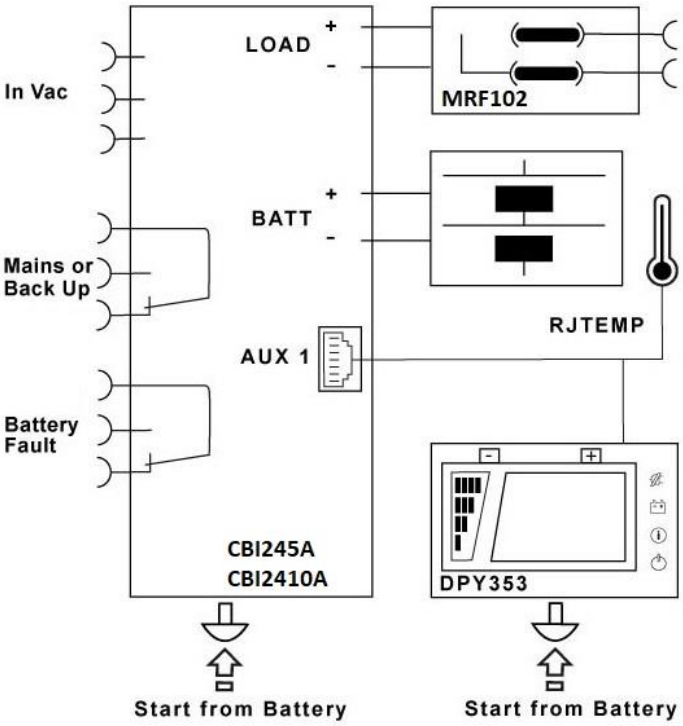
SFP: Uninterruptible Power Supply with output in DC

Thank you for choosing our product. We are sure that you will be fully satisfied by the improved support for your work.
The DC-Ups SFP power unit is used to ensure electrical continuity in fire-fighting safety systems in compliance with Regulation 305/2011/EU. Its electrical and mechanical characteristics make it conforming to standard EN 54-4:1997+A1:2002+A2:2006 (Fire detection and fire alarm systems. Part 4: Power supply equipment).

General description

SFP is an additional power supply with sealed lead batteries that guarantees more effective autonomy for automatic fire detection systems, ensuring all backup situations at the right time. Its size and performance make it suitable for systems in which power points have to be delocalised, avoiding long cables. SFP is the result of the experience gained in hundreds of thousands of applications of ADELSystem DC-UPS products around the world in the field of electrical continuity. The heart of the product is the DC-UPS, series CBI "All In One", which optimises the energy management of the system in a single, extremely compact and efficient device. The power is automatically distributed between the load and the battery using a "Power Management" device that redistributes and doubles the power to the "Power Boost" charge when needed. The device can also be switched on without the mains, directly from the battery by pressing the button on the external control interface. The "Battery Care" concept which has always distinguished the All In One "CBI" product range ensures charging over time and battery diagnostics, to guarantee an efficient system over time. A really simple device to install and use but complex inside, covering all electrical continuity management functions while compensating the battery charging according to the working temperature. Equipped with a simple yet functional external display, the product monitors system faults with real time self-diagnostics, giving clear and fundamental messages for use, including: measurement of the internal resistance of the battery, cell control in short-circuit, signal indicating the accidental disconnection of the internal connections, battery disconnection signal. Each fault is reported by a Diagnosis LED blink code. All the devices are equipped with two clean output contacts for signalling system or battery fault conditions. The sturdy container guarantees a protection rating to IP30.

Main Characteristics



- CPR in accordance with standard EN 54-4
- Charging batteries from 3 – 45Ah
- External display for controlling the battery power-on
- LED signals indicating no mains, battery status, fault signalling by blink codes
- 2 Relays with isolated contact for signalling no mains and generic battery or system faults
- Single-phase input: 115 - 230* - 277 Vac (*EN 54-4)
- Load output: 24 Vdc, 5 - 10 A
- Battery connection: 24 Vdc, 1 - 10 A
- A single product for managing different types of batteries: Sealed Lead, AGM, Gel
- Battery charging with voltage close to zero
- Automatic battery diagnosis for measuring internal impedance, element in short circuit, open battery, reverse polarity
- Charge output and battery protected from overload, short circuit, voltage above 35V
- Protection rating IP30

Functional characteristics

The heart of the SFP device is the CBI series DC-UPS, connected in output to the electronic two-channel fuse MRF102 and the Display module DPY353.

Load output

It is connected to the MRF102 electronic fuse module, which manages two completely electronically controlled outputs. The outputs give the following indications:

- Green: current from 0-80%
- Orange: current from 80-100%
- Red: overload above 100% current, output disconnected within 5 sec. The output is automatically reset if the applied charge returns within the set cut-in current within 5 sec.

The All In One “CBI” device manages the power automatically available between the charge and the battery, giving priority to the charge power supply.

In "Power Boost Mode" the maximum charge output current is:

Twice the nominal current 2 x In (Iload = In+ Ibatt) in continuous operation

3 times the nominal current 3 x In (Iload = 2In + Ibatt) for 4 seconds; after which, the output protects itself by switching off. The CBI is electrically protected from overloads and short circuits.

In "Power Boost Mode", if the battery current generates a charge current for more than 4 minutes with the mains electricity present (Overload situation), the device gives off a warning message (8 blinks); this warning message signals that the battery is discharging. If the mains input voltage falls below the threshold level (50% of the input Typ. Vac), the battery is immediately connected to the output charge, with no interruption. In Back Up, the charge output voltage is the same as the battery voltage.

Battery output performance

Connection for two 12V batteries connected in series protected by a fuse (F) in series to the positive connection; see wiring diagram.

Charging the Battery

- The battery is charged at controlled voltage and current
- Define the type of battery with the jumper for the best charging curve
- The charging can be configured in Fast mode, using a suitable jumper. The charging voltage is 2.4 V/cell for a maximum of 15h.
- The battery charging with temperature compensation is set at 25°C. The temperature compensated charging of the battery can also be compensated using the external probe RJTEMP451. Connect the probe to the CBI AUX Out with T expander (RJ45 Coupler) and the sensor RJTEMP451 directly connected to the battery (see Accessories section)
- The battery charging current can also be observed directly on the external display of the device, by pressing the “Current Reading” button (fig.1)

Testing the Battery

- The device continuously checks the battery efficiency in terms of: accidental disconnection of the charging cables, quality of the battery connection cable resistance, battery element open or in Short Circuit, reverse polarity, incorrect battery value, Internal battery resistance off limit

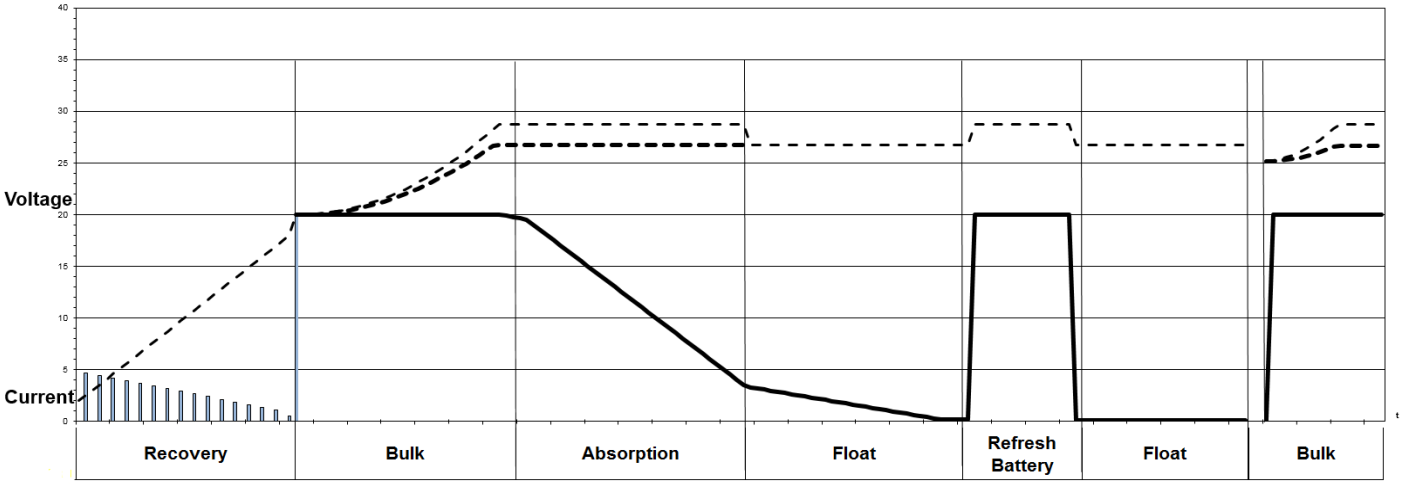
Internal Resistance Control “Life Test”

- The internal resistance in the battery is checked after having completely charged the battery in Float charge status, and is repeated every 220 mins.
    - If the alarm limit value is exceeded, this is signalled by the Relay and the Fault LED. The blinking diagnosis LED must signal a Blink code with 5 Blinks alternated with a pause. The LEDs can be found both on the CBI product and on the external Display on the container (Fig.1)
    - When replacing the battery, wait for the device to charge the battery completely before running the test, after which when in Float it will test and repeat the test every 220 min.

Battery Care

The “Battery Care” philosophy aims to ensure the longest possible battery life. It is based on algorithms that check the automatic charge to optimise the battery over time.

The system checks that the battery is working properly when charging and during diagnosis, and any problems are promptly detected and sent with the help of the diagnosis code “LED Blink”. This help is used during installation and maintenance of the product in the field. Each device is suitable for charging all types of battery, pre-defined curves can be set in order to adapt the charge to the battery chemicals in the best way. As a result, the device ensures reliability for the system in which it is installed over time, avoiding all possible risk of damage due to electrical continuity faults.



External Display DPY353

The charge status, battery charging current, all signalling and fault alarms, can be viewed by the following device,

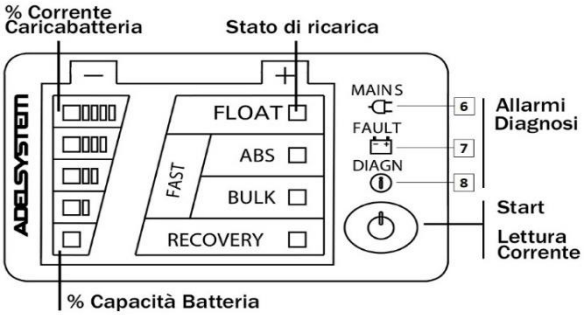


Fig: 1

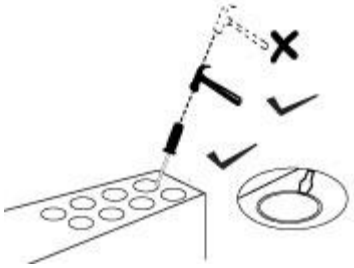
Protections

- On the primary side: the device is equipped with a non-resettable internal fuse. If the internal fuse is activated, it is highly likely there is a fault. In this case, the device must be checked at the factory.
- On the secondary side battery and charging: The device is electrically protected from short circuits and overloads.
- Reverse polarity: the module is automatically protected against the reverse polarity of the battery and the reversed charging connection; it resets automatically once correctly connected.
- Output overcurrent and short circuit: the unit limits the output current (see technical data).
- Deep discharge: not possible, the unit disconnects the battery when a minimum voltage level is reached (see technical data).

Caution and Safety

Caution – In areas with or without explosion risk, do not disconnect the device without first having switched off the system.
Caution – Areas at risk of explosion: Replacing the components may compromise its suitability for Class I, Division 2.
Caution – Switch off the system before connecting the module. Never work on the machine when live. The device must be installed in accordance with EN62368. The device must have a suitable isolation device external to the power supply, by which it can be placed in standby. Death hazard!

- Use separate cable gland holes for AC inputs, SC outputs and alarms.
- The coupling material must be in at least flammability class V-1
- The alarm contacts must be connected to systems in SELV conditions
- The AC power connection must be protected by an easily accessible 6A two-pole magnetothermal circuit breaker.
- The cables must have at least section 1.5 mm^2 with cable lug for contact connection.

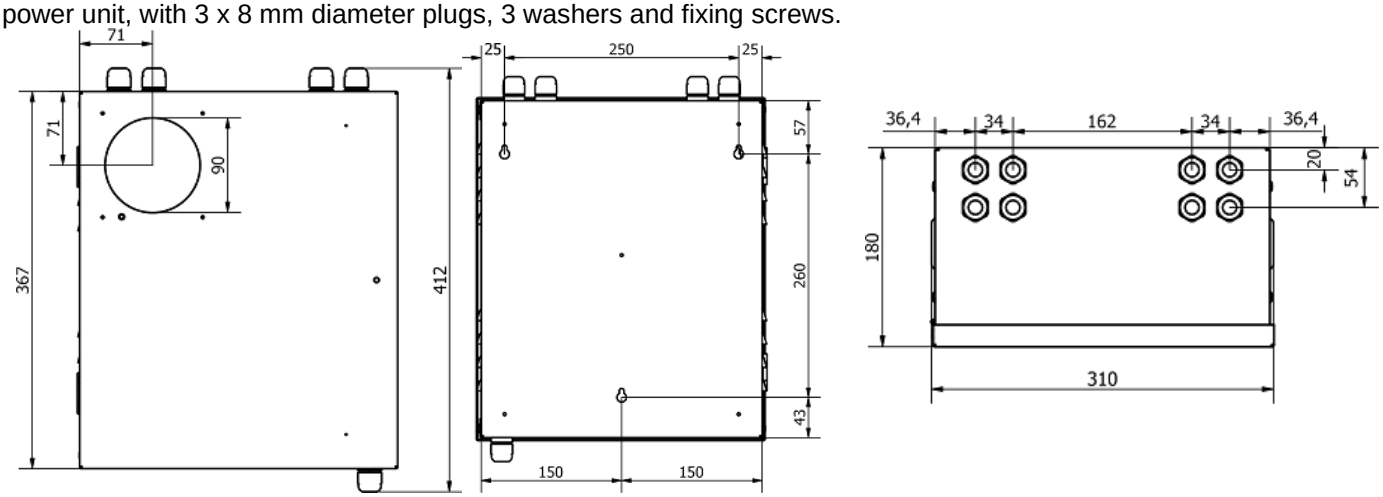


- The device must be installed by qualified persons with knowledge of safety regulations, standard EN62368 and the related power units CEI64-8
- If the power voltage is disconnected even accidentally, it must be restored by technical personnel within 48h in order to prevent the batteries from discharging

Installation

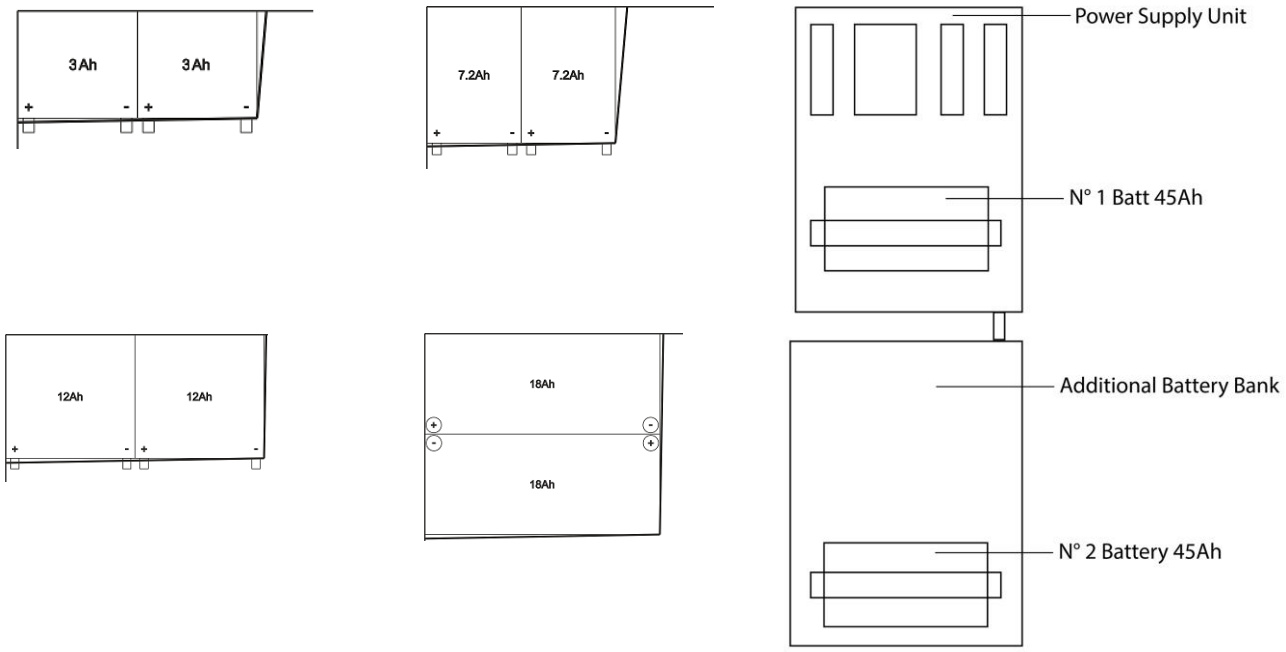
Mechanical Assembly

The device is built for mounting in buildings. It is intended for mounting on stable walls suitable for supporting a power unit, with 3 x 8 mm diameter plugs, 3 washers and fixing screws.

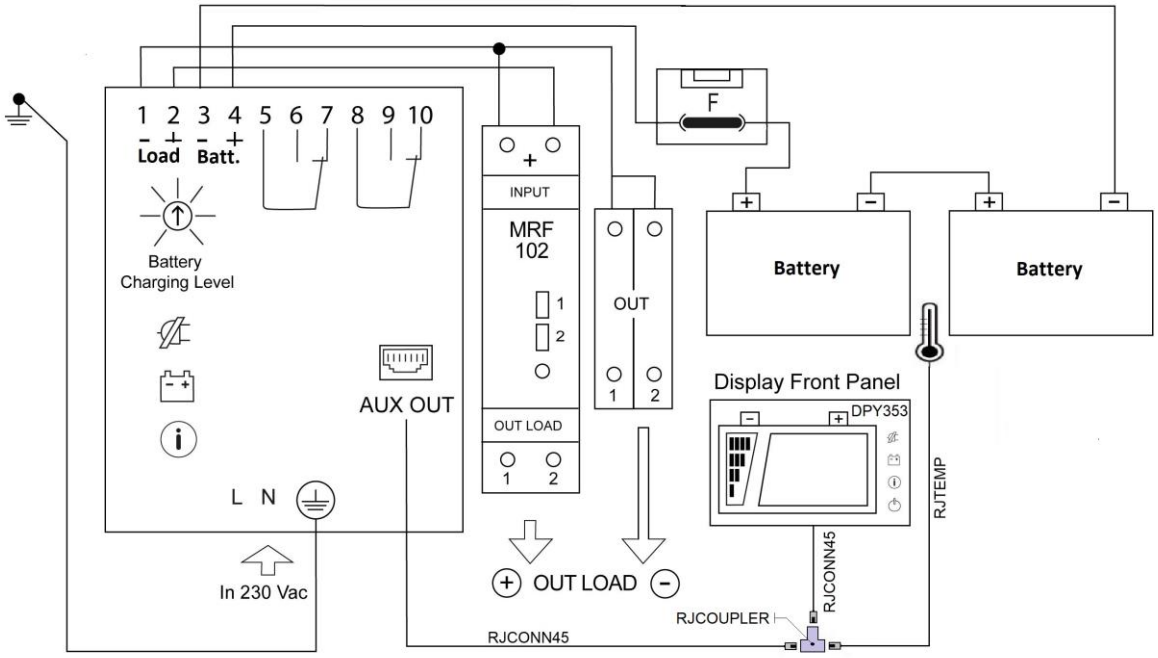


Battery connection

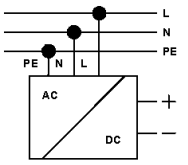
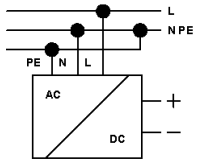
Positioning the batteries



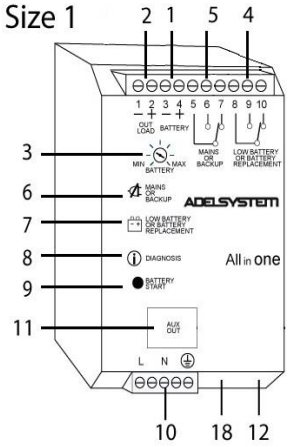
Wiring

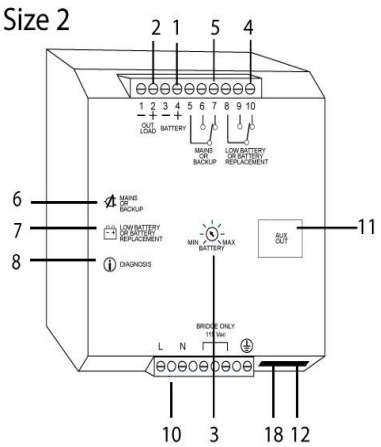


Dimension for cables and Input, Output and Signal terminals

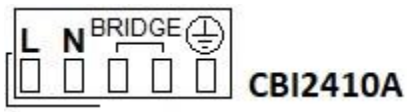
	Solid (mm^2)	Stranded (mm^2)	AWG	Torque (Nm)	Stripping Length	Type	1 Phase L N PE Input AC	1 Phase L N PE Input AC
In:	1.5 – 2.5	1.5 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Size 1 and 2 MRF102		
Out:	1.5 – 2.5	1.5 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	Size 1 and 2 MRF102		
Signal:	0.2 – 2.5	0.2 – 2.5	24 – 14	0.5 – 0.6 Nm	7 mm	All types		

Connection is via screw terminals with diameter 2.5 mm2
It is advised to number the connection wires. Use a cable suitable for power connections and for temperatures up to 75°C





No. 10: Input AC Port pin. L – N:



Single-phase power supply connection L, N, PE ⊕.
Only for CBI2410A, for connection with 115 Vac Input, bridge the terminals with indication “Bridge Only 115 Vac”

No. 1: Battery Connection (Fig.2)

Connect the batteries to the pins. 3 (–) and 4 (+)
Two Batteries (12 Vdc) connected in series for connection to CBI CBI245A and CBI2410A

No. 2: Load Output (Fig.2):

The CBI load output is connected to the Electronic Fuse MRF102 1 (–). 2 (+).
The safety device power supply must be connected to the output of the terminals on the Electronic Fuse MRF102

Alarm signal connection (Isolated Outputs)

No. 5: Mains Or Backup: Power Present. Contacts: 5, 6, 7 (Fig.2)
No. 4: General Fault, Low Battery, Replace battery, Battery fault or System fault: 8,9,10 (Fig.2)

Technical data of exchange contacts:

Alarm contacts:		5 ports - 6 LEDs Mains/Back-Up		4 ports - 7 LEDs Battery Fault	
		5-6 Closed	5-7 Closed	8-9 Closed (OK)	8-10 Closed
Vac Network present	ON	■ - LED off		■ - LED off	
	OFF		■ - LED On (1)	■ - LED off	
Is the battery capacity in Back Up < 30%?	YES		■ - LED On		■ - LED On (2)
	NO		■ - LED On	■ - LED off	
Battery or Device fault?	YES	■ - LED off			■ - LED On
	NO	■ - LED off		■ - LED off	

Max.DC1: 30 Vdc 1 A; AC1: 60 Vac 1A: Resistive load (EN 60947-4-1) Min.1mA at 5 Vdc: Min. permissive load

Notes:

(1) Within 5 seconds the contact of the Mains/Back relay exchanges the disconnection of the main VAC power supply

(2) If the Fault LED is on, the Diagnosis LED indicates the type of fault via the “Blink Code”

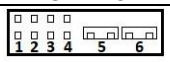
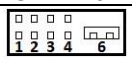
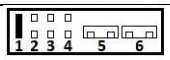
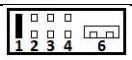
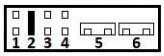
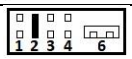
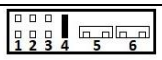
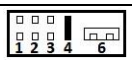
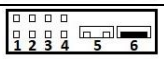
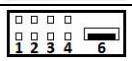
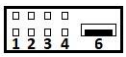
Controls and Adjustments

No. 18: Battery configuration

Preliminary operations: a device for all types of battery.

Fully automatic, all devices are suitable for charging most types of batteries using the charging curves which can be selected by the user. They can charge open lead acid or sealed lead acid.

Caution: switch off the system before setting the jumpers. Only the jumper in position 6 is updated even after switching on.

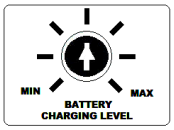
Battery Type chemistry Selection				
	Jumper Position CBI245A	Jumper Position CBI2410A	Float charge (Volt/Cell	Fast charge (Volt/Cell)
AGM Lead			2.23	2.40
AGM Low			2.25	2.40
Gel Battery			2.30	2.40
Functional Setting				
	CBI245A	CBI2410A	Function	
Battery Resistance Test ON			Jumper present: Life test enabled (not for NiCd)	
Fast Charge enabled (3)			Jumper present: Fast charge enabled It is possible to make this control remote using the RTCONN cable	
“Start from battery” (without main power supply) (1)			Used to switch on the System only from the battery without the main power supply. Press the button on the panel display	

NB:

Do not leave the jumper in position 5 for CBI245A or position 6 for CBI2410A. Otherwise, in Backup mode, the battery will completely discharge

No. 3: Charge current limitation (Fig.2):

To protect the battery from excessive charging currents, the device can limit the maximum charging current by adjusting the trimmer. This limits from max In up to 20% of the In current. To determine the maximum battery charging current, consult the battery manufacturer’s technical sheet, if this is not possible consider that on average the maximum charging current is 10% of the nominal Ah battery current.



Maintenance - Servicing - Checks

Battery and device diagnosis

All CBI devices support the user during installation, operation and maintenance. A Diagnosis LED Blink code identifies one of the possible defects.

Error conditions, "Battery Fault LED" ON and "Diagnosis LED" blinking in sequence; see subsequent Control Map section for the fault codes.

Control displays:

- 3 LEDs on the device CBI245A and CBI2410A
- 2 LEDs on device MRF102
- Display DPY353 (Fig.1) external to the device, indicating the following situations:

No.6: Mains or Backup LED: indicates the presence of the Vac mains power

No.7: Low Battery LED: indicates that the battery capacity is less than 30% when there is no mains, Battery Fault or System Fault.

No.8: Diagnosis LED: Indicates the battery charge status if the Fault LED is not ON. If the Battery Fault is ON this indicates the type of fault according to the blink code.

Control map:	Status	DIAGNOSIS LEDs (8)	BATTERY FAULT LEDs (7)
Charge Type	Float	1 Blink/2 sec	OFF
	Absorption	1 Blink/sec	OFF
	Boost	2 Blinks/sec	OFF
	Recovery	5 Blinks/sec	OFF

Battery Error/System Error

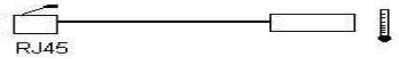
System self-diagnosis	Reverse polarity or high battery voltage (above 32.5Vdc for CBI 24xxA)	1 Blink/pause	ON
	Battery not connected	2 Blinks/pause	ON
	Element in short circuit	3 Blinks/pause	ON
	Overload or short circuit on Charge side	4 Blinks/pause	ON
	Battery fault; Internal battery resistance above the maximum value	5 Blinks/pause	ON
	Life test not possible. Battery test not possible	6 Blinks/pause	ON
	Output overload condition. The battery has been discharging for more than 4 min.	8 Blinks/pause	ON
	Internal fault	9 Blinks/pause	ON
	Low battery voltage (below 18.5Vdc for I CBI 24xxA) start condition from battery without mains. From jumper 5 or external start button.	10 Blinks/pause	ON

Accessories

No. 11: Probe for battery charging thermal compensation"

The T accessory "RJ45COOPLER" has to be added for connecting the temperature probe and the Display to the CBI "AUX Out" output

The probe must be applied to the battery surface. The probe compensates the battery charging according to the actual temperature. This ensures the best charging conditions for the battery and consequently extends its life.



the CBI will vary the battery charging voltage according to the actual temperature.

Fast Charge	Float charge
+/-5mV/°C x no. of cells from -8°C to +60°C +140mV/Cell ÷ -200mV/Cell compared to the value at 20°C	+/-3mV/°C x no. of cells from -20°C to +60°C +120mV/Cell ÷ -120mV/Cell compared to the value at 20°C

The device stops charging the battery if the temperature is below -20 °C or above + 60 °C. The battery fault alarm may be signalled by 7 blinks. The sensor on the RJTEMP cable must be applied to the battery

Start from Battery without Vac input voltage

9 (Fig.2): Press the button on the CBI for 3 sec. on the front panel to switch on the system without "Vac mains input" but only with the battery connected.

The same function is also available for remote starting from battery, using the button on the external front panel display. The function is standard for all products, apart from CBI2410A, order CBI2410A/S. Do not leave the jumper in this position, otherwise the system will completely discharge the battery.

Door opening sensor

A door opening control microswitch can be assembled on the device. The device must be places on the side of the container in this position. The accessory is also proposed with the fixing screws, code: SWC102.

Standards and Certifications

Immunity and Emission

The CE mark in conformity to EMC 2014/30/EU: Electromagnetic Compatibility Directive; 2014/35/EU: Low Voltage Directive; ROHS 2011/65/EU: Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS), as amended by 2015/863/EU

EMC Standards Immunity: EN 61000-4-2, EN 61000-4-3, EN 61000-6-2, EN 61000-4-4, EN 61000-4-5.

EMC Standards Emission: EN 61000-6-4, EN 61000-6-3, EN 61000-3-2 (see data sheet for each device)

Electrical Safety: Device assembling and Installation: IEC/EN EN62368-1; IEC/EN 60950

Conformity to: DIN41772: Charging curve; DIN41773: Characteristic Curve for charging Lead Acid and Nickel-Cadmium batteries.

Environmental Norm Conditions: Degrees of protection provided by enclosures IEC/EN 60529.

Approved Devices: CBI243A, CBI245A, CBI2410A and \S

- EN60950 / UL60950-1 and CSA C22.2 No. 60950-1-07 (Information Technology Equipment) – Safety – Part1: General Requirement.
- Electrical safety EN 54-4 Fire Detection and fire alarm systems.

Manufacturer's Declaration

- The design was developed within an internal quality management system involving a series of rules for the appropriate design of all elements of the product.
- All product components were selected for the intended purposes and their characteristics are assured when the environmental conditions outside the casing correspond to those indicated for class 3K5 of EN 60721-3-3:1995.

CE

0051

ADELSystem s.r.l. Via L. Barchi, 9/B
42124 Reggio Emilia.
21
Dop N.0051-CPR-2336-2337

EN 54-4/A2:2006/AC:1999
Power supply equipment for fire detection and fire alarm systems for buildings
SFP120, SFP240

Electrical specifications

Input Data	SFP120 (CBI245A)		SFP240 (CBI2410A)	
Nominal input voltage (*EN54-4)	115 - 230* - 277 Vac		115 - 230* - 277 Vac	
Input voltage range	90 - 305 Vac		90 - 135 Vac; 180 - 305 Vac	
Inrush Current (Vn – In nom. Load) I2t	≤ 11A ≤ 5 msec.		≤ 16 A ≤ 5 msec.	
Frequency	50/60 Hz		50/60 Hz	
Input Current (115 – 230 Vac)	2.8 - 1.3 A		5 - 2.5 A	
Internal fuse (not replaceable)	4 A		6.3 A	
External Fuse (recommended) MCB curve B	10 A		16 A	
Battery Output				
Boost charge (25 °C) (at In)	28.8 Vdc		28.8 Vdc	
Max. time Boost Charge	15 h		15 h	
Min. time Boost Charge	1 min.		1 min.	
Float charge (25 °C) (at In) (max)	27.5 Vdc		27.5 Vdc	
Jumper Configuration battery type (V/cell)	2.23;2.25;2.27;2.3		2.23;2.25;2.27;2.3	
Recovery Charge	2 – 20 Vdc		2 – 20 Vdc	
Charging current max Ibatt	5 A ± 5%		10 A ± 5%	
Charging current limiting Iadj	20 - 100% Ibat		20 - 100 % / Ibat	
Reverse battery protection	Yes		Yes	
Sulphated battery check	Yes by Jumper		Yes by Jumper	
Detection of element in short circuit	Yes		Yes	
Quiescent Current max.	≤ 100 mA		≤ 100 mA	
Charging Curve automatic: IUoUo	4 stage		4 stage	
Remote Input Control (RTCONN cable)	Boost / Float		Boost / Float	
Battery Charge Capacity	3 – 7 – 12 – 18 Ah	45Ah	12 – 18 Ah	45Ah
Charging Current Limiter Position	Min: 20% Ibat	Max: 100% Ibat	Min: 20% Ibat	Mid: 50% Ibat
Maximum battery internal resistance	600 mΩ	400 mΩ	300 mΩ	
Load Output				
Output voltage Vdc (at In)	22 - 28.8 V		22 - 28.8 V	
Out Voltage Max	32 V		32 V	
Nominal current Iload (Imax,a)	4 A ± 5% (3 – 7 – 12 - 18 Ah)	3 A ± 5% (45 Ah)	8 A ± 5%	
Continuous current (without battery) Iload= In (Imax,b)	5 A ± 5%		9 A ± 5%	
Continuous current (I min)	0 approx.		0 approx.	
N° 2 Out true MRF102 Fuse Breaker	1 – 5 A x Output (approx.)		1 – 10 A x Output (approx.)	
Continuous current (I min) on N°2 Out	0 approx.		0 approx.	
Start From Battery Without Main (Remote Input Control)	RTCONN (cable) Push Button		RTCONN (cable) Push Button	
Threshold alarm Battery almost flat (Low Batt)	20 – 21 Vdc batt		20 – 21 Vdc batt	
Protections against total discharge (LVD)	19 – 20 Vdc batt		19 – 20 Vdc batt	
Efficiency (at 50% of rated current)	≥ 90 %		≥ 83 %	
Residual Ripple	≤ 300 mVpp		≤ 300 mVpp	
Turn-On delay after applying mains voltage	1 sec. (max)		1 sec. (max)	
Start up with Strong Load (capacitive load)	Yes, Unlimited		Yes, Unlimited	
Dissipation power load max (W)	17		28	
Signal Output (free switch contacts)				
Main or Backup Input Power	Yes		Yes	
Low Battery	Yes		Yes	
Battery or system fault	Yes		Yes	
Type of Signal Output Contact				
Dry Contact. Current can be switched (EN60947.4.1): Max: DC1: 30 Vdc 1 A; AC1: 60 Vac 1A (Resistive load) Min: 1mA at 5 Vdc (Min permissive load)				
Fault System / Low Battery	C	NC	NO	
Main or Back Up	C	NC	NO	
Signal Input / Output (RJ45)				
Temp. Comp. Battery (with external probe): Aux Out	RJ Temp (cable)		RJ Temp (cable)	
Remote monitoring display: Aux Out	RJ 45 (cable)		RJ 45 (cable)	
Climatic Data				
Ambient temperature (operation)	-5 ÷ +40°C		-5 ÷ +40°C	
De Rating Ta > 40°C	- 2.5%(In) / °C		- 2.5%(In) / °C	
Ambient temperature Storage	-40 ÷ +85°C		-40 ÷ +85°C	
Humidity at 25°C no condensation (max.)	95% to 25°C		95% to 25°C	
Altitude: 0 to 2 000m - 0 to 6 560ft	No restrictions		No restrictions	
Altitude: 2,000 to 6,000m - 6,560 to 20,000ft	De-rating 5°C/1000m		De-rating 5°C/1000m	
Cooling	Auto convention		Auto convention	
General Data				
Insulation voltage (IN/OUT)	3000 Vac		3000 Vac	
Insulation voltage (Input / Earth, PE)	2000 Vac		2000 Vac	
Insulation voltage (Out Load & Battery / Earth, PE)	500 Vac		500 Vac	
Insulation voltage (Out Load & Battery / Fault System & Main or Back Up terminal)	500 Vac		500 Vac	
Protection Class (EN/IEC 60529)	IP30		IP30	
Reliability: MTBF IEC 61709	> 300,000 h		> 300,000 h	
Pollution Degree Environment	2		2	
Protection class (PE Connected)	I, with PE		I, with PE	
Dimensions (w-h-d)	305x360x185 mm		305x360x185 mm	
Weight	kg 6.8 approx.		kg 7 approx.	
Fuses				
Internal fuse (not replaceable)	4 A		6.3 A	
Battery Fuse (F) Type: Blade Fuse	20A		20 A	
MRF102 Electronic Fuse	10A Auto Restart		10A Auto Restart	