Type Certificate

Applicant: **Zucchetti Centro Sistemi SpA**

Address: Via Lungarno 305/A
52028 Terranuova Bracciolini (AR)
Italy

Type of power generating unit:	**Grid-tied photovoltaic inverter**	**AZZURRO 3PH 50000TL-V1**	**AZZURRO 3PH 60000TL-V1**	**AZZURRO 3PH 70000TL-V1**
Technical data:	Nominal active output power:	50 kW	60 kW	70 kW
	Max. apparent power:	50 kVA	60 kVA	75 kVA
	Nominal output AC voltage:	400 V (3~ + N + PE)		480 V (3~ + PE)
	Nominal frequency:	50 Hz		
Technical data determined by measurements:	Max. active power P_{Emax} / Max. active power peak P_{600} [1]:	--- [1]	60,00 kW	70,07 kW
Software version:	**V2.00** or higher			

Validated type model:	Model file:	ZCS_21-0003_0_TR4_AZZURRO 3PH 50000-70000TL-V1_V1.zip
	Identification number (MD5):	af6e7dfb7054ab26eab142938a263333

Grid connection regulation: **VDE-AR-N 4110:2018-11** – Technical requirements for the connection and operation of customer installations to the medium voltage network (TCR medium voltage) [1]

Pertinent standards / Guidelines: Technical guidelines:
FGW TR 3 Rev. 25 [3], FGW TR 4 Rev. 09 [4], FGW TR 8 Rev. 09 [5]

The power generating units, stated in the certificate, were tested and certified according to the technical guidelines referenced to the grid connection regulation. The electrical characteristics fulfil the requirements of the grid connection regulation:

- Quasi-steady-state operation
- Dynamic network stability (reactive current characteristic according to TCR medium voltage)
- Active power output and network security management
- Active power adjustment as a function of the grid frequency
- Protection technology and protection settings on generating unit level
- Power quality

The manufacturer has provided proof of certification of the quality management system of his production facility in accordance with ISO 9001

Restrictions, deviations or notes on usage: see *Supplement of Certificate* on p.2.
[1] For details see *Supplement of Certificate* on p.2.

The certificate includes the following information:

- technical data of the power generating unit, the auxiliary equipment used and the software version used;
- schematic structure of the power generating units;
- summarized information on the properties of the power generating unit.

The certificate is comprised of 78 pages (including Annex of 76 pages).

BV project number : **19TH0183**
Certificate no. : **21-0003_0** **Certification scheme** : **NSOP-0032-DEU-ZE-V01**
Issued : **2021-03-18** **Valid until** : **2026-01-11**

Certification body

Holger Schaffer

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

Supplement of Certificate (21-0003_0)

Note:

1) The P_{Emax} is *the highest 10-min mean of the active power of a power generating unit* defined according to VDE-AR-N 4110:2018 [1]. The P_{600} is *the maximum active power peak of the overall system (averaging period 10 min)* defined according to FGW TR 3 Rev. 25 [3].

The stated values on the front page of this certificate were determined according to test 4.1.1, FGW TR 3 Rev. 25 [3].

The active power results of the *AZZURRO 3PH 60000TL-V1* can be applied to the *AZZURRO 3PH 50000TL-V1* scaled (by the factor $P_{n,\ AZZURRO\ 3PH\ 50000TL\text{-}V1}$ / $P_{n,\ AZZURRO\ 3PH\ 60000TL\text{-}V1}$ = 0,833).

Restrictions, deviations or notes on usage:

- The PGUs in the series do not provide test terminals for on-site testing. For necessary on-site testing, a separate test terminal must be installed additionally.
- The on the PGU level implemented Q(U) control function deviates from requirements according to VDE-AR-N 4110:2018-11. This needs to be considered for project planning. If needed, this has to be implemented on the plant level e.g. in the superimposed PGS controller.
- The PGUs in the series provide only one kind of Q(U) control function. The on the PGU level implanted Q(U) control function can be used as *reactive power with voltage limitation function* by suitable setting of the characteristic curve. But this also deviates from requirements according to VDE-AR-N 4110:2018-11. This needs to be considered for project planning. If needed, this has to be implemented on the plant level e.g. in the superimposed PGS controller.
- No Q(P) control function implemented on the unit level. Instead, the cosφ(P) control function implemented in the software. This needs to be considered for project planning. If needed, this has to be implemented on the plant level e.g. in the superimposed PGS controller.
- The minimum setting step size of the displacement factor cosφ implemented on the PGU level is 0,01, to fulfil the requirement and if needed this has to be implemented on the plant level e.g. in the superimposed PGS controller.
- The default configuration of the units may not meet the reactive power requirement at the grid connection point (see p.44). A permanent active power reduction may be needed. This needs to be considered for project planning.
- The setting range of the stabilisation time of the automatic reconnection does not meet the requirement (adjustable between 0 and 600 s). If needed, this has to be implemented on PGS level via an external interface protection relay.
- In addition to the PGU integrated protection function a fault ride-through tripping curve function is implemented additionally in the software. This function defines a curve exceeding which the unit disconnects from the grid. This needs to be considered for parameterization of the protection relay. The defined self-protection setting of the PGU needs to be considered for parameterization of the protection relay.
- Note to simulation model:
  - The reactive power control functions implemented on the simulation model were not validated directly.
  - The active power control implemented in the simulation model is suitable for application of set point accuracy. The active power gradient is not implemented in the simulation model.
  - An apparent power /current limitation is not implemented in the model. The PQ characteristic curve of the model is not validated.

  These need to be considered on the project level.

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