

SkelStart

INSTALLATION GUIDE AND USER MANUAL

Skeleton Technologies
SkelStart™ Engine Module
12V / CCA 2100



Keep this user manual in your vehicle.

SKELE+ON
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Safety first



WARNING

SKELSTART IS NOT A BATTERY

HIGH CURRENT HAZARD

DO NOT CONNECT CABLES FROM THE BATTERY TO THE STARTER (S+) TERMINAL OF THE SKELSTART

DO NOT CONNECT IN REVERSE POLARITY

DO NOT JUMP-START

DO NOT DROP THE SKELSTART

DO NOT SHORT CIRCUIT

What do you need for installation?

The additional materials that may be needed for installation are listed below. These items are not included with the SkelStart™, but may be necessary for isolating other vehicle electronic non-starting loads from the starter system.

- + bolt, washer, nut (M8)
- + electrical insulation material (heat shrink) for proper insulation
- + cable to connect other vehicle electronic non-starting loads to the positive (+) battery terminal
- + standard shop tools

About the SkelStart™ Engine Module

The SkelStart enables drivers to start a vehicle engine in situations where the engine cannot be started by normal batteries owing to, for example, extreme weather conditions or aged batteries, or where there is insufficient power in the batteries to start the engine. The SkelStart™ is able to supply sufficient power to start the engine even at -40 °C.

SkelStart™ specifications

Specifications	Unit	SkelStart™ 12V
Weight	kg	8
Dimensions	mm	328(l) x 171(w) x 241(h)
Charging current	A	16 (max)
Charging voltage range	V	9-16
Operating temperature	°C	-40 to +65
Cold Cranking Amps (CCA)*	A	2133
Maximum engine size	L	16
Charge time (from 0 V)	min	19
Standby current draw	mA	<10
Output voltage	V	14.1 (max)
Peak power**	kW	62.9

* Based on 1s ESR

** Based on 10ms ESR

Installing the SkelStart™

Mounting location

SkelStart™ installation usually requires the installation of a bracket or a shelf on which to place the Module. The shelf must be in a safe location, away from any direct heat sources.

Electrical installation

Do not connect cables from the battery to the starter (S+) terminal of the SkelStart.

Electrical connection identification



Fig 1. SkelStart™ 12V

Cable selection

To install the SkelStart™, you need new cables from the "S+" terminal to the Starter Solenoid "+" (positive) terminal and from the "B-" and "B+" terminals to the vehicle mass, and 24V.

Length of cable (m)	4.5-6	6.1-7.5	7.5-9	9.1-12
Cable size (mm ²)	35	50	50	70

Pre-installation checks

Before installation of the SkelStart™, you need to remove all the cables from the vehicle batteries. The vehicle batteries need to be charged. Clean the battery terminals to remove any oxidation or grease.

Wiring instructions

1. Before installation, remove all the cables from the vehicle batteries.

NOTE: Do not connect the SkelStart™ before instructed to do so!

2. Most vehicle manufacturers connect the alternator and other vehicle power cables to the starter solenoid's positive terminal. Therefore, all the cables connected to the Starter Solenoid's positive terminal need to be removed (Fig. 2 cables 1, 2, 3 - cable 3 can consist several cables). Note: the starter can include an integrated magnetic switch, in which case the short cable from the magnetic switch to the starter can remain connected to the positive starter terminal.

3. The cables removed from the positive starter solenoid terminal should be connected using a terminal block or a nut-bolt connection (use spring washer or locknut). This connection will then have to be isolated from the rest of the vehicle and mounted securely. This can be achieved by bundling the cables together using cable ties and covering the connection with heat shrink (Fig. 3. cables 1,2,3). Note: the connection must be fully isolated from the mass of the truck and should be secured in such a way that vibration, abrasion or corrosion cannot cause a short circuit.

4. Construct a new cable to connect the SkelStart™ S+ to the positive terminal of the Starter Solenoid (Fig. 3 cable 4). The recommended cable size - based on the length of the total cable - can be found in the above table.

5. Construct an additional new cable to connect the SkelStart™ B+ to the 12 V line on the batteries (Fig. 3 cable 6). The cable size should be at least 25 mm² for lengths of <5 m and 35 mm² when the cable length exceeds 5 m.

6. Finally, a new cable is required for connecting the SkelStart™ B- terminal with battery "-" terminal or to the vehicle mass (Fig. 3 cable 5). This cable should be sized according to the above table.

7. After assembling the cables, mount the SkelStart™ securely and connect B+ terminal with the battery "+" terminal. Then connect SkelStart B- terminal with battery "-" terminal. In addition, reconnect the vehicle batteries. Do not connect the starter cable yet.

8. Before making the final connection, measure the voltage between the starter cable and both the positive and negative connections on the SkelStart™. In both cases, the multimeter should read 0 V. A voltage reading other than zero between the starter cable and either the positive or negative connections on the SkelStart™ indicates that the starter solenoid may be unreliable or that there is another path from the solenoid to the batteries. Connecting the SkelStart™ in this state can be dangerous and must be corrected before continuing with the installation.

9. If the voltage reading between the starter cable and both of the battery terminals reads 0V, then the cable leading from the starter can be connected to the SkelStart™.

10. After ensuring that all the connections have been fastened securely, the device is ready to be switched ON. This is achieved by holding the power button for 5 seconds.

11. Charging has been successfully initiated when the inbuilt green LED starts to flash slowly. This will continue to flash until the SkelStart™ is fully charged.

12. When the charging stops, the SkelStart™ is ready to be used to start your engine!

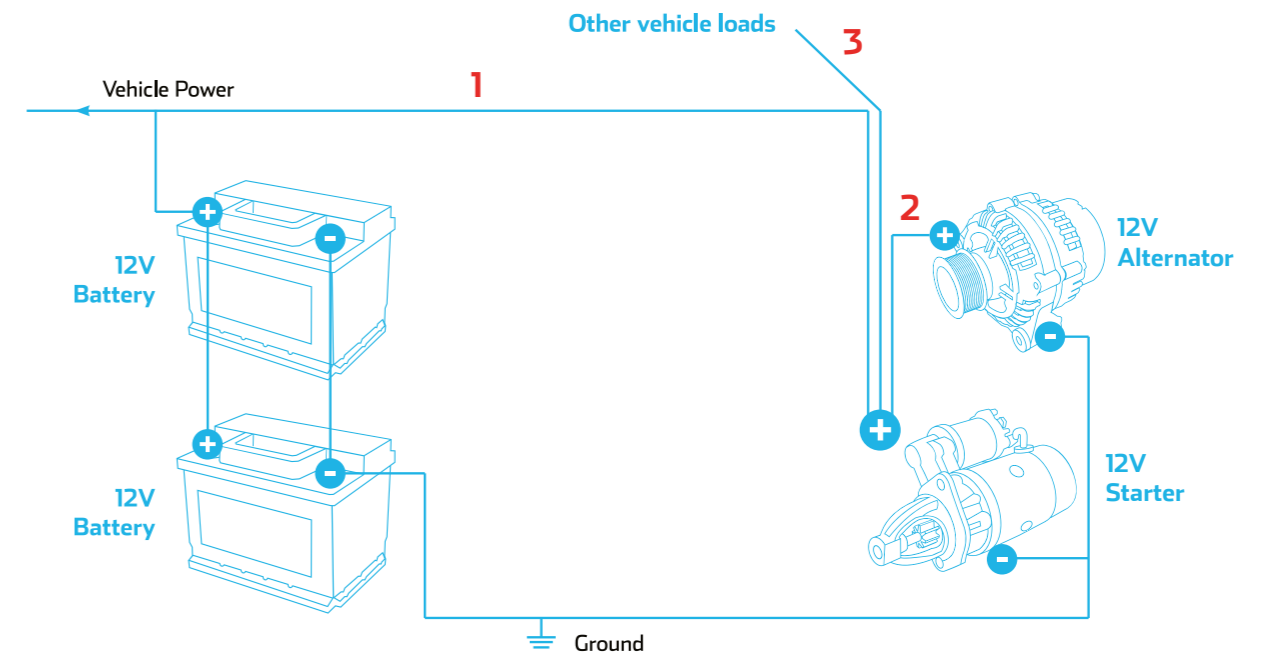


Fig 2. 12V system before SkelStart™ installation

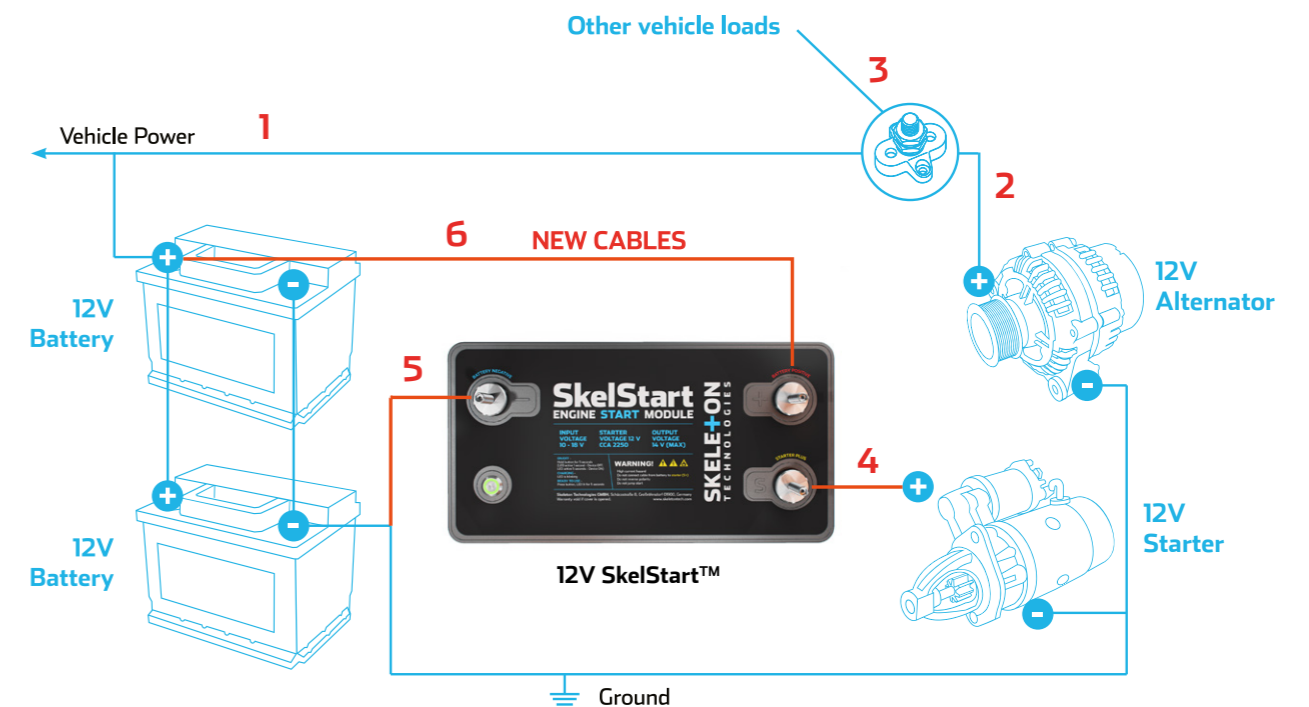


Fig 3. 12V system after SkelStart™ installation

*12V SkelStart™ can be used to replace existing battery.
In 12V parallel connection minimum of one battery is required.

SkelStart discharge

Prior to storing or packing the SkelStart™, please discharge as follows:

1. If the voltage between the SkelStart™ “S+” terminal and the “-” terminal of the batteries is above 2V

- a) Switch OFF the SkelStart™ by holding down the button for 5 seconds.
- b) Disconnect all the cables from the SkelStart™.
- c) Connect a 12V load, such as a headlight (or two 12V headlights connected in series) or a 12V blower motor, across the “S+” and “B-” terminals. Leave them connected until the light goes out or until the blower motor stops running. This will discharge the voltage stored in the SkelStart™.
- d) Verify that the voltage is 2V or less.
- e) DO NOT use a cable, bare wire or low-/no-resistance conductor to discharge the SkelStart™!

2. Using a voltmeter, measure the voltage between the “S+” and “B-” terminals. If the voltage is less than 2V, the SkelStart™ is now considered safe for handling and shipping.

Switching the SkelStart ON/OFF

The SkelStart includes a green light-emitting diode that displays the status of the unit when the button is pressed. Holding the button for 5 seconds will turn the device ON or OFF.

NOTE: This will only affect the charging circuit; it will not discharge the device or make it safe to handle if fully charged.

A short press of the button will indicate the state of the device; a single short flash will indicate that the device is ON. In the OFF state, there is no response. A blinking LED shows that the SkelStart is charging.

NOTE: if there is dust on the button, it should be removed prior pressing the button.

Taking care of your SkelStart™

The terminals should be periodically checked for oxidation or for loose connections and should be cleaned or tightened as necessary. Prior to removal or system maintenance, ensure that the module has been discharged. No other maintenance is necessary.

Avoid installing in locations with potentially high temperatures. Higher temperatures have a negative impact on lifetime.

Disposal

For your SkelStart™, do not:

- + incinerate
- + recycle with batteries
- + crush
- + dispose of in trash

Dispose in accordance with the local regulations for electronic waste.

Jump Starting

If a jump start is required, do not connect the jump start cables directly to the SkelStart. Connect the jump start cable to the batteries or to a junction box.

Guidelines for handling after extended period of parking

If the vehicle does not crank the following procedure should be followed:

- + Make sure that the batteries are in charged to specified limit
- + Make sure that SkelStart is turned on and ready to use. This can be done by pressing the button. After which the LED will be lit for 5 sec.
- + If led does not light up this means that the device is not ON. To turn on the device press the button for 5 sec. If there is a need for the device to charge the led will remain blinking.
- + If the led stops blinking this means that the device is ready to use. This can be validated by pressing the button and led will be lit for 5 sec.

Removing the SkelStart from the system temporarily

If there is a need to restore current flow directly from the batteries to the starter, remove the cable from SkelStart B+ terminal (battery + to SkelStart cable). Then remove the cable from SkelStart S+ terminal (starter to SkelStart cable). After removing cables from terminals connect these two cables together with a strong electrical connection. This restores current flow from batteries to starter, leaving the SkelStart out of the system.

NOTE: before this procedure disconnect cables from batteries and make sure you don't touch S+ terminal with a metal/conductive element connected with ground.

WARNING



HIGH CURRENT HAZARD!

Power terminals pose an arcing hazard when the SkelStart is being charged. Make sure to always discharge the SkelStart before removing it from the system or handling it.

12V SkelStart recommended input voltage range 9-16V.

Do not operate/charge above 30V continuous/32V momentary

Do not operate the SkelStart above the specified temperature range (+65°C / +149°F)

Make sure to protect the terminals from accidental shorting.

If a jump start is required, use an external jump post if possible, or jump across any battery positive (+) and battery negative (-) terminal.

WARNING



DO NOT CONNECT IN REVERSE POLARITY!

Do not connect the terminals in reverse (+ to - and/or - to +). Arcing will occur if the SkelStart is charged, creating a electric shock and/or burn hazard. The SkelStart will be permanently damaged.

WARNING



DO NOT CONNECT THE CABLES FROM THE BATTERY TO THE STARTER+ TERMINAL OF THE ESM. IT WILL CAUSE THE BATTERY TO SHORT CIRCUIT AND CAUSE ARCING.

WARNING



WARNING - THIS IS NOT A BATTERY - DO NOT JUMP START ON THE ESM! Do not connect battery or jump start cable across the STARTER + “S+” and BATTERY - “B-” terminals. Chance of damage to the battery.

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