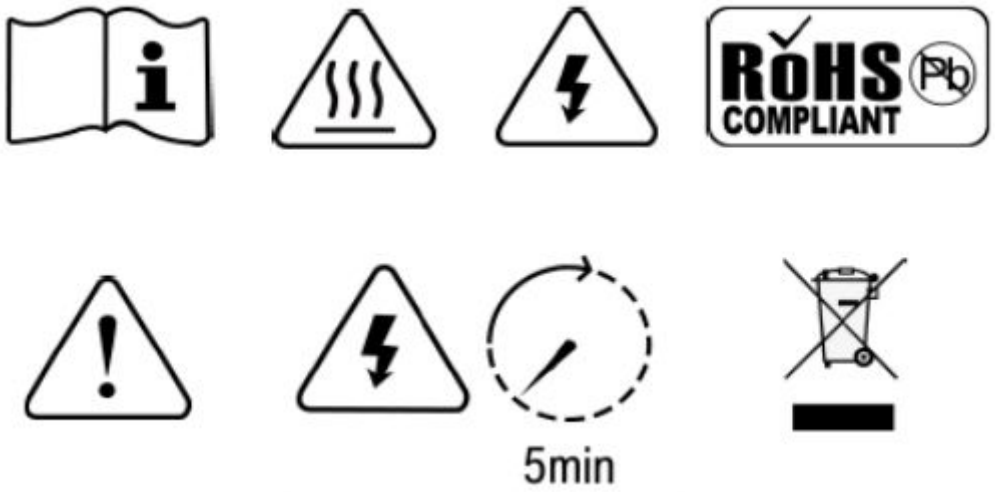
PURSUIT OF PERFECTION

NEMO series

Battery to Battery Charger

A2.1



CAUTION: THE NEMO MUST BE ISOLATED BEFORE SERVICING

MADE IN CHINA

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▪Take no liability as to the accuracy, sufficiency or suitability of any technical or other information provided in this manual or other documentation.

▪Assumes no responsibility or liability for loss or damage, whether direct, indirect, consequential or incidental, which might arise out of the use of such information.

▪TBB offers standard warranty with its products, taking no responsibility for direct or indirect loss due to equipment failure.

About this Manual

This manual describes our product features and provides instructions for installations. This manual is for anyone intending to install our equipment.

General Instruction

Thanks for choosing our products and this manual is suitable for the Nemo range of battery to battery chargers also known as DC-DC chargers.

This chapter contains important safety and operation instructions. Read and keep this User Guide safe for later reference.

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1. General Safety Instruction

1.1 Safety Instruction

As dangerous voltages and high temperatures exist within the charger, only qualified and authorized maintenance personnel are permitted to open and repair it. Please make sure the charger is turned off before attempting to dismantle or open it.

This manual contains information concerning the installation and operation of the charger. All relevant parts of the manual should be read prior to commencing the installation. Please follow the local regulations regarding electrical installations.

Any operation against safety requirement or against intended use, manufacture, safety standard, will be out of the manufacturer warranty.

1.2 General Precaution

To avoid fire and electric shock and poor performance, make sure all cables that are selected meet the wiring recommendations as per table 4-3 and table 4-4. Ensure a good electrical connection. Smaller diameter and broken or poor-quality cable should not be used. It is always recommended to suitably fuse the input and output of the Nemo.

Never place unit directly above batteries, gases from a battery will corrode and damage charger.

Do not place battery over charger.

1.3 Precaution regarding battery operation

Use plenty of fresh water to clean in case battery acid contacts skin, clothing, or eyes and consult with doctor as soon as possible.

The battery may generate flammable gas during charging. NEVER smoke or allow a spark or flame in vicinity of a battery.

Do not put any metal tool or object on the battery, spark and short circuit might lead to explosion.

REMOVE all personal metal items such as rings, bracelets, necklaces, and watches while working with batteries. Batteries can cause short-circuit current high enough to make metal melt and could cause severe burns.

2. Description of main functions

2.1 General Description

Nemo battery to battery charger is a simple but perfect in vehicle charging solution. It draws power from alternator to perform quick and reliable charging of auxiliary batteries while you are driving or stationary via solar. Compatible with Euro6 vehicles, Nemo maintains charge with a stable output even with variable voltage “smart alternators”, to ensure your battery receives a full charge in the shortest time without concerns about overcharging or undercharging which can reduce life cycle of your batteries.

- DC-DC charging solution protects your auxiliary battery by regulating voltage and controlling output current.
- TBB premium II multistage charging algorithm for various battery chemicals including LFP.
- Built in automatic temperature and voltage compensated battery charging.
- Support auxiliary battery (AGM, GEL and WET) low voltage (under 2V) detect before the charger charging and LFP wake-up with continuous output.
- Compatible with Euro 6 engine(variable voltage smart alternators).
- Battery protection function prevents deep-discharge of starter battery.
- Dual input model with built in solar charge controller (MPPT) is available for DDX\IDDX.
- Model with 12Vdc input and 24Vdc output is available.
- Compact and waterproof IP63 rated without fan for convenient installation.
- Multiple units can be connected in parallel to increase output current.
- Provides maintenance solar charge to starter battery when auxiliary battery is full.
- Suitable for supporting loads up to maximum output rating while on the move.
- E-Mark approval.
- 2-year warranty.

2.2 Principle Diagram

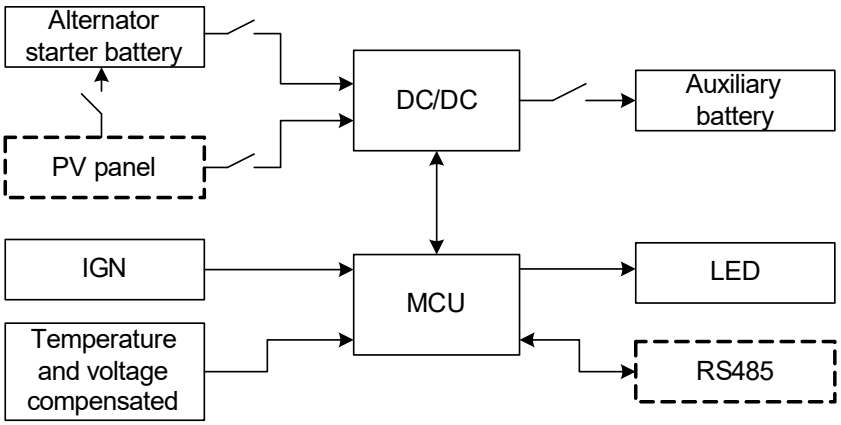


Figure 2-1 Functional block diagram of the charger

2.3 Model Information

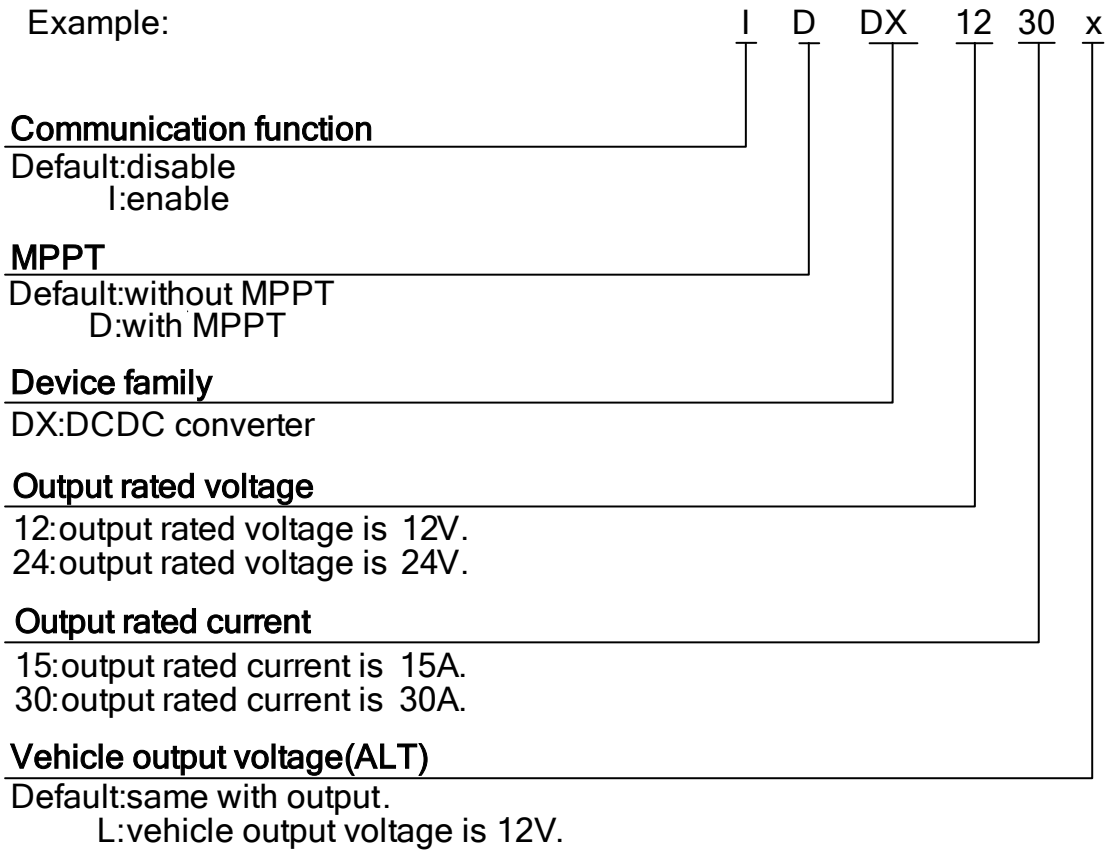


Figure 2-2 Ordering information scheme

Table 2-1 Model series

Model	Alternator	PV	RS485

	charger	charger	
DX1215, DX1230,DX2415, DX2415L	○		
DDX1230, DDX2415, DDX2415L	○	○	
IDX1215, IDX1230,IDX2415, IDX2415L	○		○
IDDX1230, IDDX2415, IDDX2415L	○	○	○

3. Structure

3.1 Terminal and panel definition

There are two different cable configurations available as per figure 3-1 and figure 3-2 for DX and DDX models. They have no difference in function.IDX / IDDX models are for OEM and have more adjustable settings via PC software (ask your dealer for more information and refer to Figure 5-3 on page 12). The panel and terminal definition are as follow.

Figure 3-1 Charger model and cable for DX/DDX model

Table 3-1 Connectors or Terminals Description

NO.	Definition	Description
1	ALT+	Alternator IN + , Starter Battery +
2	PV+	PV IN+ (only available for DDX and IDDX)
3	OUT+	Aux battery+
4	NEG-	Common Negative for PV-, Alternator/Starter battery-, Aux battery-
5	Dip switch	Battery type setting
6	Sensor	Temperature and voltage sensor
7	IGN	Ignition feedback wire

Figure 3-2 Charger model and extension cable

Table 3-2 Connectors or Terminals Description

NO.	Definition	Description
1	ALT+	Alternator IN +, Starter Battery +
2	PV+	PV IN+ (only available for DDX and IDDX)
3	OUT+	Aux battery+
4	NEG-	Common Negative for PV-, Alternator/Starter battery-, Aux battery-
5	Dip switch	Battery type setting
6	IGN	Ignition feedback wire
7	Sensor	Temperature and voltage sensor
8	COM	Communication – RS485(only for IDX and IDDX)
9	Extension cable	Temperature/Voltage, Ignition sensor and RS485 cable

3.2 Structure dimension

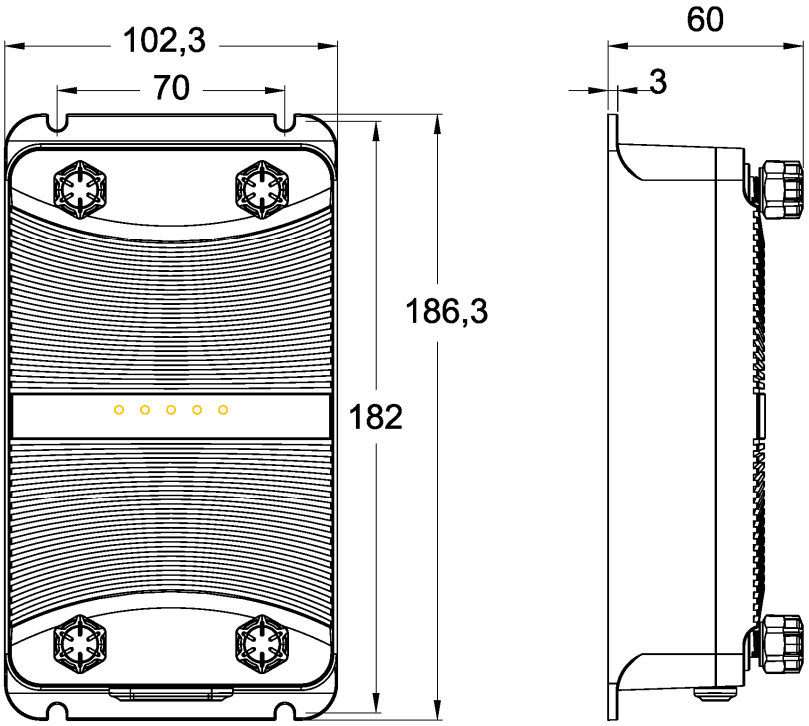


Figure 3-3 Structure dimension of the charger

4. Preparation and Configuration

4.1 Material list

The unit is supplied with the following materials. Please confirm the serial number on charger is same to that on outer carton.

- NEMO battery to battery charger.
- User manual.
- Sensor / Ignition / RS485 (model dependent for IDX and IDDX).

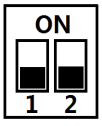
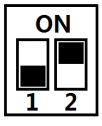
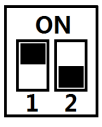
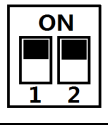
4.2 Location

Please install the equipment in a clean, cool location with good ventilation.

- Working temperature: -20℃~+60℃.
- Storage temperature: -40℃~+85℃.

4.3 Battery type setting

Table 4-1 Switch status for battery type and charging voltage

Switch status		Battery type	Charging Voltage (V)			
			Absorption		Floating	
			12V	24V	12V	24V
	OFF, OFF	AGM	14.6	29.2	13.5	27
	OFF, ON	GEL	14.2	28.4	13.8	27.6
	ON, OFF	LFP	14.4	28.8	13.5	27
	ON, ON	WET	14.8	29.6	13.8	27.6

4.4 Wiring and Fuse recommendation

Please find the following recommended cable size and fuse rating.

We recommend that a fuse is installed on the input and output of the Nemo closest to the battery.

- Fuse recommendation

Table 4-2 Fuse recommendation

Model	Input		Output	
	Max current	fuse	Max current	fuse
DX1230, DDX1230, IDX1230,IDDX1230	40A	50A	30A	40A
DX1215, IDX1215, DX2415, DDX2415, IDX2415, IDDX2415	20A	25A	15A	20A
DX2415L, DDX2415L, IDX2415L, IDDX2415L	40A	50A	15A	20A

- Wiring recommendation

Table 4-3 Input wiring recommendation

Model	Recommended wiring			
	1m	2m	5m	10m
DX1230,DDX1230,IDX1230,IDDX1230 DX2415L,DDX2415L,IDX2415L, IDDX2415L	6mm^2 or AWG9	10mm^{2}or AWG7	16mm^2 or AWG5	25mm^2 or AWG3
DX1215, IDX1215, DX2415, DDX2415, IDX2415, IDDX2415	4mm^2 or AWG11	6mm^2 or AWG9	10mm^2 or AWG7	16mm^2 or AWG5

Table 4-4 Output wiring recommendation

Model	Recommended wiring			
	1m	2m	5m	10m
DX1230, DDX1230,IDX1230, IDDX1230	6mm^2 or AWG9	10mm^2 or AWG7	16mm^2 or AWG5	25mm^2 or AWG3
DX1215, IDX1215, DX2415, DDX2415, IDX2415, IDDX2415, DX2415L, DDX2415L, IDX2415L, IDDX2415L	4mm^2 or AWG11	6mm^2 or AWG9	10mm^2 or AWG7	16mm^2 or AWG5

5. Installation and Connection

For the user's operation safety, cut off the power before installation.

Please double check the battery voltage matching the model installed.

5.1 General advice

Select a suitable place to install the battery to battery charger, ensuring adequate ventilation to the charger's metal body, free from excessive heat and vibration. The electronics are enclosed in a sealed housing. However, the charger is NOT designed to be installed in a location where water might short between terminals.

- All cables installed must be fused. The fuse should be installed as close as possible to the power source (battery).
- Connections from the battery must be fused closed to the battery.
- Use M5 screws to secure the charger in a solid surface.

5.2 Connecting the power cable

Please ensure the correct polarity when connecting. Reverse polarity will burn the fuse or damage the charger and void warranty.

When installing this unit on Euro6 vehicle with variable voltage "smart alternator", please connect IGN wire.

For safety, please always connect ground (NEG.-) first and then connect the Aux battery positive, starter battery positive and PV positive respectively.

1) Connect battery negative. Connect the negative power cable to the battery to battery charger and connect the other end of negative cable to main battery negative terminal or directly to the chassis, ensuring a good solid electrical connection.

2) Connect the auxiliary battery. Connect the positive power cable between terminals marked OUT+ on battery to battery charger and the auxiliary battery positive terminal. Ensure the in-line fuse is removed prior to connecting the cable and inserted afterwards.

3) Connect the starter battery. Connect the positive power cable between terminals marked ALT+ on battery to battery charger and the starter battery positive terminal. Ensure the in-line fuse is removed prior to connecting the cable and inserted afterwards.

4) Connect the PV. Connect the positive power cable between terminals marked PV+ on battery to battery charger and the PV positive cable. Ensure the in-line fuse is removed prior to connecting the cable and inserted afterwards.

5) Connect the ignition wire.

6) Connect the battery sensor.

7) Connect the RS485 communication cable (model dependent RS484 also used for programming IDX/IDDX).

The MAX VOC PV input is 25VDC for 12V models and 50VDC for 24V models(open circuit voltage).
Please double check the solar panel you are going to install matching the maximum voltage of PV input.

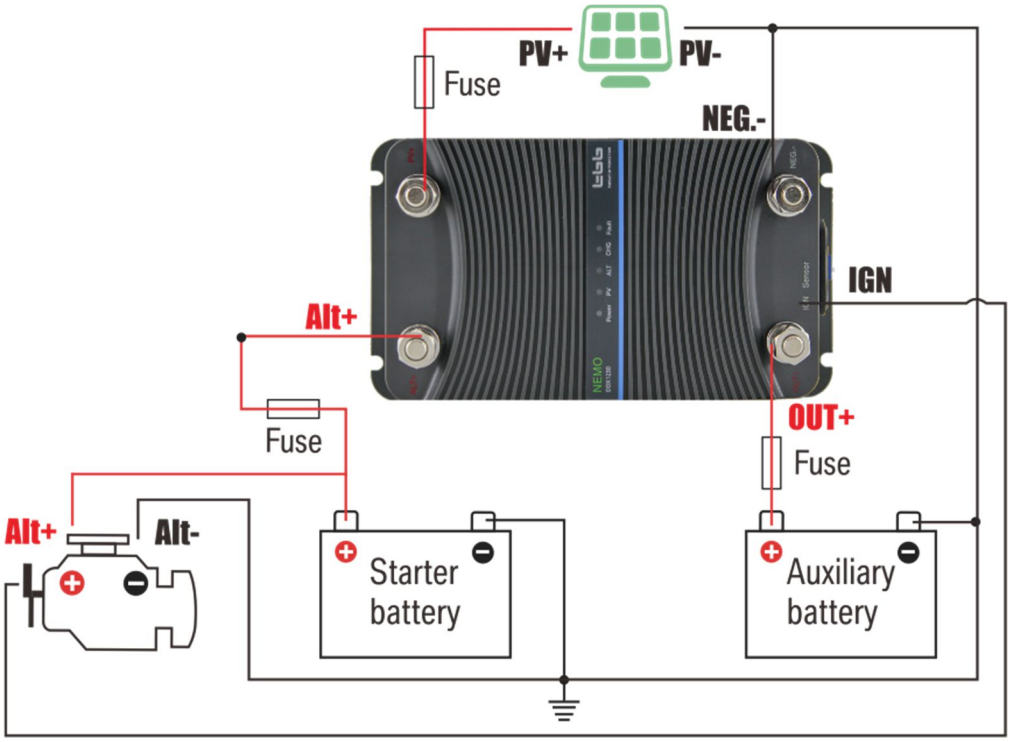


Figure 5-1 Connecting diagram of the model in real installation

The built-in battery sensor includes the voltage and temperature detection of the auxiliary battery. The detection is used to compensate the charging voltage. It must be connected at the positive of the auxiliary battery.

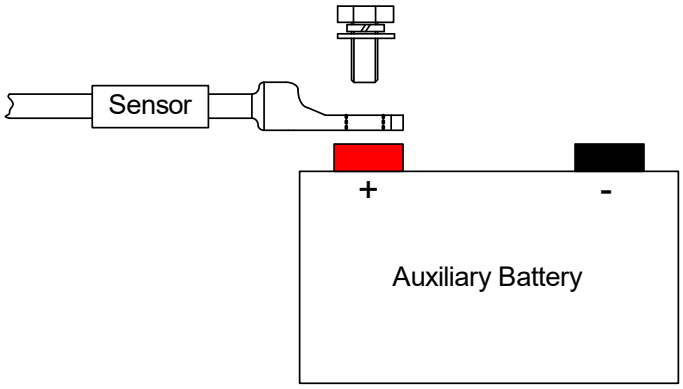


Figure 5-2 Connecting diagram of the sensor cable

For IDX and IDDX models, RS485 cable can be connected to a PC monitor or a controller to view some working information of the charger. The RS485 protocol can be obtained from our sales team if needed, please contact your local distributor.

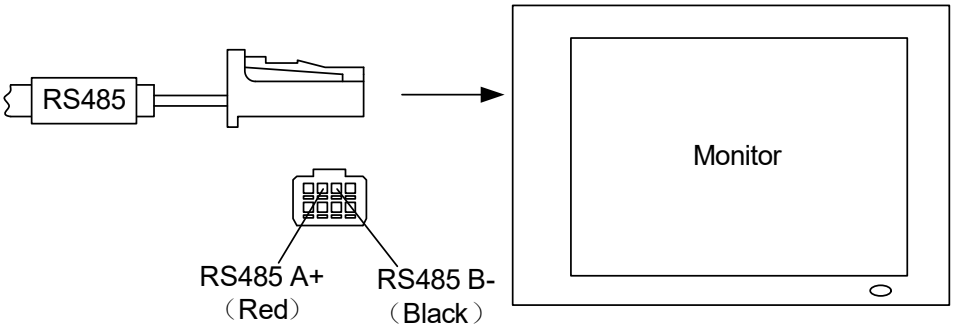


Figure 5-3 Connecting diagram of the RS485 cable

6. Operation

6.1 Double check

Before operation, please ensure the following steps are ensured.

- The battery voltage matches the charger model.
- Polarity of cable connection is correct.
- Voltage sensor is installed on the positive terminal of battery.
- Ignition wire is connected for Euro 6 vehicles.

6.2 LED Description

6.2.1 For DX and IDX series

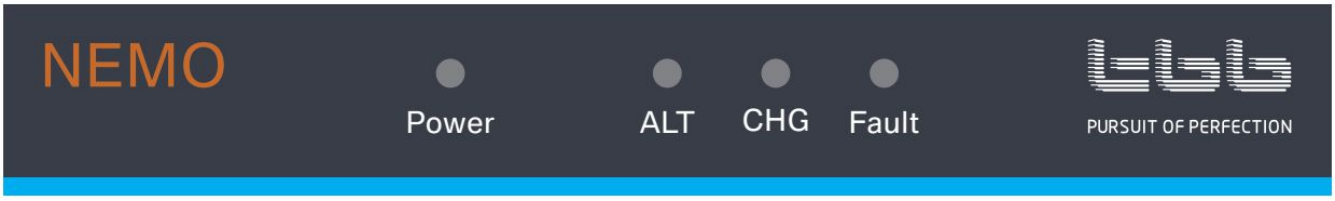


Figure6-1 Front panel of LED indication for DX and IDX series

6.2.2 For DDX and IDDX series

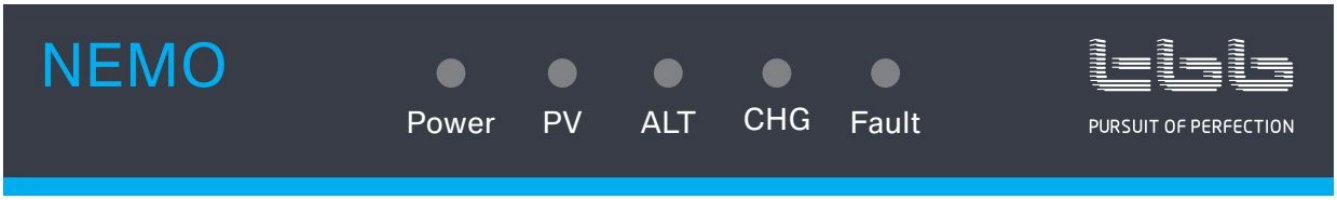


Figure 6-2 Front panel of LED indication for DDX and IDDX series

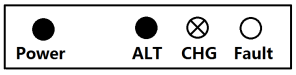
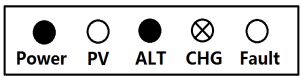
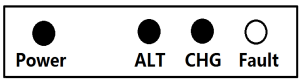
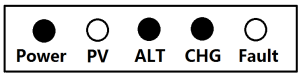
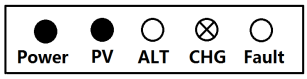
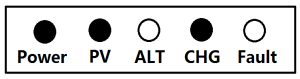
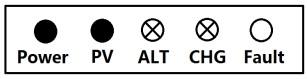
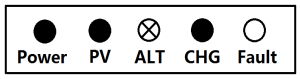
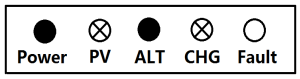
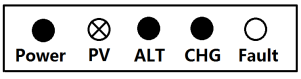
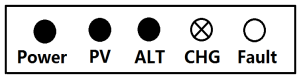
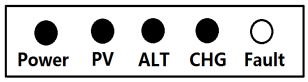
Table 6-1 Description of the LEDs status

LED name	Color	Status	Description
Power	green	Solid ON	Input normal
ALT	green	Solid ON	Alternator is charging the battery.
		Slow Flashing	Alternator input is good and synchronized with PV charging.
		Quick Flashing	Alternator input is overvoltage.
CHG	green	Flashing	Nemo is charging the battery.
		Solid ON	Battery is charged.
		OFF	No charging
Fault	red	Flashing	Battery over-temp, charger over-temp
		Solid ON	Output overvoltage, battery internal failure
PV	green	Solid ON	PV is charging the battery
		Slow Flashing	PV input is good and synchronized with alternator charging.
		Quick Flashing	PV input overvoltage

6.3 LEDs indicate the normal working status

● ON ○ OFF ⊗ Slow Flashing ⊛ Quick Flashing

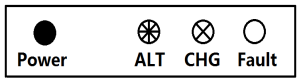
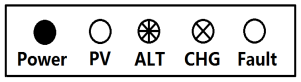
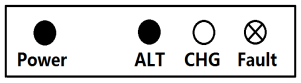
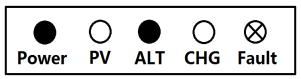
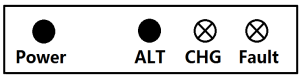
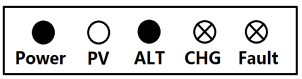
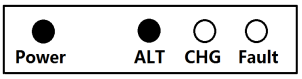
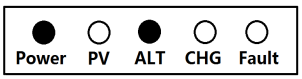
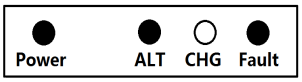
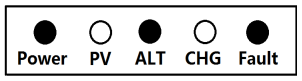
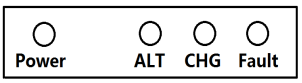
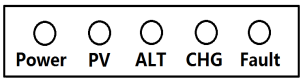
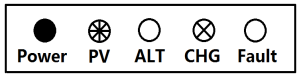
Table 6-2 LEDs indicate the normal working status

Models	LED indicator	Description
All		Alternator charging is at absorption stage.
		No PV connected. Alternator charging is at absorption stage.
		Alternator charging is at floating stage.
		No PV connected. Alternator charging is at floating stage.
Only DDX and IDDX series		PV charging is at absorption stage. No Alt connected.
		PV charging is at floating stage. No Alt connected.
		Both PV and Alt are connected. Battery is charged by PV at absorption stage.
		Both PV and Alt are connected. Battery is charged by PV at floating stage.
		Both PV and Alt are connected. Battery is charged by Alt at absorption stage.
		Both PV and Alt are connected. Battery is charged by Alt at floating stage.
		Both PV and Alt are connected and charging the battery together at absorption stage.
		Both PV and Alt are connected and charging the battery together at floating stage.

7. FAQ

● ON ○ OFF ⊗ Slow Flashing ⊛ Quick Flashing

Table 7-1 LEDs indicate abnormal status

Models	LED indicator	Description
All		Alternator input over voltage.
		
		Internal over temperature or LFP battery temperature fault.
		
		Battery over temperature.
		
		Battery disconnected or low voltage (under 2V).
		
		Output overvoltage or charger internal fault.
		
		Input low voltage or charger fault.
		
DDX IDDX		PV input over voltage.

8. Specification

Model	NEMO series battery to battery charger
Electrical	
Input nominal voltage	12 \ 24VDC
Alternator input voltage range (smart type)	12V ALT:12-16VDC, low voltage protection at 11.6V
	24V ALT:24-32VDC, low voltage protection at 23.2V
Alternator input voltage range (conventional type)	12V ALT:13.2-16VDC, low voltage protection at 12.8V
	24V ALT:26.4-32VDC, low voltage protection at 25.6V
Automatic activation -D+	Yes
PV input voltage range (DDX and IDDX models)	12V ALT:12 to 25VDC,
	24V ALT:24 to 50VDC
Output nominal voltage	12 \ 24VDC
Charge current	12V AUX battery:15A \ 30A
	24V AUX battery:15A
Efficiency	Max 97%
Standby current	⩽ 5mA
Communication (IDX and IDDX models)	RS485
Battery type	AGM \ GEL \ LFP \ WET
Temperature compensation	Yes
Voltage compensation	Yes
Charge algorithm	TBB premium II multi stages
Protection	Charger over temperature/Battery over temperature/Over load/ Short circuit / Battery low voltage(below 2V)
Operating temperature	-20 to +60℃
Enclosure	
Material	Aluminum with anodized, flame proof plastic
Battery connection	M8
Protection category	IP63
Weight	0.9kg
Dimension	186.3*102.3*60mm
Standards	

Automotive	E4-10R

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