

SAFETY INSTRUCTIONS

AIM OF THIS MANUAL

This manual is designed for use by any skilled worker wishing to use NexSys® COMpact battery chargers for recharging NexSys lead/acid batteries.

This manual provides details of:

- The chargers' functions.
 - Any adjustments required and how to use the chargers.
- When producing this manual, EnerSys® has aimed to provide its information in as simple and precise a manner as possible but cannot assume any responsibility for any misinterpretation. The owner of the equipment is required to retain this manual throughout the equipment's life and to pass it on to any purchaser in the event of its resale. The manufacturer covers the guarantee in accordance with the local regulations (contact local sales organization).

Recommended use

This manual should be read through carefully before using the equipment and also read by anyone likely to use the equipment.

The equipment:

- Presents no obstacles to the free circulation of air through the air inlet and outlet but, nevertheless, should be cleaned of dust every six months by a qualified person.
- Must be used in conformance with its indicated level of protection and never come into contact with water.
- Must be used within the temperature limits stated in the technical characteristics.
- Must be installed so that the gases from the battery being charged, do not get sucked into the charger by its fan.

Operator safety

Take all necessary precautions when the equipment will be used in areas where there is the possible risk of an accident occurring. Ensure appropriate ventilation according to standard EN 62485-3 to allow any gases released to escape. Never disconnect the battery while it is being charged.

This appliance is not intended for use by persons (including children) with reduced physical and mental capacities, who are not experienced in their use, unless instructed to do so by a person responsible for their safety.

ELECTRICAL SAFETY

The prevailing safety regulations must be observed. The system protection installed on the power supply to the charger must conform to the charger's electrical characteristics. The installation of a suitable circuit breaker is recommended. It is imperative to ensure that when fuses are being replaced only fuses of the specified type and of the correct are used. It is strictly forbidden to use inappropriate fuses or to short-circuit the fuse holders. This equipment conforms to Class 1 safety standards, which means that the appliance must be earthed and requires to be powered from an earthed supply. On-board chargers integrated within the battery compartment must ensure proper connection between the battery frame and the charger earth.

Never open the equipment: High voltage could be still present even after turning off the charger.

Any adjustment, maintenance or repairs to the equipment while it is open must only be carried out by an appropriately skilled person who is aware of the risks involved.

Contact one of the company's trained technicians if any problem is encountered when putting the charger into operation. This equipment has been designed for indoor use. It is only designed to recharge lead/acid batteries on industrial premises. When the equipment becomes obsolete, the casings and the other internal components can be disposed of by specialist companies. Local legislation takes precedence over any instructions in this document and must be scrupulously observed (WEEE 2002/96 EC).

EnerSys reserves the right to make any improvements and/or modifications to the product described in this manual at any time and without prior notice and is not obliged under any circumstances whatsoever to update the contents of this manual nor the equipment concerned.

The equipment's production number must be supplied when requiring a service.

If the charger is to be stored before its use, it must be kept carefully sealed in its original packaging. It must be stored in a clean and dry location at a moderate temperature (20°C to +40°C). Equipment stored at a temperature of less than 10°C must be brought progressively to operating temperature (over a period of 24 hours) to avoid any risk of condensation causing electrical faults (particularly short-circuits).

CANBUS RECOMMENDATIONS

For any CAN installation, the CAN data lines (CAN-H and CAN-L) must be implemented with twisted-pair wire for proper data integrity. The wire should have a characteristic impedance of 120 ohms. Power should also be provided along the CAN cable, ideally with another twisted pair to minimise noise pickup. An overall shield can also be advantageous. The optimal choice of cable is 7mm Devicenet CANbus .thin' cable, with 24AWG (0.22mm² approx. – data) + 22AWG (0.34mm² approx. – power) twisted pairs and a braided shield. Using this cable will result in a robust installation, with high immunity to noise, low voltage drop in the power cable, and reliable CAN communications. Using alternative cabling will usually result in problems during operation.

EU DECLARATION



EnerSys hereby declares that the chargers in the NexSys COMpact range covered by this declaration conform to the descriptions laid down in European Directives:

- **2014/30/EU (ElectroMagnetic Compatibility):**
EN 61000-6-2: 2006
EN 61000-6-4: 2007 + A1: 2011
- **2014/35/EU (Low Voltage Directive):**
EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A2: 2013
- **2011/65/EU (RoHS)**
- **2013/35/EU (ElectroMagnetics Field)**
EN 62311: 2008



Note: DC cables of the charger emit low power magnetic fields in their surroundings (<5cm). Even if emissions are below the standard limits, people bearing medical implants should avoid operating close to the charger during recharge.

PRESENTATION & USE

INTRODUCTION

The NexSys® COMpact range of chargers enables 24V batteries to be recharged from the mains supply. The microprocessor control automatically recognizes the battery's voltage, capacity, state of charge, etc., providing optimum battery control from highly efficient analyses of its condition. Several charging profiles are available depending on the user's configuration. Over discharge, equalizing and refreshing charges are also integrated.

Chargers can be paralleled to reach higher charge capability. Charge process, indications and peripheral connections are controlled by a 'Master' unit.

The charger includes Bluetooth capability for communication with peripheral and mobile devices. Mobile Apps are available for configuring the charge parameters and for downloading the charger history.

Multiple pieces of optional, peripheral equipment are available depending on the charger model:

- Battery temperature sensor
- Current sensor
- Remote LEDs
- Auxiliary contacts

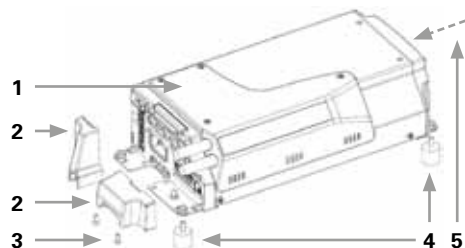
MECHANICAL INSTALLATION

The charger is designed to be embedded in a battery compartment inside the forklift (always use genuine rubber cushion parts to hold the charger).

In a vertical position, the charger shall be installed to get upwards airflow direction.

The charger shall be installed to ensure a free space of 0.1m at both front and back sides. Any action should be taken to prevent cooling air from recirculation.

You must avoid areas where the chargers may be splashed with water.



ELECTRICAL CONNECTION

To the mains supply

You may only connect to a 1-phase 230V_{AC} mains supply (or 120V_{AC} depending on factory setting) by means of a standard socket and an appropriate circuit breaker (not supplied). The current consumption is shown on the charger's information plate.

The genuine AC cord includes a locking system (pull the red part to remove the cord from the charger).

As soon as connected to the mains supply, the LEDs flash successively for circa 15s.

To the battery

Polarity must be observed. Any reversal of polarity will blow the output fuse, prevent charging and light the red LED. Please refer to **Fault Codes** section.

The charger must be connected to the battery by the cables supplied:

- The RED cable: to the battery's POSITIVE terminal.
- The BLACK cable: to the battery's NEGATIVE terminal.

Remove the charger cover to access the fuse and connections. As embedded in the battery compartment, the battery tray shall be connected to the charger earth.

To the optional peripheral devices

Remove the connectors cover(s) to access the connectors (secured with screw). Connect your genuine peripheral device(s) to the proper location as described in **Front Panel** section and replace the cover(s).

FRONT PANEL



Ref	Item	Function 1	Function 2
1	Charger cover	Access to the DC cables connections	Access to the output fuse
2	Connectors covers	Access to the peripheral connectors	
3	Cover screws (x2)	Securing connectors covers	
4	Rubber cushion (x4)	M4 male-female spacers	
5	Airflow	Direction from back to front side	
6	USB port	Download memories	Upload firmware
7	Start/Stop button (▲)	Start/Stop the charge	History download
8	Charger status indicators	Yellow: Battery in charge Green: Charge completed Red: Charge fault	Indication and fault codes (refer to dedicated section)
9	Auxiliary button (▲▲)	Firmware upgrade (combined with #2)	Activate/deactivate the Bluetooth mode
10	DC output cables		
11	Option connector	External current sensor (optional)	
12	Option connector	CANbus port (optional)	
13	Option connector	Chargers paralleling (optional)	Charger setting (via CANbus)
14	AC input connector		
15	Option connector	Battery temperature sensor (Pos. 1-2) (optional)	Auxiliary contacts (optional): Over discharge protection (Pos. 3-5) Mains presence (Pos. 6-8)
16	Earth connection	Battery frame earthing	
17	Option connector	Remote LEDs (optional)	
	Buzzer (not represented)	Over discharge indicator (optional)	Over temperature indicator (optional)

CHARGE

Connect the charger to the mains supply.

Off-charge display

With the charger in waiting mode, the LEDs are OFF.

Initiating charging

1. **Connect the battery. If default setting (AutoStart ON) then the charge will start automatically else press the Start/Stop button.**

The charger starts the countdown process (for 10s as standard). During the countdown process the yellow and green LEDs are flashing successively depending on the selected charging profile:

	Green LED	Yellow LED	Red LED
NXSTND	1 flash	1 flash	OFF
NXFAST	1 flash	2 flashes	OFF
NXBLOC	1 flash	3 flashes	OFF

2. Charge the battery

During the charge, the yellow LED lights up.

3. Completion of the charging process

When the charger completes the charging process, the green LED is lit. Stop the charger by pressing the Start/Stop button. After disconnection of the charger from the mains supply the battery will be ready for use.

4. Equalization & refresh charges

The start of the equalization and refresh charges is indicated by flashing the yellow LED.

DISCHARGE (OPTIONAL)

Some charger models offer supplemental battery monitoring features by being permanently connected to the battery (requiring additional wiring). The following options are available only on these models.

Over discharge protection

An over discharge protection is automatically activated during discharge. A low battery State Of Charge (SOC) is indicated by sounding the buzzer and flashing the yellow LED (refer to **Fault Codes** section). Auxiliary contacts are also available. Please, refer to **Auxiliary Contacts** section.

Once the contactor opens due to low SOC, in order to go in recharge, re-activate the battery by pressing the activation button **ONLY ONCE**. After pressing it once, wait 10 minutes before pressing it again. In total, you can press the button up to 4 times. After pressing the button more than 4 times, the contactor will open permanently.



Current sensor

An external current sensor can be connected to the charger to record discharge data.

AFTER THE CHARGE

Charge history

The charger records hundreds of charge history. An internal clock allows cycles dating. Downloading of charge history is available:

- The charger shall be in stand-by mode (off-charge)
- Connect a USB stick on the charger
- Press the Start/Stop button (▲) during 5s
- The buzzer starts beeping
- Release the Start/Stop button
- Both green and yellow LEDs light up during the record
- You can remove the USB stick when the LEDs turn off

Firmware upgrade

If needed, the firmware can be upgraded through the USB port. Follow the process carefully:

- Connect the charger to the mains supply
 - The charger shall be in stand-by mode (off-charge)
 - Connect a USB stick on the charger (with the firmware to upload)
 - Press both Start/Stop (▲) and Auxiliary (▲▲) buttons during 5s
 - The LEDs start to flash
 - Release the buttons
 - The firmware is automatically uploaded (during circa 10s)
 - All LEDs stop flashing
- The charger automatically reboots (during circa 15s)
 - You can remove the USB stick after completion of the initialization process
 - **Warning:** the charge process starts automatically after the initialization sequence if the battery is connected and AutoStart is ON.

CONNECTIVITY

Bluetooth

During Bluetooth identification sequence all LEDs are flashing in fast mode.

Bluetooth mode can be activated/deactivated by pressing the Auxiliary (▲▲) button during 5s (or through Mobile Apps). Release the button and the buzzer sounds during 2s as below:

- activation = intermittent beep
- deactivation = continuous beep

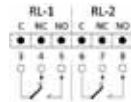
CANbus

As an option, the charger can be connected to a CANbus network allowing data transfer to external equipment (an external supply voltage from +4.8 to +5.2V_{DC} is required). Contact your local representative to receive further information (refer to **CANbus Recommendations** for good practice in installation).

Auxiliary contacts

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

Item	Function	Description
RL-1	Over discharge protection	When the battery SOC reaches a critical level, the contact Normally Open (NO) closes and the contact Normally Closed (NC) opens.
	(Only available on models allowing permanent connection to the battery).	
RL-2	Mains presence	When the equipment is switched on, the contact Normally Open (NO) closes and the contact Normally Closed (NC) opens.



Technical characteristics:
 Max. switching power 62VA
 Max. switching voltage 100V_{DC}
 Max. switching current 2A

For wire insertion/removal, push the spring on the connector (orange part).

Depending on the type of load (e.g. inductive load), additional protection may be needed such as capacitor(s) and/or diode(s). The contacts do not include any fuse, make sure to add an appropriate circuit protection.

Temperature sensor

The battery temperature can be monitored by connecting an external sensor to the charger. High temperatures are indicated by activating the buzzer and/or flashing the yellow LED (refer to **Fault Codes** section). The sensor shall be fitted in the middle of the battery (between cells). For wire insertion/removal, push the spring on the connector (orange part).

Use only genuine sensor.

INDICATION CODES

○ Off ● On * Flashing

Green	Yellow	Red	Status
○	○	○	No mains supply. Charger off-charge.
☞ * → * → * ☞			Charger initialization sequence for 15s (240V _{AC})
☞ ** → ** → ** ☞			Charger initialization sequence for 15s (120V _{AC})
☞ * → n** ☞		○	Countdown sequence for 10s (the number of yellow flashes depends on the charging profile).
○	●	○	Charge in progress.
○	* On 2.0s Off 0.5s	○	Refresh or equalization charge in progress.
●	○	○	Charge completed.
*	○	○	Unit in ‚Slave‘ mode, any indication and/or fault codes is visible on the ‚Master‘ unit only.
*	*	*	Bluetooth identification. Firmware upgrade. (Fast flashing ~0.1s)

FAULT CODES

○ Off ● On * Flashing ◀ Intermittent beeping

Green	Yellow	Red	Buzzer	Indication	Cause	Solution
○	○	●	○	DF1*	The charger cannot charge the battery.	DF1 appears when the charger is not able to supply its output current. Check the mains supply. Check the charger's setting.
				DF2*	Output fault.	Check the correct connection of the battery (reversed polarity cables) and the output fuse.
				DF3*	Wrong battery voltage.	Too high or too low battery voltage. Battery voltage must be between 1.6V and 2.4V per cell.
				TH*	Thermal problem in charger resulting in charge interruption.	Verify the proper operation of the fan and/ or absence of too high ambient temperature, or there is poor natural ventilation to the charger.
				DEF ID*	The charger is not compatible with its configuration.	Check the charger configuration. Contact your local service representative.
○	●	*	○	LINK error	One unit in ‚Master- Slave‘ configuration is not operating properly.	The charger is operating in degraded mode. Reset all units from the mains supply. Contact your local service representative.
○	○	*	○	COM error*	Communication fault inside the charger.	Reset the charger from the mains supply. Contact your local service representative.
○ ☞ * → * ☞			○	TH	Thermal problem in charger resulting in charge pause.	Wait until the charger temperature cools down, the charge process will automatically restart. Check the ambient temperature and the installation (air vents, dust).
○	●	○	2 ◀ every 1min	High battery temperature ¹	The battery tempera- ture is high (during recharge).	Wait until the charger temperature cools down, the charge process will automatically restart. Check the battery state.
○	* On ¼s Off 2s	○	2 ◀ every 1min	High battery temperature ¹	The battery tempera- ture is high (during recharge).	Wait until the charger temperature cools down, check the battery. Yellow turns Off when connected to the mains.
			3 ◀ every 5min	Low battery SOC ²	The battery State Of Charge is low.	The battery needs to be charged soon. Yellow turns Off when connected to the mains.
			1 ◀ every 5s	Critical battery SOC ²	The battery State Of Charge has reached a critical level.	The battery shall be recharged immediately. Yellow turns Off when connected to the mains.
○	○	○	○	No funtion	Absence of mains supply. AC fuse blown. Battery not detected.	Check the connection to the mains. Contact your local service representative. Check the battery voltage.
				No Bluetooth communica- tion	The charger is not visi- ble from the Bluetooth.	Activate the Bluetooth mode on your device. Ensure the Bluetooth device is BLE 4.1 compatible. Get closer to the charger.

(1) Only if a temperature sensor is connected

(2) Only on models permanently connected to the battery

(*) A blocking fault prevents charging from continuing. Please contact your local service representative.