

Product Certificate Number	21133-CER
Applicant	<p>NCLAVE Renewable S.L.U Av. de Burgos 114, 2º. 28050. Madrid, Spain</p> <p>Trina Solar Co. Ltd. No. 2 Tianhe Road, Trina PV Industrial Park, New District Changzhou, Jiangsu. China. 213031.</p>
Model	VANGUARD
Type of unit	Horizontal single axis tracker
Technical Data	See page 2 and 3
Standard	IEC 62817:2014+A1:2017 Photovoltaic system – Design qualification of solar trackers
<p>Having assessed the report number: 20827-TR performed by Certification Entity for Renewable Energies and test report number 70.407.21.055.01-00 performed by TÜV SÜD Certification and Testing (China) Co., Ltd. based on the requirements of the ISO/IEC 17025:2017.</p> <p>The above-mentioned solar tracker complies with the requirements of the:</p> <p>IEC 62817:2014+A1:2017 Photovoltaic system – Design qualification of solar trackers</p> <p>This certification is according the CERE internal process PET-CERE-09 Rev 31 based on the requirements of the EN ISO/IEC 17065:2012. For this certification process the conformity assessment activities were based on:</p> <ul style="list-style-type: none"> • Audit of quality system according ISO 9001 with certificate number: ES105154-1 issued by a certification body accredited according EN ISO/IEC 17021. • Inspection of the manufacturing process. <p>This certificate cancels and supersedes the certificate number 20827-CER-E1 issue on May 21, 2021.</p>	
<p>Madrid, August 23, 2021. This certificate is valid until October 21, 2023</p> <p style="text-align: right;">Miguel Martinez Certification Manager</p>	

Characteristics table

Characteristic	Data	
Manufacturer	NCLAVE Manufacturing S.L.U	
License holder	NCLAVE RENEWABLE S.L.U / Trina Solar Co. Ltd.	
Model Number	VANGUARD	
Type of Tracker	HSAT horizontal single axis tracker	
Payload characteristics		
Minimum/maximum mass supported	Until 3200 kg per line	
Payload center of mass restrictions	Without restrictions	
Maximum payload surface area	300 m2/per line	
Nominal payload surface area	240 m2/per line	
Maximum dynamic torques allowed while moving	22,5 kN m per actuator	
Maximum static torques allowed while in stow position	83 kN m per actuator	
Installation Characteristics		
Allowable foundation	Direct ram / micropyle	
Foundation tolerance in primary axis	Axial: $\pm 3^\circ$ N-S Lateral: $\pm 1,5^\circ$ E-W or $\pm 1,25$ cm between base end and top end Spin: $\pm 5^\circ$ Height: ± 30 mm	
Foundation tolerance in secondary axis	+ - 3° N-S	
Installation effort	910 h/MW – 214 h/MW	
Electrical characteristics		
Tracker control unit (model/manufacturer)	SL-SPT-ZB-PV self-powered TCU	SL-TCU single line
	P4Q Electronics	
Includes backup power	Yes	No
Daily energy consumption	412,10 Wh/day	373,79 VAh/day
Stow energy consumption	10,14 Wh/day	16,52 VAh/day
Input power requirements	26...46 Vdc	230 Vac
Effective (and apparent) peak power consumption tracking	59,71 W	42,87 VA
Effective (and apparent) peak power consumption non-tracking	21,92 W	15,14 VA
Effective (and apparent) peak power consumption stow positioning	43,13 W	91,45 VA
Electrical characteristics (H5-C)		
Tracker control unit (model/manufacturer)	H5-C Sistemas Digitales de Control 2002	
Includes backup power	Yes	
Daily energy consumption	139,32 Wh/day	
Stow energy consumption	13,67 Wh/day	
Input power requirements	25...50 Vdc	

Effective (and apparent) peak power consumption tracking	48,11 W		
Effective (and apparent) peak power consumption non-tracking	4,00 W		
Effective (and apparent) peak power consumption stow positioning	61,10 W		
Tracker control unit (model/manufacture)	TCU01-A	TCU01-B	TCU01-C
	Trina Solar Co. LTD.		
Includes backup power	YES	YES	NO
Daily energy consumption*	62,50 Wh (32,74 Wh for 12h tracking) (29,76 Wh for 12h non-tracking)		
Stow energy consumption*	10,10Wh		
Input power requirements	250-1500 Vdc	32-55 Vdc	180-264Vac
*The consumptions were measured only in the sample TCU01-A			
Tracking accuracy			
Accuracy, typical (low wind)	0,37		
Accuracy, 95 th percentile (low wind)	0,94		
Accuracy, typical (high wind)	0,41		
Accuracy, 95 th percentile (high wind)	1,03		
Control characteristics			
Control algorithm	Hybrid with backtracking		
Control interface	Human-machine interface and remote interface		
External communication interface	ModBus (RS-485, Ethernet, Zigbee, Lora, Optical fiber)		
Emergency stow provided	YES		
Stow time	5 minutes and 30 seconds		
Clock accuracy	Maximum deviation of 2 minutes per month, synchronized every day by communications		
Hard limit switches	Limit of angle by overcurrent		
Mechanical design			
Actuation type	Distributed		
Drive type	Electric drive		
Actuators	AHM3S / AHM2S AC 0,18 kW / DC 0,15 kW PA11 / PA13 / PA14 / PA15 26Vdc / 6,0A (max)		
Range of motion, primary axis	-55° to +55°		
Environmental conditions			
Maximum allowable wind speed during tracking	15 m/s		
Maximum allowable wind speed in stow	30 m/s		
Temperature operational range	-30°C to +60°C		
Temperature survival range	-40°C to +60°C		
Snow rating	< 20 cm		
Maintenance and Reliability			
Maintenance schedule	attached in manual		

The inspection of manufacturing process was performed in:
On August 05, 2021.

NCLAVE Manufacturing S.L.U
Pol. Ind. La Peña Crta. NA 134. Km-93
31230. Viana, Navarra. Spain

Inspection Report Number:

11461-21-1-IF

RECORD OF CHANGES

Revision	Modification / Changes	Date
0	Initial version / update certificate 20827-CER-E1	23/08/2021

