

TECHNICAL MANUAL



Dolphin pro HD+

Battery charger

24V40A

REYA Code: 399.165

24V60A

REYA Code: 399.175

24V100A

REYA Code: 399.185

SAFETY PRECAUTIONS

NOT-DOLPROHD-00

 **TO PREVENT ANY RISK OF ELECTRIC SHOCK OR FIRE, READ THIS MANUAL CAREFULLY BEFORE INSTALLING THE EQUIPMENT.**

In the event of a problem or if you do not understand, contact **REYA**.

This equipment is not designed for use by people (including children) with diminished physical, sensorial or mental capacities or people without experience or knowledge of such equipment, unless they have received instructions in the use of the equipment from a person responsible for their safety or are under the supervision of such a person. Ensure that children are supervised to avoid them playing with the device.

This equipment contains components that may cause electric arcs or sparks, when connecting cables for example. To prevent any risk of fire or explosion, do not install this equipment close to inflammable materials, liquids or gases.



Installation precautions.

In order to prevent any risk of permanent damage to the charger, the following recommendations should be strictly observed.

- ▶ The device must not be installed close to a heat source.
- ▶ It must not be installed in an airtight or badly-ventilated compartment.
- ▶ The cooling vents must not be obstructed.
- ▶ Leave a free space of at least 10 cm all around the case, to allow proper convection.
- ▶ This device must not be exposed to running water, water spray or dust of any nature.

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▶ It is recommended that the charger be mounted vertically, with the cable exit facing downwards.

▶ The case must not be mechanically modified, for example by drilling additional holes.

▶ In no sense is this device a toy. It should therefore not be left in the hands of a child.



Connection precautions.

To prevent any risk of electric shock or irreversible damage to the equipment, ensure you scrupulously respect the recommendations below.

▶ The installation to which the device is connected must be compliant with applicable standards.

▶ The charger is designed to operate on single phase mains power supplies 230V 50Hz or 115V 60Hz. 115V / 230V selection is automatic. (230V only for the 24V100A model)

▶ The mains power supply must have a main power on/off switch, with differential protection, to protect persons, notably in cases of electric shock. Refer to the charger electrical consumption characteristics for the rating and selection of the protection circuit breaker.

▶ Before connecting the charger, the mains power cable grommet supplied in the package carton must be assembled and properly mounted on the case (using the mounting nut), in the specific hole provided.

▶ For safety, the charger EARTH terminal (marked PE "Protective Earth") must be connected to the main site earth circuit

(green/yellow wire in the mains power cable). Refer to the wiring diagram for more information.

▶ To prevent overheating, check that cables are the specified section and that connections are tight.

IMPORTANT: The charger is not protected against batteries being connected with reverse polarity. A wrong connection on the battery side automatically destroys the battery fuses and causes permanent damage to the electronics board.



Startup precautions.

▶ In order to prevent any risk of electric shock when switching on or during operation, the protection cover must be installed and properly screwed to the mount.

▶ The charger complies with applicable regulations concerning emitted interference and immunity to external interference (see EMC paragraph in the Technical Specifications section).

▶ When operating the charger, ensure that it is not subjected to conducted or radiated interference at levels above the legal limits (e.g. charger too close to a powerful transmitter), as such exposure may cause malfunctions.

▶ Also, the charger emits conducted and radiated interference at levels compliant with applicable regulations. Ensure that other equipment, used close to the charger, is electro-magnetically compatible, otherwise malfunctions may be caused.

Charger serial number

The serial number is shown on the grey or white label, bonded on one of the sides of the charger. The serial number is vertical. The first two digits indicate the year of manufacture (e.g. 15 for 2015), followed by a letter indicating the month of manufacture (e.g. C for the month of March), followed by a 5-digit number which is the charger number within the series.



Important Note on the choice of charge curve

Using a charging cycle that is incompatible with the battery technology may seriously damage the battery.

This is particularly true for cycles with charge voltages that exceed the battery manufacturer's recommended charge voltage.

Example: Considerable risk of battery overheating and release of gases that represent a health hazard.

Curve No. 9 is compatible with a LiFeSo4 battery, on condition that the battery has a BMS (Battery Management System) protection function.

You should refer to the battery manufacturer's recommendations when selecting the charge cycle.

Maintenance precautions

In order to prevent any risk of electric shock during maintenance work, the following recommendations should be strictly observed before carrying out any work:

- ▶ Maintenance work should only be carried out by an appropriately qualified technician.

- ▶ To avoid danger, damaged mains power and/or battery cables should only be replaced by a qualified person.

- ▶ Mains power must be disconnected (cable or on/off switch).

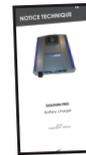
- ▶ The -DC or -BAT battery side connection must also be disconnected to avoid any energy transfer.

- ▶ Wait 5 minutes for the high voltage capacitors to discharge (on the electronics board), before working inside the case.

- ▶ Fuses should be replaced by fuses of identical rating and performance.

WHEN YOU RECEIVE THE CHARGER

Package contents



- ▶ Charger.
- ▶ Installation manual.



- ▶ Mains power cable grommet with its mounting nut (to be installed on the case before connecting the cables).



- ▶ Battery temperature sensor.

Preliminary checks



Check the charger identification label, bonded on one of the case sides, to ensure that the technical data specified corresponds to your requirement (mains power voltage, charger rating, etc.).

charger rating, etc.).

Installation conditions

The charger is mounted using 4 screws, dia. 4mm (not supplied), on a support or wall that is sufficiently strong.

Check that the mounting screws used are compatible with the type of mounting wall (resin, wood, metal, etc.).

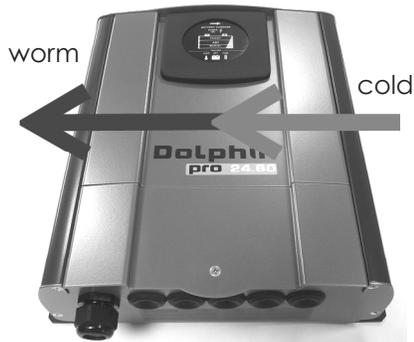
The charger should be positioned against the wall and mounted firmly. Ideally, the charger should be mounted vertically, with the cable exit facing downwards. Leave a free space of at least 10 cm all around the case, to allow optimum convection, particularly on the cooling air inlet/outlet sides.

Inside the charger, the cooling air flows from right to left when viewed from the front (see photo below).

INSTALLATION

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Cooling air flow



CONNECTIONS

The charger connections are accessible by removing the hatch in the front panel. To open the hatch, remove the mounting screw. Then rotate the hatch to remove it.

Before connecting the cables, the mains power cable grommet must be installed and properly mounted on the case, in its specific hole (hole on left when viewed from the front of the charger).

The cable grommet is mounted on the case using the plastic nut supplied. The nut is installed inside the case. Ensure that the nut is properly tightened.

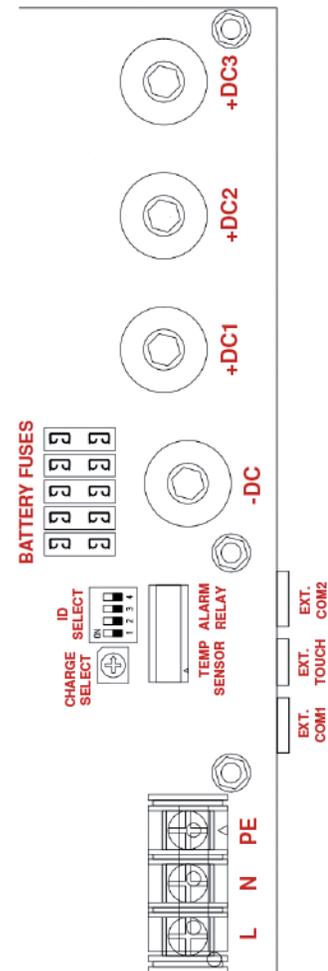


CONNECTIONS

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CONNECTION DETAILS



CONNECTIONS

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Identification	Functions
L	AC mains power phase, max. 10mm ² (wire colour code: brown or black)
N	AC mains power neutral, max. 10mm ² (wire colour code: blue, white or red)
	AC mains power earth, max. 10mm ² (wire colour code: green/yellow or green)
-DC	Battery negative (common), pin M8 (wire colour code: black)
+DC1	Main battery positive, pin M8 (wire colour code: red)
+DC2	Auxiliary 2 battery positive, pin M8 (wire colour code: red)
+DC3	Auxiliary 3 battery positive, pin M8 (wire colour code: red)
CHARGE SELECT	Curve and battery charge mode selector, 10 positions (0 to 9)
BATTERY FUSES	Battery protection fuses (on the -DC supply)
EXT TOUCH	CAN bus for TOUCH screen connection
EXT COM1 & COM2	CAN bus for network operation
ID SELECT	Configuration charger ID (network operation)
TEMP SENSOR	Battery temperature sensor (2 wires no polarity, no direction)
RELAY	Alarm dry contact

CONNECTIONS

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AC CABLES AND CIRCUIT BREAKER

AC wiring

Check that cables are properly connected and that the connections are tight.

For the mains power supply, it is preferable to use an industrial cable, type HO7RNF. Observe the recommendations below.

Charger rating	230VAC 50Hz Length < 5m (16ft)	115VAC 60Hz Length < 5m (16ft)
24V 40A	2.5mm ² / AWG13	4mm ² / AWG11
24V 60A	2.5mm ² / AWG13	4mm ² / AWG11
24V 100A	4mm ² / AWG11	6mm ² / AWG9

AC circuit breaker

The AC mains power line must have an on/off switch with integral differential protection, to protect persons, notably in cases of electric shock.

Circuit breaker sensitivity must be 30mA. The circuit breaker current rating must correspond to the charger consumption. For this, observe the recommendations below.

Charger rating	Mains power 230V 50Hz	Mains power 115V 60Hz
24V 40A	8A – 30mA	16A – 30mA
24V 60A	10A – 30mA	20A – 20mA
24V 100A	20A – 30mA	-

Nota : The charger has an internal protection fuse on access L, which notably protects against a general fault on the electronics board. As the fault concerned is permanent, this fuse is not accessible for maintenance.

CONNECTIONS

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DC CABLES AND FUSES

DC wiring

Check that cables are properly connected and that connections are tight.

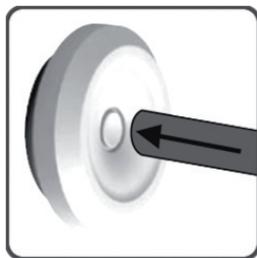
Battery cables should be as direct and short as possible.

Each battery output can deliver the full power of the charger and all cables should therefore be of identical section. Recommended cable sections are specified below.

Charger rating	Length < 2m (6ft)	Length from 3 to 5m (10 to 16ft)
24V 40A	16mm ² / AWG5	20mm ² / AWG4
24V 60A	25mm ² / AWG3	35mm ² / AWG2
24V 100A	35mm ² / AWG2	50mm ² / AWG0-1

The chargers are equipped with waterproof grommets with an “automatic” opening function.

Press the centre of the membrane to thread the cable through the grommet.



CONNECTIONS

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AC CABLES AND CIRCUIT BREAKER

DC fuses

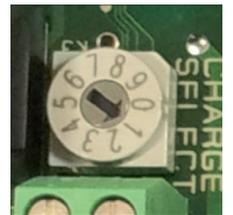
If fuses inside the charger have to be replaced, they should be replaced by fuses with identical characteristics and performance. Risk of permanent damage to the charger.

It is necessary and strongly recommended that a connections protection fuse be installed as close as possible to each positive output from the battery. This notably provides protection against a short circuit and/or battery cable overheating, for example due to cable sheath damage.

Charger rating	Charger internal fuse (-DC supply)	Battery external fuse (+BAT supply of each battery)
24V 40A	3 x 25A 32V rapid (mini automotive fuse)	60A 32V rapid
24V 60A	3 x 25A 32V rapid (mini automotive fuse)	80A 32V rapid
24V 100A	5 x 30A 32V rapid (mini automotive fuse)	150A 32V rapid

CHARGE CURVE SELECTION

The voltage, current and charge time parameters are monitored, as a function of the initial battery status, by up-to-date digital electronics, using a RISC micro-controller, which also monitors and optimises the charging process, through the exclusive “scanning charge” function.



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Battery performance and life cycle are thus enhanced.

The fully automatic charge cycles protect the battery against overloads, and the charger can thus be left permanently connected.

The charge programme is selected using the "CHARGE SELECT" rotary selector on the charger board. The selected programme number is indicated by the arrow (programme No. 1 on the photo above). The programme is selected using a small flat-head screwdriver.



CAUTION

Using a charging cycle that is incompatible with the battery technology may seriously damage the battery.

This is particularly true for cycles with charge voltages that exceed the battery manufacturer's recommended charge voltage.

Considerable risk of battery overheating and release of gases that represent a health hazard.

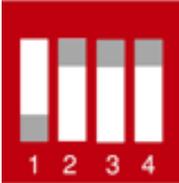
Curve No. 9 is compatible with a LiFeSo4 battery, on condition that the battery has a BMS (Battery Management System) protection function. You should refer to the battery manufacturer's recommendations when selecting the charge cycle.

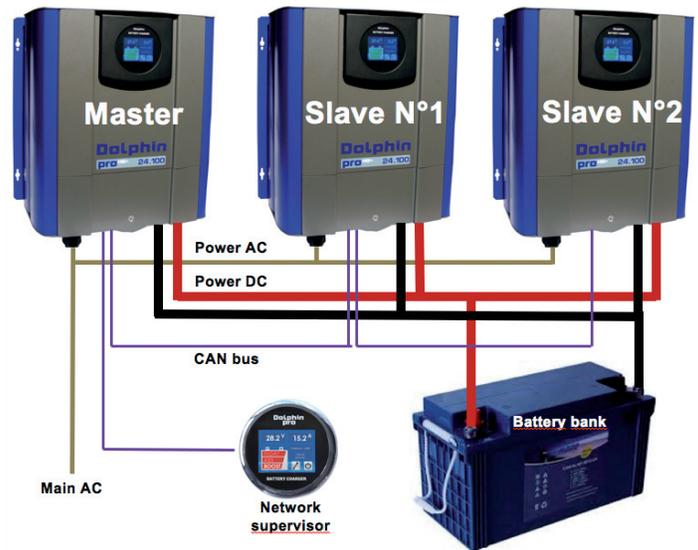
CONNECTIONS

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NETWORK MODE

<p>Toggle switch</p> 	<p>Position 2: Determines whether the charger is Master or Slave. Only ONE Master per battery ID. Position 2, 3, 4: Determine a battery ID, i.e. a group of chargers operating on one battery. Slave chargers attached to a Master must have the same battery ID.</p>
<p>Thumb-wheel</p> 	<p>On Master charger: Determines the charge curve for the Master and Slaves operating on one battery. On Slave charger: Determines the charger ID (or the Slave No., from 0 to 9) operating on one battery.</p>



	Toggle switch	Thumb-wheel
Charger Master	 <p>1: Master / 2 3 4: Network ID</p>	 <p>Charge cycle according to battery technology (10 positions)</p>
Charger Slave No. 1	 <p>1: Slave / 2 3 4: Network ID</p>	 <p>ID Slave No. 1 (e.g. position 1)</p>
Charger Slave No. 2	 <p>1: Slave / 2 3 4: Network ID</p>	 <p>ID Slave No. 2 (e.g. position 2)</p>

SETTINGS

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PROGRAMME		PHASE	VOLTAGE
0	Open lead-acid	V. BOOST V. FLOAT	28.8V 26.4V
1	Sealed lead-acid	V. BOOST V. FLOAT	28.4V 27.2V
2	Lead-calcium	V. BOOST V. FLOAT	29.6V 27.6V
3	"Delphi" type	V. BOOST V. FLOAT	30.8V 27.6V
Charge curve			
4	Type "Optima"	V. BOOST V. MAX V. FLOAT	29.6V 31.0V 27.6V
Charge curve			
5	Winter storage open lead-acid	V. BOOST V. FLOAT	28.8V 26.4V
Charge curve			

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6	Winter storage sealed lead-acid	V. BOOST V. FLOAT	28.4V 27.2V
Charge curve			
7	GEL & AGM	V. BOOST V. FLOAT	28.8V 27.6V
Charge curve			
8	Power supply	V. FLOAT	27.2V
Charge curve			
9	LiFeSo4 + integral BMS	V. FLOAT	28.8V
Charge curve			

OPERATION

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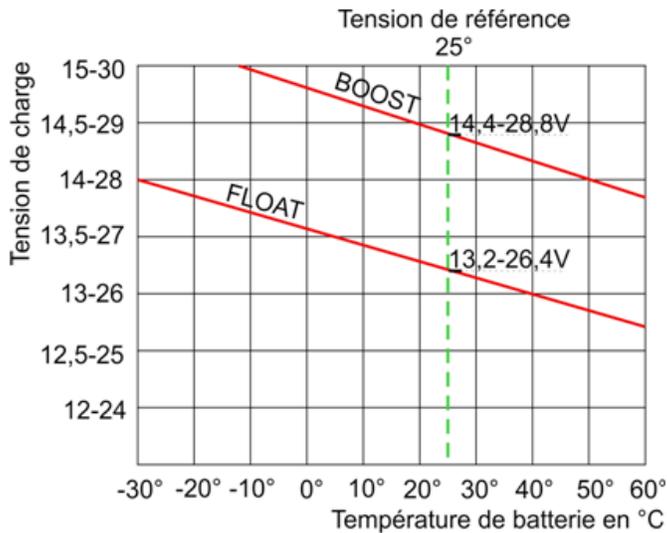
BATTERY TEMPERATURE SENSOR

The temperature sensor allows the charge voltage to be corrected as a function of the battery temperature.

This results in a longer battery life cycle, mainly in cases where the ambient temperature in the battery room is high.

The sensor is screwed onto the main battery positive terminal (generally ancillary). The 2 wires are connected to the "TEMP SENSOR" connector on the charger board (there is no polarity).

The compensation is around +/-25mV per °C for a 24V battery (see curves below).



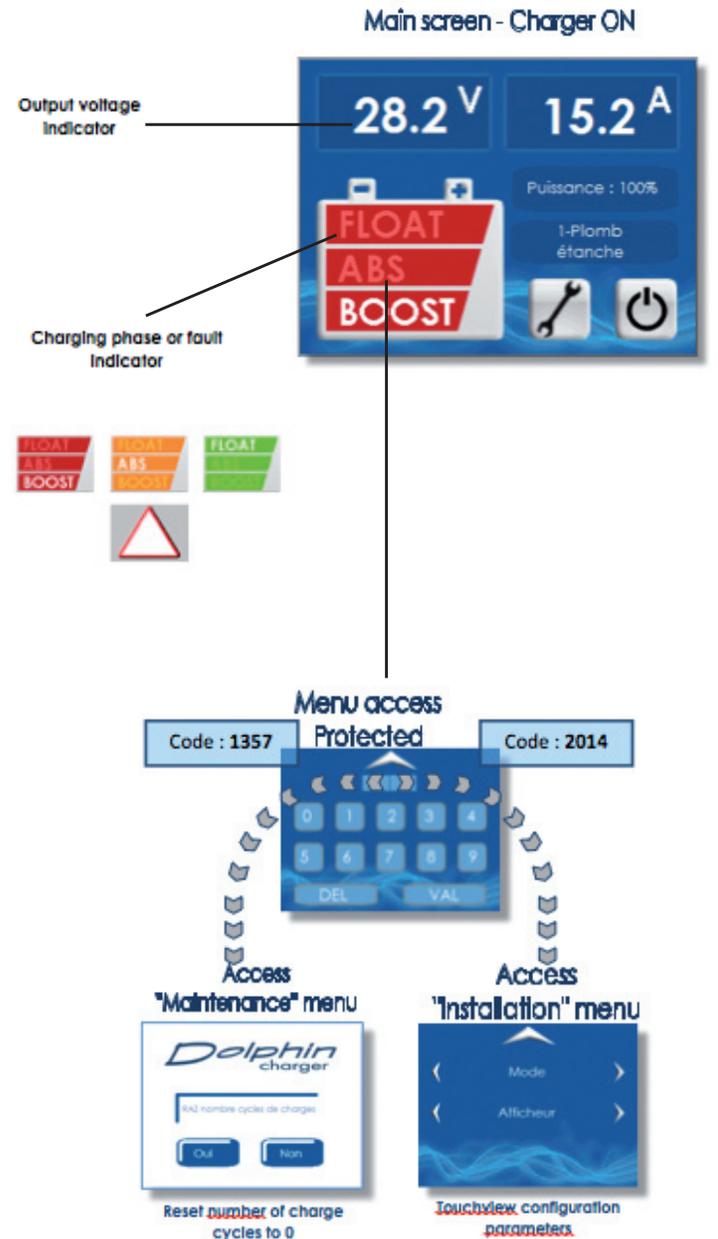
OPERATION

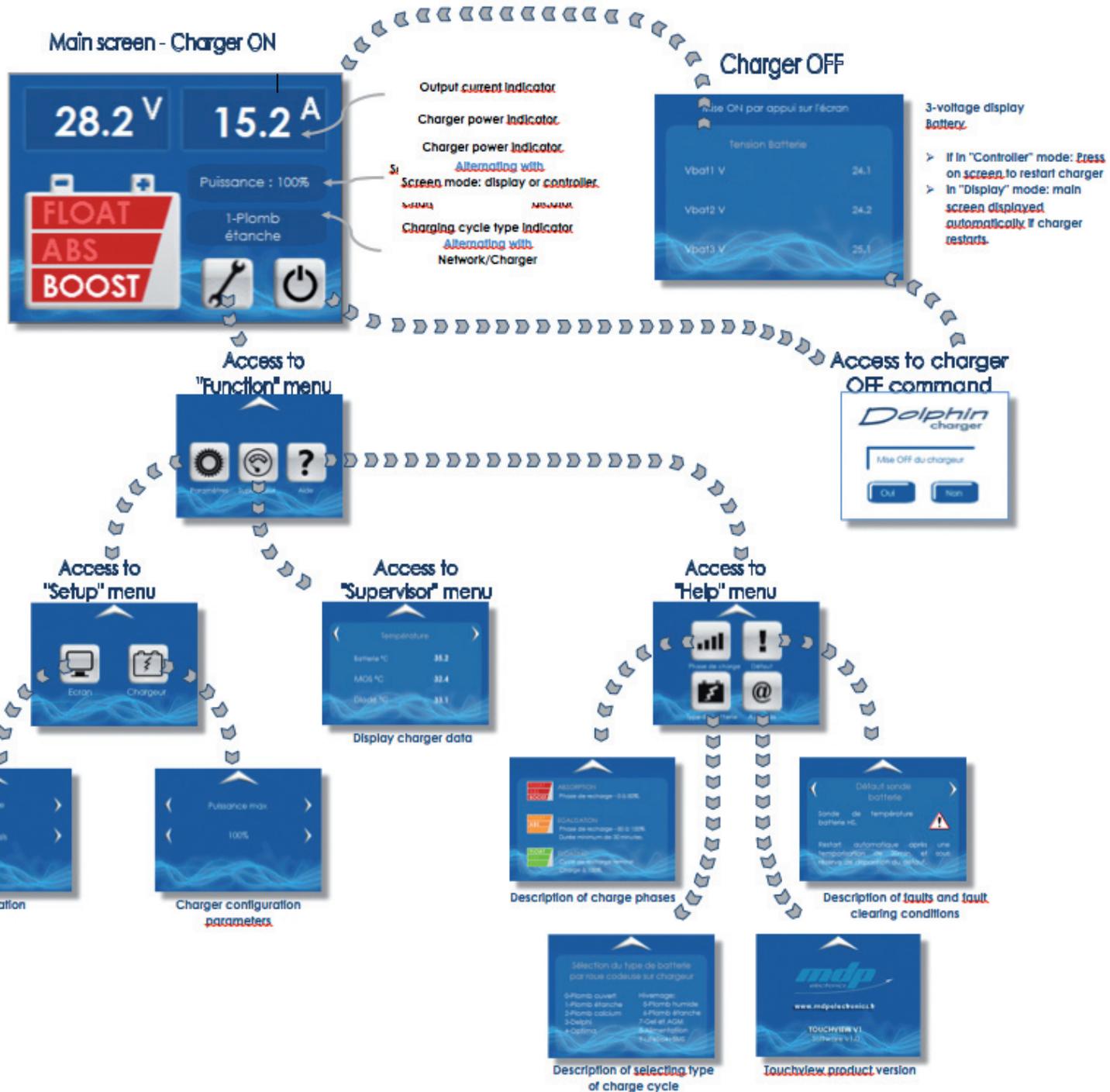
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TOUCH DISPLAY

This HD+ charger is equipped with an interactive colour TOUCH screen. Screen functions are described below.





Selecting a function:
 Back to previous page:
 Select previous parameter:
 Select next parameter:

TECHNICAL SPECIFICATIONS

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Technical specifications

	24V 40A	24V 60A	24V 100A
MAINS POWER CHARACTERISTICS			
Mains power voltage	115V 60Hz and/or 230V 50Hz (+/-15%)		230V (+/-15%)
Power factor	0.9 typ.		
Efficiency	87 typ.		
Inrush current	< 30A, limited by soft start		< 60A
Consumption	14A/6A	15A/9A	15A
Active power	1350VA	2000VA	3500VA
Derating @ 115V	Without derating	70% Pnom	-
Mains power fuse	T20A (6.3x32 mm)	T20A (6.3x32 mm)	2xT20A (6.3x32 mm)
BATTERY CHARGING CHARACTERISTICS			
Number of outputs	3 independent supplies		
Number of cycles	10 charge cycles (0 to 9), se- lectable by rotary selector		
Charge curves	In general 3 statuses, type I.U.Uo		
Open lead-acid	V.BOOST = 28.8V V.FLOAT = 26.4V		
Sealed lead-acid	V.BOOST = 28.4V V.FLOAT = 27.2V		
Lead-calcium	V.BOOST = 29.6V V.FLOAT = 27.6V		
"Delphi" type	V.BOOST = 30.8V V.FLOAT = 27.6V		
"Optima" type	V.BOOST = 29.6V then 31.0V V.FLOAT = 27.6V		
Winter storage open lead- acid	V.BOOST = 28.8V V.FLOAT = 26.4V		
Winter storage sealed lead-acid	V.BOOST = 28.4V V.FLOAT = 27.2V		

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	24V 40A	24V 60A	24V 100A
Gel & AGM	V.BOOST = 28.8V V.FLOAT = 27.6V		
Power supply	V.FLOAT = 27.2V		
LiFeSo4 + integral BMS	V.FLOAT = 28.8V		
Temperature compensation	+/-25mV / °C (by an external sensor)		
Voltage tolerance	+/-2%		
Ripple	< 1 % (BW < 20 MHz)		
Maximum current	40A (+/-5%)	60A (+/-5%)	100A (+/-5%)
-DC supply fuse	3 x F25A (miniature automo- tive fuse)		5 x 30A (miniature automo- tive fuse)
PROTECTION			
Overload in output	"Current limited" type		
Short circuit in output	"Shutdown" type with automatic restart when fault is cleared.		
Output voltage too high	"Shutdown" type with automatic restart when fault is cleared.		
Battery reverse polarity	Output fuse		
Internal temperature too high	"Shutdown" type with automatic restart when fault is cleared.		
Battery temperature too high	"Shutdown" type with automatic restart when fault is cleared.		
Temperature sensor out of service	"Shutdown" type with automatic restart when fault is cleared.		
Mains power supply general fault	Mains power fuse		
Battery supply general fault	Output fuses on -DC supply		
Climatic conditions	Tropicalised electronics board		

TECHNICAL SPECIFICATIONS

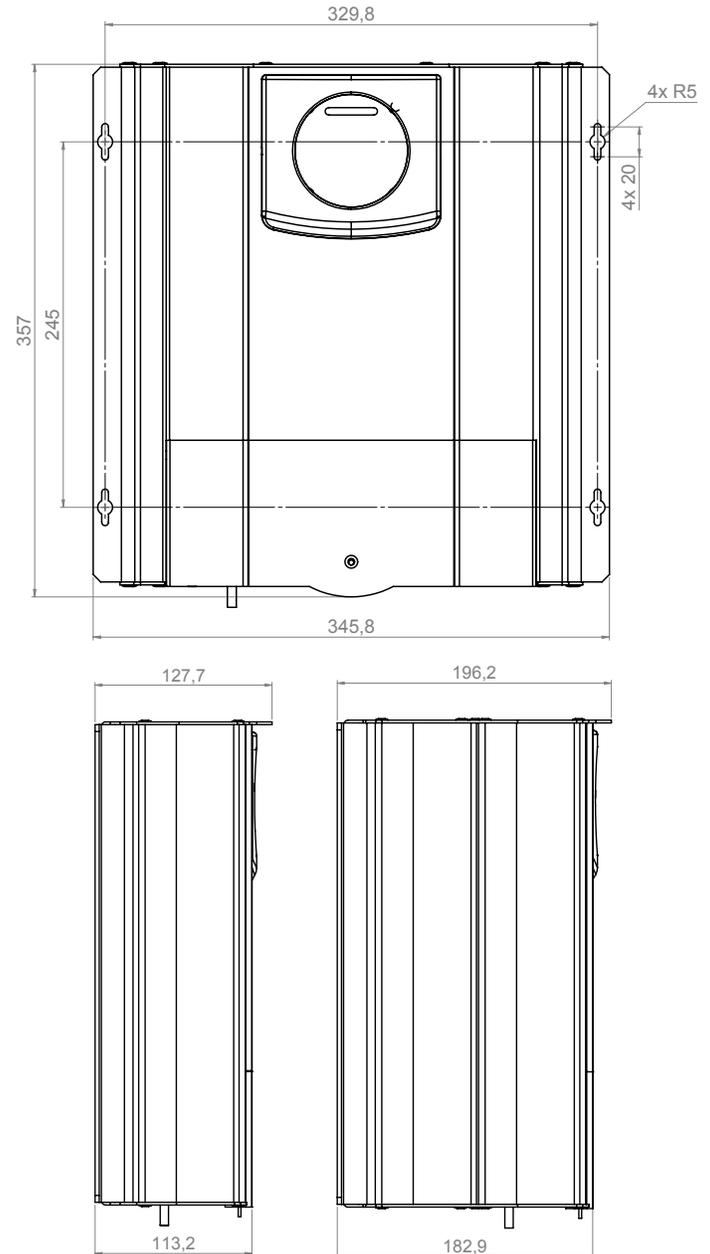
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	24V 40A - 24V 60A	24V 100A
GENERAL INFORMATION		
Operating temperature range	-10°C to +55°C	
Storage temperature range	-20°C to +70°C	
Relative Humidity	10% to 90% (without condensation)	
Convection	Forced by thermostat-controlled fan	
Case	Wall mounted case in painted light alloy	
Protection index	IP22	
Mounting	by 4 screws Ø 4mm	
Dimensions (Depth x Width x Height)	128x346x358mm	196x346x358
Weight	6 kg	11.5 kg
Display	TOUCH colour screen	
Mains power connector	3-point cage terminal for cable max. section 10mm ²	
Battery connectors	Pins M8	
Battery sensor connector	2-point cage terminal for cable max. section 1.5mm ²	
Alarm relay connector	2-point cage terminal for cable max. section 1.5mm ²	
CAN bus connectors	Micro-Fit (qty. 2) & RJ11 (qty. 1)	
STANDARDS		
EMC	EN55016-2-1, EN55016-2-1/A1, CISPR 16-2-1 EN 55016-2-3 + EN 55016-2-3/A1 IEC 61000-4-3 + A1 + A2 IEC 61000-4-2 IEC 61000-4-6 IEC 61000-4-5 IEC 61000-4-4	
Environment	IEC 60068-2-30 & IEC 60068-2-1 (climatic conditions) IEC 60068-2-52 (salt spray)	
Mechanical	IEC 60068-2-6 & IEC 60068-2-64 (vibration) test IEC publication No. 60529 (IP)	
SAFETY	EN 60335-1	
DNV	Classification "Control room, Accommodation" 	

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Dimensions



Check that the mounting screws used are compatible with the type of mounting wall (resin, wood, metal, etc.). The charger should be positioned against the wall and mounted firmly.

Warranty

TO PREVENT ANY RISK OF INCORRECT UTILISATION OF THE CHARGER, CAREFULLY READ THE LIST OF EVENTS OR POTENTIAL DEFECTS NOT COVERED BY THE PRODUCT WARRANTY

- ▶ The charger is not protected against batteries being connected with reverse polarity. Risk of permanent damage to the charger.
- ▶ If the charger falls or is dropped, the impact may permanently distort the case or cause the failure of the internal fans or certain electronic components.
- ▶ Modifications to the case (in particular, drilling additional holes) can deposit swarf or metal filings on the electronics board, causing malfunctions or permanent damage to the charger.
- ▶ Working on or modifying the electronics board can result in operating modes for which the charger was not designed, causing malfunctions or permanent damage to the charger.
- ▶ Operating the charger on an unsuitable power supply (generally a mains power voltage that is too high).
- ▶ Accidental mains power overvoltage or lightning strike, generally causing permanent damage to the charger.
- ▶ Replacing fuses by fuses of an incorrect rating can cause permanent damage to the charger.
- ▶ Obvious connection errors, causing permanent damage to the charger.
- ▶ Water projections or run-off inside the charger can cause permanent electronic malfunctions.

Precautions for scrapping

The charger contains electronic components and materials that must be recycled at the end of the charger life cycle, in order to protect the environment.

All chargers, at the end of their life cycle, should be returned to the local distributor or to a specialist electronic hardware recycling company.

CE compliance

The charger complies with the applicable European standards and bears CE marking. The certificate of conformity is available on request.

For all information, contact:

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