



**BUREAU
VERITAS**

Certificate of compliance

Applicant: TRUMPF Hüttinger GmbH + Co. KG
Bötzingen Str. 80
79111 Freiburg am Breisgau
Germany

Product: Grid-tied bi-directional battery inverter

Model: TruConvert AC 3025

Inverter for three-phase parallel connection to the public grid. The network monitoring and disconnection device is an integral part of the above-mentioned model.

Applied rules and standards:

EN 50549-1:2019-02, NBN EN 50549-1:2019-02

Requirements for parallel connection of installations with distribution networks - Part 1: Connection to an LV distribution network - Production of installations up to and including Type B

- 4.4 Normal operating range
- 4.5 Immunity to disturbances
- 4.6 Active response to frequency deviation
- 4.7 Power response to voltage variations and voltage changes
- 4.8 EMC and power quality
- 4.9 Interface protection
- 4.10 Connection and starting to generate electrical power
- 4.11 Ceasing and reduction of active power on set point
- 4.12 Remote information exchange
- 4.13 Requirements regarding single fault tolerance of interface protection system and interface switch

C10/11:2019-09

Specific technical requirements for generator in parallel operation with the distribution network

DIN V VDE V 0126-1-1:2006 (4.1 Functional safety)

Automatic disconnection device between a generator and the public low-voltage grid

Commission Regulation (EU) 2016/631 of 14 April 2016

Establishing a network code on requirements for grid connection of generators (NC RFG).
Type approval for generation units to use in Type A and Type B plants.

The safety concept of an aforementioned representative product corresponds at the time of issue of this certificate to the valid safety specifications for the specified use in accordance with regulations.

Report number: 19TH0414-EN50549-1_0 **Certification program:** NSOP-0032-DEU-ZE-V01
Certificate number: U21-0194 **Date of issue:** 2021-02-26

Certification body



Thomas Lammel

Certification body of Bureau Veritas Consumer Products Services Germany GmbH Accredited according to DIN EN ISO/IEC 17065

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Annex to the EN 50549-1 / C10/11 certificate of compliance No. U21-0194

Appendix

Extract from test report according to EN 50549-1 / C10/11

Nr. 19TH0414-EN50549-1_0

Type Approval and declaration of compliance with the requirements of EN 50549-1 / C10/11 and Commission Regulation (EU) 2016/631 of 14 April 2016

Manufacturer / applicant	TRUMPF Hüttinger GmbH + Co. KG Bötzingen Str. 80 79111 Freiburg am Breisgau Germany			
Micro-generator Type	Grid-tied bi-directional battery inverter			
	TruConvert AC 3025	--	--	--
Input DC voltage range [V]	750 .. 950	--	--	--
Input DC current [A]	36 .. 28	--	--	--
Output AC voltage [V]	380 – 480 / N / PE @ 50 / 60 Hz	--	--	--
Output AC current [A]	3 x 38 .. 3 x 31	--	--	--
Firmware version	beginning with AC: V01.22.00			
Measurement period	2020-05-04 - 2021-01-21			
Description of the structure of the power generation unit:	The power generation unit is equipped with a DC and line-side EMC filter. The power generation unit has no galvanic isolation between DC input and AC output.			



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Parameter Table:

Clause EN 50549-1	Ref	Parameter	Micro generator setting range	Default settings used	
4.3.2 Interface switch	n.a.	Single fault tolerance for interface switch	yes no	no	
4.4.2 Operating frequency range	A,B	47,0 – 47,5 Hz Duration	Infinite	20s*	
	A,B	47,5 – 48,5 Hz Duration	Infinite	90 min*	
	A,B	48,5 – 49,0 Hz Duration	Infinite	90 min*	
	A,B	49,0 – 51,0 Hz Duration	Infinite	Infinite*	
	A,B	51,0 – 51,5 Hz Duration	Infinite	90 min*	
	A,B	51, 5 – 52 Hz Duration	Infinite	15 min*	
4.4.3 Minimal requirement for active power delivery at under frequency	A,B	Reduction threshold	Infinite	Infinite*	
	A,B	Maximum reduction rate	N/A	N/A: Electronic inverter no power reduction take place	
4.4.4 Continuous operating voltage range	n.a.	Upper limit	100 – 110%	N/A	
	n.a.	Lower limit	85 – 100%	N/A	
4.5.2 Rate of change of frequency (ROCOF) immunity	A,B	ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology: synchronous generating technology:	not defined	2,5 Hz/s	
4.5.3.2 Generating plant with non-synchronous generating technology (FRT)	B	Maximum power resumption time	not defined	N/A	
	B	Voltage-Time-Diagram	N/A	Time [s]	U [p.u.]
				N/A	N/A
				N/A	N/A
N/A				N/A	
4.5.3.3 Generating plant with synchronous generating technology (FRT)	B	Maximum power resumption time	not defined	N/A	
	B	Voltage-Time-Diagram	see Figure 7, EN 50549-1	Time [s]	U [p.u.]
				N/A	N/A
				N/A	N/A
				N/A	N/A
				N/A	N/A
N/A	N/A				



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4.5.4 Over-voltage ride through (OVRT)	n.a.	Voltage-Time-Diagram	not configurable	Time [s]	U [p.u.]	
				N/A	N/A	
				N/A	N/A	
				N/A	N/A	
				N/A	N/A	
				N/A	N/A	
				N/A	N/A	
4.6.1 Power response to over frequency (LFSM-O)	A,B	Threshold frequency f_1	50,2 Hz – 52 Hz	50,2 Hz		
	A,B	Droop	2 % – 12 %	5 %		
	A,B	Power reference	P_M P_{max}	P_M		
	n.a.	Intentional delay	0 – 2 s	0 s		
	n.a.	Deactivation threshold f_{stop}	50,0 Hz – 52Hz	deactivated		
	n.a.	Deactivation time t_{stop}	0 – 600 s	0s		
	A	Acceptance of staged disconnection	not configurable	No		
4.6.2 Power response to under frequency	n.a.	Threshold frequency f_1	49,8 Hz – 45 Hz	N/A		
	n.a.	Droop	2 – 12 %	N/A		
	n.a.	Power reference	P_M P_{max}	N/A		
	n.a.	Intentional delay	0 – 2 s	N/A		
4.7.2.2 Capabilities	B	Active factor range overexcited	0 – 1	0,9		
	B	Active factor range underexcited	0 – 1	0,9		
4.7.2.3 Control modes	n.a.	Enabled control mode	Q setp. Q(U) cos φ setp. cos φ (P)	All can be set!		
4.7.2.3.2 Set point control modes	n.a.	Q setpoint and excitation	0 – 48 % P_D	0		
	n.a.	cos φ setpoint and excitation	1 – 0,9	1		
4.7.2.3.3 Voltage related control modes	n.a.	Characteristic curve	Q(U) P(U)	-		
	n.a.	Characteristic curve see Figure 16, EN 50549-1		Min	Max	
			Q1	0,85	0,95	0,93 p.u.
			Q2	0,95	0,99	0,97 p.u.
			Q3	1,01	1,05	1,03 p.u.
			Q4	1,05	1,10	1,07 p.u.
		Reactive power @ Q2 and Q3		0	1	0
		Reactive power @ Q2 and Q3		0	1	0,436
	n.a.	Time constant	1* τ : 1s-30s	1* τ = 3,3 s		
	n.a.	Min cos φ	0 – 1	0,9		
n.a.	Lock in power	0 % – 100%	deactivated			
n.a.	Lock out power	0 % – 100%	deactivated			



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4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	P/Smax	cos(Phi)	-	-
			0 - 1	0 - 1	-	-
4.7.2.3.4 Power related control mode	n.a.	Characteristic curve	cos φ (P)		-	
4.7.4.2.2 Zero current mode for converter connected generating technology	n.a.	Enabling	enable disable		disabled	
	n.a.	Static voltage range overvoltage	>115 % U _n		N/A	
	n.a.	Static voltage range undervoltage	<85 % U _n		N/A	
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		N/A*	
	B	Undervoltage threshold stage 1	0,2 U _n – 1 U _n		N/A*	
	B	Undervoltage operate time stage 1	0,1 s – 100 s		N/A*	
	B	Undervoltage threshold stage 2	0,2 U _n – 1 U _n		N/A*	
	B	Undervoltage operate time stage 2	0,1 s – 5 s		N/A*	
	B	Overvoltage threshold stage 1	1,0 U _n – 1,2 U _n		N/A*	
	B	Overvoltage operate time stage 1	0,1 s – 100 s		N/A*	
	B	Overvoltage threshold stage 2	1,0 U _n – 1,3 U _n		N/A*	
	B	Overvoltage operate time stage 2	0,1 s – 5 s		N/A*	
	B	Overvoltage threshold 10 min mean protection ^a	1,0 U _n – 1,15 U _n		N/A*	
	B	Overvoltage operate time 10 min mean protection ^a	0 – 3 s		N/A*	
	B	Underfrequency threshold stage 1	47,0 Hz – 50,0 Hz		N/A*	
	B	Underfrequency operate time stage 1	0,1 s – 100 s		N/A*	
	B	Underfrequency threshold stage 2	47,0 Hz – 50,0 Hz		N/A*	
	B	Underfrequency operate time stage 2	0,1 s – 5 s		N/A*	
	B	Overfrequency threshold stage 1	50,0 Hz – 52,0 Hz		N/A*	
	B	Overfrequency operate time stage 1	0,1 s – 100 s		N/A*	
	B	Overfrequency threshold stage 2	50,0 Hz – 52,0 Hz		N/A*	
	B	Overfrequency operate time stage 2	0,1 s – 5 s		N/A*	
B	Loss of mains according EN 62116 (LoM)	0-6000s		2 s*		
4.10.2 Automatic reconnection after tripping	B	Lower frequency	47,0 Hz – 50,0 Hz		N/A*	
	B	Upper frequency	50,0 Hz – 52,0 Hz		N/A*	
	B	Lower voltage	50 % U _n – 100 % U _n		N/A*	
	B	Upper voltage	100 % U _n – 120 % U _n		N/A*	
	B	Observation time	10 s – 600 s		N/A*	
	B	Active power increase gradient	6 % – 3000 %/min		10 % /min*	



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4.10.3 Starting to generate electrical power	A,B	Lower frequency	47,0 Hz – 50,0 Hz	N/A*
	A,B	Upper frequency	50,0 Hz – 52,0 Hz	N/A*
	A,B	Lower voltage	50 % – 100 % U _n	N/A*
	A,B	Upper voltage	100 % – 120 % U _n	N/A*
	A,B	Observation time	10 s – 600 s	N/A*
	A,B	Active power increase gradient	6 % – 3000 %/min	Disabled*
4.11.1 Ceasing active power	A,B	Remote operation of the logic interface	yes no	No
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	No
4.12 Remote information exchange	B	Remote information exchange required NOTE: If yes further definition is provided by the DSO	yes no	No

Note:

* Configurable with External protection device

^a Over voltage – stage1: 10 min-mean-value corresponding to EN 50160.

The settings of the interface protection are password protected adjustable in the stated range above.

In case the above stated generators are used with an external protection device, the protection settings of the inverters are to be adjusted according to the manufacturer's declaration.

The above stated generators are tested according to the requirements in the EN 50549-1:2019 / C10/11:2019 and Commission Regulation (EU) 2016/631 of 14 April 2016. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements.