SLOVENSKI STANDARD
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Predstavitev tehničnih podatkov in napisne ploščice za fotonapetostne razsmernike

Data sheet and name plate for photovoltaic inverters

Datenblatt und Typschildangaben von Photovoltaik-Wechselrichtern

Fiche technique et plaque d'identification pour les onduleurs photovoltaïques

Ta slovenski standard je istoveten z: EN 50524:2009

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27.160	Sončna energija	Solar energy engineering

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Data sheet and name plate for photovoltaic inverters

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Datenblatt- und Typschildangaben von Photovoltaik-Wechselrichtern

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 82, Solar photovoltaic energy systems.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50524 on 2009-06-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2010-06-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2012-06-01

Contents

1 Scope

This European Standard describes data sheet and name plate information for photovoltaic inverters in grid parallel operation.

The intent of this document is to provide minimum information required to configure a safe and optimal system with photovoltaic inverters.

In this context, data sheet information is a technical description separate from the photovoltaic inverter. The name plate is a sign of durable construction at or in the photovoltaic inverter. The name plate may be inside the photovoltaic inverter only if the name plate is visible once a door is opened in normal use.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 60529, *Degrees of protection provided by enclosures (IP Code)* (IEC 60529)

EN 60664-1, *Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests* (IEC 60664-1)

EN 61683, *Photovoltaic systems - Power conditioners - Procedure for measuring efficiency* (IEC 61683)

EN 62109-1 [1], *Safety of power converters for use in photovoltaic power systems - Part 1: General requirements* (IEC 62109-1[1])

IEC 60721-2-1, *Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity*

IEC 62103, *Electronics equipment for use in power installations*

3 Terms and definitions

3.1 Input side (PV - Generator)

3.1.1
maximum input voltage (V_{dcmax})
allowed maximum voltage at the inverter input

3.1.2
minimum input voltage (V_{dcmin})
minimum input voltage for the inverter to energize the utility grid, independent of mode of operation

3.1.3
start-up input voltage ($V_{dcstart}$)
input voltage at which the inverter starts energizing the utility grid

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[1] At draft stage.

3.1.4
rated input voltage ($V_{dc,r}$)
input voltage specified by the manufacturer, to which other data sheet information refers

3.1.5
maximum MPP voltage (V_{mppmax})
maximum voltage at which the inverter can deliver its rated power

3.1.6
minimum MPP voltage (V_{mppmin})
minimum voltage at which the inverter can deliver its rated power

3.1.7
maximum input current (I_{dcmax})
maximum current at which the inverter can operate. If the inverter has multiple MPP inputs, I_{dcmax} is related to each single input

3.2 Output side (Grid connection)

3.2.1
maximum grid voltage (V_{acmax})
maximum voltage at which the inverter can energize the grid

3.2.2
minimum grid voltage (V_{acmin})
minimum voltage at which the inverter can energize the grid

3.2.3
rated grid voltage ($V_{ac,r}$)
utility grid voltage to which other data sheet information refers

3.2.4
maximum output current (I_{acmax})
maximum output current that the inverter can deliver

3.2.5
rated power ($P_{ac,r}$)
the active power the inverter can deliver in continuous operation

3.2.6
rated frequency (f_r)
utility grid frequency at which the inverter performs as specified

3.2.7
maximum frequency (f_{max})
maximum frequency at which the inverter can energize the grid

3.2.8
minimum frequency (f_{min})
minimum frequency at which the inverter can energize the grid

3.2.9
night-time power loss
power loss of the inverter, which is supplied from the public grid, when no solar generator power is present

3.2.10
cosphi
power factor at rated power $P_{ac,r}$

4 Data sheet information

4.1 General

Technical products are usually brought into the market with a documentation providing information to the user regarding the operating conditions and its intended purpose. A data sheet specifies a product to the extent that the contained data could be consulted for planning or dimensioning. The size and organization of the data sheet are left to the manufacturer. It is however recommendable to be limited to a double-side printed on DIN-A4 sheet whereby a topic-specific separation is favourable.

4.2 Short description

In short the characteristics of the inverter are to be described. Special characteristics of the inverters can be mentioned. For better identification of the equipment, its photo or its true design drawing should be included on the data sheet. The internal design of the inverter should be represented in clear way (e.g. by means of a block diagram).

4.3 Conformity

The conformity to relevant norms and standards must be shown in the data sheet.

4.4 Electrical parameters

The electrical parameters from 4.4.1 to 4.4.2 are to be regarded as minimum requirement for a professional system integration of an inverter.

4.4.1 The following parameters of the input side must be indicated:

V_{dcmax}, V_{dcmin}, $V_{dcstart}$ [2], $V_{dc,r}$, V_{mppmax}, V_{mppmin}, I_{dcmax}, number of independent MPP inputs (if applicable).

NOTE 1 The maximum voltage of the connected solar generator is to be determined in individual cases from the planner. The maximum input voltage of the inverter may not be exceeded at any time.

NOTE 2 The specification of maximum and minimum MPP voltage can also be indicated as ranges.

4.4.2 The following parameters of the output side must be indicated:

V_{acmax}, V_{acmin}, $V_{ac,r}$, I_{acmax}, $P_{ac,r}$, f_r, f_{min}, f_{max}, $cosphi_{ac,r}$.

Additionally the number of phases to be connected at the output and the number of phases fed in have to be noted.

NOTE The specification of the maximum and minimum output voltages and frequencies can also always be specified in each case as ranges If only one value is given, the default status at delivery has to be used.

4.5 Characterisation of the operating performance

4.5.1 The indication of the rated power ($P_{ac,r}$) refers to the respective rated values of the connected grid (e.g. 230 V/50 Hz). The rated power is given at the rated input voltage and the ambient temperature of (25 ± 3) °C.

NOTE In addition of this, the ability of the inverter, to supply the rated power even at higher ambient temperatures can be started together with the time the inverter can supply this power (e.g. 2 h or unlimited).

[2] The indication of the start-up input voltage is necessary only if the input voltage is used as switching on criterion for the inverter.

4.5.2 Night-time power loss is to be specified.

4.5.3 The operating efficiency has to be specified at least for the three input voltages (V_{mppmax}, $V_{dc,r}$ and V_{mppmin}) in tabular form. A graphical representation is optional (example: Figure 1). In all cases the efficiency is referred to the standardized power output ($P_{ac}/P_{ac,r}$).

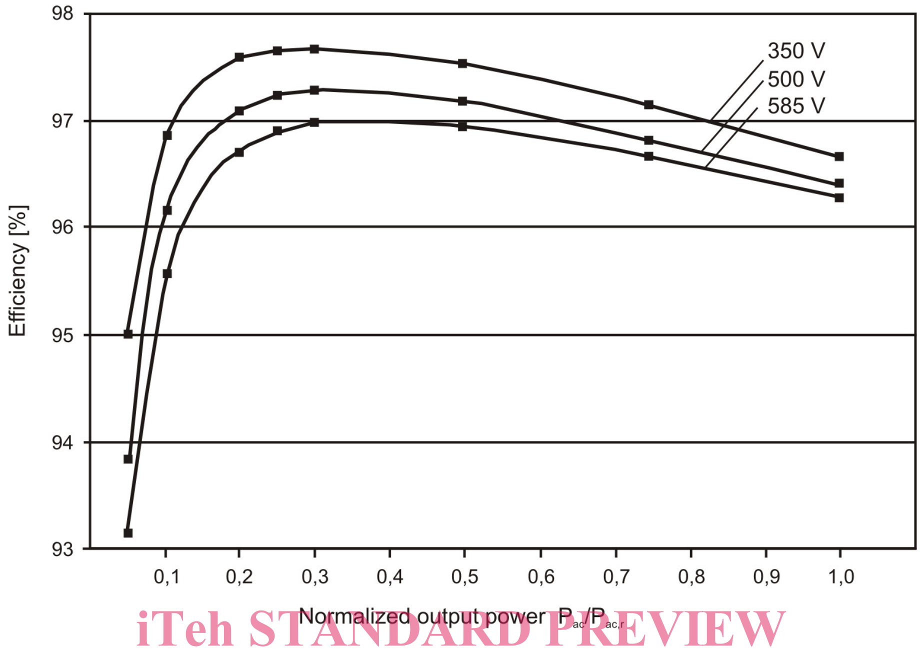

Figure 1 – Representation of the inverter efficiency

P_{ac} is output power at percentaged rated power (5 %, 10 %, 20 %, 25 %, 30 %, 50 %, 75 %, 100 %). As supplement to the EN 61683 additionally the value must be given at 20 % and 30 % of the rated power.

4.5.4 The computation of the European efficiency (weighted efficiency) η_{EU} is taken as the partial load efficiencies as indicated by (1) and the full load efficiency are weighted after the frequency of their occurrence.

$$\eta_{EU} = (0{,}03 \times \eta_{5\%}) + (0{,}06 \times \eta_{10\%}) + (0{,}13 \times \eta_{20\%}) + (0{,}1 \times \eta_{30\%}) + (0{,}48 \times \eta_{50\%}) + (0{,}2 \times \eta_{100\%}) \quad (1)$$

The partial efficiencies are to be determined at the rated input voltage of the inverter.

NOTE A standard on the efficiency is in consultation and will replace the definition of the η_{EU} given in this European Standard.

4.5.5 For the purpose of self-protection routines can be implemented into the inverter, which prevent a damage (current – power – temperature derating). Any self protection routine that causes derating must be described in tabular or graphical form over the entire permitted operation range (see example in Figure 2).