



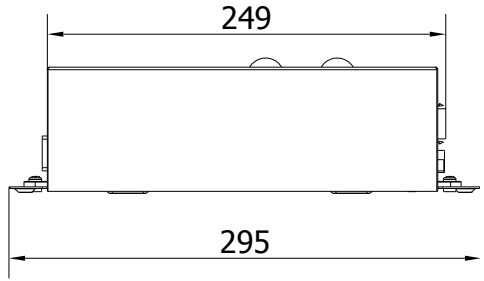
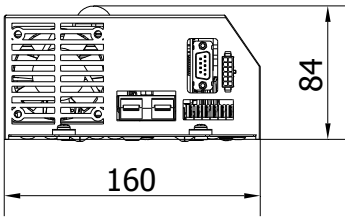
HIGH FREQUENCY BATTERY CHARGERS

NG1 Battery Charger

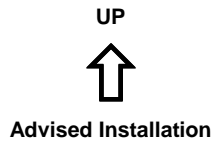
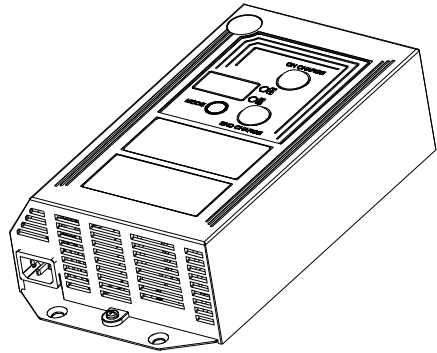
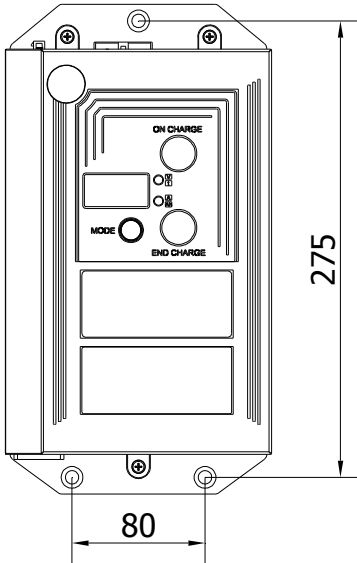
User's and Installation MANUAL



Mechanical dimension

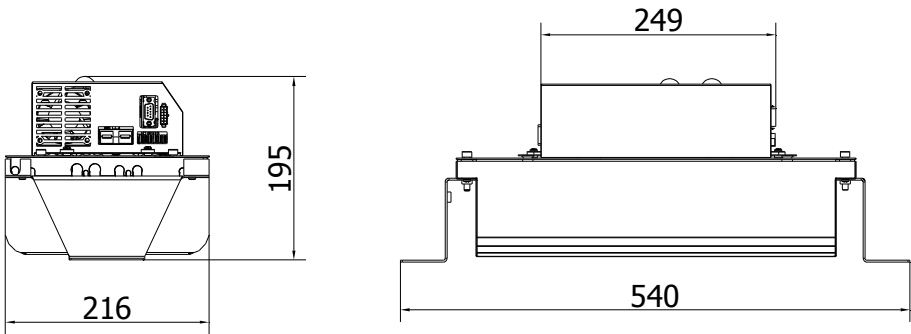


Drilling details

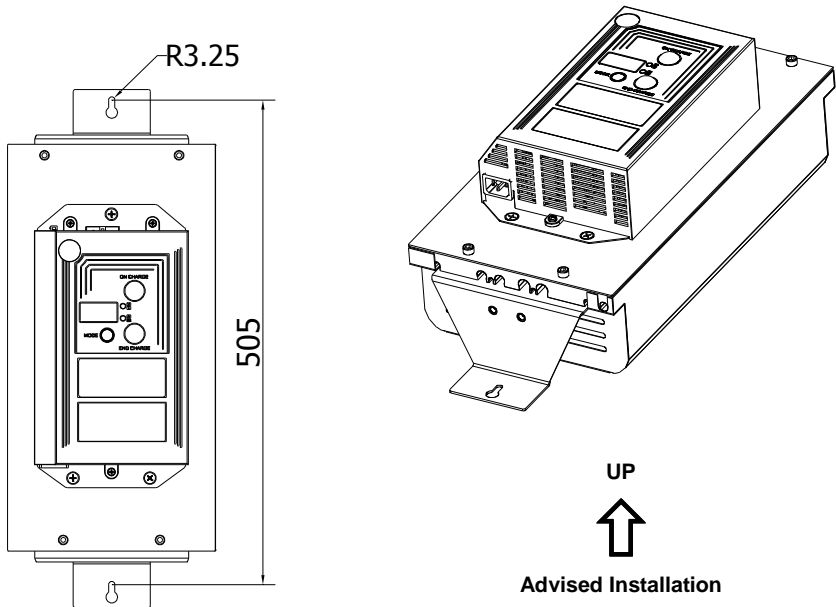


N.B. All dimensions are expressed in mm

Mechanical dimension with Air Pump



Drilling details with Air Pump



N.B. All dimensions are expressed in mm



ATTENTION: To reduce the risk of electric shock, do not remove cover. Refer servicing to qualified service personnel. Disconnect the mains supply before connecting or disconnecting the links to the battery.



During operation it is possible that some parts of the product reach high temperatures.



Read the Instruction Manual carefully before use. Verify that the selected charge curve is suitable for the type of battery You have to re-charge.



The product suffers from moisture: ensure installation prevents any liquids entering.

Explanation of Graphical Symbols:



Is intended to alert the user to the presence of uninsulated "dangerous voltage" within the equipment's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock to persons.



Warning to user: some contact surfaces may become hot.



Is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the equipment.



Warning to user: the product suffers from humidity.

This product is covered by warranty. The relative warranty certificate is attached to the Instructions Manual. If the Manual is not provided with this certificate, please ask your retailer for a copy.

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Designated use

The NG1 battery charger is an electronic appliance, only for professional use, developed to recharge different battery types depending on the firmware installed. According to the application and the software programmed it is also allowed as power supply use.

Use safety instructions

Battery charger NG1 has been designed to provide safety and reliable. It is necessary to observe the following precautions in order to avoid damage to persons and to the battery charger:

- Read the installation instructions contained in this Manual carefully. For further information put the Manual in a proper place.
- This charger must be installed by qualified personnel.
- Risk of electric shock. If the charger is provided with a plug, connect it only to an outlet that has been properly installed and grounded in accordance with all local codes and ordinances.
- A grounded outlet is required to reduce risk of electric shock. Do not use ground adapters or modify plug
- Do not touch uninsulated portion of output connector or uninsulated battery terminal.
- To avoid damaging the power cord, do not put anything on it or place it where it will be walked on. If the cord becomes damaged or frayed, refer to qualified personnel for replacing it immediately.
- Do not operate charger if the AC supply cord is damaged or if the charger has received a blow, been dropped, or otherwise damaged in any way. Refer all repair work to qualified personnel.
- For safety and electromagnetic compatibility, the battery charger has a 3-prong plug as a safety feature, and it will only fit into an earthed outlet. If you can not plug it in, chances are you have an older, non-earthed outlet; contact an electrician to have the outlet replaced. Do not use an adapter to defeat the grounding.
- If you are using an extension cord or power strip, make sure that the total of the amperes required by all the equipment on the extension is less than the extension's rating.
- Avoid recharging of non-rechargeable batteries.
- Do not use to charge starter batteries installed on board of thermal engine cars.
- Verify that the nominal voltage of the battery to be re-charged corresponds to the voltage stated on the battery charger name plate.
- Verify that the selected charging curve is suitable for the type of battery to be re-charged. In case of doubt, consult Your retailer. The producer will not accept any responsibility in case of mistaken choice of the charging curve that may cause irreversible damage to the battery.
- To recharge Lead Acid batteries: WARNING: Explosive Gas – Avoid flames and sparks. The battery must be positioned in a correctly cooled place.
- Ensure that no flammable materials are stored in the area surrounding the charger.
- If the battery charger does not work correctly or if it has been damaged, unplugged it immediately from the supply (turn off the switch) and from the battery socket and contact a retailer.
- Do not try to service the battery charger yourself. Opening the cover may expose you to shocks or other hazards.
- Disconnect the mains supply or turn the charge off (turn off the switch) before connecting or disconnecting the links to the battery.

Installation instructions

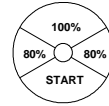
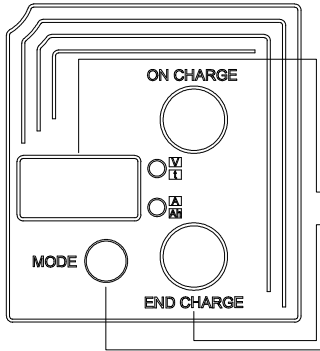
- This charger should be installed only by qualified personnel
- Do not operate on the charger while it is connected to the grid. Always disconnect it before.
- Do not modify or repair the charger. Only authorized personnel could do it
- Only installation instruction listed in this manual could be done by qualified personnel. Further action are avoided.

- Fix the battery charger to a stable surface through the appropriate holes inserted on the fixing flanges. In case of installation on a vehicle it is advisable to use anti-vibration supports.
- Ensure that no flammable materials are stored in the area surrounding the charger.
- Ensure all ventilation ports are not obstructed, to avoid the overheating. Do not put the battery charger near heat sources. Make sure that free space around the battery charger is sufficient to provide adequate ventilation and an easy access to cables sockets.
- To recharge Lead Acid batteries: **WARNING: Explosive Gas** – Avoid flames and sparks. The battery must be positioned in a correctly cooled place.
- Verify that the available supply voltage corresponds to the voltage that is stated on the battery charger name plate. In case of doubt, consult a retailer or local Electric Supply Authority.
- In order to protect against electric shock, please observe the in force local regulations. If an RCD is used, it is warmly recommended the use of a class A, or better a class B switch. **Warning:** in case of damage, the charger may generate pulsating fault currents.
- For safety and electromagnetic compatibility, the battery charger has a 3-prong plug as a safety feature, and it will only fit into an earthed outlet. If you can not plug it in, chances are you have an older, non-earthed outlet; contact an electrician to have the outlet replaced. Do not use an adapter to defeat the grounding.
- In order to avoid voltage drop, thereby assuring 100% charge at the battery, the output cables must be as short as possible, and the diameter must be adequate for the output current.
- After the installation make sure that all opening and doors of the charger are closed and secured

Maintenance instructions

- Make sure charge connections to battery terminals are tight and clean.

Visualization



Description
Digital Instrument
Ready Light
Digital adjustment mode

RED LED shows that battery is in the initial charging phase.

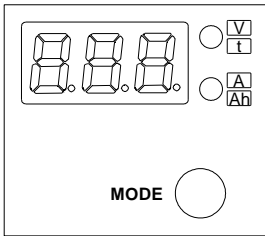
YELLOW LED shows that battery charger has reached 80% of charge.

GREEN LED shows that battery has reached 100% of charge.

Further information can be found in the description of the Charging Curve.

Digital Instrument

To set the compensation value made by the charger to balance the voltage drop on the cables please follow the procedure "Compensation setting of the voltage drop on output cables."



From the starting the digital instrument will display the string of the following parameters:

- **BATTERY VOLTAGE** (two-tone red upper led).
- **CURRENT** provided by the charger (two-tone red lower led).
- **TIME** in hours lacking to the end of charge (two-tone green upper led).
- **Ah** supplied (two-tone green lower led).
- **CONNECTED GADGETS** (no two-tone led on – only on a MASTER battery charge).

By pressing once the MODE button, the parameters' sequence is blocked and it will be kept the last value displayed. By pressing again on the MODE button the sequence of parameters restarts.

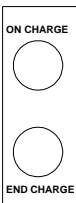
Compensation setting of the voltage drop on output cables.

While charging, with a long pressure of Mode Button, you can program the voltage cables drop. Please execute the following operations while charger is at maximum current.

1. Gauge the voltage drop at the ends of the output bars of the battery charger (close to the cover).
2. Gauge the voltage on the battery poles.
3. Make the difference between the two values to get the voltage drop compensate.
4. Press shortly the MODE button (ROLL) until reaching the nearest voltage value to the desired one: it is possible to ROLL parameters between 0,0V e 1,5V with steps of 0,1V.
5. Press long the MODE button (ENTER) to confirm.

Ready Light

Charging status and current phase of charge of the equipment is indicated through the light station:



PHASE	RED LED	GREEN LED
Phase 1	On	Off
Phase 2	On with short flashing	Off
Phase 3	On (firmware CB: off)	On with short flashing
Phase 4	On with short flashing (firmware CB: off)	On with short flashing (firmware CB: on)
Phase5-Phase6	Off	On with short flashing (firmware CB: on)
End of charge	Off	On

When using the remote visualisation through two-tone LED (AUX F – Pin 1 e 2), the following signals are valid:

PHASE	RED	GREEN	YELLOW
Phase 1	On	Off	Off
Phase 2	On with short flashing	Off	Off
Phase 3	Off	Off	On
Phases 4-5-6 & End charge	Off	On	Off
S/S or alarm	Off	Off (firmware CB: On with short flashing)	Off

IMPORTANT: according to the charging curve used maybe some phases are lacking.

IMPORTANT: the above description complies only with the standard CB firmware. For different firmware please refer curve spec sheet or contact the retailer/producer.

Charging curve selection (if display is present)

Depending on the duration of the pressure of the MODE button, you can perform different actions:

1. Long pressure (at least 1 second): during battery charger setting, it means ENTER
2. Short pressure (less than 1 second): during battery charger setting, it means ROLL.

Setting:

1. Turn on the charger while pressing the MODE button.
2. **ROLL:** select the **CAN Node** number. Choose a value according to the following specification:
CB Firmware ()*:
 - Choose a value between 1 and 125. 126 is a forbidden value that forces the charger to enter the charging curve selection procedure
 - Node 10 corresponds to a MASTER unit charger (connected with one or more SLAVE units).
 - Nodes from 1 to 9 identify the ID of the SLAVE (used together with a MASTER).
 - Nodes from 11 to 125 identify a STAND-ALONE charger (used as a single unit).*All other firmware versions (*)*:
 - Node 10 corresponds to a MASTER unit charger (connected with one or more SLAVE units).
 - Nodes from 1 to 8 identify the ID of the SLAVE (used together with a MASTER).
 - Node 9 identifies a STAND-ALONE charger (used as a single unit).
3. **ENTER:** **CAN Node** confirmation. **Battery type** selection begins.
4. **ROLL:** **Battery type** selection.
Choose BA1 for Lead-Acid batteries, Choose BA2 for Gel electrolyte batteries.
5. **ENTER:** **Battery type** confirmation. **Curve selection** begins.
6. **ROLL:** **Curve selection**.
The charger offers a total of five different charging curves. The available selections are listed below:
 - a. CU1: IU1a curve plus equalization and maintenance
 - b. CU2: IU1U2ob curve
 - c. CU3: power supply curve
 - d. CU4: User programmable curve
 - e. CU5: Desulphation curve
7. **ENTER:** **Curve selection** confirmation. **Capacity** selection begins.
8. **ROLL:** **Capacity** selection.
The starting point for the capacity selection is the nominal value, but you can select a value included between 50% and 140% of the nominal one in steps of 10%.
9. **ENTER:** **Capacity** confirmation. **Recharging time** selection begins.
10. **ROLL:** **Recharging time** selection.
Starting from a suggested **Recharging time** (according to the capacity chosen at the previous step) this time, expressed in hours, can only be increased up to 20 hours max.
11. **ENTER:** **Recharging time** confirmation. In the *CB firmware (*)*, **Seasonal thermal compensation** selection begins; in all other *firmware versions (*)* skip to step 14.
12. **ROLL:** **Seasonal thermal compensation** selection (*CB firmware (*)* only).
The charger offers a total of three different seasonal thermal compensations, which add or subtract a fixed amount to the output voltage during charging phase 1 and 2. Please note that the Seasonal thermal compensation will only take place if the thermal compensation through the external probe is not enabled. The available selections are listed below:
 - a. Std: Standard compensation; no additional compensations are calculated. This means that if the thermal compensation through external probe is enabled, the charger will perform the usual correction algorithm (example, 5 mV/(cell °K)), otherwise no correction at all will be performed.
 - b. Hot: Hot season compensation; -40 mV/cell correction
 - c. CoL: Cold season compensation; +100 mV/cell correction
13. **ENTER:** **Seasonal thermal compensation** confirmation.
14. The battery charger goes into stand-by mode until output cables are connected to battery binding-clamps (if connections have already been done before starting the setting, once arrived at point 14, charge immediately starts).

Warning: if some trouble or mistake occurred during the setting procedure, switch off the battery charger through the rotary ON-OFF switch, then switch on again by keeping pressed the MODE button and restart the procedure from the beginning.

(*) **Note:** the firmware version can be determined from the product code. For example, G9ITCB-07GRXX

(**) **Note:** **Curve selection** takes place before **Battery type** in *CB firmware*

Charge delay selection and usage (if display is present – *CB firmware only*)

To enter a delay between the connection of the battery and the actual begging of the charge:

1. Hold a long pressure pressure on the MODE button during the standby state (battery unplugged, the display shows three dots). The display shows "dLY".
2. **ROLL:** selection of the **Charge Delay**, expressed in hours and tens of minute (e.g.: "1.3h" indicates a one hour and thirty minutes delay).
3. **ENTER:** **Charge Delay** confirmation.

Each time a battery is connected, the charger will show a blinking message indicating the hours and tens of minute to the beginning of the charge (in the "h.m" format, where *h* stands for hours and *m* stands for tens of minutes).

It is also possible to skip the delay and immediately start the charge by holding a long pressure on the MODE button during the execution of the delay.

In case of disconnection of the battery during the execution of the delay, the charger will go back to the standby state.

Firmware Release indication (if display is present – CB firmware only)

When the charger is turned on, the display will show "Fir" followed by a number. This number indicates the firmware release: for example, "1.03" means CB CURVE, revision 1.03.

Alarms

When an alarm situation stopping the charge occurs, the display shows one of the information below according failure detected:

<A> <alarm code identified with a 2 digits code>

The table below describe the alarm list.

Display code	Alarm Type	Charge stop	Description
1	LOGIC FAILURE #1	Yes	Trouble on current circuit (turn off/on the charger. If the problem persists please contact customer service).
2	CAN BUS KO	No	Trouble on CAN communication (verify CANBUS communication).
3	WATCHDOG	Yes	Logic board trouble (turn off/on the charger. If the problem persists please contact customer service).
5	HIGH BATTERY TEMPERATURE	Temporary	Battery temperature over than 55°C (the charger restarts when battery temperature goes under 50°C).
7	OVERCURRENT	Temporary	Anomalous input current absorption (charger restarts after 3 seconds. If the problem persists please contact customer service).
8	HIGH TEMPERATURE	Yes	Internal high temperature (turn off/on the charger. If the problem persists please contact customer service).
9	MISMATCH VOLTAGE	Yes	Trouble on voltage circuit (turn off/on the charger. If the problem persists please contact customer service).
10	TIMEOUT	Temporary	End of Phase 1 due to timeout (check if charger is suitable for the specified battery type – disconnect the battery).
11	OVER DISCHARGE	No	Over discharged battery
12	DEEP DISCHARGE	No	Deeply discharged battery.
13	CONNECTION FAULT	Temporary	Connection fault in the output cables. Disconnect the battery and wait for the display to show three dots before connecting a new battery.
14	PUMP MISTAKE	No	Air pump mis-working
15	TH. SENSOR KO	No	Thermal sensor failure.
16	LOGIC FAILURE #2	Temporary	Voltage sag (charger restarts after 3 seconds. If the problem persists please contact customer service).
17	FLASH CHECKSUM	Yes	Error in flash memory (turn off/on the charger. If the problem persists please contact customer service)
18	EEPROM KO	Yes	Problem in EEPROM communication (turn off/on the charger. If the problem persists please contact customer service).
21	LOGIC FAILURE #3	Yes	The output voltage has exceed a safety threshold (turn off/on the charger. If the problem persists please contact customer service).
29	CLOCK BATTERY OFF	No	The Clock battery is discharged or removed
30	NODE RESET	Yes	The CAN Node has been set to 126, which is the reset value. The charger forces you to enter again the Changing settings (see the charging curve selection section)

Notes:

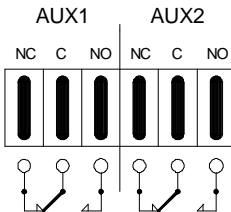
- A05: The charge restarts once the battery temperature reaches a value lower than 50°C.
 - A11: Notice on the battery status. By pressing the MODE button, a desulphation phase start followed then by the standard charge.
 - A12: Notice on the battery status. The standard charge is starting anyway
 - A15: With the thermal sensor out of order the battery charger behaves as if it was not equipped with the external probe
- Each temporary alarm, restarts the charge after alarm conditions disappear.

Each alarm, except the non-blocking ones, give also an audible alarm.

Auxiliary connections

Micro-fit contacts	
Pin N°	Description
1	Pump pressure sensor
2	Generic digital input
3	GND
4	Hardware S/S
5	GND
6	Not used
7	PPT100
8	NPT100
9	Green LED
10	GND
11	Red LED
12	Not used

CANBUS connector pinout	
Pin N°	Description
1	CAN low
2	CAN low
3	CAN negative
4	+12V (internal)
5	CAN high with termination (120Ω)
6	GND (internal)
7	CAN high
8	CAN high
9	CAN positive



Rated current/Maximum peak current	A	4/6
Rated voltage/Maximum switching voltage	Vac	50/50
Breaking capacity DC1 30	A	2
Minimum switching load	mW(V/mA)	10 (0.1/1)
Mechanical life AC/DC	cycles	~10x10 ⁹
Rated voltage between contacts and the output negative pole	Vac	50

Unless otherwise stated, the auxiliary contacts provide the following functions:

Section	Function	Description
AUX1	Mains Presence	When the equipment is switched on, the contact Normally Open (NO) CLOSES and instead the contact Normally Closed (NC) OPENS.
AUX2	End of charge	When the Stop Phase is reached, the contact Normally Open (NO) CLOSES and instead the contact Normally Closed (NC) OPENS.

Addition feature whit air pump

Standard Version

The Air Pump technology generates a re-mix of the acid inside the battery by a delivery of air pumping.

The battery charger controls the air pump by an auxiliary contact (generally AUX1).

An air injection cycle along all the charging period is held as per requirements of the battery specifications.

Pressure sensor version

Further to the characteristics of the standard version it is also available an electronic circuit equipped with an air pressure sensor.

At the beginning of the charging process, the sensor verifies that the pressure in the circuit is included in a definite window between a minimum and a maximum value (look at the following table). When an anomaly occurs the battery charger will modify the charging factor by effecting a charge without detecting and controlling the Air Pump

Air Pump Technical Features

Description	Symbol	Test Condition	Value and/or Range	Unit
Power absorbed by the Air Pump	P_{ap}	Air Pump controlled	90	W
Input fuse	-	Equipment interns	1,6	A
Maximal dimensions	axbxc	Without connecting cables	540x216x195	mm
Weight	-	Without connecting cables	7,5	kg
Air Delivery*	Q	Air Pump controlled	4÷13	l/min
Available pressure range	Δp	Starting charging point	50÷250	mbar

* To know the effective air delivery please refer to the plate values.



This device is in conformity with the Low Voltage directive 2006/95/CE and EMC directive 2004/108/CE and their further modifications.

TECHNICAL FEATURES

Ta=25°C unless otherwise specified

Mains side

Description	Symbol	Test Condition	Value and/or Range	Unit
Supply Voltage	Vin	-	115 ± 10%	Veff
Frequency	f	-	50 ÷ 60	Hz
Absorbed Maximum Current	Iin _{max}	P = P _{max}	13	Aeff
Inrush Current	-	Vin = 115Veff	< 5,4	A
Displacement Factor	DPF/cosφ	P = P _{max}	1	-
Power Factor	P.F.	P = P _{max}	0,68	-
Absorbed Minimum Power	Pin _{min}	End of charge	< 5	W
Absorbed Maximum Power	Pin _{max}	P = P _{max}	1,7	kW

Battery side

Description	Symbol	Test Condition	Value and/or Range	Unit
Output current	I	-	See curve	-
Maximum output current	I1	Phase 1	See curve	A
Output current ripple	-	I = I1	< 5%	-
Absorbed current	I _a	Equipment turned off	< 0,2	mA
Output voltage	U	-	See curve	-
Constant output voltage	U1	Phase 2	See curve	V
Thermal compensation of output voltage	dU1/dT	Phase 2	-5 (programmable)	mV / (°C·cell)
Operating range of Temperature Sensor	ΔT	-	from -20 to +50	°C
Output voltage ripple	-	U = U1	< 1%	-
Maximum power supplied	P _{max}	U = U1, I = I1	1440	W
Output capacity	C	-	Depend on the model (>0,3)	mF

General

Description	Symbol	Test Condition	Value and/or Range	Unit
Operating range of temperature	ΔT	-	from -20 to +50	°C
Maximum relative humidity	RH	-	90%	-
Switching frequency	f _c	-	50 ± 5%	kHz
Efficiency	η	At each operation condition	> 85%	-
Maximum size	a×b×c	Without connecting cable	295×160×84	mm
Weight	-	Without connecting cable	2,2	kg
Enclosure class	-	-	IP20	-

Protection and Safety

Description	Symbol	Test Condition	Value and/or Range	Unit
Insulation	-	Mains to Battery side	1250	V _{AC}
Insulation	-	Mains side to Earth	1250	V _{AC}
Insulation	-	Battery side to Earth	1250	V _{AC}
Leakage current	I _L	Supplied equipment	< 3	mA
Input fuse	F1	Inside the equipment	10/20	A
Output fuse	F2	Inside the equipment	about 1,2×I1	A
Minimum output voltage of operation (Battery Detector)	-	Equipment turn on	1,5	V/cell
Maximum output voltage	Um	Phase 3 (IU1a - IU1Uo)	See curve	V
Reverse output polarity	-	At the connection to the Battery	Protection provided by fuse F2	-
Thermal protection of semiconductors (Temperature of Thermal Alarm)	-	Ta=55°C	100	°C
Safety Requirements (Rules)	-	EN60335-1, EN60335-2-29	-	-
EMC Requirements (Rules)	-	EN55014-1, EN61000-3-3 EN55014-2, EN61000-4-2 EN61000-4-4, EN61000-4-5 EN61000-4-6, EN61000-4-11	-	-

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