Electrodacus SMBS0 I/O Summary

This is a collection of information about the I/O pins on the SBMS0. This information comes from a combination of the SBMS0 manual, Forum Member Inputs and emails with Dacian.

This document should be used as a supplement to the SMBS0 Manual found here: https://electrodacus.com/SBMS0/SBMS0v03d.pdf If there are discrepancies between this document and the manual, use the information in the manual.

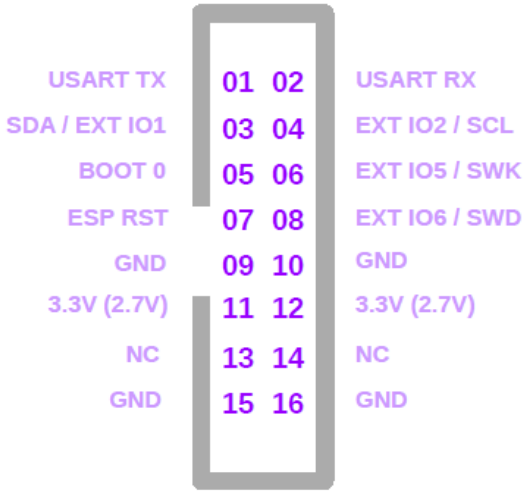
ElectroDacus SBMS0 16 Pin Green Connector

#	Name	Function	Settings	Comments
1	PVn	Solar array shunt[1]	PV Shunt Resistance[1]	The shunt(s) must be directly connected to the + on the battery bank. **Do not put a fuse between the battery bank and the shunt(s).** (It can damage the SBMS voltage detectors if the fuse blows.)
2	PVp			
3	ADC1n	Main Battery Shunt[1]	Battery Shunt Resistance[1]	
4	ADC1p			
5	ADC2	Voltage Sensor[2] (0-60V)		Voltage is displayed on screen 1 monitoring and recorded in logs[2]
6	ADC3	Voltage Sensor[2] (0-60V)		Voltage is displayed on screen 1 monitoring and recorded in logs[2]
7	EXTIO6-	Load or Charge Control	Type 1, through Type 6	Can be used to control additional Loads or Chargers
8	EXTIO6+			
9	EXTIO5-	Load or Charge Control	Type 1, through Type 6	Can be used to control additional Loads or Chargers
10	EXTIO5+			
11	EXTIO4-	Load or Charge Control	Type 1, through Type 6 (Factory default = Type 1)	Recommended to leave as Charge Control (Type 1)
12	EXTIO4+			
13	EXTIO3-	Load or Charge Control	Type 1, through Type 6 (Factory default = Type 2)	Recommended to leave as Load Control (Type 2)
14	EXTIO3+			
15	XT1-	Battery Temp Sensor	Temp Control Parameters	
16	Xt1+			

Note 1:	The shunt should be sized at ~1.6 to 2 times the max expected current. SBMS0 supports any shunt between 0.0400mOhm and 9.9999mOhm. The Shunt resistance can be calculated from Voltage/Current. (A 75mv-300A shunt would be .075/300 = .00025 ohms or .25 mOhm)
Note 2:	ADC2 and ADC3 have no specific functionality. They are just voltmeters and will measure any voltage up to 60V DC and display on page 1 monitoring and will also be stored together with other values. They are there if you want to measure and log something.
Note 3:	The EXT IOx are Toshiba opto-isolators TLP187 in case of v02b SBMS0 and they are capable of max 50mA.

Ext I/O types

Type 1	(HVD - High voltage disconnect) used to control any charger that can be DSSR20, an MPPT solar charger with remote ON/OFF, a grid charger or a battery-to-battery charger.
Type 2	Type 2 (LVD - Low voltage disconnect) used to control any load like in most case an inverter or something like a Victron BP-65 for small DC loads.
Type 3&4	Type 3 and 4 are the same as 1 and 2 but based on SOC instead of voltage and should only be used as alarms not to control devices that is what the SOC setting is for in the EXT IO just for this type 3 and 4
Type 5	Type 5 is for fault conditions when something went wrong and you get to secondary high or low voltage limits named under voltage or over voltage lock. This is not necessary but can be used as backup in case one of the chargers or loads fail to respond to remote ON/OFF control (very unlikely that will ever happen) and the you can have something like a remote triggered circuit breaker than can be tripped by this type 5 signal and manual intervention will be needed to check the fault, repair and then reset the breaker or breakers.
Type 6	Type 6 is for dual PV setup where you install two PV arrays ideally one 2x larger than the other and that 2x larger PV array will be set as type 6



Left Side Connector (This connector is not available if you are using the USB/WiFi extension)			
#	**Name**	**Function**	**Comments**
1	USART TX	WIFI Connector	UART TX and RX pins are used for the WiFi module so if you want to use the USART for something else then WiFi will be disabled (voltage levels 0 to 3.3V).
2	USART RX		
3	SDA/EXT IO1	I2C port	These two pins are reserved as I2C port for communicating with Digital MPPT heat controller. Firmware version 3.0g or higher has support for DMPPT450 but only for monitoring and settings with SBMS0 not charging.
4	SCL/EXT IO2		
5	Boot 0	Programming Mode Jumper	Boot 0 connected to pin 12 will put the STM32F373 microcontroller in programming mode.
6	EXT IO5/SWK	IO 5 or STM32F373. programming SWK	This pin has dual function as programmable EXT IO5 (0 to 3.3V 20mA max) and as SWK programming interface for the STM32F373 (IO 5 is the same signal as on the green connector but before the opto Isolator)
7	ESP RST	WIFI PROGRAMMING Jumper	ESP Flash connected to GND will put the ESP32 WiFi module in programming mode.
8	EXT IO6/SWD	IO 6 or STM32F373. programming SWD	This pin has dual function as programmable EXT IO6 (0 to 3.3V 20mA max) and as SWD programming interface for the STM32F373 (IO 6 is the same signal as on the green connector but before the opto Isolator)
9	GND	Ground	
10	GND	Ground	
11	3.3V (2.7V)	Power	
12	3.3V (2.7V)	Power	
13	NC	No Connection	
14	NC	No Connection	
15	GND	Ground	
16	GND	Ground	

Green Connector on USB/WiFi Extension board. Note: These pins are isolated from the rest of the SMBS0 through a high-speed digital isolator			
#	**Name**	**Function**	**Comments**
1	GND	Ground	
2	3.3V DV	Power IN	If you are using the USB then this side of the isolator is powered from USB else if you say want to use this with UART directly connected to Raspberry Pi or similar boards then you need to provide also 3.3V on the 3V labeled pin.
3	USART TX	Serial port if not using WiFi.	UART TX and RX pins are used for the WiFi module so if you want to use the USART for something else then WiFi will be disabled (voltage levels 0 to 3.3V).
4	USART RX		
5	SCL/EXT IO2	Reserved for I2C	
6	SDA/EXT IO1		

Other interesting tidbits I have learned:

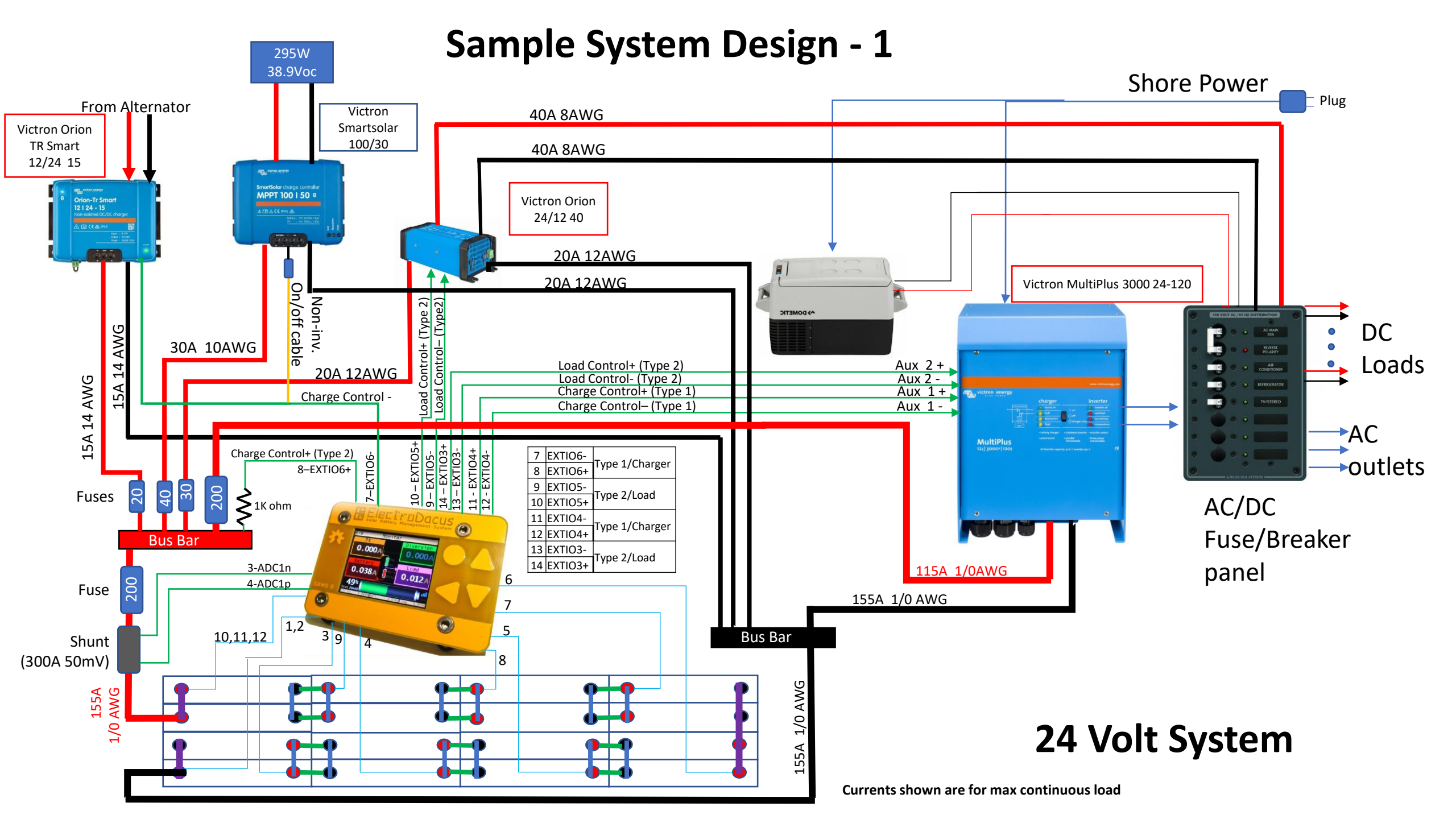
1. Do not put a fuse or breaker (or anything else) between the battery + and the Shunt(s). If the fuse/breaker were to blow, the resulting voltages on the input to the SBMS0 could damage it.

2. The EXTIOn outputs are opto-isolated 'dry contacts' (No voltage present). If you need to drive a voltage to control an external device, you can put the voltage on EXTIOn+ and use EXTIOn- to control the device.
   The common approach would be to put the battery voltage (12 or 24V) onto EXTIOn+. If the controlled device is a high impedance (low current) on it's input, you can/should put a 470ohm to 1000ohm resistance in the circuit to protect from shorts. This is better than a fuse because it also protects the SBMS0. (See EXTIO6 in the diagram on the following page)

3. Even though the Balance harness has 12 wires, the max number of series cells it can manage is 8.

4. If you need a voltage signal to control a device, you can put the proper voltage on EXTIOn+ and then use EXTIOn- to drive the device. Putting a 470ohm – 1Kohm resistor on the voltage source on EXTIO+ will protect circuits and the wires in the event of a short. (See EXTIO6 in the sample design on the next page)

Sample System Design - 1



Sample System Design - 2

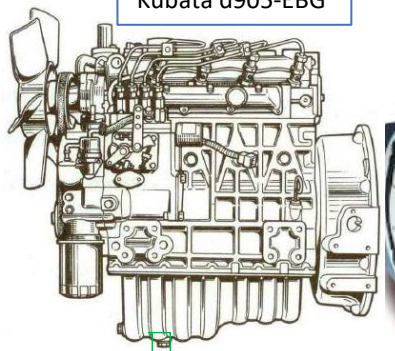
400W 400W 400W
400W 400W 400W
QCELL-400-72DUO Panels

100’ 2AWG Cu
100’ 2AWG Cu

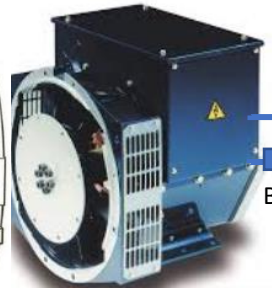
Victron Smartsolar 250/100

Pin	Signal	Configuration	Device controlled
7	EXTIO6-	Type 1/Charger	Solar Charge Controller
8	EXTIO6+		
11	EXTIO4-	Type 1/Charger	MultiPlus Charger Control
12	EXTIO4+		
13	EXTIO3-	Type 2/Load	MultiPlus Inverter Control
14	EXTIO3+		

Kubata d905-EBG



Newage Stamford Generator
BC I164D1L 12KVA



Breaker
150’ 4AWG Al
150’ 4AWG Al

Charge Control +
Charge Control -

2-wire starter control

Fuses

14 – EXTIO3+ Load Control + (Type 2)
13 – EXTIO3- Load Control - (Type 2)
Charge Control + (Type 1)
Charge Control – (Type 1)

Aux 1 +
Aux 1 -
Aux 2 +
Aux 2 -

7 – EXTIO6-
8 – EXTIO6+

2-PVp
1-PVn
3-ADC1n
3-ADC1P

11 - EXTIO4+
12 - EXTIO4-
1,2
3
4
5
6
7
8
9
10,11,12

Fuse
Fuse
PV Shunt
Bat Shunt

Bus Bar

Meter Shunt

Victron MultiPlus 3000 24-120

To AC panel

5P8S 280Ah Cells

Balance Harness
Control

24 Volt System