CERTIFICATE OF COMPLIANCE

Certificate Number	20181030-E210376
Report Reference	E210376-20181108
Issue Date	2018-November-08

Issued to: SMA Solar Technology AG
Sonnenallee 1
34266 Niestetal GERMANY

This is to certify that representative samples of STATIC INVERTERS, CONVERTERS AND ACCESSORIES FOR USE IN INDEPENDENT POWER SYSTEMS - Permanently-connected, utility Interactive, 3-phase inverter.

SMA Solar Technology AG Models STP 33-US-41, STP 50-US-41, STP 62-US-41 inverter, which is intended for DC input from photovoltaic modules.

Listed Accessory for use with inverter model STP 33-US-41, STP 50-US-41, STP 62-US-41: Universal Mounting System UMS-KIT-10

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: See addendum page for standards.

Additional Information: See the UL Online Certifications Directory at www.ul.com/database for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

Look for the UL Certification Mark on the product.

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The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: , may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Standards for Safety:

UL 62109-1 Safety of power converters for use in photovoltaic power systems – Part 1: General requirements

Evaluated to the requirements of the Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741, Second Edition, dated January 28, 2010, with revisions through February 15,2018. Including the requirements in UL 1741 Supplement A, sections as noted in the Technical considerations.

IEEE 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems.

IEEE 1547.1, IEEE Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.

This description covers the SMA Solar Technology AG Models STP 33-US-41, STP 50-US-41, STP 62-US-41 inverters.

USL - Evaluated to the requirements of the Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741,

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Products covered by this certificate provide functionality in compliance with UL 1741Supplement A (SA) when used in a UL Listed end product which has been evaluated by UL for its intended purpose.

Compliance testing was conducted on samples of the products according to the test methods in UL 1741 with compliant results, and product ratings were reviewed for fulfillment of the requirements in the following SRDs:

See also Appendix A for UL 1741Supplement A (SA)

Certified functions. Cross Reference table – UL 1741 SA to SRD	Source Requirement Document(s)	Test Standard(s) and Section (s)	Report Date
ANTI-ISLANDING PROTECTION - UNINTENTIONAL ISLANDING WITH GRID SUPPORT FUNCTIONS ENABLED	Electric Rule No. 21 Hh.1a	UL 1741 SA 8	2018-11-08
LOW/HIGH VOLTAGE RIDETHROUGH	Electric Rule No. 21 Table Hh.1	UL 1741 SA 9	2018-11-08
LOW/HIGH FREQUENCY RIDETHROUGH	Electric Rule No. 21 Table Hh.2	UL 1741 SA10	2018-11-08
RAMP RATES	Electric Rule No. 21 Hh.2k	UL 1741 SA11	2018-11-08
RECONNECT BY "SOFT START"	Electric Rule No. 21 Hh.2k	UL 1741 SA11	2018-11-08
SPECIFIED POWER FACTOR	Electric Rule No. 21 Hh.2i	UL 1741 SA12	2018-11-08
DYNAMIC VOLT/VAR OPERATIONS	Electric Rule No. 21 Hh.2J	UL 1741 SA13	2018-11-08
FREQUENCYWATT	Electric Rule No. 21 Hh.2.l	UL 1741 SA14	2018-11-08
VOLT-WATT	Electric Rule No. 21 Hh.2.m	UL 1741 SA15	2018-11-08

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Testing conducted to the requirements of UL 1741 SA corresponds to the minimum requirements for CA Rule 21, 2015. An enumeration of functions tested, including complete ratings, and available certified settings for the Grid Support functions, are recorded in the appendix to this document. Test data and detailed results of compliance testing are retained in the complete UL Report for this product.

See also Appendix B: Grid Support Utility Interactive Inverter Worksheet

(+)	Grid Support Function	Source Requirement Document(s)	Test Standard(s) and Section(s)	NRTL Certified Date
	LOW/HIGH VOLTAGE RIDE-THROUGH	SRD 14H V1.1: Part II.C. Table 4	UL 1741 SA 9	2018-11-08
	LOW/HIGH FREQUENCY RIDE-THROUGH	SRD 14H V1.1: Part II.D.1 Table 5	UL 1741 SA 10	2018-11-08
	RAMP RATES	SRD 14H V1.1: Part II.G.1	UL 1741 SA 11.2	2018-11-08
	RECONNECT BY "SOFT START"	SRD 14H V1.1: Part II.G.2	UL 1741 SA 11.4	2018-11-08
	SPECIFIED POWER FACTOR	SRD 14H V1.1: Part II.A.1	UL 1741 SA 12	2018-11-08
	DYNAMIC VOLT/VAR OPERATIONS	SRD 14H V1.1: Part II.A.2 Table 2, Figure 2	UL 1741 SA 13	2018-11-08
	FREQUENCY-WATT	SRD 14H V1.1: Part II.F Table 7	UL 1741 SA 14	2018-11-08
	VOLT-WATT	SRD 14H V1.1: Part II.B Table 3, Figure 3	UL 1741 SA 15	2018-11-08
	Anti-Islanding	N/A	UL 1741 SA8	2018-11-08

(+) – Self Certification

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Appendix A

Detailed Testing Summary	Test Standard(s) and Section(s)	Fixed / Adjustable	Pass / Fail
UNINTENTIONAL ISLANDING WITH GRID SUPPORT FUNCTIONS ENABLED	UL 1741 SA 8	Adjustable	Pass
HIGH VOLTAGE RIDE-THROUGH DURATION	UL 1741 SA 9.1	Adjustable	Pass
HIGH VOLTAGE RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA 9.2	Adjustable	Pass
HIGH VOLTAGE MUST TRIP CLEARING TIMES	UL 1741 SA 9.2	Adjustable	Pass
LOW VOLTAGE RIDE-THROUGH DURATION	UL 1741 SA 9.1	Adjustable	Pass
LOW VOLTAGE RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA 9.2	Adjustable	Pass
LOW VOLTAGE MUST TRIP CLEARING TIMES	UL 1741 SA 9.2	Adjustable	Pass
HIGH FREQUENCY RIDE-THROUGH DURATION	UL 1741 SA10.1	Adjustable	Pass
HIGH FREQUENCY RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA10.2	Adjustable	Pass
HIGH FREQUENCY MUST TRIP CLEARING TIMES	UL 1741 SA10.2	Adjustable	Pass
LOW FREQUENCY RIDE-THROUGH DURATION	UL 1741 SA10.1	Adjustable	Pass
LOW FREQUENCY RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA10.2	Adjustable	Pass
LOW FREQUENCY MUST TRIP CLEARING TIMES	UL 1741 SA10.2	Adjustable	Pass
NORMAL RAMP RATE	UL 1741 SA 11.2	Adjustable	Pass
"SOFT START" RAMP RATE	UL 1741 SA 11.4	Adjustable	Pass
SPECIFIED POWER FACTOR	UL 1741 SA 12	Adjustable	Pass
VOLT/VAR MODE (Q(V))	UL 1741 SA 13	Adjustable	Pass
FREQUENCY-WATT (FW)	UL 1741 SA 14	Adjustable	Pass
VOLT-WATT (VW)	UL 1741 SA 15	Adjustable	Pass

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Inverter Firmware Version:		
UL 1998	Date	Version/Revision
Compliant	2018	01.09.03.R

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Inverter Ratings - Output	All models, with individual differences as shown		
Output phase configuration	3/3-(N)-PE		
Nominal (line to line) output voltage V ac	480 /277 WYE		
Operating voltage range V ac	244 – 305		
Line Synchronization Characteristics	Method 2		
Normal out frequency Hz	60		
models	STP 33-US-41	STP 50-US-41	STP 62-US-41
Rated output current (A ac)	40	64	79.5
Rated output power, (kW)	33.3	50	62.5
Max. Branch Circuit overcurrent protection (A ac)	100		
Maximum Air Ambient (°C)	60		

Other ratings:	
Max. output fault current (A) / duration (ms)	440Apeak/26ms
Max. utility backfeed current to PV input (A)	0
Line Synchronization Characteristics / In-rush current	Method 2 / NA
Limits of accuracy of voltage measurement	+/- 2%
Limits of accuracy of frequency measurement	+ /- 0.05 Hz
Manufacturers stated accuracy of time response for voltage trips	< 0.1 s
Manufacturers stated accuracy of time response for frequency trips	<0.1s
*Enclosure Ratings	Type 4X/3SX

INTERCONNECTION INTEGRITY TEST CATEGORIES:	
C62.42.2 Ring Wave Surge Category	B
C62.42.2 Combination Wave Surge Category	B
C37.90.1 RF Immunity - compliance	Yes
C37.90.2 Communication circuit - compliance	Yes

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Magnitude and time Limits - Utility interconnection voltage magnitude limits, Ride Through time limits and trip times:						
Nominal voltage	/ Single/Split phase / Single/Split phase					
UL 1741 SA9:	Magnitudes (% of nominal)		Ride Through (Seconds) (+)		Must Trip (Seconds)	
Boundary designation (++)	Min	Max	Min	Max	Min	Max
HV3	79.42	120.00	1	30	0.1	59
HV2	79.42	120	1	30	0.1	59
HV1	79.42	110	1	30	0.1	60
LV1	37.36	100	1	30	0.1	60
LV2	37.36	100	1	30	0.1	60
LV3	37.36	100	1	30	0.1	60

Magnitude and time Limits - Utility interconnection Frequency magnitude limits, Ride Through time limits and trip times:						
Nominal Frequency	60 Hz					
UL 1741 SA10:	Magnitudes (Frequency)		Ride Through (Seconds) (+)		Must Trip (Seconds)	
Boundary designation	Min	Max	Min	Max	Min	Max
HF3	-	-	-	-	-	-
HF2	50.0	66.0	10	999.0	0.1	1000.0
HF1	50.0	66.0	10	999.0	0.1	1000.0
LF1	44.0	60.0	10	999.0	0.1	1000.0
LF2	44.0	60.0	10	999.0	0.1	1000.0
LF3	-	-	-	-	-	-

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SA11 Ramp Rate test ratings (RR)		
Minimum normal ramp-up rate	0.2	%Irated/SEC
Maximum normal ramp-up rate	20	%Irated/SEC
Minimum soft start ramp-up rate	0.1	%Irated /SEC
Maximum soft start ramp-up rate	20	%Irated /SEC

SA12 SPF Specified Power Factor (INV3)	
Minimum Inductive (Underexcited) Power Factor (<0)	-0.8
Minimum Capacitive (Overexcited) Power Factor (>0)	+0.8

SA13 Volt/Var Mode (VV) extent of curve range settings				
		Qmax Values - Maximums	Qmin Values - Minimums	Units
Reactive power production setting	Q_1	60	15	%VAR
Reactive power absorption setting at the left edge of the deadband	Q_2	0	0	%VAR
Reactive power absorption setting at the right edge of the deadband	Q_3	0	0	%VAR
Reactive power absorption setting	Q_4	-60	-15	%VAR
Functional in the following priority modes: [ ] active power priority [X] reactive power priority (RPP)				

		Maximum	Minimum	Units
The voltage at Q_1	V_1	97.83	92.00	%Vnom
The voltage at Q_2	V_2	100.00	96.00	%Vnom
The voltage at Q_3	V_3	104.00	100.00	%Vnom
The voltage at Q_4	V_4	108.00	102.17	%Vnom

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SA14 Frequency-Watt (FW) extent of curve range settings				
Settings	Frequency		Power level	
Low end of the adjustment range of the start of the curtailment function	F_{start_min}	60.1	100 %	%Watts
High end of the adjustment range of the start of the curtailment function	F_{start_max}	62.0	100 %	%Watts
Low end of the adjustment range of the endpoint of the curtailment function	F_{stop_min}	60.78	0 %	%Watts
High end of the adjustment range of the endpoint of the curtailment function	F_{stop_max}	65.5	0 %	%Watts

SA15 Volt-Watt (VW) extent of curve range settings				
Settings	Volts		Power level	
Low end of the adjustment range of the start of the curtailment function	V_{start_min}	103 %	100%	%Watts
High end of the adjustment range of the start of the curtailment function	V_{start_max}	103 %	100 %	%Watts
Low end of the adjustment range of the endpoint of the curtailment function	V_{stop_min}	106%	0 %	%Watts
High end of the adjustment range of the endpoint of the curtailment function	V_{stop_max}	110 %	0 %	%Watts

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GENERAL		
VALUE	**INFORMATION**	**NOTES**
Manufacturer	SMA Germany	
Model #	STP 33-US-41 STP 50-US-41 STP 62-US-41	List Applicable Model(s)
Firmware version	01.09.03.R or higher	Provide applicable firmware
Certification / Self-Certification	Certified	Choose 1
NRTL Name	Underwriters Laboratories (UL)	
Certificate #	20181108-E210376	
SA Certification Date	2018-Nov. 08	
Responsible Engineer	Travis Bizjak (Review) Sven Engel (Handling)	
Report #	E210376-20181108	

MANUFACTURER's STATED ACCURACY						
VALUE	**UNITS**	**RANGE**	**RATING**			**DESCRIPTION**
Model	unitless	-	STP 33-US-41	STP 50-US-41	STP 62-US-41	Provide MSA for each model represented
Voltage, RMS	Volts	50 % < V ≤ 120 %	2%	2%	2%	
Current, RMS	Amps	100 %	1%	1%	1%	
Frequency	Hz	50 to 66 Hz	0.05 Hz	0.05 Hz	0.05 Hz	
Active Power	Watts	20 % < P ≤ 100 %	5%	5%	5%	
Reactive Power	VAR	20 % < Q ≤ 100 %	5%	5%	5%	
Power Factor	Displacement	20 % < P ≤ 100 %	0.015	0.015	0.015	
Time	s	100 ms to 600 s	0.001 s	0.001 s	0.001 s	

INVERTER DC (INPUT) SIDE				
VALUE	**RATING**		**UNITS**	**DESCRIPTION**
	Min	**Max**		
$V_{DC\text{- rating}}$	150	1000	Volts	DC voltage rating
$V_{MPPT\text{-RANGE}}$	330	800	Volts	Maximum power point track range / 330V for STP 33-US-41 / 500V for STP 50-US-41 / 550V for STP 62-US-41
$I_{DC\ max}$	30		Amps	Max input short-circuit current per MPPT

INVERTER AC (OUTPUT) SIDE					
VALUE	**RATING**			**UNITS**	**DESCRIPTION**
$V_{AC\text{-}NOMINAL(Phase\text{-}neutral)}$	277	277	277	Volts	Nominal Voltage Phase-neutral (if neutral available)
$V_{AC\text{-}NOMINAL(Phase\text{-}phase)}$	**480**	**480**	**480**	Volts	Nominal Voltage Phase-phase
Number of Phases	3	3	3	Number	Number of electrical phases
P_{OUT}	**33.3**	**50**	**62.5**	kW	Rated Power Output
$I_{NOMINAL\text{-}OUTPUT}$	**40**	**64**	**79.5**	Amps	Nominal current per phase
$I_{MAXIMUM\text{-}OUTPUT\ (at\ Vlow)}$	**40**	**64**	**79.5**	Amps	Maximum output current at lowest operating voltage

FIXED POWER FACTOR		**480**		**480**		**480**		**UNITS**	**SRD V1.1 Range**	**SRD V1.1 Compliant?**	**DESCRIPTION**
		Min	**Max**	**Min**	**Max**	**Min**	**Max**				
>15 kW	Underexcited, Inductive, Absorbing	-80	100	-80	100	-80	100	%	-85% to 100%	Y	Capacitive (var injection) power factor to Reactive (var absorption) power factor range. RULE 14H Default PF = -0.95 (Absorbing) for self certification purposes.
	Overexcited, Capacitive, Injecting	100	80	100	80	100	80	%	100% to 85%	Y	
<=15 kW	Underexcited, Inductive, Absorbing	NA	NA	NA	NA	NA	NA	%	-90% to 100%	-	Capacitive (var injection) power factor to Reactive (var absorption) power factor range. RULE 14H Default PF = -0.95 (Absorbing) for self certification purposes.
	Overexcited, Capacitive, Injecting	NA	NA	NA	NA	NA	NA	%	100% to 90%	-	

VOLTAGE RIDE-THROUGH		480		480		480		UNITS	SRD V1.1 Range	SRD V1.1 Compliant?	DESCRIPTION
		Min	Max	Min	Max	Min	Max				
OV2	$I_{RMS\_MAX@VRT(V = 120\%)}$	33.39		48.14		62.68		Amps	-	-	Maximum RMS current when voltage goes above to 120% before trip
	$t_{TRIP (V > 120\%)}$	0.1	59	0.1	59	0.1	59	Sec.	0.16	Y	Trip time
OV1	$I_{RMS\_MAX@VRT(V = 110\%)}$	33.4 - 36.43		48.14 - 54.15		62.68 - 68.37		Amps	-	-	Maximum RMS current when voltage is between 110% and 120% before trip
	$t_{RIDE-THROUGH (110\% < V \leq 120\%)}$	0.1	30	0.1	30	0.1	30	Sec.	0.92	Y	Ride through time
	$t_{TRIP (110\% < V \leq 120\%)}$	0.1	60	0.1	60	0.1	60	Sec.	1	Y	Trip time
Nominal	$I_{RMS\_MAX@(V = 109\%)}$	36.77		54.6		69		Amps	-	-	Maximum RMS current when voltage is 109%
	$I_{RMS@(V = 100\%)}$	40		60.17		75.21		Amps	-	-	RMS current when voltage is 100%
	$I_{RMS\_MIN@(V = 90\%)}$	40		64		79.5		Amps	-	-	Minimum RMS current when voltage is 90%
UV1	$I_{RMS\_MIN@VRT(V = 75\%)}$	40		64		79.5		Amps	-	-	Minimum RMS current when voltage is between 70% and 88% before trip
	$t_{RIDE-THROUGH (70\% \leq V < 88\%)}$	0.1	30	0.1	30	0.1	30	Sec.	20	Y	Ride through time
	$t_{TRIP (70\% \leq V < 88\%)}$	0.1	60	0.1	60	0.1	60	Sec.	21	Y	Trip time
UV2	$I_{RMS\_MIN@VRT(V = 70\%)}$	40		64		79.5		Amps	-	-	Minimum RMS current when voltage is between 50% and 70% before trip
	$t_{RIDE-THROUGH (50\% \leq V < 70\%)}$	0.1	30	0.1	30	0.1	30	Sec.	10-20	Y	Ride through time
	$t_{TRIP (50\% \leq V < 70\%)}$	0.1	60	0.1	60	0.1	60	Sec.	11-21	Y	Trip time
UV3	$I_{RMS\_MIN@VRT(V = 50\%)}$	40		64		79.5		Amps	-	-	Minimum RMS current when voltage is below 50% before trip
	$t_{RIDE-THROUGH (V < 50\%)}$	0.1	30	0.1	30	0.1	30	Sec.	-	-	Ride through time
	$t_{TRIP (V < 50\%)}$	0.1	60	0.1	60	0.1	60	Sec.	2	Y	Trip time

FREQUENCY RIDE-THROUGH		480		480		480		UNITS	SRD V1.1 Range	SRD V1.1 Compliant?	DESCRIPTION
		Min	Max	Min	Max	Min	Max				
OF2	$I_{RMS\_MAX@FRT(f = 64Hz)}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	Maximum RMS current when the frequency is above 64 Hz before trip
	$t_{TRIP (f > 64 Hz)}$	0.1	1000	0.1	1000	0.1	1000	Sec.	0.16	Y	Trip time
OF1	$I_{RMS\_MAX@FRT(63 Hz < f \leq 64Hz)}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	Maximum RMS current when the frequency is between 63 and 64 Hz before trip
	$t_{RIDE-THROUGH (63 Hz< f \leq 64 Hz)}$	0.1	999	0.1	999	0.1	999	Sec.	20	Y	Ride Through Time
	$t_{TRIP (63 Hz < f \leq 64 Hz)}$	0.1	1000	0.1	1000	0.1	1000	Sec.	21	Y	Trip time
Nominal	$I_{RMS\_MAX@ f = 63 Hz}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	Maximum RMS current when the frequency is 63 Hz
	$I_{RMS@ f = 60 Hz}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	RMS current when the frequency is 60 Hz
	$I_{RMS\_MIN@ f = 57 Hz}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	Minimum RMS current when the frequency is 57 Hz
UF1	$I_{RMS\_MIN@FRT(56 Hz \leq f < 57 Hz)}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	Minimum RMS current when the frequency is between 56 and 57 Hz before trip
	$t_{RIDE-THROUGH (56 Hz \leq f < 57 Hz)}$	0.1	999	0.1	999	0.1	999	Sec.	20	Y	Ride Through Time
	$t_{TRIP (56 Hz \leq f < 57 Hz)}$	0.1	1000	0.1	1000	0.1	1000	Sec.	21	Y	Trip time
UF2	$I_{RMS\_MIN@FRT(f < 56 Hz)}$	40.0	40.0	60.17	64.00	75.21	79.5	Amps	-	-	Minimum RMS current when the frequency is below 56 Hz before trip
	$t_{TRIP (f < 56 Hz)}$	0.1	1000	0.1	1000	0.1	1000	Sec.	0.16	Y	Trip time

VOLT-VAR, Q(V)	480		480		480		UNITS	SRD V1.1 Range	SRD V1.1 Compliant?	DESCRIPTION
	Min	Max	Min	Max	Min	Max				
V1, $UV_{Volt\text{-}Var\_MIN}$	70	100	70	100	70	100	% $V_{NOMINAL}$	94	Y	Lowest voltage where Volt-VAr starts at undervoltage
% Q1, $VArs_{@UV\_Volt\text{-}Var\_MIN}$	-100	100	-100	100	-100	100	% Q (Var Injection)	44	Y	VArs at lowest undervoltage Volt-VAR point (-53% for aggregate generating facility >15 kW, -44% for aggregate generating facility <= 15 kW)
V2, $UV_{Volt\text{-}Var\_MAX}$	70	100	70	100	70	100	% $V_{NOMINAL}$	97	Y	Highest voltage where Volt-VAr finish at undervoltage
% Q2, $VArs_{@UV\_Volt\text{-}Var\_MAX}$	-100	100	-100	100	-100	100	% Q (0 VAr)	0	Y	VArs at highest undervoltage Volt-VAR point
V3, $OV_{Volt\text{-}Var\_MIN}$	100	120	100	120	100	120	% $V_{NOMINAL}$	103	Y	Lowest voltage where Volt-VAr starts at overvoltage
% Q3, $VArs_{@OV\_Volt\text{-}Var\_MIN}$	-100	100	-100	100	-100	100	% Q (0 VAr)	0	Y	VArs at lowest overvoltage Volt-VAR point
V4, $OV_{Volt\text{-}Var\_MAX}$	100	120	100	120	100	120	% $V_{NOMINAL}$	106	Y	Highest voltage where Volt-VAr finish at overvoltage
% Q4, $VArs_{@OV\_Volt\text{-}Var\_MAX}$	-100	100	-100	100	-100	100	% Q (Var Absorption)	-44	Y	VVArs at highest overvoltage Volt-VAR point (53% for aggregate generating faility >15 kW, 44% for aggregate generating facility <= 15 kW)
Response Time	0	1000	0	1000	0	1000	Sec.	10	Y	Response time (if non-adjustable range, place default value in MIN)
Power Priortity	reactive		reactive		reactive		Unitless	Reactive	Y	Power Priority

POWER RAMP RATE	480		480		480		UNITS	SRD V1.1 Range	SRD V1.1 Compliant?	DESCRIPTION
	Min	Max	Min	Max	Min	Max				
Connect/Reconnect $RAMP_{RATE}$	0.16	166	0.16	166	0.16	166	% P_{RATED}/sec.	100	Y	Percentage of nominal generated power per second "Ramp Rate"
Soft Start $RAMP_{RATE}$	0.016	166	0.016	166	0.016	166	% P_{RATED}/sec.	0.33	Y	Percentage of nominal generated power per second "Ramp Rate"

VOLT-WATT	480		480		480		UNITS	SRD V1.1 Range	SRD V1.1 Compliant?	DESCRIPTION
	Min	Max	Min	Max	Min	Max				
Power Rate	0	100	0	100	0	100	% P_{PRATED}/V	-25	Y	Percentage of power reduction per volt "Volt-Watt rate"
Start voltage	100	120	100	120	100	120	% Vnom	106	Y	Power reduction starting voltage
Stop voltage	100	120	100	120	100	120	% Vnom	110	Y	Power reduction endpoint voltage
Response Time	0	1000	0	1000	0	1000	Sec.	10	Y	Response tiem (If non-adjustable range, place default value in MIN)
Power Reference	P_{pre}		P_{pre}		P_{pre}		unitless	P_{rated} or $P_{pre\text{-}disturbance}$	Y	Active power output

FREQUENCY-WATT	480		480		480		UNITS	SRD V1.1 Range	SRD V1.1 Compliant?	DESCRIPTION
	Min	Max	Min	Max	Min	Max				
FW_{RATE}	28.6	130	28.6	130	28.6	130	%P_{rated}/Hz	~42	Y	Minimum percentage of power reduction per hertz "frequency-watt rate" (based on kOF = 0.04)
Freq adjustment range at Start frequency	60.01	62	60.01	62	60.01	62	Hz	60.04	Y	Power reduction Starting Frequency (Based on dbOF = 0.036 Hz)
Response Time	3	3	3	3	3	3	Sec.	0,5 - 3	Y	Response tiem (if non-adjustable range, place default value in MIN)
Power Reference	P_{pre}		P_{pre}		P_{pre}		unitless	P_{rated} or $P_{pre\text{-}disturbance}$	Y	Active power output