ATTESTATION ◆ ATTESTATO ◆ ATESTACIÓN ◆ BESCHEINIGUNG ◆ ATTESTATION

Product Service

Compliance Document

No. D 126875 0029 Rev. 00

Holder of Certificate: **Atmoce Holding B.V.**
Singel 250
1016 AB Amsterdam
THE NETHERLANDS

Product: **Energy Storage System**

Model(s): **MS-7K-U**

Parameters: See next pages.

Tested according to: PPDS Annex 4:2022

This Compliance document confirms the compliance with the listed standards on a voluntary basis. It refers only to the sample submitted for testing and certification and does not certify the quality or safety of the serial products. For details see: www.tuvsud.com/ps-cert

Test report no.: 704092520331-00

Date, 2025-05-20

(Zhengdong Ma)

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Model	MS-7K-U
Battery Input / Output:	
Nominal Battery Voltage	DC 25.6 V
Battery Voltage range	DC 20.4 V, …, 28.8 V
Max. Battery Continuous Charging Current	DC 235 A
Max. Battery Continuous Discharging Current	DC 270 A
AC parameters (Grid side):	
Input / Output Nominal Voltage	1/N/PE ~ 230 V (single-phase mode) or 3/N/PE ~ 230/400 V (three-phase mode)
AC Max. Output Current (Discharging)	AC 21.74 A@230V (single-phase mode) or AC 7.25 A@230/400V (three-phase mode)
AC Max. Input Current (Charging)	AC 16.3 A@230V (single-phase mode) or AC 5.41 A@230/400V (three-phase mode)
Max. Output Power (Overload)	5 kW
Max. Continuous Output Power	4.5 kW
Max. Continuous Input Power	3.75 kW
Nominal Frequency	50 Hz
Power factor range	-0.8, …, 1, …, +0.8
Number of Phases	1 a.c. or 3 a.c.
Remark: Operating mode at single-phase or three-phase depends on field wiring connection according to user manual	

Power categories of generating plants (generating modules)				
Generating module category	Limit	subcategory	PGS boundaries	Most important requirements
A	800 W	☒ A1	≥800 W ≤11 kW	According to Article 13 for generating module A
		☒ A2	>11 kW <100 kW	According to Article 13 for generating modules A and Articles 14.2, 14.3, 14.4, 14.5 for generating modules B and Article 20 for non-synchronous generating modules of category B
B	1 MW	☐ B1	≥100 kW <1 MW	According to Article 14 for generating modules B and Article 17 for synchronous generating modules B and Article 20 for non-synchronous generating modules of category B
		☐ B2	≥1 MW <30 MW	According to Article 14 for generating modules B and Articles 17 for synchronous generating modules B and Article 15.2, 15.3, 15.4, 15.5a, 15.5b, 15.5c, 15.6a, 15.6b, 15.6c for generating modules C, according to Art. 18 for synchronous generating modules C and according to Article 21 for non-synchronous generating modules of category C
C	50 MW	☐ C	≥30 MW <75 MW	according to Article 15, Article 18 and Article 21
D	75 MW	☐ D	≥75 MW	according to Article 16, Article 19 and Article 22
As requested by manufacturer, requirements of subcategory A1 and A2 is applicable.				

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Evaluated parameter and parameter range

Interface protection system default settings and power controls in inverter (based on EN 50549-1:2019 and PPDS Annex 4:2022)					
Clause(s) / subclause(s) of EN 50549	Ref	Parameter	Typical value range	Type A1 Value default	Type A2 Value default
4.3.2 Interface switch	n.a.	Single fault tolerance for interface switch required	yes | no	yes	
4.4.2 Operating frequency range	A,B	47.0 – 47.5 Hz Duration	0 – 20 s	10 s	
	A,B	47.5 – 48.5 Hz Duration	30 – 90 min	30 min	
	A,B	48.5 – 49.0 Hz Duration	30 – 90 min	90 min	
	A,B	49.0 – 51.0 Hz Duration	not configurable	unlimited	
	A,B	51.0 – 51.5 Hz Duration	30 – 90 min	30 min	
	A,B	51. 5 – 52 Hz Duration	0 – 15 min	1 min	
4.4.3 Minimal requirement for active power delivery at underfrequency	A,B	Reduction threshold	49 Hz – 49.5 Hz	N/A	
	A,B	Maximum reduction rate	2 – 10 % PM/Hz	No reduction	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	not configurable	110%Un	
	n.a.	Lower limit	not configurable	85%Un	
4.5.2 Rate of change of frequency (ROCOF) immunity	A,B	ROCOF withstand capability (defined with a sliding measurement window of 500 ms)	not defined	2 Hz/s	
		non-synchronous generating technology:			
		synchronous generating technology:		N/A	
4.5.3.2 Generating plant with non-synchronous generating technology	B	Maximum power resumption time	not defined	1 s	
	B	Voltage-Time-Diagram	see Figure 6	Time [s]	U [p.u.]
				0.00	0.05
				0.25	0.05
				3.00	0.85
4.5.3.3 Generating plant with synchronous generating technology	B	Maximum power resumption time	not defined	N/A	
	B	Voltage-Time-Diagram	see Figure 7 (N/A)	Time [s]	U [p.u.]
				-	-
				-	-
				-	-
				-	-
				-	-
4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	U [p.u.]
				0.0	1.25
				0.1	1.25
				0.1	1.20
				5.0	1.20
				5.0	1.15
				60.0	1.15
				60.0	1.10
4.6.1 Power response to overfrequency	A,B	Threshold frequency f1	50.2 Hz – 52 Hz	50.2 Hz	
	A,B	Droop	2 % – 12 %	5 %	
	A,B	Power reference	PM | Pmax	Pmax	
	n.a.	Intentional delay	0 – 2 s	0 s	
	n.a.	Deactivation threshold fstop	50.0 Hz – f1	50.05 Hz	
	n.a.	Deactivation time tstop	0 – 600 s	30 s	
	A	Acceptance of staged	yes | no	yes	

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		disconnection			
4.6.2 Power response to storage device at underfrequency	n.a.	Threshold frequency f1	49.8 Hz – 46 Hz	49.8 Hz	
	n.a.	Droop	0.1 – 12 %	5 %	
	n.a.	Power reference	PM | Pmax	Pmax	
	n.a.	Intentional delay	0 – 2 s	2 s	
4.7.2.2 Capabilities	B	Active factor range overexcited	0.9 – 1	1	
	B	Active factor range underexcited	0.9 – 1	1	
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setpoint Q(U) Cos φ fixed Cos φ (U) Cos φ (P)	Q setpoint	
4.7.2.3.2 Setpoint control modes	n.a.	Q setpoint and excitation	0 – 60 % S_{max}	0	
	n.a.	cos φ setpoint and excitation	1 – 0.8	1	
4.7.2.3.3 Voltage related control modes	n.a.	Characteristic curve – Q (U)	-	-	
	n.a.	Point a	50%Un – 100%Un	94 %Un	
	n.a.	Point b	50%Un – 100%Un	97 %Un	
	n.a.	Point c	100%Un – 115%Un	105%Un	
	n.a.	Point d	100%Un – 117%Un	108 %Un	
	n.a.	Min. reactive power	0 – 60 % P_{max} ($Q_{max\ under}$)	43.6 % P_{max}	
	n.a.	Max. reactive power	0 – 60 % P_{max} ($Q_{max\ over}$)	43.6 % P_{max}	
	n.a.	Time constant	3 s – 60 s	20 s	
	n.a.	Min cos φ	0.0 – 1	deactivated	
	n.a.	Lock in power	0 % – 20 %	20 %	
	n.a.	Lock out power	0 % – 20 %	5%	
4.7.2.3.4 Power related control mode	n.a.	Characteristic Curve – Cos φ (P)	--	Indicate default characteristic	
	n.a.	Point a	0 – 100%Pn/ PF: -0.8, …, +0.8	0% Pn/PF=1	
	n.a.	Point b	0 – 100%Pn/ PF: -0.8, …, +0.8	50%Pn/PF=1	
	n.a.	Point c	0 – 100%Pn/ PF: -0.8, …, +0.8	100%Pn/PF=-0.95	
	n.a.	Point d	0 – 100%Pn/ PF: -0.8, …, +0.8	N/A	
	n.a.	Cos φ	-0.8, …, +0.8	0.8	
	n.a.	Time constant	3 s – 60 s	3.33 s	
	n.a.	Lock in voltage	105 %Un	deactivated	
	n.a.	Lock out voltage	100 %Un	deactivated	
4.7.3 Voltage related active power reduction	n.a.	Characteristic curve - P (U)	--	Indicate default characteristic	
	n.a.	Point a	0 – 100%Pn/ U:100-125%Un	100 % / 230 V	
	n.a.	Point b	0 – 100%Pn/ U:100-125%Un	100 % / 250.7 V	
	n.a.	Point c	0 – 100%Pn/ U:100-125%Un	0%/ 255.3 V	
	n.a.	Point d	0 – 100%Pn/ U:100-125%Un	--	
	n.a.	Time constant	3 s – 60 s	3.33 s	
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enable | disable	disable	
	n.a.	Static voltage range overvoltage	100 % Un – 120 % Un	120 %U_n	
	n.a.	Static voltage range undervoltage	20 % Un – 100 % Un	85 %U_n	
4.9.2 Requirements on voltage and frequency protection	n.a.	Threshold for protection as dedicated device [in A or kW, kVA]	16 A – 250 kVA	Interface protection integrated	
	B	Undervoltage threshold stage 1	0.2 Un – 1 Un	0.85 Un	0.7 Un
	B	Undervoltage operate time stage 1	0.1 s – 100 s	1.5 s	2.7 s

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	B	Undervoltage threshold stage 2	0.2 Un – 1 Un	-	0.45 Un
	B	Undervoltage operate time stage 2	0.1 s – 5 s	-	0.2 s
	B	Overvoltage threshold stage 1	1.0 Un – 1.2 Un	1.15 Un	1.15 Un
	B	Overvoltage operate time stage 1	0.1 s – 100 s	1 s	5 s
	B	Overvoltage threshold stage 2	1.0 Un – 1.3 Un	1.20 Un	1.20 Un
	B	Overvoltage operate time stage 2	0.1 s – 5 s	0.1 s	0.1 s
	B	Overvoltage threshold 10 min mean protection	1.0 Un – 1.15 Un	1.10 Un	1.11 Un
	B	Underfrequency threshold stage 1	47.0 Hz– 50.0 Hz	47.50 Hz	47.50 Hz
	B	Underfrequency operate time stage 1	0.1 s – 100 s	0.5 s	0.1 s
	B	Underfrequency threshold stage 2	47.0 Hz – 50.0 Hz	-	-
	B	Underfrequency operate time stage 2	0.1 s – 5 s	-	-
	B	Overfrequency threshold stage 1	50.0 Hz – 52.0 Hz	52 Hz	51.5 Hz
	B	Overfrequency operate time stage 1	0.1 s – 100 s	0.5 s	0.1 s
	B	Overfrequency threshold stage 2	50.0 Hz – 52.0 Hz	-	-
	B	Overfrequency operate time stage 2	0.1 s – 5 s	-	-
4.10.2 Automatic reconnection after tripping	B	Lower frequency	47.0 Hz – 50.0 Hz	47.50 Hz	
	B	Upper frequency	50.0 Hz – 52.0 Hz	50.05 Hz	
	B	Lower voltage	50 % Un – 100 % Un	85%Un	
	B	Upper voltage	100 % Un – 120 % Un	110%Un	
	B	Observation time	10 s – 600 s	300 s	
	B	Active power increase gradient	6 % – 3000 %/min	10% Pn/min	
4.10.3 Starting to generate electrical power	A,B	Lower frequency	47.0 Hz – 50.0 Hz	47.50 Hz	
	A,B	Upper frequency	50.0 Hz – 52.0 Hz	50.05 Hz	
	A,B	Lower voltage	50 % – 100 % Un	85%Un	
	A,B	Upper voltage	100 % – 120 % Un	110%Un	
	A,B	Observation time	10 s – 600 s	300 s	
	A,B	Active power increase gradient	6 % – 3000 %/min	10% Pn/min	
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes | no	Can be achieved by atmozen APP or atmoce cloud, acceptance should be made by the DSO and responsible party	
4.11.2 Reduction of active power on set point	B	Remote operation NOTE: If yes further definition is provided by the DSO	yes | no	Can be achieved by atmozen APP or atmoce cloud, acceptance should be made by the DSO and responsible party	
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes | no	Standardized communication protocol not provided by manufacturer	

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