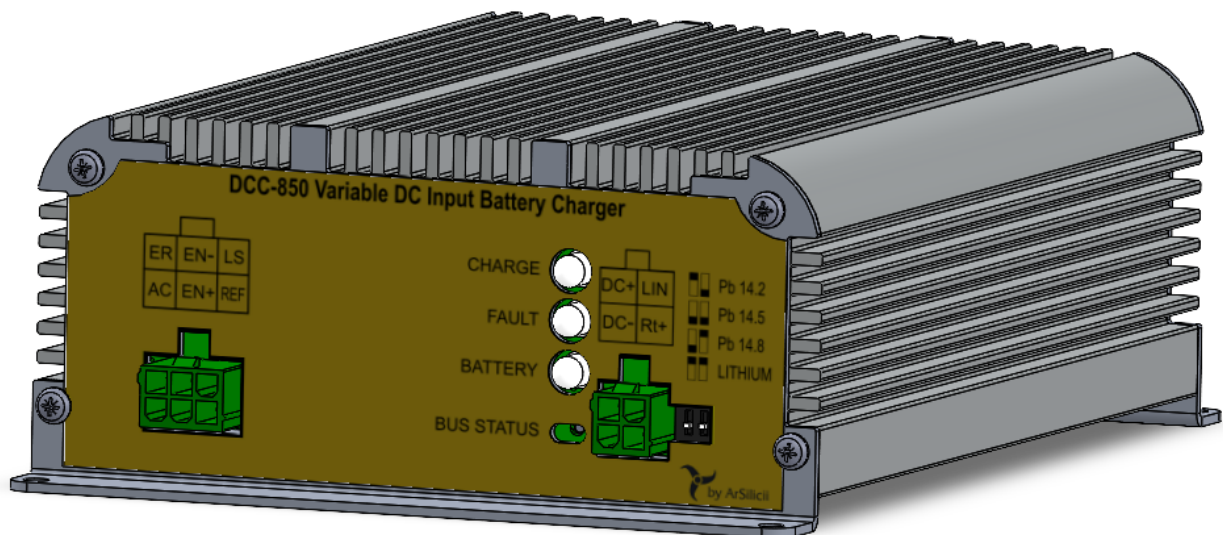




ADVANCED ELECTRONIC ENGINEERING FOR AUTOMOTIVE

Automotive 3-stage Smart Battery to Battery Chargers

DCC-530 and DCC-850



DCC Family

The DCC family is meant to charge batteries taking energy from a variable source, like a battery or an alternator adopting a user selectable charging cycle in accordance to the type (i.e. chemistry) of the battery and to battery manufacturer's specifications.

It is able to reach the optimal charge level and to maintain it. It is designed to be used in conjunction with standard alternators and also with new smart and variable output alternators of modern low emission vehicles, including vehicles equipped with START and STOP devices.

An important feature of this family is that the unit works as a standard step-up or step-down stabilized power-supply for a load also in absence of the auxiliary battery connected drawing energy from the alternator.

WARNING & SAFETY INSTRUCTIONS

This manual contains IMPORTANT SAFETY INSTRUCTIONS for the DCC-530 and DCC-850 battery chargers.

DO NOT OPERATE THE BATTERY CHARGER UNLESS YOU HAVE READ AND UNDERSTOOD THIS MANUAL AND THE CHARGER IS INSTALLED AS PER THESE INSTALLATION INSTRUCTIONS. ARSILICII RECOMMENDS THAT THE CHARGER BE INSTALLED BY A SUITABLY QUALIFIED PERSON.

RISK OF EXPLOSIVE GASES:

WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU FOLLOW THE INSTRUCTIONS WHEN INSTALLING AND USING THE CHARGER.

1. The Battery Charger should not be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised or have been instructed on how to use the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the Battery Charger.
2. Do **NOT** alter or disassemble the Battery Charger under any circumstances. All faulty units must be returned to ARSILICII or repair. Incorrect handling or reassembly may result in a risk of electric shock or fire and may void the unit warranty.
3. Only use the Battery Charger for charging Standard Automotive Lead Acid, Calcium Content, Gel, AGM, Deep Cycle or Lithium Ions batteries. Check the manufacturers data for your battery and ensure that the 'Maximum' voltage of the profile you select does not exceed the manufacturers recommended maximum charging voltage. If the 'Maximum' voltage for your battery type is too high, please select another charging profile.
4. **NEVER** smoke or allow a spark or flame in vicinity of battery or engine. This may cause the battery to explode.

5. PERSONAL SAFETY PRECAUTIONS

To assist with the safe operation and use of the Battery Charger:

- a) Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.
- b) If battery acid contacts your skin or clothing, remove the affected clothing and wash the affected area of your skin immediately with soap and water. If battery acid enters your eye, immediately flood the eye with running cold water for at least 10 minutes and seek medical assistance immediately.

CONTENTS

DCC FAMILY	2
WARNING & SAFETY INSTRUCTIONS.....	2
SPECIFICATIONS	4
GENERAL DESCRIPTION	4
SYSTEM LOGIC	4
CHARGING CYCLE WHEN IN CHARGER MODE	5
CUSTOM CHARGE CYCLE.....	5
CUSTOM SYSTEM LOGIC	6
FRONT LEDS.....	6
CONNECTORS.....	6
INSTALLATION DIAGRAM	8
POWER LINES.....	8
3-WIRES CONNECTION	8
4-WIRES CONNECTION	9
CONTROL SIGNAL LINES.....	9
<i>FIAT /STELLANTIS DUCATO CABLING.....</i>	<i>10</i>
<i>FORD TRANSIT CABLING</i>	<i>10</i>
<i>BASIC ENGINE RUN SIGNAL ONLY.....</i>	<i>10</i>
BUS LINE	10
CABLE SIZING	11
WIRING.....	12

SPECIFICATIONS

Part Number	DCC-530	DCC-850
Continuous Current Rating	30A	50A
Cooling Fan	No	Yes
Output SC Protecting	Yes (Electronic resettable)	
Output Peak Power	500W	800W
DC Input Voltage Range ¹	9-32V	9-32V
Default Charging Profile	Standard Lead Acid, Calcium content, Gel & AGM	
-Maximum Voltage	14.3-15.6V	
-Float Voltage	13.3-13.8V	
No Load Current	0 or <2 mA (according to cabling)	
Standby Current	<200uA	
Ambient Temperature	-20°C to +80°C	
Weight	450g	
Dimensions	100x120x37mm	
Warranty	2 years	
Standards	CE	

GENERAL DESCRIPTION

The DCC family is family of multi stage, 12V DC-DC battery chargers that operates from an input voltage starting from 9 volts to 32 volts and it adjusts dynamically the output to follow the charging cycle selected by the user using a 3-stage charging strategy.

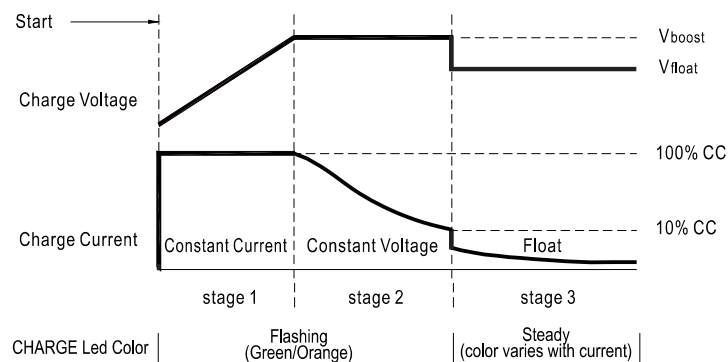
It is designed to work in conjunction with modern environmental compliant engines, therefore accepts control signals from most of main vehicles manufacturers. In order to save quiescent current when not in use, the unit may be powered only when the ignition is on or with a very low quiescent current (<2mA), for always ON operations, where current drain is critical.

SYSTEM LOGIC

When the DCC is turned on, it analyses the load connected at its output (connector B, pole 2). This phase lasts about 20 seconds, in order to determine if a battery is connected. If battery is detected, it switches to **CHARGER** mode, otherwise, if only a standard load is detected, it switches to **STABILIZER** mode in which deliver all the possible power at a steady output of 13.5.

As a charger, when the engine is running, according to operational status, the DCC optimize the charge of the battery, if not expressly commanded by the vehicle's ECU. Several kind of connections are possible, using engine running and/or ignition key signals.

CHARGING CYCLE WHEN IN CHARGER MODE



When the DCC is turned on in charging mode, it will maintain a constant current until the battery voltage reaches the Absorption Voltage. The current during this stage may vary throughout operation in order to maintain a safe operating temperature, or to limit the difference between input and output voltages.

The charger will then maintain a constant voltage level for a predetermined period of time after which the charger will enter Float stage.

Float stage maintains 13.5V on the output battery, keeping the battery topped up. This counteracts the battery's self-discharging. When the battery loses charge, due to excessive loads, the charger will move back into the first stage.

Mount the unit to a flat surface close to the auxiliary battery and away from any heat sources. The DCC has several connectors and should be installed as described over the following pages.

NOTE: The unit will operate optimally below 55°C air temperature provided a good airflow. At higher temperatures, the unit will automatically de-rate output current.

NOTE: Appropriate connections must be made to the wires with a continuous current rating of at least 80A (50A for the DCC-530). Failure to do so may cause damage to the unit and vehicle.

Pre-sets charging cycles can be selected using the dip switches located in the front panel according to the table below.

DIP switch S	SW 1	SW 2	Battery Type	Vboost	Vfloat
	ON	OFF	Lead/AGM Low Temperature Lead	14.8 V	13.8 V
	OFF	OFF	Wet Lead/AGM	14,5 V	13.8 V
	OFF	ON	Lead/Gel	14.2 V	13.5 V
	ON	ON	Lithium	14.5 V	13.6 V

Custom Charge Cycle

Charge Cycle can be customized for special needs by the user, through a serial communication connection using a proprietary software that can be requested directly to ArSilicii s.r.l.

Custom System Logic

System Logic can be customized for special needs by the user, reprogramming the unit through a serial communication programmer. For information ask directly to ArSilicii s.r.l. Examples of custom system logic:

Manage batteries with special chemistry, 24V-12V Voltage system converter, Power Filtering and Stabilizing, Solar power Converter/Charger, special logic by handling signal and/or analogic measure through connector D.

FRONT LEDS

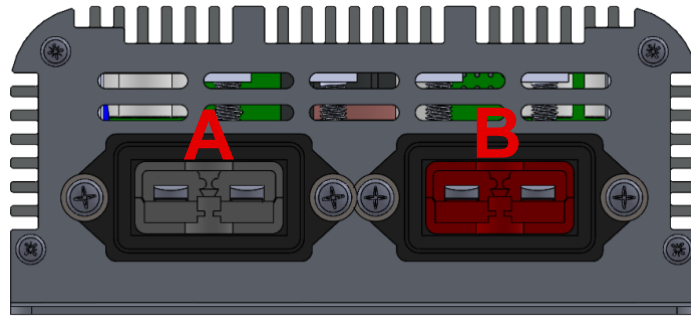
These units are provided with 4 front LEDs to signal the state.

LED LABEL	LED state	Description of the State
Charge	Off (Not lit)	Unit is not powered
	Blinking Green or Orange	System check and Charging
	Blinking Red	Limit Reached (i.e. max temperature)
	Steady	Supply
Fault	Off (Not lit)	
	Flashing Red	Call Assistance.
Battery	Green	Battery Full.
	Orange	Battery medium charge.
	Red	Battery Empty.
Bus Status	Flashing Green	Communication OK
	Flashing Red	Communication Problems

CONNECTORS



The drawing above show a schematic diagram of the connectors designated in red. Below follow the tables with the details for each connector and the functional description.

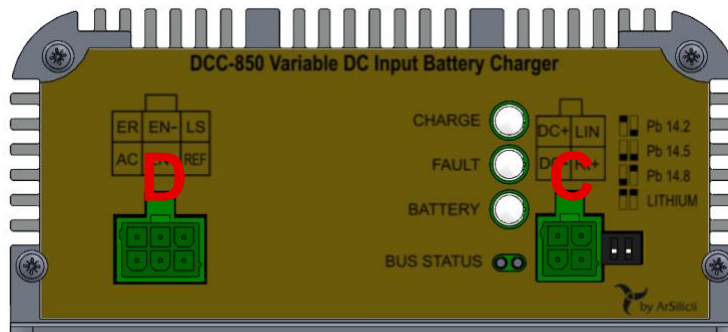


The connector A is the input of the power line from the alternator and negative reference.

Connector A Panel Front View	Pin	Description
	1	Positive pole powerline from the alternator and car battery
	2	Negative Reference to car chassis.
Model: ARSILICII QC03000180 Mate with: ARSILICII QC03000180		

The B connector groups to battery and to user load.

Connector B Panel Front View	Pin	Description
	1	To Positive pole Aux Battery.
	2	To Positive pole User Loads.
Model: ARSILICII QC03000181 Mate with: ARSILICII QC03000181		

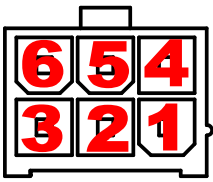


Connector C is the connector for basic signal and serial port to program the DCC.

Connector C Front Panel View	Pin	Name	Dir	Description
	1	RTH/RX	IN	Battery Temperature Sensor / Serial RX
	2	DC-	IN	Signal ground
	3	LIN	OUT	Serial TX /Lin BUS
	4	DC+	IN	Bus Supply
Model: Molex 87727 Mate with: Molex 39012040				

Note: Optional Battery Temperature sensor NTC SK between pin 1 and 2.

The D connector groups all the signal coming from the car.

Connector D Panel Front View	Pin	Name	Dir	Description	Function in default logic
	1	REF	IN	Signal Ground	Ref. Signal negative pole
	2	EN+	IN	Activation signal	Enable: Active High (12v)
	3	AC	IN	Adaptive Charging	Forces Low power mode (disabled when GND)
	4	LS	IN	Load Shedding	Forces stop charge when high.
	5	EN-	IN	Activation Signal	Enable: Active Low (GND)
	6	ER	IN	Engine Run	Engine Running: Active Low
Model: Molex 35318-0620 Mate with: Molex 39012060					

INSTALLATION DIAGRAM

Power Lines

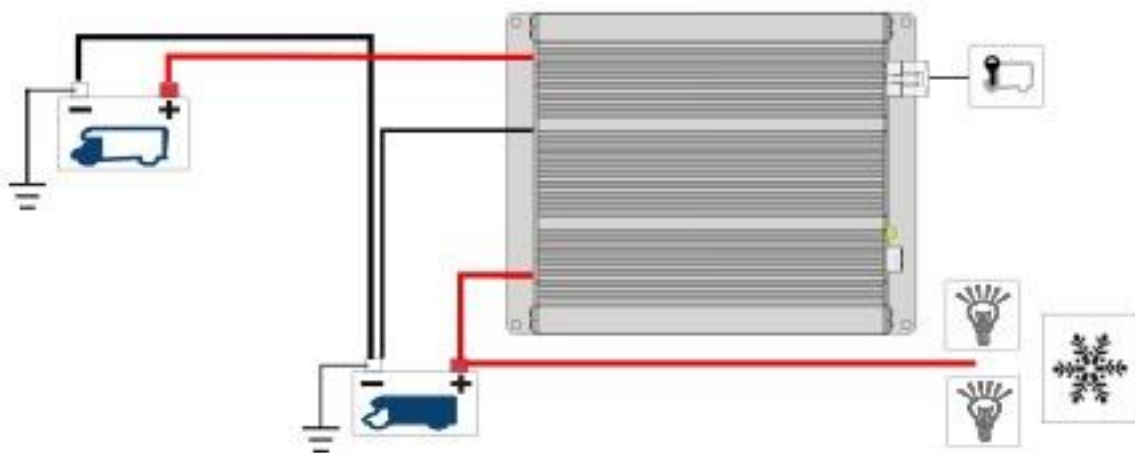
The DCC has the power flow from Connector A to Connector B.

Basically, there are two kinds of connections possible of the DCC-0850 for use in leisure vehicles: 3-wires and 4-wires connection. The latter is highly recommended!

3-Wire connection

The 3-wire connection is more simple, in that, only one output is used both for the Service Battery and for the motorhome loads.

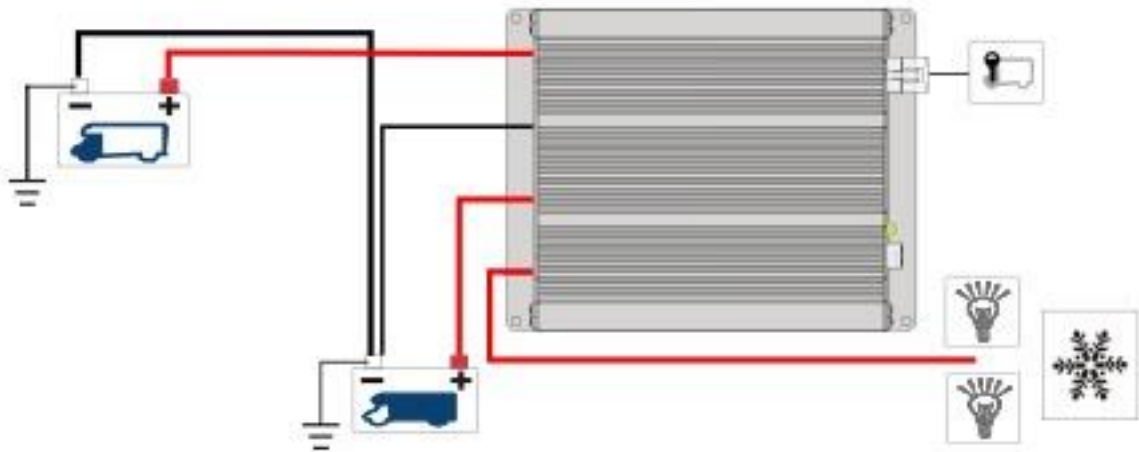
This type of cabling does not allow the unit the current delivered to the load to that delivered to the battery, making optimal battery charging quite difficult.



3-Ways connection

4-Wire connection

The 4-wire connection, instead, separates the loads from the leisure battery. In this way is possible to keep distinguish between the current delivered to/from external loads and sources from that delivered to charge the leisure battery and optimize charging cycle. With the 4-wires connection the unit can estimate precisely the charging status of the aux battery and deliver the proper voltage and current in accordance to the charging algorithm for the battery type selected.



4-Ways Connection (highly recommended)

Control Signal Lines

Regarding control signals from the vehicle, the connection strictly necessary is the activation signal (either positive or negative), that is pin 2 (for switched to 12V) or 5 (for switched to gnd signals) on connector D.

In most cases, you want to short-circuit pin 3 with pin 6 in order to disable Adaptive Charging (Low power mode).

Unfortunately, every car manufacturer makes available slightly different signals and furthermore uses a different naming convention.

On most of the vehicles signals are available notifying when the ignition key is turned and when the engine is effectively running. Sometimes only one of the two signals is available.

Below some commented examples of how engine signals cabling.

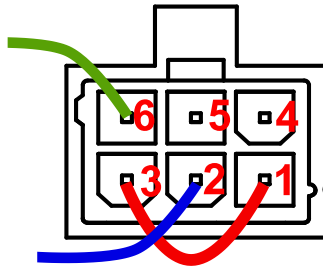
Adaptive Charging

If pin 3 on connector D is not connected to reference ground (negative), then adaptive charging is enabled. This mode **limits the output current**. This mode is to be used when input cabling size is small, in order to avoid a too big voltage drop on the device input line.

FIAT /STELLANTIS DUCATO CABLING

Short-circuiting pin 3 and 1 (red), adaptive charging is disabled, so maximum power charge mode is enabled. For this car, the signal of engine running, is switched to ground (engine is active), so it is attached to pin 6 (green). Key position signal is high when key is turned to active position and therefore is attached to pin 2 (blue).

Charging stop is delayed after engine stops so to allow for short start/stop cycles. When engine is not running and key is in off position, the unit turn off after a timeout.

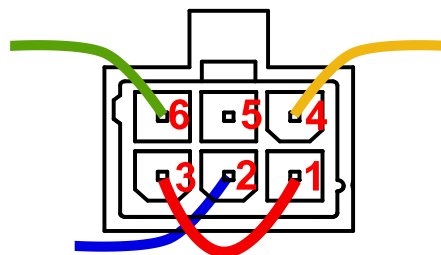


FORD TRANSIT CABLING

For this car, Short-circuiting pin 3 and 1 disables adaptive charging. The engine running signal (green) in this case is switched to ground when engine is active, so it is attached to pin 6.

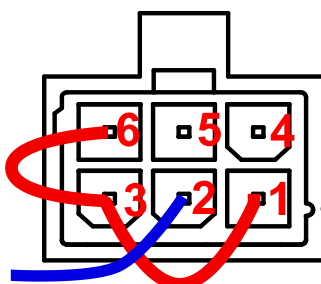
Key position signal is high when key is turned to active position and therefore is attached to pin 2 (blue). This car provides a load shedding signal, to prevent draining current under some circumstances, this signal goes high to stop charge and is attached to pin 4 (orange).

Charging stop is delayed after engine stops so to allow for short start/stop cycles. When engine is not running and key is in off position, the unit turn off after a timeout.



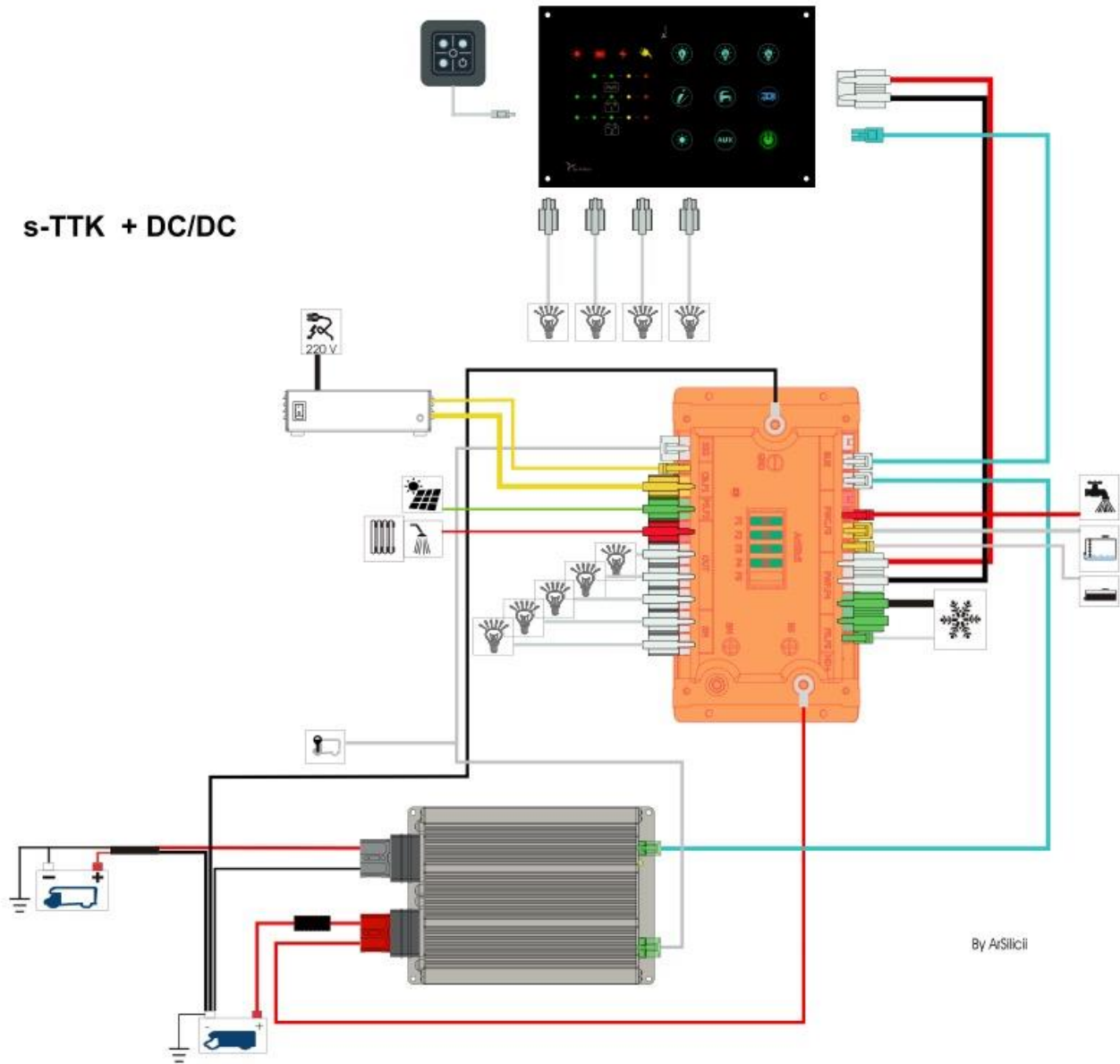
BASIC ENGINE RUN SIGNAL ONLY

Short-circuiting pin 6,3 and 1 (red), disables Adaptive charging and enable the unit. For this car, the signal D+ is switched high when alternator is active, so it is attached to pin 2 (blue). If this signal or an equivalent engine run was switched low, then it should be connected on pin 5. The unit shuts off when engine is not running.



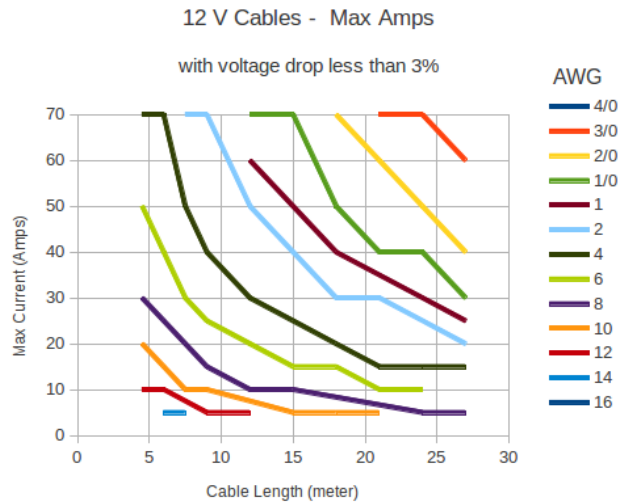
BUS Line

DCC-0850 operations can be controlled and monitored via a communication bus. Several standard serial bus protocols are available. **By default, when the unit is used in conjunction with ArSilicii control panels the TTK bus is used.** Below a simple system diagram.



CABLE SIZING

Below is a table outlining the required cable size for a given cable install length. Always choose a wire diameter equal to or greater than what is specified below.



WIRING

The wires on the DCC units carry peak high currents of many Amps and it is important to make a good, low resistance, electrical connection that will not degrade over time. Failure to make a good, reliable contact may result in breakdown of the wire insulation and cause a short circuit, or worst case a fire. We recommend that this activity be undertaken by an appropriately trained person. Crimping provides good mechanical connection; soldering provides a long lasting electrical connection and forming of the heatshrink will prevent any shorting/ accidental contacts with your vehicle chassis. As a general rule, avoid blade contacts of any size or colour.