Product Service

Technical Report No.: 70.409.22.287.05-00

Date: 2022-05-24

Client:	Autarco Group BV Torenallee 20, 5617 BC, Eindhoven, The Netherlands
Factory:	Ginlong Technologies Co., Ltd. No.57 Jintong Road, Binhai Industrial Park, Xiangshan, 315712 Ningbo, Zhejiang, PEOPLE'S REPUBLIC OF CHINA
Test object:	Product: Hybrid Inverter Type: S2.MH3000, S2.MH3600, S2.MH4600, S2.MH5000, S2.MH6000, S2.MH3000-MII, S2.MH3600-MII, S2.MH4600-MII, S2.MH5000-MII, S2.MH6000-MII
Test specification:	VDE-AR-N 4105:2018 DIN VDE V 0124-100 (VDE V 0124-100):2020
Purpose of examination:	• Testing and evaluation (visual / partial) according to the test specification
Test result:	The test results show that the presented product is in compliance with the specific requirements.

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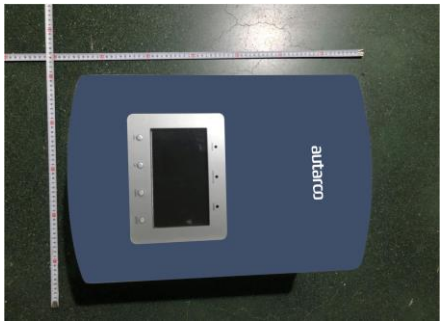
1. Description of the test object

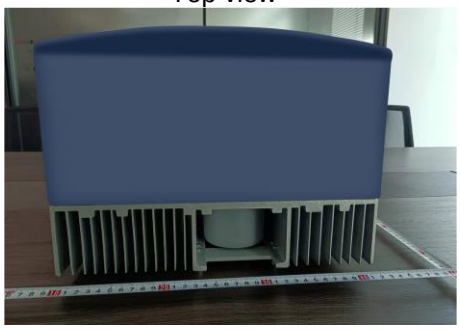
1.1 Picture(s)

Representative model: S2.MH6000-MII

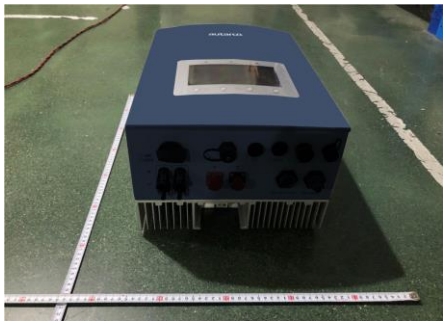
Front view



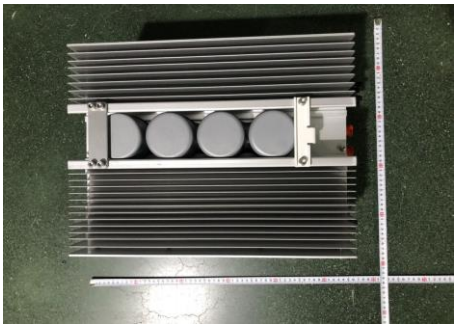
Top view



Bottom view



Rear view



1.2 Function

These devices are transformer-less grid-connected PV inverters which convert direct current optimized by PV and battery system to alternating current, and they are intended to be connected in parallel with public LV grid to supply common load.
They are intended for professional incorporation into PV and battery system, and they are assessed on a component test basis.
For PV and battery system with inverter rating apparent power Smax > 4.6kVA to be connected to the low voltage network, a balancing device is need to be installed together to ensure that the feed in power ≤ 4.6kVA

Firmware version for family design inverter : DSP: 25, LCD display: 02

Default setting value for NS protection:

Setting values for NS protection [a]				
Protective function	Requirement		Factory setting	
	Trip value	Trip time	Trip value	Trip time
Rise-in-voltage protection U >>	1.25 Un	≤ 100 ms	1.25 Un	100 ms
Rise-in-voltage protection U >	1.10 Un	≤ 100 ms	1.10 Un	100 ms [b]
Voltage drop protection U <	0.8 Un	3.0 s	0.8 Un	3.0 s

Voltage drop protection U <<	0.45 Un	300 ms	0.45 Un	300 ms
Frequency decrease protection f <	47.5 Hz	≤ 100 ms	47.5 Hz	100 ms
Frequency increase protection f >	51.5 Hz	≤ 100 ms	51.5 Hz	100 ms

Remark:
[a]: The duration set-point "< 100 ms" for the protection relay setting value is based on the assumption that the maximum response time for NS protection + interface switch is also 100 ms. This results in a maximum "total disconnection time" of 200 ms. If the response time of the components is < 100 ms (e. g. 50 ms), then this allows for a longer period during which to perform the measurements and the evaluation of the protective function (e. g. up to 150 ms). This would then result in a protection relay setting value higher than "< 100 ms", i. e. "< 150 ms". However, in that case, only the 100 ms shall be visualised as the setting value at the NS protection. Nevertheless, the disconnection time of 200 ms shall in no case be exceeded.
[b]: disconnection time of 10 min moving average value.

1.3 Consideration of the foreseeable use

☒ Not applicable
☐ Covered through the applied standard
☐ Covered by the following comment*
☐ Covered by attached risk analysis
*

1.4 Technical Data

Model	:	S2.MH3000, S2.MH3600, S2.MH4600, S2.MH5000, S2.MH6000, S2.MH3000-MII, S2.MH3600-MII, S2.MH4600-MII, S2.MH5000-MII, S2.MH6000-MII
PV input	:	See rating labels below
AC output	:	See rating labels below

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Model:	S2.MH3000
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	62.5A/62.5A
AC-Output(Back-up)	
Rated output power a.c.	3000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	13.6A/13A
AC-Output(Grid side)	
Rated output power	3000W
Max. apparent output power a.c.	3300VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	15.7A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	26.1A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH3000.1
S/N：110F40186080001

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Model:	S2.MH3600
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	62.5A/62.5A
AC-Output(Back-up)	
Rated output power a.c.	3000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	13.6A/13A
AC-Output(Grid side)	
Rated output power	3600W
Max. apparent output power a.c.	4000VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	17.3A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	26.1A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH3600.1
S/N：110F40186080001

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Model:	S2.MH4600
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	100A/100A
AC-Output(Back-up)	
Rated output power a.c.	5000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	22.7A/22A
AC-Output(Grid side)	
Rated output power	4600W
Max. apparent output power a.c.	4600VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	23A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	26.1A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH4600.1
S/N：110F40186080001

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Model:	S2.MH5000
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	100A/100A
AC-Output(Back-up)	
Rated output power a.c.	5000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	22.7A/22A
AC-Output(Grid side)	
Rated output power	5000W
Max. apparent output power a.c.	5500VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	23.9A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	26.1A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH5000.1
S/N：110F40186080001

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Model:	S2.MH6000
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X11A
Isc PV(absolute maximum) d.c.	2X17.2A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	100A/100A
AC-Output(Back-up)	
Rated output power a.c.	5000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	22.7A/22A
AC-Output(Grid side)	
Rated output power	6000W
Max. apparent output power a.c.	6000VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	26.1A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	26.1A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH6000.1
S/N：110F40186080001

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Model:	S2.MH3000.MII
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X15A
Isc PV(absolute maximum) d.c.	2X22.5A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	62.5A/62.5A
AC-Output(Back-up)	
Rated output power a.c.	3000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	14A/13.5A
AC-Output(Grid side)	
Rated output power	3000W
Max. apparent output power a.c.	3300VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	15A/14.5A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	20.5/20A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH3000.MII.1
S/N：110F40186080001

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Model:	S2.MH3600.MII
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X15A
Isc PV(absolute maximum) d.c.	2X22.5A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	62.5A/62.5A
AC-Output(Back-up)	
Rated output power a.c.	3000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	14A/13.5A
AC-Output(Grid side)	
Rated output power	3600W
Max. apparent output power a.c.	4000VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	18.5A/17.5A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	25/23.5A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH3600.MII.1
S/N：110F40186080002

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Model:	S2.MH4600.MII
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X15A
Isc PV(absolute maximum) d.c.	2X22.5A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	100A/100A
AC-Output(Back-up)	
Rated output power a.c.	5000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	23A/22A
AC-Output(Grid side)	
Rated output power	4600W
Max. apparent output power a.c.	4600VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	21A/20A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	31.5/30A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH4600.MII.1
S/N：110F40186080002

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Model:	S2.MH5000.MII
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X15A
Isc PV(absolute maximum) d.c.	2X22.5A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	100A/100A
AC-Output(Back-up)	
Rated output power a.c.	5000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	23A/22A
AC-Output(Grid side)	
Rated output power	5000W
Max. apparent output power a.c.	5500VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	25A/24A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	34.5/33A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH5000.MII.1
S/N：110F40186080002

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Model:	S2.MH6000.MII
PV-Input	
Max.input voltage d.c.	600V
Mppt voltage range d.c.	90-520V
Max.input current d.c.	2X15A
Isc PV(absolute maximum) d.c.	2X22.5A
Battery	
Battery Type	Li-ion / Lead-acid
Battery Voltage range d.c.	42 - 58V
Max.Charge/discharge current d.c.	100A/100A
AC-Output(Back-up)	
Rated output power a.c.	5000W
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Rated output current a.c.	23A/22A
AC-Output(Grid side)	
Rated output power	6000W
Max. apparent output power a.c.	6000VA
Rated output voltage/frequency a.c.	220/230 V,50/60 Hz
Max. output current a.c.	30A/29A
Displacement factor	-0.8...1...+0.8
Protective class	I
Ingress protection	IP65
Ambient temperature	-25...+60℃
Overvoltage category	II(PV),III(MAINS)
AC-Input	
Rated Voltage a.c.	220/230 V
Current(maximum continuous)	34.5/33A
Rated Frequency	50/60 Hz
Inverter topology	non-isolated

Item Code: S2.MH6000.MII.1
S/N：110F40186080002

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Protection Class	:	I
Ingress Protection	:	IP65
Construction	:	Fixed equipment
Supply connection	:	Non-detachable power cord

2. Order

2.1 Date of Purchase Order, Customer's Reference

2022.02.28, 7482399104

2.2 Test Sample(s)

- Reception date(s): 2022-05-10
- Location(s) of reception: Ginlong Technologies Co., Ltd
- Condition of test sample(s): Engineering sample

2.3 Date(s) of Testing 2022-05-10

2.4 Location(s) of Testing Testing refer to Amendment 1 report No. 70.409.19.076.11-01 dated on 2021-06-18

2.5 Points of Non-Compliance or Exceptions of the Test Procedure

- None

3. Test Results

Pass

- "Decision rule according to IEC Guide 115:2007, clause 4.4.3, 4.5.1 was applied."

3.1 Positive Test Results

- Grid code compliance-VDE-AR-N 4105:2018 and DIN VDE V 0124-100 (VDE V 0124-100):2019

The devices covered by this report are same as the products in the test report 70.409.19.076.10-01, except for minor variations on markings.

Additional tests need not be carried out, as same products had been type tested refer to test reports 70.409.19.076.10-01.

Test specification(s)	Report no. / Rev. No.	Date	Remark
VDE-AR-N 4105:2018, and DIN VDE V 0124-100 (VDE V 0124-100):2019	70.409.19.076.11-01	2021-06-18	Original
VDE-AR-N 4105:2018, and DIN VDE V 0124-100 (VDE V 0124-100):2020	70.409.22.287.05-00	2022-05-24	

3.2 Points of Non-Compliance according to the test specification

- N/A

4. Remarks

4.1 General

N/A, not test against satety standard, no requirement for user manual in test specification

The user manual has been examined according to the minimum requirements described in the product standard. The manufacturer is responsible for the accuracy of further particulars as well as of the composition and layout.

4.2 Factory surveillance cycle

Your production facility is currently on a
☐ Annual (12 month)
☐ Bi-Annual (6 month)
☐ Quarterly (3 month)
☐
surveillance cycle.

5. Documentation

- Application Form
- Marking labels
- User manual

6. Summary

"The test specification(s) is (are) met"

TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch

Tested by:

Min Zeng

printed name, function & signature

Approved by:

Kai Zhao

printed name, function & signature