TEST REPORT

OVE-directive R25

Test requirements for generation units to be connected and operated parallel with the low voltage distribution networks

Report No. .....:	**BWDO-ESH-P24042699**
Date of issue .....:	2024-09-19
Total number of pages.....:	27
Testing laboratory name .....:	
Address .....:	
Accreditation.....:	
Applicant's name .....:	**Marstek energy Co., Ltd.**
Address .....:	1-4F, BLDG#9, 1/F, BLDG#5, West Industrial Park, South of the Intersection of Ma'anshan Tunnel and Zhangshe Avenue, Xiangxi High-tech Zone, Hunan Province, China
Test specification	
Standard.....:	Tor Erzeuger Typ A:2024-07 OVE-directive R25:2020-03
Certificate.....:	**Certificate of compliance**
Template number standard. .....:	OVE-directive R25_30
Master TRF originator.....:	
Test item description .....:	**Microinverter**
Trademark.....:	MARSTEK
Model / Type.....:	**MST-MI1000W, MST-MI1000G, MST-MI800W, MST-MI800G, MST-MI600W, MST-MI600G**

Ratings.....:	**MST-MI600W MST-MI600G**	**MST-MI800W MST-MI800G**	**MST-MI1000W MST-MI1000G**
MPP DC voltage range [V] .....:	25-55		
Input DC voltage range [V] .....:	16-60		
Input DC current [A].....:	2*10,5	2*12,5	2*14,5
Output AC voltage .....:	L/N/PE, 230Va.c., 50/60Hz		
Output AC current [A] .....:	2,61	3,48	4,35
Initial short-circuit AC current $I_{k''}$[A].....:	5,46		
Output power [VA] .....:	600	800	1000

Testing Location.....:	**LCIE China Company Limited**
Address .....:	Building 4, No, 518, Xinzhuan Road, Caohejing, Songjiang High-Tech Park, Shanghai, P,R, China (201612)
Tested by (name, function and signature).....:	
Approved by (name, function and signature).....:	
Manufacturer's name .....:	**Marstek energy Co., Ltd.**
Manufacturer address.....:	1-4F, BLDG#9, 1/F, BLDG#5, West Industrial Park, South of the Intersection of Ma'anshan Tunnel and Zhangshe Avenue, Xiangxi High-tech Zone, Hunan Province, China
Factory's name……..:	**Hunan Planck Esstechnology Co., Ltd.**
Factory address……...:	Building 12, West Industrial Park, South of intersection of Maanshan Tunnel and Zhangshe Avenue, Xiangxi High-tech Zone, Hunan Province

Document History

Date	Internal reference	Modification / Change / Status	Revision
2024-09-19		Initial report was written	0

Supplementary information:

Test items particulars

Equipment mobility ..... :	Permanent connection
Operating condition ..... :	Continuous
Class of equipment..... :	Class I
Protection against ingress of water..... :	IP67 according to EN 60529
Mass of equipment [kg] ..... :	3,85

Test case verdicts

Test case does not apply to the test object ..... :	N/A
Test item does meet the requirement ..... :	P(ass)
Test item does not meet the requirement ..... :	F(ail)

Testing

Date of receipt of test item..... :	2024-04-29
Date(s) of performance of test..... :	2024-04-29 to 2024-08-30

General remarks:

The test result presented in this report relate only to the object(s) tested.

The report shall state compliance of the tested objects with the requirements of Tor Erzeuger Typ A / OVE-directive R25.

All information in this test report limited to the type label, warning markings, trademark, block diagram, manual and datasheets are provided by the customer.

Conformity statements are decided in accordance with IEC GUIDE 115:2021 Procedure 2 (accuracy method), unless otherwise normatively specified or contractually agreed. The measurement result is considered as "pass" according to the requirement if it is within the prescribed limit or exactly on the limit.

”(see Annex #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

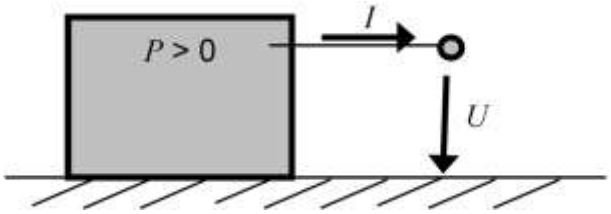
Throughout this report a comma is used as the decimal separator.

- “P_{rE}” for the rated active power:
  $P_{rE} = U_n \times I_r \times \cos \varphi$ (single-Phase); $P_{rE} = \sqrt{3}\ U_n \times I_r \times \cos \varphi$ (three-Phase)
- “P_{ref}” for the momentary power
- “ΔP_{E60}” in [%] = $(P_{Setpoint} - P_{E60}) / P_{rE}$
- “ΔQ_{E60}” in [%] = $(Q_{expected} - Q_{E60}) / P_{Emax}$
- “$_{E0,2}$” for gliding average values over 200 milliseconds
- “$_{E60}$” for gliding average values over 60 seconds
- “$_{E600}$” for gliding average values over 10 minutes
- “(c)” for over-excited
- “(i)” for under-excited

Active and reactive power:

The regarded system of the voltage and current vectors is the producer view (Figure 2):

- if the inverter feeds to the grid the active power is measured with positive sign.



For the representation in quadrants, a power circle is chosen whose representation is compatible with mathematical representations of trigonometry and complex numbers (see Figure 2). Angles are counted positively counter-clockwise as in mathematics. The phase angle is defined as the angle from the current pointer to the voltage pointer. The current pointer is always in the real axis; the position of the voltage pointer corresponds to the apparent power and the phase angle.

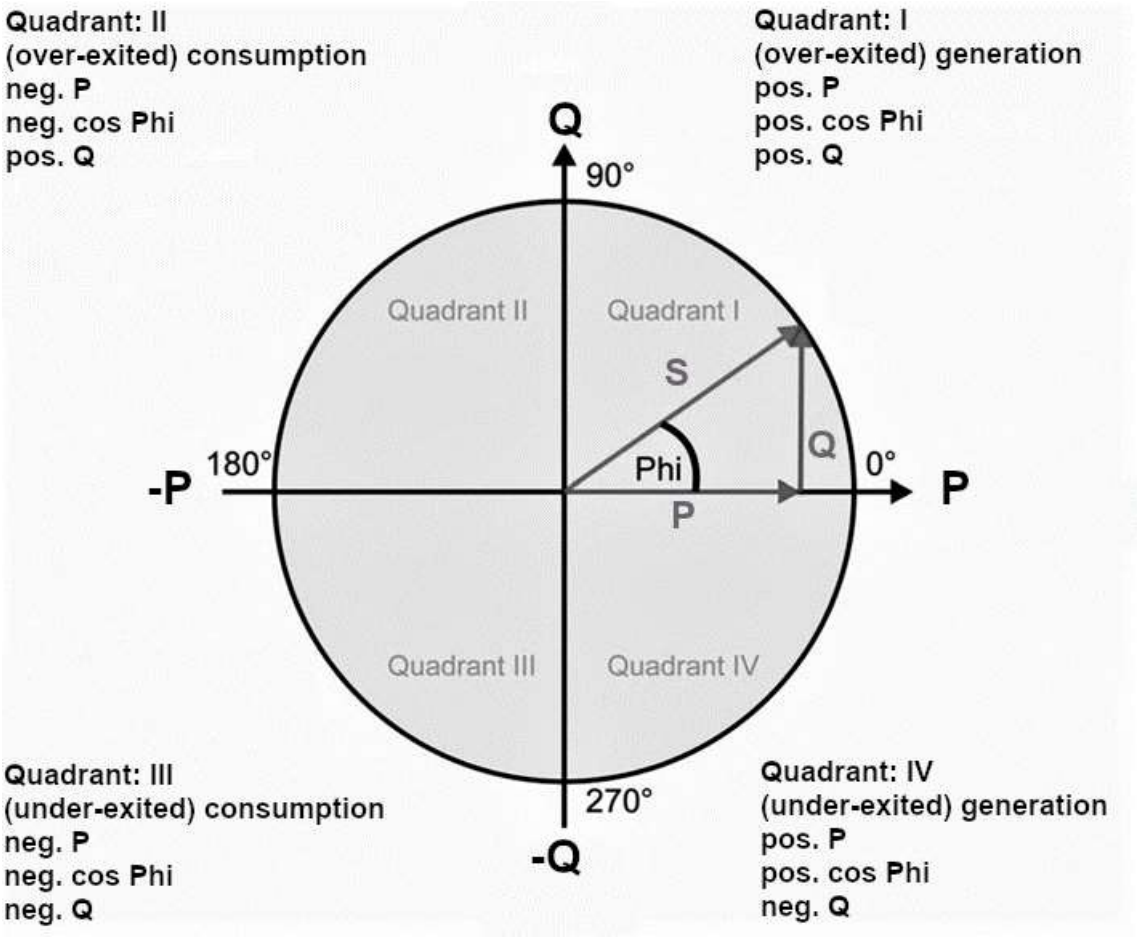
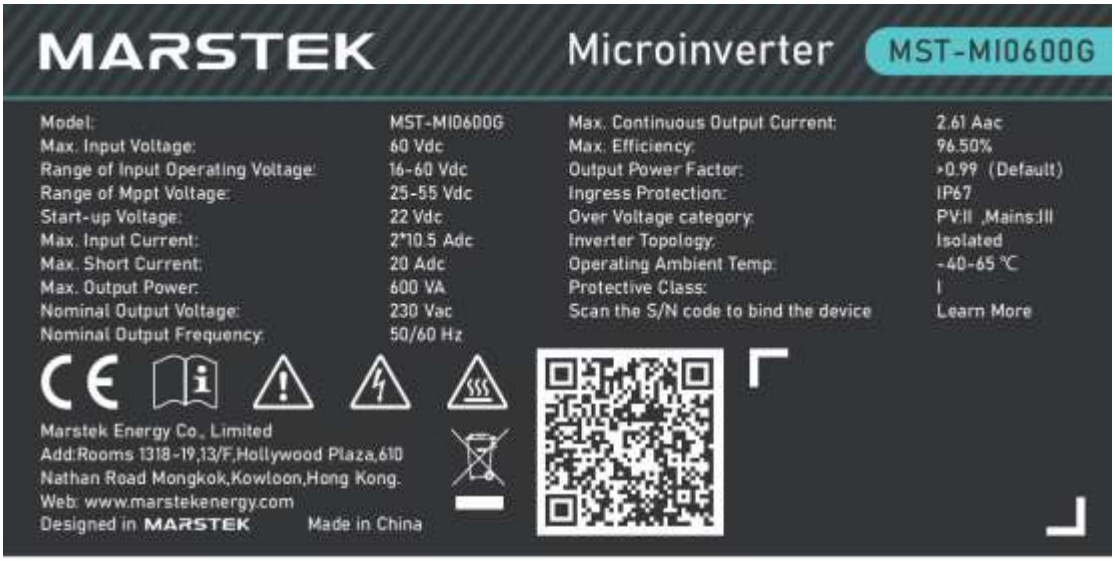


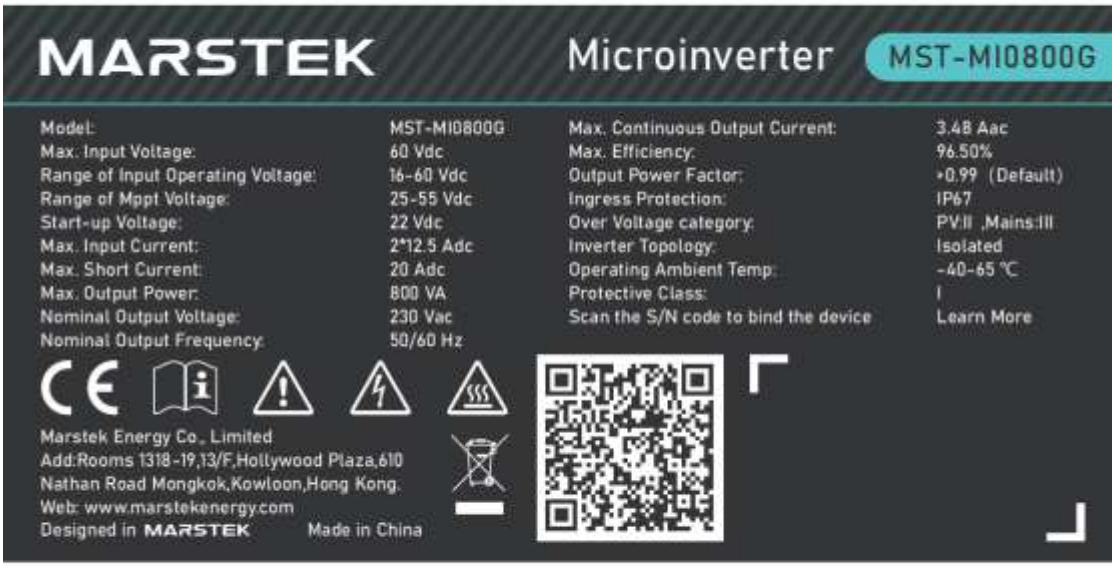
Figure 2

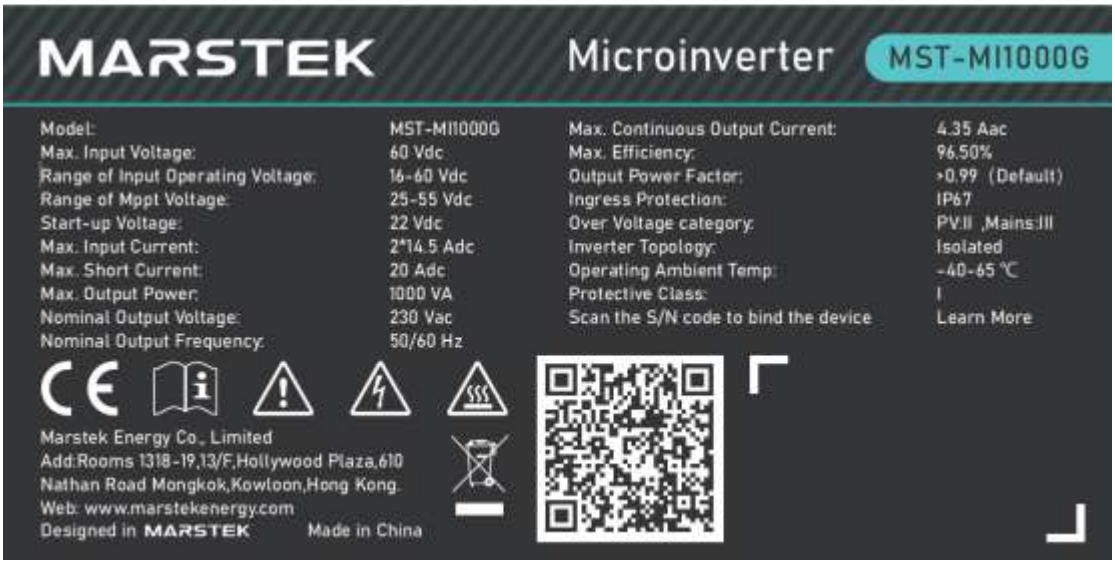
The different operating states can be represented in quadrants I to quadrant IV. The quadrants are named in a counter-clockwise direction.

This Test Report consists of the following documents:

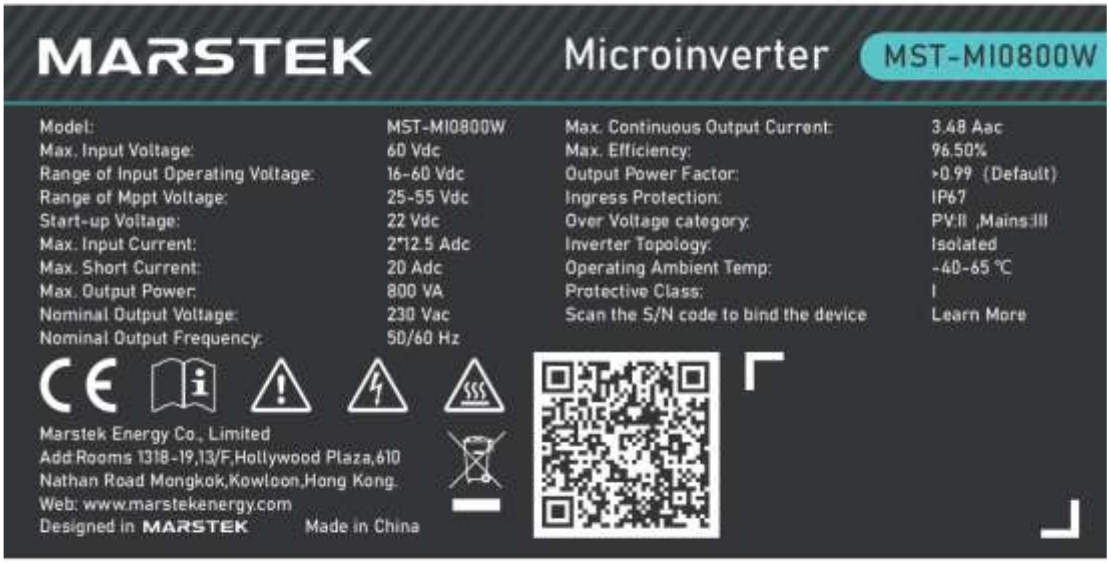
Copy of marking plate








MARSTEK
Microinverter
MST-MI0600W
Model: MST-MI0600W
Max. Input Voltage: 60 Vdc
Range of Input Operating Voltage: 16-60 Vdc
Range of Mppt Voltage: 25-55 Vdc
Start-up Voltage: 22 Vdc
Max. Input Current: 2*10.5 Adc
Max. Short Current: 20 Adc
Max. Output Power: 600 VA
Nominal Output Voltage: 230 Vac
Nominal Output Frequency: 50/60 Hz
Max. Continuous Output Current: 2.61 Aac
Max. Efficiency: 96.50%
Output Power Factor: >0.99 (Default)
Ingress Protection: IP67
Over Voltage category: PV:II ,Mains:III
Inverter Topology: Isolated
Operating Ambient Temp: -40-65 ℃
Protective Class: I
Scan the S/N code to bind the device
Learn More
Marstek Energy Co., Limited
Add:Rooms 1318-19,13/F,Hollywood Plaza,610
Nathan Road Mongkok,Kowloon,Hong Kong.
Web: www.marstekenergy.com
Designed in MARSTEK
Made in China


MARSTEK
Microinverter
MST-MI0800W
Model: MST-MI0800W
Max. Input Voltage: 60 Vdc
Range of Input Operating Voltage: 16-60 Vdc
Range of Mppt Voltage: 25-55 Vdc
Start-up Voltage: 22 Vdc
Max. Input Current: 2*12.5 Adc
Max. Short Current: 20 Adc
Max. Output Power: 800 VA
Nominal Output Voltage: 230 Vac
Nominal Output Frequency: 50/60 Hz
Max. Continuous Output Current: 3.48 Aac
Max. Efficiency: 96.50%
Output Power Factor: >0.99 (Default)
Ingress Protection: IP67
Over Voltage category: PV:II ,Mains:III
Inverter Topology: Isolated
Operating Ambient Temp: -40-65 ℃
Protective Class: I
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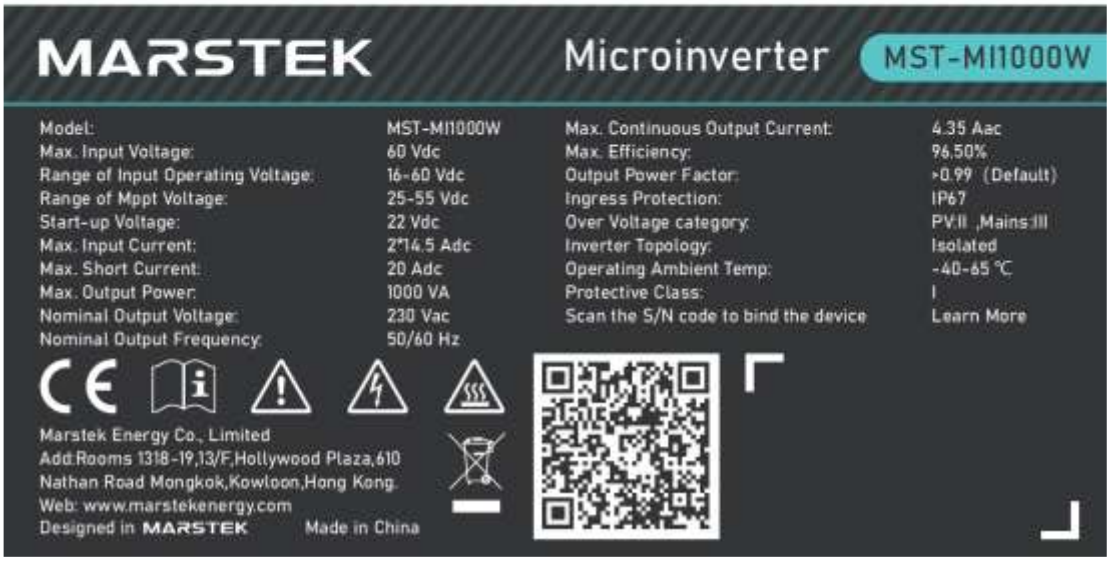
MARSTEK
Microinverter
MST-MI1000W
Model: MST-MI1000W
Max. Input Voltage: 60 Vdc
Range of Input Operating Voltage: 16-60 Vdc
Range of Mppt Voltage: 25-55 Vdc
Start-up Voltage: 22 Vdc
Max. Input Current: 2*14.5 Adc
Max. Short Current: 20 Adc
Max. Output Power: 1000 VA
Nominal Output Voltage: 230 Vac
Nominal Output Frequency: 50/60 Hz
Max. Continuous Output Current: 4.35 Aac
Max. Efficiency: 96.50%
Output Power Factor: >0.99 (Default)
Ingress Protection: IP67
Over Voltage category: PV:II ,Mains:III
Inverter Topology: Isolated
Operating Ambient Temp: -40-65 ℃
Protective Class: I
Scan the S/N code to bind the device
Learn More
Marstek Energy Co., Limited
Add:Rooms 1318-19,13/F,Hollywood Plaza,610
Nathan Road Mongkok,Kowloon,Hong Kong.
Web: www.marstekenergy.com
Designed in MARSTEK
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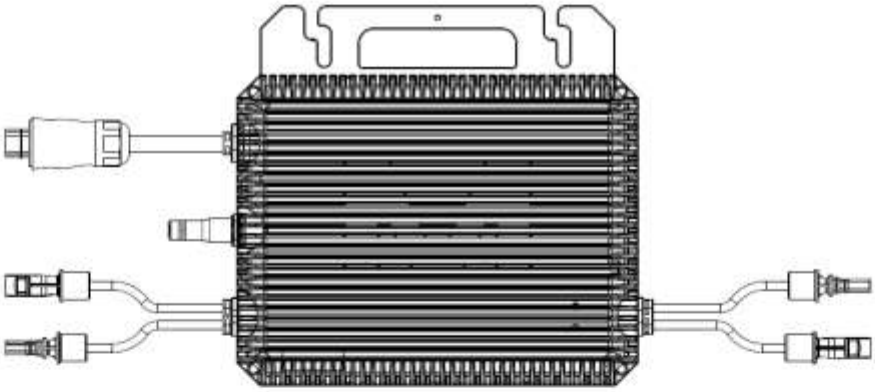
General product information:

USER MANUAL

MARSTEK

MST-MI SERIES SINGLE PHASE MICROINVERTER

MST-MI0600W//MST-MI0800W//MST-MI1000W
MST-MI0600G//MST-MI0800G//MST-MI1000G



JUPITER TECHNOLOGY CO.,LIMITED WWW.MARSTEKENERGY.COM

6. Technical Specifications

Warnings

Before installing a MARSTEK micro inverter system, be sure to note the following:

- Check and ensure that the photovoltaic module and the micro inverter voltage and current specifications are consistent.
- The maximum open circuit voltage of the photovoltaic module must be within the working voltage range of the micro inverter.
- The maximum rated current of MPPT shall not exceed the maximum input current on the DC side of the micro inverter.
- The DC power of the output side of the photovoltaic module shall not exceed 1.35 times the AC power of the output side of the micro inverter.
- For more information, please refer to the "MARSTEK Warranty Terms and Conditions".

6.1 4G Communication version specifications

Specification Type	MST-MI0600G	MST-MI0800G	MST-MI1000G
DC Input			
Max. Input Voltage		60V	
PV Typical Input Power	240W-405W+	320W-540W+	400W-670W+
Range of Input Operating Voltage		16-60V	
Range of Mppt Voltage		25-55V	
Start-up Voltage		22V	
Max. Input Current	10.5A×2	12.5A×2	14.5A×2
Max. Short Current		20A	
Max. inverter backfeed current to the array		0A	
MPPT No.		2	
MPPT Efficiency		99.8%	
AC Output			
Max. Output Power	600W	800W	1000W
Nominal Output Voltage(AC)		230V	
Output Voltage Range		180-275V	
Nominal Output Frequency & Range		50Hz/45~55Hz 60Hz/55~65Hz	
Max. Continuous Output Current(AC)	2.61A	3.48A	4.35A
Max. Overcurrent		10A	
Max.Fault Current		24A	
Current (In rush)		2A	
Max. Efficiency		96.5%	
Output Power Factor		>0.99 (Default)	
THD		<3%	

General Parameter	
Night Power Consumption	<50mW
Ingress Protection	IP67
Over Voltage category	PV:Ⅱ, Mains:Ⅲ
Inverter Topology	Isolated
Operating Ambient Temp.	-40~+65 ℃
Relative humidity	≤95%RH
Cooling Strategy	Natural Convection
Protective Class	Ⅰ
Standard	VDE 4105,IEC/EN 62109-1/-2,IEC/EN 61000-6-1/-2/-3/-4
Supported Communication Interface	4G
Size	565.3mm×251.1mm×37.7mm
Weight	3.85kg
Monitoring Platform	Power Zero
Maintenance	10 Year
Pollution Degree	Outdoor PD:Ⅲ Indoor PD:Ⅱ
Max operation Altitude	2000m

* Note 1: The rated voltage/frequency range can be changed according to the requirements of the local power department.

* Note 2: Please refer to the local electrical code requirements to determine the number of microinverters that can be connected to each road.

6.2 WIFI Communication version specifications

Specification Type	MST-MI0600W	MST-MI0800W	MST-MI1000W
DC Input			
Max. Input Voltage		60V	
PV Typical Input Power	240W-405W+	320W-540W+	400W-670W+
Range of Input Operating Voltage		16-60V	
Range of Mppt Voltage		25-55V	
Start-up Voltage		22V	
Max. Input Current	10.5A×2	12.5A×2	14.5A×2
Max. Short Current		20A	
Max. inverter backfeed current to the array		0A	
MPPT No.		2	
MPPT Efficiency		99.8%	
AC Output			
Max. Output Power	600W	800W	1000W

Nominal Output Voltage(AC)		230V	
Output Voltage Range		180-275V	
Nominal Output Frequency & Range		50Hz/45~55Hz 60Hz/55~65Hz	
Max. Continuous Output Current(AC)	2.61A	3.48A	4.35A
Max. Overcurrent		10A	
Max.Fault Current		24A	
Current (In rush)		2A	
Max. Efficiency		96.5%	
Output Power Factor		>0.99 (Default)	
THD		<3%	
General Parameter			
Night Power Consumption		<50mW	
Ingress Protection		IP67	
Over Voltage category		PV:Ⅱ, Mains:Ⅲ	
Inverter Topology		Isolated	
Operating Ambient Temp.		-40~+65 ℃	
Relative humidity		≤95%RH	
Cooling Strategy		Natural Convection	
Protective Class		Ⅰ	
Standard		VDE 4105,IEC/EN 62109-1/-2,IEC/EN 61000-6-1/-2/-3/-4	
Supported Communication Interface		WIFI	
Size		565.3mm×251.1mm×37.7mm	
Weight		3.85kg	
Monitoring Platform		Power Zero	
Maintenance		10 Year	
Pollution Degree		Outdoor PD:Ⅲ Indoor PD:Ⅱ	
Max operation Altitude		2000m	

* Note 1: The rated voltage/frequency range can be changed according to the requirements of the local power department.

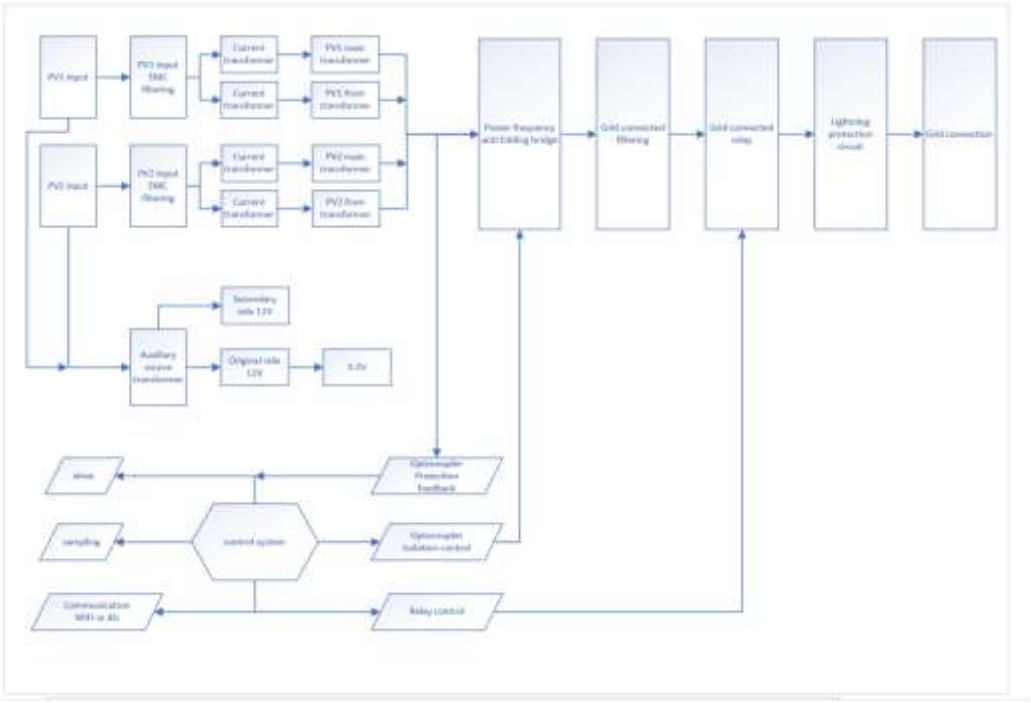
* Note 2: Please refer to the local electrical code requirements to determine the number of microinverters that can be connected to each road.

Block diagram of the utility interactive inverter:

The internal control is redundant built, It consists of master controller(U15) and slave controller(U17), the master controller(U15) can control relays, measures voltage, frequency, AC current with injected DC, insulation resistance and residual current, The slave controller (U17) can control the relays, measures the voltage and frequency, Both controllers communicate with each other,

The voltage and frequency measurement is achieved with resistors in serial which are connected directly to line and neutral, Both controllers get these signals and calculate the data.

The unit provides one dual contact relay in L and N, The relay is tested before each start up, In addition the power bridge can be stopped by both controllers.



Differences of the models in the series:

Description example:

<u>All Identically</u>

The PGUs MST-MI1000W, MST-MI1000G, MST-MI800W, MST-MI800G,

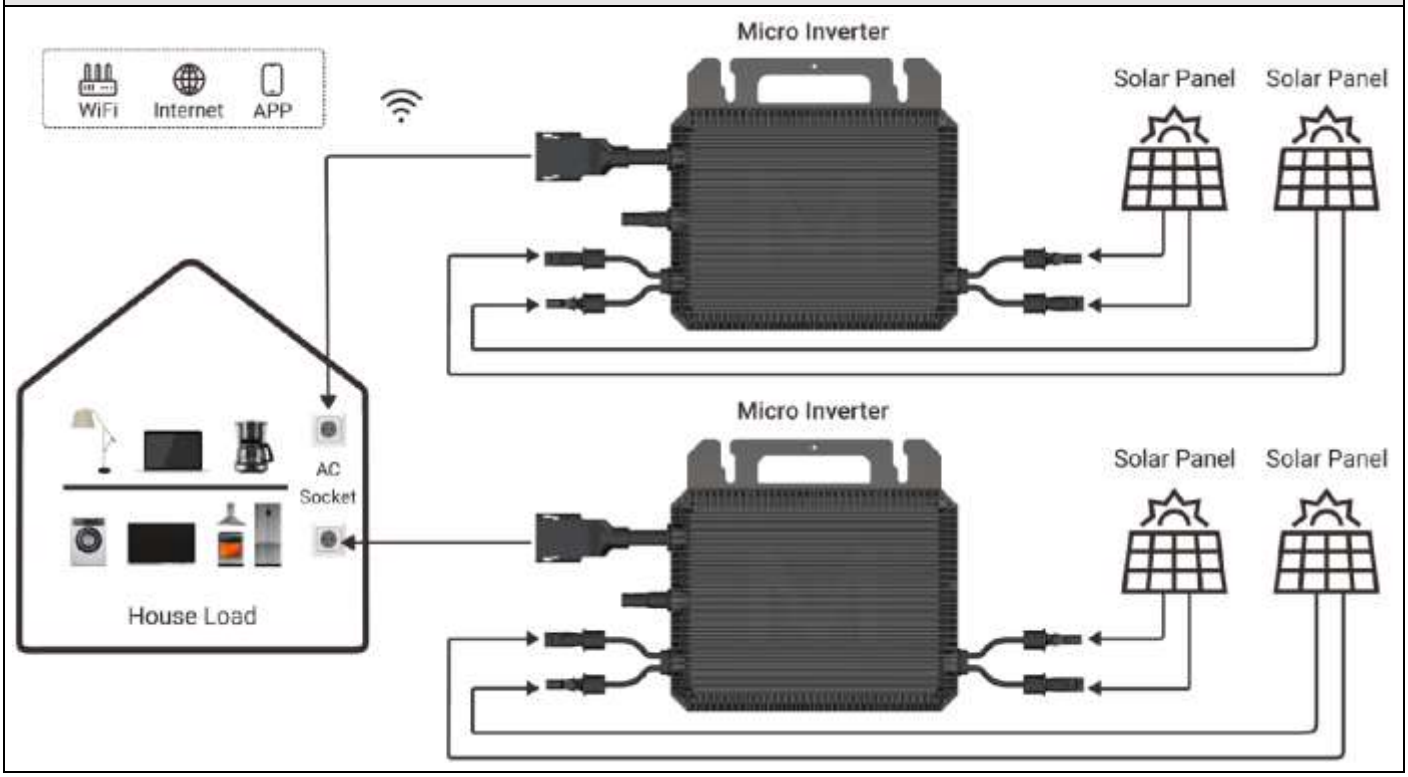
MST-MI600W and MST-MI600G use the same hardware platform,

The PGUs use the same control unit, control system and software,

Therefore testing of the PGU MST-MI1000W is applicable for the PGUs MST-MI1000G, MST-MI800W, MST-MI800G,

MST-MI600W and MST-MI600G.

Description of the remote control in a typical installation:



The product was tested on:
The products with serial number HMMI1000W20241200001, HMMI0800W20241200001 and HMMI0600W20241200001 were tested on. Hardware: V3.0 Software: V1.0.1
Parameters set, country setup in inverter or parameter list in manual used for testing:
Country setup selected at inverter: “AT_400_TOR12_TpA_22 country”.

Test Results

Annex No. 1
Pictures of the unit

Enclosure front

Enclosure back

Enclosure (connectors)

Enclosure top side


Enclosure left side

Enclosure right side

Enclosure open

Annex No. 2
Parameter setup of the EUT

Default Parameter setting Austria

Annex No. 3
Test Equipment list

Testing Location: **Delta Electronics, Inc.**

39 Section 2, Huandong Road,Shanhua District ,Tainan City 74144,Taiwan, R.O.C.

Date(s) of performance test: 2023-11-01 to 2023-12-07

No.	Equipment	Internal No.	Type	Manufacturer	Last Calibration	Due Date
1	ScopeCoder	10014835	DL850	YOKOGAWA	11/Aug/23	10/Aug/24
2	Current probe	10023925	CP8300A	CYBERTEK	11/Aug/23	10/Aug/24
3	Current probe	10027917	CP8300A	CYBERTEK	11/Aug/23	10/Aug/24
4	Current probe	10023926	CP8300A	CYBERTEK	11/Aug/23	10/Aug/24
5	AC power source	10017577	61860	Chroma	11/Aug/23	10/Aug/24
6	Programmable DC source	10013391	62150H-1000S	Chroma	11/Aug/23	10/Aug/24
7	Programmable DC source	10013392	62150H-1000S	Chroma	11/Aug/23	10/Aug/24
8	Programmable DC source	10013418	62150H-1000S	Chroma	11/Aug/23	10/Aug/24
9	Programmable DC source	10014176	62150H-1000S	Chroma	11/Aug/23	10/Aug/24
10	Programmable DC source	10017608	62150H-1000S	Chroma	11/Aug/23	10/Aug/24
11	Programmable DC source	10017948	62150H-1000S	Chroma	11/Aug/23	10/Aug/24
12	Power Analyzer	10024150	WT1806E	YOKOGAWA	11/Aug/23	10/Aug/24
13	Power Analyzer	10027183	WT3000	YOKOGAWA	11/Aug/23	10/Aug/24

End of Test Report