

## 4.2. CAN Settings for Studer / SMA

Mandatory objects:

**Data from external BMS (Orange mandatory values):**

Byte	0	1	2	3	4	5	6	7
CAN-ID	0		1		2		3	
0x351	Battery charge voltage		DC charge current limitation		DC discharge current limitation		discharge voltage	
0x355	SOC value		SOH value		HiResSOC			
0x356	Battery Voltage		Battery Current		Battery Temperature			
0x35A	Alarms				Warnings			
0x35B	Events							
0x35E	Manufacturer-Name-ASCII							
0x35F	Bat-Type		BMS Version		Bat-Capacity		reserved Manufacturer ID	

**Remote Quick Stopp (optional):**

Byte	0	1	2	3	4	5	6	7
CAN-ID	0		1		2		3	
0x00F	No data							

**i Required for the optimal operation of the product**

After receiving this message, Sunny Island will immediately go into standby. Please send start command, to start again. Manual start is also possible.

For eventual monitoring purposes Sunny Island sends out every second following process values (read only). Please note that battery voltage and battery current are Sunny Island measured values.

Byte	0	1	2	3	4	5	6	7
CAN-ID	0		1		2		3	
0x305	Battery voltage		Battery current		Battery temperature		SOC battery	
0x306	SOH battery		Charging procedure	Operating state	active Error Message		Battery Charge Voltage Set-point	

Name	Data type	Scaling	Unit	Min*	Max*	Default*	Description	CAN ID	CAN-Byte	CAN-Byte-Bit
Battery charge voltage	U16	0.1	V	41	63	54	Set point for battery charge voltage	0x0351	0	
DC charge current limitation	S16	0.1	A	0	1200	0	DC charge current limitation	0x0351	2	
DC discharge current limitation	S16	0.1	A	0	1200	0	DC discharge current limitation	0x0351	4	
Battery discharge voltage	U16	0.1	V	41	48	41	Voltage discharge limit	0x0351	6	
SOC value	U16	1	%	0	100	0	State of Charge (SOC) value from an external BMS	0x0355	0	
SOH value	U16	1	%	0	100	100	State of Health (SOH) value from external Battery Management	0x0355	2	
HiResSOC	U16	0.01	%	0	100	0	High resolution SOC value: It allows more sophisticated protection of the battery	0x355	4	
Battery Voltage	S16	0.01	V			0.0	Measured actual Battery Voltage value from external BMS	0x0356	0	
Battery Current	S16	0.1	A			0.0	Measured actual Battery Current value from external BMS	0x0356	2	
Battery Temperature	S16	0.1	degC			25.0	Measured actual Battery Temperature value from external BMS	0x0356	4	

Studer use the same protocol but the time-out is shorter than at SMA.

## 6. SOC Calculation

For the calculation of the SOC (State Of Charge), the reference point is 100%. This is determined by the following conditions:

- All cell voltages are within the range of the parameter SOC\_100%\_voltage  $\pm$  50mV and the charging current is less than 5% of the nominal capacity for a period of at least one minute (only if the charging current is not limited by the BMS) OR
- At least half of the cell voltages is greater than the parameter SOC\_100%\_voltage OR
- At least one cell voltage is greater than the parameter SOC\_100%\_voltage + 50mV

Below 100%, the SOC is continued calculated by integrating the current over time. With SOC = 100% recalibration starts.

If the minimal voltage of the cells is below the parameter for max. cell discharge voltage, the value is set to (100% - DOD), even if the SOC value is calculated above the parameter for max. discharge voltage (DOD) and will be recalibrate.

After the BMS is switched on, the SOC is estimated, only when the first 100% or DOD is reached by the above conditions, the SOC is set and is valid.

The SOC value is retained on restart, only if the firmware is updated or reset by the inverter.

The estimate is based on the minimum voltage at rest with the following curve:  
In order to minimise distortion of the SOC by a deviation of the offset of the current sensor, the measured current is not taken to calculate the residual capacitance within a configurable band around zero. If the device is operated with an inverter, a default consumption is given for this device (parameter Stand-By Power of the inverter).