SIMARINE ®

SC303 & SC503

USER MANUAL

V1.4

1. Introduction

Simarine's high precision SCX03 (SC303 & SC503) active digital shunt measures voltage, current, and temperature of the battery or battery bank.

It can be used for monitoring current draw of heavy consumers (inverters, bow and stern thrusters, anchor winches) and current generators (shore power chargers and solar panels). Additionally, it allows monitoring tanks for fuel, fresh and gray water.

- Innovative combination of shunt and tank level module. **SC303** is an active combo shunt for PICO battery monitor with 2 voltages, 2 tank levels or temperature, 1 socket for temperature sensor with JST connector and 1 current sensor up to 300A for up to 75V systems. It can be used for monitoring current draw of heavy consumers (inverters, bow and stern thrusters, anchor winches) and current generators (shore power chargers and solar panels). Additionally, it allows monitoring tanks for fuel, fresh and gray water. SC303 is capable of measuring continuous current up to 300A and suitable for maximal power of 3600W at 12V or 7200W at 24V.

- Innovative combination of shunt and tank level module. **SC503** is a high precision combo shunt for PICO battery monitor with 2 voltage, 2 temperature, 1 socket for temperature sensor with JST connector and 1 current sensor up to 500A for up to 75V systems. SC505 is capable of measuring continuous current up to 500A and suitable for maximal power of 6000W at 12V or 12000W at 24V.

2. Safety

Only qualified electricians with proper safety equipment should make installation of Simarine electronics. When working with batteries, you should wear protective clothing and eye protection.

CAUTION: Batteries contain acid, a corrosive, colorless liquid that can burn your eyes, skin, and clothing. If the acid comes into contact with eyes or skin, wash out with lukewarm water and immediately seek medical support.

CAUTION: Do NOT connect anything to a damaged battery. It could heat up, catch fire, or explode.

CAUTION: Lead-acid batteries can generate explosive gases during operation. Never smoke, allow flames, or sparks near the battery. Make sure to keep sufficient ventilation around the battery.

3. Declaration of conformity

$\mathsf{C}\,\mathsf{E}$

MANUFACTURER: SIMARINE d.o.o.
ADDRESS: Ulica škofa Maksimilijana Držecnika 6, SI-2000 Maribor, Slovenia, EU

Declares that the following product:
PRODUCT TYPE: SC303 & SC503

Is in conformity with the relevant European union harmonization legislation:

EMC Directive 2014/30/EU with the following harmonized standards:
- EN- IEC 61000-6-1:2007 o EN-IEC 61000-6-2:2005/AC:2005
- EN- IEC 61000-6-312007/AI:2011/AC:2012
- EN 50498:2010 o ISC)7637-2:2016

RED DireCtive 2014/53/EU with the following standards:
- CISPR 16-23:2010(EN 55016-2- 3:2010 and Amd AI:2010>
- ETSI EN 301 489- 1∨2 2 3 and ETSIEN 301 489-17V3.24
- ETSI EN 300 628 V2 2 2,Clause 4 3110 and Clause 4.3111

Low Voltage Directive 2014/35/EU with the following harmonized standards:
- EN IEC 62368-1:2020

Restriction of the use of certain hazardous substances RoHS ⟨2011/65/EU and 2015/863/EU)with the following harmonized standards:
- EN IEC 63000,2018

Vehicle Radiated Emissions&Immunity:
- ECE RIO-6

4. Overview

A - Battery (to battery)
B - Hub - GND (to system)
C - 2x SiCOM port
D - 1x JST socket for the temperature sensor
E - 2x voltage input, 1x GND
F - 2x resistance input, 1x GND

5. Installation

CAUTION: Install the shunt module in a clean and dry place protected from accidental spilling of liquids.

- Remove the shunt cover by unscrewing four screws on top of the shunt cover.
To install the shunt use the supplied voltage cables and find a place no further than 3 m away from the battery/battery bank. You can fix the shunt with the supplied screws using two holes on the bottom of the casing.
- Connect all cables.
- Replace the shunt cover and screw the four screws on the cover of the shunt unit.

5.1 Cables

For the SiCOM connection use the supplied cable. If not possible, use the following table to determinate the correct cable type.

CABLES	
Cable length	Cable type
< 5m	No limitations
>= 5m	2x2x0.25 mm2 twisted pair (recommended)

5.1.1 Power cable

Minimum power cable cross-section requirement at maximal temperature of insulation 70°C (160°F).

Continuous current	Area
500A	220mm2
400 A	150mm2
300 A	95mm2
200 A	50mm2
100 A	25mm2

CAUTION: Failure to observe the required cable cross-sections can damage the shunt, wiring, or cause a fire.

6. Connecting

For proper function of the Simarine SC3O3/SC5O3 digital shunt **it is necessary to take the following steps**:

1. For safety reasons, disconnect the battery/battery bank plus and minus terminals.

2. Connect the shunt to the Simarine PICO via the SiCOM port.

3. Connect shunt voltage sensing input to a battery terminal.

4. Connect the temperature sensor to the shunt and place it near the battery/battery bank (optional).

5. Connect the battery/battery bank minus or plus terminals through the shunt IN terminal.

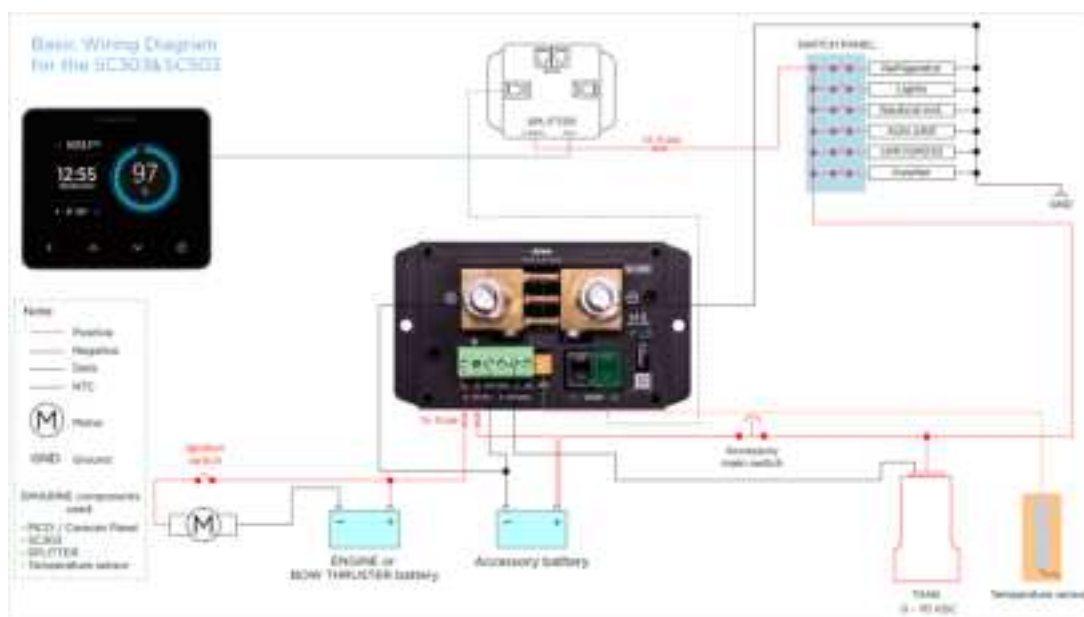6. Connect all consumers and charging sources to the OUT terminal on the shunt.

Each correctly connected shunt needs to be configured. This can easily be done with the PICO unit. The configuration process is described in the PICO manual.

- The PICO manual & other user manuals: https://simarine.net/support/

It is recommended that the shunt is installed in the negative line if possible.

CAUTION: After connecting the shunt, make sure all connections between cables and shunt are secured. Loose connections may cause sparks, heating and even a **fire**. They may also damage the shunt.

6.1 Wiring Diagram

7. Technical specifications SC303 & SC503

SC303	
Operating	
Voltage range	6 - 35V
Temperature range	-20°C – 70°C (-4°F – 158°F)
Power consumption at 12V	
Operating	1.2 mA
Current measuring range	0.01 - 300A
Accuracy	± 1%
Resolution	0.01A
Sampling rate	100ms
Maximal current	
Continuous	300A
Peak current (<5min)	400A
Peak current (<1min)	700A
Voltage drop at 300A	37,5mV
Maximal voltage on terminals	35V
Voltage inputs (U1, U2)	2
Range	0 - 75V
Accuracy	± 0.3%
Resolution	1mV
Sampling rate	100ms
Resistance inputs (R1, R2, JST socket)	3
Range	0 Ohm–65 kOhm
Accuracy	±3%
Temperature sensor – NTC 10k	
Range	From –13°C to +80°C
Accuracy (from –10 to +60°C, from 14 to 140°F)	± 3,0%
Communication	SiCOM
Installation and dimensions	
Dimensions	125 x 70 x 22 mm
	4.92 x 2.75 x 0.86 in
Battery connection	M10 bolts

SC503	
Operating	
Voltage range	6 - 35V
Temperature range	-20°C – 70°C (-4°F – 158°F)
Power consumption at 12V	
Operating	1.2 mA
Current measuring range	0.01 - 500A
Accuracy	± 1%
Resolution	0.01A
Sampling rate	100ms
Maximal current	
Continuous	500A
Peak current (<5min)	700A
Peak current (<1min)	1000A
Voltage drop at 300A	41,6mV
Maximal voltage on terminals	35V
Voltage inputs	
Range	0 - 75V
Accuracy	± 0.3%
Resolution	1mV
Sampling rate	100ms
Resistance inputs (R1, R2, JST socket)	3
Range	0 Ohm–65 kOhm
Accuracy	±3%
Temperature sensor – NTC 10k	
Range	From –13°C to +80°C
Accuracy (from –10 to +60°C, from 14 to 140°F)	± 3,0%
Connectivity	SiCOM
Installation and dimensions	
Dimensions	125 x 70 x 22 mm
	4.92 x 2.75 x 0.86 in
Battery connection	M10 bolts

8. Troubleshooting

Before contacting support, please check the following

8.1 Negative current values

If PICO is showing the wrong sign for the current value, check if the shunt is correctly installed. This means the battery/battery bank minus (optionally plus) terminal is connected to the IN terminal on the shunt. If this is not the case, you can **reinstall** the shunt or simply **switch** the IN and OUT terminal via the shunt configuration on the PICO unit.

8.2 Shunt is not visible on PICO

If the shunt is not visible in the PICO menu, check the following:

- Is the shunt properly connected via the SiCOM port to the PICO unit?

- If you are using your own SiCOM cable, make sure it has the right square and is twisted.

- Check if the voltage sensing input is correctly installed and that it does not have plus and minus terminals switched.