability, you should take note of the terms and conditions of delivery of your Cellpower supplier.

8.4 IEC recommendations

The following represents a typical, but non-exhaustive, list of good advice to be provided by the equipment manufacturer to the end-user.

a) Do not dismantle, open or shred secondary cells or batteries.
b) Keep batteries out of the reach of children. Battery usage by children should be supervised. Especially keep small batteries out of reach of small children.
c) Seek medical advice immediately if a cell or a battery has been swallowed.
d) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
e) 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.
f) Do not remove a cell or battery from its original packaging until required for use.
g) Do not subject cells or batteries to mechanical shock.
h) 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.
i) Do not use any charger other than that specifically provided for use with the equipment.
j) Observe the plus (+) and minus (−) marks on the cell, battery and equipment and ensure correct use.
k) Do not use any cell or battery which is not designed for use with the equipment.
l) Do not mix cells of different manufacture, capacity, size or type within a device.
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 the cell or battery only 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.

The following represents a typical, but non-exhaustive, list of good advice to be provided by the manufacturer of secondary cells and batteries to equipment manufacturers and battery assemblers.

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) Compartments should be designed to prevent easy access to the batteries by young children.
c) 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.
d) Do not remove a cell or battery from its original packaging until required for use.
e) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
f) Do not subject cells or batteries to mechanical shock.
g) 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.
h) 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.
i) Do not mix cells of different manufacture, capacity, size or type within a battery.
j) Seek medical advice immediately if a cell or battery has been swallowed.
k) Consult the cell or 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.
l) A dedicated charger should be provided for each equipment. Complete charging instructions should be provided for all secondary cells and batteries offered for sale.
m) Keep cells and batteries clean and dry.
n) Wipe the cell or battery terminals with a clean dry cloth if they become dirty.
o) 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.
p) Do not maintain secondary cells and batteries on charge when not in use.
q) After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several times to obtain maximum performance.
r) Retain the original cell and battery literature for future reference.
s) When disposing of secondary cells or batteries, keep cells or batteries of different electrochemical systems separate from each other.